

# SASE Bull 1250 EBS Propane Industrial Vacuum MANUAL



SASE Company, LLC 800.522.2606 | SASECompany.com

## SASE Bull 1250 EBS Propane

## **Vacuum System Operating Instructions**

Instructions for Installation, Repair, and Maintenance

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Please call 800.522.2606 with any questions!

#### **FOREWORD**

o achieve the safe installation and operation of your new Bull 1250 EBS Propane Industrial Vacuum, we urge you to become familiar with the information in this manual.

The SASE Bull 1250 EBS Propane industrial vacuum cleaning system is designed for heavy duty operation. The mechanical and electrical components are of a robust nature and will provide long life with minimal maintenance even under severe conditions.

This manual describes the installation and preventative care requirements to ensure their maximum life and to provide virtually trouble-free operation for years ahead.

This manual is prepared in six (6) general Sections:

**Section 1:** Health and Safety Recommendations

Section 2: Bull 1250 EBS Propane DRAWINGS

**Section 3:** Maintenance Instructions

**Section 4:** Accessory Data Sheets

**Section 5:** Service and Maintenance Instructions for the blower

**Replacement Parts Lists,** if applicable, can be found within the individual sections pertaining to that item.

Past experience indicates that the majority of part replacements and repairs occur due to misuse or carelessness by personnel not qualified to operate and service this equipment. Observance of the instructions in this manual will minimize references to those Sections pertaining to Repair and Replacement.

#### WARRANTY

**SASE** warrants this equipment to operate within the limits of our specification when properly used, properly

Any part proven defective in material and workmanship shall be duplicated without charge **F.O.B.** <u>your jobsite</u>. This warranty <u>excludes</u> <u>normal wear and tear</u> of parts or equipment, and especially excludes degradation from normal abrasion of corrosion.

**Please note!** The vacuum producer requires unrestricted air flow! Running the Bull 1250 EBS Propane "deadheaded" for more than a few minutes will overheat the vacuum producer and void the warranty.

This warranty shall be void if the equipment has been altered or if any attempt to repair this equipment has been made by persons, institutions or firms not authorized by SASE to make repairs.

SASE will not be responsible for any LABOR costs of TOOLS, MATERIALS, remove orre-install equipment, INSURANCE, OVERHEAD or any INCIDENTAL, CONSEQUENTIAL or other expenses which may be SPECIAL, incurred by the purchaser in the execution of this warranty.

SASE will NOT assume any responsibility under terms of this warranty in parts or equipment which have not been paid for in full, or where an account is outstanding for 60 days or more.

Please call 800.522.2606 with any questions!

#### **Section**

# **Health and Safety Recommendations**

Bull 1250 EBS Propane The Information Contained In This Section Can Help Prevent Serious Personal Injury.

# PLEASE READ THIS SECTION CAREFULLY BEFORE OPERATING OR SERVICING THIS EQUIPMENT.

his section outlines some of the health and safety issues that must be acknowledged when operating or servicing your SASE industrial vacuum cleaning system.

It is important that plant operators are made aware of the responsibility incumbent on them to take all necessary precautions to ensure their health and safety, and that plant authorities implement the procedures necessary toward this end.

We strongly advise that you, the customer, add to, and tailor, these safety recommendations to suit your own particular working and operating environment.

#### **Explosive Dust**

The operators of this equipment must always be aware of the physical and chemical properties of the dust particles being collected. A surprising number of dusts are flammable or prone to explosion when mixed with air as we find with a filter receiver application.

Materials or processes presenting such hazards MUST be identified by the customer.

The customer must also be alert to any changes in the dust material or process. If a new process is introduced after the installation of the vacuum system which changes the composition, quantity, or most especially the chemical type of material being introduced into the vacuum system, this may greatly increase the chance of explosion and fire.

If your process is to be changed, or if you have any concerns, we suggest you contact us to see how we can assist you to ensure that the operation of your *SASE* industrial vacuum cleaning system is as safe as possible.

#### **Isolate Electrical Before Maintenance**

DO NOT ATTEMPT ANY MAINTENANCE WORK UNTIL ALL ELECTRICAL HAS BEEN ISOLATED.

Isolate all electrical before removing any guards, covers or accessories before beginning any maintenance or repair work.

Always lock out the main system blower disconnect before opening any inspection door on any separator or filter receiver.

Before re-connecting the electrical supply, ensure that all guards, covers and accessories are correctly replaced.

## **Implement Measures to Handle Respirable Dust**

Operators must be fitted with appropriate respirators and must wear protective clothing if handling dust that may be irritating or even toxic.

We recommend that the MSDS's for each of the dusts to be handled by the vacuum system be included in this manual, and that specific measures to handle problem materials be clearly identified in those sections of this manual where the operator is exposed to these dusts; i.e. filter bag replacement, etc.

#### **Use Suitable Electrical Warning Notices**

Do NOT leave electrical gear live and unattended without a suitable warning notice.

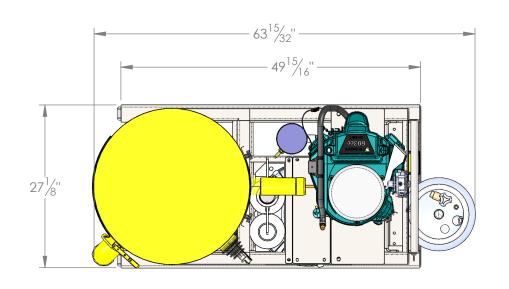
Distinctive warning notices must be provided for posting in a conspicuous position to any piece of electrical equipment or machinery on which maintenance is being carried out, and which, for any reason whatsoever, is liable to be left unattended while in a live condition.

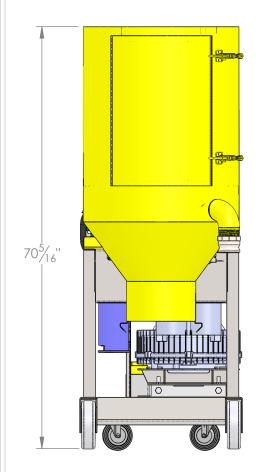
#### **Use CAUTION When Using the Hoses**

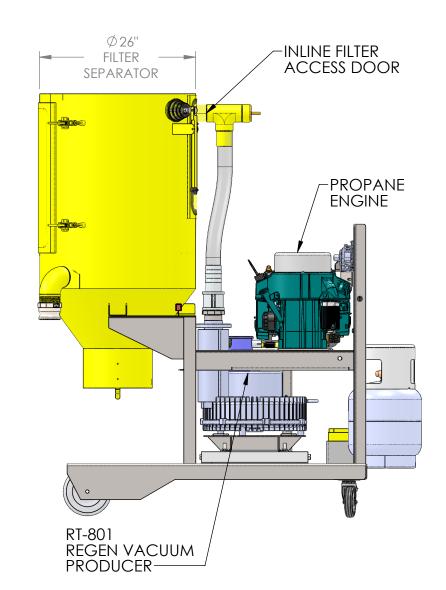
*SASE* vacuum systems use blowers that develop very high vacuum conditions which can be dangerous if caution is not observed.

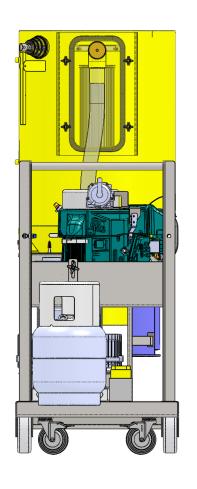
DO NOT PUT THE END OF THE HOSE AGAINST YOUR SKIN OR CLOTHES OR THOSE OF OTHERS!

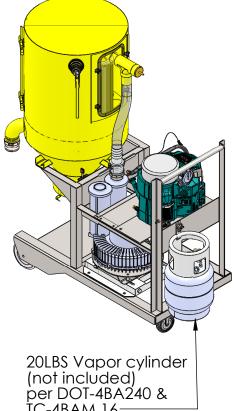
Remove the hose from the inlet valve to dislodge materials that plug the end of tools.









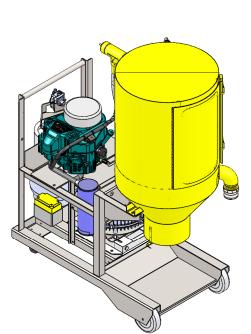


(not included) per DOT-4BA240 & TC-4BAM 16

#### GENERAL SPECIFICATIONS:

- 388 CFM & 8" Hg. CONTINUOUS 18Hp @ 3600 RPM PROPANE ENGINE WITH RON TAI 8553
- ENGINE WITH RON TAI 8553
  VACUUM PRODUCER
  42 SF† FILTER, POLYESTER FELT WITH
  99.9% @ 0.5 MICRONS, STANDARD
  EFFECTIVE FILTER CLEANING VIA
  SHAKER MECHANISM
  HEPA INLINE FILTER TO PROTECT
  VACUUM PRODUCER
  MOUNTED ON HEAVY-DUTY STEEL
  STRUCTURE
  WEIGHT ~ 650 lbs

- WEIGHT ~ 650 lbs



PAINT SPEC: EQUIPMENT COLOUR - SASE YELLOW STRUCTURAL FRAME COLOUR - BLACK

Note - All dimensions are in Inches

CUSTOMER:

Sase - 1250P EBS

PROJECT:

Longo

Industrial Vacuum System 18Hp Propane Engine with RT-801

	, p c c		,,,,,	
SHEET SIZE:	SCALE: 1:16		THE INFORMATION CONTAINED IN DRAWING IS PROPRIETARY. NO PAR THIS DRAWING MAY BE TRANSMITE OTHER PARTIES WITHOUT PRIOR WE	
D	1.10			
SHEET 1 OF 1			PERMISSION FROM NORTHWIND AIR SYSTEMS OR ITS APPROVED AGENTS.	
DRAWN BY:			DATE:	
Ravi			9/18/2017	
CHECKED BY:			DATE:	
KRW			9/18/2017	
DWG NO:				REV. NO:
EBS-	1250P	- R1		Α

#### **Section**

#### **A System Overview**

This section provides an introduction to the SASE, how it works, its capabilities and limitations.

#### **System Capabilities**

The system capabilities for the various Bull 1250 EBS Propane systems are shown below. They are rated at 388 scfm and 8.0 inches Hg, respectively, with a hose up to 50 ft. long.

The system pickup capacity is based on material with a density of 75 pcf with a 50-ft. long hose. Pickup capacity drop-off is approximately 0.5 lb per foot beyond 50 feet.

The system shall be capable of handling dry materials with a primary filter efficiency of 99.9% at 0.5 microns.

The system shall be suitable for continuous operation. System equipment, accessory devices and controls shall be suitable for outdoor operation in an environment suitable for NEMA 4 devices (weather tight).

The system equipment noise level shall not exceed 85 dBa at 5 feet.

Both systems are capable of pickup capacity of about 67 pounds per minute and can support:

- up to one (1) operator using a 2.0-inch hose
- or up to two (2) operators each using a 1.5-inch hose

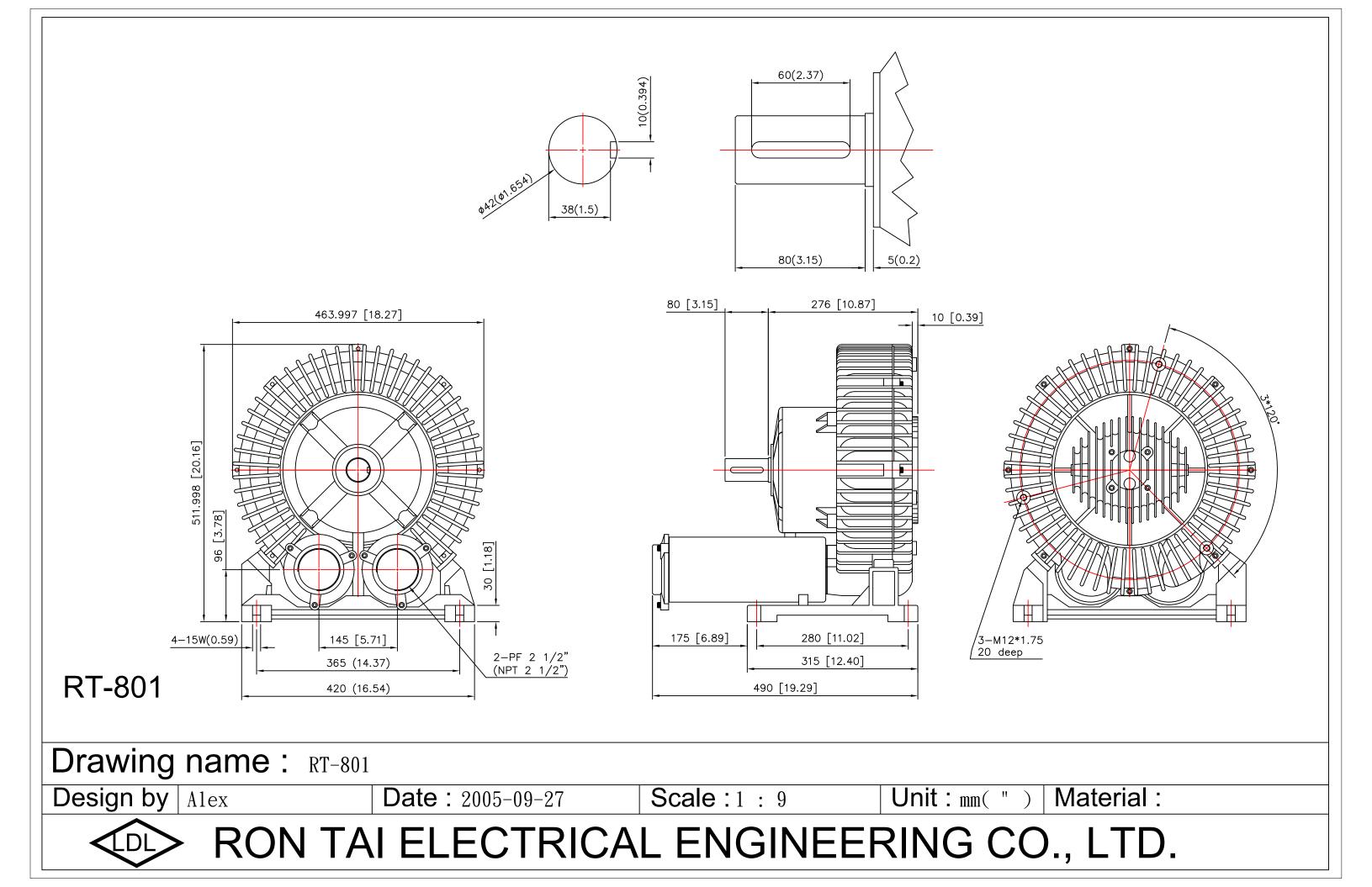
#### **System Limitations**

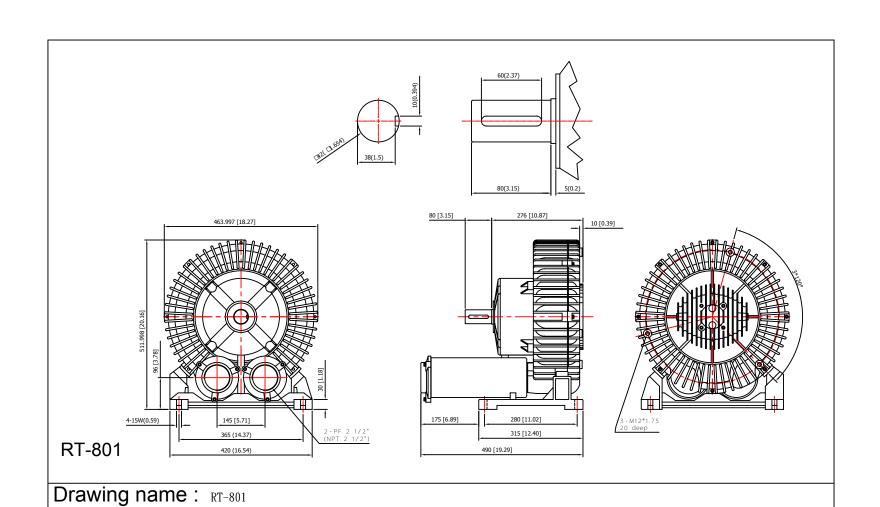
#### **IMPORTANT NOTE!**

The vacuum producer provides industrial-strength vacuum power to the operators, so the system is mostly forgiving of plugs, but all vacuum systems MUST have an air/material mix to work; therefore, we talk of the system as a pneumatic conveyor.

It is essential that operators be trained to introduce air into the hose with the material at a reasonable rate. Without conveying air, material will NOT move!

The system is designed to handle almost anything that will fit though the vacuum hoses. However, the *Bull 1250 EBS Propane* is **not designed to handle liquids directly**. If the filters get wet, then are coated in powders, the filters will "blind". The filters must them be laundered (if facilities exist), or replaced. Please contact your representative if you wish to pick up liquids.





#### Side Channel Blower & Turbo Blower



#### **Instruction Manual**

#### Instructions prior to installation and operation

- 1. Check if any part of the blower has been damaged during the transportation.
- 2. Do not dispose of solid or material from suction inlet directly, shall use filter before inlet, otherwise damage to blower may occur.
- 3. Do not dispose of acid, alkali or inflammable gas, otherwise explosion and damage may occur.
- 4. Do not dispose of liquid and air with high temperature.
- 5. Do not touch the blower to avoid burn damage; temperature may rise due to long time continuous operation.
- 6. High pressure blower (RT series) electric current is proportional to pressure and inverse proportional to air flow. Turbo blower series) electric current is proportional to air flow and inverse proportional to pressure.
- 7. Locking pressure of high pressure blower (RT series) shall higher than max. static pressure (motor full loading) do not operate over loading remarked on rating plate or rating label, to prevent motor damage, electric current over load relay, adjustable pressure relief or vacuum limitation valve shall be installed to protect motor.
- 8. When blowing air into water, the maximum transportation depth shall not excess 70% max. static pressure remarked on catalogue. (water column)

#### Installation

- 1. 3-phase blower shall be installed with ambient temperature  $-10 \sim +40^{\circ}$ C, single phase blower with ambient temperature  $-5 \sim +40^{\circ}$ C, relative humidity shall under 80%.
- 2. When installed outdoor, please check if any obstruction around blower suction inlet, and install shelter to avoid motor damage or electric shock due to getting wet.
- 3. If inlet does not connect any pipe, a filter with larger area shall be installed at suction inlet.
- 4. Over high pressure using shall be avoid in closed piping loop for high pressure blower (RT series), otherwise deformation and break may be occur to blower due to temperature raise, adjustable pressure relief or vacuum limitation valve shall be installed to protect motor.
- 5. Distance at least 50mm shall be maintained between blower motor fan and wall to avoid over heat due to poor motor heat dissipation.
- 6. Heat may be produced during operation due to friction between air, impeller and piping. Heat-resisted piping material shall be used over 1 m for outlet piping.
- 7. Section area of piping shall not smaller than 60% of blower inlet and outlet section area.
- 8. Centerline of piping and blower inlet and outlet shall remain the same, please do not connect forcibly.
- 9. Piping shall be fixed independently, the weight of piping shall not load on the rim of blower inlet nor outlet, to avoid damage occurred to rim.
- 10. Unusual sudden diameter shrinkage, enlarge or curve design of piping shall avoided to ensure best blower air efficiency.
- 11. When install blower in vertical or inclined position, please consider the total weight of impeller and rotor loading on bearing, please contact your blower supplier or manufacturer for further confirmation.
- 12. Blower with the same horse power could be installed in series or parallel connection, please contact your blower supplier or manufacturer for further confirmation before installation.
- 13. Installed with screw on leveling and hard foundation or base. Standard loading is generally about 3 times of blower weight, if installed on uneven base, vibration absorber shall be installed to avoid deformation or noise occurred due to fastening bolt of blower.

#### Wiring and operation

- 1. Make sure the voltage and frequency of power supply fits the requested electrical condition marked on blower rating plate or label, otherwise injury or motor damage may occur due to incorrect voltage.
- 2. Allowable voltage variance shall be within 5% of rated voltage, and frequency variance shall be within 2%.
- 3. Please wiring according to the wiring instruction inside the cover of terminal box, and *connect earth lines* to prevent electrical leakage accident.
- 4. Over-heat relay device is not available for normal blower, please install over-load switch according to the voltage marked on rating plate or rating label and choose the appropriate over-load switch.
- 5. Turn on switch for a short time (twinkling) and test run blower after wiring, make sure rotation in compliance with arrow direction. If wrong direction happened with three phase blower, please exchange any two lines of three wires. As for single phase blower, please contract your supplier or manufacturer.

- 6. Over load may happen when all-close piping system for high pressure blower or all-open piping system for turbo blower, please keep the current in allowable range marked on rating plate or label to avoid motor damage.
- 7. Avoid turn blower switch on and off to many times within a short time, otherwise overheat may occur to motor.
- 8. Inverter is not available for single phase blower. When using inverter in three-phase blower, please avoid operation with too high or too low frequency, otherwise damage may occur to blower.

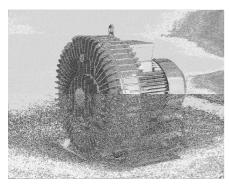
#### Maintenance and inspection

- 1. Filer or filter net used in piping system may blocked after a period of operation, and may block air flowing, please clean filter or filter net periodically.
- 2. Please clean the dust and oil on the blower housing to ensure best heat dissipation performance.
- 3. Bearing, seal and muffler cotton are consumptive parts with limited life, which would be different for different ambient and operation condition, please inspect and replace periodically.
- 4. Please inject lubrication oil periodically to ensure long bearing life for the models with oil injection nipple.
- 5. Conveying air with higher moisture may make blower shorter service life, and moisture air shall be avoided, if not avoidable, shall inspect blower parts periodically to prevent blower damage or injury occurred due to corrosion problem.

Trouble shooting

Trouble shooting		
Status	Causes	Solution
Motor dose not work, without any	1. Power lose phase	1. Check power condition
sound	2. Wiring disconnection	2. Check wiring connection and tighten again if loosen
	3. Electro-magnetic switch broken	3. Check electro-magnetic switch condition
	4. Motor coil burnout	4. Send for repair
Motor do not work, with current	1. Blower impeller stuck	1. Clean blower inside
Sound	2. Bearing can not rotate	2. Replace new bearing
	3. Screw loosen	3. Check all screw and tighten if loosen
Motor RPM not regular, with loud	1. Wrong wiring connection	1. Check wiring connection method
current sound	2. Wrong voltage	2. Use multi-meter to check power voltage
	3. Motor coil burnout	3. Send for repair
Motor RPM regular, blower with	1. Impeller deformed or corrosion	1. Replace new impeller
strange sound	2. Worn bearing	2. Replace new bearing
	3. Blower housing damaged	3. Send for repair
Blower with harsh loud sound	1. Blower crack from deformation or	1. Send for repair
	corrosion	2. Replace new muffler cotton
	2. Worn muffler cotton	3. Check piping or filter blocked or not
	3. Blower running pressure too high	or choose blower with bigger capacity
Blower work regularly, pressure or	1. Wrong motor rotation	1. Change motor rotation direction
air flow lower than standard.	2. Worn blower impeller	2. Replace new blower impeller
	3. Blocked piping or filter	3. Clean piping and filter
	4. Frequency too low	4. Set the right frequency
	5. Worn bearing	5. Replace new bearing
	6. Too many piping sudden change	6. Change piping design
	or curve design	

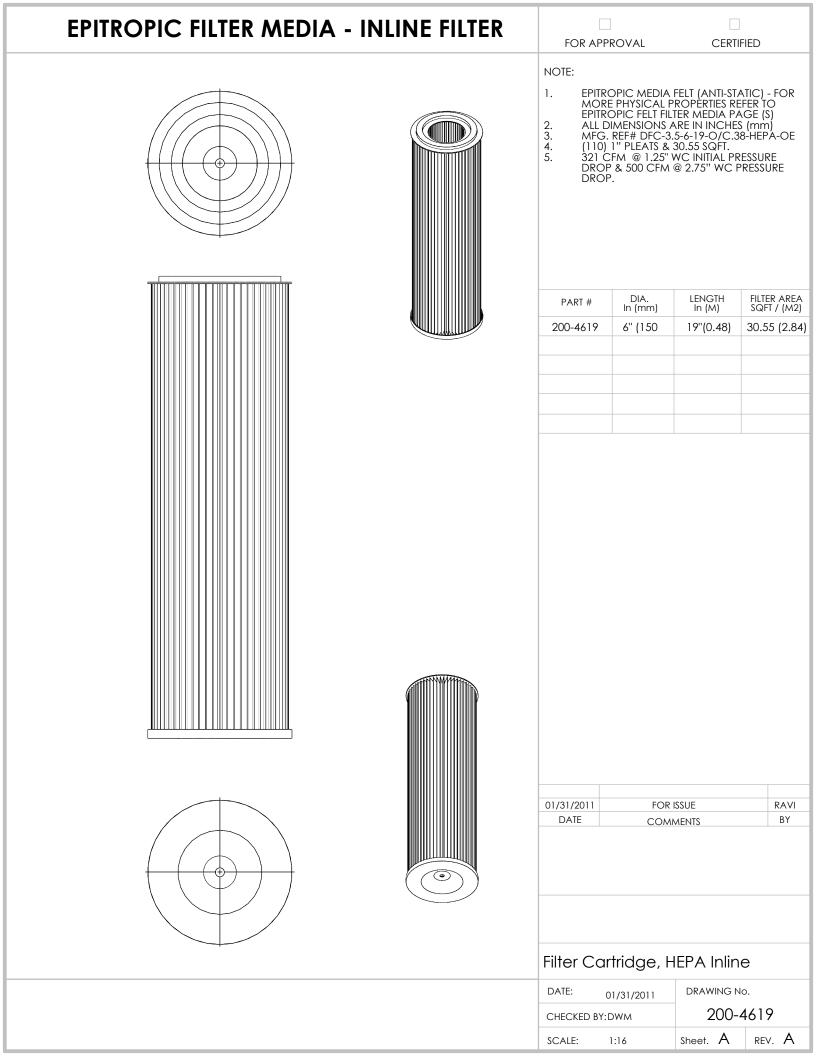
- Blower is technical product, please do not dismantle and repair it without consulting professional technician to avoid any danger.

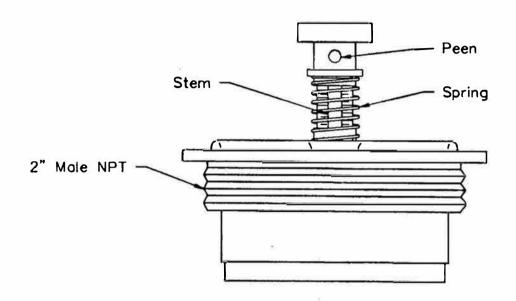




www.blowertw.com

~Fall into the Excellence~





#### **Specifications**

Height - 4-1/4" Width - 2-7/8" Weight - 1.5 Lbs. Thread Size - 2" MPT

#### **Features**

- Brass Construction
- Adjustable in the field
- ♦ 4" to 16" Hg. Range
- Up to 200 CFM

# Kanasaki — ENGINES — UN SOCIO FUERTE (/UN-SOCIO-FUERTE)

**MENU** 

HOME (/) / ENGINES (/ENGINES) / FS (/ENGINES/FS) / FS481V

#### **FS481V**

#### FS481V 14.5 hp

The FS481V engine is a Critical Power-Certified landscaping workhorse.

This forced air-cooled overhead V-valve 4-cycle engine delivers compact strength with quiet operation and low emissions.



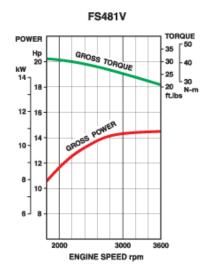
- Overhead V-valve
- Integrated clean out ports
- 90° V-twin
- · Pressurized lubrication system
- Electronic spark ignition
- Automatic compression release
- Internally vented carburetor
- Rotating grass chopper screen
- Dual element air filtration system with reinforced primary filter
- Cast-iron cylinder liners



(/four-cycle-engine-warranty)



Specifications	
Displacement	603 cc (36.8 cu. in.)
Number of Cylinders	2
Bore x Stroke	2.9 x 2.8 in. (73 x 72mm)
Compression Ratio	8.1:1
Oil capacity w/filter	1.8 U.S. qt ( 1.7 liters)
Maximum Power	14.5 hp (10.8 kW) at 3,600 RPM
Maximum Torque	30.9 ft lbs (42.0 N·m) at 1,800 RPM
Dry Weight (without muffler)	80.9 lbs (36.7 kg)



## TEST DATA PDF (HTTP://WWW.KAWASAKIENGINESUSA.COM/SITES/DEFAULT/FILES/TEST-DATA/KAWASAKI%2520FS481V%2520CERTIFIED%2520POWER%2520RATING.PDF)

# DOWNLOAD MANUAL (HTTP://WWW.KAWASAKIENGINESUSA.COM/SITES/DEFAULT/FILES/MANUALS/99920-225604 FS481V-541V-600V ENGLISH.PDF)

#### FS SERIES (/ENGINES/FS)

Kawasaki FS Series engines are designed to keep emissions down without compromising muscle. Take on tough landscaping jobs and trust that with an SAE-Certified FS Series engine powering your machine, you'll get the performance the task demands.

#### **MODELS**

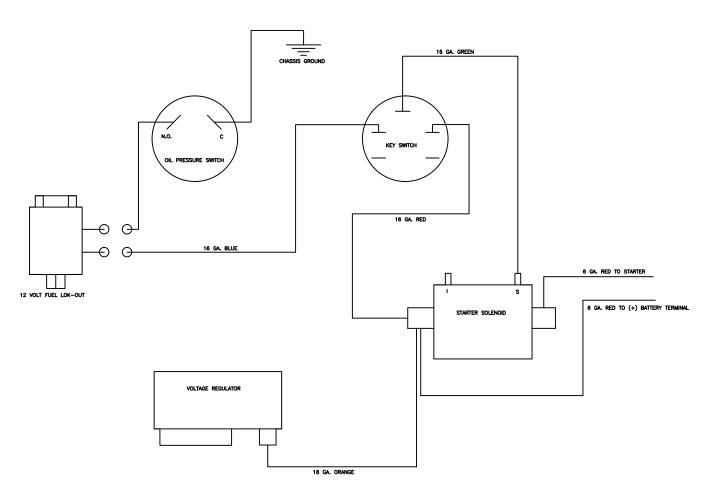
FS481V (/engines/fs/fs481v)FS541V (/engines/fs/fs541v)FS600V (/engines/fs/fs600v)

FS651V (/engines/fs/fs651v)FS691V (/engines/fs/fs691v)FS730V (/engines/fs/fs730v)

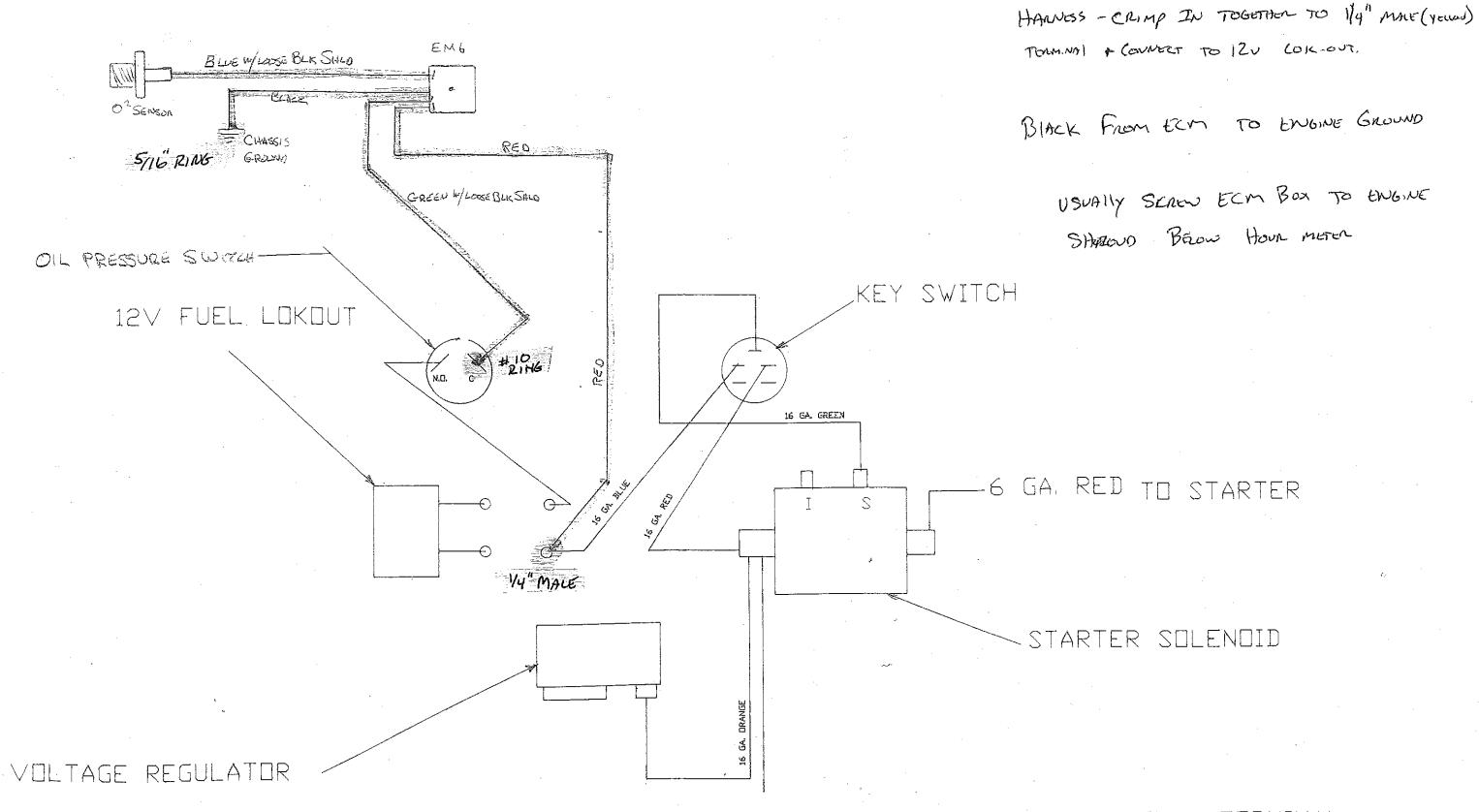
FS730V-EFI (/engines/fs/fs730v-efi)

Compare FS Series (/compare/series/18)

#### KAWASAKI WIRING DIAGRAM



Interior



EXISTING WIZES

NEW CONNECTORS

6 GA, RED TO POSITIVE BATTERY TERMINAL

RED WIRE FROM ECM + BIVE from



### MotoBatt MBTX12U

#### **General Information**

Model: MBTX12U
Voltage: 12
Amp Hour: 14.0
CCA: 200
Terminal(s): 4 QuadFlex

#### **Dimensions**

 Length (IN):
 5.94

 Width (IN):
 3.42

 Height (IN):
 5.12

Length (MM): 151.00 Width (MM): 87.00 Height (MM): 130.00

Spacer Height (IN): 0.59 Spacer Height (MM): 15.00

Total Height (IN): 5.71 Total Height (MM): 145.00

#### **OEM Yuasa Cross Reference**

YTX12-BS YTX14-BS YTX14H-BS YTX14L-BS

#### **Warranty Information**

Full 2-Year Replacement Warranty

#### Contents

- 1) One MotoBatt MBTX12U
- 2) MotoBatt Literature & Sticker
- 3) Height Spacer

#### **Comments**

MotoBatt uses the highest quality products and knows their battery will outperform the competition. How do they prove it? By offering a warranty that is double the power sport industry standard!



# FS481V FS541V FS600V

4-Stroke Air-Cooled V-Twin Gasoline Engine

OWNER'S MANUAL

Part No. 99920-2256-04



# FS481V FS541V FS600V

4-Stroke Air-Cooled V-Twin Gasoline Engine

OWNER'S MANUAL

Part No. 99920-2256-04

#### **SAFETY AWARENESS**

Whenever you see the symbols shown below, heed their instructions! Always follow safe operating and maintenance practices.

#### A DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

#### **A** WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

#### **A** CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

#### NOTICE

NOTICE is used to address practices not related to personal injury.

#### NOTE

 This note symbol indicates points of particular interest for more efficient and convenient operation.

READ THE OPERATING INSTRUCTIONS OF THE EQUIPMENT THIS ENGINE POWERS.

© 2010 Kawasaki Heavy Industries, Ltd.

(1): Dec. 2010. (M)

#### **READ THIS FIRST**

For your safety, read this Owner's Manual and understand it thoroughly before operating this ENGINE.

#### A DANGER

Exhaust gas contains carbon monoxide, a colorless, odorless poisonous gas. Inhaling carbon monoxide can cause serious brain injury or death. DO NOT run the engine in enclosed areas. Operate only in a well-ventilated area. Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. When refueling, servicing fuel system, draining gasoline and/or adjusting the carburetor: Stop engine and allow it to cool before refueling. DO NOT smoke.

Make sure the area is well-ventilated and free from any source of flame or sparks, including the pilot light of any appliance.

DO NOT fill the tank so the fuel level rises into the filler neck or level surface of level gauge.

If the tank is overfilled, heat may cause the fuel to expand and overflow through the vents in the tank cap. Wipe off any spilled gasoline immediately.

Engines can become extremely hot during normal operation. To prevent fire hazard:Keep the engine at least 1 m (3.3 ft) away from buildings, obstructions and other burnable objects. DO NOT place flammable objects close to the engine.

DO NOT expose combustible materials to the engine exhaust.

DO NOT use the engine on any forest covered, brush covered or grass covered unimproved land unless spark arrester is installed on the muffler.

To avoid getting an electric shock, DO NOT touch spark plugs, plug caps or spark plug leads during engine running.

To avoid a serious burn, DO NOT touch a hot engine or muffler. The engine becomes hot during operation. Before you service or remove parts, stop engine and allow the engine to cool.

DO NOT place hands or feet near moving or rotating parts. Place a protective cover over pulley, V belt or coupling.

DO NOT run engine at excessive speeds. This may result in injury.

Always remove the spark plug caps from spark plugs when servicing the engine to prevent accidental starting.

Read warning labels which are on the engine and understand them. If any label is missing, damaged, or worn get a replacement from your Kawasaki engine dealer and install it in the correct position.

#### EMISSION CONTROL INFORMATION

#### Fuel Information

THIS ENGINE IS CERTIFIED TO OPERATE ON UNLEADED REGULAR GRADE GASOLINE ONLY. A minimum of 87 octane of the antiknock index is recommended. The antiknock index is posted on service station pumps in the U.S.A.

#### **Emission Control Information**

To protect the environment in which we all live, Kawasaki has incorporated an exhaust emission control system in compliance with applicable regulations of the United States Environmental Protection Agency and the California Air Resources Board. Also, depending on when your engine was produced, it may have an assigned emissions durability period. \*See below for the engine emissions durability period that may apply to your engine.

#### **Exhaust Emission Control System**

The exhaust emission control system applied to this engine consists of a fuel system and an ignition system having optimum ignition timing characteristics. The fuel system has been calibrated to provide lean air/fuel mixture characteristics and optimum fuel economy with a suitable air cleaner and exhaust system.

A sealed-type crankcase emission control system is also used to eliminate blow-by gasses. The blow-by gasses are led to a breather chamber through the crankcase and from there to the air cleaner.

#### **Engine Emissions Compliance Period**

All Other States

California **Engines Greater Than or Equal To 225 cc** 

Engines Greater Than or Equal To 225 cc

Model Year - 2008 and later

Model Year - 2011 and later

Durability Period – 500 hours

Durability Period – 500 hours (Category B)

If your engine has an assigned emissions durability period it will be located on the certification label attached to the engine (IMPORTANT ENGINE INFORMATION).

#### **High Altitude Performance Adjustment Information**

To improve the EMISSIONS CONTROL PERFORMANCE of engines operated above 1,000 meters (3,300 feet), Kawasaki recommends the following Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) approved modifications.

However, the model with DFI (Digital Fuel Injection system) does not require high altitude performance adjustment.

#### NOTE

OWhen properly performed, these specified modifications only are not considered to be emissions system "tampering" and engine performance is generally unchanged as a result.

#### **Maintenance and Warranty**

Proper maintenance is necessary to ensure that your engine will continue to have low emission levels. This Owner's Manual contains those maintenance recommendations for your engine. Those items identified by the Periodic Maintenance Chart are necessary to ensure compliance with the applicable standards.

As the owner of the engine, you have the responsibility to make sure that the recommended maintenance is carried out according to the instructions in this Owner's Manual at your own expense.

The Kawasaki Limited Emission Control System Warranty requires that you return your engine to an authorized Kawasaki dealer for remedy under warranty. Please read the warranty carefully, and keep it valid by complying with the owner's obligations it contains.

#### **Tampering with Emission Control System Prohibited**

Federal law and California State law prohibit 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 purposes 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 parts:

- Carburetor or DFI system, and their internal parts
- Spark Plug
- Magneto or electronic ignition system
- Fuel filter element
- Air cleaner elements
- Crankcase
- Cylinder heads
- Breather chamber and internal parts
- Intake pipe and tube
- Muffler or any internal portion of the muffler

#### **FOREWORD**

This Owner's Manual provided to aid you in the safe and reliable operation of your Engine. READ AND UNDERSTAND IT THOROUGHLY BEFORE OPERATING YOUR ENGINE.

READ THE OPERATING INSTRUCTIONS OF THE EQUIPMENT THIS ENGINE POWERS.

To ensure a long, trouble-free life for your Engine, give it proper care and maintenance in accordance with this Owner's Manual.

Please note that the photographs and illustrations shown in this manual are made based on Model FS600V as a typical example among other similar models.

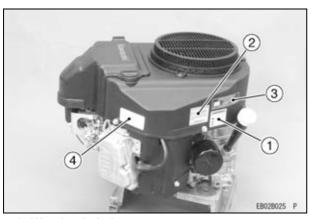
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#### GENERAL INFORMATION

#### **Label Location**



- 1. Warning Label
- 2. Important Engine Information Label
- 3. Engine Maintenance Label
- 4. Engine Serial Number Label

The engine serial number is your only means of identifying your particular engine from others of the same model type.

This engine serial number is needed by your dealer when ordering parts.







- 1.CHECK DIL LEVEL 2.CHECK & CLEAN AIR CLEANE
- 3. CLEAN SCREEN & FINS 4. CHANGE OIL & OIL FILTER

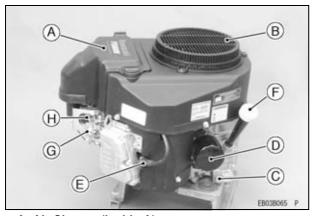
REFER TO OWNER'S MANUAL FOR FURTHER INFORMATION

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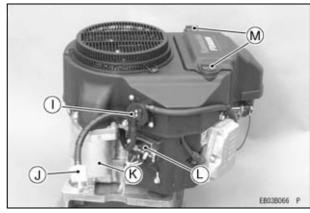
#### 10 GENERAL INFORMATION

#### **Parts Location**

#### [Electric Starter Model]



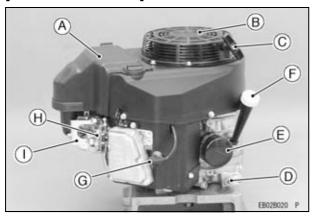
- A. Air Cleaner (inside A)
- **B. Air Inlet Guard**
- C. Oil Drain Plug
- D. Oil Filter
- E. Spark Plugs/Spark Plug Caps
- F. Oil Gauge/Filler Cap
- G. Control Panel
- H. Carburetor



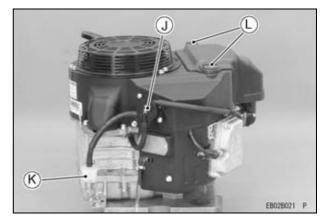
- I. Fuel Pump
- J. Fuel Filter
- K. Electric Starter
- L. Voltage Regulator
- M. Nuts

#### **GENERAL INFORMATION 11**

#### [Recoil Starter Model]



- A. Air Cleaner (inside A)
- B. Recoil Starter
- C. Recoil Starter Grip
- D. Oil Drain Plug
- E. Oil Filter
- F. Oil Gauge/Filler Cap
- G. Spark Plugs/Spark Plug Caps
- H. Control Panel
- I. Carburetor



- J. Fuel Pump
- K. Fuel Filter
- L. Nuts

#### 12 GENERAL INFORMATION

# **Tune-up Specifications**

ITEM	Specifications	
Ignition Timing	Unadjustable	
Spark Plugs: Gap	NGK BPR4ES 0.75 mm (0.030 in)	
Low Idle Speed	1 550 r/min (rpm)	
High Idle Speed	3 600 r/min (rpm)	
Valve Clearance	In 0.10 ~ 0.15 mm (0.004 ~ 0.006 in) Ex 0.10 ~ 0.15 mm (0.004 ~ 0.006 in)	
Other Specifications	No other adjustment needed	

#### NOTE

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

# **Engine Oil Capacity**

#### **Engine Oil Capacity**

FS481V FS541V	1.5 L (1.6 US·qt) [when oil filter is not removed]
FS600\/	1.7 L (1.8 US·qt) [when oil filter is removed]

# **FUEL AND OIL RECOMMENDATIONS**

#### Fuel

Use only clean, fresh, unleaded regular grade gasoline.

#### **NOTICE**

Do not mix oil with gasoline.

#### **Octane Rating**

The octane rating of a gasoline is a measure of its resistance to "knocking". Using a minimum of 87 octane by the antiknock index is recommended. The antiknock index is posted on service station pumps in the U.S.A.

Antiknock Index: (RON + MON)/2 RON = Research Octane Number MON = Motor Octane Number

#### NOTE

Olf "knocking or pinging" occurs, use a different brand of gasoline or higher octane rating.

#### **Oxygenated Fuel**

Oxygenates (either ethanol or MTBE) are added to the gasoline. If you use the oxygenated fuel be sure it is unleaded and meets the minimum octane rating requirement.

The following are the EPA approved percentages of fuel oxygenates.

ETHANOL: (Ethyl or Grain Alcohol)

You may use gasoline containing up to 10% ethanol by volume.

MTBE: (Methyl Tertiary Butyl Ether)

You may use gasoline containing up to 15% MTBE by volume.

METHANOL: (Methyl or Wood Alcohol) 5% by volume

You may use gasoline containing up to 5% methanol by volume, as long as it also contains cosolvents and corrosion inhibitors to protect the fuel system. Gasoline containing more than 5% methanol by volume may cause starting and/or performance problems. It may also damage metal, rubber, and plastic parts of your fuel system.

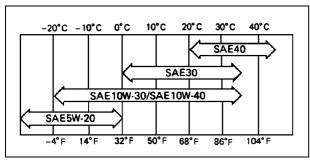
#### 14 FUEL AND OIL RECOMMENDATIONS

# **Engine Oil**

The following engine oils are recommended. API Service Classification: SJ or higher class.

#### Oil Viscosity

Choose the viscosity according to the temperature as follows:



#### NOTE

○ Using multi grade oils (5W-20, 10W-30, and 10W -40) will increase oil consumption. Check oil level more frequently when using them.

# **PREPARATION**

#### Fuel

# **A** WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Turn the ignition switch to "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. Never fill the tank completely to the top. If the tank is filled completely to the top, heat may cause the fuel to expand and overflow through the vents in the tank cap. After refueling, make sure the tank cap is closed securely. If gasoline is spilled on the fuel tank, wipe it off immediately.

# **Engine Oil**

Check the engine oil daily before starting the engine otherwise shortage of the engine oil may cause serious damage to the engine such as seizure.

- Place the engine on level surface. Clean area around the oil gauge before removing it.
- Remove the oil gauge (A) and wipe it with a clean cloth.
- Pour the oil slowly to "FULL" mark on the oil gauge.
- Insert the oil gauge into tube (B) WITHOUT SCREWING IT IN.
- Remove the oil gauge (A) to check the oil level.
   The level should be between "ADD" and "FULL" marks. Do not overfill.
- Install and tighten the oil gauge (A).

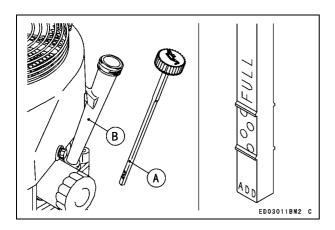
#### NOTICE

Do not fill above the "FULL" mark. Excess oil will cause a smoking condition, and may cause the engine to overheat.

#### **Engine Oil Capacity**

FS481V FS541V	1.5 L (1.6 US·qt) [when oil filter is not removed]
FS600V	1.7 L (1.8 US·qt) [when oil filter is removed]

# **16 PREPARATION**



# NOTICE

The engine is shipped without engine oil.

# **STARTING**

# Starting the Engine

# A DANGER

Exhaust gas contains carbon monoxide, a colorless, odorless poisonous gas. Inhaling carbon monoxide can cause serious brain injury or death. DO NOT run the engine in enclosed areas. Operate only in a well-ventilated area.

# **WARNING**

Engine exhaust may ignite combustible materials and cause a fire.

Keep the area around the exhaust outlet clear. Locate the unit so that the exhaust outlet points toward an open area and is located at least one meter (3.3 feet) from any obstructions.

#### NOTE

- OBe aware of the following in order to start the engine easily in cold weather.
- OUse proper oil for expected temperature (See "FUEL AND OIL RECOMMENDATIONS" chapter).

Use fresh gasoline.

Protect the engine or the equipment from direct exposure to weather when not in operation.

#### NOTE

- O Follow the operating instructions of the equipment this engine powers.
- Before starting the engine, disconnect all possible external loads.

Open the fuel valve (A) on the equipment. Move throttle lever on dash to half throttle position. Use full choke when the engine is cold, but in hot weather or when the engine is already warm, use half choke or leave the choke fully open.

#### [Electric Starter Model]

- Put the switch key into the engine switch.
- Turn the switch key to the START position on the equipment. Usually engine will start within 3 seconds.

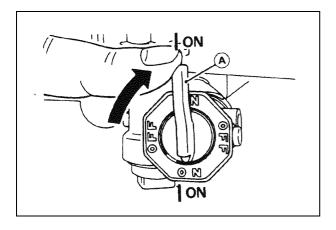
#### **NOTICE**

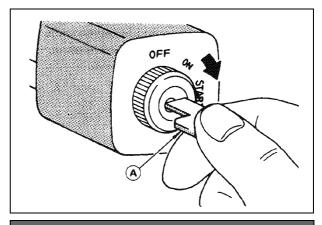
Do not run the electric starter continuously for more than 5 seconds, otherwise the battery may discharge quickly. If the engine does not start right away, wait 15 seconds and try again.

#### 18 STARTING

#### NOTE

- O When the engine is very warm, or when the engine does not start immediately, DO NOT keep trying to start it with the choke closed as this will cause flooding and make starting more difficult.
- O Instead, fully open the choke and start the engine.





# **NOTICE**

Whenever you start engine, make sure warning lamp is not illuminated after engine starts. If warning lamp comes on, stop engine immediately and check oil level (If equipped).

• After starting the engine, gradually return the choke lever to the fully open position.

#### [Recoil Starter Model]

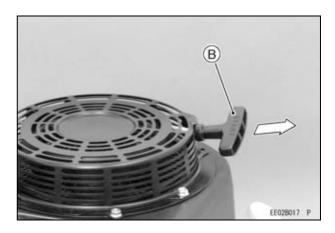
- Put the switch key into the engine switch.
- Turn the switch key to the ON position on the equipment.
- Pull the recoil starter grip [B] slowly until you feel compression, then pull it briskly.

# NOTICE

Do not let recoil cord snap back by itself. This may damage the cord or recoil starter assembly.

#### NOTE

O If the engine won't start in three pulls, open the choke and try again.



# **OPERATING**

# **Warming Up**

After the engine starts, move the throttle lever (A) on the equipment to halfway between "FAST" and "SLOW"

To warm up the engine, run it for 3 to 5 minutes with the throttle lever in the same load position (halfway) before putting the equipment under load. Then, move the throttle lever (A) on the equipment to its "FAST" position.

#### **NOTICE**

Allow engine to warm up sufficiently (3 to 5 minutes at idle) before applying a load. This will allow oil to reach all engine parts, and allow piston clearance to reach design specifications.

# **NOTICE**

While warming up the engine, make sure the warning lamp (oil pressure) on dash is not on. The warning lamp must not be illuminated during engine operation (if equipped).

# **Engine Inclination**

This engine will operate continuously at angles up to 25° in any direction.

Refer to the operating instructions of the equipment this engine powers. Because of equipment design or application, there may be more stringent restrictions regarding the angle of operation.

# NOTICE

Do not operate this engine continuously at angles exceeding 25° in any direction. Engine damage could result from insufficient lubrication.

# **STOPPING**

# **Stopping the Engine**

# **WARNING**

Leaving the equipment with the key hanging in the ignition can allow operation by someone who does not know how to operate it. It may cause serious accident with injury. Always remove the key from unattended equipment.

#### **Ordinary Stop**

- Move the throttle lever (A) to "slow" position.
- Lower the engine speed to the idle speed. Keep running at the idle speed for about one minute.

# **NOTICE**

Engine damage can occur from run-on or after-burning if engine is stopped suddenly from high speed loaded operation. Reduce engine speed to idle for one minute before shutting engine off.

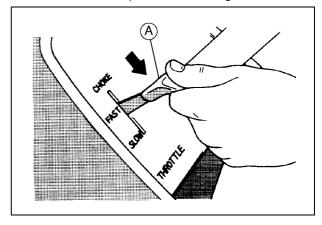
 Turn the engine switch or the switch key to "OFF" position. For Control Panel Switch Type, move the throttle lever against its low speed end to turn the ignition off.

#### **Emergency Stop**

 Immediately turn the engine switch or the switch key to "OFF" position.

Close the fuel valve on the equipment.

For Control Panel Switch Type, move the throttle lever on the equipment to its low speed end. Moving the lever to its low speed end turns ignition off.



# **ADJUSTMENT**

# **Throttle Cable Installation, Adjustment**

- Link the throttle cable (G) to the speed control lever (C) and loosely clamp the throttle cable outer housing (F) with the cable clamp bolt (A).
   Move the throttle lever to "FAST" position.
   Pull up the outer housing (F) of the throttle cable until the inner wire (G) has almost no slack, and tighten the cable clamp bolt (A).
  - Move the throttle lever to "SLOW" position. Make sure that the carburetor throttle valve (H) is moved smoothly.

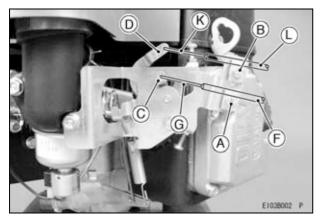
# **Choke Cable Installation, Adjustment**

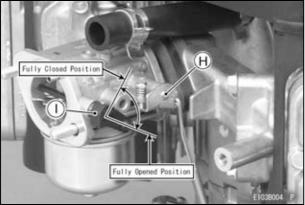
- Link the choke cable (K) to the choke control lever (D), and loosely clamp the choke cable outer housing (L) with the cable clamp bolt (B).
   Move the equipment choke control to "OPEN" po-
- Move the equipment choke control to "OPEN" position. Make sure that the carburetor choke valve (I) is fully opened.

Pull up the outer housing (L) of the choke cable until the inner wire (K) has almost no slack, and tighten the cable clamp bolt (B).

Move the equipment choke control to "CHOKE" position. Make sure that the carburetor choke valve (I) is completely closed.

Make sure that the choke valve turns from fully closed position to fully opened position when actuating the equipment choke control.





# **Engine Speed Adjustment**

#### **NOTE**

- O Do not tamper with the governor setting or the carburetor setting to increase the engine speed. Every carburetor is adjusted at the factory and a cap or stop plate is installed on each mixture screw.
- If any adjustment is necessary, it must be performed by your authorized Kawasaki Engine dealer.

Maintenance, replacement, or repair of the emission control devices and systems may be performed by any nonroad engine repair establishment or individual.

#### **Periodic Maintenance Chart**

# **A** WARNING

Prevent accidental starting during engine service by removing the spark plug caps.

#### NOTE

O The service intervals can be used as a guide. Service more frequently as necessary by operating conditions.

• : Service more frequently under dusty conditions.

K: Service to be performed by an authorized Kawasaki dealer.

	INTERVAL								
MAINTENANCE	Daily	First 8 hr.	Every 25 hr.	Every 50 hr.	Every 100 hr.	Every 200 hr.	Every 250 hr.	Every 300 hr.	Every 500 hr.
Check and add engine oil.	•								
Check for loose or lost nuts and screws.	•								
Check for fuel and oil leakage.	•								
Check battery electrolyte level.	•								
◆ Check or clean air inlet screen.	•								
◆ Clean air cleaner foam element.			•						

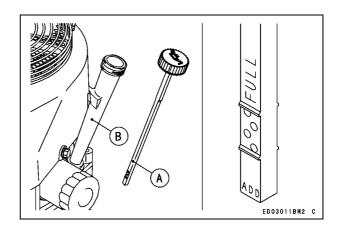
	INTERVAL								
MAINTENANCE	Daily	First 8 hr.	Every 25 hr.		Every 100 hr.	Every 200 hr.	Every 250 hr.	Every 300 hr.	Every 500 hr.
◆ Clean air cleaner paper element.					•				
♦ Clean dust and dirt from cylinder K and cylinder head fins.					•				
Tighten nuts and screws.					•				
Change engine oil.		•			•				
Clean and regap spark plugs.					•				
Change oil filter.						•			
Replace air cleaner paper element						•			
K Clean combustion chamber.								•	
K Check and adjust valve clearance.								•	
K Clean and lap valve seating surface.								•	

# Oil Level Check

Check oil level daily and before each time of operation. Be sure oil level is maintained. See "PREPARATION" chapter.

**Engine Oil Capacity** 

FS481V FS541V	1.5 L (1.6 US·qt) [when oil filter is not removed]
FS600\/	1.7 L (1.8 US·qt) [when oil filter is removed]



## Oil Change

Change oil after <u>first 8 hours of operation.</u>Thereafter change oil <u>every 100 hours.</u>

Run the engine to warm oil.
 Be sure the engine (equipment) is level.
 Stop the engine.

Remove the oil drain plugs (A) and drain the oil into suitable container while engine is warm.

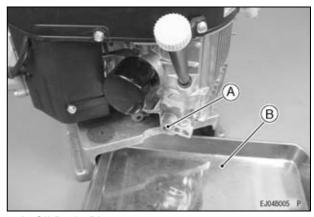
# **A** WARNING

Hot engine oil can cause severe burns. Allow engine temperature to drop from hot to warm level before draining and handling oil.

• Install the oil drain plugs.

Remove oil gauge and refill with fresh oil (See "FUEL AND OIL RECOMMENDATIONS" chapter).

Check the oil level (See "PREPARATION" chapter for oil level check).



A. Oil Drain Plug
B. Suitable Container

# **A** WARNING

Engine oil is a toxic substance. Dispose of used oil properly. Contact your local authorities for approved disposal methods or possible recycling.

# Oil Filter Change

• Change the oil filter every 200 hours of operation.



Hot engine oil can cause severe burns. Allow engine temperature to drop from hot to warm level before attempting to remove oil filter.

• Drain engine oil into a suitable container (C).

#### **NOTICE**

Before removing the oil filter, place suitable pan under filter connection.

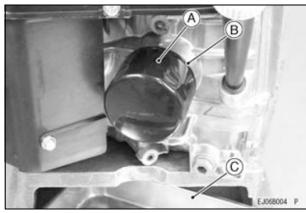
 Rotate the oil filter (A) counterclockwise to remove it.

Coat a film of clean engine oil on seal of new filter. Install new filter rotating it clockwise until seal contacts mounting surface (B). Then rotate filter 3/4 turn more by hand.

Supply engine oil as specified.

Run the engine for about 3 minutes, stop engine, and check oil leakage around the filter.

Add oil to compensate for oil level drop due to oil filter capacity (See "PREPARATION" chapter for oil level check).



- A. Oil Filter
- **B. Mounting Surface**
- C. Suitable Container

# **A WARNING**

Engine oil is a toxic substance. Dispose of used oil properly. Contact your local authorities for approved disposal methods or possible recycling.

#### **Air Cleaner Service**

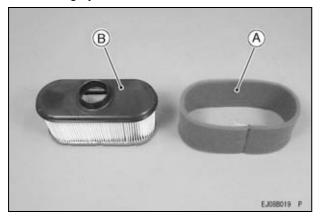
# **NOTICE**

To prevent excessive engine wear, do not run the engine with the air cleaner removed.

#### Foam Element

Clean the foam element (A) every 25 hours.

 Wash the element in detergent and water, and dry it thoroughly.



#### **Paper Element**

Clean the paper element (B) every 100 hours.

Clean the paper element by tapping gently to remove dust. If very dirty, replace the paper element with a new one.

Replace with a new paper element yearly or 200 hours. Whichever comes first.

#### NOTE

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

#### **NOTICE**

Do not wash paper element.

Do not oil foam or paper element.

Do not use pressurized air to clean paper element.

# **Spark Plug Service**

# **A** WARNING

Engines can become extremely hot during normal operation. Hot engine components can cause severe burns. Stop the engine and allow it to cool before checking spark plugs.

Clean or replace the spark plugs and reset spark plug gap (A) every 100 hours of operation.

 Disconnect the spark plug caps from the spark plugs and remove the spark plugs.

Clean the electrodes (B) by scraping with a wire brush to remove carbon deposits.

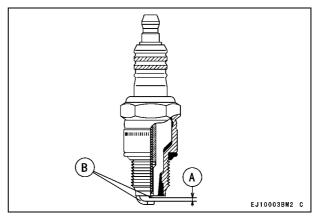
Inspect for cracked porcelain or other wear and damage. Replace the spark plug with a new one if necessary.

Check the spark plug gap and reset if necessary. The gap must be 0.75 mm (0.030 in). To change the gap, bend only the side–electrode, using a spark plug tool.

Install and tighten the spark plugs to <u>22 N·m (2.2 kgf·m, 16 ft·lb)</u>. Connect the spark plug caps.

#### **RECOMMENDED SPARK PLUG**

NGK .....BPR4ES



A. Spark Plug Gap B. Electrodes

# **Fuel Filter and Fuel Pump Service**

# **A** WARNING

Many solvents are highly flammable and may cause serious burns. Improper use of solvents can result in fire or an explosion. Do not use gasoline or low flash-point solvents to clean the fuel filter and/or the fuel pump. Clean only in a well-ventilated area away from sources of sparks or flame, including any appliances with a pilot light.

 The fuel filter can not be disassembled. If the fuel filter gets clogged, replace it with a new one.
 The fuel pump can not be disassembled. If the fuel pump fails, replace it with a new one.

# **Cooling System Cleaning**

<u>Before each use</u>, check that the air inlet (rotary) screen (G) is free from grass and debris and clean if necessary. When checking or cleaning the air inlet screen, loosen the screws (F) and remove air inlet guard (A). <u>Every 100 hours of operation</u>, check and clean the cooling fins and inside of engine shrouds to remove grass, chaff or dirt clogging the cooling system and causing overheating. When cleaning, remove the air cleaner (inside E), loosen the bolts (C), (D), and then, remove the fan housing (B).

#### **NOTICE**

Do not run engine before all cooling system parts are reinstalled to keep cooling and carburetion as intended.

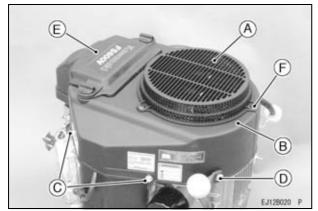
#### [Recoil Starter Model]

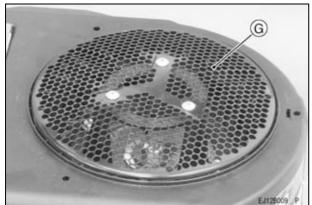
When checking or cleaning the air inlet screen, loosen the bolts (J) and remove the recoil starter (H). When checking or cleaning the cooling fins and inside engine shrouds, remove the air cleaner (inside I) and the recoil starter (H), loosen bolts (C) (D) and nuts (K), and then, remove the fan housing (B).

[Bolts Size, Tightening Torque]

Bolts	Size	Length	Tightening Torque
С	M6	16 mm	8.8 N·m (0.9 kgf·m, 78 in·lb)
D	M6	22 mm	8.8 N·m (0.9 kgf·m, 78 in·lb)

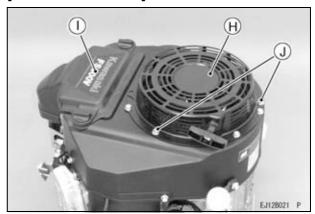
#### [Electric Starter Model]

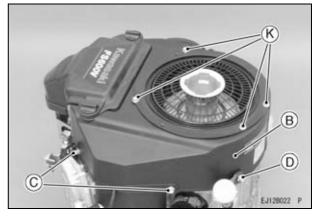




Without Inlet Guard

#### [Recoil Starter Model]





# **STORAGE**

# **Fuel System Draining**

Engines to be stored over 30 days should be completely drained of fuel to prevent gum deposits forming on essential carburetor parts, fuel filter and fuel tank.

# **A** WARNING

Gasoline is extremely flammable and can be explosive under certain conditions.

Drain fuel before storing the equipment for extended periods.

Drain fuel in a well-ventilated area away from any source of flame or sparks, including any appliances with a pilot lamp. Store fuel in an approved container in safe location.

- Clean every part of the engine.
  - Be sure that the engine switch or switch key is positioned at "OFF".
  - Close the fuel valve and remove the sediment bowl.

Put a pan under the fuel valve to receive the drained fuel, and open the fuel valve to drain the fuel from fuel tank completely.

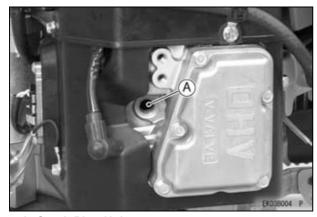
- Install the sediment bowl and open the fuel valve.
- To remove the fuel from the carburetor, run the engine to use up the fuel in the carburetor.
- Remove the spark plugs and pour approx. 1 ~ 2 mL (0.06 ~ 0.1 cu. in.) of engine oil through the spark plug holes (A) and then screw the spark plugs in after turning the engine a few times. Slowly turn the engine until you feel compression and then leave it there. This blocks the air inside the cylinder and prevents rust inside the engine. Wipe the body with oily cloth.

Wrap the engine with plastic sheeting and store it in a dry place.

Change engine oil for next use after period of storage (refer to "Oil Change" section in "MAINTE-NANCE" chapter).

# **A WARNING**

Gasoline is a toxic substance. Dispose of gasoline properly. Contact your local authorities for approved disposal methods.



A. Spark Plug Hole

# TROUBLESHOOTING GUIDE

If the engine malfunctions, carefully examine the symptoms and the operating conditions, and use the table below as a guide to troubleshooting.

Sym	otom	Probably Cause	Remedy
Engine won't Insufficient start or output is compression Faulty pistons, cylinders, pistor and head gaskets		Faulty pistons, cylinders, piston rings, and head gaskets	К
low		Faulty valves	
		Loose spark plugs	Tighten properly
		Loose cylinder head bolts	
	No fuel to	No fuel in fuel tank	Fill fuel tank
	combustion chamber	Fuel valve not in "ON" position	Open fuel valve lever.
	Spark plugs fouled by fuel	Blocked fuel filter or tube	Change fuel filter or fuel tube
		Blocked air vent in tank cap	Clean fuel tank cap
		Faulty carburetor	K
			Over rich fuel/air mixture
		Clogged air cleaner	Clean
		Faulty carburetor	K
		Incorrect grade/type of fuel	Change fuel
		Water in fuel	

#### **TROUBLESHOOTING GUIDE 37**

Symptom		Probably Cause	Remedy	
	No spark or	Faulty spark plugs	Replace spark plugs	
	weak spark	Faulty ignition coil	K	
		Engine switch left in "OFF" position	Turn engine switch to "START" position (See <b>M</b> )	
Low output	Engine	Clogged air cleaner	Clean	
overheats		Air inlet screen or cooling air path clogged with dirt		
		Insufficient engine oil	Replenish or change oil	
		Carbon build-up in combustion chamber	К	
		Poor ventilation around engine	Select a better location	
	Engine speed won't increase	Faulty governor	К	

K: Service to be performed by an authorized Kawasaki dealer.M: For Control Panel Switch Type, move the throttle lever on the equipment away from its low speed end to turn the engine switch to "START" position.

# **ENVIRONMENTAL PROTECTION**

To protect our environment, properly discard used batteries, engine oil, gasoline, coolant, or other components that you might dispose of in the future.

Consult your authorized Kawasaki engine dealer or local environmental waste agency for their proper disposal procedure.

# **SPECIFICATIONS**

	FS481V, FS541V, FS600V		
Туре	Air-cooled, 4-stroke vertical shaft OHV, gasoline engine		
Bore × Stroke	73 × 72 mm (2.88 × 2.84 in.)		
Displacement	603 mL (36.8 cu.in)		
Ignition Type Fly wheel magneto fixed timing type			
Direction of Rotation	Counterclockwise facing the PTO Shaft		
Starting System	Electric starter/Recoil Starter		
Dry Weight: kg (lbs) 36.7 (80.9)			

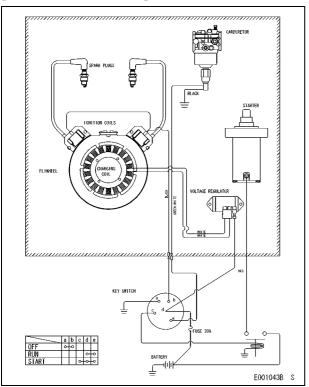
#### **NOTE**

- Specifications are subject to change without notice.
- ODry weight excludes that of fuel tank and muffler.

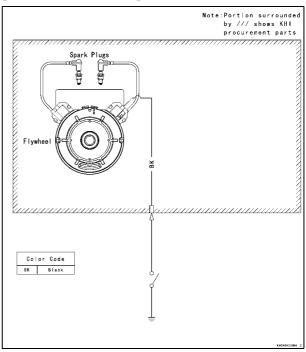
# **WIRING DIAGRAM**

# **Wiring Diagram**

#### [Electric Starter Model]



#### [Recoil Starter Model]



#### NOTE

 Portion Surrounded by hatching Shows Kawasaki Procurement Parts.

# **A** WARNING

Prevent sparks and/or electrical system damage by removing the negative (-) cable from the battery before attempting any repair or maintenance.

#### **Battery Capacity Recommended**

**Battery Capacity** 

12 V 550 CCA Class

# **▲** WARNING: **▲**

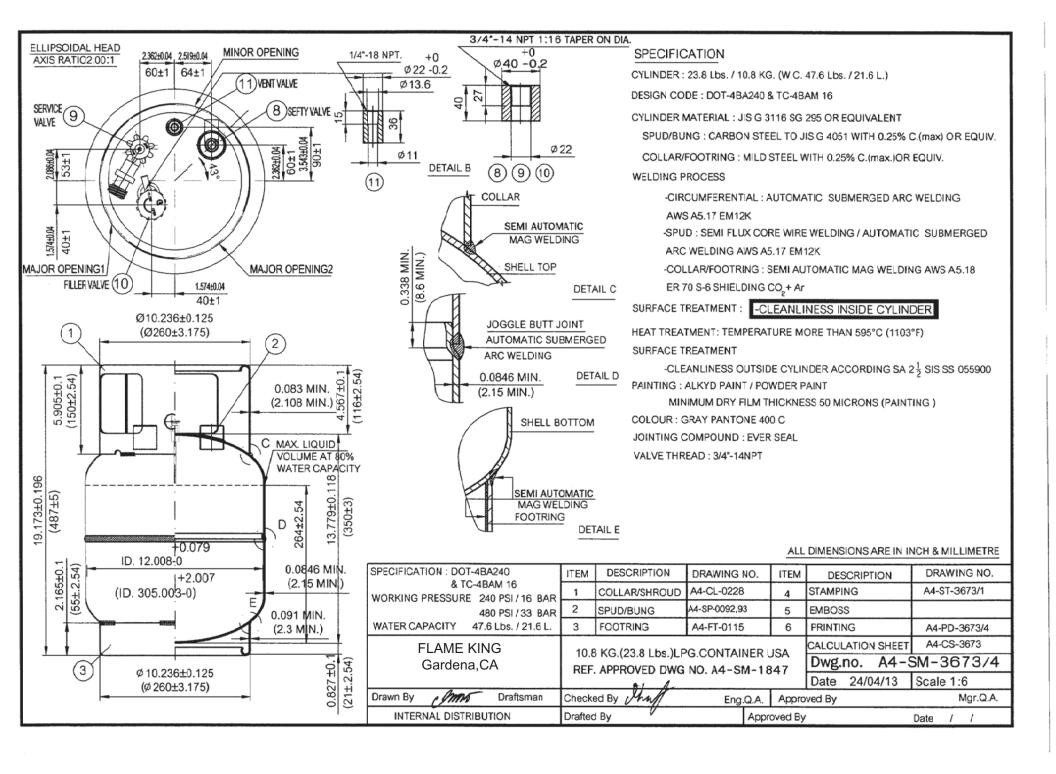
The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

For repair/warranty assistance please contact your local Kawasaki Authorized Dealer, email kawpower-website@kmc-usa.com or call toll-free 1-877-364-6404

Engine oil is a toxic substance. Dispose of used oil properly. Contact your local authorities for approved disposal methods or possible recycling.

Gasoline is a toxic substance.
Dispose of gasoline properly.
Contact your local authorities for approved disposal methods.







Toll Free: 888-330-3365 Local: 905-624-4003 Fax: 905-624-4641

# DuroVac Parts List (EBS1250 & 1250P)

	Replacement Parts	NW Part #	Recommended
1.	Filter Bags, 4" x 23.5"	200-9423	1 set/20
2.	Inline Filter Element, HEPA	200-4619	1
3.	Discharge Flap	303-365	
4.	Foam weather stripping, 1/8thkx7"dia (PSA)	450-270	
5.	Torsion Spring, Discharge Flap	460-367	
6.	Gaskets for Filter Housing Service door, Inline Filter Service door	450-1215	Ask for length
7.	Caster, Swivel with Brakes, 5"	480-256	2
8.	Caster, Rigid Wheel, 8"	480-343	2
9.	Rubber Boot	430-120	1
10.	V-belts (BX-33)	213-033	(2) for Propane Only

# **Maintenance Instructions**

This Section Contains Information about the Upkeep and Maintenance of your SASE Industrial Vacuum System

This section contains information of the following topics:

1.	The Filtration System	Page 2
2.	Elongated Bag Maintenance	Page 2
3.	Removing Elongated Bags	Page 3
4.	Installing New Elongated Bags	Page 3
5.	Bag Specification and Re-Order Info	Page 3
6.	The Inline Filter (HEPA)	Page 4
7.	The Vacuum Producer	Page 5
8.	Drive – Bull 1250 EBS Propane	Page 6
9.	The Belt Drive	Page 8
10.	The Special hopper with discharge flap	Page 8
11.	Vacuum Seal Troubleshooting	Page 9

This equipment is designed for full time operation under the most severe conditions; however, proper maintenance procedures must be observed.

Please read and follow the instructions on the following pages to ensure proper operation of each of the components of your system.

# **The Filtration System**

The *SASE* is designed to handle super fine powders, so the filtration sub-system is its "heart" and must be maintained properly. The unit is equipped with inverted bag type tubular filters that collect the fine dust particles on the filter's **inside surfaces** during operation.

Before commissioning, open access door and check to ensure all bags are firmly secured to the lower bag plate. The top of the bags are attached to the shaker ring and must not be loose or out of place.

NOTE: A loose or unsecured bag will allow product to pass through the filter separator and will plug the in-line filter.

The elongated bags should be shaken at least daily, preferably after each use. To shake elongated bags, simply grasp the external lever handle and apply a series of several rapid "PUSH/PULL" strokes. This rapid movement will dislodge particles on the inside of the elongated bag surfaces and drop them into the dust can.

#### The unit must be OFF in order to shake the filters.

If the filters are to be replaced, please replace them ALL at once, or they will be a constant source of frustration.

#### **Elongated Bag Maintenance**

The following is a recommended program of preventative maintenance:

- 1. Check that the filters are seated properly and that they do not appear to be leaking WEEKLY. There should be NO appreciable or visible dust inside the service access door.
- **2.** Replace ALL the filters if wear points or holes are noticed.
- **3.** If the secondary filter cartridge becomes plugged rapidly, check for holes in the primary filter bags, or upgrade the primary filter material to a more efficient type.

#### **Removing Elongated Bags**

To change the filter bags, remove the bag from the shaker assembly inside the tank at the top.

Squeeze the spring cuff at the bottom of the bag compressing the snap ring into a "U" shape, and remove from the bag plate hole.

# **Installing New Elongated Bags**

The most common installation mistake is to release the cuff lower than it should be. The groove in the bag cuff matches the hole size exactly.

Attach the top of the bag at the top to the shaker assembly inside the filter housing.

Grasp the spring cuff at the bottom of the bag and compress into a "U" shape. Insert into the proper hole in the bag plate, and release the bag bottom, assuring the "groove" in the bag cuff is centered in the bag plate hole.

After installing all the filters, check the installation from below; all the filters should be neatly and evenly seated.

NOTE: Failure to assure proper seating of the bag in the bag plate will allow material leakage.

#### **Elongated Bag Specification**

The Elongated bags supplied with this system are:

Material:	Epitropic Fiber
Quantity:	20
Length:	23.5"
Bag Plate Hole Size	4"

Elongated Bag Re-order Instructions When re-ordering replacement filters, use part # 200-9423 (refer to parts list enclosed)

# The Inline Filter (HEPA)

The HEPA inline filter is a mandatory requirement as per OSHA regulations for vacuum systems using silica dust. Hence it is provided with this vacuum system to help prevent silica fines in the blower exhaust and prevent damage to the exhauster in case of failure of a primary filter bags.

It is advised to inspect the inline filter cartridge every week. If dust deposits on the cartridge, inspect the bags for damage, or to see if they have become loose. Properly clean the bags if no damage is seen.

Remove the inline filter, and clean by back flushing with compressed air (NOT recommended), or replace the filter.

WARNING: Do not under any circumstances run this system without the inline filter installed. Catastrophic failure of the vacuum pump can easily occur!

# **The Other Mechanical Sub-Systems**

The *Bull 1250 EBS Propane* features a positive displacement vacuum producer which is designed to run continuously. In case of propane unit the belts must be periodically tightened.

The following sub-sections describe typical maintenance requirements and the problems which can occur.

#### The Vacuum Producer

The vacuum producer supplied with your equipment is a high quality regenerative vacuum producer that provides high pressure, low flow quite suitable for the very application.

There regenerative blowers operate quietly and efficiently with high torque and low noise rotation. A centrifugal blower is very noisy with the inlet and outlet being perpendicular (with the inlet feeding air into the center of the impeller and the outlet tangential to the rotation of the impeller and hence delivers high flow at low pressure). In a regenerative blower the inlet and outlet are parallel with both positioned perpendicular to the rotation of the impeller.

In regenerative blowers, as the impellor pushes the air around the ring, centrifugal forces cause the air trapped between the rotating impeller vanes to move towards the blower casing. The air flow is then forced to the base of a following impeller vane for recirculation in the same manner. This circular flow in combination with the revolution of the impeller causes air to follow a spiral path through a regenerative blower (see picture); the result is air that is under constant acceleration. This "regeneration" of air with each revolution allow regenerative blowers to develop significant pressure.



#### **Drive**

# EBS 1250 - Electric

For 1250 EBS the electric motor is assembled on the top of the regenerative blower with direct driving the impeller @ 3600 RPM.

There is a maintenance and troubleshooting guide for this vacuum producer is included in section 2

Please follow the manufacturer's instructions for wiring and motor maintenance.





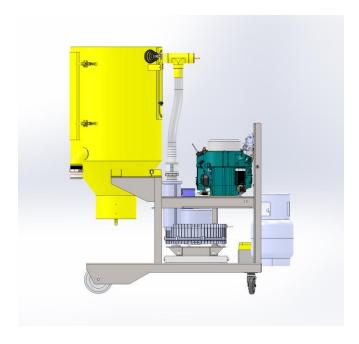
RT-7063 for 50/60Hz 3Phase - 460 / 240 / 415 / 380V system

# 1250 EBS - Propane

For Bull 1250 EBS Propane unit a 18Hp propane run engine belt drives the RT-801 motorless bare shaft blower with belts and sheaves to obtain the exact performance achieved by electric motor unit. The blower is run @ 3600 RPM and is tuned to provide excellent lifetime performance.



RT-801 (Motorless)



RT-801 (Motorless) with FS-481V Engine

#### **Belt Drive**

The heavy-duty belt drive on this equipment is designed to provide years of service. Proper maintenance will ensure trouble free operation.

If the system is "lurching", or does not have an even running sound, then the problem is almost certainly a loose belt drive. Belts can be tightened using the motor slide base.

One or two days after equipment start-up, inspect the belt tension and retension as required (new belts stretch during normal operation). **DO NOT OVERTIGHTEN**. The belts should be tight enough not to slip during start-up and operation.

Recheck the belt tension on a regular basis (at least once monthly) for tension and signs of damage that could indicate that the belts have been slipping (ie. cracking, overheating etc.).

On multiple belt drives, replace all belts at one time.

NOTE: Always follow prescribed safety precautions when servicing the belt drive assembly.

# The Special Hopper with discharge flap & torsion spring

EBS 1250 Filter housing comes with a specially designed discharge hopper with a perforated baffle located efficiently slow down the dust and collect above the discharge chute. The discharge chute is equipped with a discharge flap and torsional spring to retain the flap in position and partially crack open when the unit is not in operation.

Two tabs are riveted to the discharge chute to enable the operator to install the elongated vacuum bag dispenser for continuous bagging system.

When the unit is turned on the suction with continuous bagging system installed in place the discharge flap closed due to vacuum inside the hopper thus sealing the system.

Discharge flap has a urethane gasket secured on to its face with pressure sensitive adhesive and provides the sealing against the hopper discharge. A torsional spring is provided to adjust the opening of the flap when the unit is not in use and to discharge the material.

NOTE: Dispose of waste material in accordance with local environmental codes.

#### Vacuum Seals

If you experience a "lack of suction", almost certainly there is a leak in a seal somewhere in the system. The following is a short list of common fail points:

- 1. Check the door seals. If air is leaking in through these seals, dust will normally collect on the inside surface of the door showing the exact location of the leak. Sometimes, running your hands around the door frame will allow you to locate the leak. Either way, replace the seals as required.
- **2.** DO NOT over-tighten the door latches! Almost certainly that we cause more problems than it fixes.
- **3.** Check the discharge flap and the continuous bagging system ensure the flap seals when the vacuum system is turned on, if not adjust the torsion spring to achieve the same. If problem persists replace the flap with the gasket / or torsion spring or both.
- **4.** If the unit is connected to a central vacuum piping system, check the integrity of the seals there. Of particular importance, please check the seals at each inlet valve as these valves often get knocked and no longer seat well.
- **5.** Check the hoses for leaks. A hose covered in gray duct tape is a sure indicator that the hoses should be replaced.

# EPITROPIC FELT FILTER MEDIA

**GROUNDED PTFE** 

# **EPITROPIC FELT (ANTI-STATIC)**

PHYSICAL PROPERTIES

Recommended continuous operation temperature:

275°F

Maximum (short time) operation temperature:

n 300℉

Yes

Biological resistance (bacteria, mildew):

Supports combustion:

No Effect

Resistance to alkalies:

Fair

Resistance to mineral acids:

Fair+

Resistance to organic acids:

Fair

Resistance to oxidizing agents:

Good

Resistance to organic solvents:

Good

Weight:

16 oz.



# **EPITROPIC FELT (ANTI-STATIC) ePTFE**

CONDUCTIVITY TESTING DIN 54 345 Part 5

An independent testing laboratory in Germany tested samples of Epitropic Felt ePTFE. The test results are shown below in Figure 8.

Specimen Electrical Resistance (Ω)	Electrical Resistance (Ω)		Electrode Spacing
	Machine Direction	Cross-Machine Direction	(mm)
Epitropic Felt and ePTFE Membrane	1.2 x 10 <sup>7</sup>	1.2 x 10 <sup>6</sup>	30

Figure 8: DIN test results (DIN 54345 Part 5)

The results for the ePTFE membrane sample indicate that although ePTFE is an insulator, it does not significantly affect the ability of the filter to pass the test. This is likely the result of the fact that the membrane is thin and has a good bond to the conductive fibers within the backing material.

The DIN testing results show an expected, but interesting, phenomenon. The electrical resistance changes depending on the original orientation of the test sample. The reason is that during the felting process, the fibers are preferentially oriented in one direction. This is not an indication of a problem in felting. It is characteristic of felted materials.

# **EPITROPIC FELT FILTER MEDIA**GROUNDED PTFE

#### **EFFICIENCY TESTING**

Efficiencies were measured using a TSI, Inc., AFT 8160 Automated Filter Tester. As shown in Figure 9, initial efficiency of non-membrane materials is significantly lower than the sample with ePTFE membrane. Conventional filters do not reach maximum filtration efficiency until both the primary cake (within the felt) and the secondary cake (on the surface) have developed.

Efficiency must be considered in two ways: 1) initial efficiency, and 2) long-term efficiency. In filtration applications, efficiency changes over time due to seasoning effects and filter durability.

Particle Size (µm)	Conventional Polyester Felt	Epitropic Felt	Epitropic Felt and ePTFE
0.03	18.87	19.53	97.92
0.04	23.92	22.86	96.98
0.05	32.32	29.84	96.02
0.07	40.30	39.02	94.74
0.10	50.88	48.21	94.55
0.15	58.81	57.02	95.29
0.20	66.65	64.18	96.43
0.30	73.60	71.53	98.12

**Figure 9:** Filtration efficiency measured in % (count basis, face velocity = 5.0 cm/sec): Comparison of antistatic polyester felts.

