



SERVICE DATA

CHAIN SAW

ECHO: CS-4310SX

(Serial number : C86038000001 - C86038999999)
(Serial number : C92440000001 - C92440999999)

shindaiwa: 431sx

(Serial number : C86138000001 - C86138999999)
(Serial number : C92540000001 - C92540999999)

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.

Carburetor Adjustment Video

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Reference No. **01-43A-02**

REVISED: 202211

ISSUED: 202106



1 SERVICE INFORMATION**1-1 Specifications**

Dimensions	Length*	mm(in)	416 (16.4)
	Width	mm(in)	225 (8.9)
	Height	mm(in)	277 (10.9)
Dry weight*		kg(lb)	4.3 (9.6)
Engine	Type	YAMABIKO, stratified scavenging, air-cooled, two-stroke, single cylinder	
	Rotation	Clockwise as viewed from the output end	
	Displacement	cm ³ (in ³)	42.9 (2.618)
	Bore	mm(in)	42.0 (1.654)
	Stroke	mm(in)	31.0 (1.220)
	Compression ratio	7.3	
Carburetor	Type	Diaphragm, horizontal-draft	
	Model	Walbro HD-68	
	Venturi size-Throttle bore	mm(in)	16.7 - 20.6 (0.657 - 0.811)
Ignition	Type	CDI (Capacitor discharge ignition) system, Digital Magneto	
	Spark plug	NGK CMR7H	
Exhaust	Muffler type	Spark arrester muffler	
Starter	Type	ES (Effortless-Start) / S (Soft-start)	
	Rope diameter x length	mm(in)	3.5 x 950 (0.14 x 37.40)
Fuel	Type**	Mixed two-stroke fuel	
	Mixture ratio	50 : 1 (2 %)	
	Gasoline	Minimum 89 octane	
	Two-stroke air cooled engine oil	ISO-L-EGD (ISO/CD13738), JASO FC/FD	
	Tank capacity	L (UK.fl.oz.)	0.4 (13.5)
Clutch	Type	Centrifugal type, 3-shoe slide with 3-tension spring	
Guide bar / Saw chain lubrication type		Adjustable automatic oiler	
Oil	Tank capacity	L (UK.fl.oz.)	0.27 (9.1)
Auto oiler	Type	Clutch driven type	
Sprocket	Type	Floating rim	
	Number of teeth	7	
	Pitch	in	0.325

* Without guide bar and saw chain.

** Premixed alkylate fuel for 2-stroke can be used.

Cutting devices						
Guide bar	Type	Y33R20-56ML	Y35R20-60ML	Y40R20-68ML	Y45R20-72AL	
	Called length	cm	33	35	40	45
	Gauge	in	0.050			
Saw chain	Type	Oregon 95TXL				
	Number of drive links	56	60	68	72	
	Pitch	in	0.325			
	Gauge	in	0.050			

1-2 Technical data

Engine			
Compression pressure	MPa (kgf/cm ²) (psi)	1.08 (11.0) (157)	
Clutch engagement speed	r/min	4000	
Ignition system			
Spark plug gap	mm(in)	0.6 - 0.7 (0.024 - 0.028)	
Spark test	Tester gap w/ spark plug	mm(in)	4.0 (0.16)
	Tester gap w/o spark plug	mm(in)	6.0 (0.24)
Secondary coil resistance	kΩ	3 - 30	
Pole shoe air gaps	mm(in)	0.3 - 0.4 (0.012 - 0.016)	
Ignition timing	at 3000 r/min	°BTDC	13
	at 10500 r/min	°BTDC	28
Carburetor			
Test Pressure, minimum	MPa (kgf/cm ²) (psi)	0.05 (0.5) (7.0)	
Metering lever height	mm(in)	Flush with diaphragm seat	
Limiting cap / plug		-	
Tool to adjust mixture needles		D-shaped tool (L) P/N X645-000032 (Carb. adjustment tool P/N Y089-000095)	
Carburetor adjustment			
Fuel type		Mixed two-stroke fuel	Premixed alkylate fuel
1) Initial setting	H mixture needle	turn out	3 1/2
	L mixture needle	turn out	2
	Throttle adjust screw	turn in* ¹	2
Engine warm-up	Idle - WOT : Total	sec.	5 - 5 : 150
2) Find idle maximum speed			Adjust L mixture needle to maximum idle speed.* ²
3) Set idle maximum speed w/ TAS		r/min	3800
4) Set idle speed by turning L mixture needle CCW		r/min	2800
5) Confirm H mixture needle position before WOT setting			Turn H mixture needle CCW to confirm engine speed decreases less than or equal to 12500 r/min.
6) WOT setting			Turn H mixture needle CW in 1/8 turn increment with the engine at idle, then accelerate to WOT and check engine speed. The final engine speed should fall within
		r/min	13200-13600 12800-13200
7) Verify final engine speed with standard equipment			Idle: 2700 - 3000
		r/min	WOT: 13200-13600 WOT: 12800-13200
8) Verify clutch engagement speed			Confirm clutch engagement speed. If it is less than 1.25 times the idle speed, adjust the idle speed by turning TAS CCW.
Chain oil discharge volume	mL/min(UK.fl.oz./min)	Adjustable: 3.0 - 16.5 (0.10 - 0.58) (Factory set: 7 mL/min)	

BTDC: Before top dead center. **WOT:** Wide open throttle **CCW:** Counterclockwise **TAS:** Throttle adjust screw

*¹ Set Throttle adjust screw to the point that its tip just contacts throttle plate before initial setting.

*² If clutch engages during adjustment process 2), decrease engine speed by turning TAS CCW until clutch disengages and then redo 2).

1-3 Torque limits

Descriptions		Size	kgf•cm	N•m	in•lbf	
Starter system	Starter pawls	M5	40 - 60	4 - 6	35 - 52	
	Starter center shaft screw	M5	30 - 40	3 - 4	26 - 35	
	Starter case	M4	20 - 30	2 - 3	17 - 26	
Ignition system	Magneto rotor	M8	250 - 290	25 - 29	220 - 255	
	Ignition coil	M4	35 - 50	3.5 - 5	30 - 45	
	Spark plug	M10	100 - 150	10 - 15	90 - 135	
Fuel system	Carburetor	M4	20 - 30	2 - 3	17 - 26	
	Intake insulator	M4*	10 - 20	1 - 2	9 - 17	
	Intake bellows	M4	30 - 45	3 - 4.5	26 - 40	
Clutch	Clutch assembly	LM12	300 - 400	30 - 40	262 - 350	
Engine	Crankcase	Starter side	M5 x 30	70 - 90	7 - 9	60 - 80
			M5 x 16	40 - 50	4 - 5	35 - 45
		Clutch side	M4	20 - 30	2 - 3	17 - 26
	Cylinder	M5	70 - 90	7 - 9	60 - 80	
	Muffler	M5	70 - 90	7 - 9	60 - 80	
	Muffler plate	M4	20 - 30	2 - 3	17 - 26	
	Others	Auto-oiler	M4	25 - 35	2.5 - 3.5	22 - 30
Cylinder cover		M4	20 - 30	2 - 3	17 - 26	
Compression spring		M5 [†]	30 - 40	3 - 4	26 - 35	
Rear handle		M5 [†]	25 - 35	2.5 - 3.5	22 - 30	
Front handle		M5	50 - 70	5 - 7	45 - 60	
Spike		M5	70 - 90	7 - 9	60 - 80	
Brake lever (Hand guard)		M5	50 - 60	5 - 6	45 - 52	
Brake cover		M4*	15 - 25	1.5 - 2.5	13 - 22	
Chain catcher		M5	50 - 70	5 - 7	45 - 60	
Chain tensioner		M4*	15 - 25	1.5 - 2.5	13 - 22	
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

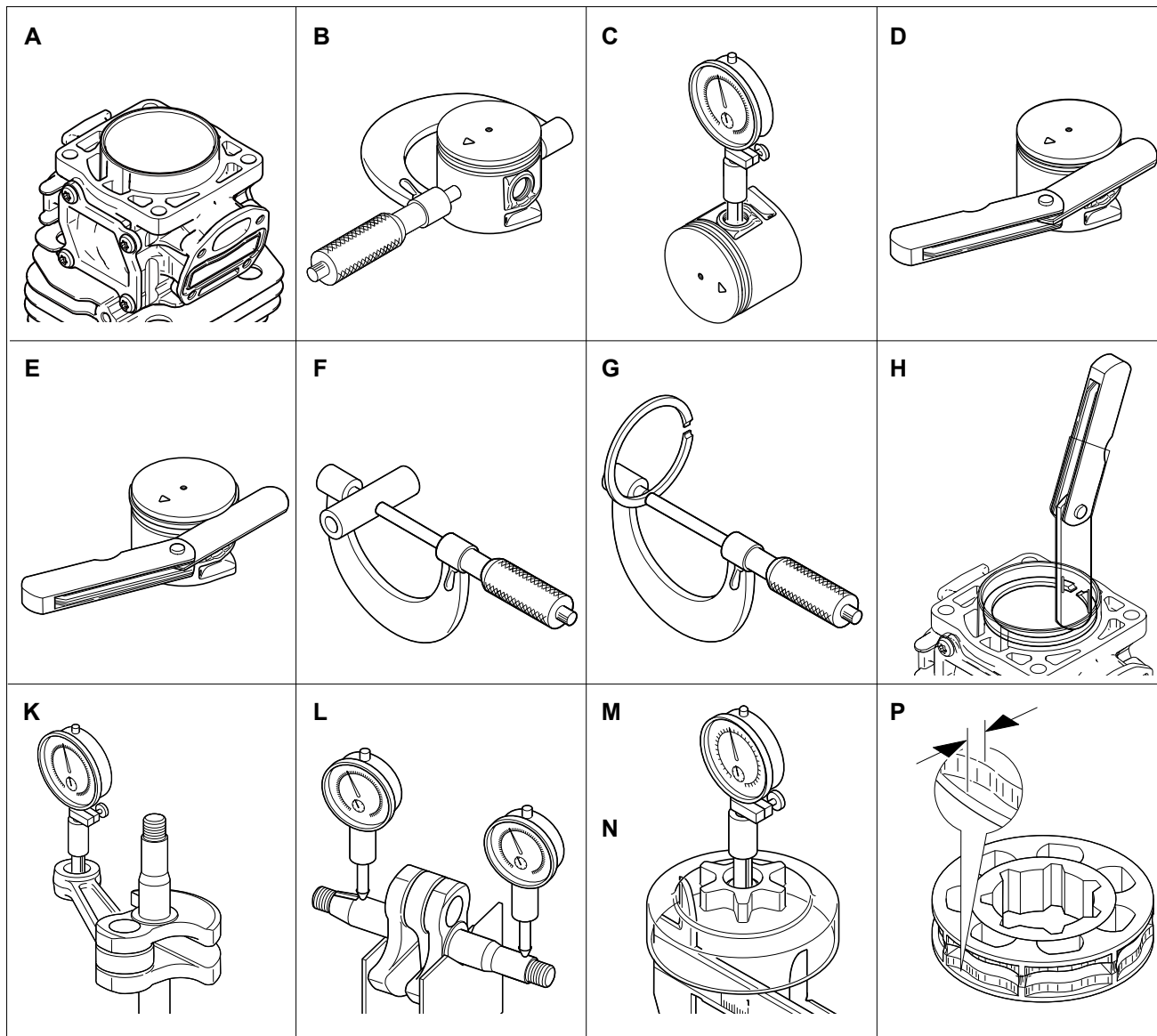
*Apply special repairing materials (See below)

† Tapping screw

1-4 Special maintenance materials

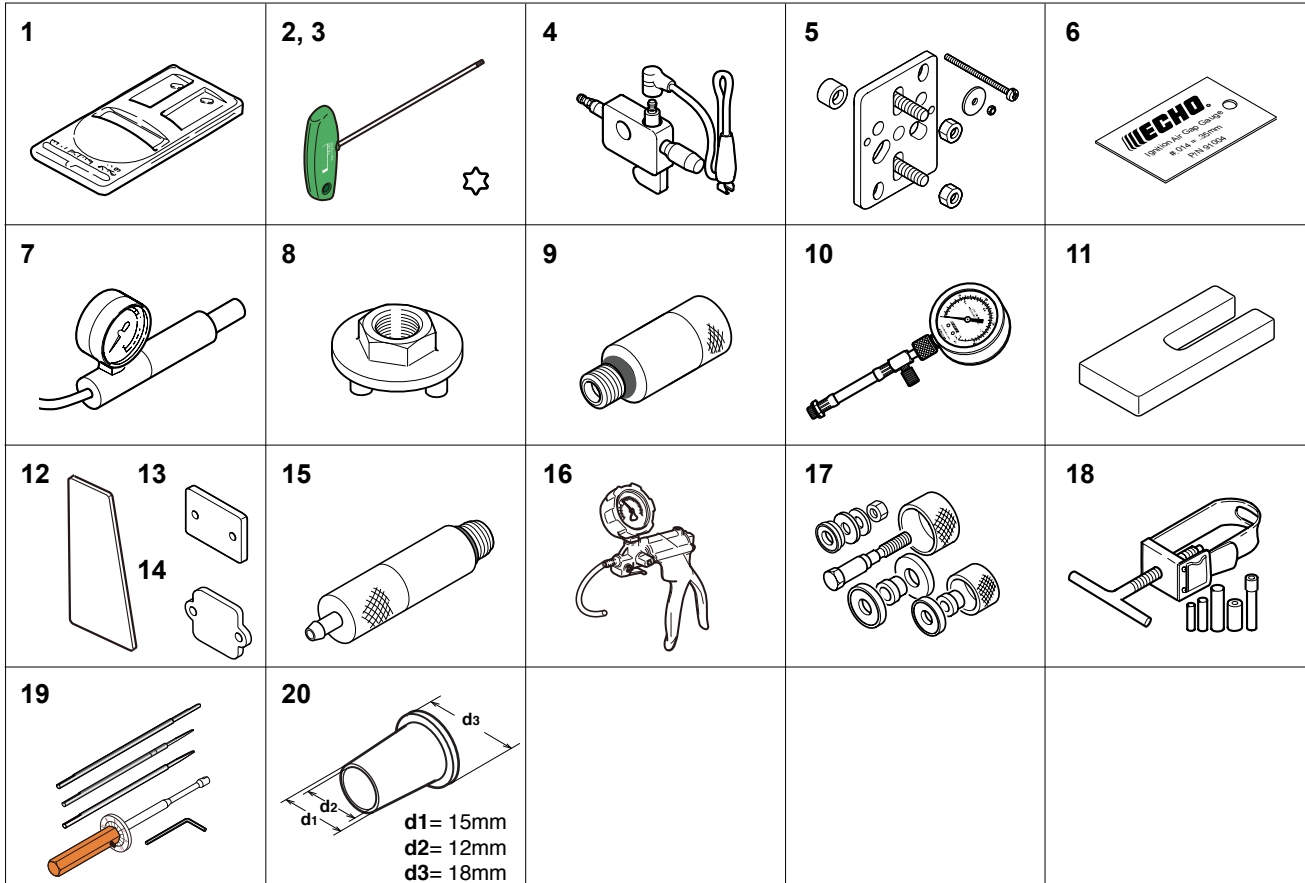
Material	Location	Remarks
Thread locking sealant	Intake insulator	ThreeBond #1344J or equivalent
	Brake cover	
	Chain tensioner	
Grease	Clutch needle bearing	EPNOC AP2 (Lithium based grease) P/N X695-000060
	Recoil starter	
	Worm gear	
	Oil seal inner lips	
	Gear, Auto-oiler	
	Crankshaft, Clutch side	

1-5 Service Limits



Description		mm (in)
A	Cylinder bore	When plating is worn and aluminium can be seen
B	Piston outer diameter	Min. 41.90 (1.650)
C	Piston pin bore	Max. 10.035 (0.3951)
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. 9.98 (0.3929)
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. 14.025 (0.5522)
L	Crankshaft run out	Max. 0.02 (0.001)
M	Sprocket bore	Max. 12.80 (0.5039)
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	897802-33330	Tachometer PET-1000R	Measuring engine speed to adjust carburetor
2	X602-000320	Torx wrench (T20)	Removing and installing Torx bolts
3	X602-000340	Torx wrench (T27)	Removing and installing Torx bolts
4	897800-79931	Spark tester	Checking ignition system
5	Y089-000111	Puller	Removing magneto rotor (flywheel)
6	91004	Module air gap gauge	Adjusting pole shoe air gaps
7	897803-30133	Pressure tester	Testing carburetor and crankcase leakage
8	897505-16133	Clutch tool	Removing and installing clutch assembly
9	P021-051690	Adapter	Measuring cylinder compression (with P/N: 91037)
10	91037	Compression gauge	Measuring cylinder compression
11	897719-02830	Piston holder	Making piston steady to remove and install piston/ring
12	91041	Pressure rubber plug	Plugging exhaust port to test crankcase / cylinder leakages
13	897826-16131	Pressure rubber plug	Plugging intake port to test crankcase / cylinder leakages
14	897827-16131	Pressure plate	Plugging intake port to test crankcase / cylinder leakages
15	A131-000160	Pressure connector	Testing crankcase and cylinder leakage
16	91149	Pressure / vacuum tester	Testing tank vent and crankcase leakages
17	897701-14732	Bearing tool	Removing and installing ball bearings on crankcase
18	897702-30131	Piston pin tool	Removing and installing piston pin
19	Y089-000095	Carburetor adjustment tool	Adjusting carburetor
20	X646-000150	Collar oil seal tool	Set oil seal collect position

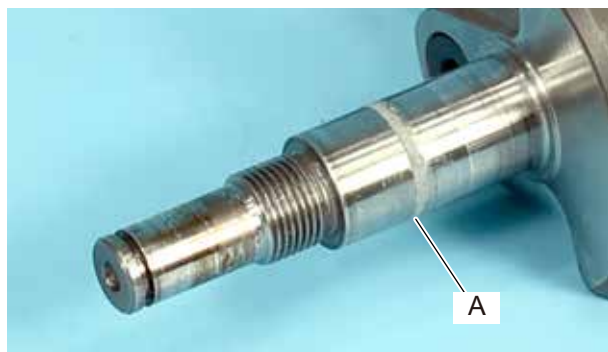
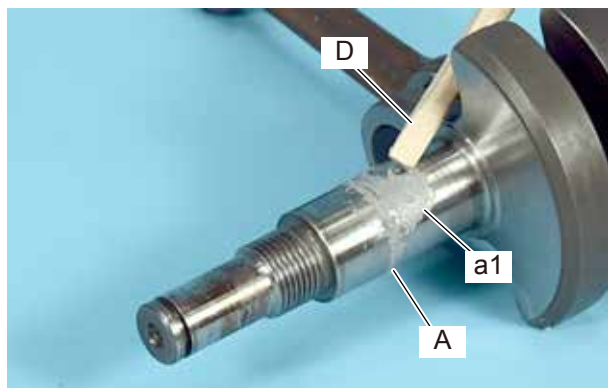
2 SERVICE HINT

2-1 Assembling crankshaft and crankcase

Assemble crankshaft and crankcase in the following procedures to avoid inner lips of oil seal from being turned up due to groove of crankshaft at clutch side.

Tools required:

- Liquid gasket (A)
(ThreeBond #1207D X686-000000 or equivalent)
- Collar oil seal tool X646-000150 (B)
- M5 bolt of length 40 - 50 mm (C): 3 pics



1. Apply liquid gasket (A) on groove of crankshaft at clutch side to fill the groove.
2. After the gasket (A) is dry, remove excess portion (a1) of the gasket with wooden stick (D).

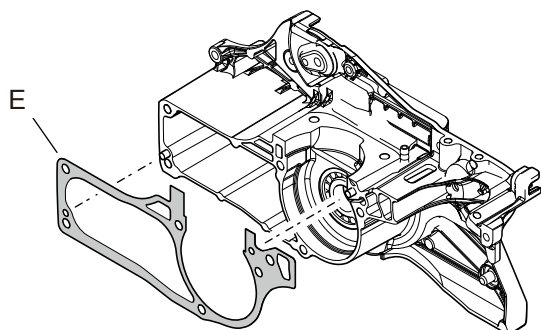
NOTE: Do not use metal tools, or damage to crankshaft may result.

3. Make sure that the gasket (A) is flat with crankshaft surface as shown.

4. Clean mating surface of crankcase.
5. Apply Lithium based grease (EPNOC AP2 X695-000060 or equivalent) on inner lips of oil seal.
6. Heat ball bearings on both side of crankcase for easy installation.

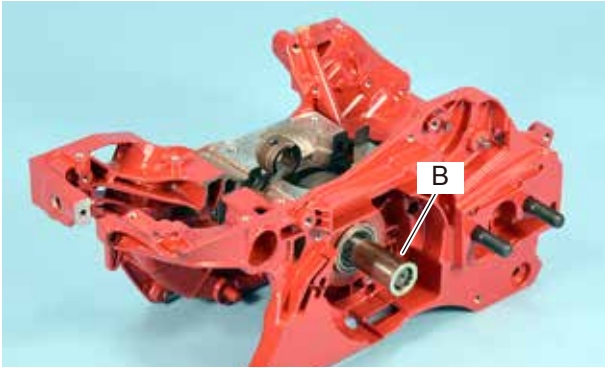
WARNING **DANGER**

When using a heat gun, put on gloves. Otherwise, a burn will result.



7. Place new crankcase gasket (E) on clutch side of crankcase.

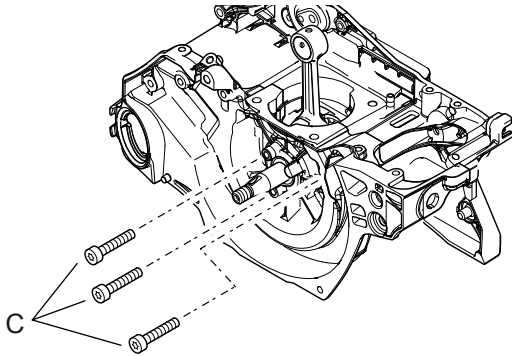
2-1 Assembling crankshaft and crankcase (Continued)



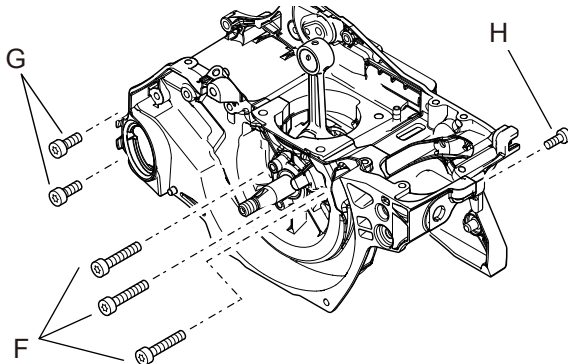
8. Insert Collar oil seal tool (A) into inner lips of oil seal on crankcase at clutch side until the tool contacts ball bearing.

9. Insert crankshaft into clutch side of crankcase through Collar oil tool (A) as shown.

10. Insert crankshaft into magneto side of crankcase.



11. Tighten three M5 bolts (C) of length 40 - 50 mm to make about 10 mm gap between two halves of crankcase. Then, remove the bolts (C).

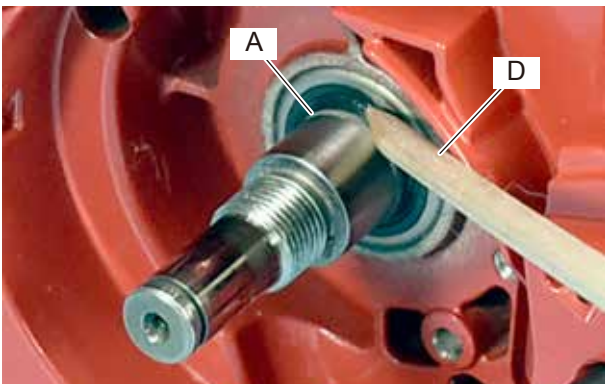


12. Tighten original bolts (F) to secure crankcase halves together diagonally.

13. Tighten bolts (G) and (H).

14. Check crankshaft for smooth rotation.

NOTE: If crankshaft doesn't rotate smoothly, tap both ends of crankshaft with plastic mallet several times. And recheck crankshaft for smooth rotation.



15. Remove the liquid gasket (A) with wooden stick (D).

NOTE: Do not use metal tools, or damage to crankshaft may result.

16. Carefully remove excess portion of crankcase gasket (E) with sharp knife.

