SERVICE DATA

TRIMMER/BRUSHCUTTER

ECHO: RM-410ES

ECHO: SRM-410ES

(Serial number : 36000001 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, illustrations and directions in this SERVICE DATA are based on the latest product information available at the time of publication.
ECHO SERVICE MANUAL Ord. 402-25 (Model : SRM-4000, RM-4000) contains lots of information for servicing this model.

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Reference No. **10-43H-00**
ISSUED: 201002

1 SERVICE INFORMATION

1-1 Specifications

Model			SRM-410ES(L)	SRM-410ES(U)	RM-410ES
Dimensions*	Length	mm(in)	1860 (73.2)		2770 (109.1)
	Width	mm(in)	355 (14.0)	655 (25.8)	360 (14.2)
	Height	mm(in)	324 (12.8)	460 (18.1)	560 (22.0)
Dry weight*		kg(lb)	8.4 (18.5)	8.7 (19.1)	11.5 (25.4)
Engine	Type		YAMABIKO, air-cooled, two-stroke, single cylinder		
	Rotation		Anticlockwise as viewed from the output end		
	Displacement	$cm^3(in^3)$	42.7 (2.605)		
	Bore	mm(in)	40.0 (1.575)		
	Stroke	mm(in)	34.0 (1.339)		
	Compression ratio		6.1		
Carburettor	Type		Rotary type : Diaphragm, horizontal-draught, with primer††		
	Model		Walbro WYK-226A		
	Venturi size -Throttle bore	mm(in)	13.5 - 15.0 (0.531 - 0.591)		
	Metering diaphragm pressure		Lead pressure from inside of cleaner case		
Ignition	Type		CDI (Capacitor discharge ignition) system with electronic timing advancer and speed governor		
	Spark plug		RCJ-6Y		BPMR7A
Exhaust	Muffler type		Spark arrester muffler		
Starter	Type		ES (effortless-start)		
	Rope diameter x length	mm(in)	3.8 x 910 (0.15 x 35.8)		
Fuel	Type		Premixed two-stroke fuel		
	Mixture ratio		50 : 1 (2 %)		
	Petrol		Minimum 89 octane petrol (RON)		
	Two-stroke air cooled engine oil		ISO-L-EGD (ISO/CD13738), JASO FC/FD		
	Tank capacity	L (U.S.fl.oz.)	1.0 (33.8)		1.2 (40.6)
Clutch	Type		Centrifugal, 2 - shoe pivot		
Handle	Type	SRM-410ES(L)	Front : Crescent loop with cushion grip / Rear : Integrated control grip with cushion		
		SRM-410ES(U)	U-handle with integrated control grip		
		RM-410ES	Front : Crescent loop with cushion grip / Rear : Integrated control grip with cushion		
Drive shaft	Type		Solid type with serration (10-tooth)		
	Inner shaft: Diameter - Length	mm(in)	8 - 1590 (0.31 - 62.6)		8 - 1494 (0.31 - 58.8)
	Housing OD -ID	mm(in)	28 - 24 (1.10 -0.94)		28 - 25.6 (1.10 -1.01)
	(Main pipe) Length	mm(in)	1530 (60.2)		1440 (56.7)
Gear case	Reduction ratio		1.33		
	Gear tooth		Spiral bevel gear		
	Lubrication		Lithium based grease or ECHO XTended Protection ™ Lubricant		
Cutter	Type		Nylon line cutter, 3-tooth blade (255mm) †		
	Pilot diameter	mm(in)	25.4 (1.0)		
	Fastener type, size	mm	Left-hand thread nut, M10 x 1.25 pitch		
	Cutting rotation		Anticlockwise as viewed from top		

OD: Outer diameter. ID: Inner diameter.
* Without shoulder harness and standard cutter.
† Install and use U-shaped handle when operating with steel blade.
†† Primer is on cleaner case.

1-2 Technical data

Model			SRM-410ES(L)	SRM-410ES(U)	RM-410ES
Engine					
Idling speed		r/min	2,500 +/- 200		
Operating speed (Max. power)		r/min	7,000 - 7,500		
Wide open throttle speed		r/min	9,000 - 10,000*1 , 10,000 - 11,500*2		
Clutch engagement speed		r/min	3,500		
Service limit speed†		r/min	3,200		
Compression pressure		MPa (kgf/cm^2) (psi)	0.83 (8.4) (120)		
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		
Secondary coil resistance		kΩ	2.0 - 2.8		
Pole shoe air gaps		mm (in)	0.30 - 0.40 (0.012 - 0.016)		
Ignition timing	at 1,000 r/min	°BTDC	18		
	at 3,000 r/min	°BTDC	25		
	at 8,000 r/min	°BTDC	31		
	at 10,000 r/min	°BTDC	23		
PET-9000 Parameter	#1		312		
	#2		02		
Carburettor					
Idle adjust screw initial setting		turn in**	2 3/8		
Idle mixture needle initial setting		turn in***	12 1/4		
Hi speed mixture needle initial setting		turn out	4		
Test Pressure, minimum		MPa (kgf/cm^2) (psi)	0.05 (0.5) (7.0)		
Metering lever height		mm (in)	1.5 (0.06) lower than diaphragm seat		

BTDC: Before top dead centre.
*1 With Nylon line cutter and shield. *2 With 3-tooth blade (255 mm).

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

*** Screw in idle mixture needle from initial thread engagement (at the point that the clicking sound is heard).

† If clutch engagement speed is lower than service limit speed, replace clutch assembly with new one.

1-3 Torque limits

Descriptions		Size	kgf•cm	N•m	in•lbf
Starter system	Pawl carrier	M 8	80 - 100	8 - 10	70 - 90
	Pawl carrier nut	M 8	160 - 200	16 - 20	140 - 175
	Starter case	M 5*	35 - 50	3.5 - 5	30 - 45
Ignition system	Magneto rotor (Flywheel)	M 10	200 - 240	20 - 24	175 - 210
	Ignition coil	M 5	60 - 100	6 - 10	50 - 90
	Spark plug	M 14	150 - 170	15 - 17	130 - 150
	Fan cover	M 5	70 - 110	7 - 11	60 - 95
Fuel system	Carburettor insulator	M 5	40 - 55	4 - 5.5	35 - 50
	Carburettor	M 5	30 - 45	3 - 4.5	26 - 40
	Fuel tank bracket	M 5*	70 - 110	7 - 11	60 - 95
	Fuel tank	M 5*	50 - 90	5 - 9	45 - 80
Clutch	Clutch shoe	M 8	160 - 200	16 - 20	140 - 175
Engine	Crankcase	M 5**	70 - 110	7 - 11	60 - 95
	Cylinder	M 5**	70 - 110	7 - 11	60 - 95
	Decompression valve	M 8	80 - 100	8 - 10	70 - 90
	Top guard	M 5*	30 - 45	3 - 4.5	26 - 40
	Muffler	M 6	110 - 150	11 - 15	95 - 130
	Muffler cover	M 5*	30 - 45	3 - 4.5	26 - 40
	Muffler stay	M 5	70 - 110	7 - 11	60 - 95
Others	Blade fastening nut	LM 10	280 - 320	28 - 32	245 - 280
Regular bolt, nut and screw		M 3	6 - 10	0.6 - 1	5 - 9
		M 4	15 - 25	1.5 - 2.5	13 - 22
		M 5	25 - 45	2.5 - 4.5	22 - 40
		M 6	45 - 75	4.5 - 7.5	40 - 65
		M 8	110 - 150	11 - 15	95 - 130
		M 10	210 - 300	21 - 30	180 - 260

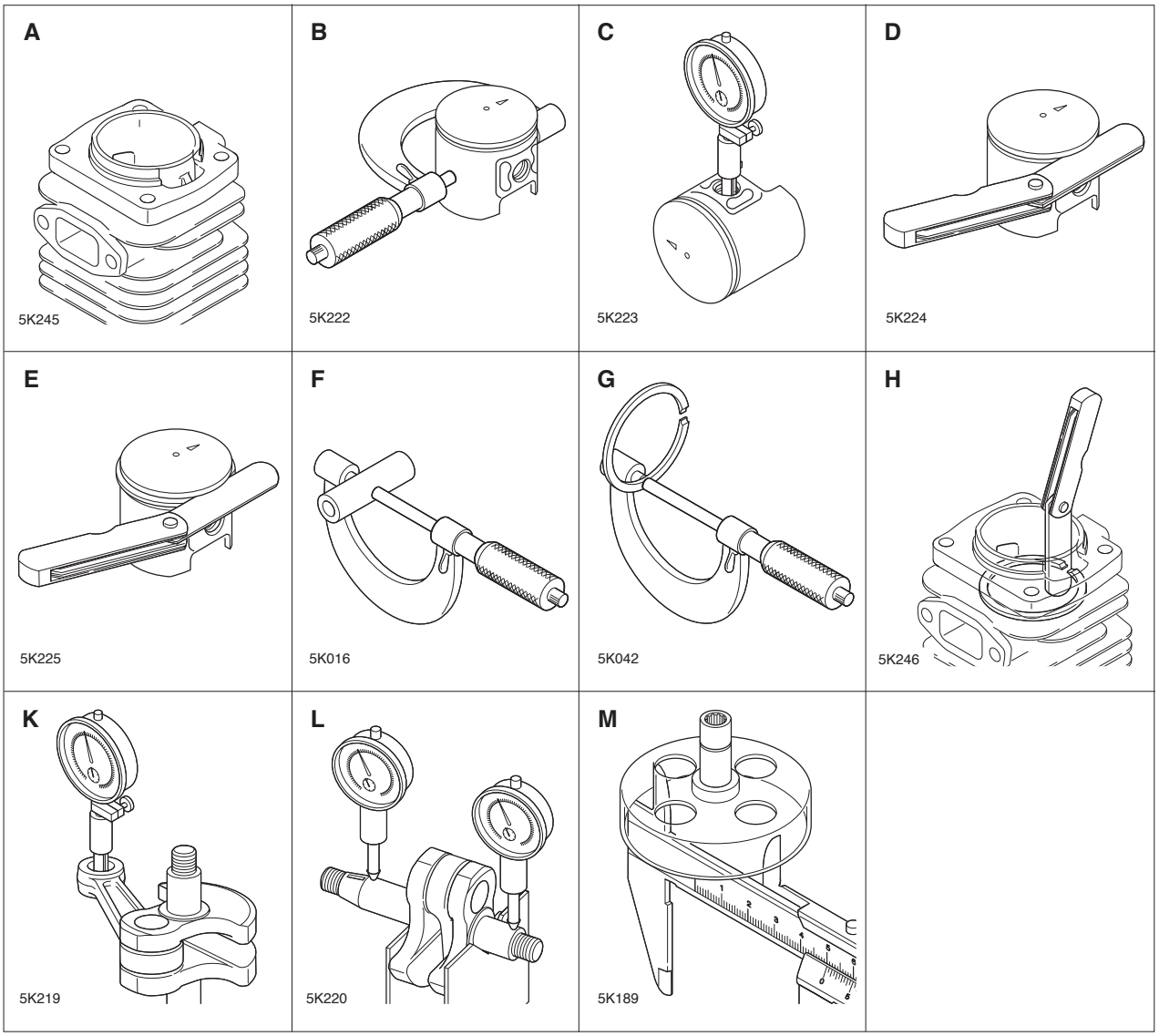
LM: Left hand thread.* Apply thread locking sealant. (See below)

** The torque differences among four bolts should not exceed 20 kgf•cm (2N•m, 17in•lbf) on one cylinder or crankcase.

1-4 Special repairing materials

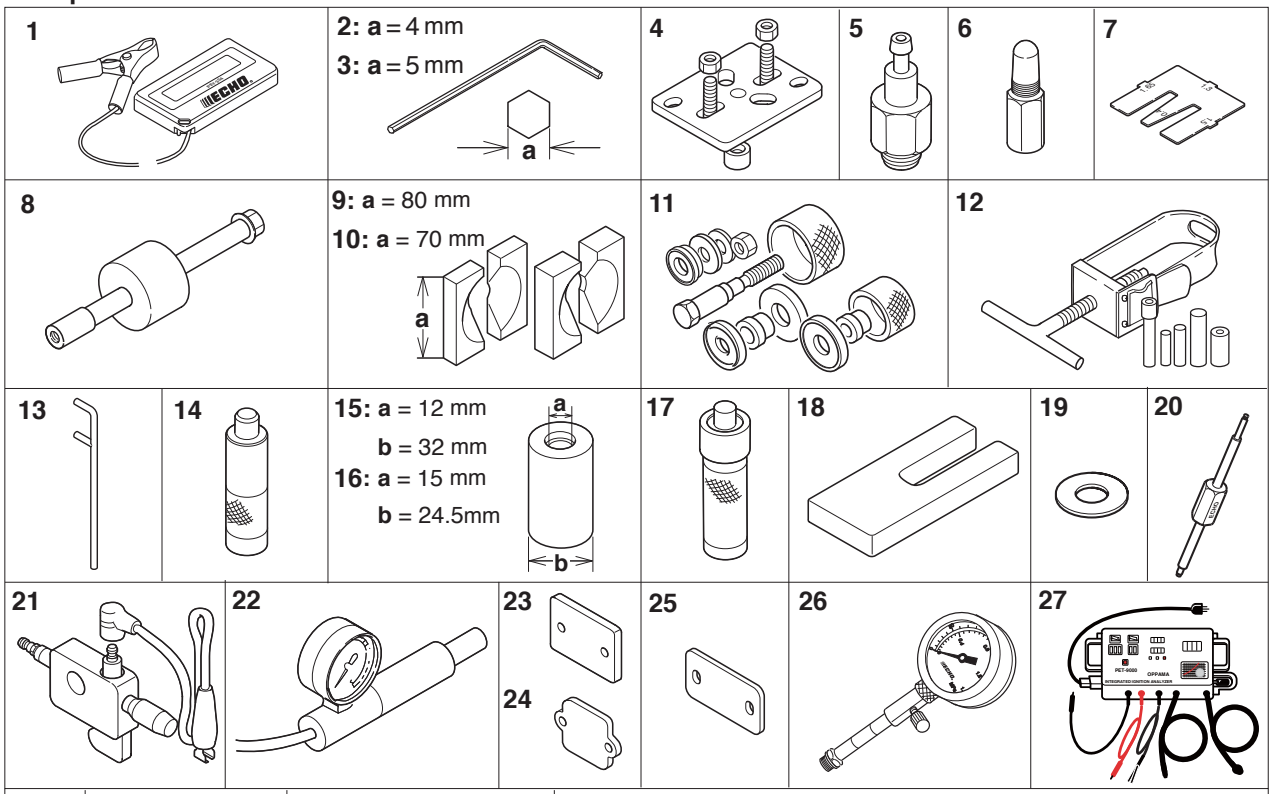
Material	Location	Remarks
Grease	Gear case	Lithium based grease or ECHO XTended Protection ™ Lubricant
	Rewind spring	
	Starter center post	
Oil	Oil seal inner lips	Two-stroke engine oil or engine oil (SAE#30)
	Drive shaft	
Thread locking sealant	Starter case	Loctite #242, ThreeBond #1324 or equivalent
	Fuel tank bracket	
	Muffler cover	
	Fuel tank	
	Top guard	

1-5 Service limits



	Description		mm (in)
A	Cylinder bore		When plating is worn and aluminum can be seen
B	Piston outer diameter	Min.	39. 95 (1.573)
C	Piston pin bore	Max.	10. 035 (0.395)
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.	9. 98 (0.393)
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.	14. 025 (0.552)
L	Crankshaft runout	Max.	0. 02 (0.001)
M	Clutch drum bore	Max.	79. 5 (3.13)

1-6 Special tools



Key	Part Number	Description	Used for:
1	G310-000050	Tachometer PET-304	Measuring engine speed to adjust carburettor
2	895610-79920	L-hex wrench (4 mm)	Removing and installing hex. socket bolt (M5)
3	895611-79920	L-hex wrench (5 mm)	Removing and installing hex. socket bolt (M6)
4	897501-03938	Puller	Removing flywheel
5	897835-16131	Pressure connector	Testing crankcase and cylinder leakages
6	897537-30130	Piston stopper	Locking crankshaft rotation
7	897563-19830	Metering lever gauge	Measuring metering lever height on carburettor
8	897603-23030	PTO shaft puller	Removing PTO shaft
9	897701-02830	Bearing wedge	Removing ball bearing remaining on crankshaft
10	897701-06030	Bearing wedge	Removing ball bearing on PTO shaft / drive gear
11	897701-14732	Bearing tool	Removing and installing ball bearings on crankcase / clutch drum
12	897702-30131	Piston pin tool	Removing and installing piston pin (Use 10mm dia. adapter)
13	897712-04630	2-pin wrench	Removing and installing pawl carrier
14	897714-12330	Oil seal tool	Installing crankcase oil seal (clutch side)
15	897714-24330	Oil seal tool	Installing crankcase oil seal (starter side) / PTO shaft bearings
16	897726-21430	Oil seal tool	Installing crankcase oil seal (clutch side)
17	897718-03930	Bearing tool	Installing crankcase oil seal (starter side)
18	897719-02830	Piston holder	Making piston steady to remove and install piston / ring
19	363018-00310	Washer	Installing crankcase oil seal (starter side)
20	91020	Limiter plug tool	Removing and installing limiter plug
21	897800-79931	Spark tester	Checking ignition system
22	897803-30132	Pressure tester	Testing fuel pipes/tank and crankcase leakages
23	897826-16131	Pressure plug	Plugging intake port to test crankcase / cylinder sealing
24	897827-16131	Pressure plate	Plugging intake port to test crankcase / cylinder sealing
25	897831-16131	Pressure plug	Plugging exhaust port to test crankcase / cylinder sealing
26	91037	Compression gauge	Measuring cylinder compression
27	900300	Ignition Analyzer : PET-9000	Measuring Ignition timing, Primary/Secondary voltage engine speed

2 CARBURETTOR ADJUSTMENT PROCEDURE

2-1 General adjusting rules

1) 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.

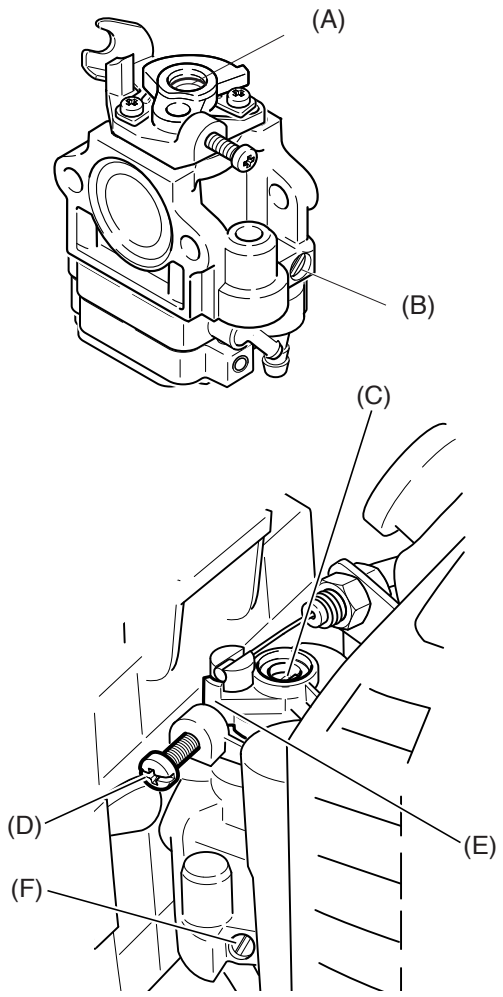
6. Install nylon line cutter with 2 nylon lines with 160 mm, even if 3-tooth blade is installed, for proper engine loading to make sure engine speed on both SRM-410ES(L), SRM-410ES(U) and RM-410ES.

2) Adjustment with limiter plugs on carburettor.

Start and run engine for 1 minute at idle, and for 2 minutes alternating engine speed between WOT for 20 seconds and idle for 10 seconds. Adjust idle engine speed to 2,500 +/- 100 r/min by turning idle adjust screw. Confirm WOT engine speed approx. 9,500 r/min. If engine does not run correctly after this adjustment, proceed to the next step 2-2.

IMPORTANT : After adjusting carburettor according to the steps 2-2 and 2-3, the limiter plug(s) must be installed in Idle and Hi speed mixture needle(s) hole(s) to comply with Emission Directive.

2-2 Presetting Idle mixture needle and Hi speed mixture needle



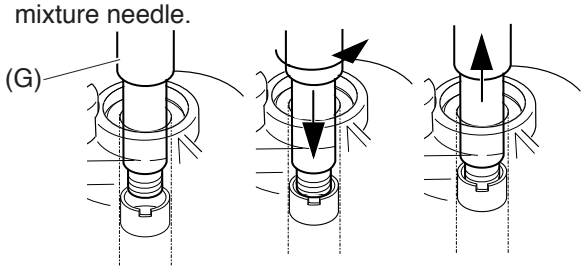
1. Remove the plugs from Idle mixture needle hole (A) and Hi speed mixture needle hole (B) using limiter plug tool (G) as follows.

(1)Put limiter plug tool (G) on limiter plug in mixture needle hole.

(2)Push and turn limiter plug tool anticlockwise 2 turns into limiter plug slowly while pushing the tool.

(3)Pull out limiter plug tool with the limiter plug from mixture needle hole.

(4)Repeat plug removal procedure for the other mixture needle.



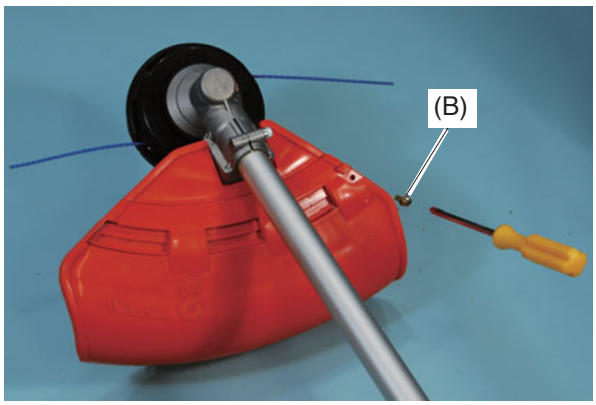
NOTE : If plug is damaged and stays in the hole, use hand auger or pin-shaped tool to scrape, and lift the cap pieces out of the hole.

2. Turn Idle adjust screw (D) anticlockwise until its tip just touches throttle plate (E). Then turn it in clockwise 2 3/8 turns.

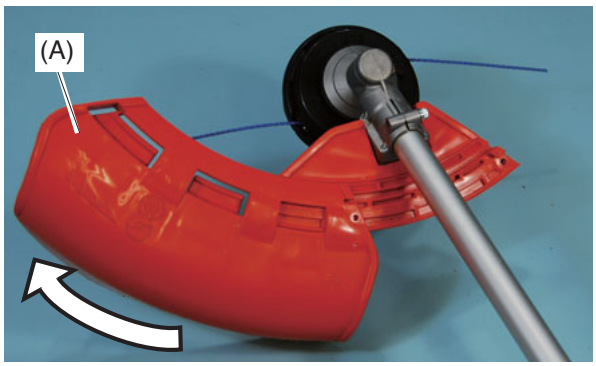
3. Turn Idle mixture needle (C) anticlockwise to fully come out until clicking sound is heard. Then turn it clockwise 12 1/4 turns.

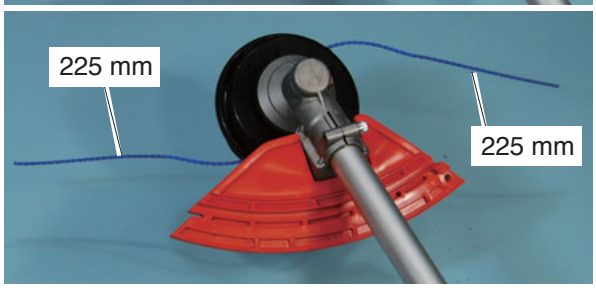
Turn Hi speed mixture needle (F) clockwise until lightly seated. Then turn it anticlockwise 4 turns.

2-3 Adjusting carburettor



1. Remove shield piece (A) by removing screw (B), and expand nylon lines, and cut nylon lines to 225 mm for proper engine loading to adjust carburettor correctly.

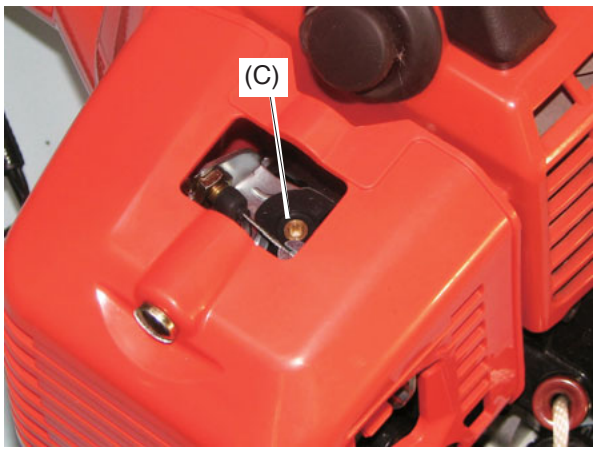




2. Start and warm engine for 1 minute at WOT.

NOTE : If the engine doesn't start, turn Idle mixture needle anticlockwise in 1/2 turn increments.

3. Verify idle engine speed and adjust idle engine speed as follows.



3-1. When the speed is in the range of 2,400 to 2,600 r/min, proceed to step 4.

3-2. Adjust Idle mixture needle (C) to reach maximum idle speed with 2.5 mm blade screwdriver.

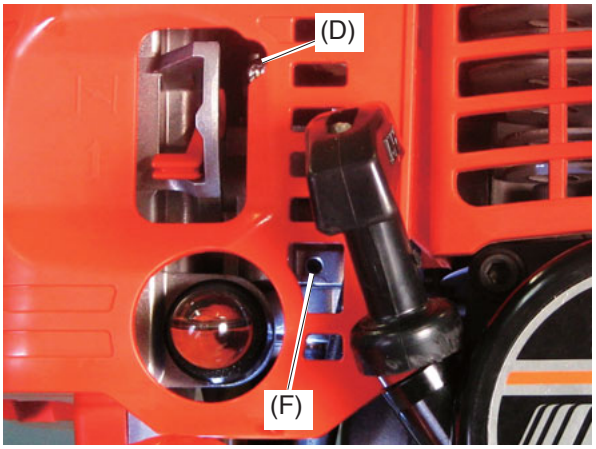
3-3. Set idle speed to 3,500 r/min by turning idle adjust screw. Engine speed should be stable at 3,500 +/- 50 r/min.

3-4. Turn idle mixture needle (C) anticlockwise to reduce idle speed 1,000 r/min in the range of 2,400 to 2,600 r/min.

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

(continued)

2-3 Adjusting carburettor(continued)



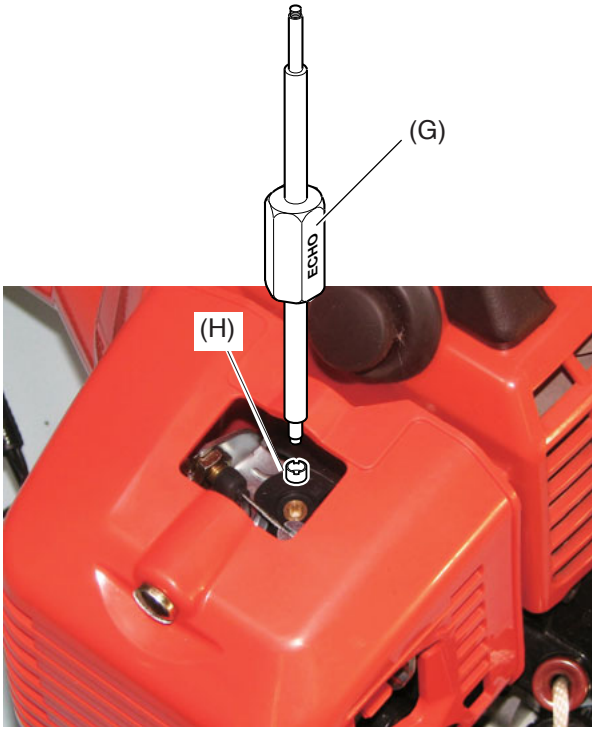
4. Adjust Hi speed mixture needle (G) to reach maximum WOT engine speed after 20 seconds at WOT. Then turn Hi speed mixture needle (G) anti-clockwise to reduce WOT engine speed 120 r/min (RANG : 100-140 r/min).

Max. approx. 8,000 r/min

NOTE : Nylon line length should be 225 mm without shield.

5. SRM-410ES(L) : Stop engine, reinstall shield and restart engine again and verify engine idle speed ranges from 2,300 to 2,700 r/min, and WOT engine speed ranges from 9,000 to 10,000 r/min after 60 seconds at WOT.

NOTE : Nylon line length should be 160 mm with shield.

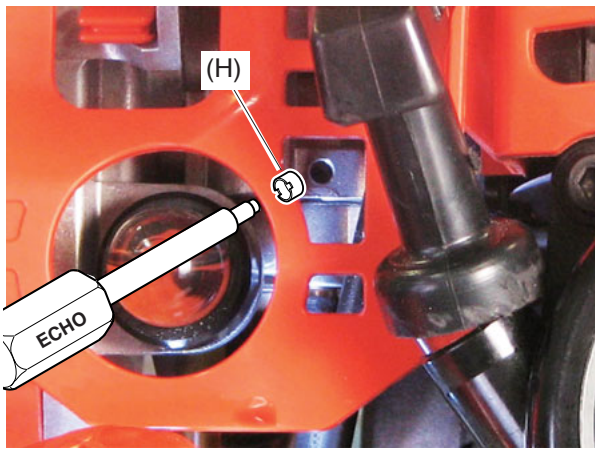


SRM-410ES(U) / RM-410ES : Stop engine, Reinstall shield for blade and 3-tooth blade (255 mm). Start engine again and verify engine idle speed ranges from 2,300 to 2,700 r/min, and WOT engine speed ranges from 10,000 to 11,500 r/min after 20 seconds at WOT.

Make sure the nylon line cutter/3-tooth blade(255 mm) does not rotate when engine is idle, and engine should accelerate smoothly.

6. After adjusting carburettor, insert and secure new plug(s) (H) A259-000000 deep in the needle holes per the Emission Directive using limiter plug tool (G).

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



IMPORTANT : The limiter plugs must be installed Idle and Hi speed mixture needle holes to comply with Emission Directive.

NOTE : Initial carburettor setting (Idle adjust screw, Idle and Hi speed mixture needles) shown here is to start the engine after restoration or carburettor change. Idle adjust screw, Idle and Hi speed mixture needles turn for designated engine revolution through procedures indicated here may vary. As long as idle and WOT engine speed is set in given range, the variance would be ignorable.

IMPORTANT : When the power is down while operating unit, the user must clean air filter.