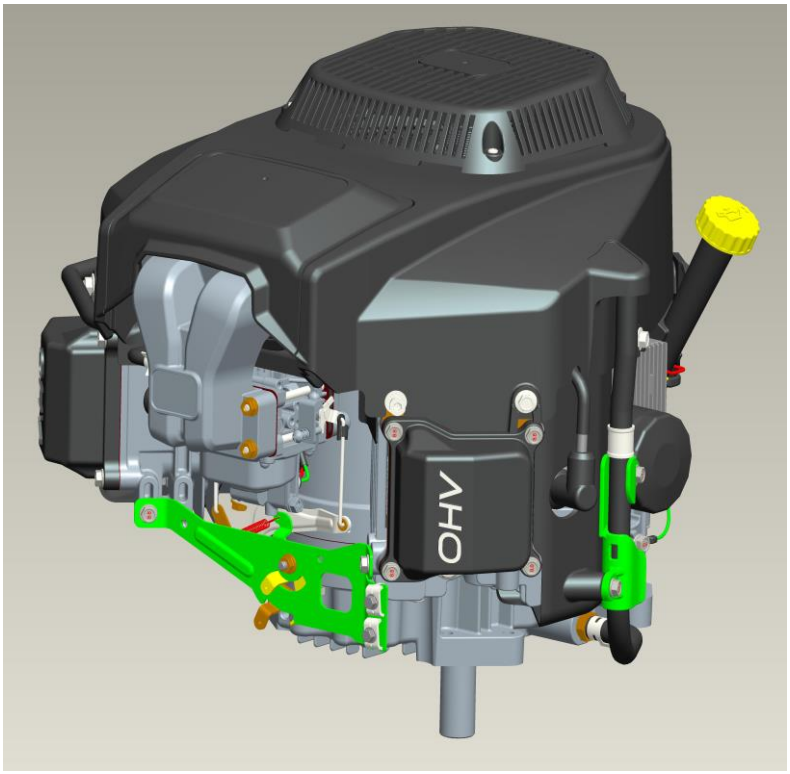
EXMARK V-TWIN AIR COOLED ENGINE SERVICE MANUAL

P/N 127-9041 (708cc)



About this Manual

This service manual was written expressly for Exmark service technicians. Exmark Mfg. Co. Inc. has made every effort to make the information in this manual complete and correct. Basic shop safety knowledge and mechanical/electrical skills are assumed. The Table of Contents lists the systems and the related topics covered in this manual. An electronic version of this service manual is available on the Exmark Dealer Extranet. We are hopeful that you will find this manual a valuable addition to your service shop. If you have any questions or comments regarding this manual, please contact us at the following address:

Exmark Mfg. Co. Inc.
415 Industrial Row
Beatrice, NE 68310
Customer Service | 402-223-6397
service@exmark.com

Chapter 1

– General Service Information

Safety

Safety Information

This symbol means **WARNING or PERSONAL SAFETY INSTRUCTION** – read the instruction because it has to do with your safety. Failure to comply with the instruction may result in personal injury or even death.
This manual is intended as a service and repair manual only. The safety instructions provided herein are for troubleshooting, service, and repair of the Exmark engine. The Exmark operator's manual contains safety information and operating tips for safe operating practices.

Avoid Unexpected Engine Start - Turn off engine and disconnect the spark plug before servicing engine.

Avoid Lacerations and Amputations - Stay clear of all moving parts while the engine is running.

Avoid Burns - Do not touch the engine, muffler, or other components which may increase in temperature during operation, while the unit is running or shortly after it has been running.

Avoid Fires and Explosions - Avoid spilling fuel and never smoke while working with any type of fuel or lubricant. Wipe up any spilled fuel or oil immediately. Never remove the fuel cap or add fuel when the engine is running. Always use approved, labeled containers for storing or transporting fuel and lubricants.

Avoid Asphyxiation - Never operate an engine in a confined area without proper ventilation.

Avoid Injury From Batteries - Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes, and clothing. Battery gases can explode. Keep cigarettes, sparks, and flames away from the battery.

Avoid Injury Due To Inferior Parts - Use only original equipment parts to ensure that important safety criteria are met.

Avoid Injury To Bystanders - Always clear the area of bystanders before starting or testing power equipment.

Avoid Injury Due To Projectiles - Always clear the area of sticks, rocks, or any other debris that could be picked up and thrown by the power equipment.

Avoid Modifications - Never alter or modify any part unless it is a factory approved procedure.

SAFETY PRECAUTIONS

⚠ **WARNING:** A hazard that could result in death, serious injury, or substantial property damage.

⚠ **CAUTION:** A hazard that could result in minor personal injury or property damage.

NOTE: is used to notify people of important installation, operation, or maintenance information.

⚠ WARNING
CAUTION

Explosive Fuel can cause fires and severe burns.

Do not fill fuel tank while engine is hot or running.

Gasoline is extremely flammable and its vapors can explode if ignited. Store gasoline only in approved containers, in well ventilated, unoccupied buildings, away from sparks or flames. Spilled fuel could ignite if it comes in contact with hot parts or sparks from ignition. Never use gasoline

⚠ WARNING

Rotating Parts can cause severe injury.

Stay away while engine is in operation.

Keep hands, feet, hair, and clothing away from all moving parts to prevent injury. Never operate engine with covers, shrouds, or guards removed.

⚠WARNING

Carbon Monoxide can cause severe nausea, fainting or death.

Avoid inhaling exhaust fumes.

Engine exhaust gases contain poisonous carbon monoxide. Carbon monoxide is odorless, colorless, and can cause death if inhaled.

WARNING

Accidental Starts can cause severe injury or death.

Disconnect and ground spark plug lead(s) before servicing.

Before working on engine or equipment, disable engine as follows: 1) Disconnect spark plug lead(s). 2) Disconnect negative (–) battery cable from battery.

⚠ WARNING

Hot Parts can cause severe burns.

Do not touch engine while operating or just after stopping.

Never operate engine with heat shields or guards removed.

⚠

Electrical Shock can cause injury.

Do not touch wires while engine is running.

⚠ CAUTION

Damaging Crankshaft and Flywheel can cause personal injury.

Using improper procedures can lead to broken fragments. Broken fragments could be thrown from engine. Always observe and use precautions and procedures when installing flywheel.

MAINTENANCE INSTRUCTIONS

⚠ WARNING Accidental Starts can cause severe injury or death. Disconnect and ground spark plug lead(s) before servicing.	Before working on engine or equipment, disable engine as follows: 1) Disconnect spark plug lead(s). 2) Disconnect negative (–) battery cable from battery.

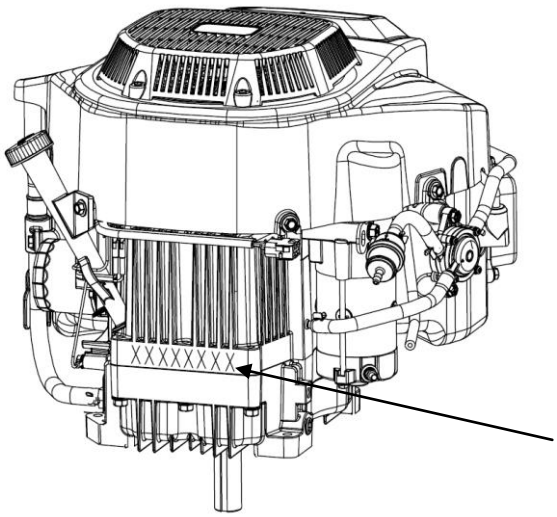
Normal maintenance, replacement or repair of emission control devices and systems may be performed by any repair establishment or individual; however, warranty repairs must be performed by an authorized Exmark dealer.

Service Rules

1. **Only use genuine Exmark parts and lubrication products.**
2. **Always install new gaskets, O-rings and seals when assembling engine.**
3. **Always torque fasteners to specification and in sequence.**
4. **Always lubricate friction components with clean engine oil or engine assembly lube when assembling engine.**

Engine Model / Serial Number Location

The engine model and serial number are stamped into the block, there will also be a label attached to a new engine with this information on it as well.



Engine Model & Serial Number

XXX-XXXX XXXXXXXXXXX

1.1 Torque values

Note: For unspecified bolts and nuts listed, refer to the table of standard torque values.

No.	Process Description	Bolt Specification	Torque Range	
1	Oil Drain Plug Assy.	Oil Drain Plug	20 Ft. Lbs.	26 N.m
2	Spark Plug	M14×1	21 Ft. Lbs.	28 N.m
3	Connecting Rod Cover	Hex Flange Bolt M6×35	9 Ft. Lbs.	12 N.m
4	Crankcase Cover Bolt	Hex Flange Bolt M8×55	21 Ft. Lbs.	28 N.m
5	Fuel Pump Assy.	Hex Flange Bolt M6×16	5 Ft. Lbs.	7 N.m
6	Breather Valve Assy.	Hex Flange Bolt M6×12	8 Ft. Lbs.	10 N.m
7	Cylinder Head	Hex Flange Bolt M10×1.25×70	38 Ft. Lbs.	52 N.m
		Hex Flange Bolt M10×1.25×50		
8	Push Rod Location Limit Plate	Valve Adjust Stud	22 Ft. Lbs.	30 N.m
9	Valve Lash Inspection（Q1）	Valve Lock Nut M6	10 Ft. Lbs.	14 N.m
10	Valve Cover	Hex Flange Bolt M6×25	8 Ft. Lbs.	10 N.m
11	Flywheel	Hex Flange Bolt M12×35	62 Ft. lbs.	82 N.m
12	Ignition Coil	Hex Flange Bolt M6×20	8 Ft. Lbs.	10 N.m
13	Electric Starter Motor	Hex Flange Bolt M8×80	20 Ft. Lbs.	26 N.m
14	Inlet Pipe	Hex Flange Bolt M6×35	8 Ft. lbs.	10 N.m
		Stud Bolt M6×106	5 Ft. Lbs.	7 N.m
15	Air Box	Nut, Flange M6	6 Ft. Lbs.	8 N.m
16	Cooling Fan	Hex Flange Nut M8×20	15 Ft. Lbs.	22 N.m
17	Cooling Fan Cover	Hex Flange Nut M5×16	3 Ft. lbs.	4 N.m
18	Fan Shroud	Hex Flange Step Bolt 6×21.8-8×10.8	6 Ft. Lbs.	8 N.m
19	Shroud Comp	Hex Flange Step Bolt 6×16.8-8×5.8	8 Ft. Lbs.	10 N.m
20	Starter Shroud	Screw ST4.0×15	**10 – 11 In. Lbs.**	**1 N.m**
21	Charging Coil	Screw Inner Six Angle M6×25	8 Ft. Lbs.	10 N.m
22	Engine Shroud	Hex Flange Bolt M6×16	8 Ft. Lbs.	10 N.m
23	Breather Valve Cover	Hex Flange Bolt M6×16	8 Ft. lbs.	10 N.m
24	Ignition Coil	Hex Flange Bolt M6×20	8 Ft. Lbs.	10 N.m
25	Regulator	Hex Flange Bolt M6×16	5 Ft. Lbs.	7 N.m
26	Oil Drain Fitting	/	20 Ft. lbs.	26 N.m
27	Oil Pump Cover	Hex Flange Bolt M6×16	8 Ft. Lbs.	10 N.m
28	Oil Screen Cover	Hex Flange Bolt M6×16	8 Ft. Lbs.	10 N.m
29	Oil Tube Plate	Hex Flange Bolt M6×16	8 Ft. lbs.	10 N.m
30	Governor Throttle	Hex Flange Bolt M6×16	8 Ft. Lbs.	10 N.m
31	Governor Arm	Nut M6	8 Ft. Lbs.	10 N.m
32	Tube Clip	Hex Flange Bolt M6×16	5 Ft. Lbs.	7 N.m
33	Connector, Oil Filter	M20	30 Ft. Lbs.	42 N.m

34	Cylinder Head	Stud Bolt M8×39	11 Ft. Lbs.	14 N.m
		Nut M8	13 Ft. Lbs.	17 N.m
35	Oil Filter	/	9 Ft. Lbs.	12 N.m

1.2 Engine Specifications

Part	Item	Standard	Service Limit
		P/N 127-9041	P/N 127-9041
Engine	Ile speed	1800 RPM's	+ or – 100 RPM's
	Operating RPM	3600 RPM's	+ or – 50 RPM's
Cylinder head	Warpage		0.0020" (0.05 mm)
Cylinder	Sleeve Taper / Out of Round	3.0315"-3.0319" (77 – 77.01 mm)	3.0354" (77.1 mm)
	(Inside Diameter)		
Piston	Skirt outside diameter	3.0301-3.0305" (76.965-76.975 mm)	3.0219" (76.755 mm)
	Clearance to cylinder	0.00098-0.0017" (0.025-0.045 mm)	0.01000" (.255 mm)
	Piston pin bore inside diameter	0.66937- 0.66961" (17.002-17.008 mm)	0.67402" (17.12 mm)
	Piston – pin clearance	0..00016-0.00063" (0.004-0.016 mm)	0.0014" (0.029 mm)
Piston pin	Outside diameter	0.6689-0.6692" (16.992-16.998 mm)	0.6654" (16.9 mm)
Piston ring	Ring to Groove (Top and Middle	0.0008-0.0024" (0.02-0.06 mm)	0.0043" (0.11 mm)
	End gap (top and middle)	0.0079-0.01578" (0.20-0.40 mm)	0.0177" (0.45 mm)
	Width (top)	0.0382-0.0390" (0.97-0.99 mm)	0.0354" (0.9 mm)
	Width (second)	0.0460-0.0469" (1.17-1.19 mm)	0.0433" (1.1 mm)
	Width (oil ring)	0.0650-0.0728" (1.65-1.85 mm)	0.0630" (1.6 mm)
Connecting rod	Small end inside diameter	0.6695-0.670" (17.006-17.017 mm)	0.6712" (17.05 mm)
	Big end inside diameter	1.575-1.576" (40.015-40.025 mm)	1.577" (40.065 mm)
	Big end side clearance	0.0010-0.0031" (0.024-0.079 mm)	0.0051" (0.129 mm)
Crankshaft	Connecting Rod Journal Diameter	1.5735-1.5744" (39.966-39.991 mm)	1.555" (39.5 mm)
Valve	Clearance(cold) (intake)	0.004-0.006" (0.10-0.15 mm)	—
	Clearance(cold) (exhaust)	0.006-0.008" (0.15-0.20 mm)	—
	Stem diameter (intake)	0.258-0.259" (6.565-6.58 mm)	0.256" (6.515 mm)
	Stem diameter (exhaust)	0.257-0.258" (6.545-6.56 mm)	0.258" (6.495 mm)
Valve guide	Inside diameter (intake, exhaust)	0.259-0.260" (6.6-6.615 mm)	0.262" (6.665 mm)
	Stem to guide clearance (intake)	0.0008-0.0020" (0.02-0.05 mm)	0.006" (0.15 mm)
	Stem to guide clearance exhaust)	0.0016-0.0027" (0.04-0.07 mm)	0.007" (0.17 mm)
Valve seat	Seat width	0.0027-0.0031" (0.7-0.8 mm)	0.051" (1.3 mm)
Valve spring	Free length	1.55-1.60" (39.5-40.5 mm)	1.535" (39 mm)
Cam shaft	Height (intake)	1.15-1.18" (29.95-30.05 mm)	1.17" (29.75 mm)
	Height (exhaust)	1.15-1.18" (29.95-30.05 mm)	1.17" (29.75 mm)
	Outside diameter (bearing)	0.628-0.629" (15.966-15.984 mm)	0.626" (15.916 mm)

Crankcase cover	Camshaft hole diameter	0.629-0.630” (16-16.018 mm)	0.633” (16.068 mm)
	Crankshaft hole diameter	1.575-1.576” (40.009-40.025 mm)	1.578” 40.075 mm)
Spark plug	Gap	0.0027-0.0031” (0.7-0.8 mm)	—
Ignition coils	Resistance (primary)	(1.6-1.9 Ω)	—
	Resistance (secondary)	(6.27.1k Ω)	—
	Gap to flywheel	0.015-0.016” (0.4±0.1 mm)	—

GENERAL TORQUE VALUES

English Fastener Torque Recommendations for Standard Applications				
	Bolts, Screws, Nuts and Fasteners Assembled Into Cast Iron or Steel			Grade 2 or 5 Fasteners Into Aluminum
Size	Grade 2	Grade 5	Grade 8	
Tightening Torque: N·m (in. lb.) ± 20%				
8-32	2.3 (20)	2.8 (25)	—	2.3 (20)
10-24	3.6 (32)	4.5 (40)	—	3.6 (32)
10-32	3.6 (32)	4.5 (40)	—	—
1/4-20	7.9 (70)	13.0 (115)	18.7 (165)	7.9 (70)
1/4-28	9.6 (85)	15.8 (140)	22.6 (200)	—
5/16-18	17.0 (150)	28.3 (250)	39.6 (350)	17.0 (150)
5/16-24	18.7 (165)	30.5 (270)	—	—
3/8-16	29.4 (260)	—	—	—
3/8-24	33.9 (300)	—	—	—
Tightening Torque: N·m (ft. lb.) ± 20%				
5/16-24	—	—	40.7 (30)	—
3/8-16	—	47.5 (35)	67.8 (50)	—
3/8-24	—	54.2 (40)	81.4 (60)	—
7/16-14	47.5 (35)	74.6 (55)	108.5 (80)	—
7/16-20	61.0 (45)	101.7 (75)	142.5 (105)	—
1/2-13	67.8 (50)	108.5 (80)	155.9 (115)	—
1/2-20	94.9 (70)	142.4 (105)	223.7 (165)	—
9/16-12	101.7 (75)	169.5 (125)	237.3 (175)	—
9/16-18	135.6 (100)	223.7 (165)	311.9 (230)	—
5/8-11	149.5 (110)	244.1 (180)	352.6 (260)	—
5/8-18	189.8 (140)	311.9 (230)	447.5 (330)	—
3/4-10	199.3 (147)	332.2 (245)	474.6 (350)	—
3/4-16	271.2 (200)	440.7 (325)	637.3 (470)	—

Metric Fastener Torque Recommendations for Standard Applications						
	Property Class					Noncritical Fasteners Into Aluminum
Size	4.8	5.8	8.8	10.9	12.9	
Tightening Torque: N·m (in. lb.) ± 10%						
M4	1.2 (11)	1.7 (15)	2.9 (26)	4.1 (36)	5.0 (44)	2.0 (18)
M5	2.5 (22)	3.2 (28)	5.8 (51)	8.1 (72)	9.7 (86)	4.0 (35)
M6	4.3 (38)	5.7 (50)	9.9 (88)	14.0 (124)	16.5 (146)	6.8 (60)
M8	10.5 (93)	13.6 (120)	24.4 (216)	33.9 (300)	40.7 (360)	17.0 (150)

Tightening Torque: N·m (ft. lb.) ± 10%						
M10	21.7 (16)	27.1 (20)	47.5 (35)	66.4 (49)	81.4 (60)	33.9 (25)
M12	36.6 (27)	47.5 (35)	82.7 (61)	116.6 (86)	139.7 (103)	61.0 (45)
M14	58.3 (43)	76.4 (56)	131.5 (97)	184.4 (136)	219.7 (162)	94.9 (70)

Torque Conversions

N·m = in. lb. x 0.113 in. lb. = N·m x 8.85

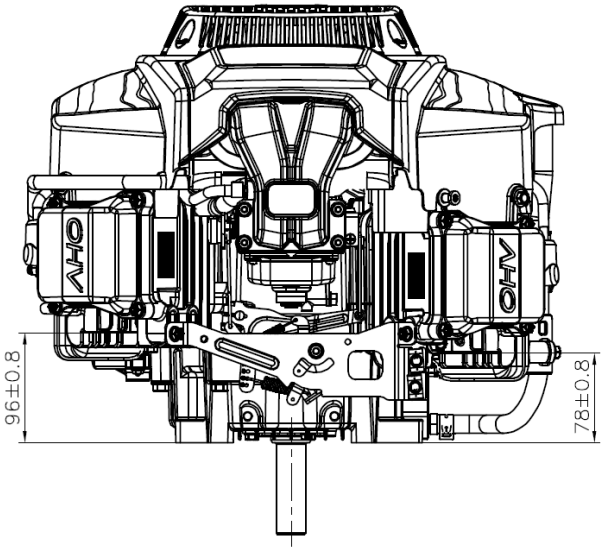
N·m = ft. lb. x 1.356 ft. lb. = N·m x 0.737

2. Specifications

2.1 Specifications

Model	P/N 127-9041 - 708 CC
Type	OHV, V-twin –Air Cooled 4-Stroke
Idle speed	1800 ± 50 rpm
Bore X Stroke	3.03” x 2.99” (77×76mm)
Displacement(cc)	43.20 Cubic Inches (708 cc)
Compression Ratio	8.7 :1
Lubricating mode	Full pressure
Starting mode	Electric
Rotation	Counter Clockwise(from P.T.O. side)
Valve clearance	Intake valve：0.004” - 0.006” , Exhaust valve：0.006” – 0.008”
Spark plug clearance	0.0027” - 0.0031” (0.7~0.8mm)
Igniting mode	Transistorized Magneto Ignition
Air cleaner	Foam & paper
Fuel type	Unleaded gasoline, minimum 87 Octane
Oil capacity	2.1 Quarts (2.0 liters)
Dimension(L×W×H)	18.44” x 18.61” x 15.06” (468.4×472.7×382.7 mm)
Net weight	89.95 lbs. (40.8 kg)

2.2 Dimensional Drawings in Millimeters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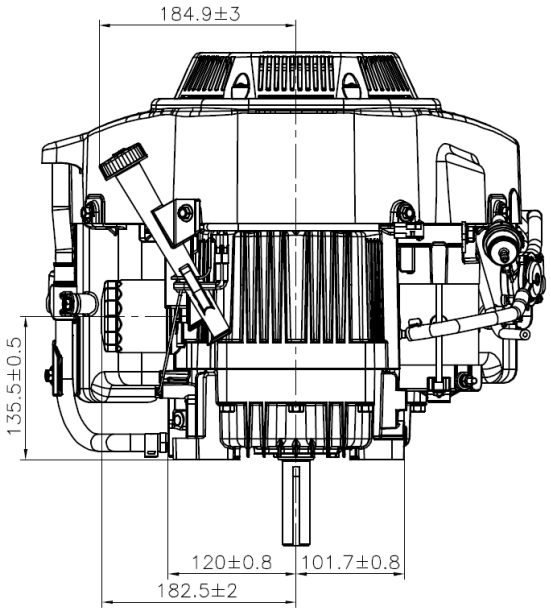
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120±0.8
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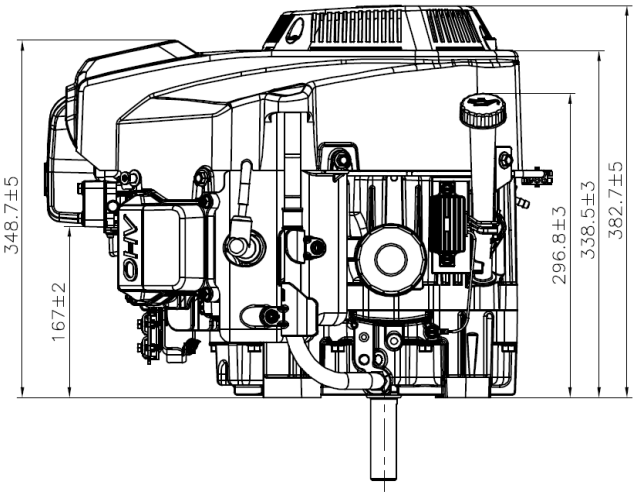
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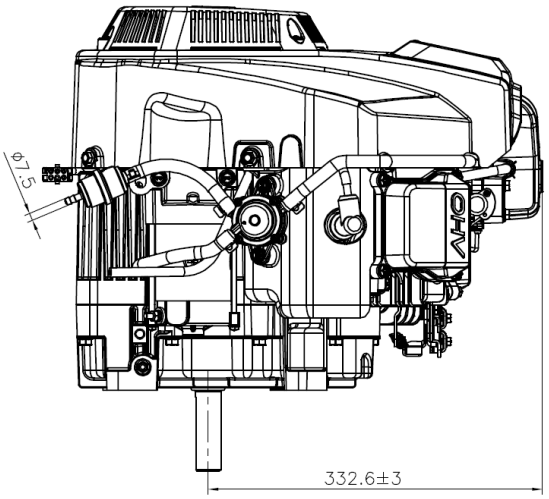
382.7±5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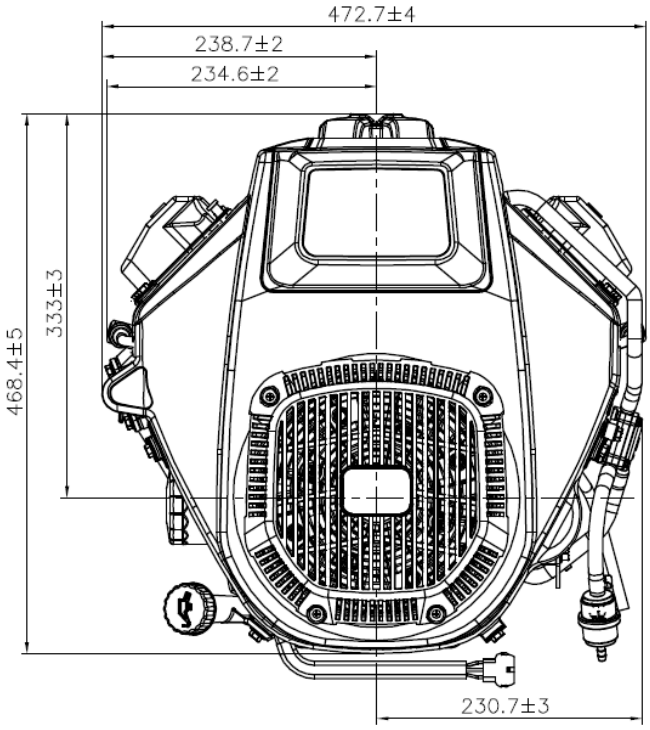
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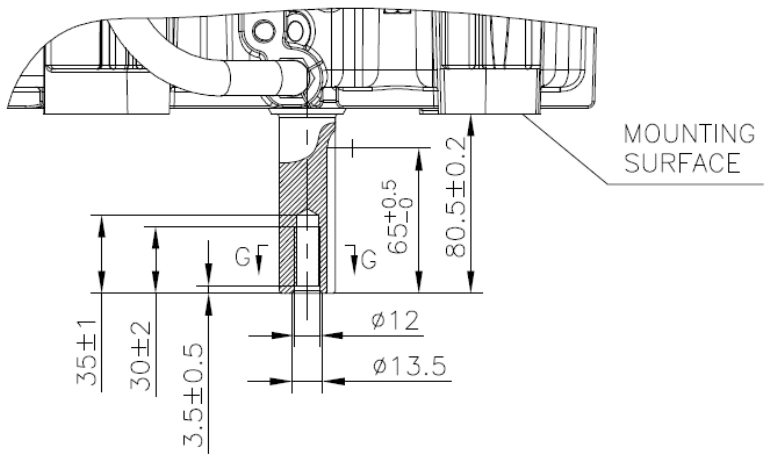
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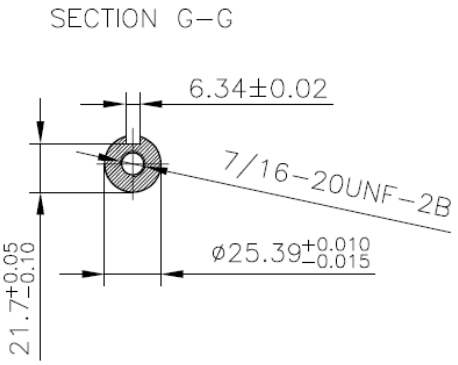
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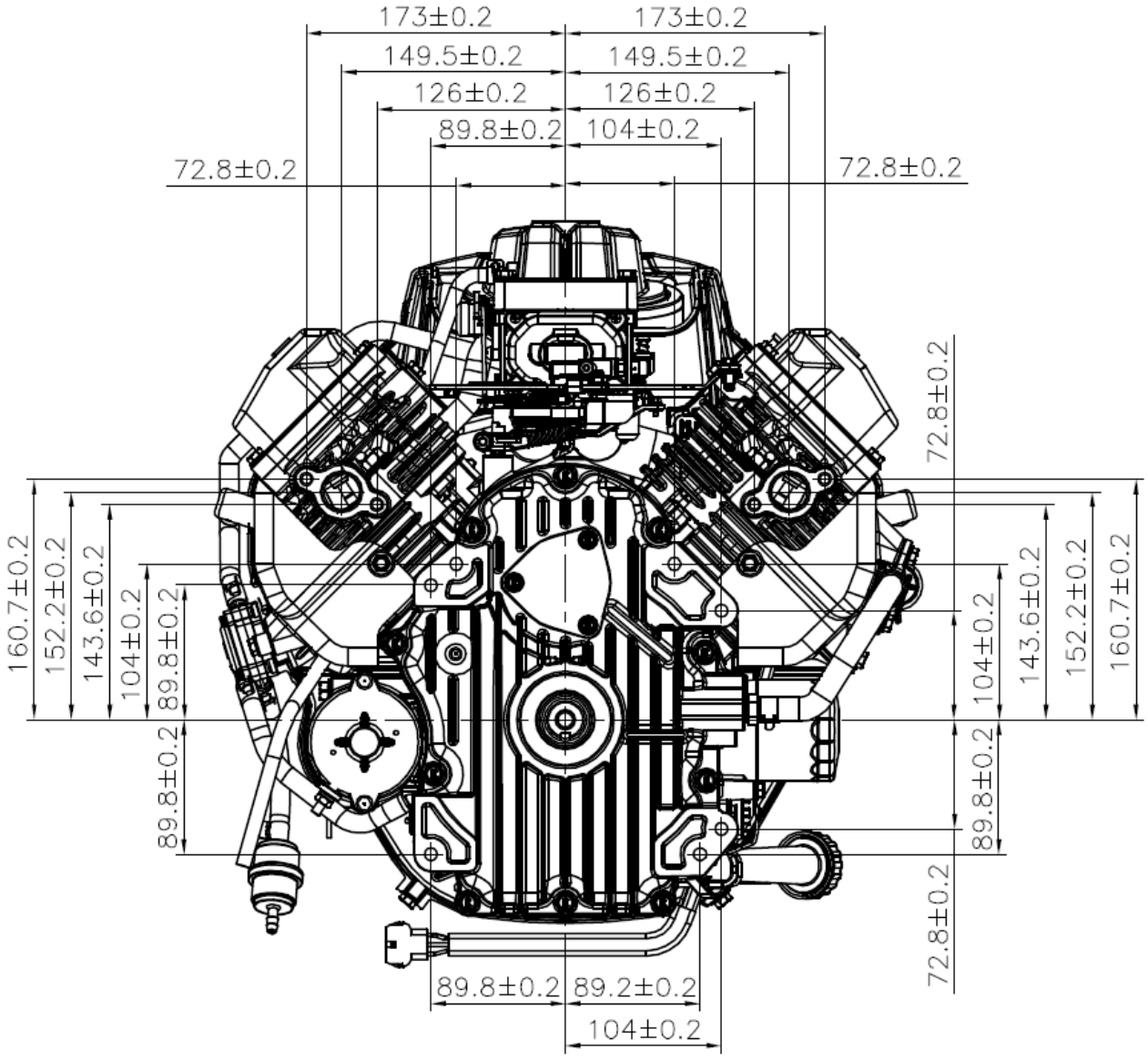
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89.8±0.2
72.8±0.2
89.8±0.2
89.2±0.2
104±0.2

3 Maintenance

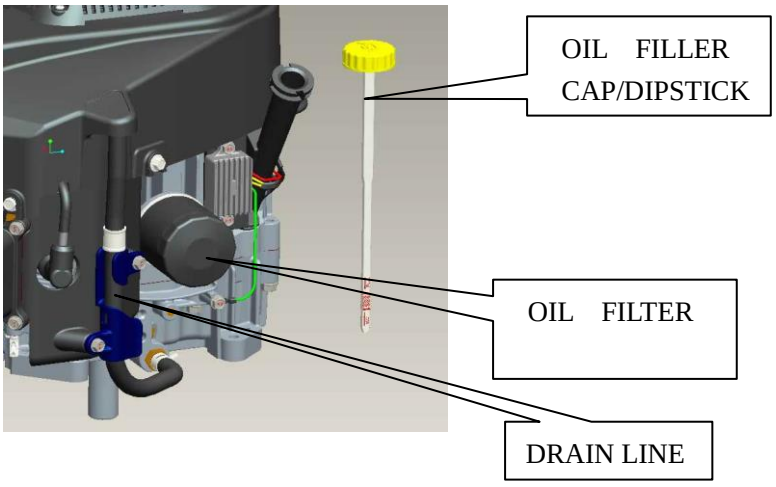
3.1 Maintenance Schedule

Maintenance schedule		Each Use	First 1 month or 5 hours	Every 3 months or 25 hours	Every 6 months or 50 hours	Every year or 100 hours	Every 2 years or 200 hours
Engine oil	Oil level	●					
	Change		●		●		
Air cleaner foam element	Clean			●(1)			
	Change					●(1)	
Air cleaner paper element	Clean					●(1)	
	Change						●(1)
Oil Filter	Change				●		
Fuel filter	Replace						
Spark plug	Replace						●
	Check-adjust					●(2)	
Valve clearance	Check-adjust						●(2)
Combustion chamber	Clean						●(2)
Remove engine shroud and clean	Compressed Air					●	
Fuel hose		Every 3 years (Replace sooner if necessary) (2)					

（1）Service more frequently when used in dusty condition areas.

（2）These items are to be maintained by designated dealers unless the user has special tools and skills for maintenance.

3.2 Engine Oil



Drain the oil while the engine is warm to assure rapid and complete draining.

1. Clean the area around the oil filler cap/dipstick. Remove the oil filler cap/dipstick.
2. Drain the engine oil into a suitable container using one of the following methods.

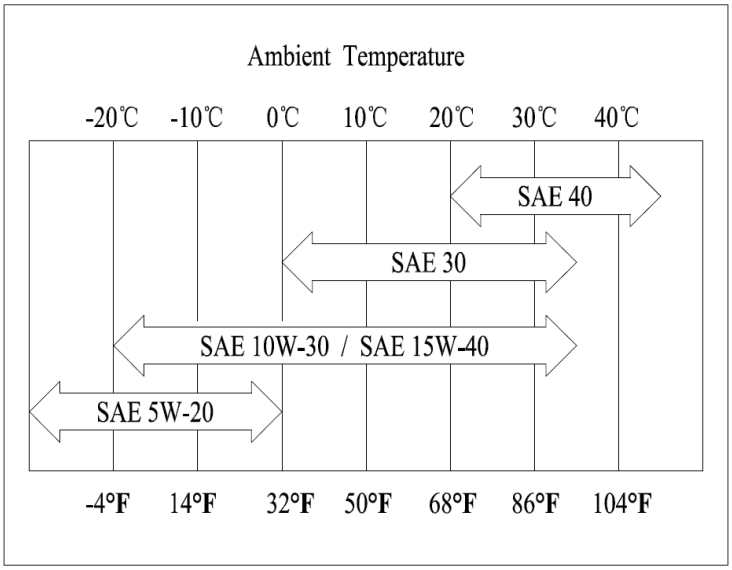
Oil Drain:

a. Unwind the tube from the cleat
b. Pull hose down from the fitting
c. Allow the oil to drain into a suitable container.
d. Replace hose fully

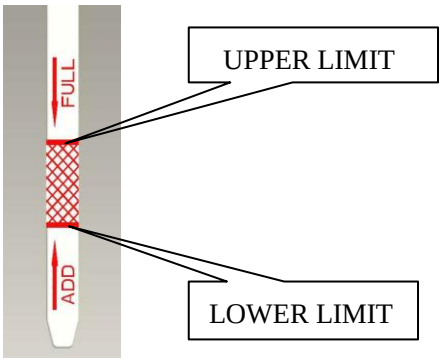
Engine Oil Capacity: 2.1 quarts (2.0 L)

Use a high-detergent, premium quality 4-stroke engine oil certified to meet or exceed US. Automobile manufacturers' requirements for API Service Classification SG, SF.

SAE 15W-40 is recommended for general, all-temperature use. Other viscosities shown in the chart may be used when the average temperature in your area is within the indicated range.



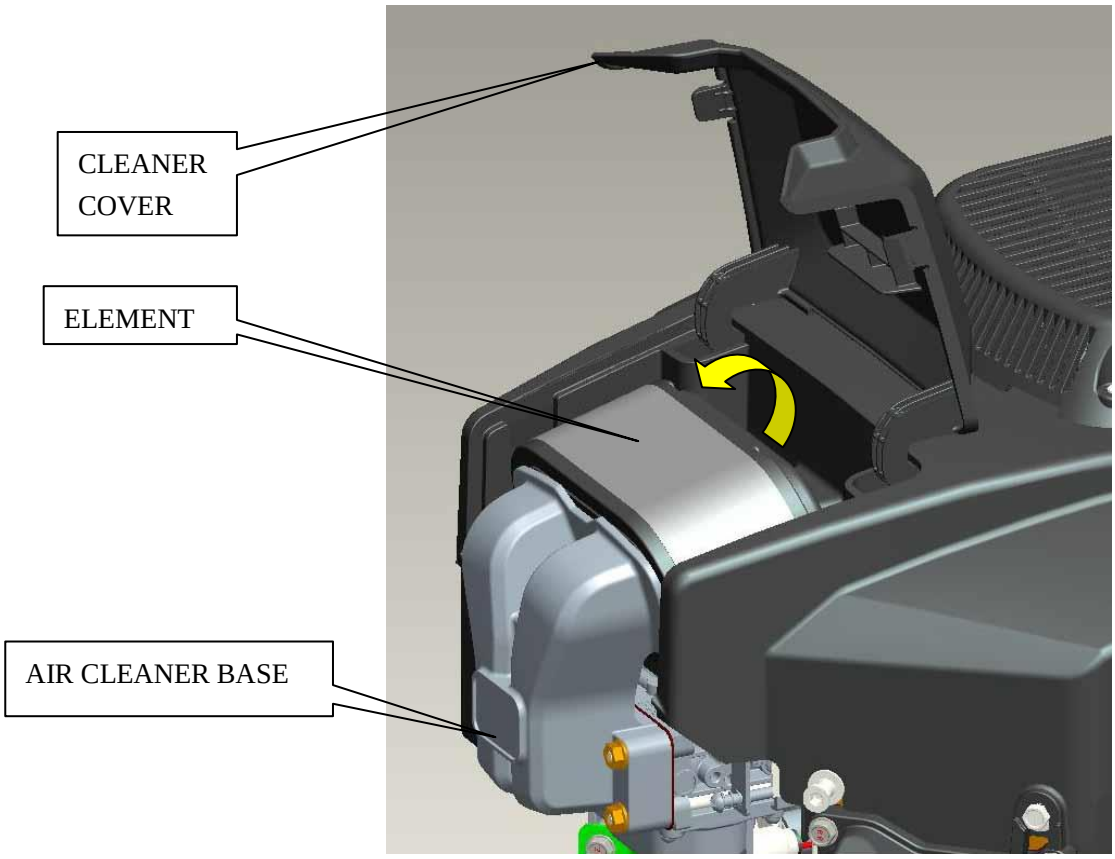
3. Insert the oil filler cap/dipstick into the oil filler tube. Remove the oil filler cap/dipstick and check the oil level. Bring the level to the upper mark on the dipstick.
after running the engine, recheck the oil level and adjust if necessary.
Wash your hands thoroughly with soap and water as soon as possible after contact with used oil which contains Carcinogenic substances.



Please dispose of used motor oil and the oil containers in a manner that is compatible with the environment. We suggest you take it in a sealed container to your local recycling center or service station for reclamation. Do not throw it in the trash, or pour it on the ground.

3.3 Air Cleaner

1. Lift open door
2. Rotate filter out from rear.



3. Clean the foam element by squeezing it in warm soapy water, rinsing it, and allowing it to dry. You may also use a nonflammable solvent and then allow it to dry.
4. Clean the paper element by tapping it on a hard surface to knock off dirt, never used compressed air. Never try to brush off the dirt. Brushing will force dirt into the filter fibers.
5. Use a damp rag to wipe any dirt from the inside of the air cleaner base and cover. Be careful not to allow dirt into the duct leading to the carburetor.
6. Install filter in reverse order of removal
7. Close door

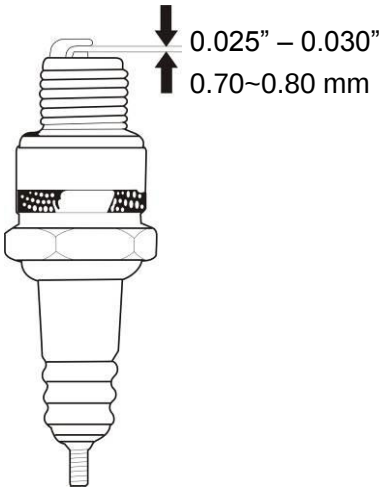
CAUTION: ***Operating the engine without an air filter, or with a damaged air filter, will allow dirt to enter the engine, causing rapid engine wear. This type of damage is not covered by the Distributor's Limited Warranty.***

3.4 Spark Plug

Recommended types: BOSCH F7RTC NHSP BP7RES CHAMPION RN9YC

NOTICE

Spark plugs of the wrong size or incorrect heat range can cause engine damage.



1. Disconnect the spark plug lead and remove any dirt from around the spark plug area.
2. Remove the spark plug with a spark plug wrench.
3. Inspect the spark plug for excessively worn electrodes, chips or cracks in the insulator, or excessive deposits. Replace the spark plug if you have any doubts about its condition.
4. Measure the electrode gap with a wire gap gauge. Adjust the gap to 0.025 – 0.030” by carefully bending the ground electrode.
5. Use a spark plug wrench to tighten the plug enough to compress the washer. For a used plug, tighten 1/8 to 1/4 of a turn after the spark plug seats. For a new plug, tighten 1/2 turn after the spark plug seats. 18 – 22 ft. lbs.

NOTICE

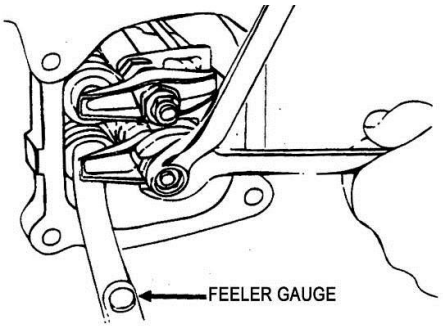
A loose spark plug can become hot enough to damage the engine. Over tightening a spark plug can damage the threads in the engine.

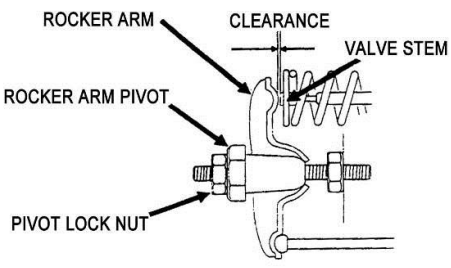
6. Install the spark plug lead on the plug.

3.5 Valve Clearance

Valve clearance inspection and adjustment must be done with the engine cold.

1. Remove the valve cover, and set the first cylinder piston at top dead center of the compression stroke (both valves will be fully closed).
2. Measure the clearance between the rocker arm and the valve stem with a feeler gauge.
   Intake: 0.040” to 0.060” (0.10~0.15 mm)
   Exhaust: 0.060” to 0.075 (0.15~0.20 mm)
3. To adjust valve clearance, hold the rocker arm pivot and loosen the pivot lock nut.
4. Turn the rocker arm pivot to obtain the specified clearance.
5. Hold the rocker arm pivot and tighten the pivot lock nut.
6. Recheck the clearance and readjust if necessary.
7. Install the cylinder head cover.
8. Repeat procedure for the other side.



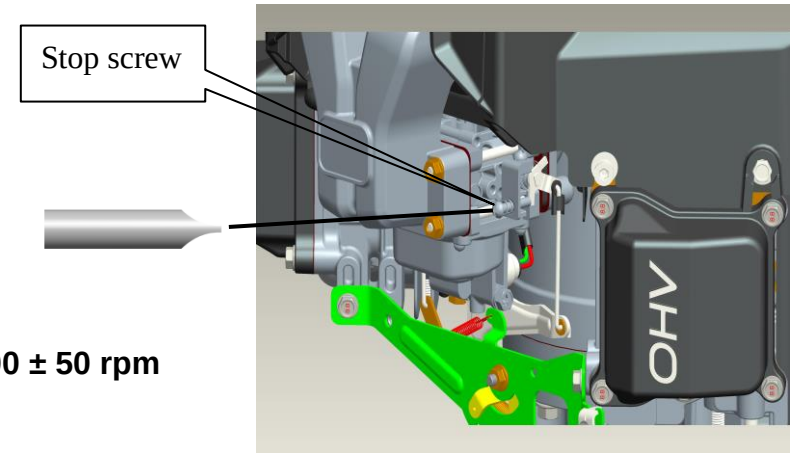


3.6 Carburetor

Idle speed

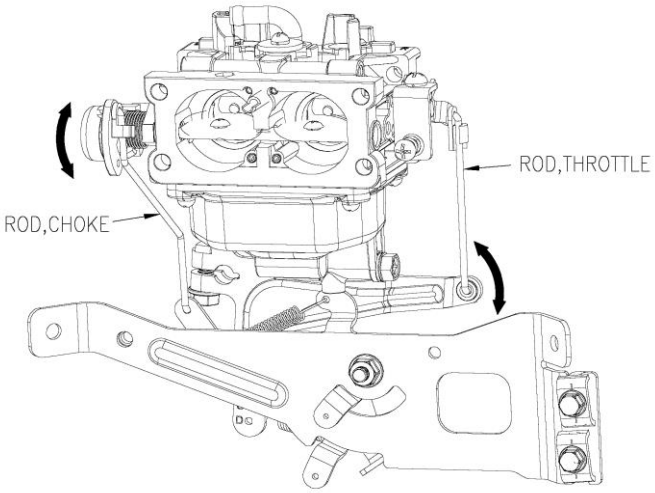
1. Start the engine and allow the engine to warm to normal operating temperature.
2. With the engine idling, adjust the throttle stop screw to obtain the recommended engine idle speed.

Recommended idle speed: 1800 ± 50 rpm



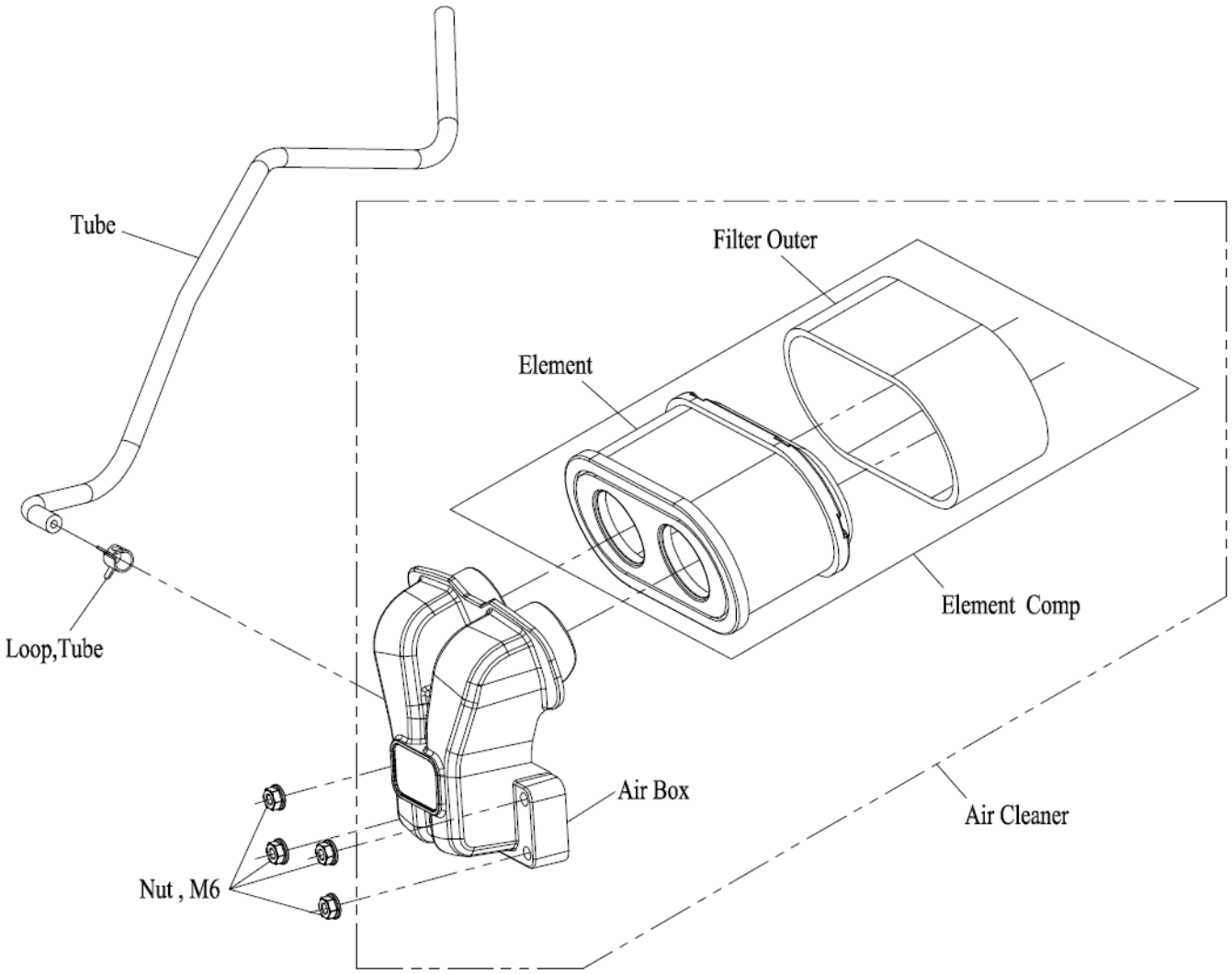
3.7 Governor

1. Loosen the governor arm pinch bolt nut. but do not remove it.
2. Move the governor arm anti clockwise to fully open the throttle and hold it in this position.
3. Rotate the governor arm shaft fully clockwise and hold it there with a pair of pliers. Tighten the governor arm pinch bolt nut to 8 ft. lbs. (11N·m) to secure the governor arm to the governor arm shaft.
4. Check to be sure the governor arm and throttle valve move free

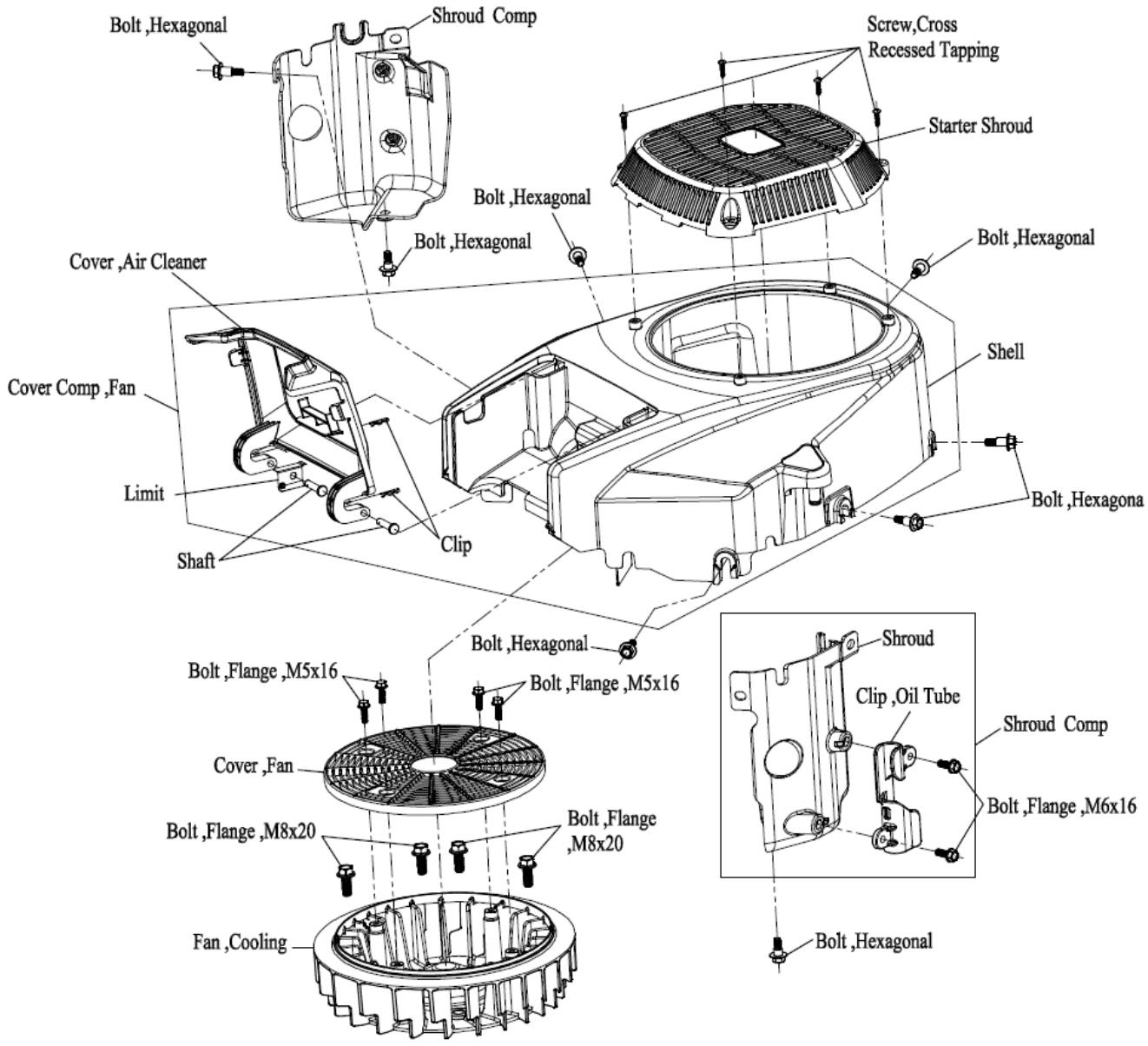


4 Disassembly and Service

4.1 Air Cleaner

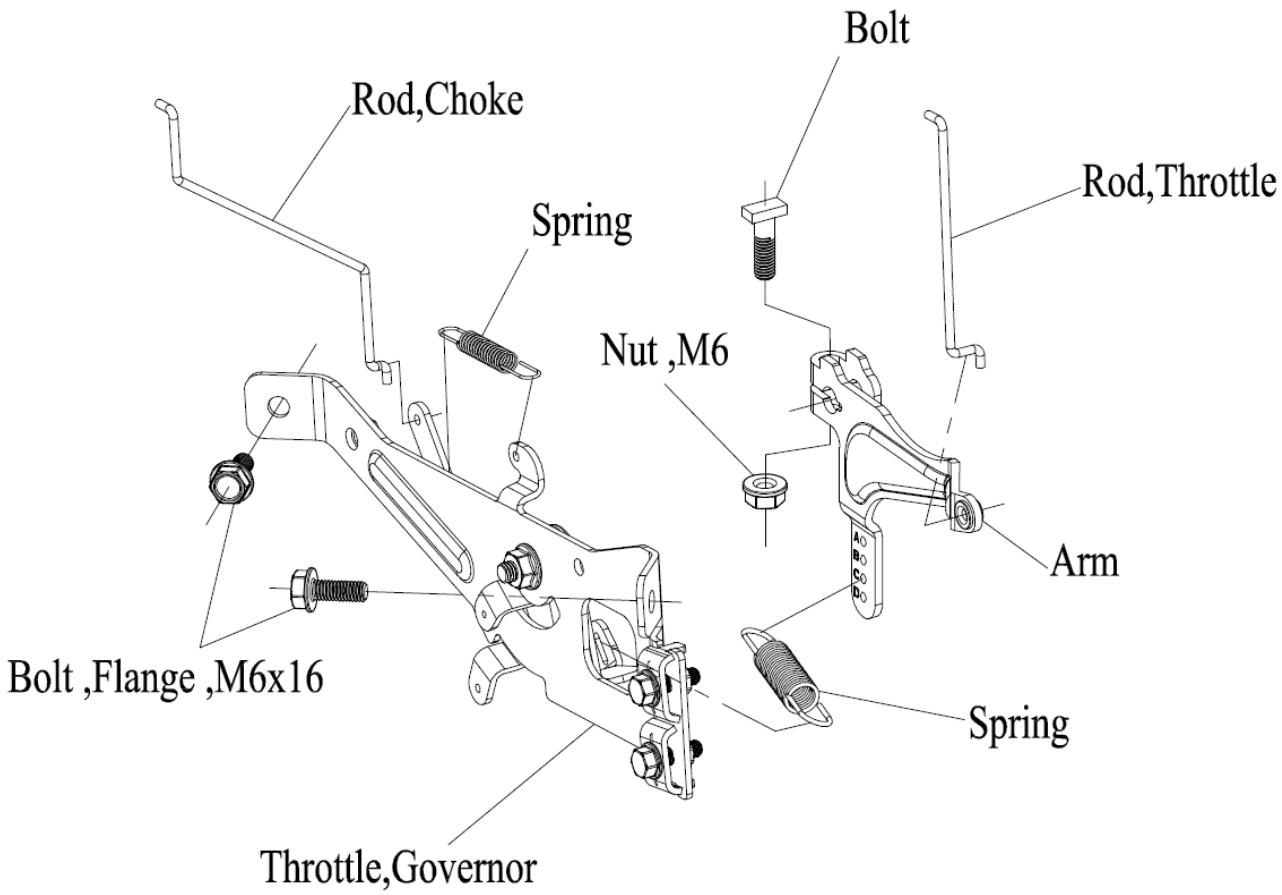


4.2 Engine Cover

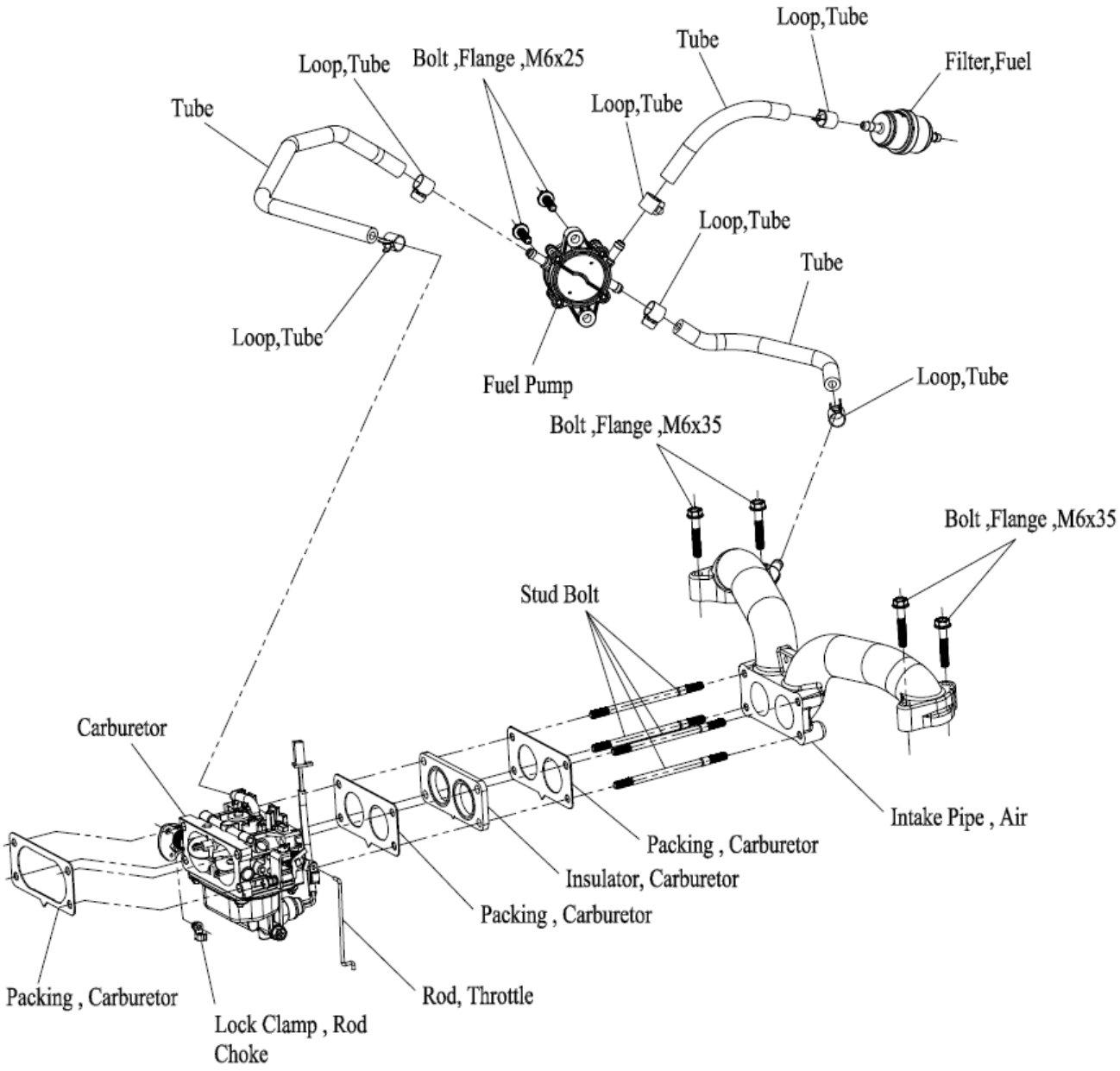


4.3 Control Lever

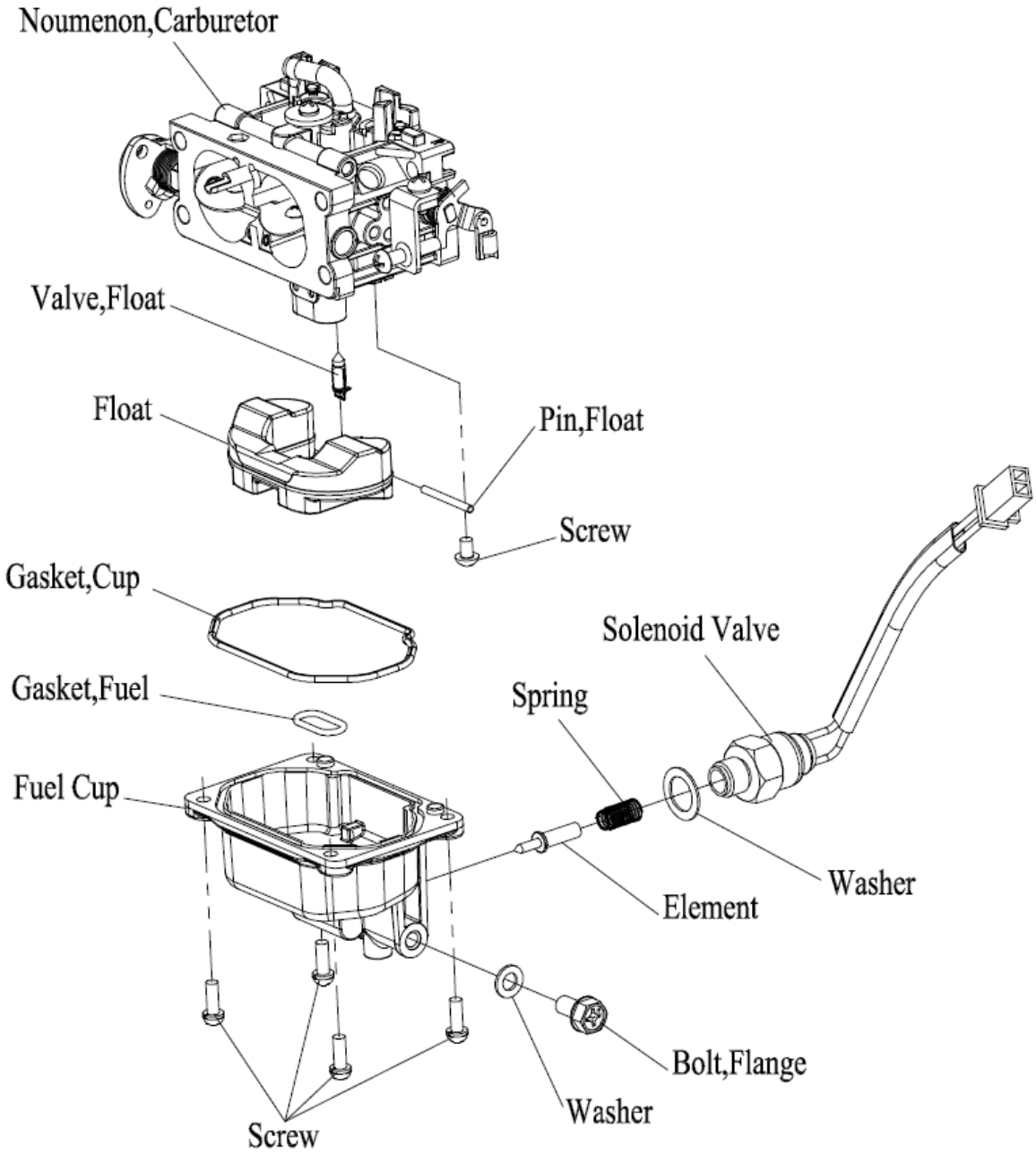
Removal / Installation



4.4 Air Intake



4.5 Carburetor



NOTICE

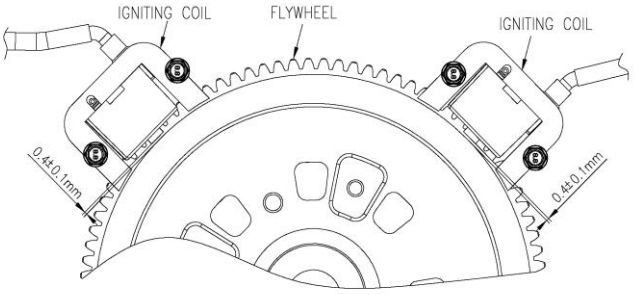
No.	Process Description	Bolt Specification	Torque Range	
			N.m	In.lb.
1	Solenoid Valve	M12	6~9	53.1~79.6
2	Fuel Cup	Screw M4	1.5~2.0	13.3~17.7
3	Fuel Plug	Flange Bolt M6	6~9	53.1~79.6
4	Pin,Float	Screw M3	1.8~3.0	15.9~26.5
5	Main Jet		1.2~1.7	10.6~15

4.6 Ignition Coil

Igniting coil gap adjustment

When reinstalling ignition coils, adjust the air gap to: (0.015" – 0.020")

1) Lightly tighten the igniting coil mounting bolt.
2) Insert the feeler gauge or a piece of paper of the same thickness between the flywheel and coil as shown.
3) Push the coil against the flywheel by hand and tighten the two bolts.

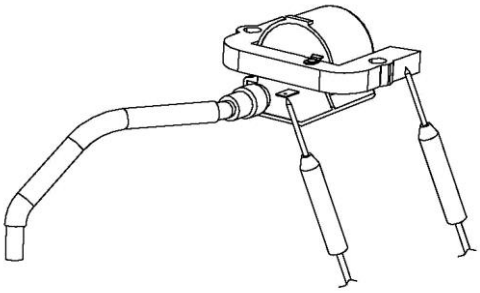


NOTICE

a) Adjust both ends of the coil to the same gap.

b) Avoid the magnet portion of the flywheel when adjusting.

c) Inspect your work



Ignition Coil：

<Primary coil>

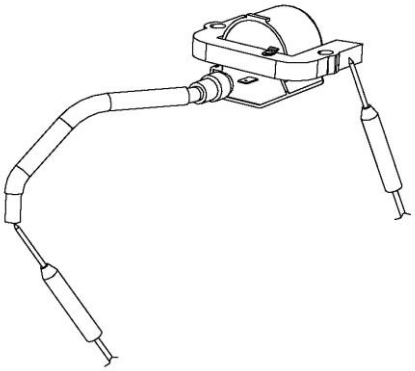
Put the tester terminal and lead terminal to contact with iron core of coil, and measure the primary coil resistance.

Primary coil resistance	1.6-1.9 Ω

<Secondary coil>

Put the tester terminal and removed spark plug cap's high tension cord to contact with iron cord and measure the secondary coil resistance.

Secondary coil resistance	6.2-7.1 KΩ



Adjustment

Adjustment is required only when the ignition coil or the flywheel has been removed.

1. Loosen the ignition coil mounting bolts.
2. Insert the thickness gauge or a piece of paper of the proper thickness between the ignition coil and the flywheel, both gaps should be adjusted simultaneously. Avoid the magnet when adjusting the air gap.
3. Push the ignition coil firmly toward the flywheel and tighten the mounting bolts.

Specified clearance	0.015" – 0.020" (0.4 mm +/- 0.1mm)

4.7 Flywheel /Breather

Removal / installation

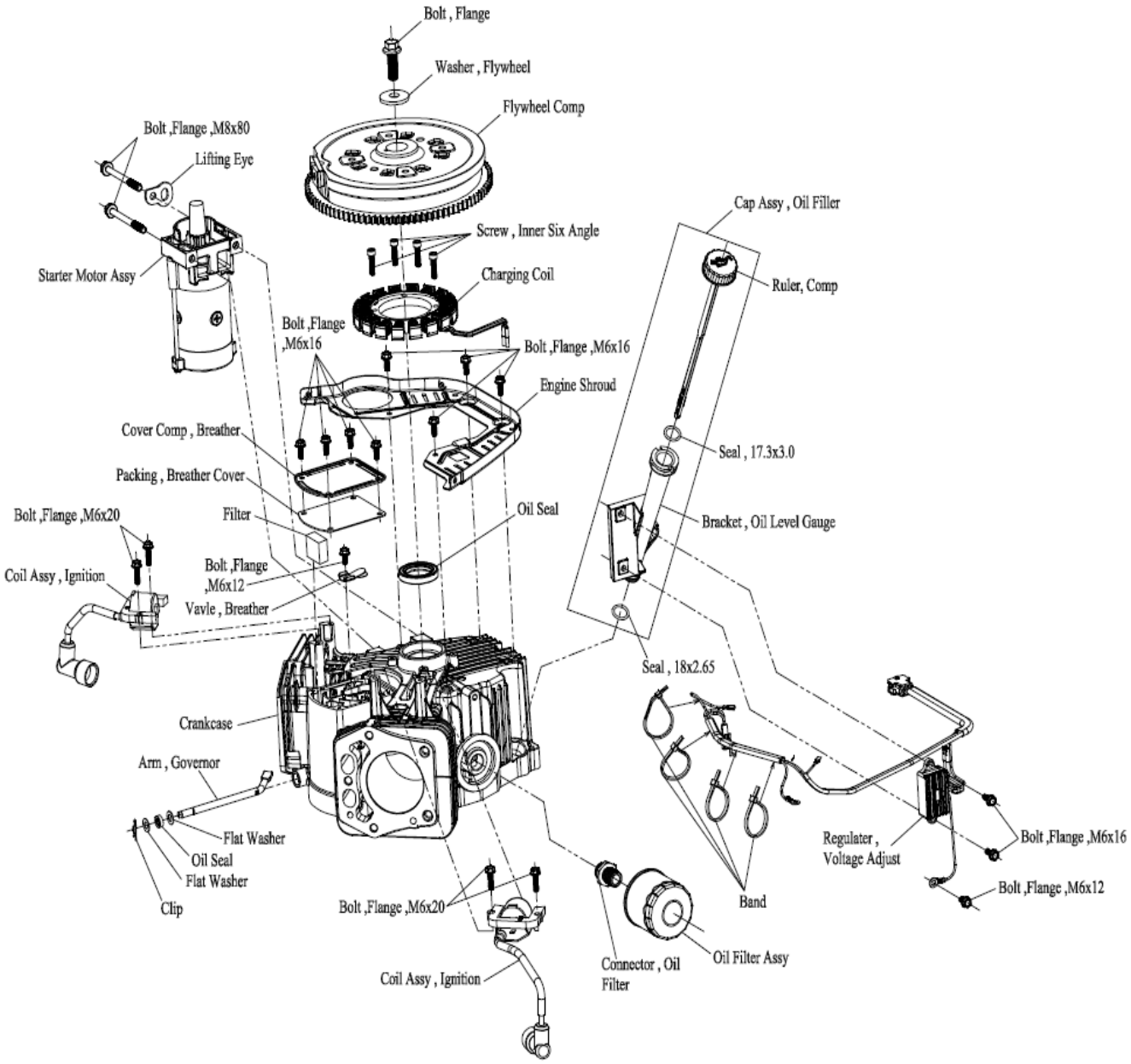
NOTICE：

Disassembly:

Do not hit the flywheel with a hammer. Remove with a commercially available puller.
Avoid the magnet section when attaching the puller.

Reassembly:

Make certain there are no metal objects stuck to the magnet.
Adjust the ignition coil air gap after reassembly.



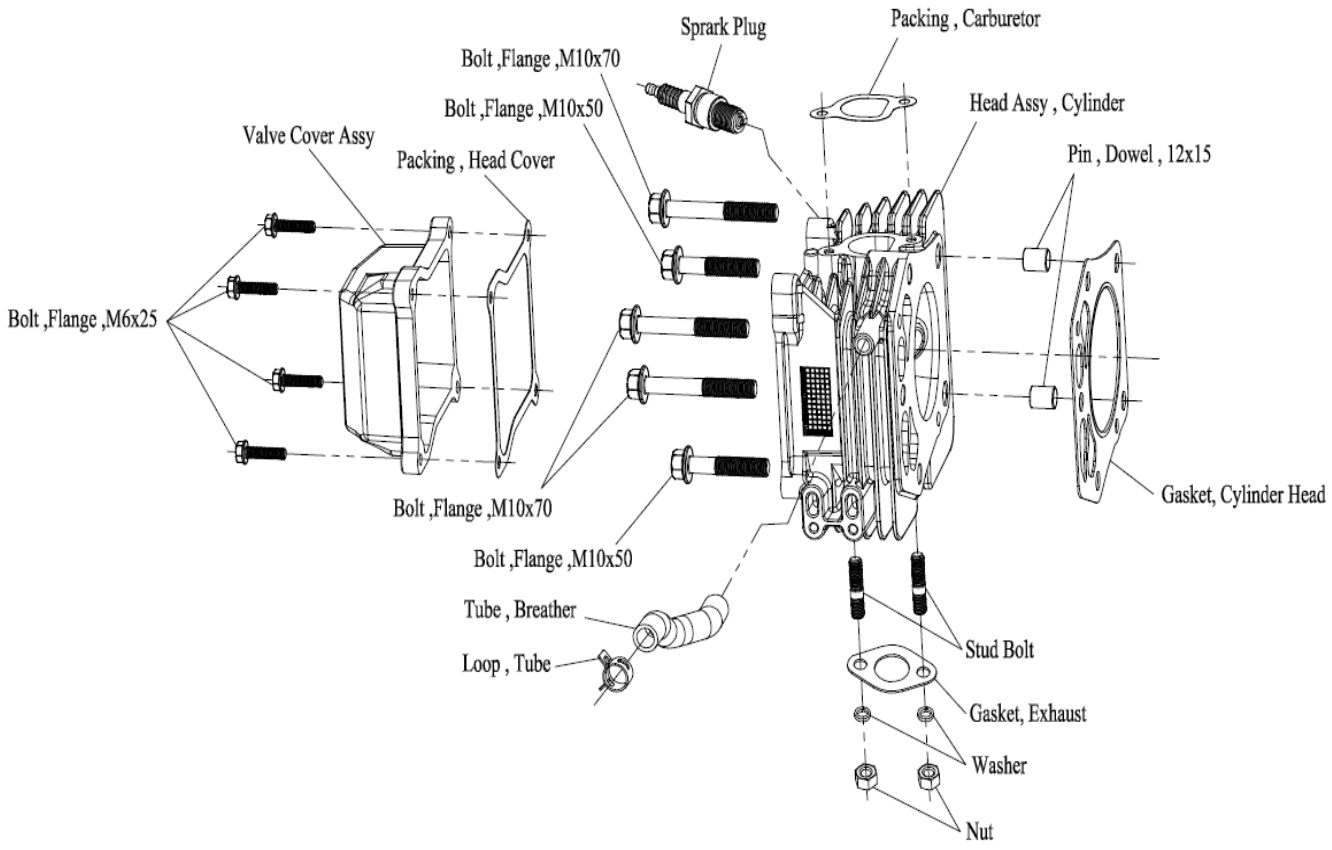
4.8 Cylinder Head & Valves

Removal / Installation:

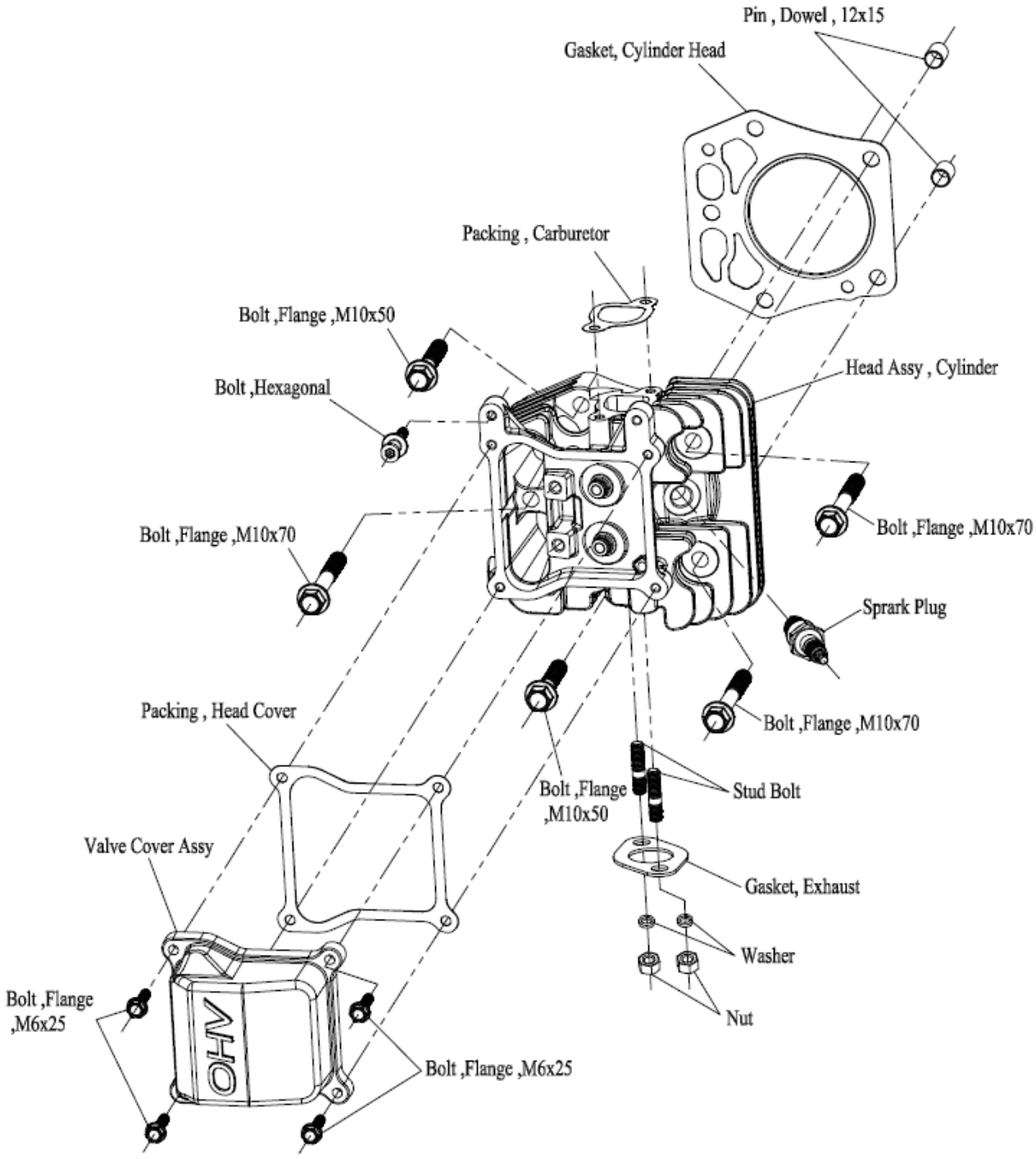
Remove the following:

1. engine cover
2. carburetor
3. Shroud Comp

Cylinder Head-Right



Cylinder Head-Left



NOTICE:

Removal /Installation

Loosen and tighten Bolt, Cylinder Head in a crisscross pattern in 2~3 steps;

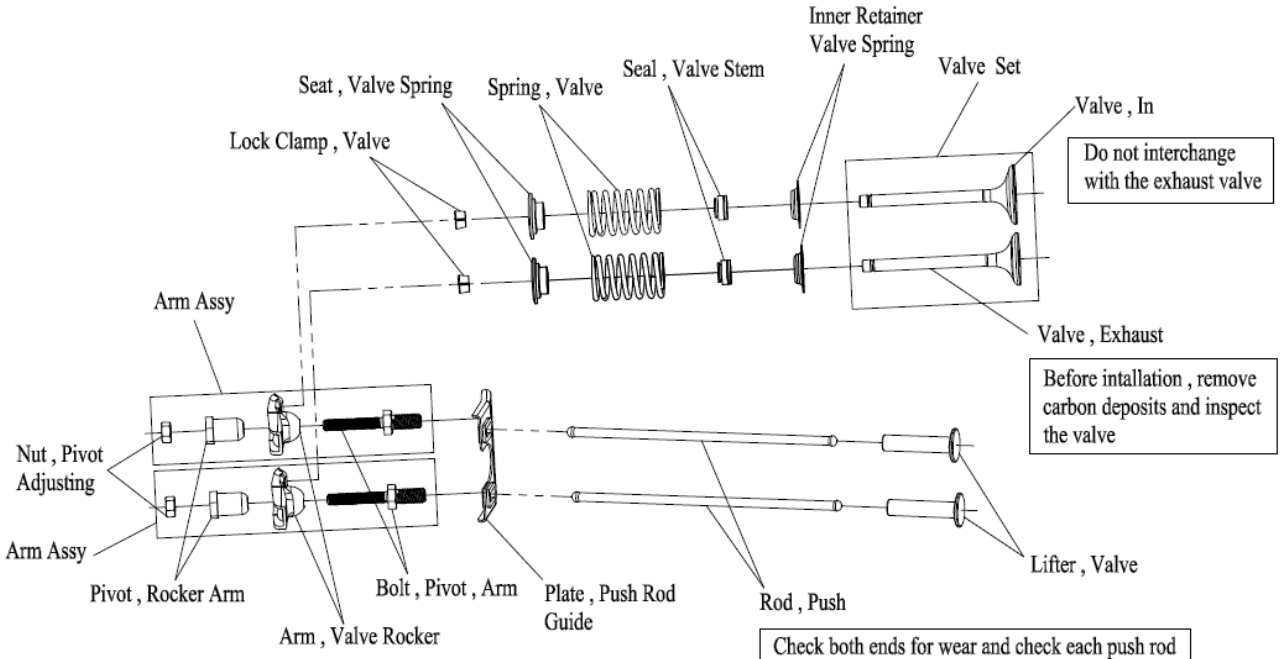
Before installation, remove any carbon deposits from the combustion chamber and inspect the valve seats;

Measure the cylinder compression after reassembly.

Disassembly / Reassembly

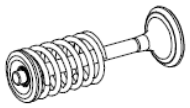
Inspection

Cylinder Head-Right

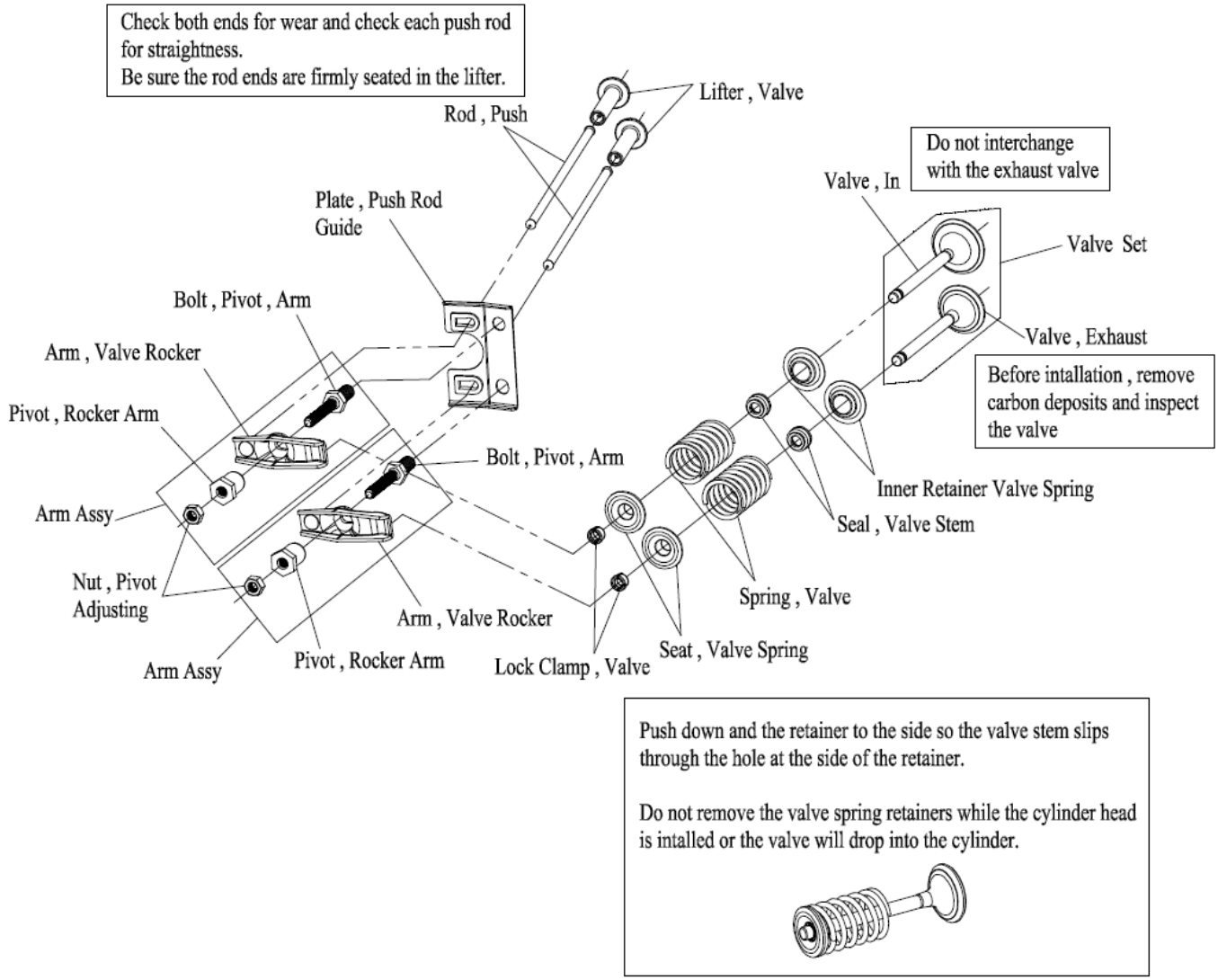


Push down and the retainer to the side so the valve stem slips through the hole at the side of the retainer.

Do not remove the valve spring retainers while the cylinder head is intalled or the valve will drop into the cylinder.



Cylinder Head-Left

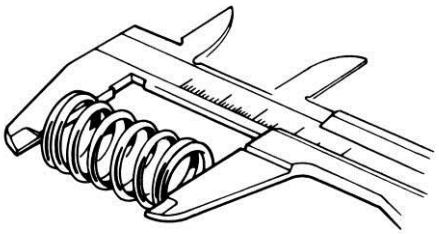


Valve Spring Free Length

Measure the free length of the valve springs.

Standard	Service limit
1.55” – 1.60”	1.53”

Replace the spring if they shorter than the service limit.

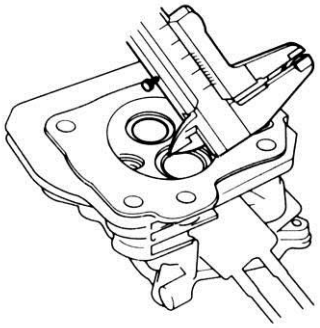


Valve Seat Width

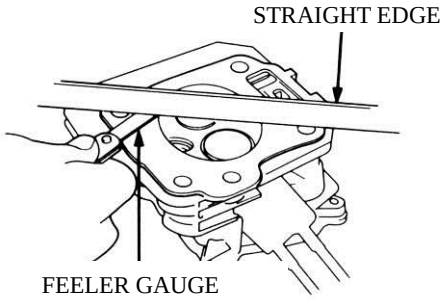
Remove carbon deposits from the combustion chamber. Inspection the valve seats for pitting or other damage. Measure the valve seat width.

Standard	Service limit
0.028” – 0.030”	0.040”

If the valve seat width is under the standard, or over the service limit, recondition the valve seat



Cylinder Head



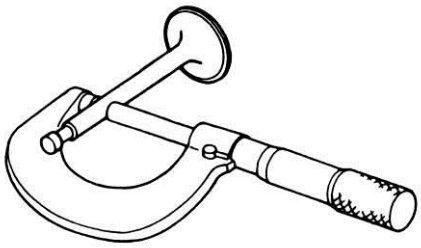
1、Remove carbon deposits from the combustion chamber. Clean off any gasket material from the cylinder head surface.

2、Check the spark plug hole and valve areas for cracks.

3、Check the cylinder head for warpage with a straight edge and a feeler gauge as shown.

Service limit	0.002”

Valve Stem OD



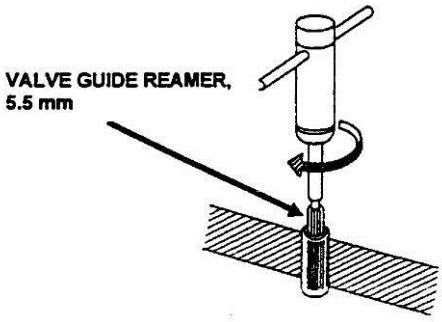
Inspect each valve for face irregularities, bending or abnormal stem wear. Replace the valve if necessary.

Measure and record each valve stem OD.

	Standard	Service limit
IN	0.258” – 0.259”	0.255”
EX	0.257” – 0.258”	0.255”

Replace the valves if their OD is smaller than the service limit.

Valve Guide ID



Ream the exhaust valve guide to remove any carbon deposits before measuring.

Measure and record each valve guide ID.

Standard	Service limit
0.259” – 0.260”	0.262”

Stem –to- Guide Clearance

Subtract each valve stem OD from the corresponding guide ID to obtain the guide-to-stem clearance.

	Standard	Service limit
IN	0.0008” – 0.0019”	0.0050”
EX	0.0015” – 0.0027”	0.0067”

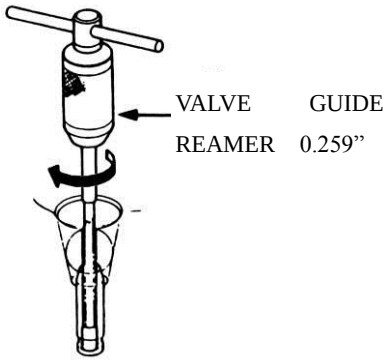
If the stem-to-guide clearance exceeds the service limit, determine if the new guide with standard dimensions would bring the clearance within tolerance. If so, replace the guide (or cylinder head) as necessary and ream to fit. If the stem-to-guide clearance exceeds the service limit with new guides, replace the valves as well.

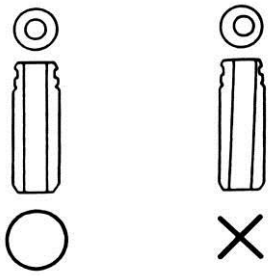
Recondition the valve seat whenever the valve guide is replaced.

Exhaust Valve Guide Reaming

For best results, be sure the cylinder head is at room temperature before reaming the exhaust valve guide.

1. Coat the reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise through the valve guide the full length of the reamer.
3. Continue to rotate the reamer clockwise while removing it from the valve guide.
4. Thoroughly clean the cylinder head to remove any cutting residue.
5. Check the valve guide bore; it should be straight, round and centered in the valve guide. Insert the valve and check operation. If the valve does not operate smoothly, the guide may have been bent during installation. Replace the valve guide if it is bent or damaged.
6. Check the valve stem-to-guide clearance



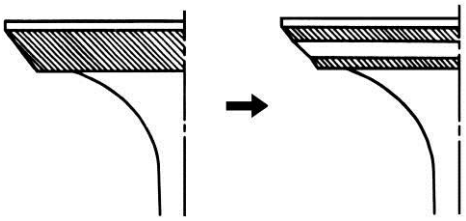


Valve Seat Reconditioning

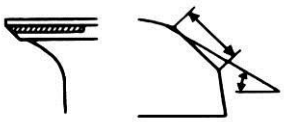
1. Thoroughly clean the combustion chambers and valve seats to remove carbon deposits.
2. Apply a light coat of Prussian Blue or erasable felt-tipped marker ink to the valve faces.
3. Insert the valve, and then lift them and snap them closed against their seats several times. Be sure the valve does not rotate on the seat. The transferred marking compound will show any area of the seat that is not concentric.
4. Using a 45°cutter, remove enough material to produce a smooth and concentric seat. Follow the valve seat cutter manufacture’s instructions.

Turn the cutter clockwise, never counterclockwise. Continue to turn the cutter as you lift it from the valve seat.

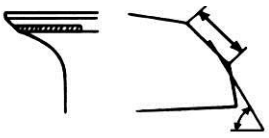
5. Using the 30°~32° and 60° cutter to narrow and adjust the valve seat so that it contacts the middle of the valve face. The 30°~32° cutter removes material from the top edge. The 60° cutter removes material from the bottom edge. Bu sure that the width of the finished valve seat is within specification.



CONTACT TOO HIGH



CONTACT TOO LOW



Valve Seat Width

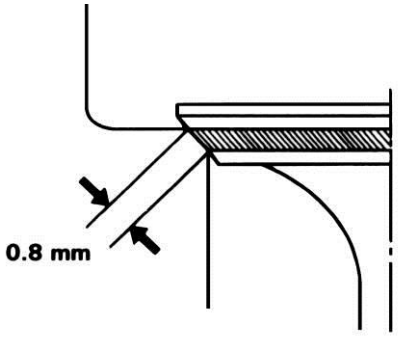
Standard	Service limit
0.0275” – 0.0315”	0.050”

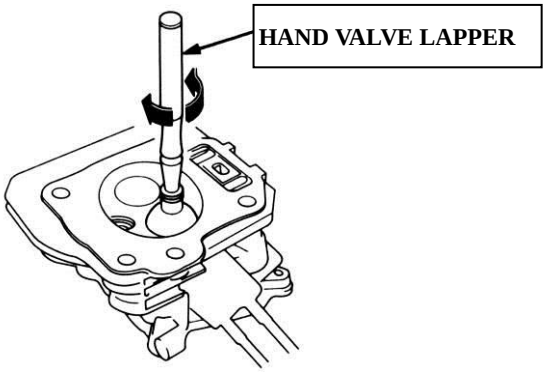
1. Make a light pass with the 45° cutter to remove any possible burrs at the edges of the seat.
2. After resurfacing the seats, inspection for even valve seating.
3. Apply a light coat of Prussian Blue or erasable felt-tipped marker ink to the valve faces.
4. Insert the valves, and then lift them and snap them closed against their seats several times. Be sure the valve does not rotate on the seat. The seating surfacing, as shown by the transferred marking compound, should have good contact all the way around.

NOTICE

To avoid severe engine damage, be sure to remove all lapping compound from the head before reassembling.

5. Check the valve clearance after reassembly.

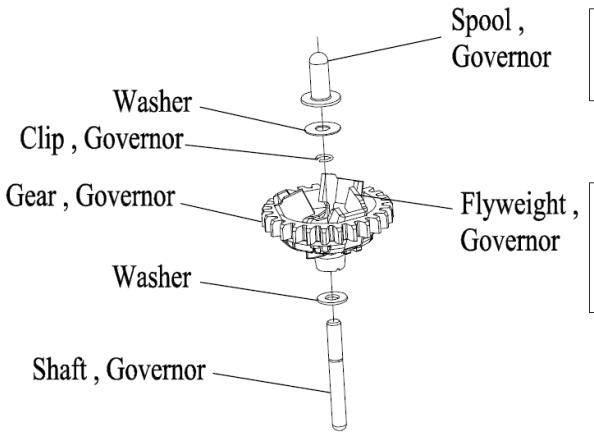




4.9 Crankcase Cover / Governor

Disassembly / Reassembly

Governor



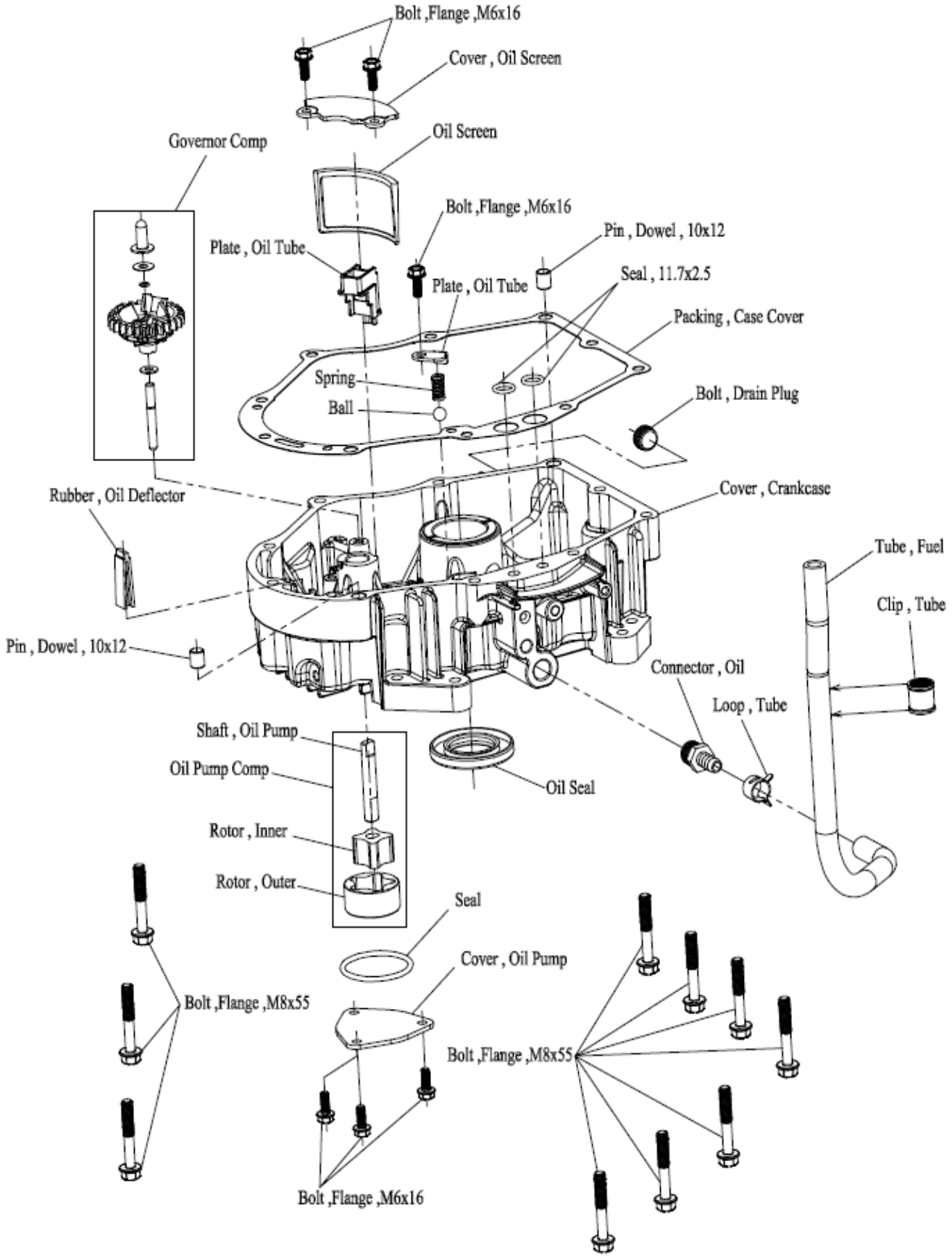
Spread the governor weights to intall the slider ;
After intalling , confirm that the silder moves smoothly.

Before intalling , check for gear wear or damage ;
Insert pins pointed end first ;
Check that the weights move smoothly.

NOTICE:

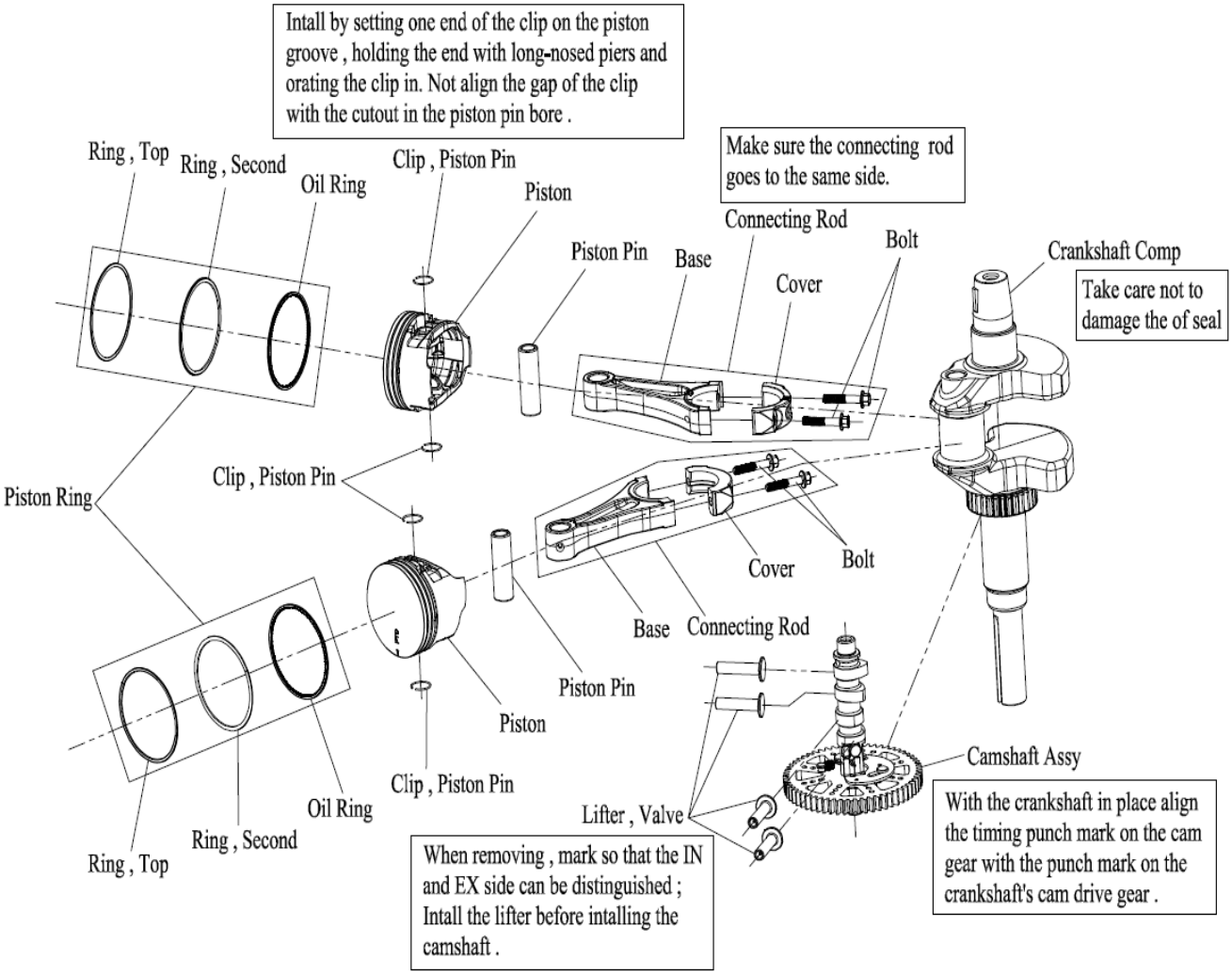
Check that the governor moves smoothly.

Crankcase cover



4.10 Crankshaft / Piston / Camshaft

Remove /installation



Disassembly / Reassembly

Piston connecting rod

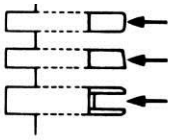
Assembly:

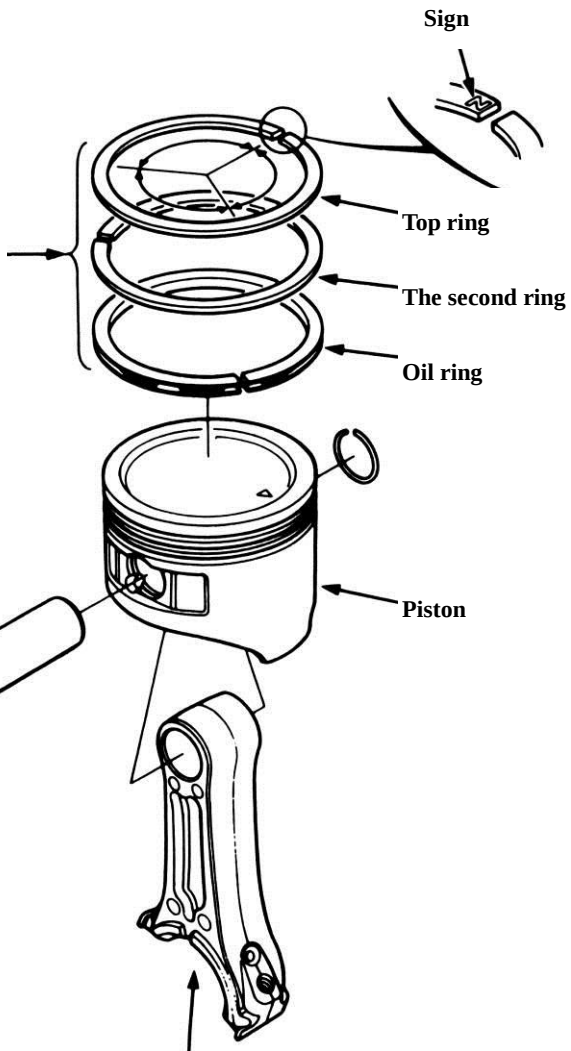
. Put the piston ring sign facing up when assembling.

. Don't wrongly assemble the top ring and the second ring.

. After assembling, be sure the piston can freely move.

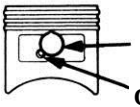
. Stagger the open of the piston to piston pin hole with 120 degree.





Piston ring clip

Assembly: Put the one end into the piston slot, clamp other end by sharp nose pliers and revolve into slot. Don't let the open of clip aiming at the piston pin slot..

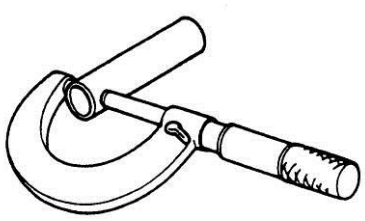


Connecting rod

Assembly: Put the long end of the connecting rod aiming at the triangular mark when assembling.

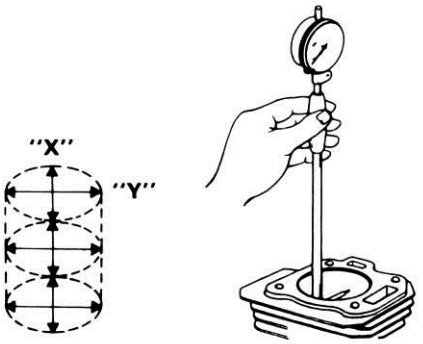
Piston Pin OD

Model	Standard	Service limit
LC2P77F	0.6689” – 0.6692”	0.6653”



Cylinder Inside Diameter

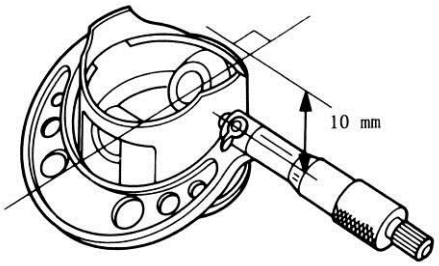
Measure three points on the “X” and “Y” shaft and record cylinder inside diameter（“X” shaft is vertical to crankshaft and “Y” shaft parallel to crankshaft）. Take maximum reading as the wearing and tapering of the cylinder.



Model	Standard	Service limit
708 CC	X: 3.0315”-3.0318”	3.0354”
	Y: 3.0315”-3.0318”	3.0354”

Piston Skirt Outside Diameter

Measure and record the piston skirt outside diameter at the 10mm from piston skirt maximum lower side making 90°to piston pin hole.

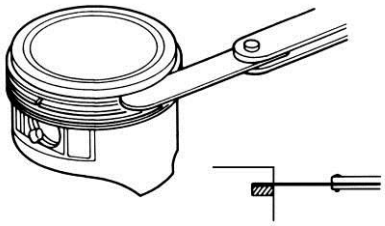


Model	Standard	Service limit
708 CC	3.0301”-3.0351”	3.0218”

Piston- to – Cylinder Clearance

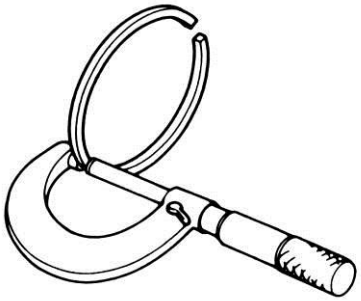
Standard	Service limit
0.0009”-0.0017”	0.010”

Piston Ring Side Clearance



	Standard	Service limit
Top/ Second	0.0007” – 0.0023”	0.0043”

Piston Ring Width

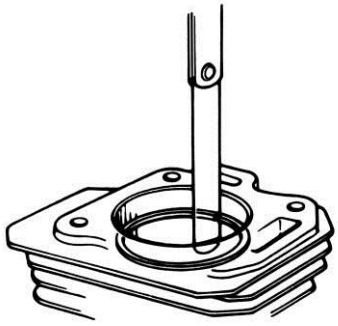


	Standard	Service limit
Top	00382”-0.0390”	0.0354”
Second	0.0460”-0.0468”	0.0433”

Piston Ring End Gap

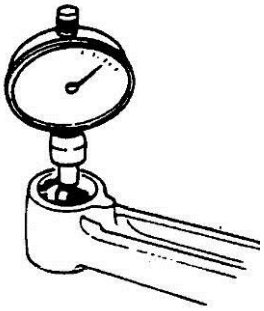
Standard	Service limit
0.0078” – 0.0157”	0.0177”

Before measuring end gap, use the piston top to position the ring so it will not be cocked in the cylinder bore.



Connecting Rod Small End ID

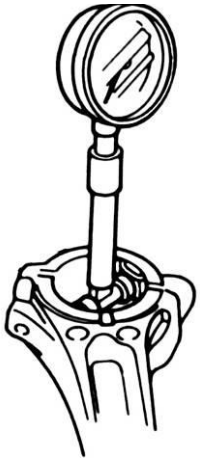
Model	Standard	Service limit
708 CC	0.6695” – 0.6699”	0.6712”



Connecting Rod Large End ID

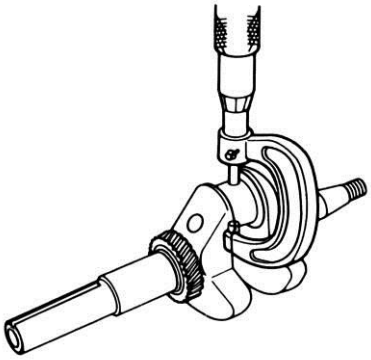
Original size

Model	Standard	Service limit
708 CC	1.5754” – 1.5757”	1.5773”



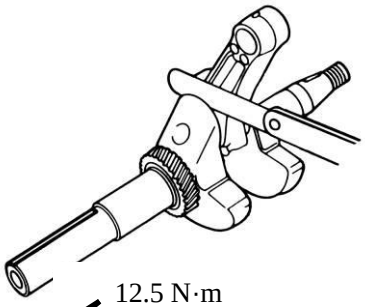
Crankshaft Pin OD

Model	Standard	Service limit
708 CC	1.5734” – 1.5744”	1.5551”



Connecting Rod Large End Axial Clearance

Standard	Service limit
0.0177” – 0.0374”	0.0413”

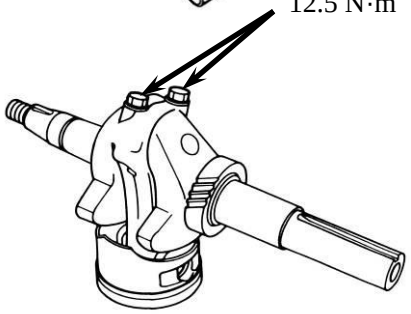


Connecting Rod Large End Oil Clearance(Radial)

1) Clean all oil from the crankshaft neck journal and inside side.

2) Place a piece of plastic gauge on the crankshaft neck journal, assemble connecting rod, and tighten the bolts to specified torque.

Bolt torque：9 ft. lbs. (12.5 N·m)

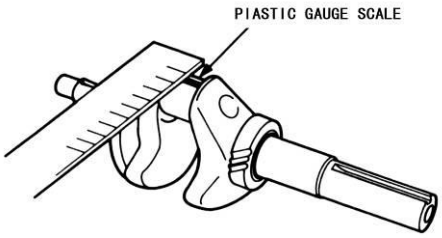


⚠ ATTENTION

Do not rotate the crankshaft while the tightening connecting rod bolt

3) Remove the connecting rod and measure the plastic gauge.

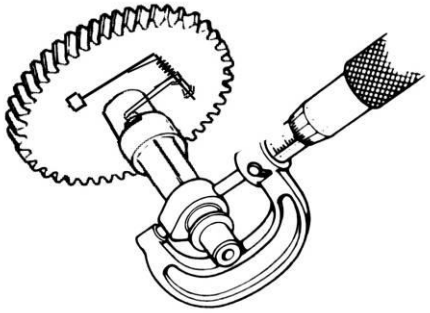
Standard	Service limit
0.0015” – 0.0024”	0.0032”



4) If the clearance exceeds the service limit, replace the connecting rod and recheck the clearance. After using new connecting rod, the clearance still exceeds the service limit, lap the neck journal and use a connecting rod lower than standard value.

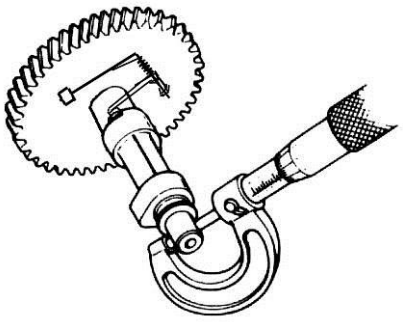
Camshaft Cam Height

	Standard	Service limit
IN	1.179” – 1.183”	Replace under 1.171”
EX	1.179” – 1.183”	Replace under 1.171”



Camshaft OD

Standard	Service limit
0.6285” – 0.6293”	0.6266”



Note the location of the decompression mechanism, check to be sure it moves freely.

Chapter 5 – Electrical System Information

5

Ignition Coil Gap Adjustment

High Voltage Ignition Systems can be Dangerous - Use Caution when Servicing Ignition Systems

4) Install the ignition coil and lightly tighten the ignition coil mounting bolts.
5) Rotate engine so ignition coil is aligned with the magnet portion of the flywheel.
6) Insert the feeler gauge between the flywheel and coil.
7) Adjust the ignition coil gap at both sides of the coil.
8) Sufficiently tighten the mounting bolts.

Ignition Coil Gap	0.011- 0.019” (.3-.5 mm)

Ignition Coil Resistance Inspection

Primary Coil

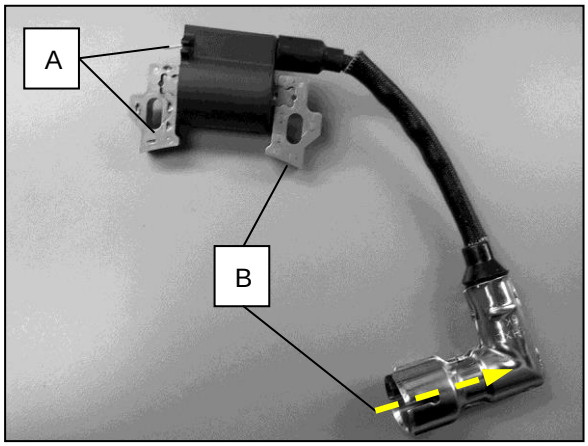
Place Ohm meter leads between the harness connection lead and the exposed metal coil leg.

A - Primary Coil Resistance	1.0-1.6 Ω

Secondary Coil

Place Ohm meter leads between exposed metal coil leg and the spark plug terminal connection.

B Secondary Coil Resistance	8.9 k Ω – 12.1 k Ω



Spark Testing

- **Fuel is Extremely Flammable** - Use Extreme Caution When Servicing the Fuel System
- **High Voltage Ignition Systems can be Dangerous** - Use Caution when Servicing Ignition Systems

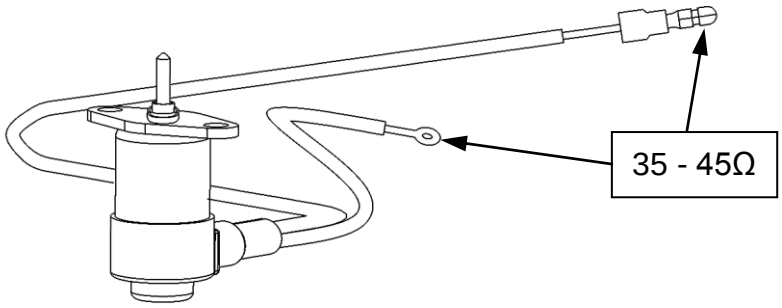
1. Remove spark plug cap from the spark plug.
2. Remove the spark plug from the engine.
3. Connect the negative (-) electrode of the spark plug (threaded area) to ground (cylinder head cover).
4. Crank the engine and view the electrode gap. Spark should be present when engine is turning over.
5. Reinstall the spark plug and torque to specification - **22 ft-lbs (30 Nm)**.
6. Properly install the spark plug boot.

Fuel Solenoid

Fuel Solenoid Resistance

Place Ohm meter leads between the harness connections,

Fuel Solenoid Resistance	35 - 45Ω



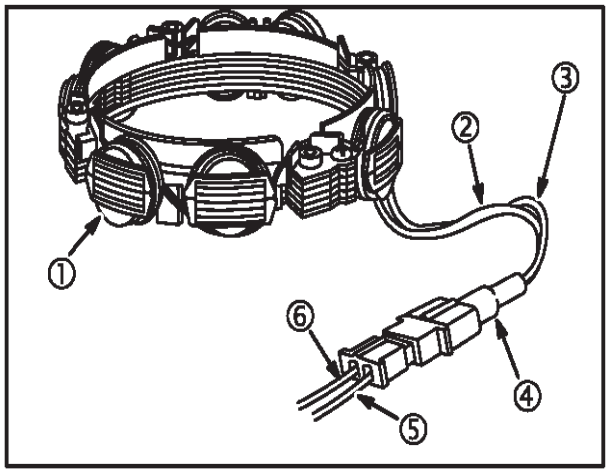
Charging System Specifications

Charge Coil(s) Air Gap Measure Between the Magnet Area of the Flywheel and the Charge Coil Legs	0.011- 0.019” (.3-.5 mm)
No Load DC Voltage Output @ 3000 RPM Measure Across Battery Terminals	14.5 +/- .5 Volts DC
No Load AC Voltage Output @ 3000 RPM Measure Across Stator Leads – Stator Leads Disconnected	30 VAC
Charge Coil / Stator Resistance Measure Resistance Across the Two Stator Leads	0.16 Ohms +/- 15%

AC Output Test

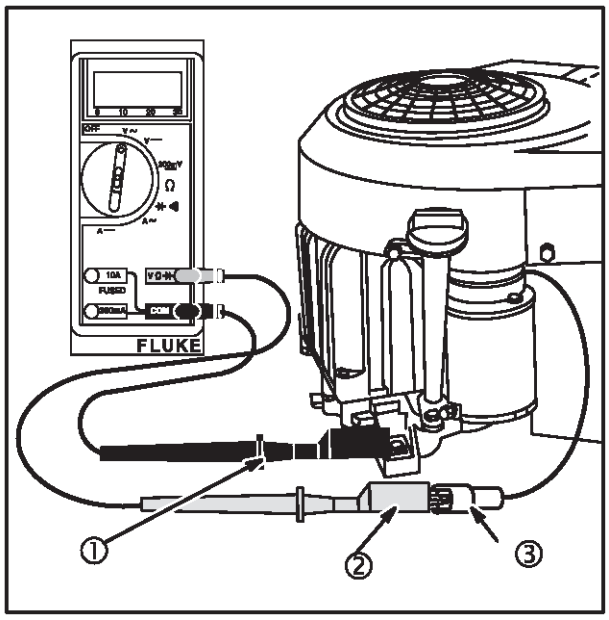
1. Insert RED test lead into VC receptacle in meter.
2. Insert BLACK test lead into COM receptacle.
3. Rotate selector to V- (AC VOLTS) position.
4. Attach RED test lead clip (1) to AC output terminal(5), Fig.18.
5. Attach BLACK test lead clip (2) to engine ground.
6. With engine running at 3600 RPM output should be no less than 14 volts AC.

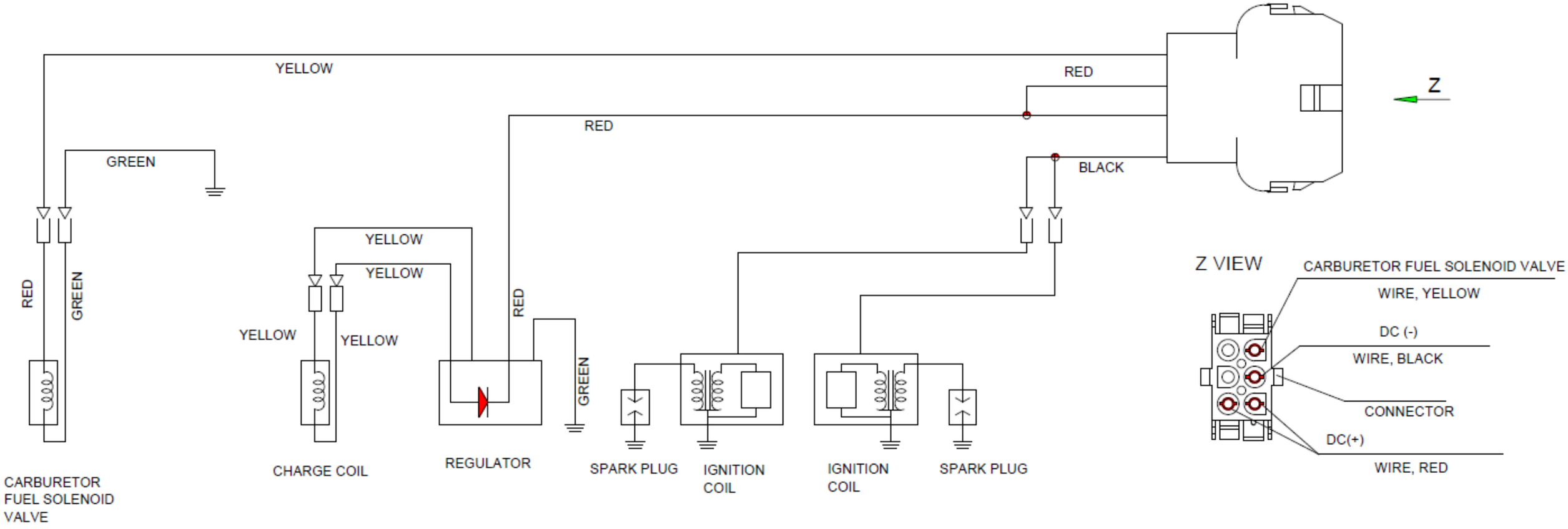
7. NOTE: The battery MUST be in good condition to perform this test.



DC Output Test

1. Insert RED test lead into 10A receptacle in meter.
2. Insert BLACK test lead into COM receptacle in meter.
3. Rotate selector to A== (DC AMPS) position.
4. Attach RED test lead clip (1) to DC output pin (6)in connector (4), Fig.16. If NO or LOW output is found, replace stator.




YELLOW
RED
Z
RED
GREEN
BLACK
YELLOW
YELLOW
RED
GREEN
YELLOW
YELLOW
RED
GREEN
Z VIEW
CARBURETOR FUEL SOLENOID VALVE
WIRE, YELLOW
DC (-)
WIRE, BLACK
CONNECTOR
DC(+)
WIRE, RED
CARBURETOR
FUEL SOLENOID
VALVE
CHARGE COIL
REGULATOR
SPARK PLUG
IGNITION
COIL
IGNITION
COIL
SPARK PLUG