



SERVICE DATA

CHAIN SAW

ECHO: CS-420ES

(Serial number : 37000001 and after)
(Serial number : 38000001 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.

ECHO SERVICE MANUAL Ref. 401-29 (Model : CS-370ES, CS-420ES) contains lots of information for servicing this model.

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Reference No. **01-40C-01**
REVISED : 201903
ISSUED: 200912



1 SERVICE INFORMATION

1-1 Specifications

Dimensions	Length*	mm(in)	393 (15.5)
	Width	mm(in)	245 (9.6)
	Height	mm(in)	277 (10.9)
Dry weight*		kg(lb)	4.6 (10.1)
Engine	Type		YAMABIKO, air-cooled, two-stroke, single cylinder
	Rotation		Clockwise as viewed from the output end
	Displacement	cm ³ (in ³)	40.2 (2.453)
	Bore	mm(in)	40.0 (1.575)
	Stroke	mm(in)	32.0 (1.260)
	Compression ratio		6.5
Carburetor	Type		Diaphragm horizontal-draft with auto-return choke
	Model		Walbro WT-980
	Venturi size-Throttle bore	mm(in)	13.5 - 15.85 (0.532 - 0.624)
Ignition	Type		CDI (Capacitor discharge ignition) system, Digital Magneto
	Spark plug		NGK BPMR8Y
Exhaust	Muffler type		Spark arrester muffler with catalyst
Starter	Type		ES (Effortless-Start)
	Rope diameter x length	mm(in)	3.5 x 950 (0.14 x 37.4)
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 (U.S.fl.oz.)	0.41 (13.9)
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 driven type
Sprocket	Type		Spur
	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		C38S21-64AA C45S21-72AA
	Called length	cm	38 45
	Gauge	in	0.058
Saw chain	Type		OREGON 21BPX, Carlton K2L
	Number of drive links		64 72
	Pitch	in	0.325
	Gauge	in	0.058

1-2 Technical data

Engine			
Compression pressure	MPa (kgf/cm ²) (psi)		0.88 (8.9) (127)
Clutch engagement speed	r/min		4,100
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		1.5 - 2.2
Pole shoe air gaps	mm(in)		0.3 - 0.4 (0.012 - 0.016)
Ignition timing	at 3,000 r/min	°BTDC	10
	at 8,000 r/min	°BTDC	32
	at 10,000 r/min	°BTDC	34
Carburetor			
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
Tool to adjust mixture needles			D-shaped tool (L) P/N X645-000031
Carburetor adjustment			
1) Initial setting	H mixture needle	turn out	2 3/4
	L mixture needle	turn out	1 3/8
	Throttle adjust screw	turn in* ¹	1 3/8
Engine warm-up	Idle - WOT : Total	sec.	5 - 5 : 120
2) Find idle maximum speed			Adjust L mixture needle to maximum idle speed* ²
3) Set idle maximum speed w/ TAS		r/min	3,500
4) Set idle speed by turning L mixture needle CCW		r/min	2,600
5) Confirm H mixture needle position before WOT setting			Turn H mixture needle CCW to confirm engine speed decreases less than or equal to 11,500 r/min.
6) WOT setting		r/min	Turn H mixture needle CW in 1/8 turn increments with the engine at idle, then accelerate to WOT and check engine speed. The final engine speed should fall within: 11,600 - 12,100
7) Verify final engine speed with standard equipment		r/min	Idle: 2,400 - 2,900 WOT: 11,500 - 12,200
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 at 7,000 r/min			Adjustable: 1.5 - 13 (0.05 - 0.43) (Factory set: 7 mL/min)
	mL/min (US.fl.oz./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 chain starts to rotate during adjustment process step 2), decrease engine speed by turning TAS ACW until chain stops and then redo step 2). Repeat this until chain no longer rotates after the adjustment step 2).

1-3 Torque limits

Descriptions		Size	kgf•cm	N•m	in•lbf	
Starter system	Starter pawl	M5**	40 - 60	4 - 6	35 - 52	
	Starter case	M5 [†]	40 - 55	4 - 5.5	35 - 48	
Ignition system	Flywheel (Magneto rotor)	M8	250 - 290	25 - 29	220 - 255	
	Ignition coil	M5	40 - 60	4 - 6	35 - 52	
	Ignition switch	M14	15 - 30	1.5 - 3	13 - 26	
	Spark plug	M14	130 - 170	13 - 17	110 - 150	
Fuel system	Carburetor	M5	30 - 45	3 - 4.5	26 - 40	
	Carburetor elbow	M5	20 - 40	2 - 4	17 - 35	
	Intake bellows	M5	30 - 45	3 - 4.5	26 - 40	
Clutch	Clutch hub	LM8	300 - 400	30 - 40	262 - 350	
Engine	Crankcase	M5	70 - 110	7 - 11	60 - 95	
	Engine mount	M5	70 - 110	7 - 11	60 - 95	
	Muffler	M5	80 - 110	8 - 11	70 - 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	Muffler side	M5 [†]	35 - 50	3 - 5	26 - 45
		Carburetor side	M4	25 - 40	2.5 - 4	18 - 35
	Brake cover	M4**	10 - 20	1 - 2	9 - 17	
	Rear handle lid	M4 [†]	10 - 20	1 - 2	9 - 17	
	Brake lever (Hand guard)	Starter side	M5	45 - 65	4.5 - 6.5	40 - 55
		Clutch side	M4**	20 - 30	2 - 3	17 - 26
	Sprocket guard plate	M4**	20 - 30	2 - 3	17 - 26	
	Spike	M5 [†]	45 - 65	4.5 - 6.5	40 - 55	
	Chain catcher	M5	45 - 65	4.5 - 6.5	40 - 55	
	Guide bar nut	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 [†] Tapping screw

* Apply thread locking sealant. (See "1-4 Special repairing materials")

** Precoat bolt: If the coat is peeled off, replace new one or apply ThreeBond #1324N or equivalent.

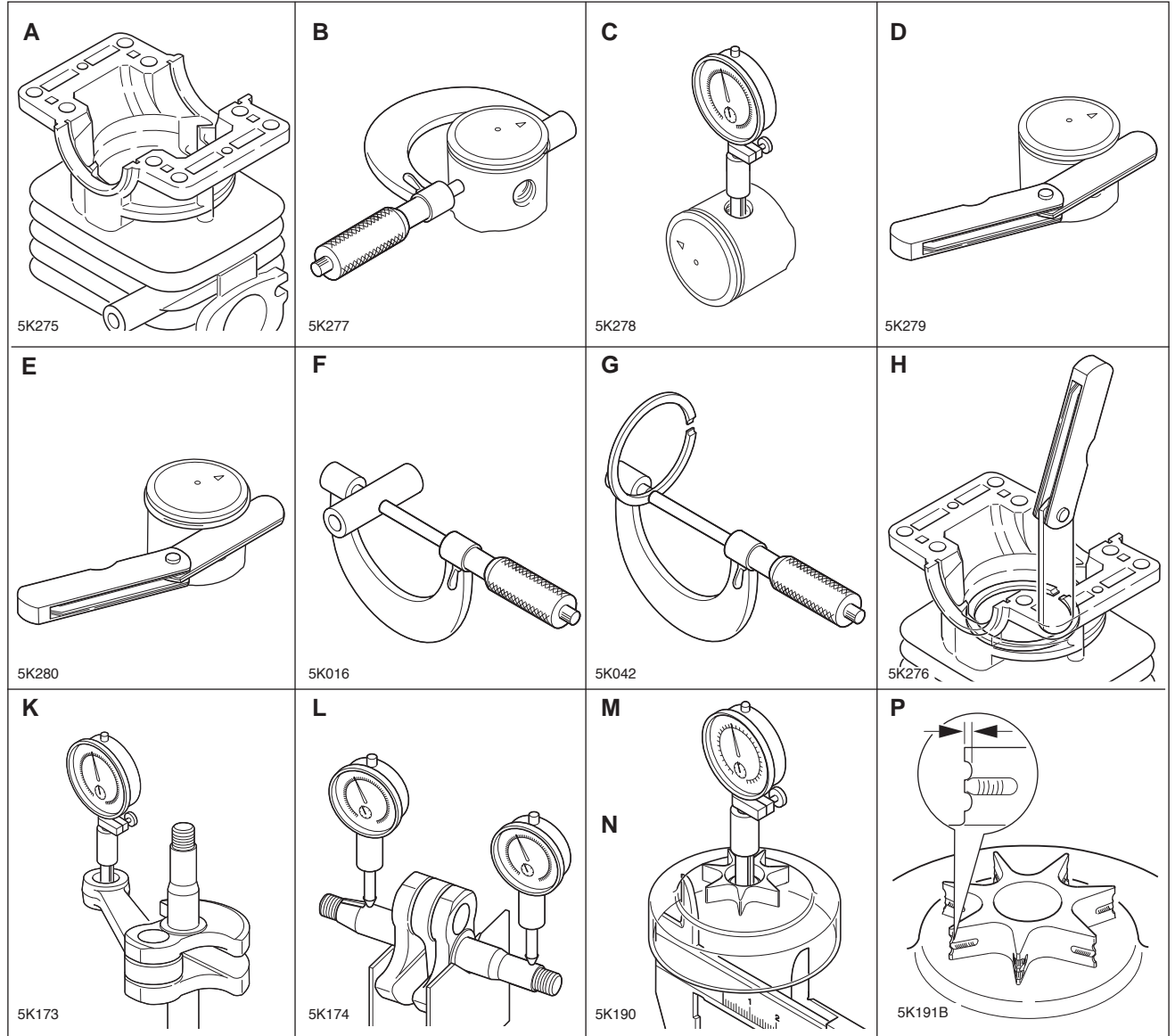
NOTE: If old thread locking sealant is left in threads, correct torque may not be secured.

In case old thread locking sealant is left, remove it.

1-4 Special repairing materials

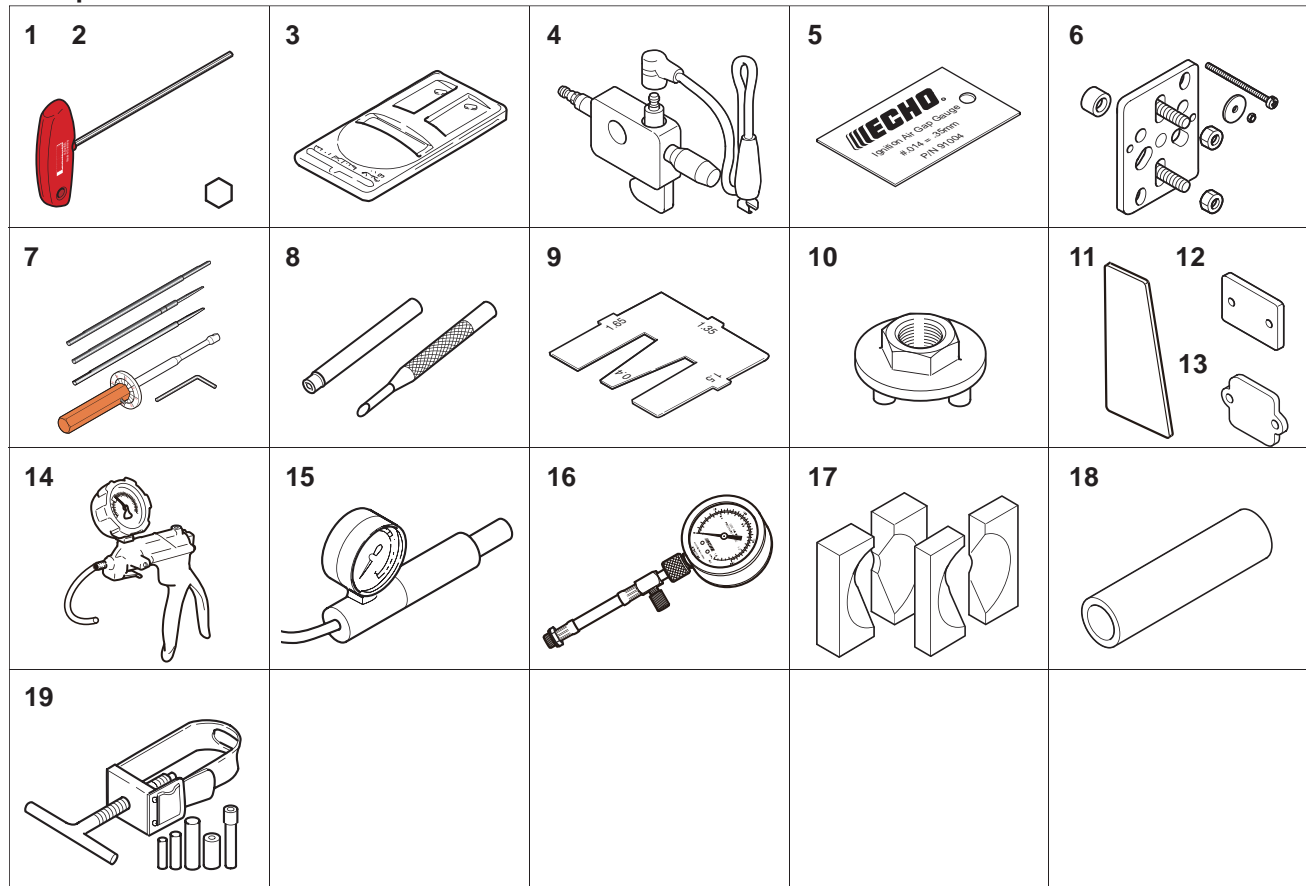
Material	Location	Remarks
Thread locking sealant	Cylinder cover	ThreeBond #1344J or equivalent
Liquid gasket	Crankcase seams	ThreeBond #1207D or equivalent
Adhesive	Ball bearing outer / crankcase	Loctite #638 or equivalent
	Pulse pipe joint	Loctite #675 or equivalent
	Engine cover cushions (Rear handle side)	Loctite #424 or equivalent
Grease	Recoil starter	EPNOC AP2 (Lithium based grease) P/N X695-000060
	Needle bearing, clutch	
	Worm gear	
	Auto-oiler	
	Oil seal lips	
	Rear handle cushions	
	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 aluminum can be seen	
B	Piston outer diameter	Min.	39.89 (1.570)
C	Piston pin bore	Max.	9.030 (0.3555)
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.	8.98 (0.3535)
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.	12.025 (0.4734)
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)

1-6 Special tools



Key	Part Number	Description	Reference
1	X602-000350	T-hex. wrench	Removing and installing hex. head bolt (M4)
2	X602-000360	T-hex. wrench	Removing and installing hex. head bolt (M5)
3	897802-33330	Tachometer PET-1000R	Measuring engine speed to adjust carburetor
4	897800-79931	Spark tester	Checking ignition system
5	91004	Module air gap gauge	Adjusting pole shoe air gaps
6	Y089-000111	Puller	Removing magneto rotor (flywheel) and crankcase
7	Y089-000094	Carburetor adjustment tool	Adjusting carburetor
8	500-500	Welch plug tool (Walbro)	Removing and installing welch plug
9	897563-19830	Metering lever gauge	Measuring metering lever height on carburetor
10	897505-16133	Clutch tool	Removing and installing clutch assembly
11	91041	Pressure rubber plug	Plugging exhaust port to test crankcase/cylinder leakages
12	897826-16131	Pressure rubber plug	Plugging intake port to test crankcase/cylinder leakages
13	897827-16131	Pressure plate	Plugging intake port to test crankcase/cylinder leakages
14	91149	Pressure / vacuum tester	Testing crankcase / cylinder leakages
15	897803-30133	Pressure tester	Testing carburetor and crankcase leakage
16	91037	Compression gauge	Measuring cylinder compression
17	897701-02830	Bearing wedge	Removing ball bearings on crankshaft
18	897726-09130	Oil seal tool	Installing oil seals
19	897702-30131	Piston pin tool	Removing and installing piston pin