



# **SERVICE DATA**

## **CHAIN SAW**

**ECHO: CS-2510TES**  
**shindaiwa: 250Ts 250TCs**  
 (Serial number : 37000001 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. **00-25A-01**

**REVISED: 201604**

ISSUED: 201509



## 1 SERVICE INFORMATION

## 1-1 Specifications

|  |                                    |   |  |
|--|------------------------------------|---|--|
| Dimensions                             | Length*                            | mm(in)  | 243 (9.57)                                 |
|  | Width                              | mm(in)  | 201 (7.91)                                 |
|  | Height                             | mm(in)  | 196 (7.72)                                 |
| Dry weight*                            |                                    | kg(lb)  | 2.3 (5.1)                                  |
| 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> )  | 25.0 (1.525)                               |
|  | Bore                               | mm(in)  | 35.0 (1.378)                               |
|  | Stroke                             | mm(in)  | 26.0 (1.024)                               |
|  | Compression ratio                  | 7.9   |  |
| Carburettor                            | Type                               | Diaphragm horizontal-draught with separated primer  |  |
|  | Model                              | Walbro WT-1153 (CS-2510TES)<br>WT-1155 (250TS, 250TCS)<br>with Large D-shaped mixture needles |  |
|  | Venturi size-Throttle bore         | mm(in)  | 11.11-14.3 (0.437-0.563)                   |
| Ignition                               | Type                               | CDI (Capacitor discharge ignition) system<br>Digital magneto                                  |  |
|  | Spark plug                         | CMR7H   |  |
| Starter                                | Type                               | ES (effortless)-start / S(Soft)-start   |  |
|  | Rope diameter x length             | mm(in)  | 3.0 x 720 (0.12 x 28.3)                    |
| 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 (UK.fl.oz.)   | 0.19 (6.7)                                 |
| Exhaust                                | Muffler type                       | Spark arrester muffler with catalyst  |  |
| Clutch                                 | Type                               | Centrifugal type, 3-shoe slide with 3-tension spring  |  |
| Guide bar / Saw chain lubrication type |                                    | Adjustable automatic oil pump   |  |
| Oil                                    | Tank capacity                      | L (UK.fl.oz.)   | 0.14 (4.9)                                 |
| Auto oiler                             | Type                               | Clutch related type   |  |
| Sprocket                               | Type                               | Spur  |  |
|  | Number of teeth                    | 6 (Sprocket nose bar), 8 (Carving bar)  |  |
|  | Pitch                              | in  | 3/8 (Sprocket nose bar), 1/4 (Carving bar) |
| Spike                                  | Option (Parts number: C304-000000) |   |  |

\* Without guide bar and saw chain.

| Cutting devices |                       | Sprocket nose bar             |             |             | Carving     |             |    |
|-----------------|-----------------------|-------------------------------|-------------|-------------|-------------|-------------|----|
| Guide bar       | Type                  | C20S91-35SA                   | C25S91-40SL | C30S91-47ML | C20H25-52CL | C25H25-60CL |    |
|                 | Called length         | cm                            | 20          | 25          | 30          | 20          | 25 |
|                 | Gauge                 | in                            | 0.050       |             |             |             |    |
| Saw chain       | Type                  | Carlton N1C-BL<br>OREGON 91PX |             |             | OREGON 25AP |             |    |
|                 | Number of drive links | 35                            | 40          | 47          | 52          | 60          |    |
|                 | Pitch                 | in                            | 3/8         |             |             | 1/4         |    |
|                 | Gauge                 | in                            | 0.050       |             |             |             |    |

**1-2 Technical data**

|                                       |                                  |   |    |
|---------------------------------------|----------------------------------|---|----|
| Engine                                |                                  |   |    |
| Idling speed                          | r/min                            | 2,800 - 3,600   |    |
| Wide open throttle speed*             | r/min                            | 12,700 - 13,100   |    |
| Clutch engagement speed               | r/min                            | 4,400   |    |
| Engagement Minimum <sup>†</sup>       | r/min                            | 3,700   |    |
| Compression pressure                  | MPa (kgf/cm <sup>2</sup> ) (psi) | 1.03 (10.5) (150)   |    |
| Ignition system                       |                                  |   |    |
| Spark plug gap                        | mm(in)                           | 0.6 - 0.7 (0.024 - 0.028)                                     |    |
| Spark test                            |                                  |   |    |
| Spark tester gap w/ spark plug        | mm(in)                           | 4.0 (0.16)  |    |
| Spark tester gap w/o spark plug       | mm(in)                           | 6.0 (0.24)  |    |
| Pole shoe air gaps                    | mm(in)                           | 0.3 - 0.4 (0.012 - 0.016)                                     |    |
| Ignition timing                       | at 1,000 r/min                   | °BTDC   | 9  |
|                                       | at 3,000 r/min                   | °BTDC   | 12 |
|                                       | at 10,000 r/min                  | °BTDC   | 29 |
| Carburettor                           |                                  |   |    |
| Throttle adjust screw initial setting | turn in**                        | 1 5/8   |    |
| L mixture needle initial setting      | turn out                         | 1 7/8   |    |
| H mixture needle initial setting      | turn out                         | 2 5/8   |    |
| 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                         |    |
| Chain oil discharge volume            | mL/min(UK.fl.oz./min)            | Adjustable: 1.5 - 13 (0.05 - 0.46)<br>(Factory set: 7 mL/min) |    |

BTDC: Before top dead centre.

\* With 25 cm guide bar and properly tensioned saw chain.

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

<sup>†</sup> If clutch engagement speed is lower than minimum clutch engagement speed, replace clutch assembly with new one.

## 1-3 Torque limits

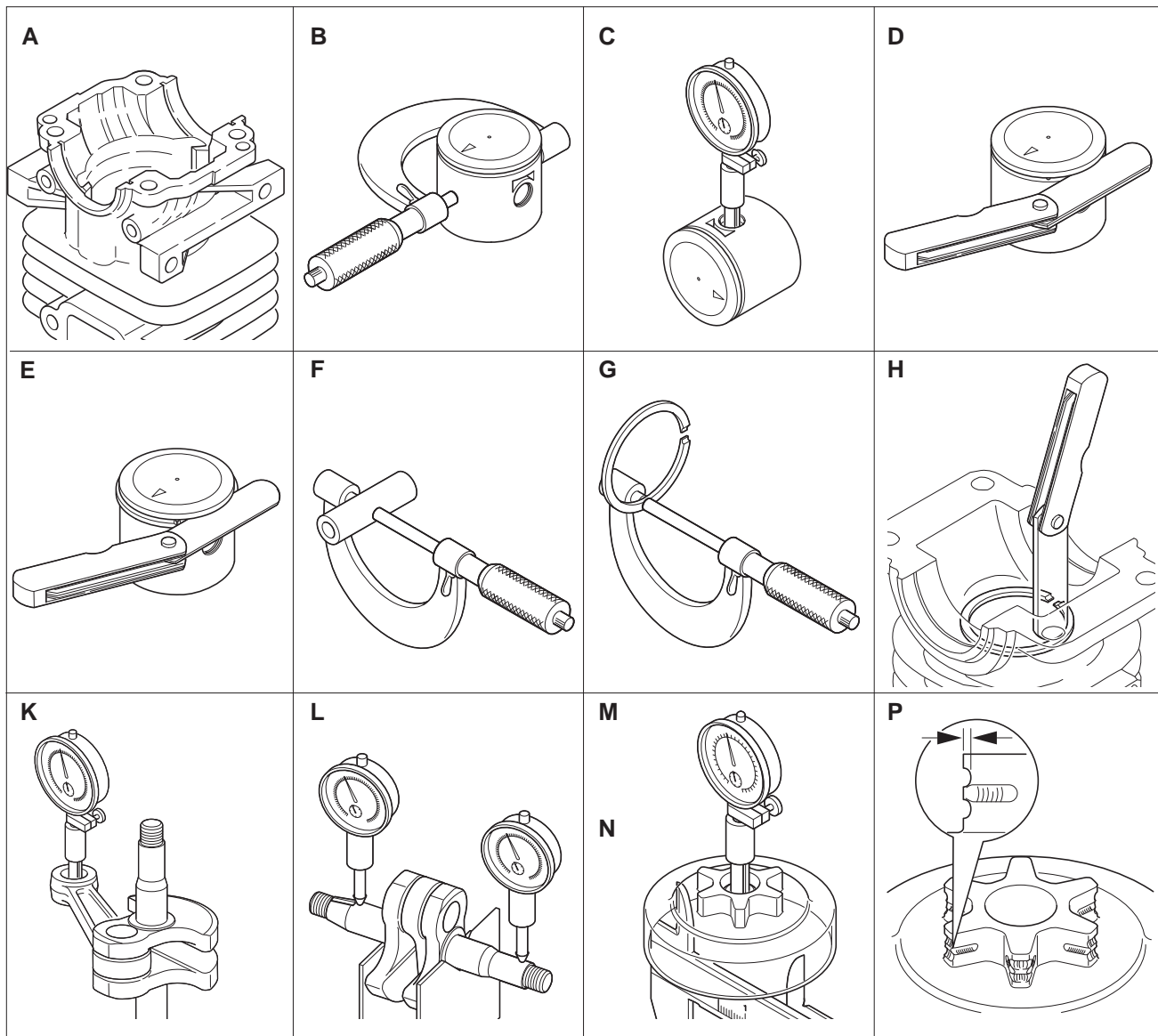
| Descriptions    |  | Size    | kgf•cm    | N•m       | lbf•in    |
|-----------------|--|---------|-----------|-----------|-----------|
| Starter system  | Starter pawl                             | M5      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Starter case                             | M4      | 20 - 30   | 2 - 3     | 20 - 25   |
| Ignition system | Flywheel (Magneto rotor)                 | M8      | 250 - 290 | 25 - 29   | 220 - 255 |
|                 | Ignition coil                            | M4*     | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Ignition switch                          | M3*     | 3 - 5     | 0.3 - 0.5 | 3 - 4     |
|                 | Spark plug                               | M10     | 100 - 150 | 10 - 15   | 90 - 135  |
| Fuel system     | Carburetor                               | M5      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Intake bellows                           | M4      | 30 - 45   | 3 - 4.5   | 25 - 40   |
| Clutch          | Clutch hub                               | LM8     | 250 - 290 | 25 - 29   | 220 - 255 |
| Engine          | Crankcase                                | M4      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Cylinder                                 | M4      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Engine mount                             | M4      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Muffler                                  | M5      | 60 - 90   | 6 - 9     | 55 - 80   |
|                 | Muffler cover                            | M4      | 20 - 30   | 2 - 3     | 20 - 25   |
| Others          | Auto-oiler                               | M4      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Rear handle lid                          | M4      | 20 - 30   | 2 - 3     | 20 - 25   |
|                 | Front handle (front side)                | M5      | 30 - 40   | 3 - 4     | 25 - 35   |
|                 | Front handle (rear side)                 | M4      | 20 - 30   | 2 - 3     | 20 - 25   |
|                 | Spring                                   | M4      | 20 - 35   | 2 - 3.5   | 20 - 30   |
|                 | Brake cover                              | M4      | 20 - 30   | 2 - 3     | 20 - 25   |
|                 | Sprocket guard plate(Sproket guard side) | M4      | 20 - 30   | 2 - 3     | 20 - 25   |
|                 | Brake lever (Hand guard)                 | M5      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Chain catcher                            | M5      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Stud bolt                                | M8*     | 150 - 200 | 15 - 20   | 130 - 220 |
|                 | Bolt (at guide bar mount)                | M5      | 30 - 45   | 3 - 4.5   | 25 - 40   |
|                 | Guide bar nut                            | M8      | 120 - 150 | 12 - 15   | 105 - 135 |
|                 | 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   |           |

LM: Left-hand thread \*Apply thread locking sealant described in "1-4 Special repairing materials"

## 1-4 Special repairing materials

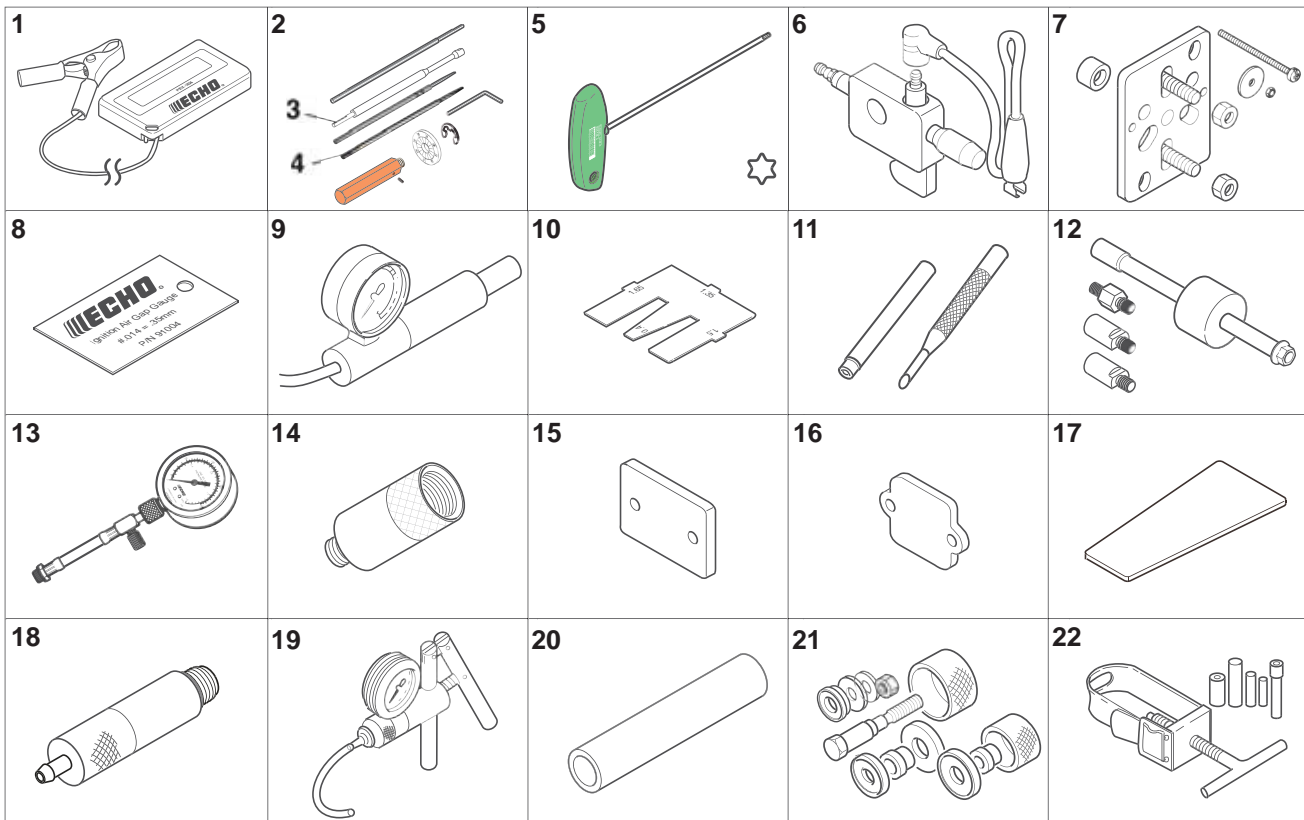
| Material                         | Location               | Remarks                                      |
|----------------------------------|------------------------|--|
| Thread locking sealant           | Stud bolt              | Loctite #272 or equivalent                   |
|                                  | Ignition coil          | Loctite #222, ThreeBond #1344J or equivalent |
|                                  | Ignition switch        | Loctite #242, ThreeBond #1324N or equivalent |
| Grease                           | Recoil starter         | Lithium based grease                         |
|                                  | Needle bearing, clutch |  |
|                                  | Worm gear              |  |
|                                  | Auto-oiler             |  |
|                                  | Oil seal lip           | Molybdenum grease (approx.1 gram)            |
| Chain brake (metal contact part) |                        |  |

1-5 Service limits



| Description |                            | mm (in)  |                |
|-------------|----------------------------|--|----------------|
| A           | Cylinder bore              | When plating is worn and aluminium can be seen |                |
| B           | Piston outer diameter      | Min.   | 34.92 (1.375)  |
| C           | Piston pin bore            | Max.   | 8.035 (0.3163) |
| 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.   | 7.98 (0.3142)  |
| 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.   | 11.03 (0.4341) |
| L           | Crankshaft runout          | Max.   | 0.02 (0.001)   |
| M           | Sprocket bore              | Max.   | 13.07 (0.5146) |
| N           | Clutch drum bore           | Max.   | 53.5 (2.11)    |
| P           | Sprocket wear limit        | Max.   | 0.5 (0.02)     |

## 1-6 Special tools



| Key | Part Number  | Description                 | Reference   |
|-----|--------------|-----------------------------|---|
| 1   | G310-000050  | Tachometer PET-304          | Measuring engine speed to adjust carburettor                |
| 2   | Y089-000094  | Carburettor Adjustment tool | Adjusting carburettor                                       |
| 3   | X645-000031  | D-shaped tool (L)           | Adjusting D-shaped L / H mixture needle                     |
| 4   | X603-000050  | Driver(2.5mm)               | Adjusting throttle adjust screw                             |
| 5   | X602-000340  | Torx wrench (T27)           | Removing and installing Torx bolt                           |
| 6   | 897800-79931 | Spark tester                | Checking ignition system                                    |
| 7   | Y089-000111  | Puller                      | Removing magneto rotor and crankcase                        |
| 8   | 91004        | Module air gap gauge        | Adjusting pole shoe air gaps                                |
| 9   | 897803-30133 | Pressure tester             | Testing carburettor and crankcase leakage                   |
| 10  | 897563-19830 | Metering lever gauge        | Measuring metering lever height on carburettor              |
| 11  | 500-500      | Welch plug tool             | Removing and installing welch plug                          |
| 12  | P021-044870  | PTO shaft puller            | Removing plug from auto-oiler assembly                      |
| 13  | 91037        | Compression gauge           | Measuring cylinder compression                              |
| 14  | P021-051690  | Adapter (M10)               | Measuring cylinder compression(for 10mm dia. spark plug)    |
| 15  | 897826-16131 | Pressure rubber plug        | Plugging intake port to test crankcase / cylinder leakages  |
| 16  | 897827-16131 | Pressure plate              | Plugging intake port to test crankcase / cylinder leakages  |
| 17  | 91041        | Pressure rubber plug        | Plugging exhaust port to test crankcase / cylinder leakages |
| 18  | A131-000160  | Pressure connector(M10)     | Checking crankcase and cylinder leakages                    |
| 19  | 91139        | Pressure / vacuum tester    | Testing tank vent and crankcase leakages                    |
| 20  | 897726-09130 | Oil seal tool               | Installing oil seals  |
| 21  | 897701-14732 | Bearing tool                | Removing and installing ball bearings on crankcase          |
| 22  | 897702-30131 | Piston pin tool             | Removing and installing piston pin                          |

## 2 CARBURETTOR ADJUSTMENT PROCEDURE

### 2-1 General adjustment rules

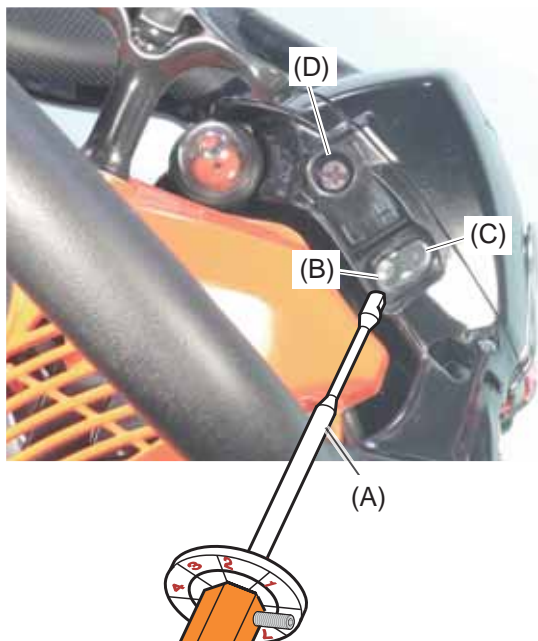
A. Before starting the unit for adjustment, check the following items.

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. 20, 25 or 30 cm bar and chain must be installed, and properly tensioned.

B. Preliminary adjustment : Adjustment by Throttle adjust screw of carburettor.

Start and run engine for 100 seconds alternating engine speed between WOT 5 seconds and idle 5 seconds. Adjust throttle adjust screw to 2,800 - 3,600 r/min. Make sure WOT engine speed in range 12,700 - 13,100 r/min. If engine does not run correctly after this adjustment, proceed to the next step 2-2.

### 2-2 Initial setting Throttle adjust screw, L mixture needle and H mixture needle



Tools Required : P/N G310-000050 Tachometer PET-304, P/N X089-000094 Carburettor adjustment tool KIT (D-shaped tool (L) and Driver(2.5mm))

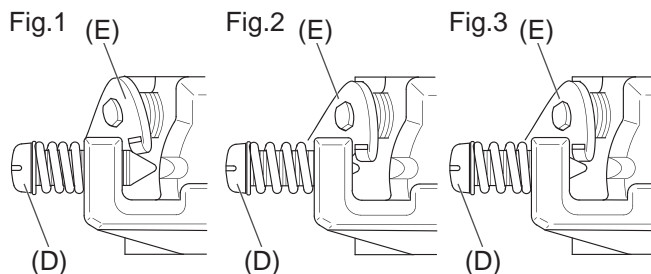
1. Turn L and H mixture needles clockwise until lightly seated, and then turn out both mixture needles following turns.

L mixture needle (B) : 1 7/8

H mixture needle (C) : 2 5/8

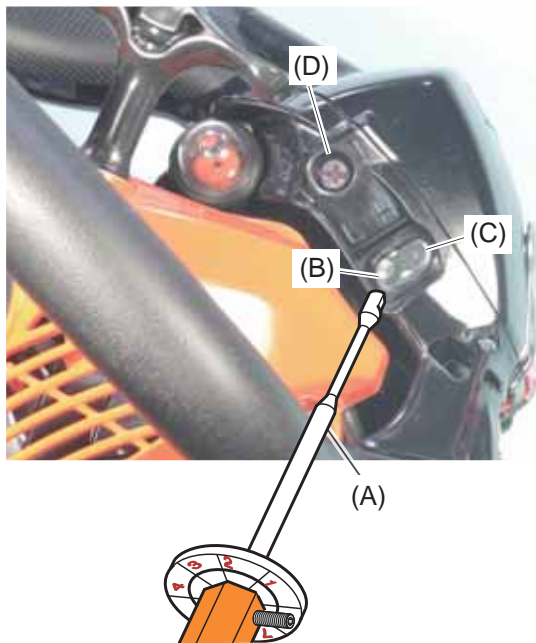
**NOTE** : If needles are overtightened during seating, damage to carburettor may occur.

2. Remove air cleaner lid to see the Throttle adjust screw (D) contacts the throttle plate(E) (Fig.1). Turn the screw(D) anticlockwise until its tip no longer touches the throttle plate(E) (Fig.2). Then turn the screw (D) clockwise until its tip just comes into contact with the plate (E) again (Fig.3). Finally, turn the screw (D) 1 5/8 turns clockwise. Reinstall cleaner lid.



**NOTE** : The initial carburettor settings for Throttle adjust screw, L and H mixture needles are intended to start and run the engine before final carburettor adjustments are made to conform the unit to meet Emission Directive. The actual number of turns needed for engine operation may vary.

## 2-3 Adjusting carburettor



1. Start and warm engine for 100 seconds alternating engine speed between WOT 5 seconds and idle 5 seconds. Turn H mixture needle (C) anticlockwise until engine speed drops to approx. 12,000 r/min at WOT.

**NOTE :** Do not run engine at high speed without load (cutting) longer than 10 seconds, or engine damage may occur.

2. Adjust L mixture needle (B) using D-shaped tool (A) to reach maximum engine speed just before lean drop off.

If chain starts to rotate during adjustment, decrease engine speed by turning throttle adjust screw (D) anticlockwise until chain stops and then readjust L mixture needle (B).

3. Set idle engine speed to 4,000 r/min by turning Throttle adjust screw (D). Engine speed should be stable at 4,000 +/- 50 r/min after Throttle adjust screw adjustment.

4. Turn L mixture needle (B) anticlockwise reducing engine idle speed 800 r/min to set idle speed at 3,200 r/min. The engine idle speed ranges 3,100 - 3,300 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 12,000 r/min or less. If engine speed is higher, turn H mixture needle (C) anticlockwise until 12,000 r/min is achieved. Turn H mixture needle (C) clockwise in 1/8 turn increments with the engine at idle, then squeeze throttle trigger and check WOT engine speed. Adjust H mixture needle (C) to reach WOT engine speed within 12,400 - 12,600 r/min. To make the final WOT engine speed adjustment, turn H mixture needle (C) clockwise in 1/4 turn with the engine at idle, then squeeze throttle trigger and check WOT engine speed. The WOT engine speed should be within 12,700 - 13,100 r/min range.

7. Start engine, and verify engine idle speed ranges from 2,800 to 3,600 r/min, and WOT engine speed ranges from 12,700 to 13,100 r/min. Make sure the chain does not rotate when engine is idling. When final adjustment is completed, the engine should idle, accelerate smoothly, and attain WOT per above specifications.

**NOTE:** WOT and idle engine speed in field operation may vary from final adjustment specifications due to changing ambient conditions and fuel. Safe engine speed variances should be within the WOT and Idle engine speed ranges listed in Section 1-2, otherwise the carburettor should be readjusted.