Kawasaki

FR651V, FR691V, FR730V

FS651V, FS691V, FS730V

FX651V, FX691V, FX730V



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4-Stroke Air-Cooled V-Twin Gasoline Engine

Service Manual

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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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General Specifications

Item	FR651V,FR691V,FR730V, FS651V,FS691V, FS730V, FX651V, FX691V, FX730V
Type of Engine	Forced air-cooled, vertical shaft, OHV, 4-stroke gasoline engine
Cylinder Layout	90 V-Twin
Bore × Stroke	78 mm × 76 mm (3.07 in. × 2.99 in.)
Piston Displacement	726 cm³ (44.3 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:	
FR and FS Models	Electric starter
FX Models	Shift type electric starter
Charging System:	
FS and FX Models	12 V - 15 amps with regulator
FR Models	12 V - 3.6 amp without regulator
Spark Plug	NGK BPR4ES
Carburetor:	
FR and FS Models	Float type, fixed main jet, internally vented, single barrel
FX Models	Float type, fixed main jet, internally vented, two barrel
Fuel Pump	Diaphragm type pulse pump
Air Cleaner:	
FR Models	Single stage element, dry type
FS Models	Dual stage element, dry type
FX Models	Dual stage element, heavy duty type
Governor	Flyweight all speed governor
Lubrication System	Pressure feed by positive displacement pump
Oil Filter	Cartridge type full flow filter
Oil Capacity (when engine is completely dry)	2.0 L (2.1 US qt)
Cooling System	Forced air cooling by fan
Dimensions (L × W × H):	
FR Models	481 mm × 424 mm × 380 mm (18.9 in. × 16.7 in. × 15.0 in.)
FS Models	481 mm × 424 mm × 380 mm (18.9 in. × 16.7 in. × 15.0 in.)
FX Models	478 mm × 424 mm × 549 mm (18.8 in. × 16.7 in. × 21.6 in.)
Dry Weight (without muffler):	
FR Models	40.0 kg (88.2 lb)
FS Models	41.0 kg (90.4 lb)
FX Models	46.0 kg (101.4 lb)

Specifications are subject to change without notice.

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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 250 hr.	Every 300 hr.	Every 500 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	●							
Replace air cleaner primary element (Heavy Duty Air Cleaner) (FX Models) (1)						●		
Check air cleaner secondary element (Heavy Duty Air Cleaner) (FX Models) (1)						●		
Replace air cleaner secondary element (Heavy Duty Air Cleaner) (FX Models) (1)								●
Clean air cleaner foam element (FS Models) (1)			●					
Clean air cleaner paper element (FR and FS Models) (1)				●				
Replace air cleaner paper element (FR and 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.

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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.

Lh: Left-hand threads.

S: Tighten the fasteners following the specified sequence.

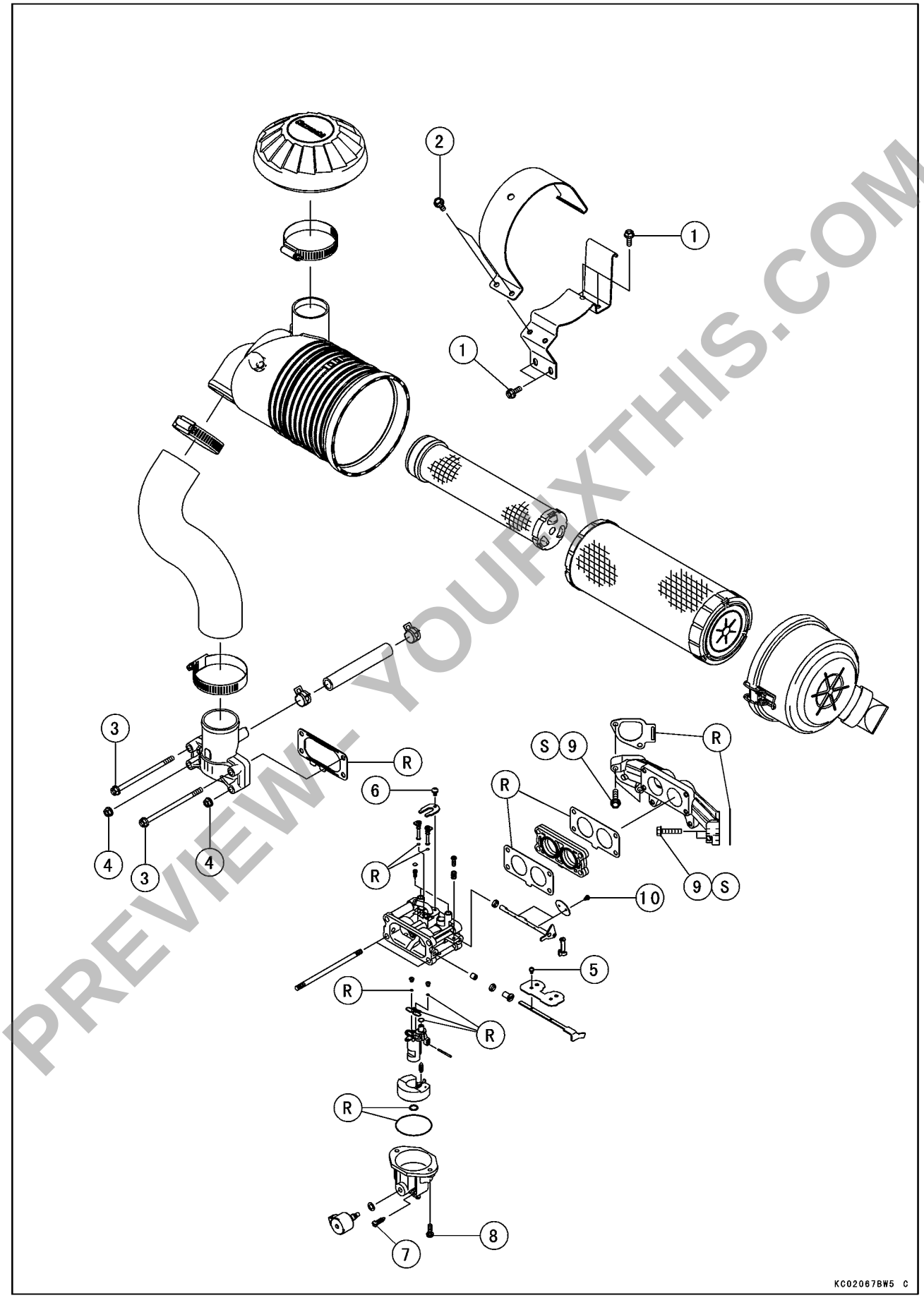
Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System				
Carburetor and Inlet Pipe Mounting Nuts	5.9	0.60	52 in·lb	
Control Panel Mounting Bolt	5.9	0.60	52 in·lb	
Governor Arm Clamp Nut	7.8	0.80	69 in·lb	
Governor Arm Joint Bolt	5.9	0.60	52 in·lb	Lh
Governor Shaft Plate Screws	2.0	0.20	18 in·lb	
Inlet Manifold Bolts	5.9	0.60	52 in·lb	S
FX Models				
Air Cleaner Bracket Mounting Bolts	5.9	0.60	52 in·lb	
Air Cleaner Holder Bracket Bolts	5.9	0.60	52 in·lb	
Carburetor and Inlet Pipe Mounting Bolts	5.9	0.60	52 in·lb	
Choke Valve Screws	0.93	0.095	8.2 in·lb	
Cover Plate Screw	2.4	0.24	21 in·lb	
Drain Screw	2.0	0.20	18 in·lb	
Float Chamber Mounting Screws	3.9	0.40	35 in·lb	
Throttle Valve Screws	0.93	0.095	8.2 in·lb	
FR and FS Models				
Control Panel and Inlet Pipe Mounting Bolt	5.9	0.60	52 in·lb	
Main Jet	2.3	0.23	20 in·lb	
Solenoid Valve	4.5	0.46	40 in·lb	
Throttle Valve Screws	0.68	0.069	6.0 in·lb	L
FR651V, FR691V, FS651V, FS691V Models				
Throttle Lever Mounting Screw	0.68	0.069	6.0 in·lb	L
Cooling System				
Cooling Fan Plate Mounting Bolts	8.8	0.90	78 in·lb	
Cooling Fan Screen Bolts	5.9	0.60	52 in·lb	
Flywheel Bolt	56	5.7	41	
FX Models				
Engine Shroud Bolts	5.9	0.60	52 in·lb	
Fan Housing Bolts	5.9	0.60	52 in·lb	
Guard Mounting Bolts	5.9	0.60	52 in·lb	
FR and FS Models				
Engine Shroud Bolts	8.8	0.90	78 in·lb	
Fan Housing Bolts	8.8	0.90	78 in·lb	
Engine Top End				
Connecting Rod Big End Cap Bolts	9.8	1.0	87 in·lb	EO
Cylinder Head Bolts (L = 50 mm)	46	4.7	34	S

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Exploded View

FX Models



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Periodic Maintenance Procedures

Fuel System

NOTE

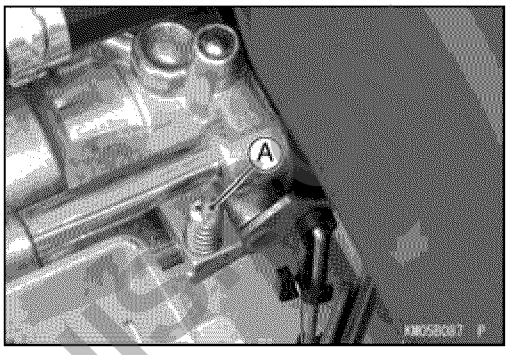
○*High and low idle speeds may vary depending on the equipment on which the engine is used. Refer to the equipment specification.*

Low Idle Speed Adjustment

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

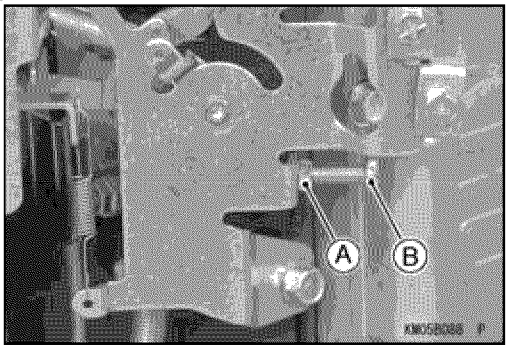
⚠ WARNING

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.

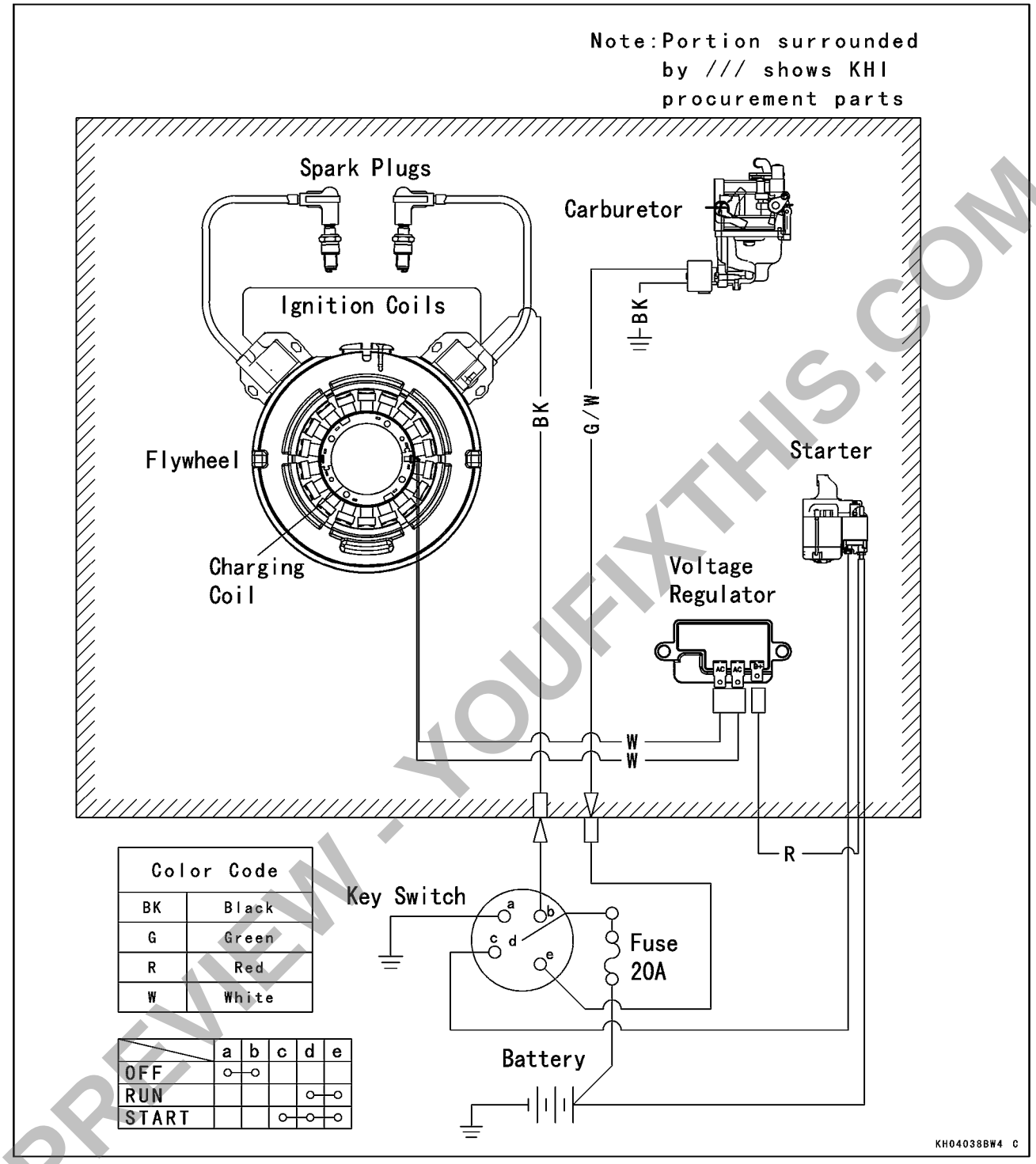
- Start and warm up the engine thoroughly.

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Wiring Dagram

FX Models



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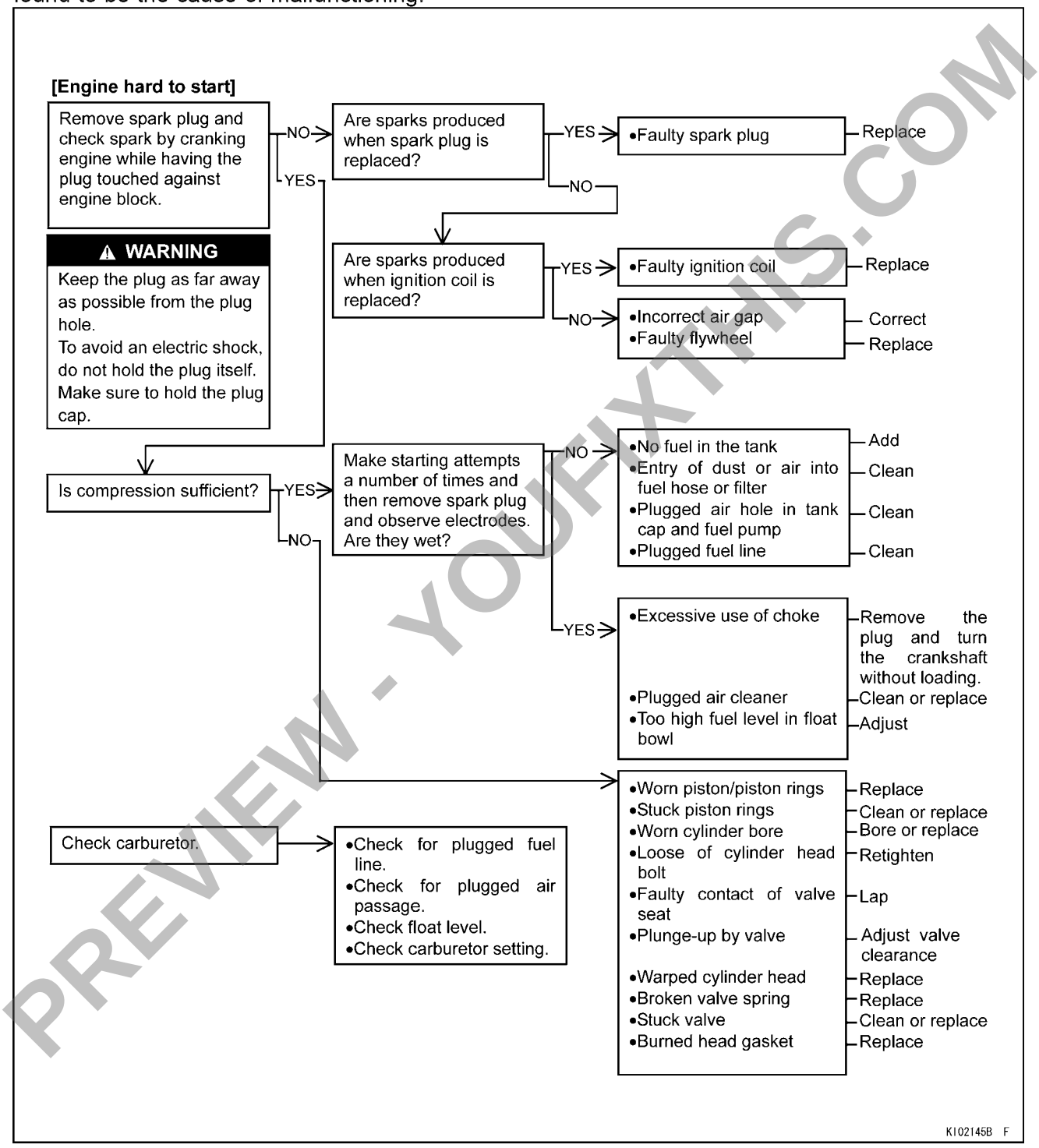
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Engine Troubleshooting Guide

If the engine malfunctions, check if the way the engine is used is correct. If the engine malfunctions even if the engine is used correctly, systematically carry out troubleshooting starting with simple points.

This chart describes typical troubleshooting procedures.

Do not unnecessarily disassemble the carburetor, the magneto or the engine unless it has been found to be the cause of malfunctioning.



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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)		

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Carburetor

Carburetor Cleaning

⚠ WARNING

Clean the carburetor in a well-ventilated area, and take care that there is no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvents to clean the carburetors.

CAUTION

Do not use compressed air on an assembled carburetor, or the floats may be crushed by the pressure. Remove as many rubber or plastic parts from the carburetor as possible before cleaning the carburetor with a cleaning solution. This will prevent damage to or deterioration of the parts.
The carburetor body has plastic parts that cannot be removed. Do not use a strong carburetor cleaning solution which could attack these parts; instead, use a mild high-flash point cleaning solution safe for plastic parts.
Do not use wire or any other hard instrument to clean carburetor parts, especially jets, as they may be damaged.

- Disassemble the carburetor (see Carburetor Disassembly/Assembly).
- Immerse all the carburetor metal parts in a carburetor cleaning solution and clean them.
- Rinse the parts in water and dry them with compressed air.
- Do not use rags or paper to dry parts. Lint may plug the holes or passages.
- Blow air through the holes and fuel passages with the compressed air. All holes must be open.
- Assemble the carburetor (see Carburetor Disassembly/Assembly).

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Specifications

Item	Service Limit
Camshaft, Tappet:	
Cam Lobe Height:	
Inlet	29.36 mm (1.156 in.)
Exhaust	29.36 mm (1.156 in.)
Camshaft Journal Diameter:	
PTO Side	15.99 mm (0.630 in.)
Flywheel Side	15.99 mm (0.630 in.)
Camshaft Bearing Inside Diameter:	
Crankcase	16.119 mm (0.6346 in.)
Crankcase Cover	16.119 mm (0.6346 in.)
Crankshaft, Connecting Rod:	
Connecting Rod Bend	TIR 0.15/100 mm (0.006/3.94 in.)
Connecting Rod Twist	TIR 0.15/100 mm (0.006/3.94 in.)
Connecting Rod Big End Width	22.05 mm (0.868 in.)
Crankpin Width	44.7 mm (1.76 in.)
Connecting Rod Big End Inside Diameter	40.04 mm (1.58 in.)
Crankpin Outside Diameter	39.94 mm (1.57 in.)
Crankshaft Runout	TIR 0.05 mm (0.002 in.)
Crankshaft Journal Diameter	
PTO Side	39.90 mm (1.571 in.)
Flywheel Side	39.88 mm (1.570 in.)
Crankcase:	
Crankshaft Bearing Inside Diameter:	
Crankcase	40.035 mm (1.576 in.)
Crankshaft Journal Bearing Inside Diameter:	
Crankcase Cover	40.005 mm (1.575 in.)

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