



**FS481V
FS541V
FS600V**



**4-Stroke Air-Cooled V-Twin Gasoline Engine
Service Manual**

Quick Reference Guide

General Information	1
Periodic Maintenance	2
Fuel System	3
Cooling System	4
Engine Top End	5
Lubrication System	6
Camshaft/Crankshaft	7
Starter System	8
Electrical System	9
Troubleshooting	10

This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.



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4-Stroke Air-Cooled V-Twin Gasoline Engine

Service Manual

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All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

LIST OF ABBREVIATIONS

A	ampere(s)	lb	pound(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	min	minute(s)
ATDC	after top dead center	N	newton(s)
BBDC	before bottom dead center	Pa	pascal(s)
BDC	bottom dead center	PS	horsepower
BTDC	before top dead center	psi	pound(s) per square inch
°C	degree(s) Celsius	r	revolution
DC	direct current	rpm	revolution(s) per minute
F	farad(s)	TDC	top dead center
°F	degree(s) Fahrenheit	TIR	total indicator reading
ft	foot, feet	V	volt(s)
g	gram(s)	W	watt(s)
h	hour(s)	Ω	ohm(s)
L	liter(s)		

EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems (EM) in compliance with applicable regulations of the United States Environmental Protection Agency and California Air Resources Board.

1. **Crankcase Emission Control System**

A sealed-type crankcase emission control system is used to eliminate blow-by gases. The blow-by gases are led to the breather chamber through the crankcase. Then, it is led to the air cleaner.

Oil is separated from the gases while passing through the inside of the breather chamber from the crankcase, and then returned back to the bottom of crankcase.

2. **Exhaust Emission Control System**

The exhaust emission control system applied to this engine consists of a carburetor and an ignition system having optimum ignition timing characteristics.

The carburetor has been calibrated to provide lean air/fuel mixture characteristics and optimum fuel economy with a suitable air cleaner and exhaust system.

TAMPERING WITH EMISSION CONTROL SYSTEM PROHIBITED

Federal law and California State law prohibits the following acts or the causing thereof: (1) the removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new engine for the purpose of emission control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the engine after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:
Do not tamper with the original emission related part:

- Carburetor and internal parts
- Spark plugs
- Magneto or electronic ignition system
- Fuel filter element
- Air cleaner elements
- Crankcase
- Cylinder heads
- Breather chamber and internal parts
- Inlet pipe and tube

General Information

Table of Contents

Before Servicing	1-2
Model Identification.....	1-5
General Specifications.....	1-6

1-2 GENERAL INFORMATION

Before Servicing

Before starting to service the engine, carefully read the applicable section to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations, a certain amount of basic knowledge is required for successful work.

Especially note the following

(1) Dirt

Before removal and disassembly, clean the engine. Any dirt entering the engine, carburetor, or other parts, will work as an abrasive and shorten the life of engine. For the same reason, before installing a new part, clean off any dust or metal filings.

(2) Battery Ground

Remove the ground (–) lead from the battery before performing any disassembly operations on the equipment. This prevents:

- (a) the possibility of accidentally turning the engine over while partially disassembled.
- (b) sparks at electrical connections which will occur when they are disconnected.
- (c) damage to electrical parts.

(3) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them evenly, in a staggered sequence. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter of a turn and then remove them. Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

(4) Torque

When torque values are given in this Service Manual, use them. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(5) Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removal of screws held by a locking agent) in order to avoid damaging the heads.

(6) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

(7) High-Flash Point Solvent

A high-flash point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is Standard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

(8) Gasket, O-ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(9) Liquid Gasket, Non-Permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine oil passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock'n Seal (Blue).

(10) Press

A part installed using a press or driver, such as a journal, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

(11) Ball Bearing, Needle Bearing

Do not remove a ball bearing or a needle bearing unless it is absolutely necessary. Replace any ball or needle bearings that were removed with new ones. Install bearings with the manufacturer and size marks facing out, applying pressure evenly with a suitable driver to the end of the race that contacts the press fit portion, and press it evenly over the base component.

Before Servicing

(12) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals.

When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole.

(13) Seal Guide

A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little oil, preferably high-temperature grease on the lips to reduce rubber to metal friction.

(14) Circlip, Retaining Ring and Cotter Pin

When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more. Install the circlip with its chamfered side facing load side as well.

Replace any circlips, retaining rings, and cotter pins that were removed with new ones, as removal weakens and deforms them. If old ones are reused, they could become detached while running, leading to a problem.

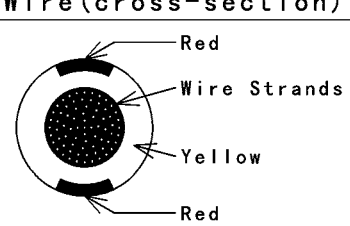

(15) Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.

Don't use just any oil or grease. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended. This manual makes reference to molybdenum disulfide grease (MoS₂) in the assembly of certain engine parts. Always check manufacturer recommendations before using such special lubricants.

(16) Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed to make red the main color.

Wire (cross-section)	Color Indicated on the Wire	Color Indicated on the Wiring Diagram
	Yellow/Red	

GB020601W1 C

(17) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

(18) Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

Abrasion	Crack	Hardening	Warp
Bent	Dent	Scratch	Wear
Color change	Deterioration	Seizure	

(19) Service Data

Service Data terms are defined as follows:

"Standards" show dimensions or performances which brand-new parts or systems have.

1-4 GENERAL INFORMATION

Before Servicing

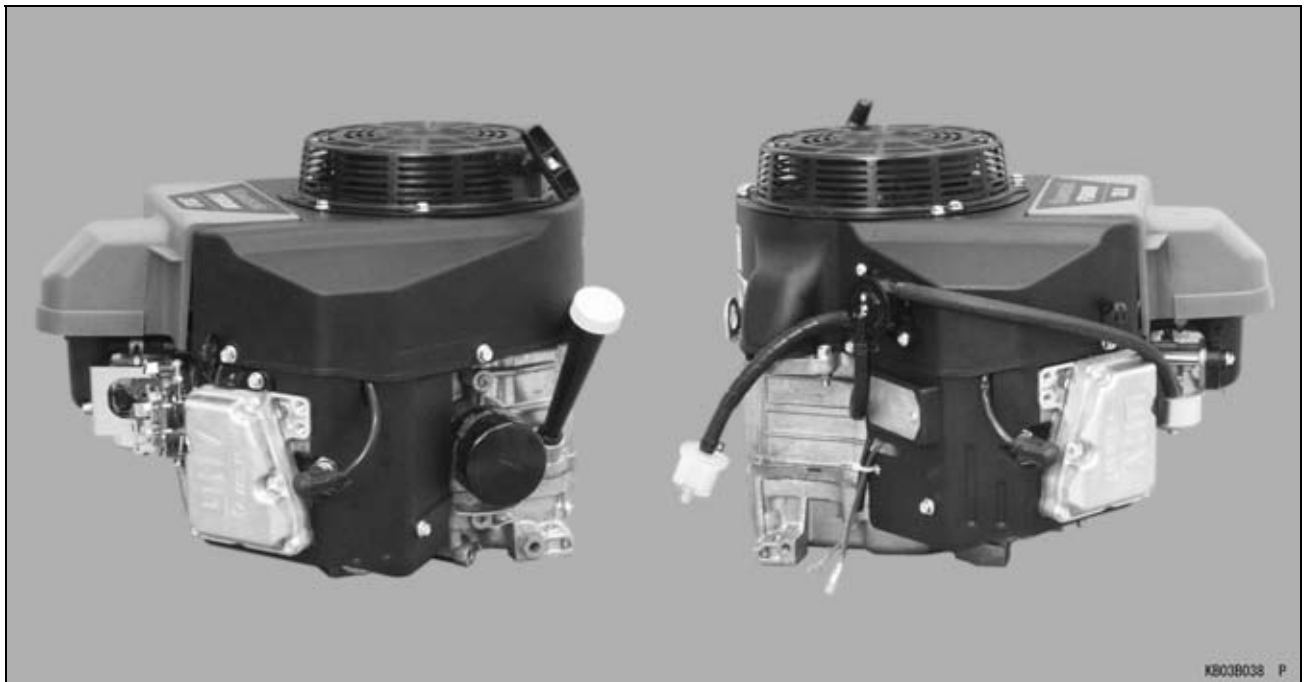
“Service Limits” indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

Model Identification

Electric Starter Model



Recoil Starter Model



Cylinder Number Designation:

No.1 Cylinder is the left-hand cylinder viewed from the inlet pipe.

No.2 Cylinder is the right-hand cylinder viewed from the inlet pipe.

1-6 GENERAL INFORMATION

General Specifications

Item	FS481V, FS541V, FS600V
Type of Engine	Forced air-cooled, vertical shaft, OHV, 4-stroke gasoline engine
Cylinder Layout	90 V-Twin
Bore x Stroke	73 mm x 72 mm (2.87 in. x 2.84 in.)
Piston Displacement	603 cm ³ (36.8 cu in.)
Direction of Rotation	Counterclockwise facing the PTO shaft
Compression Release	Automatic compression release
Low Idle Speed	1 550 r/min (rpm)
High Idle Speed	3 600 r/min (rpm)
Ignition System	Transistorized-flywheel magneto
RFI	Per Canada and U.S.A. requirements
Starting System: FS Models	Electric starter/Recoil starter
Charging System: Electric Starter Model Recoil Starter Model	12 V - 15 amps with regulator 12 V - 3.6 amp without regulator (optional part)
Spark Plug	NGK BPR4ES
Carburetor: FS Models	Float type, fixed main jet, internally vented, single barrel
Fuel Pump	Diaphragm type pulse pump
Air Cleaner: FS Models	Dual stage element, dry type
Governor	Flyweight all speed governor
Lubrication System Oil Filter Oil Capacity (when engine is completely dry)	Pressure feed by positive displacement pump Cartridge type full flow filter 2.0 L (2.1 US qt)
Cooling System	Forced air cooling by fan
Dimensions (L x W x H): FS Models	486 mm x 429 mm x 362 mm (19.1 in. x 16.9 in. x 14.3 in.)
Dry Weight (without muffler): FS Models	36.7 kg (80.9 lb)

Specifications are subject to change without notice.

Periodic Maintenance

Table of Contents

Periodic Maintenance Chart	2-2
Torque and Locking Agent.....	2-3
Specifications	2-5
Special Tools	2-6
Periodic Maintenance Procedures.....	2-7
Fuel System.....	2-7
Low Idle Speed Adjustment	2-7
High Idle Speed Adjustment	2-7
Fuel System Cleanliness Inspection	2-8
Element Cleaning and Inspection	2-9
Engine Top End	2-9
Cylinder Head Cleaning.....	2-9
Valve Clearance Inspection	2-9
Valve Clearance Adjustment.....	2-10
Valve Seat Inspection	2-11
Valve Seat Repair	2-11
Lubrication System	2-14
Engine Oil Level Inspection	2-14
Engine Oil Change.....	2-14
Oil Filter Replacement	2-15
Electrical System	2-16
Spark Plug Cleaning and Inspection.....	2-16
Spark Plug Gap Inspection	2-16

2-2 PERIODIC MAINTENANCE

Periodic Maintenance Chart

To ensure satisfactory operation over an extended period of time, any engine requires normal maintenance regular intervals. The Periodic Maintenance Chart below shows periodic inspection and maintenance items and suitable intervals. The bullet mark (●) designates that the corresponding item should be performed at that interval.

Some adjustments require the use of special tools or other equipment. An electronic tachometer will facilitate setting idle and running speeds.

OPERATION	INTERVAL					
	Daily	First 8 hr.	Every 25 hr.	Every 100 hr.	Every 200 hr.	Every 300 hr.
Check or clean air inlet screen (1)	●					
Check and add engine oil	●					
Check for fuel and oil leakage	●					
Check for loose or lost nuts and screws	●					
Check battery electrolyte level	●					
Clean air cleaner foam element (FS Models) (1)			●			
Clean air cleaner paper element (FS Models) (1)				●		
Replace air cleaner paper element (FS Models) (1)					●	
Clean dust and dirt from cylinder and cylinder head fins (1)				●		
Tighten nuts and screws				●		
Change engine oil		●		●		
Clean and re-gap spark plugs				●		
Change oil filter					●	
◆ Check and adjust valve clearance						●
◆ Clean and lap valve seating surface						●
◆ Clean combustion chambers						●

(1): Service more frequently under dusty conditions.

- ◆: These items must be performed with the proper tools. See your authorized Kawasaki Engine Dealer for service, unless you have the proper equipment and mechanical proficiency.

Torque and Locking Agent

The following tables list the tightening torque for the major fasteners and the parts requiring use of a non-permanent locking agent or liquid gasket.

Letters used in the "Remarks" column mean:

EO: Apply oil to the threads.

L: Apply a non-permanent locking agent to the threads.

R: Replacement Parts

S: Tighten the fasteners following the specified sequence.

Fastener	Torque			Remarks
	N-m	kgf-m	ft-lb	
Fuel System				
Control Panel and Inlet Pipe Mounting Nuts	5.9	0.60	52 in-lb	
Control Panel Mounting Bolt	5.9	0.60	52 in-lb	
Governor Arm Clamp Nut	7.8	0.80	69 in-lb	
Governor Shaft Plate Screws	2.0	0.20	18 in-lb	
Inlet Manifold Bolts	5.9	0.60	52 in-lb	S
Main Jet	2.3	0.23	20 in-lb	
Throttle Valve Screws	0.68	0.069	6.0 in-lb	L
Electric Starter Model				
Solenoid Valve	4.5	0.46	40 in-lb	
Recoil Starter Model				
Float Chamber Mounting Screw	4.5	0.46	40 in-lb	
Cooling System				
Engine Shroud Bolts	8.8	0.90	78 in-lb	
Fan Housing Bolts	8.8	0.90	78 in-lb	
Electric Starter Model				
Cooling Fan Mounting Bolts	5.9	0.60	52 in-lb	
Cooling Fan Screen Screws	3.0	0.31	27 in-lb	
Recoil Starter Model				
Cooling Fan Plate Mounting Bolts	5.9	0.60	52 in-lb	
Flywheel Bolts	56	5.7	41	
Engine Top End				
Connecting Rod Big End Cap Bolts	9.8	1.0	87 in-lb	EO
Cylinder Head Bolts (L = 50 mm)	27.4	2.8	20	S
Cylinder Head Bolts (L = 70 mm)	27.4	2.8	20	S
Lift Hook Bolt	5.9	0.60	52 in-lb	
Rocker Arm Bracket Bolts	14.7	1.5	11	L
Rocker Cover Bolts	5.9	0.60	52 in-lb	S
Spark Plugs	22	2.2	16	
Valve Clearance Adjusting Locknuts	11	1.1	97 in-lb	
Lubrication System				
Engine Oil Drain Plug	6.9	0.70	61 in-lb	
Oil Filler Mounting Bolt	8.8	0.90	78 in-lb	
Oil Filter	11.8	1.2	104 in-lb	R
Oil Pump Cover Plate Bolts	5.9	0.60	52 in-lb	
Camshaft/Crankshaft				
Breather Chamber Cover Bolts	5.9	0.60	52 in-lb	

2-4 PERIODIC MAINTENANCE

Torque and Locking Agent

Fastener	Torque			Remarks
	N-m	kgf-m	ft-lb	
Breather Valve Mounting Screw	2.0	0.20	18 in-lb	
Connecting Rod Big End Cap Bolts	9.8	1.0	87 in-lb	EO
Crankcase Cover Bolts	27.4	2.8	20	S
Crankcase Cover Oil Passage Plugs	3.9	0.40	35 in-lb	L
Crankcase Oil Passage Plugs	3.9	0.40	35 in-lb	L
Starter System				
Electric Starter Model				
Starter Motor Mounting Bolts	19.6	2.0	14	
Starter Motor Through Bolts	3.95	0.40	35 in-lb	
Recoil Starter Model				
Fan Housing Stud Bolts	5.9	0.60	52 in-lb	
Recoil Starter Mounting Bolts	5.9	0.60	52 in-lb	
Recoil Starter Retainer Screw	5.9	0.60	52 in-lb	L
Electrical System				
Flywheel Bolt	56	5.7	41	
Ignition Coil Bolts	5.9	0.60	52 in-lb	
Spark Plugs	22	2.2	16	
Stator Coil Screws	3.4	0.35	30 in-lb	
Recoil Starter Model				
Ignition Coil Stud Bolts	5.9	0.60	52 in-lb	

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

Threads Diameter (mm)	Torque		
	N-m	kgf-m	ft-lb
4	2.0	0.20	17 in-lb
5	3.4	0.35	30 in-lb
6	5.9	0.60	52 in-lb
8	15	1.5	11
10	20	2.0	15

Specifications

Item	Standard
<p>Fuel System</p> <p>Idle Speed (1):</p> <p> Low Idle Speed (Carburetor idle rpm)</p> <p> Low Idle Speed (Governor idle rpm)</p> <p> High Idle Speed</p> <p>Air Cleaner:</p> <p> Type</p> <p> Pre-cleaner:</p> <p> FS Models</p> <p> Second-stage cleaner:</p> <p> FS Models</p>	<p>1 450 r/min (rpm)</p> <p>1 550 r/min (rpm)</p> <p>3 600 r/min (rpm)</p> <p>Dual stage filtration system</p> <p>Foam element</p> <p>Paper element</p>
<p>Engine Top End</p> <p>Valve Clearance:</p> <p> Inlet, Exhaust</p> <p>Valve Seating Surface Angle:</p> <p> Inlet, Exhaust</p> <p>Valve Seating Surface Width:</p> <p> Inlet</p> <p> Exhaust</p>	<p>0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)</p> <p>45°</p> <p>0.8 ~ 1.4 mm (0.031 ~ 0.055 in.)</p> <p>0.8 ~ 1.4 mm (0.031 ~ 0.055 in.)</p>
<p>Lubrication System</p> <p>Engine Oil:</p> <p> Type</p> <p> Viscosity</p> <p> Capacity</p> <p> Level</p>	<p>SJ or higher class</p> <p>SAE 40, SAE 30, SAE 10W-30/SAE 10W-40, or SAE 5W-20</p> <p>1.5 L (1.6 US qt) (When the oil filter is not removed)</p> <p>1.7 L (1.8 US qt) (When the oil filter is removed)</p> <p>Operating range (grid area (ADD and FULL)) on dipstick</p>
<p>Electrical System</p> <p>Spark Plug</p> <p>Spark Plug Gap</p>	<p>NGK BPR4ES</p> <p>0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)</p>

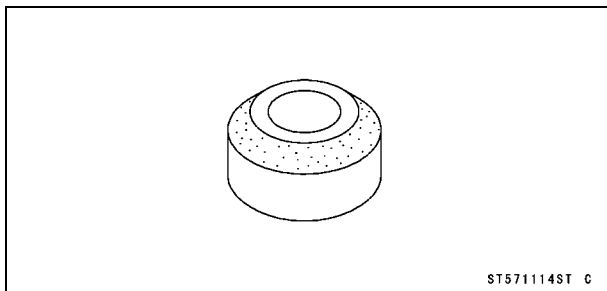
(1) Idle speeds may vary depending on each equipment. Refer to the equipment specification.

2-6 PERIODIC MAINTENANCE

Special Tools

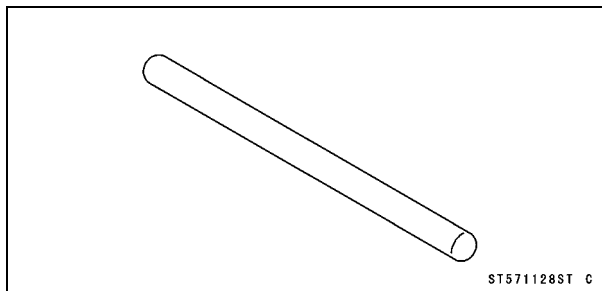
Valve Seat Cutter, 45° - $\phi 27.5$:

57001-1114



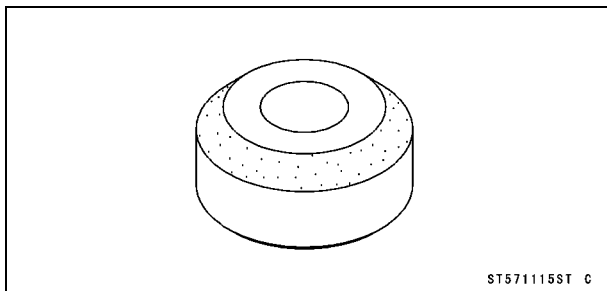
Valve Seat Cutter Holder Bar:

57001-1128



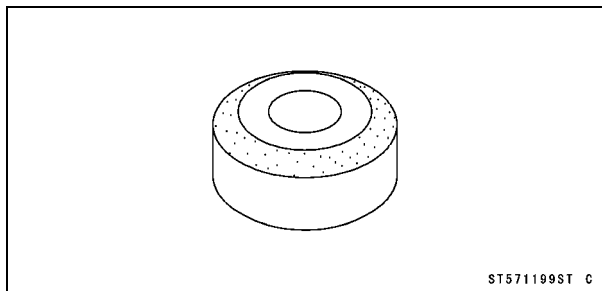
Valve Seat Cutter, 45° - $\phi 32$:

57001-1115



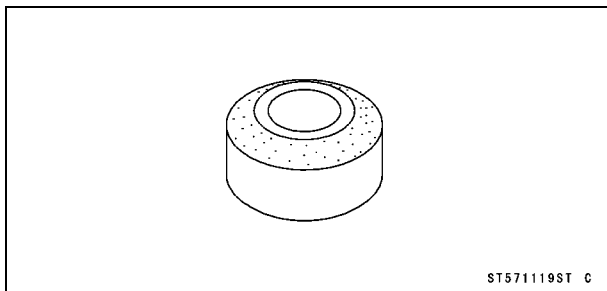
Valve Seat Cutter, 32° - $\phi 33$:

57001-1199



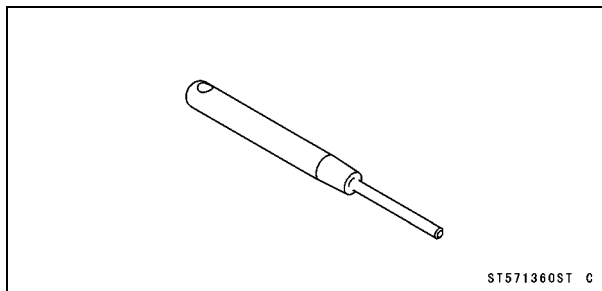
Valve Seat Cutter, 32° - $\phi 28$:

57001-1119



Valve Seat Cutter Holder, $\phi 6$:

57001-1360



Periodic Maintenance Procedures

Fuel System

NOTE

○High and low idle speeds may vary depending on the equipment on which the engine is used. Refer to the equipment specification.

Low Idle Speed Adjustment

- Disconnect all possible external loads from the engine.
- Start the engine and warm it up thoroughly.

⚠ WARNING

Always keep your hands clear of the moving parts.

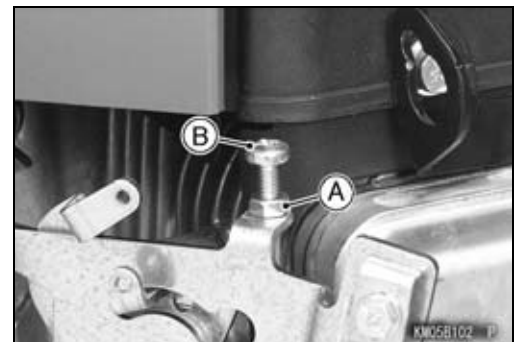
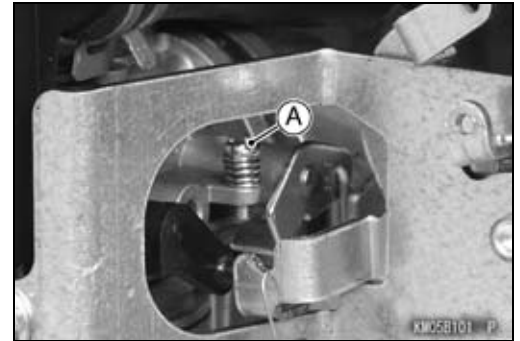
- Move the throttle lever at a dash to the idle position.
- Hold the throttle lever on the carburetor in closed position (turn the governor arm clockwise all the way) and adjust the low idle speed screw [A] until the engine idles at specified speed.

Low Idle Speed (Carburetor idle rpm)
1 450 r/min (rpm)

- Release the throttle lever.
- Loosen the locknut [A].
- Adjust the low idle speed set screw [B] on the control plate to obtain the specified governor low idle speed.

Low Idle Speed (Governor idle rpm)
1 550 r/min (rpm)

- Tighten the locknut.



High Idle Speed Adjustment

NOTE

○High idle speed adjustment should be made after the idle speed adjustment is performed.

CAUTION

Do not adjust high idle speed with the air cleaner removed.

- Start and warm up the engine thoroughly.

2-8 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

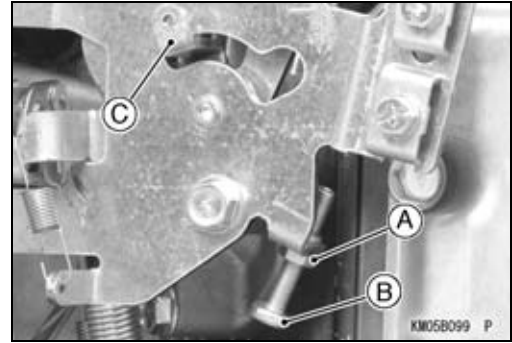
⚠ WARNING

Always keep your hands clear of the moving parts.

- Loosen the locknut [A], and unscrew the high idle set screw [B] few turns.
- Move the throttle lever on dash to obtain the specified high idle speed and leave it there.

High Idle Speed
3 600 r/min (rpm)

- Turn the high idle set screw so that the end of it just touches the speed control lever [C], and tighten the lock nut.
- Check the idle speed, and readjust the idle speed if necessary.



CAUTION

Be sure to make the idle and fast idle speeds respectively correspond to those of the equipment.

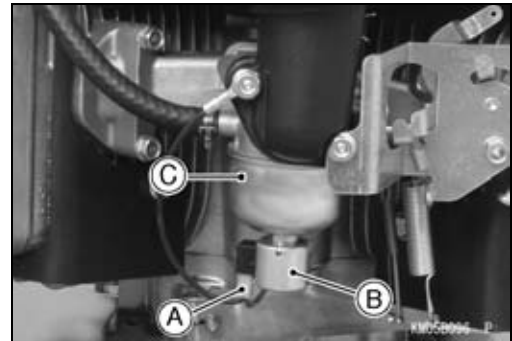
Fuel System Cleanliness Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the engine switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

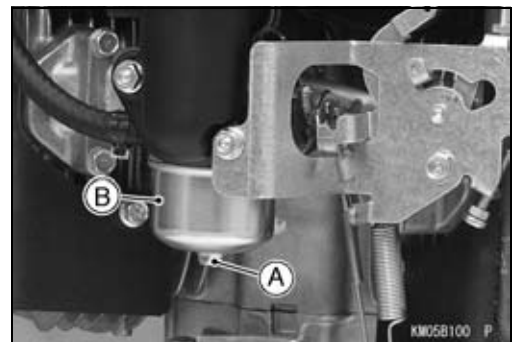
Electric Starter Model

- Place a suitable container under the carburetor.
- Remove:
 - Solenoid Valve Connector [A]
 - Solenoid Valve [B]
 - Float Chamber [C] and Gasket
- Check if water or dirt has accumulated in the carburetor.
- Install the removed parts (see appropriate chapters).



Recoil Starter Model

- Place a suitable container under the carburetor.
- Remove:
 - Screw [A]
 - Float Chamber [B] and gasket
- Check if water or dirt has accumulated in the carburetor.
- Install the removed parts (see appropriate chapters).



- ★ If any water or dirt is found, clean the carburetor (see Carburetor Cleaning in the Fuel System chapter) and fuel tank. And check the fuel filter (see Fuel Filter Inspection in the Fuel System chapter).

Periodic Maintenance Procedures

Element Cleaning and Inspection

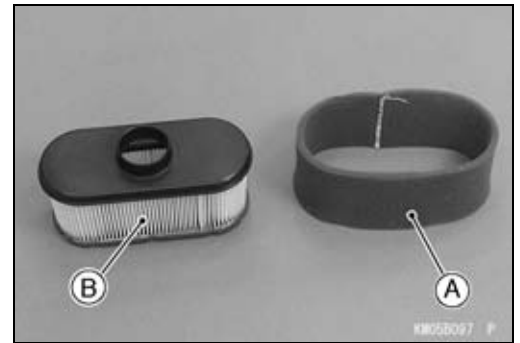
Air cleaner elements are not recommended to be cleaned, and each air cleaner element should be replaced with new ones at the maintenance time as shown in the maintenance chart.

NOTE

○ *Operating in dusty condition may require more frequent maintenance than above.*

FS Models

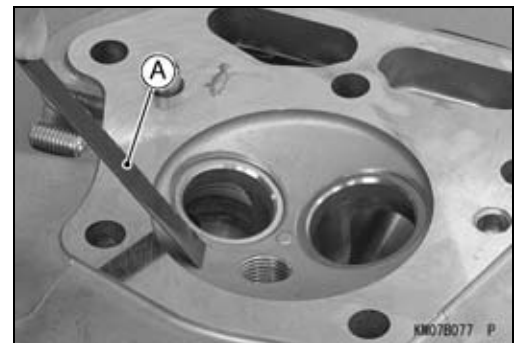
- Remove the foam and paper elements (see Air Cleaner Element Removal).
- Clean the foam element [A] in a bath of detergent and water, and let the element air-dry thoroughly.
- Clean the paper element [B] by tapping it gently on a flat surface to remove dust. If the element is very dirty, replace it with a new one.



Engine Top End

Cylinder Head Cleaning

- Scrape the carbon deposits from the cylinder head and the exhaust port with a suitable tool [A].
- To avoid gouging, use scrapers that are made of a material that will not cause damage.
- Clean the head in a bath of high-flash point solvent and dry it with compressed air.



⚠ WARNING

Clean the cylinder head in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low-flash point solvent to clean the cylinder head. A fire or explosion could result.

Valve Clearance Inspection

NOTE

○ *Valve clearance must be checked when the engine is cold (at room temperature).*

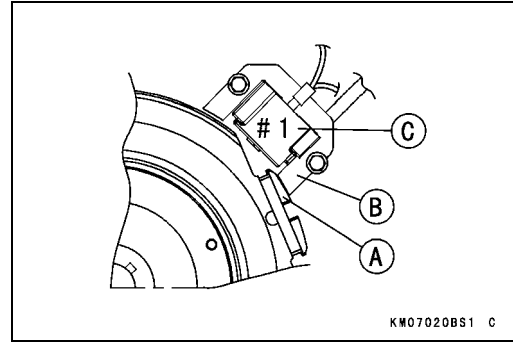
- Remove the rocker covers (see Cylinder Head Assembly Removal in the Engine Top End chapter).
- Place the piston at the top dead center (TDC) of the compression stroke by turning the crankshaft clockwise facing the flywheel.

2-10 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

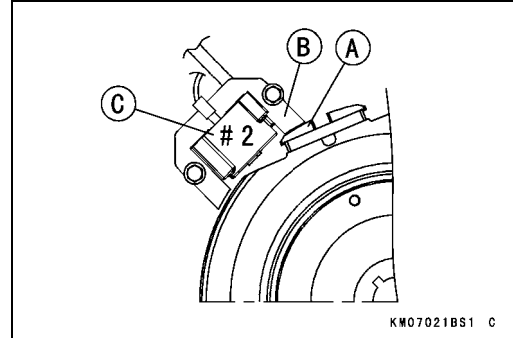
No.1 Cylinder

- The left projection [A] on the flywheel is faced with the right leg [B] on the #1 ignition coil [C] as shown in the figure.
- Check the inlet and exhaust valves are closed completely, if not, turn the flywheel one turn (360°) clockwise and face the left projection with the right leg again.



No.2 Cylinder

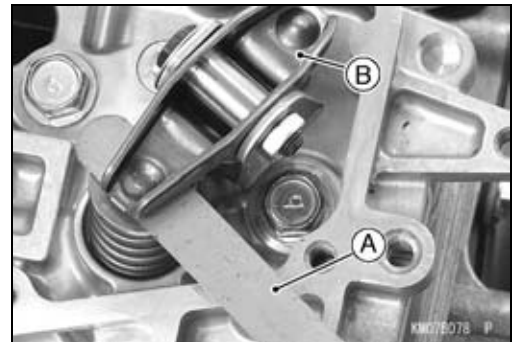
- The left projection [A] on the flywheel is faced with the right leg [B] on the #2 ignition coil [C] as shown in the figure. Follow No.1 cylinder alignment.



- Then check the valve clearance.
- Using a thickness gauge [A], measure the valve clearance between the rocker arm [B] and the valve stem end.
- ★ If the valve clearance is incorrect, adjust it.

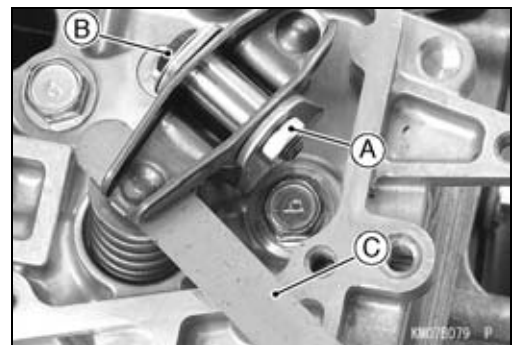
Valve Clearance (when cold)

Inlet, Exhaust 0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)



Valve Clearance Adjustment

- Since valve repairs change the valve clearance, adjust the valve clearance to the specified.
- Turn the crankshaft in proper direction until the piston is at the TDC of the compression stroke (as described above).
- Loosen the locknut [A] and adjusting bolt [B].
- Insert a 0.05 mm (0.0020 in.) thickness gauge [C] between the rocker arm and valve stem end, and turn the adjusting bolt until the thickness gauge begins to bind between the rocker arm and valve stem end. Sweep the thickness gauge during this adjustment.



Valve Clearance (when cold)

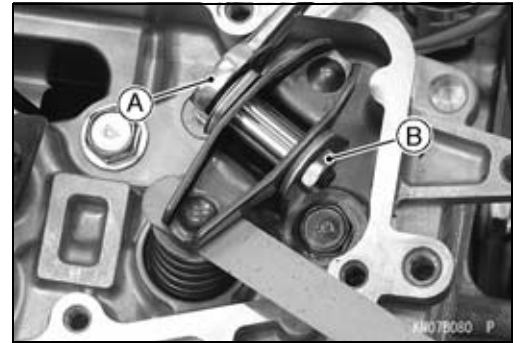
Inlet, Exhaust: 0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)

Periodic Maintenance Procedures

- Holding the adjusting bolt with a spanner [A], tighten the adjusting locknut [B] to the specified torque.

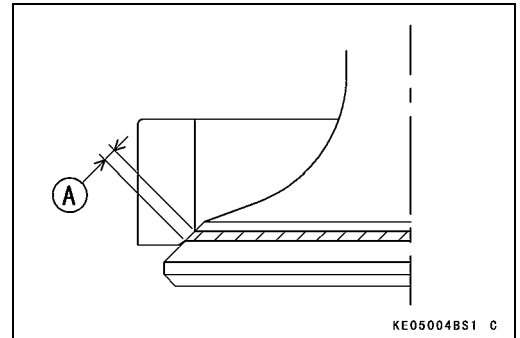
Torque - Valve Clearance Adjusting Locknuts: 11 N·m (1.1 kgf·m, 87 in·lb)

- Do not overtighten the valve clearance adjusting locknuts.
- After the valve clearance adjustment, measure the valve clearance again. Readjust the valve clearance if necessary.



Valve Seat Inspection

- Remove the valve (see Valve Mechanism Removal/Installation in the Engine Top End chapter).
- Inspect the valve seats for damage.
- ★ If the seats are warped or distorted beyond reconditioning, replace the cylinder head with a new one.
- Pitted or worn valve seats can be refaced. Lap the valves to the seats after refacing.
- Coat the valve seat with machinist's dye.
- Push the valve into the guide.
- Rotate the valve against the seat with a lapping tool.
- Pull the valve out, and check the seating pattern on the valve head. It must be the correct width [A] and even all the way around.



NOTE

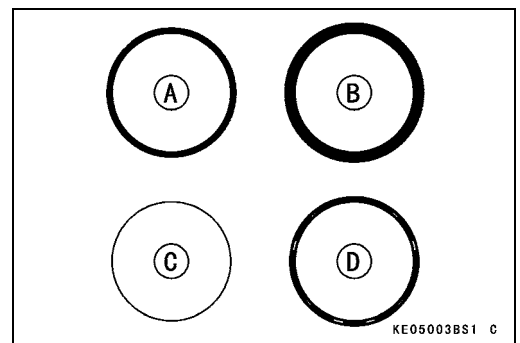
○ The valve stem and guide must be in good condition or this check will not be valid.

- Good [A]
- Too Wide [B]
- Too Narrow [C]
- Uneven [D]

- ★ If the valve seating pattern is not correct, repair the seat.

Valve Seating Surface Width (STD)

Exhaust	0.8 ~ 1.4 mm (0.031 ~ 0.055 in.)
Inlet	0.8 ~ 1.4 mm (0.031 ~ 0.055 in.)



Valve Seat Repair

- Follow the manufacturer's instructions for use of valve seat cutters.

Special Tools - Valve Seat Cutter Holder Bar: 57001-1128
Valve Seat Cutter Holder, φ6: 57001-1360

Exhaust Valve

- Valve Seat Cutter, 45° - φ27.5: 57001-1114
- Valve Seat Cutter, 32° - φ28: 57001-1119

Inlet Valve

- Valve Seat Cutter, 45° - φ32: 57001-1115
- Valve Seat Cutter, 32° - φ33: 57001-1199

- ★ If the manufacturer's instructions are not available, use the following procedure.

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