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SERVICE DATA

CHAIN SAW

CS-450

(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 products information available at the time of publication.

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Reference No. **01-45B-01**
REVISED: 200806
ISSUED: 200805

KIORITZ CORPORATION

1 SERVICE INFORMATION

1-1 Specifications

Model			CS-450
Dimensions	Length*	mm(in)	400 (15.8)
	Width	mm(in)	252 (9.9)
	Height	mm(in)	278 (10.9)
Dry weight*		kg(lb)	5.0 (11.0)
Engine	Type		KIORITZ, air-cooled, two-stroke, single cylinder
	Rotation		Clockwise as viewed from the output end
	Displacement	$cm^3(in^3)$	45.0 (2.75)
	Bore	mm(in)	43.0 (1.69)
	Stroke	mm(in)	31.0 (1.22)
	Compression ratio		7.1
Carburettor	Type		Diaphragm horizontal-draught, with auto-return choke**
	Model		Walbro WT-901
	Venturi size-Throttle bore	mm(in)	13.5 - 15.85 (0.532 - 0.624)
Ignition	Type		CDI (Capacitor discharge ignition) system with electronic timing advancer
	Spark plug		BPMR8Y
Exhaust	Muffler type		Spark arrestor muffler
Starter	Type		Automatic rewind
	Rope diameter x length	mm(in)	3.5 x 850 (0.13 x 33.4)
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.)	0.45 (15.2)
Clutch	Type		Centrifugal, 3-shoe slide with 3-tension spring
Guide bar / Saw chain lubrication type			Automatic with volume adjuster
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.
** Auto-return choke is on switch bracket.

Cutting devices					
Guide bar	Type		38RV58-325	45RV58-325	50RV58-325
	Called length	cm	38	45	50
	Gauge	in	0.058		
Saw chain	Type		CARLTON K2L		OREGON 21BP
	Number of drive links		64	72	80
	Pitch	in	0.325		
	Gauge	in	0.058		

1-2 Technical data

Engine			
Idling speed		r/min	2700 +/- 300
Wide open throttle speed*		r/min	12000 - 13000
Clutch engagement speed		r/min	3800 - 4200
Compression pressure		MPa (kgf/cm^2) (psi)	0.93 (9.5) (135)
Ignition system			
Spark plug gap		mm(in)	0.6 - 0.7 (0.024 - 0.028)
Minimum secondary voltage at 1000 r/min		kV	15
Secondary coil resistance		kΩ	1.5 - 2.2
Pole shoe air gaps		mm(in)	0.3 - 0.4 (0.012 - 0.016)
Ignition timing	at 3000 r/min	°BTDC	19
	at 8000 r/min	°BTDC	33
	at 10,000 r/min	°BTDC	35
	at 12,000 r/min	°BTDC	37
Carburettor			
Idle adjust screw initial setting		turns in**	1 7/8
L mixture needle initial setting		turns back	1 1/2
H mixture needle initial setting		turns back	3 3/8
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 at 7000 r/ min		mL/min(U.S.fl.oz./min)	Adjustable : 1.5 - 13 (0.05 - 0.40) (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 just contacts throttle plate before initial setting.

1-3 Torque limits

Descriptions		Size	kgf•cm	N•m	in•lbf
Starter system	Starter pawl	M5	30 - 45	3 - 4.5	26 - 40
	Starter case	M5**	30 - 45	3 - 4.5	26 - 40
Ignition system	Magneto rotor (Flywheel)	M8	200 - 240	20 - 24	175 - 210
	Ignition coil	M5	35 - 50	3.5 - 5	30 - 45
	Ignition switch	M14	15 - 30	1.5 - 3	13 - 26
	Spark plug	M14	130 - 170	13 - 17	115 - 150
Fuel system	Carburettor	M5	25 - 35	2.5 - 3.5	22 - 30
	carburettor elbow	M5**	25 - 35	2.5 - 3.5	17 - 26
	Intake bellows	M5	30 - 45	3.0 - 4.5	26 - 40
Clutch	Clutch hub	LM10	300 - 400	30 - 40	260 - 350
Engine	Crankcase***	M5*	70 - 110	7 - 11	60 - 95
	Engine mount	M5	70 - 110	7 - 11	60 - 95
	Muffler	M5	70 - 110	7 - 11	60 - 95
	Cylinder cover	M5	25 - 45	2.5 - 4.5	22 - 40
Others	Auto-oiler	M4	20 - 35	2 - 3.5	17 - 30
	Front handle	M5**	45 - 65	4.5 - 6.5	40 - 55
	Rear handle assembly	M5	35 - 45	3.5 - 4.5	30 - 40
	Handle lid	M4	10 - 20	1 - 2	9 - 17
	Brake lever (Hand guard)	M4**	1 - 2	1 - 2	9 - 17
	Sprocket guard plate	M4**	15 - 25	1.5 - 2.5	13 - 22
	Chain catcher	M5	70 - 110	7 - 11	60 - 95
	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

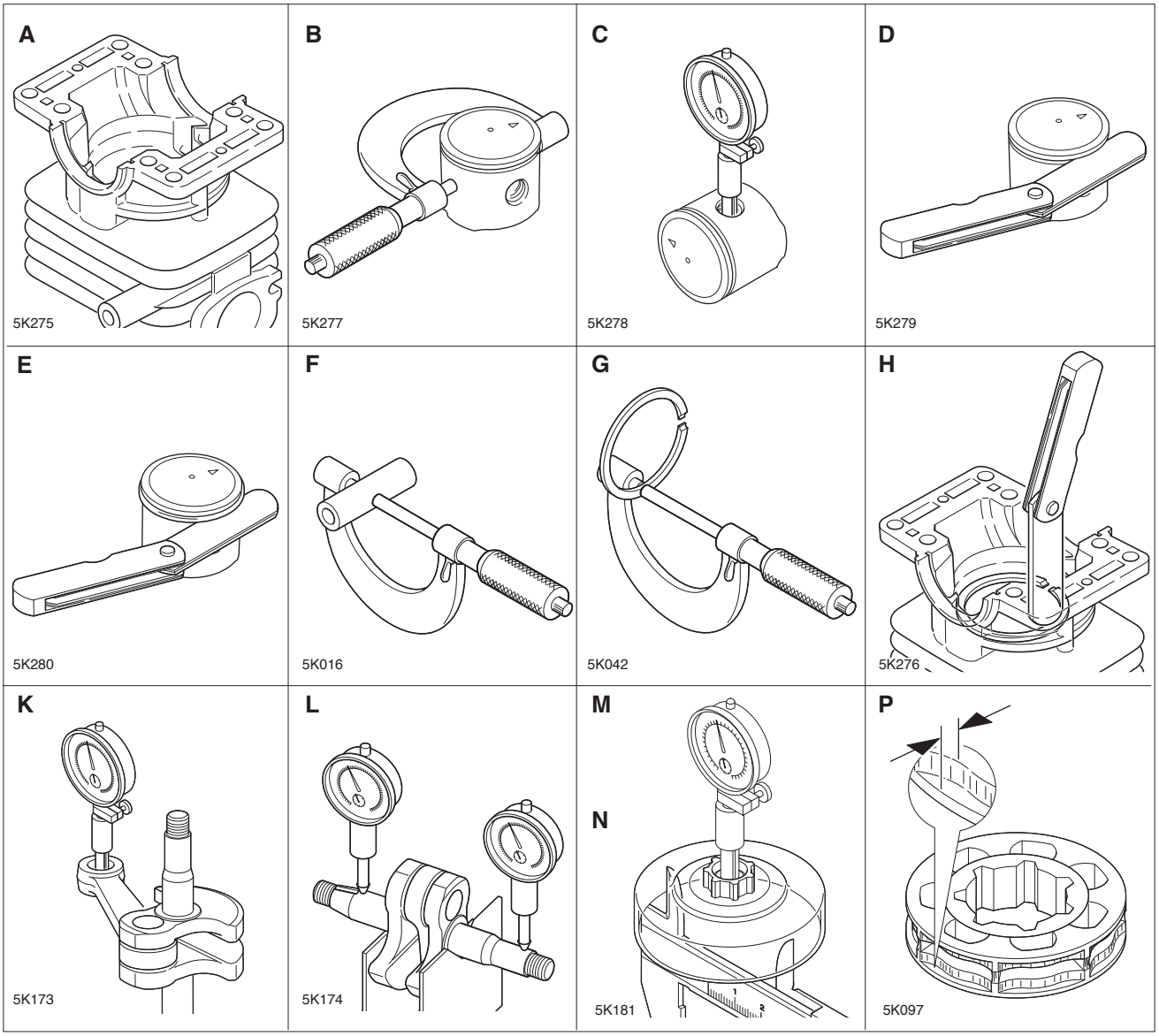
LM: Left-hand thread *Apply thread locking sealant (See below) ** Tapping screw

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

1-4 Special repairing materials

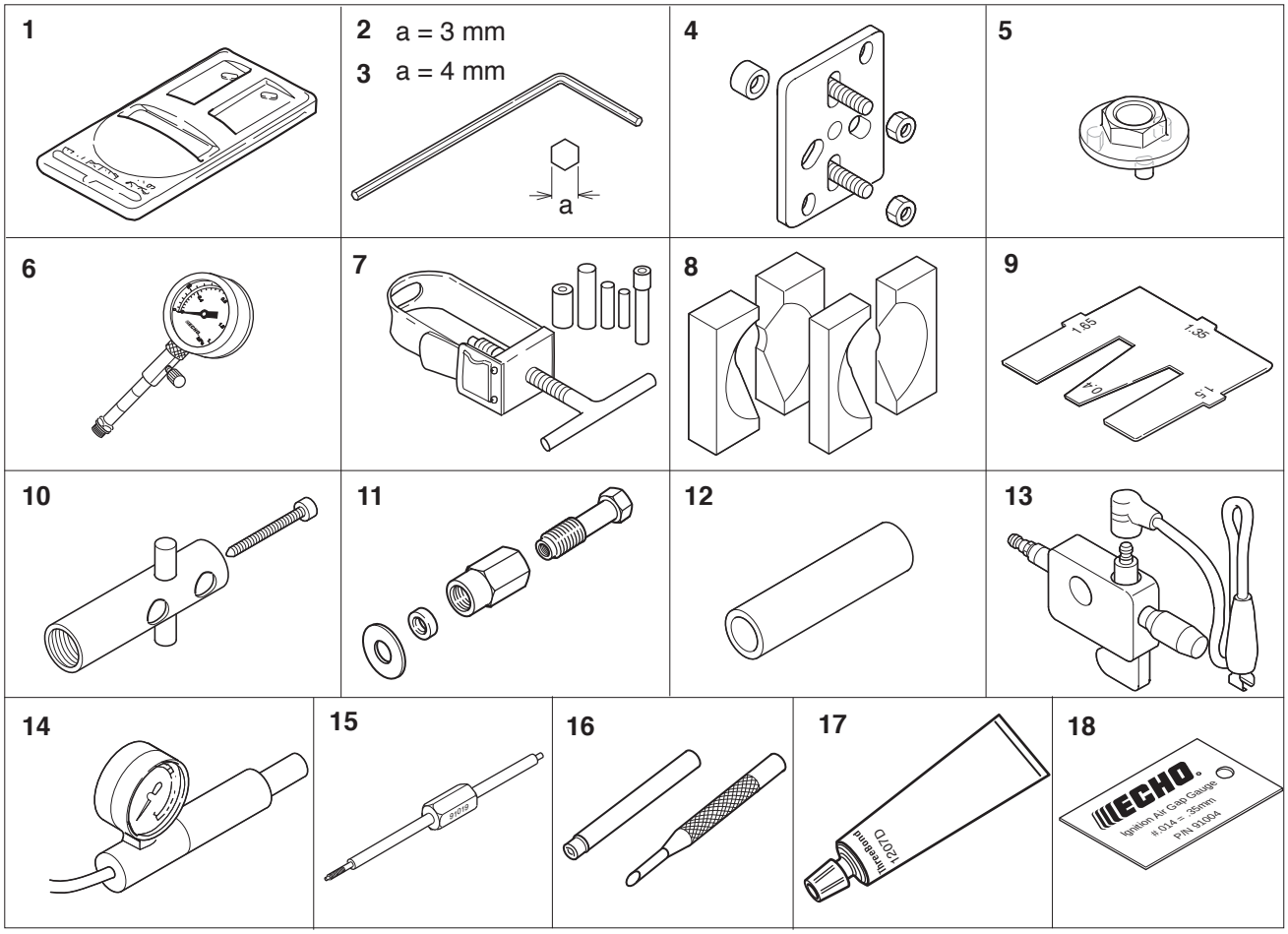
Material	Location	Remarks
Adhesive	Ball bearing outer / crankcase	Loctite #675 or equivalent
	Pulse pipe joint	
	Cushions	Loctite #424, ThreeBond #1741 or equivalent
Liquid gasket	Crankcase seams	ThreeBond 1207D
Grease	Auto-oiler worm	Lithium based grease
	Clutch needle bearing	
	Handle cushions	
	Rewind spring	
	Starter centre 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 aluminium can be seen
B	Piston outer diameter	Min.	42.87 (1.688)
C	Piston pin bore	Max.	9.030 (0.3555)
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.	8.98 (0.3535)
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.	12.025 (0.4734)
L	Crankshaft runout	Max.	0.01 (0.001)
M	Sprocket bore	Max.	14.07 (0.5539)
N	Clutch drum bore	Max.	71.5 (2.81)
P	Sprocket wear limit	Max.	0.5 (0.02)

1-6 Special tools



Key	Part Number	Description	Reference
1	897801-33330	Tachometer PET-1000	Measuring engine speed
2	895612-79920	L-hex wrench (3 mm)	Removing and installing hex. socket bolts (M4)
3	895610-79920	L-hex wrench (4 mm)	Removing and installing hex. socket bolts (M5)
4	897501-03938	Puller	Removing magneto rotor
5	897505-16133	Clutch tool	Removing and assembling clutch assembly
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	897708-19835	Worm puller	Removing auto-oiler worm
11	Y089-000010	Worm inserter	Installing auto-oiler worm : Crankshaft thread LM8x1.25
12	897726-09130	Oil seal tool	Installing oil seals
13	897800-79931	Spark tester	Checking ignition system
14	897803-30133	Pressure tester	Testing carburettor and crankcase leakage
15	91019	Limiter cap tool	Removing and installing limiter cap
16	500-500	Welch plug tool	Removing and installing welch plug tool
17	X686-000000	ThreeBond 1207D	Applying crankcase seam
18	91004	Module air gap gauge	Adjusting pole shoe air gaps

2 CARBURETTOR ADJUSTMENT PROCEDURE

2-1 General adjusting rules

A. Before starting the unit for 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, 45 or 50 cm bar and chain should be installed on the unit. Otherwise serious engine damage will occur due to overspeeding.

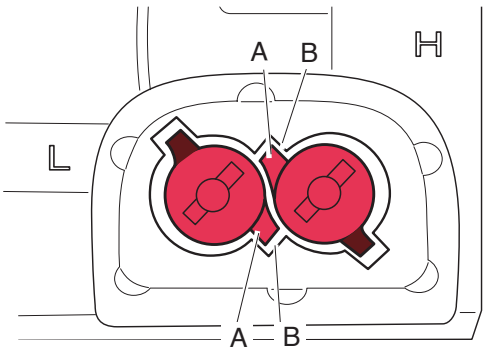
B. Set L and H mixture needles with limiter caps full anticlockwise. Start and run engine for two minutes alternating engine speed between WOT for 5 seconds and idle for 5 seconds. Adjust idle speed screw to 2,700 +/- 150 r/min. Adjust H mixture needle with limiter cap to 12,500 +/- 500 r/min. If engine 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 cap(s) must be installed on L and H mixture needle(s) to comply with Emission Directive.

2-2 Presetting Idle adjust screw, L mixture needle and H mixture needle

Tools Required : Small screwdriver with 2.5 mm blade, electronic tachometer P/N 897801-33330, limiter cap removal tool with 2.5 mm left-hand thread P/N 91019. Parts Required : (2) limiter caps P/N P003-000010.

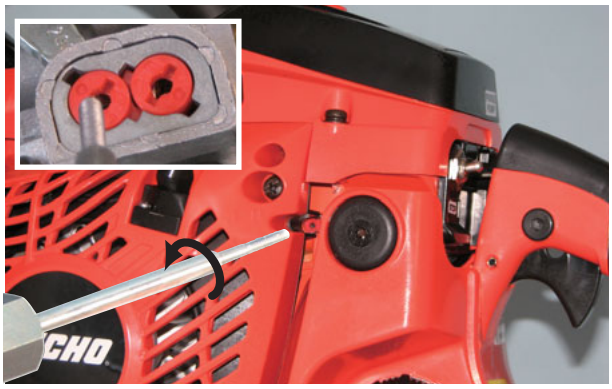
1. Turn the L and H mixture needles anticlockwise to rich side stop to align limiter cap tab (A) with locating slot (B), using 3 mm blade screwdriver.



NOTE : If cap tabs (A) misalign with locating slots (B), there is a chance to strip cap threads created by removal tool.

(continued)

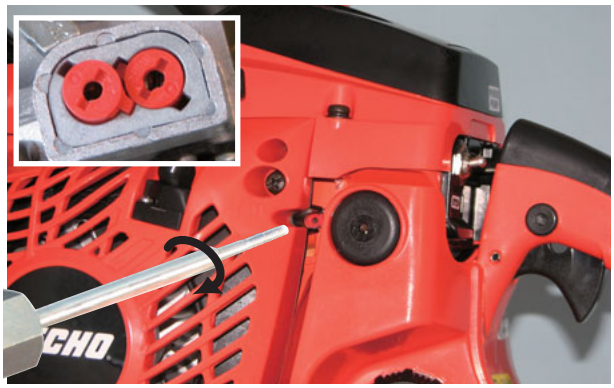
2-2 Presetting Idle adjust screw, L mixture needle and H mixture needle (continued)



2. Screw 2.5 mm limiter cap removal tool P/N 91019 anticlockwise into center hole of limiter cap until tab of the limiter cap just comes out of the locating slot.

NOTE : DO NOT COMPLETELY REMOVE LIMITER CAP FROM CARBURETTOR!

If the limiter cap is removed completely, the second limiter cap can turn while screwing in the removal tool. The cap tabs will be misaligned with location slots and the center hole threads will strip. If center hole threads strip, use 3 mm diameter thread wood screw to remove the limiter cap.



3. Remove the limiter cap removal tool from the limiter cap by turning the tool clockwise, leaving the limiter cap in place.

4. Screw 2.5 mm limiter cap removal tool P/N 91019 anticlockwise into center hole of remaining another limiter cap until the limiter cap is removed from the mixture needle completely. Remove the limiter cap from limiter cap removal tool turning clockwise, and screw 2.5 mm limiter cap removal tool 91019 into center hole of previous limiter cap to remove completely.

5. Turn L and H mixture needles clockwise until lightly seated, and then turn out both mixture needles following turns.

L mixture needle : 1 1/2, H mixture needle : 3 3/8

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

6. Remove air filter cover and air filter to see that Idle adjust screw contacts the throttle plate. Turn Idle adjust screw anticlockwise and set the screw until the tip just contacts the throttle plate. Then turn Idle adjust screw 1 7/8 turns clockwise. Reinstall air filter, and air filter cover.

2-3 Adjusting carburettor

1. Start engine and warm it up at idle for one minute. Turn H mixture needle anticlockwise until engine speed drops to approx. 11,500 r/min.

2. Warm it up well for 100 sec alternating engine speed between WOT (Wide Open Throttle) for 5 seconds and idle for 5 seconds .

NOTE : Do not run engine at high speed without load longer than 5 seconds, or engine damage may occur.

3. Adjust L mixture needle with 3 mm blade screwdriver to reach maximum engine speed just before lean drop off.

4. Set idle engine speed to 3,900 r/min by turning Idle adjust screw. Engine speed should be stable at 3,900 +/- 50 r/min after Idle adjust screw adjustment.

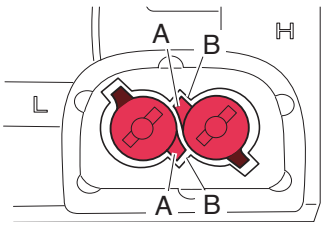
5. Turn L mixture needle anticlockwise reducing engine idle speed 1,400 r/min to set idle speed at 2,500 r/min. The engine idle speed range is 2,400 - 2,600 r/min.

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.

6. Before adjustment, WOT engine speed should be less than or equal to 11,500 r/min. If WOT engine speed is higher, turn H mixture needle anticlockwise until 11,500 r/min is achieved. To make the final WOT engine speed adjustment, turn the H mixture needle clockwise in 1/8 turn increments with the engine at idle. After each adjustment, accelerate to WOT, and check rpm. The final rpm should fall within 12,300 - 12,700 r/min at WOT.

7. After adjusting carburettor, put new limiter cap on the other side (c) of limiter cap tool (C) as shown, and press the limiter caps to the bottoms on L and H mixture needles respectively.

NOTE : Align the limiter cap's tabs (A) with locating slots (B) in extended housing of carburettor.



IMPORTANT : The limiter caps must be properly installed on L and H mixture needles to comply with Emission Directive.

8. Start engine, and adjust engine idle speed ranges from 2,600 to 2,800 r/min by turning L mixture needle with limiter cap clockwise, verify engine idle speed ranges from 2,400 to 3,000 r/min WOT engine speed ranges from 12,000 to 13,000 r/min. Make sure chain does not rotate when engine is idling. When final adjustment is completed, the engine should idle, accelerate smoothly, and attain WOT per above specification.

NOTE : Initial carburettor setting (Idle adjust screw, L and H mixture needles) shown on page 3 and 8 is to start the engine after restoration or carburettor change. Idle adjust screw, L and H 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, variance would be ignorable.