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SERVICE DATA

CHAIN SAW

CS-4400
CS-5100

(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.
ECHO SERVICE MANUAL Ord.401-21 (Model:CS-4200,CS-4400) contains lots of information for servicing this model.

CONTENTS

Reference No. **01-44C-01**
REVISED: 200510
ISSUED: 200410

INDEX

KIORITZ CORPORATION

1 SERVICE INFORMATION

1-1 Specifications

Model			CS-4400	CS-5100
Dimensions	Length*	mm(in)	398 (15.7)	
	Width	mm(in)	252 (9.9)	
	Height	mm(in)	272 (10.7)	
Dry weight*		kg(lb)	4.6 (10.1)	4.9 (10.8)
Engine	Type		KIORITZ, air-cooled, two-stroke, single cylinder	
	Rotation		Clockwise as viewed from the output end	
	Displacement	$cm^3(in^3)$	43.5 (2.654)	49.3 (3.008)
	Bore	mm(in)	43.0 (1.693)	45.0 (1.772)
	Stroke	mm(in)	30.0 (1.181)	31.0 (1.220)
	Compression ratio		7.6	7.5
Carburettor	Type		Diaphragm horizontal-draught with auto-return choke	
	Model		Walbro WT-416C	ZAMA C1Q-K79
	Venturi size-Throttle bore	mm(in)	13.5 - 15.85 (0.532 - 0.624)	13.5 - 16 (0.532 - 0.630)
Ignition	Type		CDI (Capacitor discharge ignition) system with electronic timing advancer	
	Spark plug		RCJ-6Y	
Starter	Type		Automatic rewind	
	Rope diameter x length	mm(in)	3.5 x 1000 (0.14 x 39.4)	
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	
	Tank capacity	L (U.S.fl.oz.)	0.6 (20.3)	
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)	
Sprocket	Type		Spur	Floating rim
	Number of teeth		7	7
	Pitch	in	0.325	0.325

* Without guide bar and saw chain.

Cutting devices					
Guide bar	Type	(CS-4400)	---	45RV58-325	38RV58-325
		(CS-5100)	38RV58-325	45RV58-325	50RV58-325
	Called length	cm	38	45	50
	Gauge	in	0.058		
Saw chain	Number of drive links		56	64	72
	Pitch	in	0.325		
	Gauge	in	0.058		

1-2 Technical data

Model			CS-4400	CS-5100
Engine				
Idling speed		r/min	2300 - 2800	2300 - 2800
Operating speed*		r/min	9500 - 10500	10500 - 11000
High speed (No load full throttle)*		r/min	11500 - 13000	12500 - 13500
Clutch engagement speed*		r/min	3500 - 4000	3500 - 4000
Compression pressure		MPa (kgf/cm^2) (psi)	1.05 (10.5) (146)	1.00 (10.2) (145)
Ignition system				
Spark plug gap		mm(in)	0.6 - 0.7 (0.024 - 0.028)	
Minimum secondary voltage (CS-4400 at 800 r/min, CS-5100 at 1500 r/min)		kV	14.5	23.0
Secondary coil resistance		kΩ	1.7 - 2.2	
Pole shoe air gaps		mm (in)	0.30 - 0.40 (0.012 - 0.016)	
Ignition timing	at 800 r/min	°BTDC	14.5	---
	at 1500 r/min	°BTDC	---	17
	at 3000 r/min	°BTDC	18.5	
	at 10000 r/min	°BTDC	28	
Carburettor				
Idle adjust screw initial setting		turns in**	1 1/2	2
L mixture needle initial setting		turns back	1 1/4	1 1/2
H mixture needle initial setting		turns back	3	2 1/4
Test Pressure, minimum		MPa (kgf/cm^2) (psi)	0.05 (0.5) (7.0)	
Metering lever height		mm(in)	1.65 (0.065) 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 guide bar and saw chain.

**Set idle adjust screw to contact throttle plate before initial setting.

1-3 Torque limits

Descriptions		Size	kgf•cm	N•m	in•lbf
Starter system	Starter pawl	M5*	70 - 110	7 - 11	60 - 95
	Starter case	M4**	30 - 45	3.0 - 4.5	26 - 40
Ignition system	Magneto rotor (Flywheel)	M8	200 - 240	20 - 24	175 - 210
	Ignition coil	M4	35 - 50	3.5 - 5.0	30 - 45
	Spark plug	M14	150 - 170	15 - 17	130 - 150
Fuel system	Carburettor	M5	30 - 35	3.0 - 3.5	26 - 30
	Intake bellows (Only CS-5100)	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
	Muffler plate	M4	15 - 25	1.5 - 2.5	13 - 22
Others	Cylinder cover	M4	25 - 45	2.5 - 4.5	22 - 40
	Cushion (Front handle)	M5	30 - 45	3.0 - 4.5	26 - 40
	Oil tank	M4	30 - 40	3 - 4	26 - 35
	Auto-oiler	M4	15 - 25	1.5 - 2.5	13 - 22
	Throttle latch	M4	6 - 10	0.6 - 1.0	5 - 9
	Front handle	M5**	45 - 65	4.5 - 6.5	40 - 55
	Brake lever (Hand guard)	M4	25 - 45	2.5 - 4.5	22 - 40
	Chain catcher	M5	30 - 45	3.0 - 4.5	26 - 40
	Guide bar	M8	200 - 230	20 - 23	175 - 200
	Sprocket guard plate	M4**	10 - 20	1 - 2	9 - 17
Regular bolt, nut, and screw		M3	6 - 10	0.6 - 1.0	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

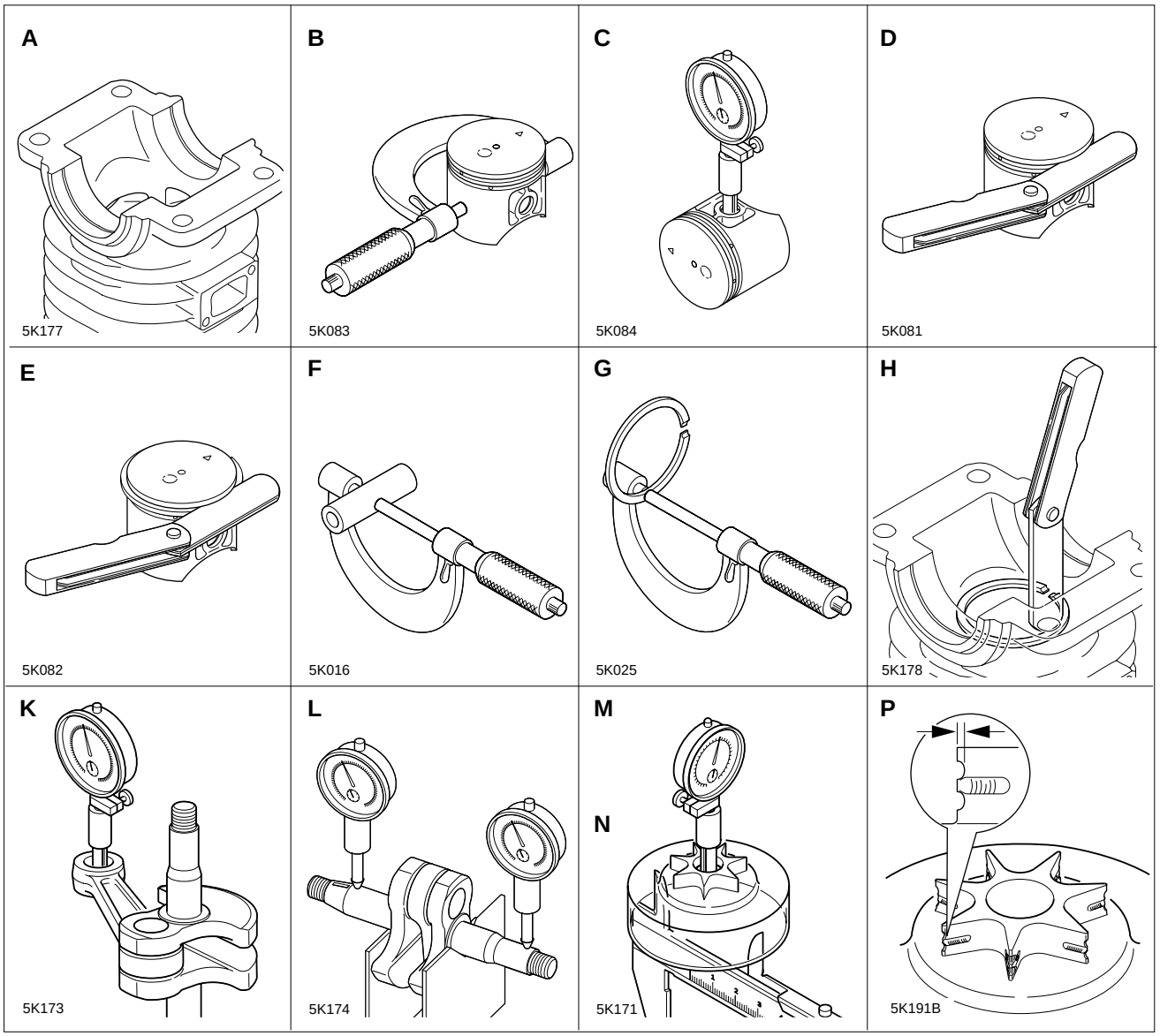
LM: Left-hand thread *Apply thread locking sealant (See next page) ** Tapping screw

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

1-4 Special repairing materials

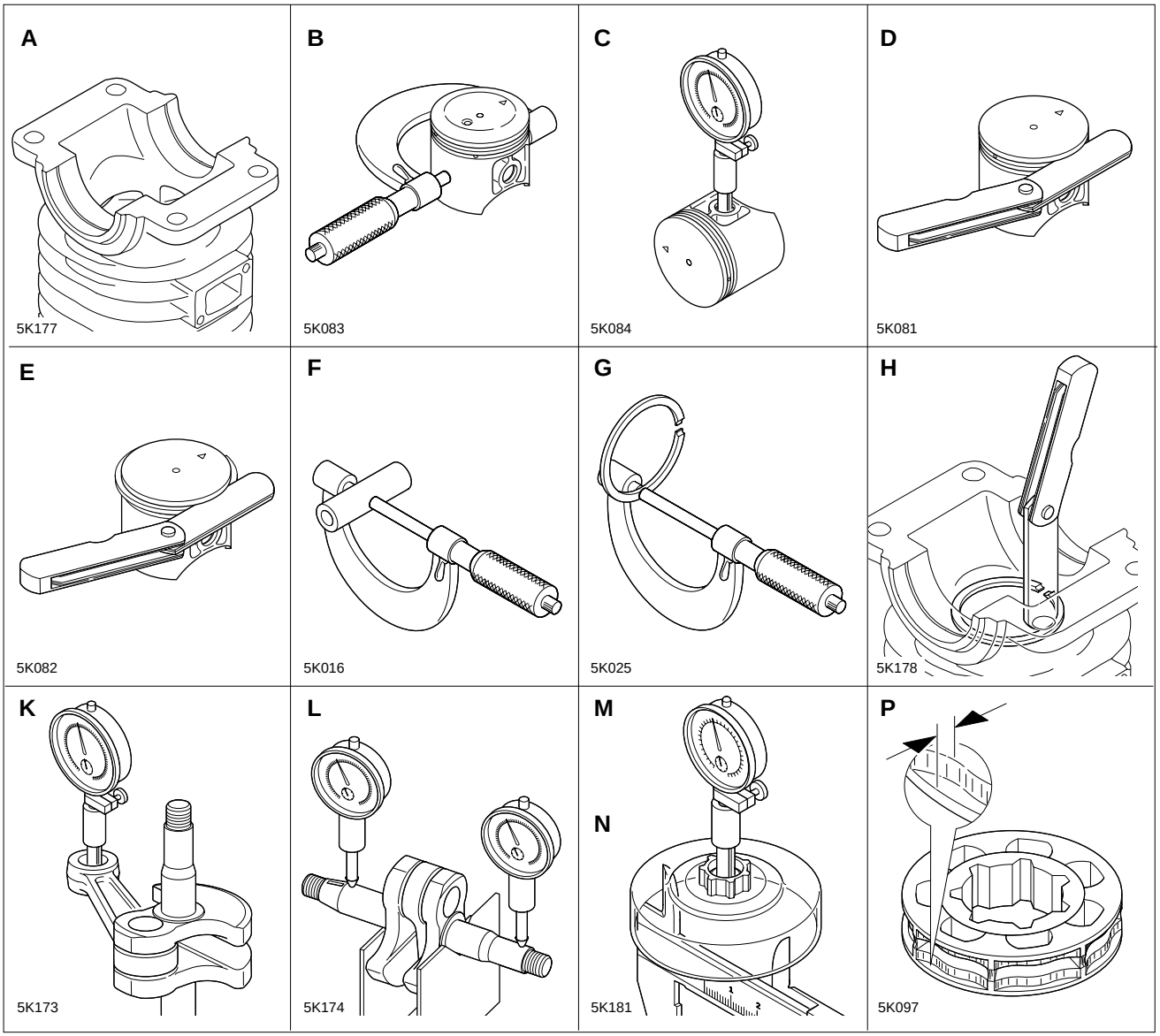
Material	Location	Remarks
Adhesive	Ball bearing outer / crankcase	Loctite #675 or equivalent
	Stud bolt	Loctite #609, ThreeBond #1373 or equivalent
	Engine cover, cushion	Loctite #406 (424) or equivalent
Liquid gasket	Crankcase seams	Loctite #515 (990610-00051) or equivalent
	Oil tank seams	Loctite superflex #595, ThreeBond #1212 or equivalent
Thread locking sealant	Starter pawl screws	Loctite #242, ThreeBond #1324 or equivalent
	Cushion screws (Rear handle)	Loctite #222, ThreeBond #1342 or equivalent
	Engine mount bolts	
	Brake weight nut	
	Crankcase	
Grease	Auto-oiler worm	Lithium based grease
	Clutch needle bearing	
	Cushion, inside	
	Rewind spring	
	Oil seal lip	
	Cleaner lid	
	Chain brake (metal contact part)	Molybdenum grease (approx. 1 gram)

1-5 Service Limits (CS-4400)



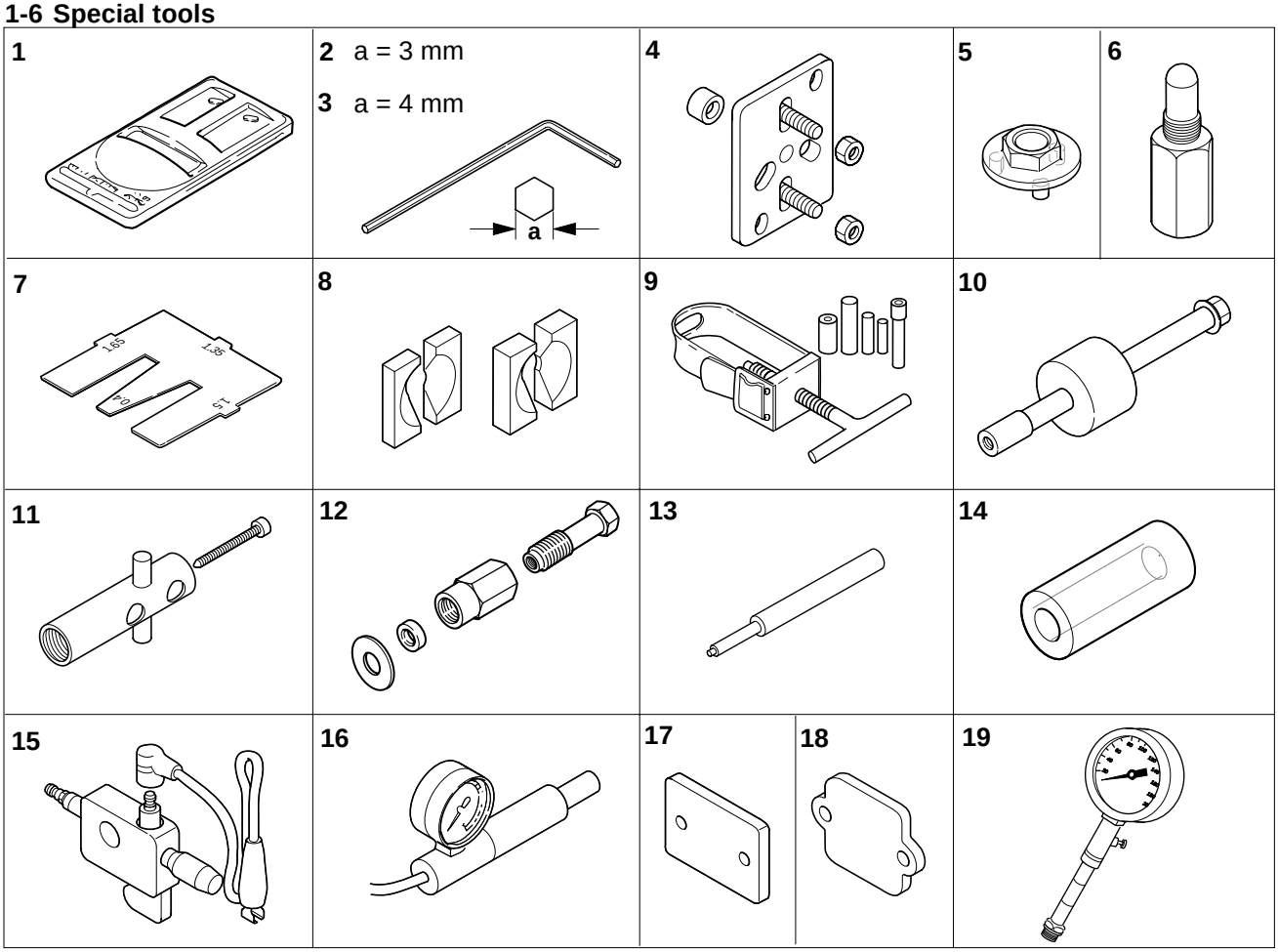
			mm (in)
A	Cylinder bore		When plating is worn and aluminium can be seen
B	Piston outer diameter	Min.	42.87 (1.688)
C	Piston pin bore	Max.	9.025 (0.3553)
D	Piston ring groove	Max.	1.3 (0.051)
E	Piston ring side clearance	Max.	0.1 (0.004)
F	Piston pin outer diameter	Min.	8.980 (0.3535)
G	Piston ring width	Min.	1.15 (0.045)
H	Piston ring end gap	Max.	0.5 (0.02)
K	Con-rod small end bore	Max.	12.125 (0.4774)
L	Crankshaft runout	Max.	0.05 (0.002)
M	Sprocket bore	Max.	13.07 (0.5146)
N	Clutch drum bore	Max.	71.5 (2.81)
P	Sprocket wear limit	Max.	0.5 (0.02)

1-5 Service Limits (CS-5100)



			mm (in)
A	Cylinder bore		When plating is worn and aluminium can be seen
B	Piston outer diameter	Min.	44.89 (1.767)
C	Piston pin bore	Max.	11.025 (0.4341)
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.	10.980 (0.4323)
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.	15.025 (0.5915)
L	Crankshaft runout	Max.	0.05 (0.002)
M	Sprocket bore	Max.	15.07 (0.5933)
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	Used for:
1	897801-33330	Tachometer PET-1000	Measuring engine speed to adjust carburettor
2	895612-79920	L-hex wrench (3 mm)	Removing and installing hex. socket bolt (M4)
3	895610-79920	L-hex wrench (4 mm)	Removing and installing hex. socket bolt (M5)
4	897501-03938	Puller	Removing magneto rotor
5	897505-16133	Clutch tool	Removing and assembling clutch assembly
6	897537-30130	Piston stopper	Locking crankshaft rotation
7	897563-19830	Metering lever gauge	Measuring metering lever hight on carburettor
8	897701-02830	Bearing wedge	Removing and crankshaft ball bearings
9	897702-30131	Piston pin tool	Removing and installing piston pin
10	897603-23030	PTO shaft puller	Removing PTO shaft
11	897708-19835	Worm puller	Removing auto-oiler worm
12	Y089-000010	Worm inserter	Installing auto-oiler worm
13	897724-01361	Spring pin tool	Removing and installing spring pin (4 mm or 5/32 in dia.)
14	897726-16431	Oil seal tool	Installing oil seals
15	897800-79931	Spark tester	Checking ignition system
16	897803-30132	Pressure tester	Testing carburettor and crankcase leakage
17	897826-16131	Pressure rubber plug	Plugging intake port to test crankcase / cylinder leakages
18	897827-16131	Pressure plate	Plugging intake port to test crankcase / cylinder leakages
19	91007	Compression gauge	Measuring cylinder compression

2 EMISSION ADJUSTMENT GUIDE

CS-4400

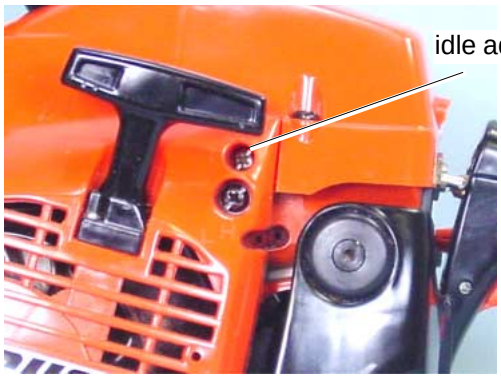
2-1 General adjusting rules

Before starting the unit for adjustment, check the following items.

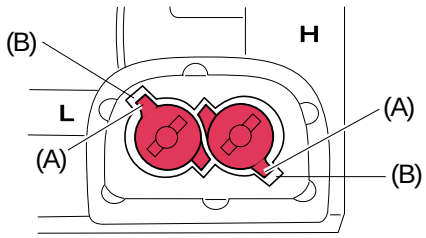
1. The correct spark plug must be clean and properly gapped.
2. The air filter element must be clean and properly installed.
3. The muffler exhaust port must be clear of carbon.
4. The fuel lines, tank vent and fuel filter are in good condition and clear of debris.
5. The fuel is fresh (> 89 octane : RON) and properly mixed at 50 : 1 with “ISO L-EGD” 2-stroke oil.
6. The recommended bar and chain must be installed to the power head, and properly tensioned.

NOTE : Make sure of proper installation of 45 cm guide bar and saw chain when adjusting carburettor, or serious engine damage may occur due to overspeeding.

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



1. Turn the L and H mixture needles out anticlockwise to rich side stop, and meet limiter caps tabs (A) with locating slots (B).



2. Screw 2.5 mm wood screw in the center of the L limiter cap.

NOTE : Screw the wood screw in until it lightly contacts L mixture needle in the cap.

3. Pull the wood screw with limiter cap using pliers.

4. Repeat Step 2 and Step 3 for H limiter cap by hand.

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

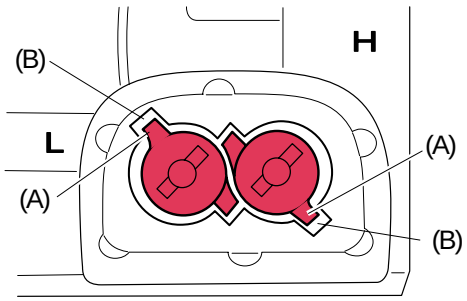
L mixture needles : 1 1/4

H mixture needles : 3

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

6. Turn idle adjust screw anticlockwise and set the screw until the tip to just contact throttle plate. Then turn idle adjust screw 1 1/2 turns clockwise.

CS-4400
2-3 Adjusting carburettor



1. Start engine and warm it up well for 2 - 3 minutes with cycle of 5 seconds at WOT (Wide Open Throttle) and 10 seconds at idling.

2. Using 2.5 mm wide blade screw driver, adjust L mixture needle to obtain maximum idle speed.

3. Set idle speed to 3,500 r/min by turning idle adjust screw (in the range of 3,300 to 3,700 r/min allowable).

4. Turn L mixture needle anticlockwise to reduce engine idle speed 1000 r/min to set idle speed in the range of 2,300 to 2,700 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. Turn H mixture needle anticlockwise at WOT until engine speed drops less than 11,000 r/min.

6. Adjust WOT engine speed in the range of 11,500 to 13,000 r/min by turning H mixture needle clockwise.

NOTE : During H mixture needle adjustment, do not run engine at high speed without load longer than 5 seconds.

7. If the engine speed at WOT is above 13,000r/min, adjust H mixture needle anticlockwise and set maximum engine speed at less than 13,000 r/min.

8. After adjusting carburettor, put the limiter cap on the tip of 2.5 mm wood screw and install the caps on L and H mixture needles.

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

9. Tap the respective limiter caps in as shown.

10. Start engine again and make it sure engine runs at idle speed in the range of 2,300 to 2,800 r/min and at WOT engine speed in the range of 11,500 to 13,000 r/min. Also make it sure chain would not turn at engine idle speed and suitable acceleration.

NOTE : Initial carburettor setting (Idle adjust screw, L and H mixture needles) shown here is to start the engine after restoration or carburettor change. Idle adjust screw, L and H 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.

CS-5100

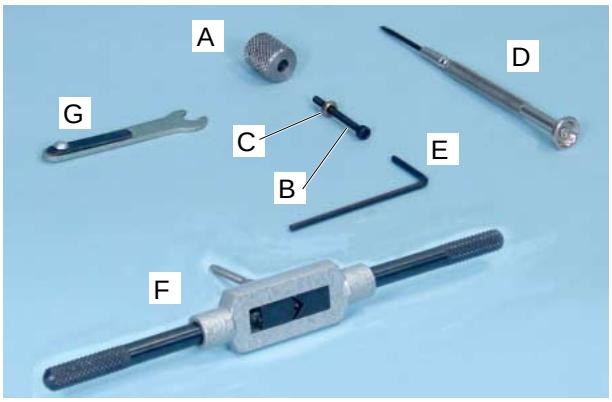
2-1 General adjusting rules

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” 2-stroke oil.
6. The recommended bar and chain must be installed to the power head, and properly tensioned.

NOTE : Make sure of proper installation of 45 cm guide bar and saw chain when adjusting carburettor, or serious engine damage may occur due to overspeeding.

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



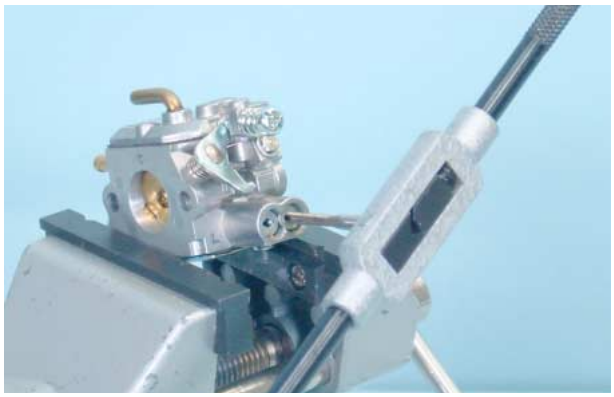
1. Tools

A. Plug extractor body B. 2.5mm Hexagonal socket bolt

C. Nut D. 1.5mm blade screw driver

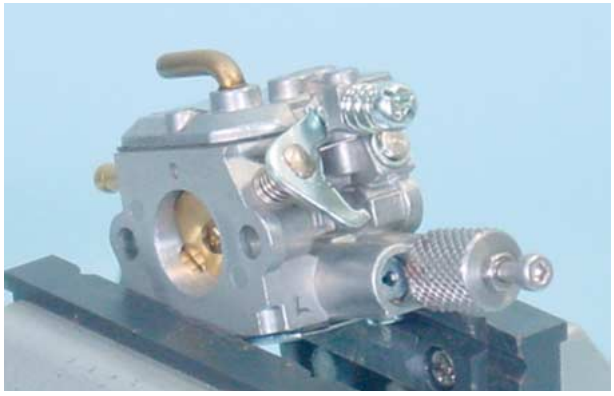
E. L wrench (2mm) F. 2.5mm hand tap

G. Magneto spanner (6mm)

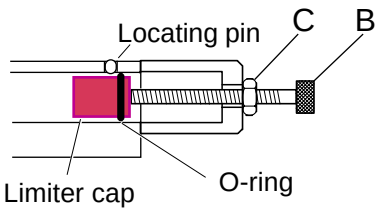


2. Remove carburettor from unit.

3. Make M2.5 x 0.5mm pitch thread using M2.5 hand tap.

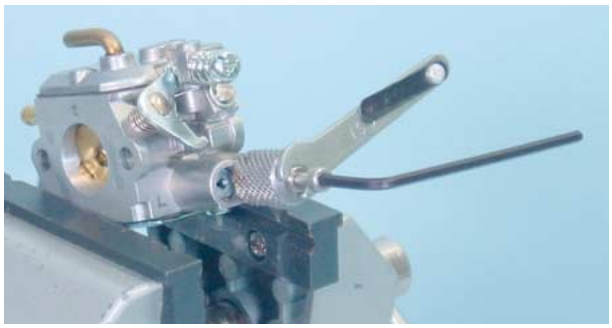


4. Fit the nut (C) on hex. socket bolt (B) near the bolt head. Place extractor body over the limiter cap. Pass the bolt (B) with nut (C) through the hole of the extractor body, and screw the bolt in the limiter cap 5 turns.



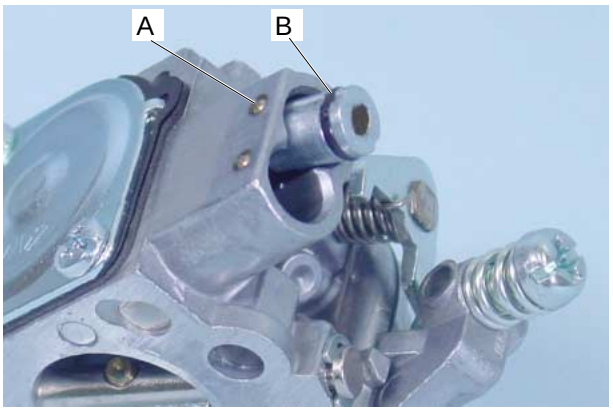
CS-5100

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

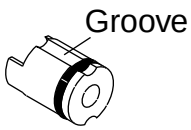


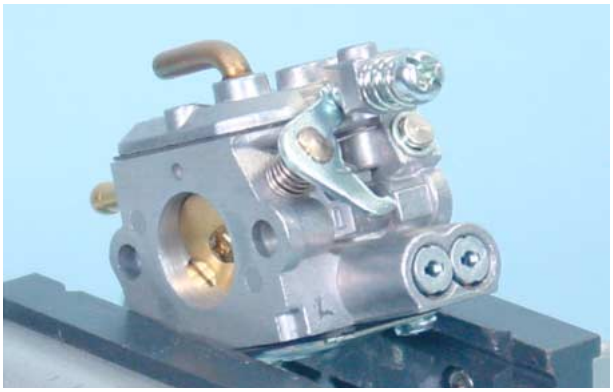
5. While holding bolt with L wrench, turn the nut clockwise to take out the limiter cap.

6. Repeat step No.3 to No.5 for other limiter cap removal.



7. Temporally insert new limiter caps on both L and H mixture needle by aligning groove on limiter cap (B) to locating pin (A) on extension housing. Make it sure that limiter cap face is leveled with extension housing top. Do not press limiter cap deeper at this moment.





8. Turn L and H mixture needles clockwise until lightly seated using 1.5mm blade screw driver, and then turn both needles anticlockwise for following turns.

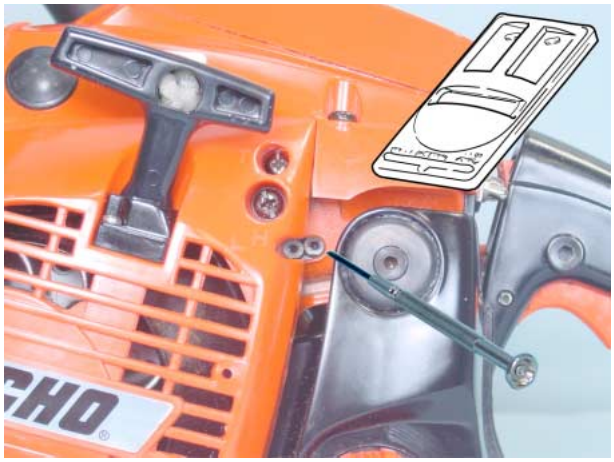
L mixture needle : 1 1/2

H mixture needles : 2 1/4

Even at this stage, do not press limiter caps in.

9. Reinstall the carburettor on the unit.

CS-5100
2-3 Adjusting carburettor



1. Start engine and warm it up well for 2 - 3 minutes with cycle of 5 seconds at WOT (Wide Open Throttle) and 10 seconds at idling.

2. Using 1.5 mm wide blade screw driver, adjust L mixture needle to obtain maximum idle speed.

3. Set idle speed to 3,500 r/min by turning idle adjust screw (in the range of 3,300 to 3,700 r/min allowable).

4. Turn L mixture needle anticlockwise to reduce engine idle speed 1000 r/min to set idle speed in the range of 2,300 to 2,700 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. Turn H mixture needle anticlockwise at WOT until engine speed drops less than 12,000 r/min.

6. Adjust WOT engine speed in the range of 12,500 to 13,500 r/min by turning H mixture needle clockwise.

NOTE : During H mixture needle adjustment, do not run engine at high speed without load longer than 5 seconds.

7. If the engine speed at WOT is above 13,500 r/min, adjust H mixture needle anticlockwise and set maximum engine speed at less than 13,500 r/min.

8. After adjusting carburettor, Press the caps on L and H mixture needles as shown.

9. Start engine again and make it sure engine runs at idle speed in the range of 2,300 to 2,800 r/min and at WOT engine speed in the range of 12,500 to 13,500 r/min. Also make it sure chain would not turn at engine idle speed and suitable acceleration.

NOTE : Initial carburettor setting (Idle adjust screw, L and H mixture needles) shown here is to start the engine after restoration or carburettor change. Idle adjust screw, L and H 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.