

Kawasaki

FB460V

4-stroke air-cooled gasoline engine
WORKSHOP MANUAL

FOREWORD

This manual is designed for use by trained mechanics in a properly equipped shop.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

Whenever you see these **WARNING** and **CAUTION** symbols, heed their instructions!

Always follow safe operating and maintenance practices.



WARNING: This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in fire, personal injury, or loss of life.

CAUTION: This identifies special instructions or procedures which, if not strictly observed, could result in equipment damage or destruction.

NOTE: Indicates message or points of particular interest for more efficient and convenient operation.

The term "Replace" and some abbreviations are used as follows:

Replace — usually means replace with a new part.

MIN	=	Minimum
MAX	=	Maximum
Ass'y	=	Assembly
STD	=	Standard
Illust.	=	Illustration
Spec.	=	Specification(s)
PTO	=	Power take off
Approx.	=	Approximately (Approximate)
Carb.	=	Carburetor
Con-rod	=	Connecting rod
Cyl.	=	Cylinder

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TABLE OF CONTENTS

Section 1 GENERAL INFORMATION

Before Servicing	1-1
Specifications	1-3
Performance Curves	1-4
Dimensional Specifications	1-5
Periodic Maintenance	1-7
4-Stroke Engine Theory	1-7
Construction (Internal Component)	1-8
Fuel System and Operation	1-9
Electrical System	1-10
Preliminary Engine Checks	1-11
Trouble Shooting	1-13
Tune-up Procedure	1-17
Overhaul Procedure	1-17

Section 2 IGNITION

Ignition System	2-1
Spark Check	2-1
Flywheel Removal	2-1
Flywheel Check	2-2
Ignition Coil Check	2-3
Control Unit Check	2-3
Flywheel Installation	2-3
Ignition Coil Air-gap Adjustment	2-3
Flywheel Housing Installation	2-4
Spark Plug Check and Cleaning	2-4

Section 3 AIR-CLEANER

Air cleaner Service	3-1
Air cleaner Housing Inspection	3-1
Air cleaner Installation	3-1

Section 4 CARBURETOR

Carburetor Operation	4-1
Carburetor Removal and Disassembly	4-1
Carburetor Cleaning	4-2
Carburetor Inspection	4-2
Carburetor Assembly	4-2
Carburetor Installation	4-3
Carburetor Adjustment	4-3

Section 5 GOVERNOR

Removal (Governor Related)	5-1
Governor Gear Disassembly	5-1
Governor Gear Inspection	5-2
Governor Reassembly	5-2
Reassembly (Governor Related)	5-2
Linkage Adjustment	5-2
Throttle Cable Installation and Adjustment	5-3
Choke Adjustment	5-3
Maximum Speed Adjustment	5-3
Idle Speed Adjustment	5-3

Section 6 COMPRESSION

Compression Check	6-1
Cylinder Head and Head Gasket Removal	6-1
Cylinder Head Tightening Procedure	6-1
Cylinder Head Check and Repair	6-2
Valve and Spring Removal	6-2
Valve Spring Inspection	6-2
To Analyze Valve	6-2
Valve Inspection	6-2
Valve Guide Check and Replacement	6-3
Valve Seat Reconditioning	6-4
Tappet Clearance Check and Repair	6-6

Section 7 LUBRICATION

Lubrication	7-1
Oil Warning System	7-1
Full Flow Oil Filter	7-1
Capacities	7-1
Oil Recommendation	7-2
Oil Level Check	7-2
Oil Change	7-2
Breather Check	7-2
Oil Pump Inspection	7-3
Oil Pump Installation	7-3

Section 8
PISTON, PISTON RING, AND CON-ROD

Piston and Con-rod Removal	8-1
Piston Inspection	8-2
Piston Ring Thickness Inspection	8-2
Piston Ring End Gap Inspection	8-3
Piston Pin and Pin Hole Dia. Inspection	8-3
Con-rod Inspection	8-4
Piston and Con-rod Assembly	8-5
Piston Ring Installation	8-5
Piston and Con-rod Assembly Installation ...	8-5

Section 9
CRANKSHAFT AND CAMSHAFT

Crankshaft and Camshaft Removal	9-1
Crankshaft Inspection	9-1
Under Size Con-rod	9-2
Link Rod Inspection	9-2
Bushing Replacement	9-2
Balance Weight Inspection	9-3
Balancer Guide Inspection	9-3
Camshaft Inspection	9-3
Crankshaft and Camshaft Installation	9-4
Crankcase Cover Installation	9-5
Crankshaft End Play	9-5
Crankshaft End Play Adjustment	9-5

Section 10
CYLINDER BLOCK AND BEARING

Cylinder Block Inspection and Repair	10-1
Ball Bearing Removing	10-2
Ball Bearing Inspection	10-2
Plain Bearing Inspection	10-2
Ball Bearing Installation	10-3
Oil Seal Replacement	10-3

Section 11
ELECTRIC STARTER AND CHARGE

Starter Motor Circuit	11-1
Starter System Check	11-1
Starter Motor Check	11-2
Starter Solenoid Test	11-2
Starter Motor Disassembly	11-3
Starter Motor Inspection	11-4
Brush Holder Check	11-7
Pinion Clutch Inspection	11-7
Starter Motor Reassembly	11-7
Charging System Check	11-7
Trouble Shooting	11-9

Section 12
RECOIL STARTER

Recoil Starter Disassembly	12-1
Recoil Starter Reassembly	12-1
Recoil Starter Inspection	12-2

Section 1

GENERAL INFORMATION**BEFORE SERVICING**

Before starting to service a engine carefully read the applicable section to eliminate unnecessary work. However, a detailed account has limitations; a certain amount of basic knowledge is required for successful work. Especially note the following:

Mechanical Systems:**Adjustments**

Adjustments shall be made in accordance with the Periodic Maintenance Chart or whenever troubleshooting or presence of symptoms indicate that adjustments may be required.

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.

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 the engine. For the same reason, before installing a new part, clean off any dust or metal fillings.

Tightening Sequence

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

Torque

The torque values given in this Service Manual should always be adhered to. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

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.

Lubricant

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.

Battery Ground

Before performing any disassembly operations on the equipment, remove the ground (—) lead from the battery to prevent the possibility of accidentally turning the engine over while partially disassembled.

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.

Press

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

Oil Seal, Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals. 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 lubricant, preferably high temperature grease, to the lips to reduce rubber-to-metal friction.

Gasket, O-ring

When in doubt as to the condition of a gasket or O-ring, replace it with a new one. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

Liquid Gasket and 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).

Ball Bearing Installation

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft.

Circlip, Retaining Ring

Renew any circlips and retaining rings that were removed, as removal weakens and deforms them. When installing circlips and retaining rings, take care to compress or expand them only enough to install them.

High Flash-point Solvent

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

Molybdenum Disulfide (MoS₂) Grease

This manual makes reference to molybdenum disulfide grease in the assembly of certain engine and chassis parts. Always check manufacturer recommendations before using such special lubricants.

Engine Rotation

When turning the crankshaft by hand, always turn it in the direction of normal rotation; which is clockwise, viewed from the front (flywheel end) of the engine. This will ensure proper adjustments.

Electrical Systems:

- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
 - Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running, unless specifically noted.
 - Never keep the starter engaged if the starter motor will not turn over, or the current may burn out the starter motor windings.
 - Never replace a defective electrical component without determining what caused the failure. If the failure was brought on by some other item or items, they too must be repaired or replaced, or the new replacement will fail.
 - Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
 - Measure coil and winding resistance when the part is cold (at room temperature).
 - All the electrical leads are either single-color or two-color and, with only a few exceptions, must be connected to leads of the same color.
 - When soldering or unsoldering connections, do not use a soldering iron of more than 40 watts capacity. Use 16 gauge (0.062 in.) 60/40 resin core solder when reconnecting wiring.
- Always minimize shock hazards when working on electrical equipment. Work in a clean, dry environment with dry hands. For maximum shock hazard protection, connect the equipment ground terminal to an earth ground.
 - Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
 - Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.

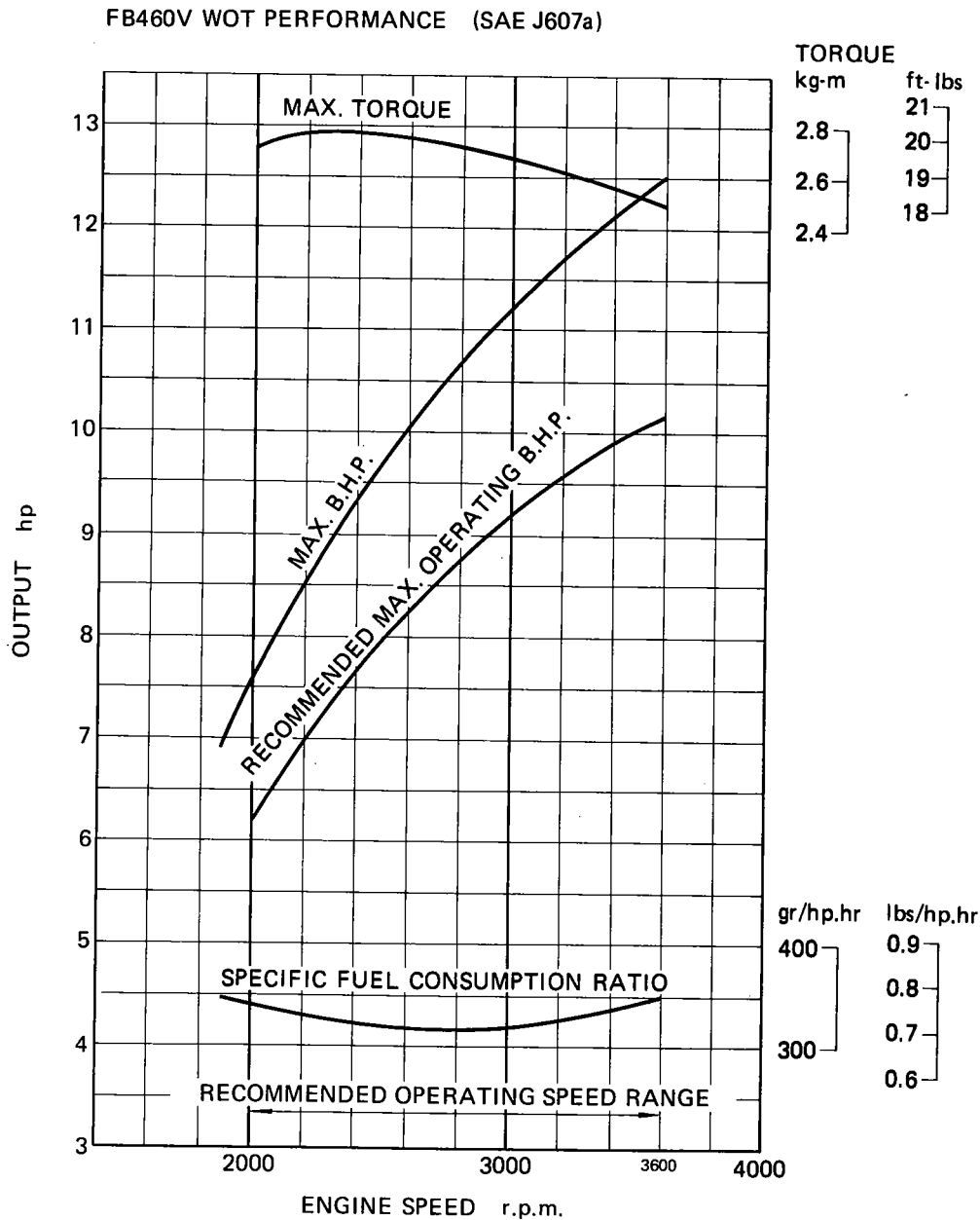
1-3 GENERAL INFORMATION

SPECIFICATIONS

ENGINE MODEL	FB460V	
ENGINE TYPE	Forced Air Cooled, Vertical Shaft, 4-Stroke Gasoline Engine	
NUMBER OF CYLINDER	1	
PISTON DISPLACEMENT	460 cc (28.1 cu.in.)	
BORE x STROKE	89 mm x 74 mm (3.50 in. x 2.91 in.)	
COMPRESSION RATIO	6.4 : 1	
MAX. OUTPUT	12.5/3,600 r.p.m. (with JX156-K112-01 muffler)	
MAX. TORQUE	2.78 kg-m/2,300 r.p.m. (20.1 ft-lbs/2,300 r.p.m.)	
MIN. SPECIFIC FUEL CONSUMPTION RATIO	315 gr/hp-hr (0.694 lbs/hp-hr)	
DIRECTION OF ROTATION	Counter-Clockwise Facing the PTO Shaft	
FAST IDLE SPEED SETTING	3,350 r.p.m.	
SLOW IDLE SPEED SETTING	1,400 r.p.m.	
LUBRICATION	Pressurised Lubrication	
BALANCING	Reciprocating Weight	
THROTTLE CONTROL	Remote Cable	
CHOKE CONTROL	Automatic	
STARTER	Electric Starter or Recoil Starter	
CARBURETOR	Float Type Fixed Main Jet	
IGNITION	Transistorized-Fly-Wheel Magneto (Point Less)	
CHARGING COIL	12V-13A with Regulator (Electric Starter Model)	
RFI	per Canada and U.S.A. Requirement	
GOVERNOR	Mechanical Governor	
OIL FILL AND DIP STICK	Extended Above Engine	
OIL DRAIN	with Extention Pipe	
COOLING AIR INLET	Rotating Screen with Periphery Blade Protector	
COOLING SHROUDS	Noise Suppressive Layered Sheet	
AIR CLEANER	Semi Cyclone Type with Dual Element	
LUBRICANT	1.4ℓ API Service Classification : SD, SE, SE/CC, SF Class At temperatures below 0°C (32°F) : SAE 5W-20 At temperatures above 0°C (32°F) : SAE 30	
FUEL	Regular Grade Leaded or Unleaded Gasoline	
	<u>(Electric Starter Model)</u>	<u>(Recoil Starter Model)</u>
DIMENSION (H x W x L)	307 mm x 381 mm x 419.5 mm (12.08 in. x 15.00 in. x 16.51 in.)	356 mm x 365 mm x 511 mm (14.01 in. x 14.37 in. x 20.12 in.)
NET WEIGHT	36 kg (79.36 lbs)	36 kg (79.36 lbs)
OPTIONAL PARTS	Oil Warning System, Full Flow Oil Filter	

Specifications and dimensions are subject to change without notice.

PERFORMANCE CURVES



The horsepower ratings shown herein are established in accordance with Society of Automotive Engineers Code J607a.

Power curves are corrected to standard conditions of sea level barometer and temperature of 15.6°C (60°F) and are developed from laboratory test engines equipped with standard air cleaner and muffler.

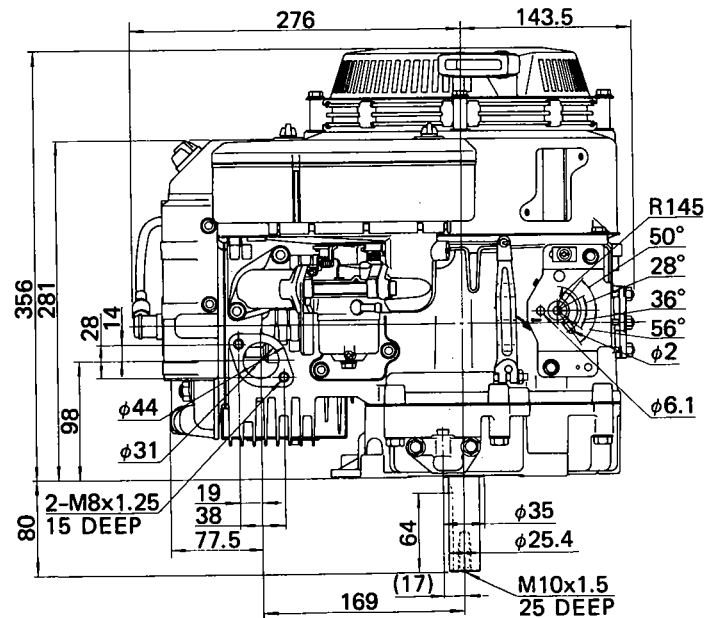
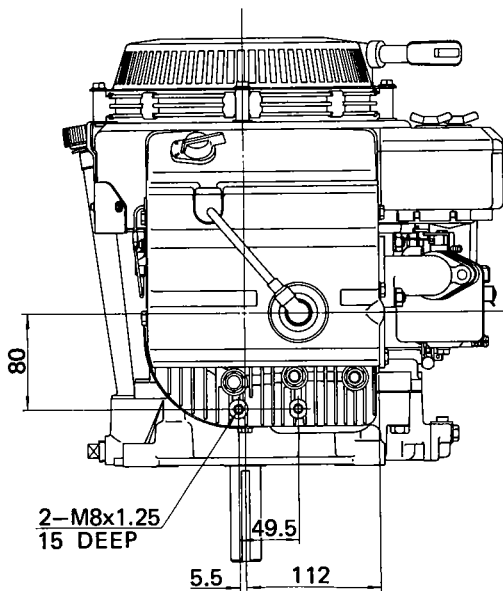
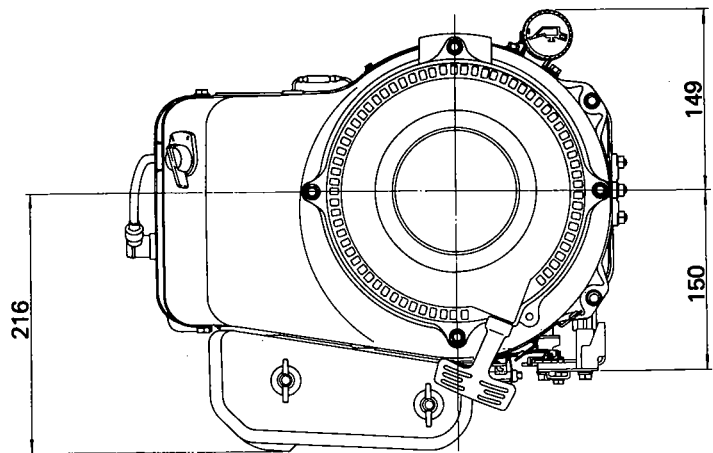
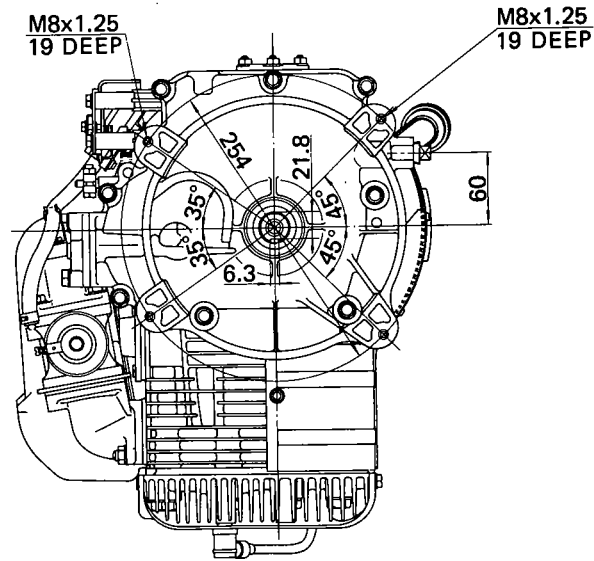
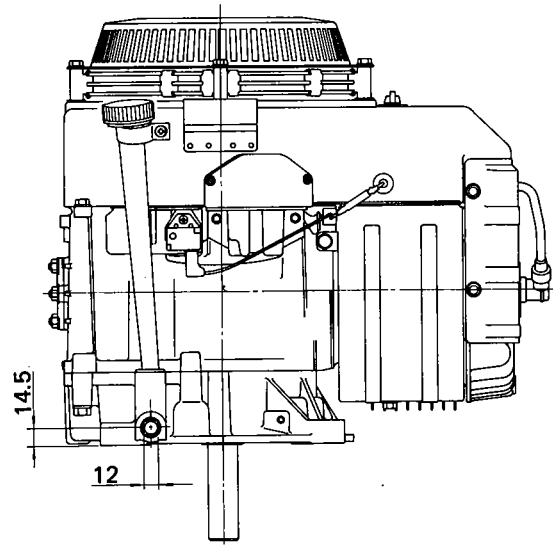
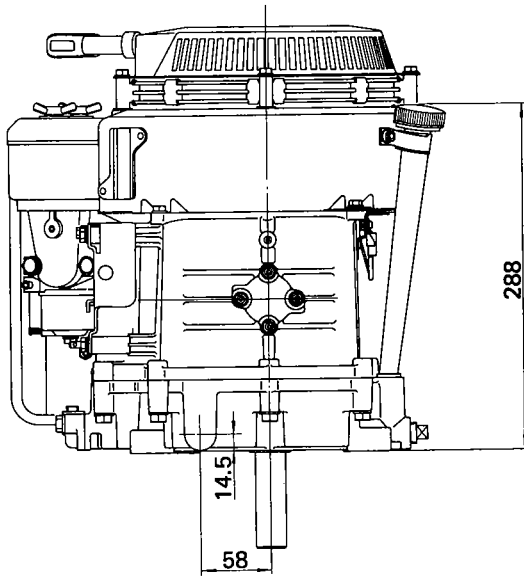
The "Maximum B.H.P." curve represents performance of laboratory test engines. Production engines will develop not less than 95% of the "Maximum B.H.P." when tested after run-in to reduce friction and after cleanout of combustion chamber, with valves, carburetor and ignition system adjusted to laboratory standards.

Engine power will decrease 3.5% for each 305m (1,000 ft.) above sea level and 1% for each 5.6°C (10°F) above standard temperature of 15.6°C (60°F).

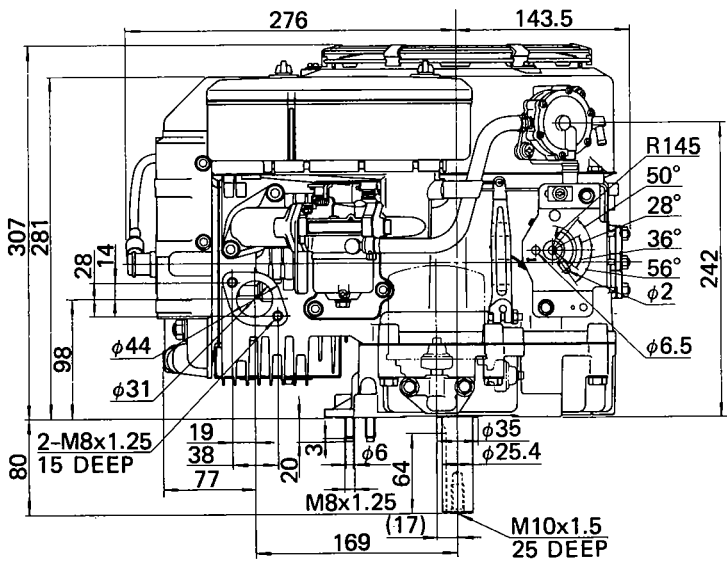
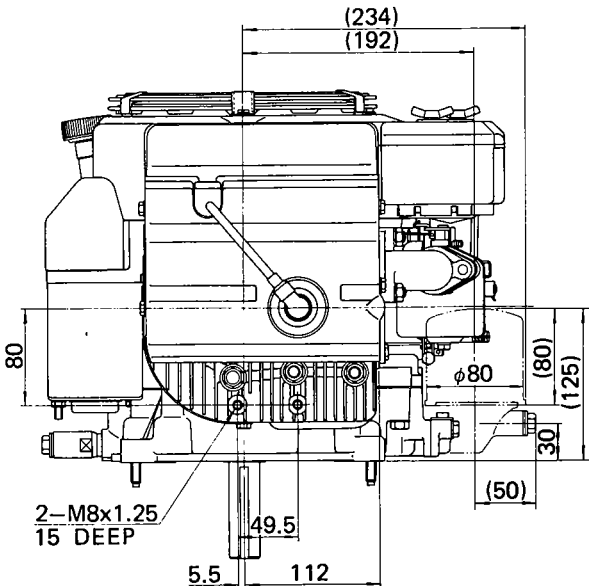
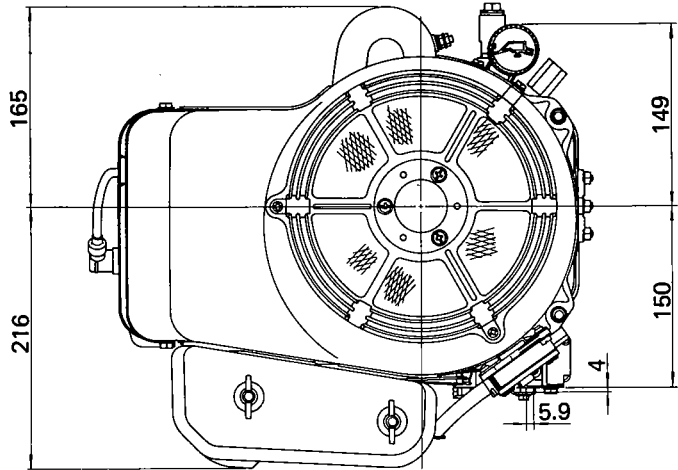
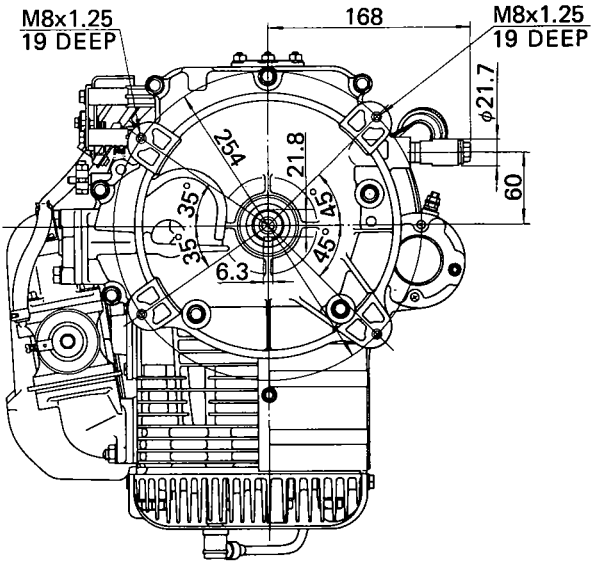
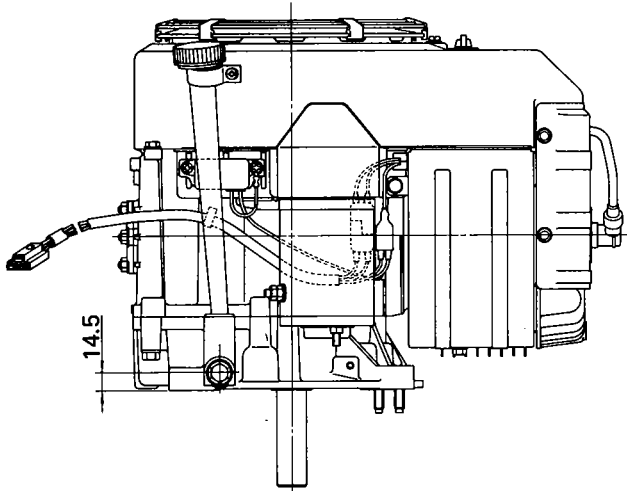
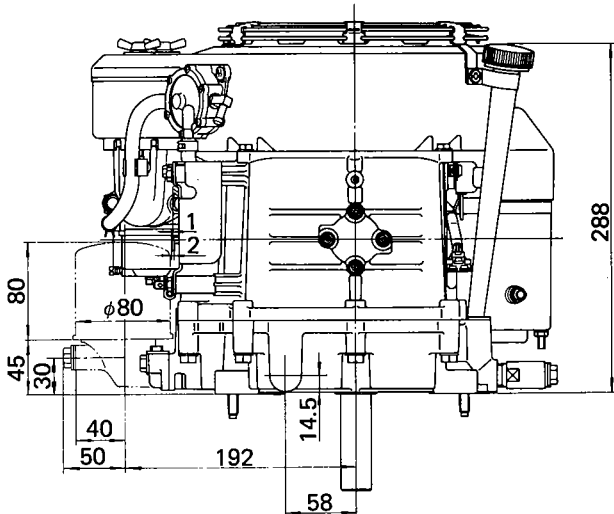
1-5 GENERAL INFORMATION

DIMENSIONAL SPECIFICATIONS

(Recoil Starter Model)



(Electric Starter Model)



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