SERVICE DATA

CHAIN SAW

ECHO: CS-7310SX

(Serial number : C81038000001 - C81038999999)
(Serial number : C89040000001 - C89040999999)

shindaiwa: 731sx

(Serial number : C84638000001 - C84638999999)

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. **01-73A-03**
REVISED: 202211
ISSUED: 202007

YAMABIKO

1 SERVICE INFORMATION

1-1 Specifications

Dimensions	Length*	mm(in)	477 (18.8)
	Width	mm(in)	249 (9.8)
	Height	mm(in)	323 (12.7)
Dry weight*		kg(lb)	6.8 (15.0)
Engine	Type		YAMABIKO, air-cooled, two-stroke, single cylinder
	Rotation		Clockwise as viewed from the output end
	Displacement	$cm^3(in^3)$	73.5 (4.485)
	Bore	mm(in)	51.0 (2.008)
	Stroke	mm(in)	36.0 (1.417)
	Compression ratio		6.8
Carburetor	Type		Diaphragm, horizontal-draft
	Model		ZAMA Z011-120-060D-A YZ0010
	Venturi size-Throttle bore	mm(in)	17.9 - 20 (0.705 - 0.787)
Ignition	Type		CDI (Capacitor discharge ignition) system, Digital Magneto
	Spark plug		NGK BPMR8Y-5
Exhaust	Muffler type		Spark arrester muffler
Starter	Type		Automatic rewind
	Rope diameter x length	mm(in)	3.5 x 1000 (0.14 x 39.4)
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 (UK.fl.oz.)	0.8 (27.1)
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.)	0.36 (12.2)
Auto oiler	Type		Clutch driven type
Sprocket	Type		Floating rim
	Number of teeth		7
	Pitch	in	3/8

* Without guide bar and saw chain.
** Premixed alkylate fuel for 2-stroke can be used.

Cutting devices					
Guide bar	Type	U45R73-68AA	U50R73-72AA	U60R73-84AA	U70R73-92AA
	Called length cm	45	50	60	70
	Gauge in	0.058			
Saw chain	Type	Oregon 73LPX, 73EXL Carlton A2LM			
	Number of drive links	68	72	84	92
	Pitch in	3/8			
	Gauge in	0.058			

1-2 Technical data

Engine			
Compression pressure		MPa (kgf/cm^2) (psi)	0.77 (7.9) (112)
Clutch engagement speed		r/min	4200
Ignition system			
Spark plug gap		mm(in)	0.4 - 0.5 (0.016 - 0.02)
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	5.5 - 11.5
Pole shoe air gaps		mm(in)	0.3 - 0.4 (0.012 - 0.016)
Ignition timing	at 3000 r/min	°BTDC	8
	at 10000 r/min	°BTDC	24
Carburetor			
Test Pressure, minimum		MPa (kgf/cm^2) (psi)	0.05 (0.5) (7.0)
Metering lever height		mm(in)	0 - 0.3 (0 - 0.01) lower than diaphragm seat
Limiter cap / plug			-
Tool to adjust mixture needles			D-shaped tool (L) P/N X645-000032 (Carb. adjustment tool P/N Y089-000095)
Carburetor adjustment			
1) Initial setting	H mixture needle	turn out	1 5/8
	L mixture needle	turn out	1 1/2
	Throttle adjust screw	turn in*1	3
Engine warm-up	Idle - WOT : Total	sec.	5 - 10 : 120
2) Find idle maximum speed			Adjust L mixture needle to maximum idle speed.*2
3) Set idle maximum speed w/ TAS		r/min	3700
4) Set idle speed by turning L mixture needle CCW		r/min	3000
5) Confirm H mixture needle position before WOT setting			Turn H mixture needle CCW to confirm engine speed reduces less than or equal to 12000 r/min.
6) WOT setting		r/min	Turn H mixture needle CW in 1/8 turn increment with the engne engine at idle, then accelerate to WOT and check engine speed. The final engine speed should fall within 12600 - 12800
7) Verify final engine speed with standard equipment		r/min	Idle: 2700 - 3400 WOT: 12600 - 12800
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 (0.11 - 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), reduce 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	90 - 110	9 - 11	80 - 95
	Starter center shaft screw		M5	50 - 70	5 - 7	45 - 60
	Starter case		M5	70 - 90	7 - 9	60 - 80
Ignition system	Magneto rotor		M8	240 - 280	24 - 28	210 - 245
	Ignition coil		M5	50 - 70	5 - 7	45 - 60
	Spark plug		M14	130 - 170	13 - 17	110 - 150
Fuel system	Carburetor		M4	20 - 35	2 - 3.5	17 - 30
	Intake bellows		M5*	60 - 80	6 - 8	52 - 70
	Carburetor case		M5**	70 - 90	7 - 9	60 - 80
	Carburetor case cover		M5	40 - 60	4 - 6	35 - 52
Clutch	Clutch assembly		LM12	500 - 600	50 - 60	435 - 522
Engine	Crankcase		M5	70 - 90	7 - 9	60 - 80
	Cylinder		M5	70 - 100	7 - 10	60 - 87
	Muffler	Screws	M6	90 - 110	9 - 11	80 - 95
		Nuts	M6*	90 - 110	9 - 11	80 - 95
	Muffler plate		M4*	15 - 25	1.5 - 2.5	13 - 22
	Decompression valve		M10	70 - 100	7 - 10	60 - 87
Others	Auto-oiler		M4*	25 - 35	2.5 - 3.5	22 - 30
	Compression spring	Rear handle	M5***	30 - 45	3 - 4.5	26 - 40
		Crankcase	M6†	50 - 60	5 - 6	45 - 52
		Cylinder	M5	50 - 60	5 - 6	45 - 52
		Front handle	M6†	50 - 60	5 - 6	45 - 52
	Spring holder		M5**	30 - 45	3 - 4.5	26 - 40
	Front handle		M5 x 16**	60 - 80	6 - 8	52 - 70
			M5 x 30*	50 - 70	5 - 7	45 - 60
	Spike	Crankcase side	M5*	90 - 110	9 - 11	80 - 95
		Sprocket side	M5*	70 - 90	7 - 9	60 - 80
	Brake lever (Hand guard)		M5	50 - 70	5 - 7	45 - 60
	Brake band		M4*	30 - 50	3 - 5	26 - 45
			M5*	50 - 70	5 - 7	45 - 60
	Brake cover		M5**	30 - 40	3 - 4	26 - 35
	Chain catcher		M6	90 - 110	9 - 11	80 - 95
	Chain tensioner		M4*	20 - 30	2 - 3	17 - 26
	Sprocket guard pieces		M4*	15 - 20	1.5 - 2	13 - 17
	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 next page)

** Precoated bolt: If the coat is peeled off, replace new one or apply thread locking sealant. (See next page)

*** Precoated bolt: Replace new one when removing the bolt. Do not re-use.

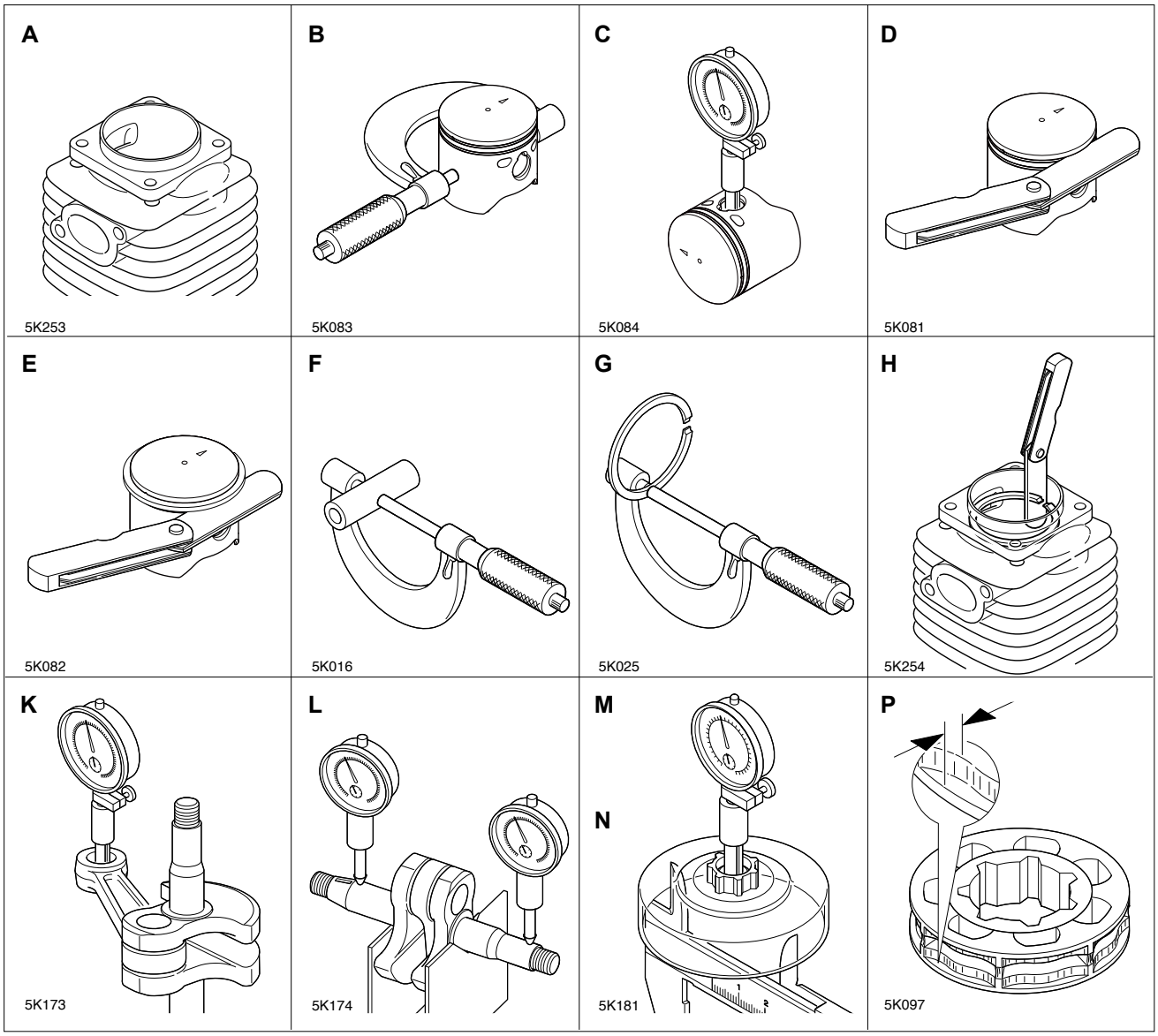
† Tapping screw

1-4 Special maintenance materials

Material	Location	Remarks
Adhesive	Stud bolt	Loctite #675 or equivalent
	Cushion on Rear handle cover	Loctite #424 or equivalent
Thread locking sealant	Muffler nuts (Through Bolts)	ThreeBond #1344J or equivalent
	Spike	Loctite #675 or equivalent
	Front handle M5 x 30	
	Auto-oiler	ThreeBond #1324N or equivalent
	Intake bellows	
	Chain tensioner	
	Sprocket guard pieces	
	Brake band	
	Carburetor case (Re-use*)	
	Brake cover (Re-use*)	
	Front handle M5 x 16 (Re-use*)	
	Spring holder (Re-use*)	
	Muffler plate	ThreeBond #1360 or equivalent
Grease	Clutch needle bearing	Lithium based grease or ECHO XTended Protection ™ Lubricant
	Recoil starter	
	Worm gear	
	Oil seal inner lips	
	Chain brake (metal contact part)	Molybdenum grease (approx.1 gram)

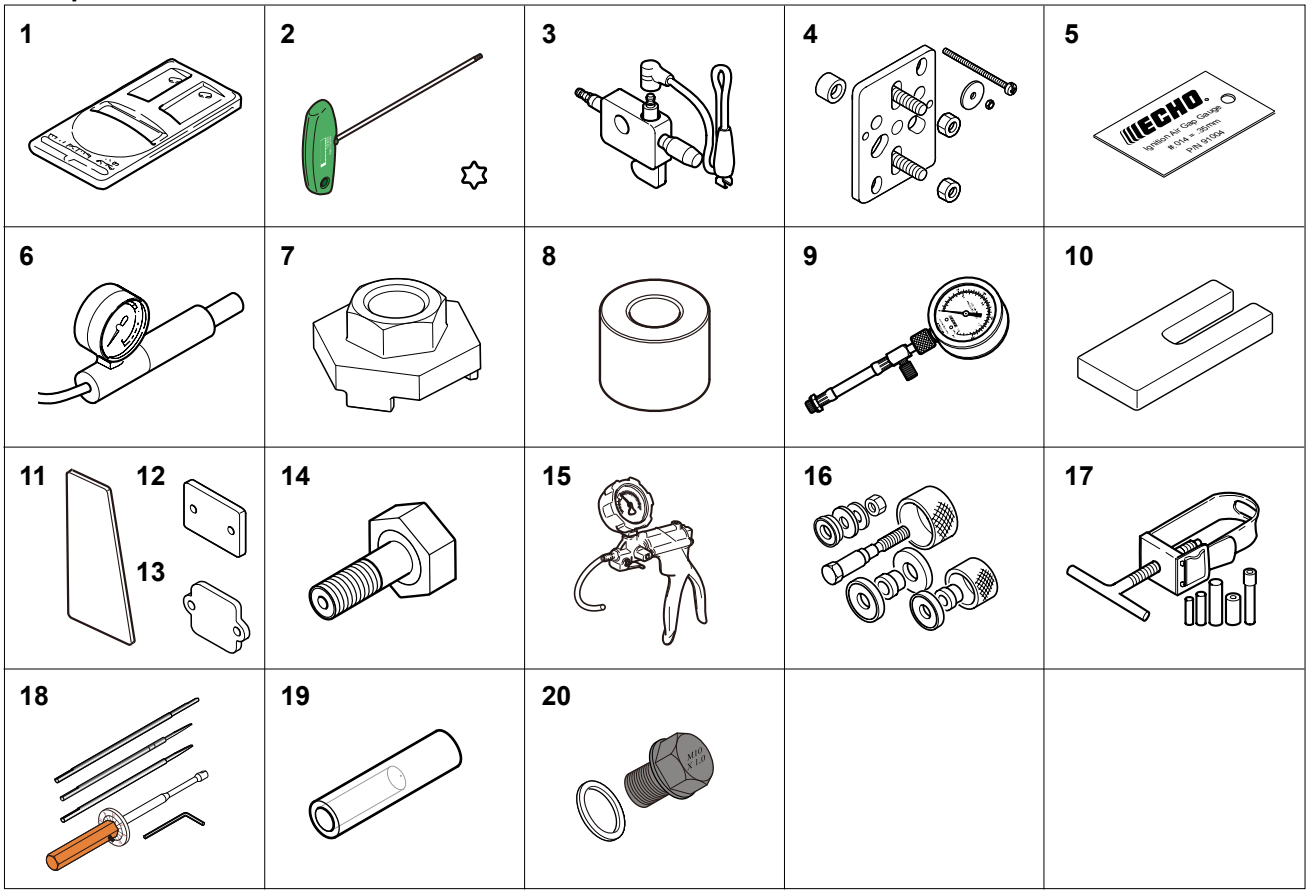
* If old thread locking sealant is left in threads, correct torque may not be secured. In case old thread locking sealant is left, remove it.

1-5 Service Limits



Description			mm (in)
A	Cylinder bore		When plating is worn and aluminium can be seen
B	Piston outer diameter	Min.	50.89 (2.004)
C	Piston pin bore	Max.	12.030 (0.4736)
D	Piston ring groove	Max.	1.3 (0.051)
E	Piston ring side clearance	Max.	0.15 (0.006)
F	Piston pin outer diameter	Min.	11.98 (0.4717)
G	Piston ring width	Min.	1.15 (0.045)
H	Piston ring end gap	Max.	0.6 (0.02)
K	Con-rod small end bore	Max.	15.025 (0.5915)
L	Crankshaft run out	Max.	0.05 (0.002)
M	Sprocket bore	Max.	70.5 (2.78)
N	Clutch drum bore	Max.	14.07 (0.5539)
P	Sprocket wear limit	Max.	0.5 (0.02)

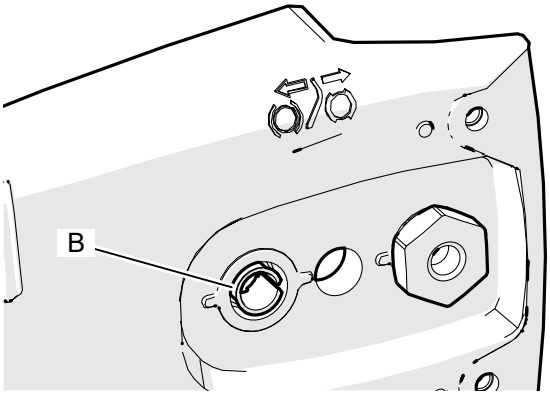
1-6 Special tools



Key	Part Number	Description	Reference
1	897802-33330	Tachometer PET-1000R	Measuring engine speed to adjust carburetor
2	X602-000340	Torx wrench (T27)	Removing and installing Torx bolts
3	897800-79931	Spark tester	Checking ignition system
4	Y089-000111	Puller	Removing magneto rotor (flywheel)
5	91004	Module air gap gauge	Adjusting pole shoe air gaps
6	897803-30133	Pressure tester	Testing carburetor and crankcase leakage
7	X640-000570	Clutch tool	Removing and installing clutch assembly
8	X648-000150	Oiler gap adjuster	Making appropriate gap between auto-oliler assembly and warm gear
9	91037	Compression gauge	Measuring cylinder compression
10	897719-02830	Piston holder	Making piston steady to remove and install piston/ring
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	X646-000620	Collar nut installer	Install collar nuts in sproket guard
15	91149	Pressure / vacuum tester	Testing tank vent and crankcase leakages
16	897701-14732	Bearing tool	Removing and installing ball bearings on crankcase
17	897702-30131	Piston pin tool	Removing and installing piston pin
18	Y089-000095	Carburetor adjustment tool	Adjusting carburetor
19	897726-21430	Oil seal tool	Installing oil seals
20	91177	Compression release valve plug	Testing crankcase and cylinder leakage

2 SERVICE HINT

2-1 Replacing captive bar nut

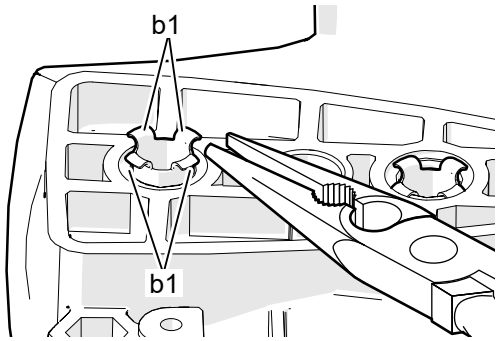


Tools required:
· Collar nut installer X646-000620 (A)

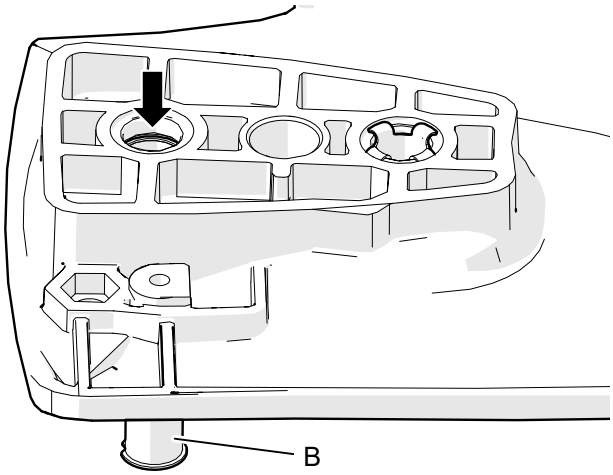
-- Removing --

[When captive bar nut has come off from sprocket guard]

1. Push remaining collar (B) out from outside of sprocket guard.

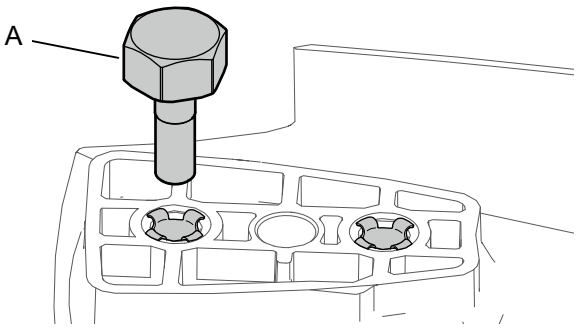


2. Then, straighten tabs (b1) of remaining collar (B) with a long nose pliers.



3. Remove remaining collar (B), pushing down from inside of sprocket guard.

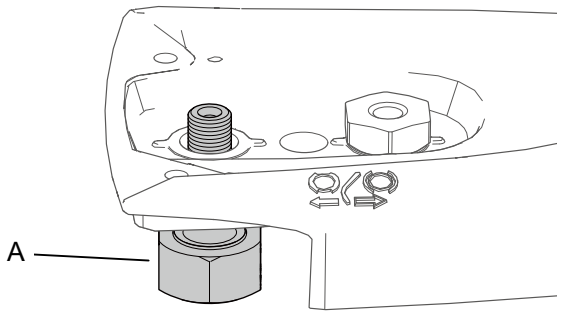
[When removing entire captive bar nut installed on sprocket guard]



1. Partially screw collar nut installer (A) into captive bar nut from inside of sprocket guard, leaving some clearance to drive the nut collar out.

2. Hold sprocket guard in one hand and tap top of installer (A) with a hammer to remove captive bar nut.

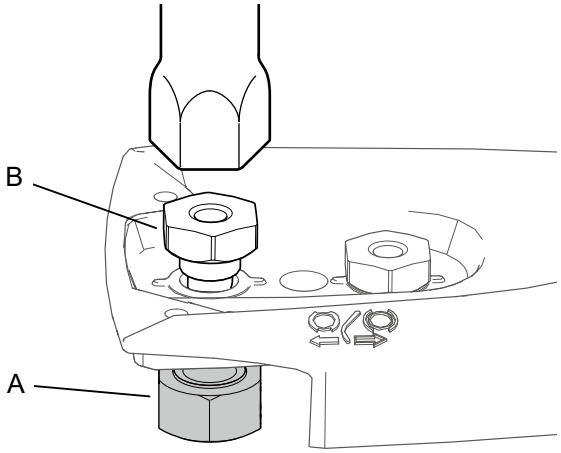
2-1 Replacing captive bar nut (continued)



-- Installing --

1. Insert collar nut installer (A) from inside of sprocket guard.

2. Hold collar nut installer (A) with a vise or wrench.

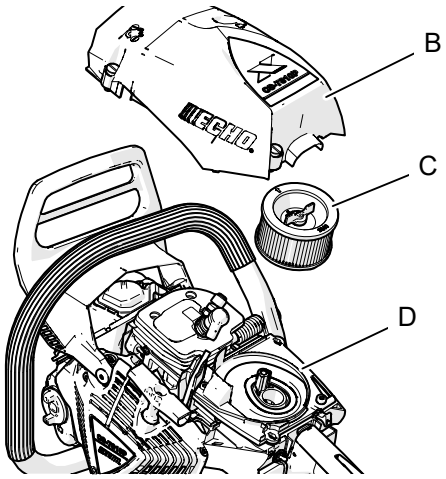


3. Install new collar nut (B) on installer (A).

4. Tighten new collar nut (B) with a wrench until it bottoms.

NOTE: Make sure that the collar nut tabs are properly seated and the nut rotates freely on the collar.

2-2 Inspecting and Replacing tank vent



NOTE: Tank vent prevents a vacuum from forming in fuel tank when fuel in fuel tank is being consumed. When pressure in fuel tank becomes too high, tank vent release the pressure.

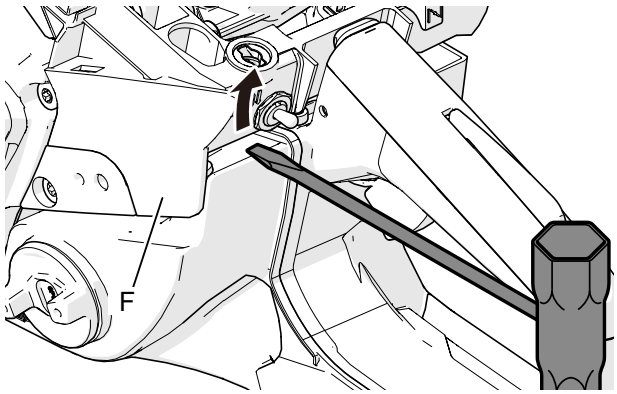
Tools required:
· Pressure/vacuum tester 91149 (A)

1. Remove cylinder cover (B).

2. Remove air filter (C).

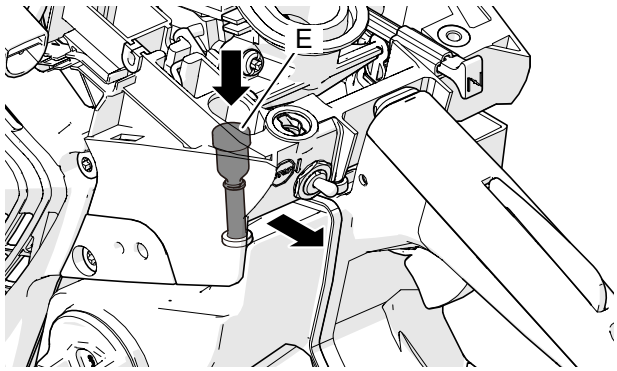
3. Remove carburetor case cover (D) with two bolts.

4. Carefully pry up carburetor case (F) from top of fuel tank with a large flathead screwdriver.



5. Then, push tank vent (E) down and out towards the throttle trigger and push the vent through.

6. Remove tank vent (E) and clip (G) from tank vent line, taking care not to lose clip (G).

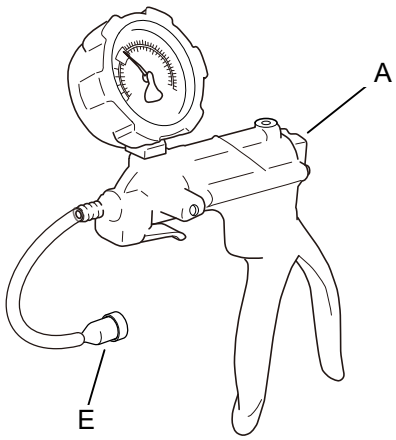


7. Connect tank vent (E) to pressure/vacuum tester (A).

8. Apply pressure approx. 50kPa (0.5 kgf/cm^2) (7 psi).

9. Make sure the pressure is stable in range of 10 - 40 kPa (0.1 - 0.4 kgf/cm^2) (1.4 - 5.7 psi).

10. If it is not in the range, gently clean tank vent with compressed air or replace with new one.

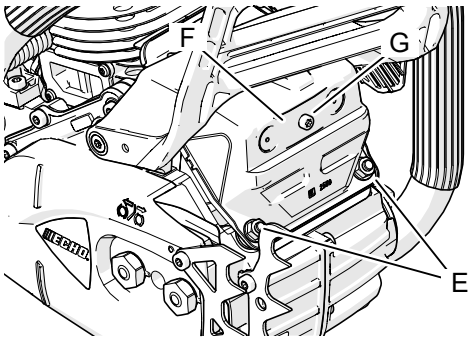


NOTE: Do not disassemble valves in tank vent. Damage to valves will occur.

11. Apply negative pressure 20 kPa (0.2 kgf/cm^2) (3 psi).

12. Tank vent should pass air freely without holding any pressure. If it does not, replace with new one.

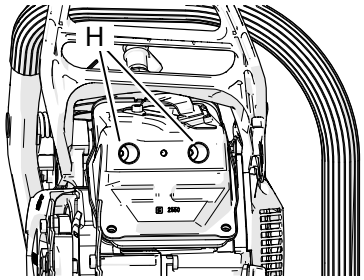
2-3 Testing crankcase and cylinder leakage



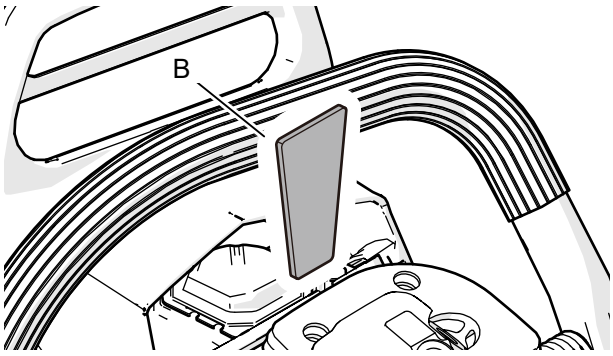
Tools required:
- **Pressure/vacuum tester 91149 (A)**
- **Two Pressure rubber plugs 91041 (B)**
- **Plug 91177 (C)**

1. Remove two bolts (E).

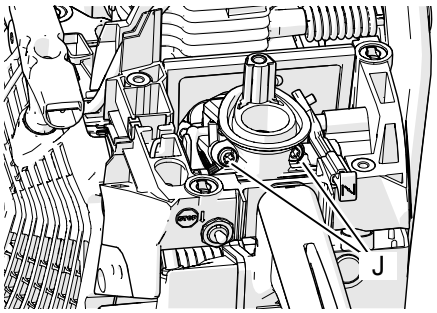
2. Remove muffler plate (F) with bolt (G).



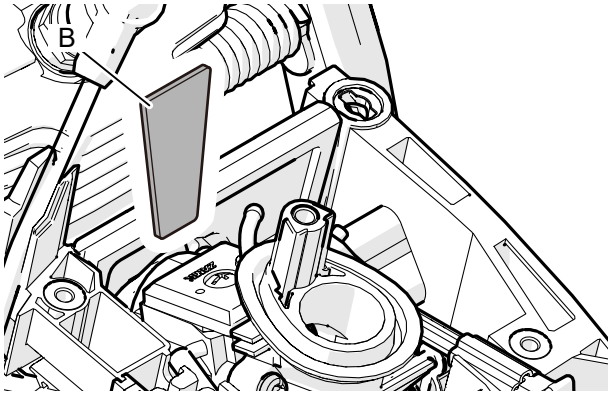
3. Loosen muffler bolts (H).



4. Insert pressure rubber plug (B) between muffler and muffler gasket to seal the exhaust port. Then, retighten bolts (H).

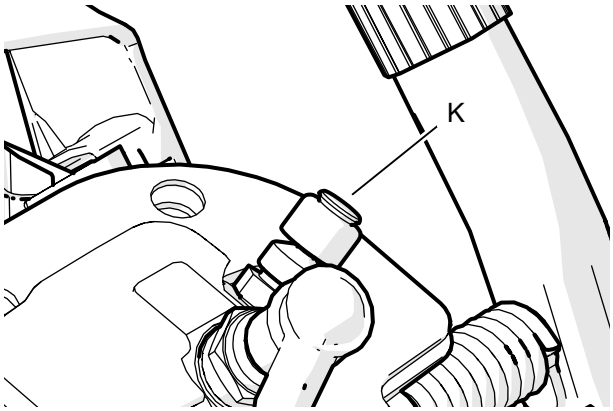


5. Loosen carburetor bolts (J).

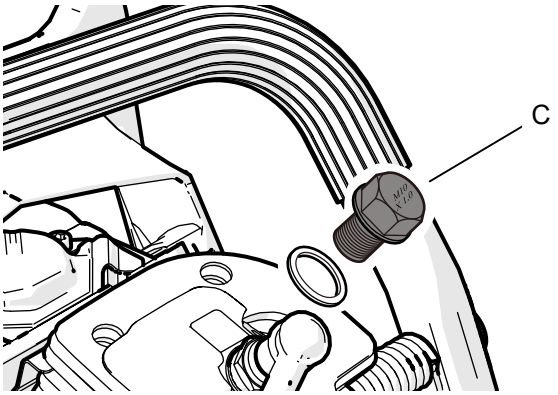


6. Insert pressure rubber plug (B) between carburetor and intake bellows to seal the intake port. Then, retighten bolts (J).

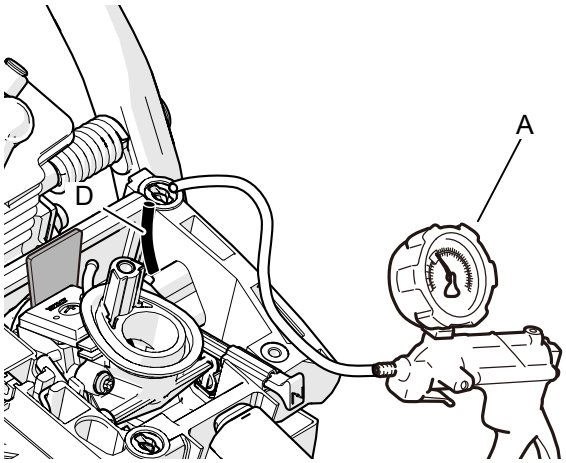
2-3 Testing crankcase and cylinder leakage (continued)



7. Remove decompression valve (K).



8. Install plug (C) with one washer into the decompression valve hole.



9. Pull out pulse line (D) from carburetor.

10. Connect pulse line (D) and pressure/vacuum tester (A) using suitable pipe (inner dia. 4 mm).

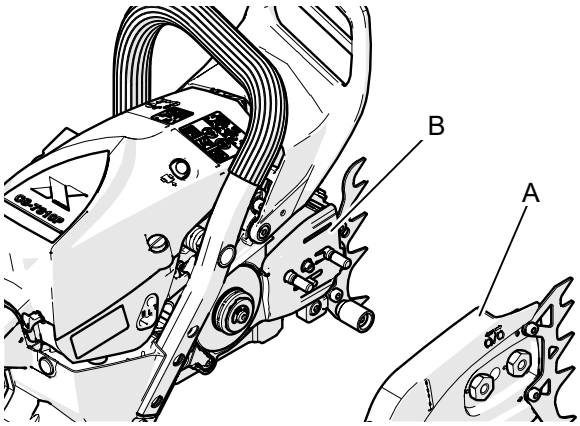
11. Apply negative pressure approx. 30 kPa (0.3 kgf/cm2) (4.4 psi) by pressure/vacuum tester (A) and leave for 30 seconds.

12. If the reading drops, leakage may occur from oil seal. Inspect oil seal for damage or wear.

13. Then, apply pressure approx. 50 kPa (0.5 kgf/cm2) (7.3 psi) by pressure/vacuum tester (A) and leave for 30 seconds.

14. If the reading drops, leakage may occur from crankcase seam or oil seal. Use soapy water to locate the leakage.

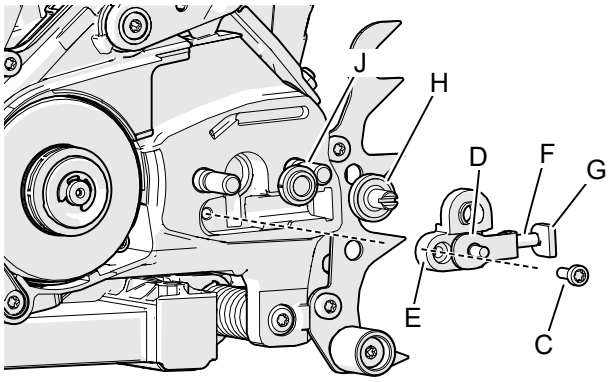
2-4 Replacing chain tensioner



-- Removing --

1. Remove sprocket guard (A).

2. Remove sprocket guard plate (B).

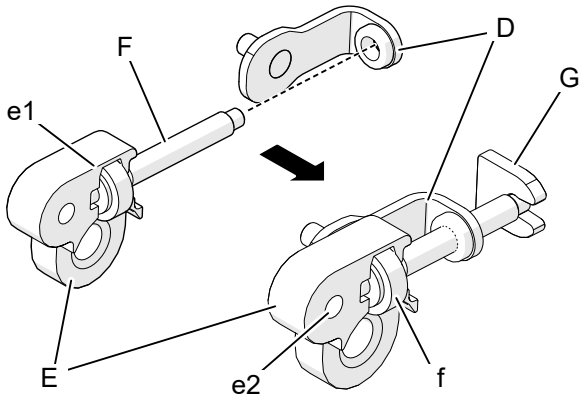


3. Remove bolt (C).

4. Remove chain tensioner (D) with collar (E), tensioner screw (F) and shaft guide (G).

5. Remove worm gear (H) and collar (J).

6. Check the removed parts for damage or wear. Replace with new one(s) as required.



-- Installing --

1. Apply lithium based grease to worm gear (H) and collar (J).

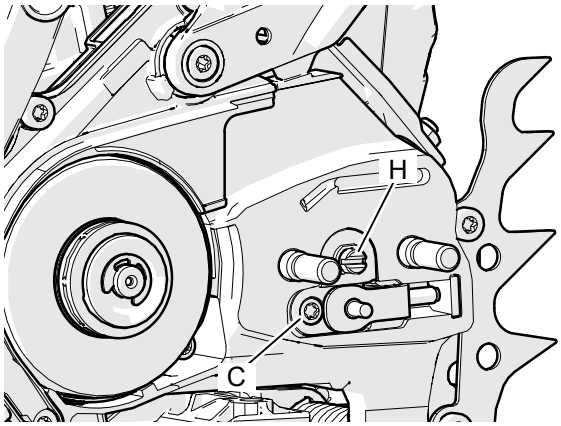
2. Install collar (J) and worm gear (H) on crankcase.

3. Install tensioner screw (F) into groove (e1) of collar (E).

4. Screw chain tensioner (D) to tensioner screw (F) by turning gear (f) of tensioner screw (F), not to cover bolt hole (e2) of collar (E) with chain tensioner (D).

NOTE: Make sure chain tensioner (D) is screwed to tensioner screw (F) more than 3 screw threads.

5. Put shaft guide (G) on tensioner screw (F).

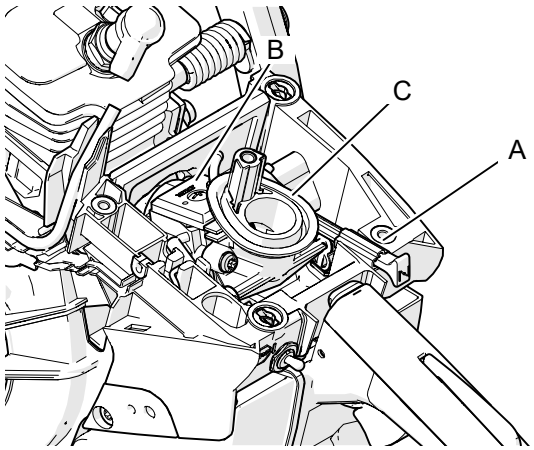


6. Install the assembled chanin tensioner on crankcase as shown.

7. Turn worm gear (H) to confirm engagement of the gears.

8. Tighten bolt (C).

2-5 Removing rear handle assembly



1. Remove sprocket guard and starter assembly.

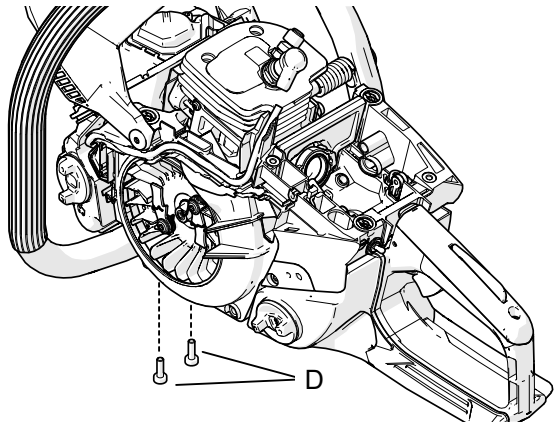
2. Remove cylinder cover, air filter and carburetor case cover.

3. Remove choke (A).

4. Pull out fuel line and pulse line from carburetor (B).

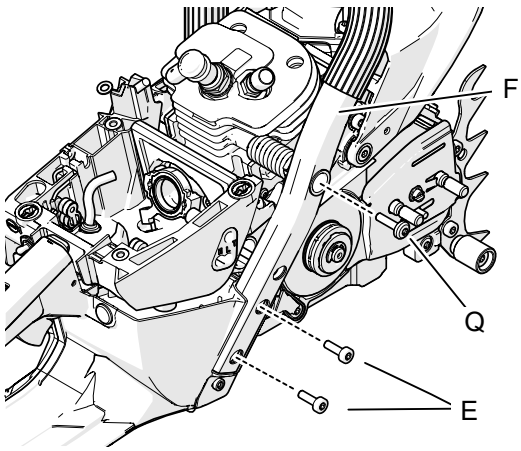
5. Disconnect throttle cable from carburetor (B).

6. Remove carburetor (B) and carburetor elbow (C) with two bolts.



7. Remove pre-coated bolts (D).

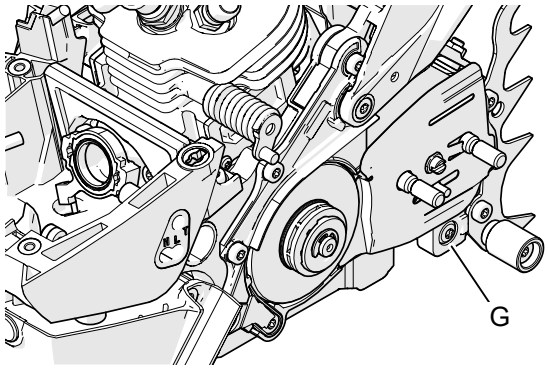
NOTE: When retighten pre-coated bolts (D), replace new ones or apply thread locking sealant ThreeBond #1324N.



8. Remove pre-coated bolts (E) and bolt (Q).

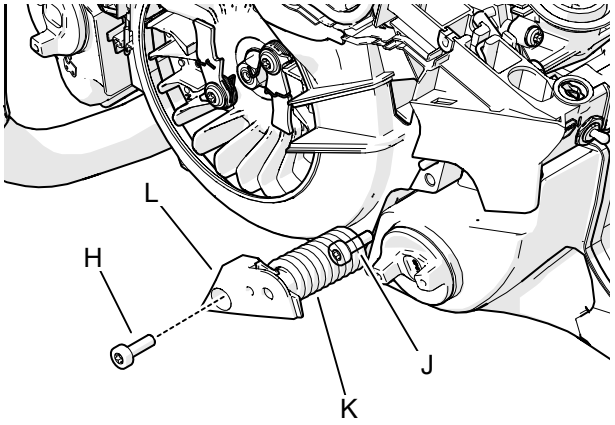
NOTE: When retighten pre-coated bolts (E), replace new ones or apply thread locking sealant ThreeBond #1324N.

9 Then, remove front handle (F) from the unit.



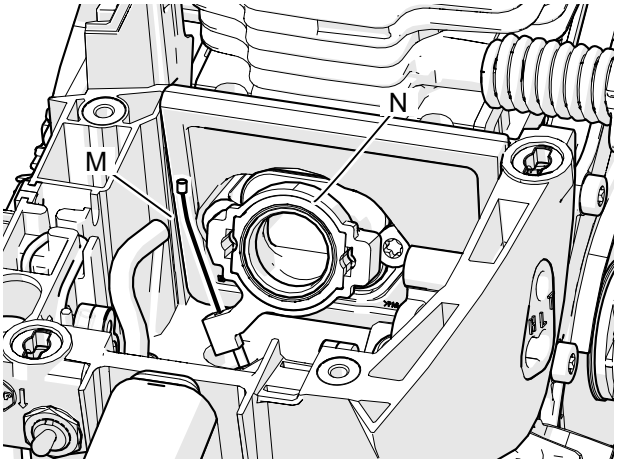
10 Remove bolt (G).

2-5 Removing rear handle assembly (continued)

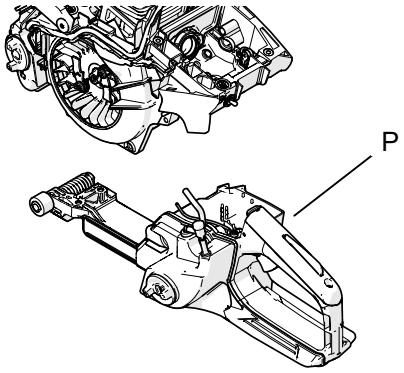


11. Remove pre-coated bolt (H).

12. Loosen pre-coated bolt (J). Then, remove spring holder (L) with spring (K) and bolt (J).



13. Remove throttle cable (M) from intake bellows holder (N).

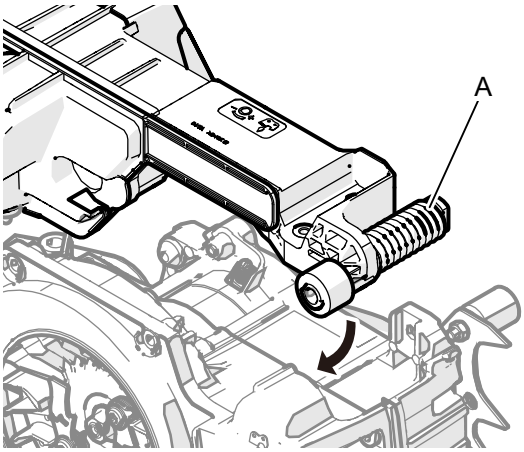


14. Remove rear handle assembly (P) carefully.

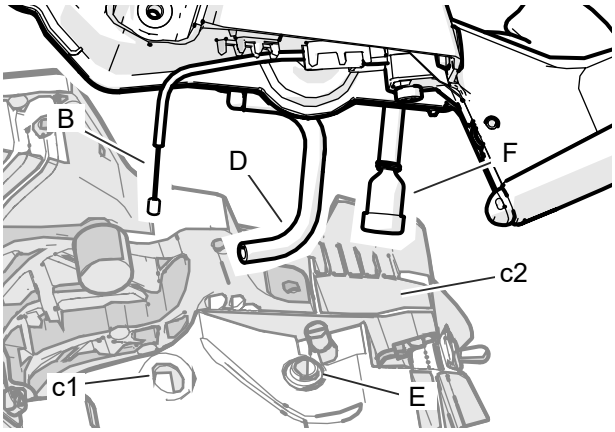
NOTE: When replacing fuel lines, refer to “2-7 Replacing fuel lines“.

NOTE: When replacing throttle cable, refer to “2-8 Replacing throttle cable and control parts“.

2-6 Installing rear handle assembly



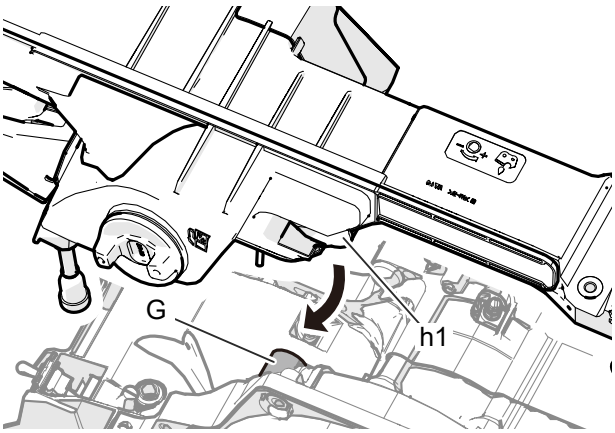
1. Install rear handle assembly from spring (A) side as shown.



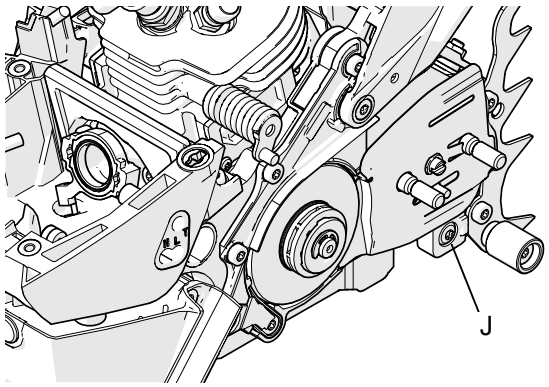
2. Pass throttle cable (B) through hole (c1) of carburetor case.

3. Pass fuel pipe (D) through grommet (E).

4. Put tank vent (F) into recess (c2) of carburetor case.

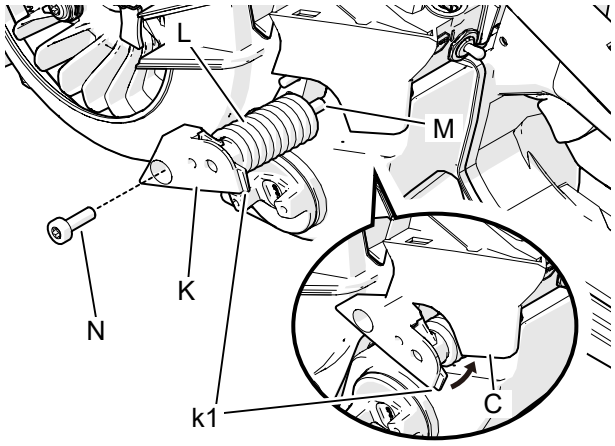


5. Fit cushion (G) into recess (h1) of rear handle assembly as shown.



6. Tighten bolt (J).

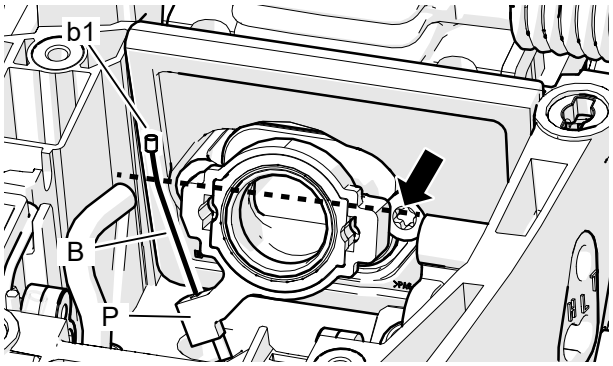
2-6 Installing rear handle assembly (continued)



7. Install assembled spring holder (K), spring (L) and bolt (M), hooking spring holder tab (k1) to carburetor case (C) as shown.

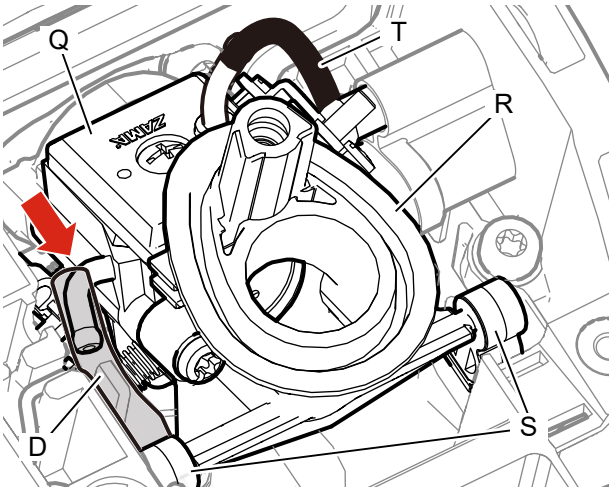
8. Tighten bolt (M) and pre-coated bolt (N).

NOTE: When retighten pre-coated bolt (N), replace new one or apply thread locking sealant ThreeBond #1324N or equivalent.



9. Install throttle cable (B) into groove of intake bellows holder (P).

NOTE: Throttle cable sleeve may be disconnected from the throttle cable guide if throttle cable end (b1) is below the line in the illustration. Refer to “2-5 Replacing throttle cable and control parts.

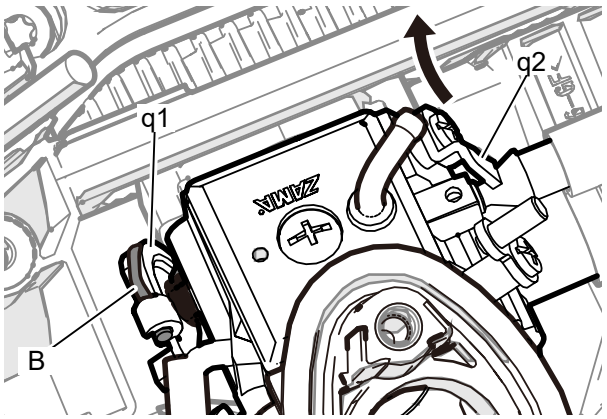


10. Install carburetor (Q) and carburetor elbow (R).

11. Connect fuel line (D) and pulse line (T).

NOTE: Make sure fuel line (D) is inserted to the rounded corner of carburetor nipple as shown.

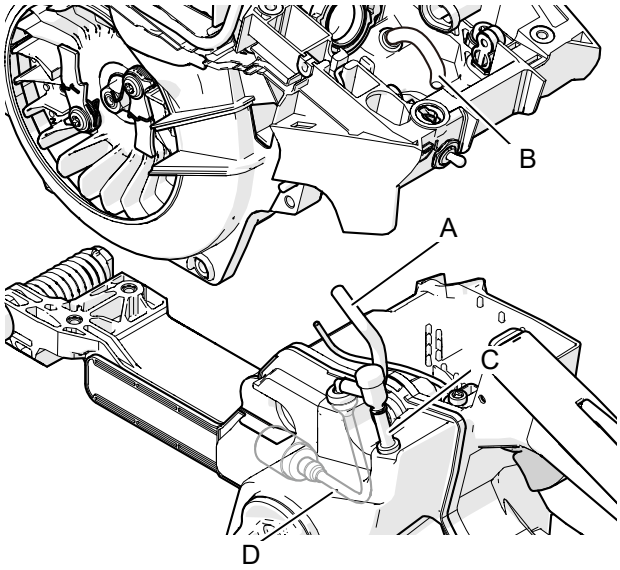
NOTE: Make sure the bosses of carburetor elbow (R) are inserted to each cushion (S) as shown.



12. Install throttle cable (B) to throttle lever (q1), holding throttle lever (q2) forward.

13. Squeeze the throttle trigger to confirm operation of throttle cable (B).

2-7 Replacing fuel lines



1. Remove rear handle from the unit. (Refer to “2-5 Removing rear handle)

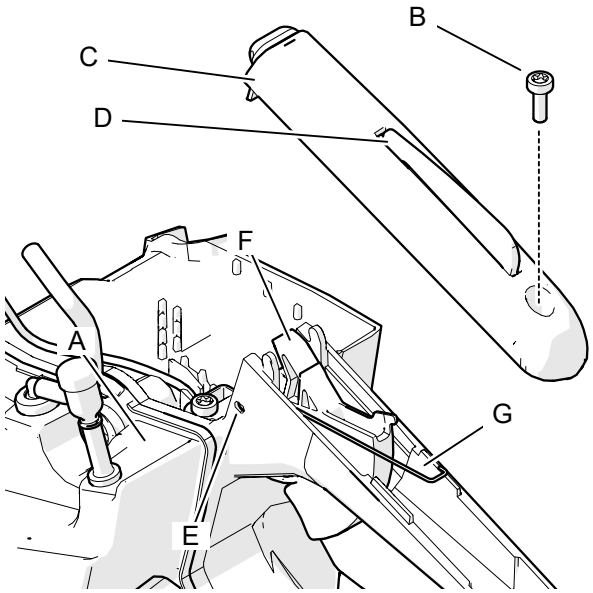
2. Inspect fuel line (A) and replace with new one if defective.

3. Inspect pulse line (B) and replace with new one if defective.

4. Inspect tank vent line (C) and replace with new one if defective.

5. Inspect fuel line (D) and replace with new one if defective.

2-8 Replacing throttle cable and control parts



When throttle cable inner wire does not move smoothly, disconnect throttle cable from carburetor and apply lubricating oil to the inner wire. If it is still hard to move, replace throttle cable.

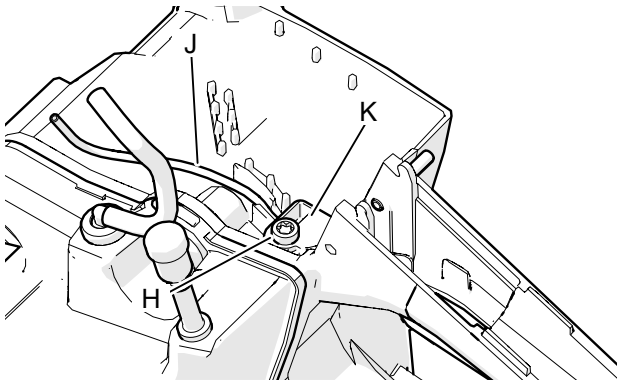
-- Removing --

1. Remove rear handle assembly from the unit (Refer to “2-5 Removing rear handle assembly”).

2. Remove bolt (B) and then remove rear handle lid (C) and throttle lockout (D).

3. Push out spring pin (E).

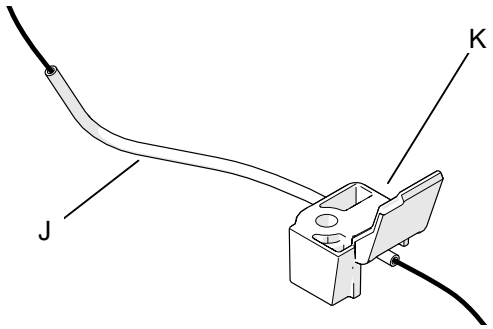
4. Remove throttle trigger (F) with torsion spring (G). Inspect and replace with new one(s) as required.



5. Remove bolt (H) and then remove throttle cable (J) with throttle cable guide (K).

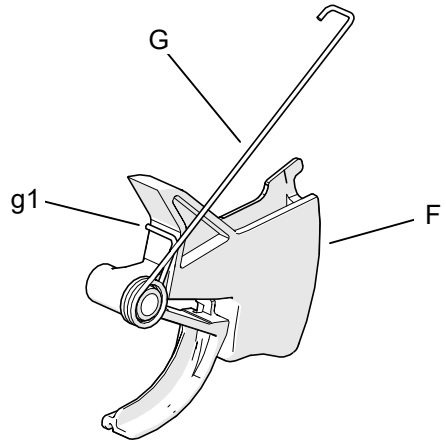
6. Inspect and replace throttle cable (J) with new one as required.

2-8 Replacing throttle cable and control parts (continued)

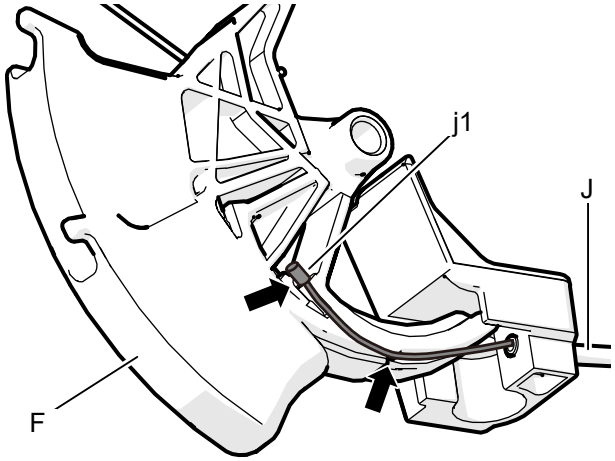


-- Installing --

1. Insert throttle cable (J) into throttle cable guide (K).

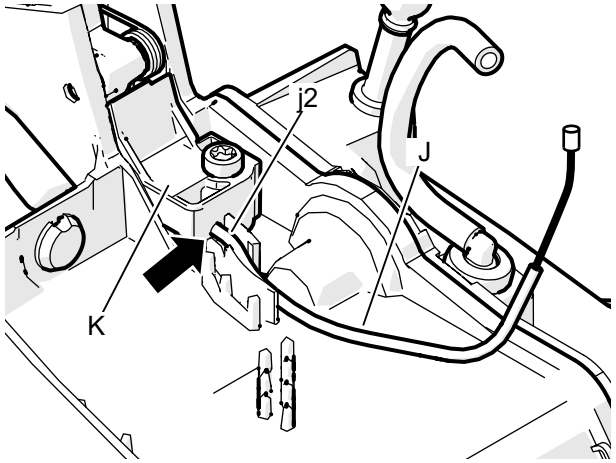


2. Set torsion spring (G) on throttle trigger (F), hooking throttle spring end (g1) as shown.



3. Assemble throttle cable (J) to throttle trigger (F), hooking throttle cable end (j1) as shown.

NOTE: Make sure inner wire of throttle cable is seated in the ribs of throttle trigger (F).



4. Install assembled throttle trigger and throttle cable on rear handle assembly.

NOTE: Make sure throttle cable sleeve (j2) is inserted to throttle cable guide (K) as shown.

5. Route throttle cable (J) in the ribs of rear handle assembly.

6. Reinstall all the removed parts.