



# SERVICE DATA

## CHAIN SAW

### ECHO: CS-281WES

(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.

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Reference No. **00-27E-01**

**REVISED: 201903**

ISSUED: 201407



## 1 SERVICE INFORMATION

## 1-1 Specifications

Model			CS-281WES
Dimensions	Length*	mm(in)	380 (14.96)
	Width	mm(in)	230 (9.06)
	Height	mm(in)	234 (9.21)
Dry weight*		kg(lb)	3.1 (6.8)
Engine	Type		YAMABIKO, air-cooled, two-stroke, single cylinder
	Rotation		Clockwise as viewed from the output end
	Displacement	cm <sup>3</sup> (in <sup>3</sup> )	26.9 (1.641)
	Bore	mm(in)	35.0 (1.378)
	Stroke	mm(in)	28.0 (1.102)
	Compression ratio		7.1
Carburetor	Type		Diaphragm horizontal-draft
	Model		Walbro WT-1108
	Venturi size-Throttle bore	mm(in)	11.11 - 14.3 (0.437 - 0.562)
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 750 (0.14 x 29.5)
Fuel	Type**		Mixed two-stroke fuel
	Mixture ratio		50 : 1 (2 %)
	Gasoline		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.)	0.24 (8.1)
Clutch	Type		Centrifugal, 3-shoe slide with 3-tension spring
Guide bar / Saw chain lubrication type			Adjustable automatic oil pump
Oil	Tank capacity	L (U.S.fl.oz.)	0.16 (5.4)
Auto oiler	Type		Clutch driven type
Sprocket	Type		Spur

\* Without guide bar and saw chain.

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

Cutting devices		Sprocket nose bar			Carving
Guide bar	Type	C20S91-35SA	C25S91-40SL	C30S91-47ML	C30H25-68CL
	Called length	cm	20	25	30
	Gauge	in	0.050		
Saw chain	Type	Carlton N1C-BL OREGON 91PX			OREGON 25A / 25AP
	Number of drive links	35	40	47	68
	Pitch	in	3/8		
	Gauge	in	0.050		
Sprocket	Number of teeth	6			8
	Pitch	in	3/8		

## 1-2 Technical data

Engine			
Compression pressure	MPa (kgf/cm <sup>2</sup> ) (psi)		1.01 (10.3) (147)
Clutch engagement speed	r/min		4,400
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		0.98 - 1.20
Pole shoe air gaps	mm(in)		0.3 - 0.4 (0.012 - 0.016)
Ignition timing	at 3,000 r/min	°BTDC	15
	at 8,000 r/min	°BTDC	31
	at 10,000 r/min	°BTDC	32
Carburetor			
Test Pressure, minimum	MPa (kgf/cm <sup>2</sup> ) (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 (Carb. adjustment tool P/N Y089-000094)
Carburetor adjustment			
1) Initial setting	H mixture needle	turn out	3 3/4
	L mixture needle	turn out	2 1/2
	Throttle adjust screw	turn in* <sup>1</sup>	2
Engine warm-up	Idle - WOT : Total	sec.	5 - 10 : 100
2) Find idle maximum speed			Adjust L mixture needle to maximum idle speed* <sup>2</sup>
3) Set idle maximum speed w/ TAS		r/min	4,200
4) Set idle speed by turning L mixture needle CCW		r/min	3,200
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: 12,300 - 12,500
7) Verify final engine speed with standard equipment		r/min	Idle: 3,000 - 3,500 WOT: 12,000 - 12,800
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	mL/min (US.fl.oz./min)		Adjustable: 1.5 - 13 (0.05 - 0.43) (Factory set: 7 mL/min)

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

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

\*<sup>2</sup> If chain starts to rotate during adjustment process step 2), decrease engine speed by turning TAS CCW until chain stops and then redo step 2). Repeat this until chain no longer rotates after the adjustment step 2).

**1-3 Torque limits**

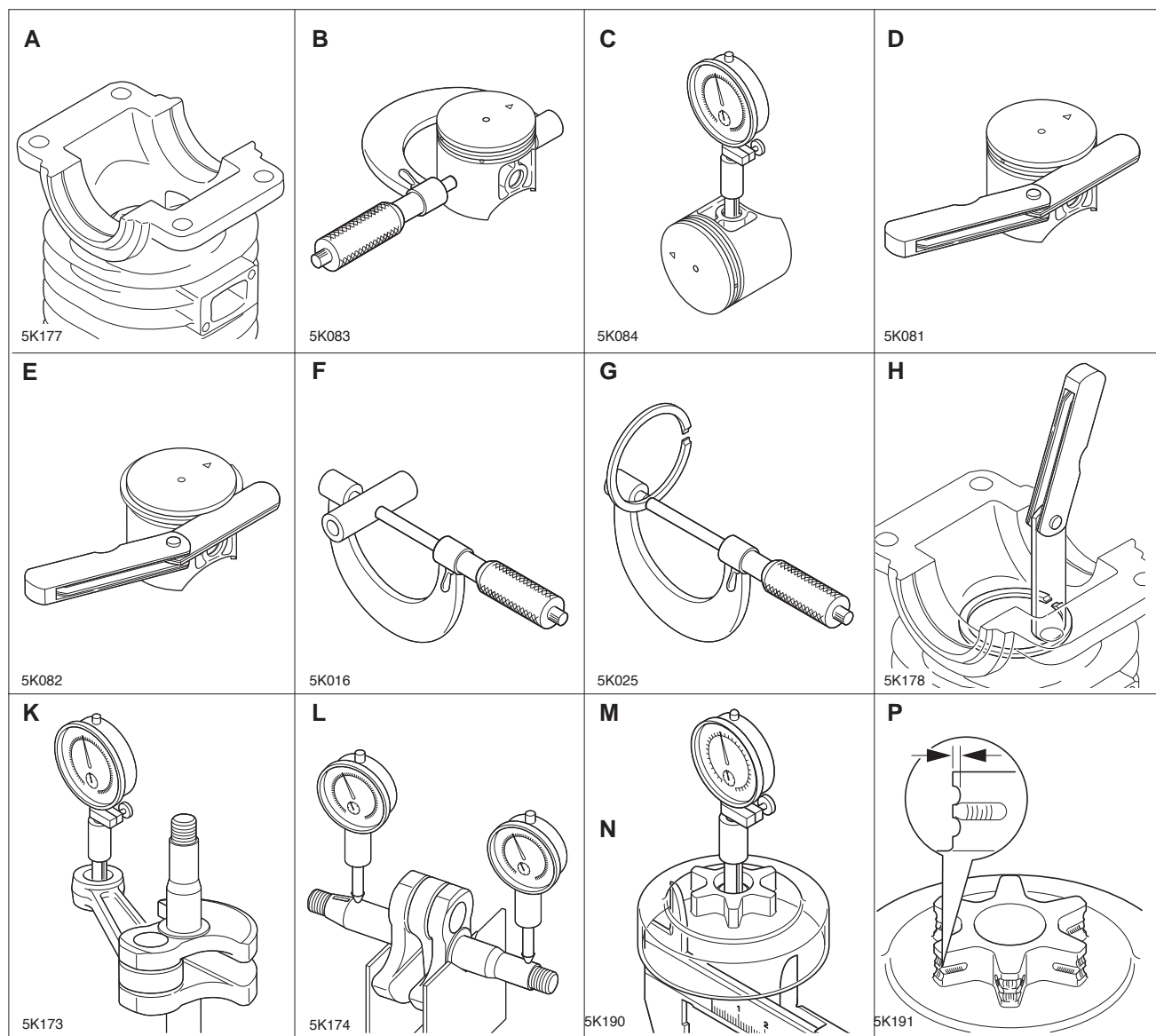
Descriptions		Size	kgf•cm	N•m	in•lbf	
Starter system	Starter pawl	M5*	30 - 45	3 - 4.5	25 - 40	
	Starter case	M4	10 - 20	1 - 2	9 - 18	
Ignition system	Magneto rotor (Flywheel)	M8	250 - 290	25 - 29	220 - 255	
	Ignition coil	M5*	30 - 45	3 - 4.5	25 - 40	
	Ignition switch	M10	15 - 30	1.5 - 3	13 - 25	
	Spark plug	M14	130 - 170	13 - 17	113 - 150	
Fuel system	Carburetor	M5	30 - 45	3 - 4.5	25 - 40	
	Intake bellows	M4	35 - 50	3.5 - 5	30 - 45	
Clutch	Clutch hub	LM10	230 - 260	23 - 26	200 - 230	
Engine	Crankcase	M5*	55 - 95	5.5 - 9.5	48 - 85	
	Engine mount	M5	70 - 110	7 - 11	60 - 95	
	Muffler	M5	70 - 100	7 - 10	60 - 90	
	Muffler cover	M4	10 - 20	1 - 2	9 - 18	
Others	Auto-oiler	M4	20 - 30	2 - 3	18 - 25	
	Front handle	Clutch side	M5	20 - 40	2 - 4	18 - 35
		Starter side	M5	30 - 40	3 - 4	25 - 35
	Rear handle assembly					
		Flange bolt	M5	70 - 100	7 - 10	60 - 90
		4 Bolt	M4	20 - 30	2 - 3	18 - 25
	Cushion	M4	10 - 20	1 - 2	9 - 18	
	Brake cover	M4	10 - 20	1 - 2	9 - 18	
	Sprocket guard plate	M4	10 - 20	1 - 2	9 - 18	
	Brake lever (Hand guard)	M5	25 - 45	2.5 - 4.5	22 - 40	
	Chain catcher	M5	20 - 40	2 - 4	18 - 35	
	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 \*Apply special repairing materials

**1-4 Special repairing materials**

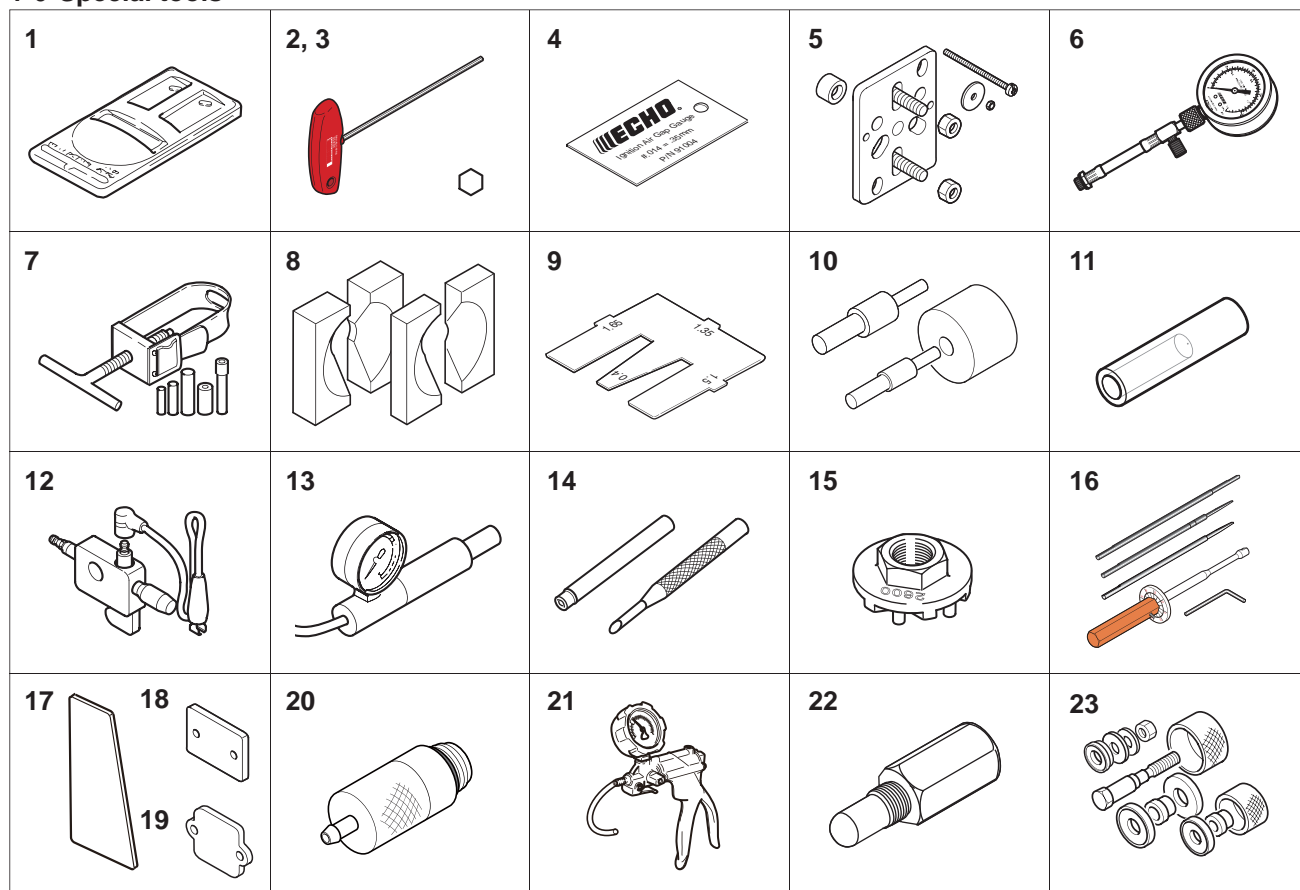
Material	Location	Remarks
Adhesive	Main bearing outer / crankcase	Loctite #675 or equivalent
Liquid gasket	Crankcase seams	ThreeBond 1207D (P/N X686-000000)

## 1-5 Service Limits



Description		mm (in)	
A	Cylinder bore	When plating is worn and aluminium can be seen	
B	Piston outer diameter	Min.	34.91 (1.374)
C	Piston pin bore	Max.	8.030 (0.3161)
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.	7.98 (0.3142)
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.	12.000 (0.4724)
L	Crankshaft runout	Max.	0.02 (0.001)
M	Sprocket bore	Max.	12.80 (0.5039)
N	Clutch drum bore	Max.	55.5 (2.19)
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
2	X602-000350	T-hex. wrench (3 mm)	Removing and installing hex. head bolt (M4)
3	X602-000360	T-hex. wrench (4 mm)	Removing and installing hex. head bolt (M5)
4	91004	Module air gap gauge	Adjusting pole shoe air gaps
5	Y089-000111	Puller	Removing magneto rotor
6	91037	Compression gauge	Measuring cylinder compression
7	897702-30131	Piston pin tool	Removing and installing piston pin
8	897701-02830	Bearing wedge	Removing and crankshaft ball bearings
9	897563-19830	Metering lever gauge	Measuring metering lever height on Carburetor
10	897705-11520	Bearing tool	Replacing needle bearing on con-rod small end
11	897726-09130	Oil seal tool	Installing oil seals
12	897800-79931	Spark tester	Checking ignition system
13	897803-30133	Pressure tester	Testing Carburetor and crankcase leakage
14	500-500	Welch plug tool	Removing and installing welch plug tool
15	X640-000011	Clutch tool	Removing and assembling clutch assembly
16	Y089-000094	Carburetor adjustment tool	Adjusting carburetor
17	91041	Pressure rubber plug	Plugging exhaust port to test crankcase/cylinder leakages
18	897826-16131	Pressure rubber plug	Plugging intake port to test crankcase / cylinder leakages
19	897827-16131	Pressure plate	Plugging intake port to test crankcase / cylinder leakages
20	A131-000150	Pressure connector	Checking crankcase and cylinder leakages
21	91149	Pressure / vacuum tester	Testing crankcase / cylinder leakages
22	X644-000020	Piston stopper	Locking crankshaft rotation
23	897701-14732	Bearing tool	Removing and installing ball bearings on crankcase