



**IMPORTANT MACHINE INFORMATION**

DATE OF PURCHASE: \_\_\_\_\_

PURCHASED FROM: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

PHONE: \_\_\_\_\_ CONTACT: \_\_\_\_\_

MACHINE MODEL #: \_\_\_\_\_ SERIAL #: \_\_\_\_\_

ENGINE MODEL #: \_\_\_\_\_ SERIAL #: \_\_\_\_\_

**OWNERS INFORMATION**

NAME: \_\_\_\_\_ BUSINESS NAME: \_\_\_\_\_

PHONE #: \_\_\_\_\_ EMAIL ADDRESS: \_\_\_\_\_

## INTRODUCTION



### **Operators Manual Mirage 27" Propane Burnisher**

This book has important information for the use and safe operation of propane powered floor burnishers. Failure to read this book prior to operating or attempting any service or maintenance procedure to your Minuteman machine could result in injury to you or to other personnel. Damage to the machine or to other property could occur as well. You must have training in the operation of this machine before using it. If your operator(s) cannot read English please have this manual explained fully before attempting to operate this machine.

Este libro contiene información importante para el uso correcto y seguro de gas propano máquinas abrillantadoras. El no leer este manual antes de utilizar o de realizar cualquier servicio o procedimiento de mantenimiento a su máquina Minuteman podría causar lesiones a usted o a otros miembros del personal, daños a la máquina u otros bienes pueden ocurrir también. Usted debe tener entrenamiento en la operación de esta máquina antes de usarla. Si su operador (s) no puede leer inglés, por favor explíquelo el manual completo antes de intentar operar esta máquina.

This Operator Manual has been prepared for the promotion of educational purposes only and Minuteman does not claim nor assume any responsibility for the operator's actions or safety. To be completely aware of what local authorities may require, contact the Fire Marshal in your community.

All directions given in this book are as seen from the operator's position at the rear of the machine.

For updated or replacement manuals:  
Visit the "Parts and Services" link at [www.minutemanintl.com](http://www.minutemanintl.com)

**DANGER:** It is the owner/operator's responsibility to ensure that the air exchange system installed in any location where a propane floor care machine is being operated is of sufficient capacity and quality to support the use of such a machine. OSHA and other County, State, and Federal Agencies publish guidelines on this subject that are usually most readily found in the possession of the respective owners and/or parent companies of any location or chain of locations. Failure on the part of the owner/operator to ensure that a propane floor care machine can be operated safely in a given location may lead to injury, sickness or even loss of life.

### MACHINE SPECIFICATIONS

<b>MODEL</b>	<b>27" Mirage Propane Burnisher</b>
<b>PART NUMBER</b>	M220028K17X
<b>PAD SIZE</b>	27" (68cm)
<b>ENGINE</b>	18hp EnviroGard Kawasaki 603cc V-Twin Propane Engine
<b>CATALYTIC MUFFLER</b>	Standard
<b>EMISSION SHUTDOWN</b>	Optional
<b>CLUTCH</b>	Optional
<b>PAD SPEED</b>	1800rpm
<b>PROPANE CYLINDER</b>	20lb. (9.1kg) Capacity, 80% Safety Fill Vertical Vapor Cylinder
<b>SAFETY FUEL LOCKOFF</b>	Standard
<b>LOW OIL SHUTDOWN</b>	Standard
<b>HOUR METER</b>	Standard
<b>SOUND LEVEL</b>	87-89 dBA
<b>PRODUCTIVITY RATE</b>	33,000 sq.ft/hr
<b>WEIGHT</b>	208lbs (95kg)
<b>CERTIFICATIONS</b>	EPA, CARB, CE
<b>DIMENSIONS (crated)</b>	54" L x 31" W X 47" H (138cm L x 79cm W x 120cm H)
<b>WARRANTY</b>	Machine 1 yr. Engine 3 yrs. (See engine mfr. warranty) Wear Items 90 days (includes belt, wheels, hoses, pad driver)

SAFETY/REGULATORY PAGES

**OPERATOR SAFETY INSTRUCTIONS**

**WARNING! AVERTISSEMENT! ADVERTENCIA!**

**DANGER:** means: Severe bodily injury or death can occur to you or other personnel if the DANGER statements found on this machine or in this Owner's Manual are ignored or are not adhered to. Read and observe all DANGER statements found in this Owner's Manual and on your machine.

**WARNING:** means: Injury can occur to you or to other personnel if the WARNING statements found on your machine or in this Owner's Manual are ignored or are not adhered to. Read and observe all WARNING statements found in this Owner's Manual and on your machine.

**CAUTION:** means: Damage can occur to the machine or to other property if the CAUTION statements found on your machine or in this Owner's Manual are ignored or are not adhered to. Read and observe all CAUTION statements found in this Owner's Manual and on your machine.

**DANGER:** Failure to read the Owner's Manual prior to operating or attempting any service or maintenance procedure to your MINUTEMAN machine could result in injury to you or to other personnel; damage to the machine or to other property could occur as well. You must have training in the operation of this machine before using it. If you or your operator(s) cannot read English, please have this manual explained fully before attempting to operate this machine.

**DANGER:** Moving parts of this machine can cause serious injury and/or damage. Do not allow contact of clothing, hair, hands, feet, or other body parts with the rotating pad. Keep other people away from the machine while it's in operation.

**DANGER:** Injury to the operator or bystanders could occur if the machine's power is on while changing the buffing pad or making machine adjustments. Never try to change the buffing pad or attempt to make machine adjustments while the engine is running.

**DANGER:** Cigarette lighters, pilot lights and any other sources ignition can create an explosion if it comes in contact with propane. Propane is a highly flammable fuel. All sources of ignition should be extinguished or removed entirely if possible from the work area. DO NOT SMOKE in the vicinity of a propane buffer.

**DANGER:** This machine emits carbon monoxide. Asphyxiation could occur if the unit is used in an area with poor or inadequate ventilation. Operate machine in a well-ventilated area only. If a headache develops, shut off the machine. Have it checked for carbon monoxide emissions by a qualified shop before using it again.

**DANGER:** Dangerous carbon monoxide emissions from this machine are greatly increased due to a dirty combustion air cleaner. Follow the engine's manufacturer's air cleaner service instructions.

### OPERATOR SAFETY INSTRUCTIONS (cont'd.)

**DANGER:** Propane is highly flammable. If you smell propane gas, shut off the machine and move it outside. Determine the source of the leak before using it again. NEVER vent propane gas inside a building. It is UNLAWFUL to store a propane bottle inside a building.

**WARNING:** Long or continuous exposure to high noise levels may cause permanent hearing loss. Always wear hearing protection while using this machine.

**WARNING:** Injury to the eyes and/or body can occur if protective clothing and/or equipment is not worn while using this machine. Always wear safety goggles and safety clothing while using this machine.

**WARNING:** Severe burn or injury could occur if you touch the hot muffler or exhaust pipe. Do not touch the hot muffler or exhaust pipe.

**WARNING:** Any alterations or modifications of this machine could result in damage to the machine or injury to the operator or other bystanders. Alterations or modifications not authorized by the manufacturer voids any and all warranties and liabilities.

**WARNING:** To avoid injury or property damage, do not leave the machine where it can be tampered with or started by persons untrained in its operation. You must have training in the operation of this machine before using it. DO NOT leave the machine running unattended.

**WARNING:** Substantial damage to the floor, the machine, or personnel may result if the machine is operated with the pad off center, damaged or missing. Do not operate the machine if the pad is off center, damaged or missing.

**WARNING:** Operating a machine that has loose parts could result in injury or property damage. Do not operate this machine if there are loose parts. Inspect the machine for loose parts frequently. This will promote safe operation and a long life for the machine.

**WARNING:** Vibration from machinery may cause numbness or tingling of the fingers in certain people. Smoking, dampness, diet, and heredity may contribute to the symptoms. Wearing warm clothing, gloves, exercising and refraining from smoking can reduce the effects of vibration. If the symptoms still persist, discontinue operation of the machine.

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## OPERATION INSTRUCTIONS

### Floor Care Machine Introduction

MINUTEMAN Propane Burnishers are best defined as ultra-high speed buffers with the staying power to produce superior high gloss floor surfaces. Upon contact with the floor, the burnisher should always be kept moving. The speed at which you walk will determine the results obtained. Slower speeds create more heat and friction and therefore more shine. MINUTEMAN recommends a moderate pace for best results and safe operation. Never run with the machine! When burnishing, avoid loose tile, electrical outlets, door thresholds, and any other objects which may come in contact with the pad other than the floor itself. Remember, the pad is turning very rapidly and will propel loose objects it comes in contact with potentially causing injury and/or death to operator and/or others.

Proper care and maintenance will protect your investment and keep your machine serving you for many years to come. It is essential that these items are closely followed:

### How to Operate the Machine

#### Preparing the Machine for Use:

Before using any type of powered equipment, proper safety dictates you should visually inspect it.

1. Adjust the Handle to a comfortable height.
2. Bonnet Filter - Make sure the bonnet air filter atop the engine is clean. It should be cleaned nightly using soap and water and fully dried prior to use.
3. Check the Engine Oil Level. To get an accurate reading, insert the dipstick but DO NOT screw in. Refer to Engine Manual for further instruction.
4. Fill the Propane Cylinder following the instructions as given under the heading: "Refilling and Storing Propane Cylinders."
5. Inspect the condition of the Pad and Pad Driver. Is there a pad? Is it properly attached? What is its condition? Ensure pad is clean and has at least a thickness of 1/3 inch. Always turn off engine to clean or replace pad.
6. Do the fuel lines show any sign of wear and tear, such as cracks or any corrosion?
7. Once inspection is complete, screw clockwise the brass fitting on the high pressure fuel line onto the propane cylinder service valve. Ensure a good connection and hand tighten only. This connection MUST be secure because the service valve has a safety valve inside it which will only open if the brass fuel line fitting is completely seated into the service valve.



### **Starting the Engine:**

1. Propane powered engines are designed to be started in the IDLE throttle position. This creates the vacuum necessary to open the lock-off valve inside the regulator. Actuation of the throttle lever will keep the lock-off valve from opening and the engine from getting propane so the engine will not start.
2. Proper maintenance will insure easy starting.
3. Propane powered engines are designed to be started in the **IDLE** throttle position. This creates the vacuum necessary to open the lock-off valve inside the regulator. Actuation of the throttle lever will keep the lock-off valve from opening and the engine from getting propane so the engine will not start.
4. Proper maintenance will insure easy starting.
5. Open (counterclockwise) the service valve on the propane cylinder about one and a half turns.
6. Engage starter for a **MAXIMUM** of 5 to 6 seconds or until the engine fires. Serious starter damage will result if this is exceeded and the warranty may not apply.
7. Operate the engine at half throttle for approximately two minutes for proper warm-up. Then advance to full throttle for best results.

**NOTE: If the engine refuses to start, see the Troubleshooting Guide.**

### **Turning Off the Engine:**

1. Close (clockwise) the service valve on the propane cylinder.
2. Always allow the engine to run until it dies from lack of fuel. Only in an emergency should the key switch or kill switch be used to turn off the engine.
3. Turn the key switch to the off position and remove the key.
3. Disconnect the high pressure fuel line from the service valve on the cylinder.
4. Remember, when you are finished with the machine, store the propane tank outside the building in a secure place away from heat or direct sunlight.

## General Machine Maintenance and Adjustments

1. Pad replacement. Tilt the machine back on its rear bumper to reach the pad centering device. Turn the outer ring counterclockwise to remove it. Remove the old pad. Install the new pad by carefully centering it against the "harpoon hook" plastic gripper. Replace the center locking ring. Check rotation of the pad driver. Eccentricity of the pad should not exceed 1/4 of an inch.

2. Belt replacement. Tilt the machine back on its rear bumper. Do not tilt the machine on its nose as this is where the carburetor is located.

(a) Remove pad.

(b) Use a suitable wrench to secure the top of the shaft and spin off the pad driver.

(c) Remove old belt carefully and completely.

(d) Install new belt and adjust the pressure of the tensioner.

(e) Reinstall pad driver.

### Routine Maintenance and Adjustments:

To be completed at 25 operating hours and every 50 hours thereafter by authorized service center or trained technician.

- Change engine oil.
- Check pad driver for loose parts.
- Check belt for wear or slippage.
- Check engine pulley for tightness.
- Check wheel bolts.
- Check engine mount bolts.
- Check handle bolts.
- Check for leakage of engine oil at the various seals.

## Machine Troubleshooting

When troubles occur, be sure to check simple causes which at first may seem too obvious to be considered. For example, a starting problem could be caused by fuel starvation due to an empty propane cylinder or an unopened service valve.

1. EXCESSIVE VIBRATION: Look for the following possibilities:

(1) Pad is off center. Remove and reinstall.

(2) Pad Driver is cracked. (Possibly from striking a curb or bolt in the floor) Replace at once with a new part.

(3) Bearings in Front End Assembly are worn. Tilt machine back on its rear bumper. Grip Pad Driver and move up, down and from side to side to check for slack in the bearings. If slack exists, Front End Assembly should be replaced.

2. EXCESSIVE NOISE FROM UNDER MACHINE: If this problem has developed after use of a new machine, the first place to check is the tensioner. As a new belt wears in, it naturally stretches and the tensioner could begin to rattle. Tilt the machine back on its rear bumper and reset by taking up the slack in the belt and tighten the tensioner.

For additional troubleshooting, refer to the Troubleshooting Guide on page 15.



**PROPANE POWERED ENGINE  
SUPPLEMENTAL OPERATORS MANUAL**

**INTRODUCTION**

**HAZARD INTENSITY LEVEL**

*The following symbols are used throughout this guide as indicated in their descriptions:*

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**IMPORTANT SAFETY INSTRUCTIONS**

**WARNING:**

- Failure to read the Owner's Manual prior to operating or attempting any service or maintenance procedure to your engine could result in injury to you or to other personnel; damage to the engine or to other property could occur as well. You must have training in the operation of this engine before using it. If you or your operator/operators cannot read English, have this manual explained fully before attempting to operate this engine. Keep other people away from the engine while it is in operation.
- Injury to the operator or bystanders could occur if the engine is running. Never attempt to make engine adjustments while the engine is running.
- Cigarette lighters, pilot lights and any other sources ignition can create an explosion if it comes in contact with propane. Propane is a highly flammable fuel. All sources of ignition should be extinguished or removed entirely if possible from the work area. **DO NOT SMOKE** in the vicinity of a propane powered engine.
- This engine emits carbon monoxide. Asphyxiation could occur if the engine is used in an area with poor or inadequate ventilation. Operate the engine in a well-ventilated area only. If a headache develops, shut off the engine. Have it checked for carbon monoxide emissions by a qualified shop before using it again.
- Dangerous carbon monoxide emissions from this engine are greatly increased due to a dirty combustion air cleaner. Follow the engine's manufacturer's air cleaner service instructions.
- Propane is highly flammable. If you smell propane gas, shut off the engine and move it outside. Determine the source of the leak before using it again. **NEVER** vent propane gas inside a building. It is **UNLAWFUL** to store a propane cylinder inside a building.

**DANGER:**

- Long or continuous exposure to high noise levels may cause permanent hearing loss. Always wear hearing protection while using this engine.
- Injury to the eyes and/or body can occur if protective clothing and/or equipment is not worn while using this engine. Always wear safety goggles and safety clothing while using this engine.
- Severe burn or injury could occur if you touch the hot muffler or exhaust pipe. **DO NOT TOUCH THE HOT MUFFLER OR EXHAUST PIPE.**
- Any alterations or modifications of this engine could result in damage to the engine or injury to the operator or other bystanders. Alterations or modifications not authorized by the manufacturer voids any and all warranties and liabilities.
- To avoid injury or property damage, do not leave the engine where it can be tampered with or started by persons untrained in its operation. You must have training in the operation of this engine before using it. **DO NOT** leave the engine running unattended.
- Substantial damage to the floor, the engine, or personnel may result if the engine is operated with the pad off center, damaged or missing. Do not operate the engine if the pad is off center, damaged or missing.
- Operating an engine that has loose parts could result in injury or property damage. Do not operate this engine if there are loose parts. Inspect the engine for loose parts frequently. This will promote safe operation and a long life for the engine.
- Vibration from engine may cause numbness or tingling of the fingers in certain people. Smoking, dampness, diet, and heredity may contribute to the symptoms. Wearing warm clothing, gloves, exercising and refraining from smoking can reduce the effects of vibration. If the symptoms still persist, discontinue operation of the engine.

**WARNING:**

- Overfilling the propane cylinder is the number one cause of problems with a propane engine. This can cause the engine to run poorly or not at all. In addition, overfilling allows liquid propane to enter the fuel control system, possibly ruining the lock off / regulator assembly. This voids the warranty on affected parts of the engine. To avoid problems, read and understand fully, the section "Filling and Storing Propane Cylinders."
- **OVERHEATING** is a major cause of engine failure. Keep the cooling air bonnet filter clean. Protect your engine; don't allow wax dust/lint to build up on the cooling fins of the engine cylinder(s). A good high pressure spray wash directed at the fins when the engine is cold will prevent this from happening.
- **LOW OIL AND DIRTY OIL** account for most of the other failures. It is recommended to change the oil on a regular schedule, perhaps exceeding that which is found in the engine manufacturers' manual. Checking the oil daily, before putting the engine to work is a good habit to get into and could save you the downtime and expense of replacing the engine due to lack of lubrication. **AFTER AN OIL CHANGE, MAKE SURE YOU HAVE REPLACED THE OIL SUPPLY BEFORE RESTARTING THE ENGINE.**

**WARNING:**

It is the owner/operator's responsibility to ensure that the air-exchange system installed in any location where a propane powered engine is being operated is of sufficient capacity and quality to support the use of a propane powered engine. OSHA and other County, State, or Federal Agencies publish guidelines on this subject that are most readily found in the possession of the respective owners and/or parent companies of any location or chain of locations. Failure on the part of the owner/operator to ensure that a propane powered engine can be operated safely in a given location may lead to injury, sickness or even loss of life.

## PROPANE SAFETY INFORMATION

### Facts about LP Gas Propane

As a fuel, Propane gas is unmatched for both safety and dependability; it has been used as a domestic household fuel for over half a century, and for over thirty years as an internal combustion engine fuel. Propane is a highly flammable fuel that is contained under pressure as a liquid. Vaporized gas has a similar explosive force to gasoline and mixtures as low as 2% LP Gas to air may be ignited in a closed environment. Care should be exercised to avoid escaping vapor as it can freeze skin and cause frost bite. Vaporized fuel is heavier than air and will collect in the lowest confined space available.

### Facts about Propane Cylinders

Propane cylinders are constructed according to ASME or Federal DOT #4ET20 pressure safety codes. All valves and fittings are UL Listed. Propane gas is noncorrosive and will not rust the inside of a cylinder. Should the cylinder exterior become damaged or rusted, discontinue use. **DO NOT** tamper with cylinder gauges or safety relief valves. **NEVER** use a cylinder not intended for use with a propane powered engine. **DO NOT** substitute cylinders that are used with a barbecue grill, etc. It is recommended to have propane cylinders tested once a year by an authorized National LP Gas Association propane dealer. The fuel cylinder is supplied directly from the manufacturer and is void of propane. This cylinder must be purged at the time of the first fill. Local propane vendors should be familiar with this operation and will provide this service.

### RECOMMENDED PURGE PROCEDURES

How to purge new LP Gas Powered Engine cylinders equipped with the Overfill Prevention Device: New containers may contain vapor, air, or other contaminants. It is essential that these be removed before filling the cylinder and placing it into service. Air in the cylinder will cause abnormally high pressure, with the result that the pressure relief valve may open. Air in the system is also likely to cause lean mixture, making ignition difficult. If a cylinder is suspected of being depressurized or open to the atmosphere for a period of time, it must be re-purged as if it were a new cylinder.

To purge a cylinder, the following steps should be taken.

1. Purging of containers should be performed in an approved area (see NFPA 58) using NPGA #13 3.89(a) procedure.
2. Determine if the cylinder pressure is zero. Should the cylinder contain only pressurized air, the air may be vented directly to the atmosphere through the service valve using an adapter and the outage valve. Pressurize the container to approximately 15 psig with LP-gas vapor. Never purge with liquid LP-gas! To do so will cause the moisture vapor to chill and remain in the cylinder. LP gas liquid also expands 270 times in volume as it vaporizes making the purge process ineffective. Use LP-gas vapor only!
3. Make the connection to the quick coupler (A purge manifold system is most effective). Fully open the cylinder service valve as well as the outage valve. Vent to a safe atmosphere. A vent stack is recommended.
4. On Overfill Prevention Device cylinders, the purge time is increased as a result of the new valve design. Opening the outage valve will help improve the speed of the purge.
5. Repeat #3 and #4 for a total of FIVE purges.
6. Re-pressurize the cylinder with odorized LP-gas vapor to 15 psig.
7. The cylinder is now ready to be filled with LP-gas.
8. Once filled, check all fittings and cylinder openings for leaks using an approved leak detector solution.
9. The cylinder is now ready to be placed in service. Add DOT and OSHA labels.

### **Symptoms of a non-purged cylinder:**

- Relief valve opens due to over pressurized cylinder creating hazardous situation.
- Moisture in the cylinder.
- Powered engine operates initially but shuts down when propane mixture becomes too lean.

## REFILLING & STORING PROPANE CYLINDERS

The NFPA Technical Committee prohibits the storage of such containers in buildings. There are few exceptions to this rule. In other words, propane cylinders should NOT be stored in buildings used by the public or frequented by anyone passing through or who is working in the building. Full or empty, never leave cylinders in small enclosed areas. The cylinder(s) must be in a secure, tamper-proof storage enclosure that provides safety from accident or vandalism. **PROPANE CYLINDERS SHOULD ALWAYS BE TRANSPORTED, INSTALLED AND USED IN AN UPRIGHT POSITION. OVERFILLING PROPANE CYLINDERS IS HAZARDOUS.** The cylinder should **NEVER** be completely filled with liquid propane. 80% of the total cylinder volume is to be considered at **ALL** times as full. **EXPANSION MUST BE ALLOWED FOR.** Propane Powered engine cylinders are equipped with a fixed liquid level gauge which contacts the liquid level at 80% of container capacity, allowing 20% for expansion. The top part of this device must be unscrewed counterclockwise so that vapor can escape through the small hole it its side, as the cylinder is refilled. When the escaping vapor starts to give way to liquid, the device must be quickly closed and the propane nozzle turned off.

### WARNING:

The engine and the fuel system on your propane powered engine are designed to run on propane vapor, not propane liquid. Overfilling the propane cylinder will result in damaging the lock off *and/or* regulator. This will **VOID** the **WARRANTY** on these components.

## ENGINE EMISSIONS AND CO SAFETY

The purpose of this document is to provide information on:

- The potential effects of CO exposure
- The methods to reduce the risk of CO poisoning
- All LPG (Liquid Propane Gas) powered engines, including this engine, produce Carbon Monoxide (CO). It is a FATAL POISON that is a colorless, odorless, tasteless, and non-irritating gas. It is produced by incomplete combustion of carbonaceous material such as propane (LPG). Failure to provide for proper venting of CO produced during the operation of combustion powered engines may result in SERIOUS INJURY OR DEATH to the operator and those in the contaminated area. The effects of CO can be experienced at different exposure levels, depending on the health of the individual. Conditions that affect the tolerance of the individual are smoking, age, temperature, humidity, and other conditions.

### WARNING:

Read and understand The Operators Manual completely before using this engine. This document explains how CO produced can be managed to reduce the risk of carbon monoxide poisoning. All distributors, owners, and operators should be aware of the potential effects of CO and the methods used to prevent overexposure. We are dedicated to our customers, their safety, and providing information, services, and products that meet those needs. Information provided in this document is current as of the date written January 2013.

## SUMMARY

### POTENTIAL EFFECTS OF CO EXPOSURE

The information provided in the following overview has been condensed to provide the reader with a summary of the material presented.

- Work place/industry guidelines for CO exposure limits vary substantially from region to region (OSHA) Permissible Exposure Limit (PEL) for CO is 50 ppm, as an 8-hour time weighted average.
- Definition of CO effects - The toxic effects of carbon monoxide in the blood is the result of tissue hypoxia (lack of oxygen). The severity depends on the state of activity of the individual and his tissue oxygen needs.

## WORK PLACE/INDUSTRY GUIDELINES FOR CO EXPOSURE LIMITS

Limits for permissible exposure to CO vary substantially from region to region, City, State, and Industry requirements should be consulted prior to use of any equipment. The current Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for CO is 50 ppm, as an 8-hour time-weighted-average (TWA), This is computed by making measurements at intervals over 8 hours, then adding the sums of the concentrations and the intervals, and dividing by 8 hours, For example:

Time	Interval	
8:00-9:00	1HR	100
9:00-10:00	1HR	25
10:00-11:00	1HR	25
11:00-12:00	1HR	50
12:00-1:00	1HR	50
1:00-2:00	1HR	50
2:00-3:00	1HR	50
3:00-4:00	1HR	50
<b>ANY 8 HR PERIOD</b>	<b>8HR</b>	<b>400 PPM</b>
<b>400ppm/8HR=50ppm (TWA)</b>		

The current National Institute for Occupational Health and Safety (NIOSH) has determined that concentrations above the recommended level for CO of 1,200 ppm are Immediately Dangerous to Life and Health (IDLH). NIOSH defines the IDLH exposure level as the concentration that could result in irreversible health effects or death, or prevent escape from the contaminated environment within 30 minutes.

#### **DEFINITION OF CO EFFECTS**

The toxic effects of carbon monoxide in the blood are the result of tissue hypoxia (lack of oxygen) carbon monoxide combines with hemoglobin to form carboxyhemoglobin. Since CO and oxygen react with the same group in the hemoglobin molecule, carboxyhemoglobin is incapable of carrying Oxygen. The affinity of hemoglobin for CO is 200 to 240 times greater than for oxygen. The extent of saturation of hemoglobin with CO depends on the concentration of the gas, the quantity of inspired air and on the time of exposure. The severity depends on the state of activity of the individual and his tissue oxygen needs.

According to Harrison's Principles of Internal Medicine 7th edition, no symptoms will develop at a concentration of 0.01 % CO (100ppm) in inspired air, since this will not raise blood saturation above 10 %. Exposure to 0,05% (500ppm) for 1 hour during light activity will produce a blood concentration of 20% carboxyhemoglobin and result in a mild or throbbing headache. Greater activity or longer exposure causes a blood saturation of 30 to 50 %. At this point headache, irritability, confusion, dizziness, visual disturbance, nausea, vomiting, and fainting can be experienced. Exposure for one hour to concentrations of 0.1 % (1000ppm) inspired air the blood will contain 50 to 80% carboxyhemoglobin which results in coma, convulsions, respiratory failure and death. On inhalation of high concentrations of CO, saturation of the blood proceeds so rapidly that unconsciousness may occur suddenly without warning.

#### **METHODS TO REDUCE THE RISKS OF CO POISONING FOR INDOOR APPLICATIONS**



- **Air Exchange and CO Diffusion** - CO does not mix with air on its own. Air currents can stir the CO and dilute the concentration values by mixing it with the available air. When using equipment over a large area in a short time stirring occurs as you walk.
- **Application Considerations** When activity is concentrated to a smaller area as in a stripping application, air stirring must be forced by use of fans to reduce the risk of high concentrations of CO.
- **Air Quality Monitoring** - Deployment of a monitor/detector is essential for the safe operation of any equipment that has the potential to produce CO.
- **Room Size and Time Estimations** - The concentration and volume of CO production, the size of the area and the amount of air exchange are factors involved with determining safe time limits for operation in a specific room size.
- **Maintenance of the Engine** - LPG powered engines are dependent on engine tune up, and air filter replacement. CO concentration (production) rises exponentially when the air to propane ratio becomes propane rich. Follow the recommended Maintenance Schedule for the engine.
- **Safety Equipment** - Three-way type catalytic converter to scrub CO, hydrocarbons (HC), and nitrous oxide (NO<sub>x</sub>) from the engine exhaust providing the lowest possible emissions, high cubic feet per minute (CFM) fans (forced air mixing), and digital combustion analyzers for tail pipe emissions monitoring.

The most reliable method to prevent CO Poisoning is to ensure the entire CO produced is vented outside. With wood stoves or gas heaters this is performed with ductwork that carries the exhaust and CO outside. Non-stationary combustion type equipment must be used in such a way that CO is not allowed to rise to a harmful or dangerous level. CO does not readily dissipate or mix with air on its own. Air currents can stir the CO and dilute the concentration or ppm values by mixing it with the available air. When using equipment over a large area in a short time stirring occurs as you walk, or to say it another way, your effective operating zone is large. When activity is concentrated to a smaller area as in a stripping application, the effective operating zone is small, and stirring must be forced by the use of fans to increase the effective operating zone and reduce high concentrations of CO. Air exchange rates (air exchange is defined as the exhausting of internal air to the external atmosphere), the size of the effective operating zone, amount of CO produced, level of human activity, and the duration of exposure are all factors in the determination of the production of carboxyhemoglobin and the amount of CO blood saturation.

#### **AIR QUALITY MONITORING**

Warning - Deployment of a monitor/detector is essential for the safe operation of any equipment that has the potential to produce CO. CO sensors/detectors became available on the mass market around 1978. The main differences between the technologies involved are battery or electric and Semiconductor or Biomimetic types. Detectors for carbon monoxide (CO) are manufactured and marketed for use in either the home or occupational industrial settings. The detectors for home use are devices that will sound an alarm before CO concentrations in the home become hazardous. There is an Underwriters Laboratories, Inc., performance standard (UL 2034) for residential CO detectors. Detectors currently available on the market are battery-powered, plug-in, or hardwired. Some models incorporate a visual display of the parts per million (ppm) concentration of CO present in the home. For more information on CO detectors for home use, call the Consumer Product Safety Commission: Commission Hotline at 1-800-638-2772. CO detectors for use in residential settings are not designed for use in workplace settings. Monitoring requirements in an occupational setting are different from monitoring requirements in the home. In the workplace, it is frequently necessary to monitor a worker's exposure to carbon monoxide over an entire work shift and determine the time-weighted average (TWA) concentration of the exposure. It may also be necessary to have carbon monoxide monitors with alarm capabilities in the workplace.

The direct reading instruments are frequently equipped with audio and/or visual alarms and may be used for area and/or personal exposure monitoring. Some have microprocessors and memory for storing CO concentration readings taken during the day.

It is significant to note that some of the devices mentioned for workplace CO monitoring are not capable of monitoring TWAs, and not all are equipped with alarms. The appropriate monitor must be chosen on an application-by-application basis. For more information on the availability of workplace CO monitors or their application, call the National Institute for Occupational Safety and Health at 1-800-35-NIOSH (1-800-356-4674).

#### Room Size and Time Estimations for Parts Per Million (PPM) CO

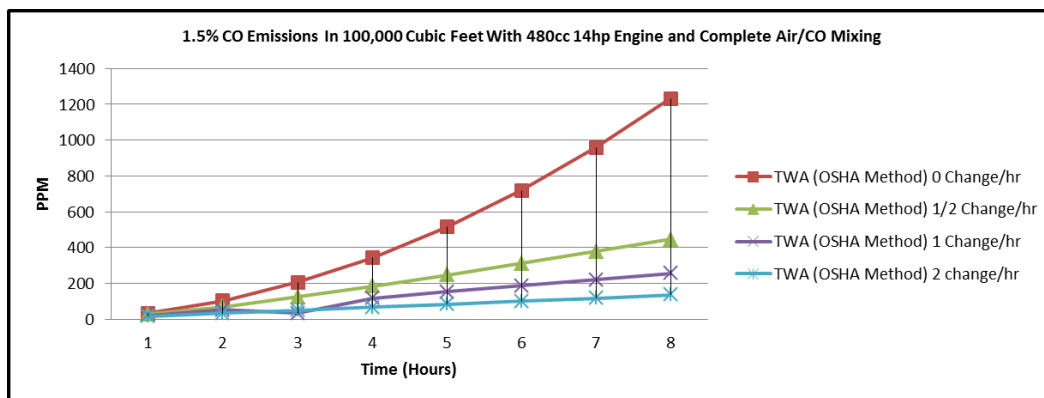
##### The fundamental factors in area CO levels involve the following:

- The concentration and volume of CO production
- The size of the area
- The amount of air exchange if any
- The amount of time CO is produced

Multiplying length, width, and height will determine the volume or cubic feet in a room. So an empty building 100ft by 100ft with a 10ft ceiling would be 100,000 cubic ft. in size. Any material that is in the room and takes space would reduce the cubic feet. Air exchange is defined as the exhausting of internal air to the external atmosphere. The Graph above depicts the relationships of air exchange to time and CO ppm with cubic feet area and percent CO emissions remaining constant. Based on the CO production rates shown above the TWA would be exceeded in a 100 x 100 x 10 foot (empty) space after 3 hours with 2 air changes per hour. (Assumes no additional CO exposure during 8 hour time period)

8 Hour Time Weighted Average (OSHA Method)		1	2	3	4	5	6	7	8
1.5% CO 100,000cf	Hours of Operation								
TWA (OSHA Method)	0 Change/hr	34	103	206	343	514	719	959	1232
	1/2 Change/hr	27	70	124	183	246	311	378	445
	1 Change/hr	22	51	34	118	152	186	220	255
	2 change/hr	15	32	49	66	83	100	117	135

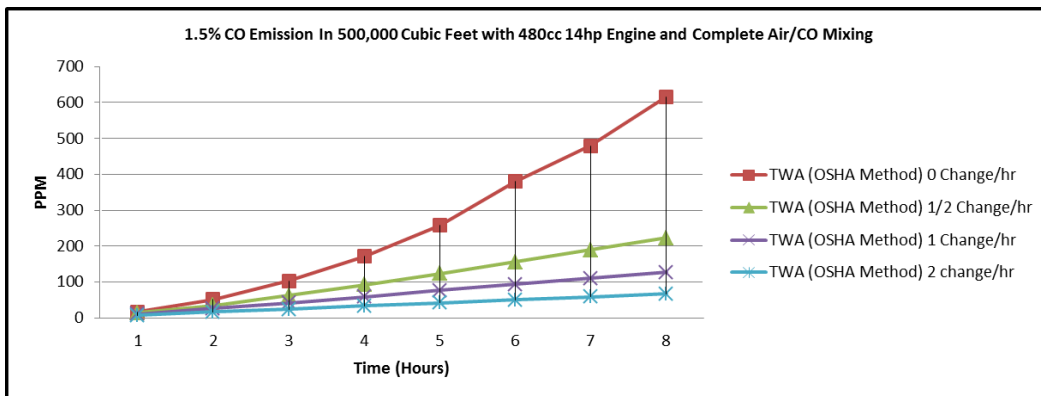
Based on the CO production rates shown above the TWA would be exceeded in a 100 x 100 x 10 foot (empty) space after 3 hours with 2 air changes per hour. (Assumes no additional CO exposure during 8 hour period)



The Graph above depicts the relationships of air exchange to time and CO ppm with cubic feet area and percent CO emissions remaining constant.

8 Hour Time Weighted Average (OSHA Method)									
1.5% CO 500,000cf	Hours of Operation	1	2	3	4	5	6	7	8
TWA (OSHA Method)	0 Change/hr	17	51	103	171	257	380	479	616
	1/2 Change/hr	14	35	62	92	123	156	189	223
	1 Change/hr	11	26	42	59	76	93	110	127
	2 change/hr	7	16	24	33	42	50	59	67

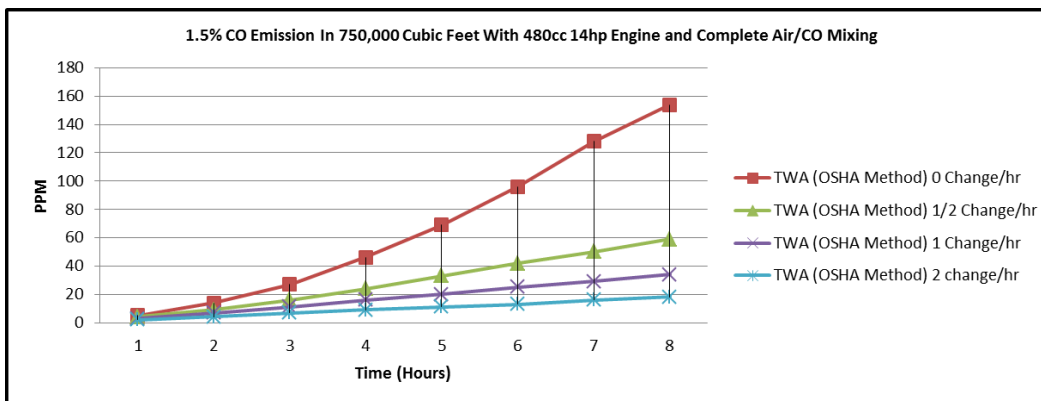
Based on the CO production rates shown above the TWA would be exceeded in a 100 x 500 x 10 foot (empty) space after 6 hours with 2 air changes per hour. (Assumes no additional CO exposure during any 8 hour time period),



The Graph above depicts the relationships of air exchange to time and CO ppm with cubic feet area and percent CO emissions remaining constant.

8 Hour Time Weighted Average (OSHA Method)									
1.5% CO 750,000cf	Hours of Operation	1	2	3	4	5	6	7	8
TWA (OSHA Method)	0 Change/hr	5	14	27	46	69	96	128	154
	1/2 Change/hr	4	9	16	24	33	42	50	59
	1 Change/hr	3	7	11	16	20	25	29	34
	2 change/hr	2	4	7	9	11	13	16	18

Based on the CO production rates shown above the TWA would not be exceeded in a 100 x 750 x 10 foot (empty) space after 8 hours with 2 air changes per hour. (Assumes no additional CO exposure during 8 hour time period)



The Graph above depicts the relationships of air exchange to time and CO ppm with cubic feet area and percent CO emissions remaining constant.

## MAINTENANCE OF THE ENGINE

The proper maintenance of your propane powered engine is vital to safe operation. LPG engines are dependent on engine tune up, and air filter replacement. CO concentration (production) increases significantly when the air to propane ratio becomes propane rich. Follow the recommended maintenance schedule for the engine found in the engine operator/owner manual as well as the maintenance and adjustments schedule found in the engine operator/owner manual that was supplied with the equipment.

## OPERATION

### PREPARING THE ENGINE FOR USE

*NOTE: Before using any type of powered equipment, proper safety dictates you should visually inspect it. Check the following:*

- **ENGINE OIL LEVEL.** To get an accurate reading, insert the dipstick but **DO NOT** screw in. Refer to Engine Manual for further instruction.
- **BONNET FILTER** - Make sure the bonnet air filter atop the engine is clean. It should be changed hourly and thoroughly cleaned before reuse.
- **CYLINDER** Fill the cylinder following the instructions (see "Refilling and Storing Propane Cylinders." section)
- **FUEL SYSTEM** - Check for any sign of wear of the entire fuel system ie the Cylinder, fuel hoses, fittings and etc., such as cracks or any corrosion. Replace hoses or correct any problems before operating the engine.
- Screw the brass propane line fitting onto the cylinder service *valve* hand tight only. This connection **MUST** be secure because the service *valve* has a safety *valve* inside it which will only open if the brass propane line fitting is **COMPLETELY** seated into the service *valve*.

### STARTING THE ENGINE

1. Propane powered engines are designed to be started in the **IDLE** throttle position. This creates the vacuum necessary to open the lock-off valve inside the regulator. Actuation of the throttle lever will keep the lock-off valve from opening and the engine from getting propane so the engine will not start.
2. Proper maintenance will insure easy starting.
3. Propane powered engines are designed to be started in the **IDLE** throttle position. This creates the vacuum necessary to open the lock-off valve inside the regulator. Actuation of the throttle lever will keep the lock-off valve from opening and the engine from getting propane so the engine will not start.
4. Proper maintenance will insure easy starting.
5. Open (counterclockwise) the service valve on the propane cylinder about one and a half turns.
6. Engage starter for a **MAXIMUM** of 5 to 6 seconds or until the engine fires. Serious starter damage will result if this is exceeded and the warranty may not apply.
7. Operate the engine at half throttle for approximately two minutes for proper warm-up. Then advance to full throttle for best results.

*NOTE: If the engine fails to start, see the Troubleshooting Guide.*

### STOPPING THE ENGINE

**ONLY IN AN EMERGENCY** should the key switch be used to stop the engine.

1. Close (clockwise) the service valve on the propane cylinder.
2. **ALWAYS** allow the engine to run until it stops from lack of propane.
3. Disconnect the propane line from the cylinder.
4. Turn the "kill switch" or Ignition Switch to the "off" position.
5. When you are finished with the engine, store the propane cylinder outside the building, in a **SECURE** place away from heat or direct sunlight.

## **MAINTENANCE**

### **EMISSION CONTROL INFORMATION**

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

1. **Crankcase Emission Control System.** A sealed-type crankcase emission control system is used to eliminate blow-by gases. The blow-by gases are led to the breather chamber through the crankcase where it is led to the air cleaner. Oil is then separated from the gases while passing through the inside of the breather chamber from the crankcase, and then returned back to the bottom of crankcase.
2. **Exhaust Emission Control System.** The exhaust emission control system applied to this engine consists of a carburetor and an ignition system having optimum ignition timing characteristics. The carburetor has been calibrated to provide lean air/propane mixture characteristics and optimum propane economy with a suitable air cleaner and exhaust system.

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

Among acts presumed to constitute tampering involve the parts/systems listed below:

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

### **GENERAL MAINTENANCE AND ADJUSTMENTS**

#### **PROPANE CONTROL SYSTEM**

To ensure personal safety, adjustments should ONLY be made by a qualified LPG system technician or an authorized service center, using an exhaust gas analyzer. Do not operate the engine if carbon monoxide levels exceed OSHA standards.

#### **RECOMMENDED OIL CHANGE INTERVALS**

Do not exceed the 50 hour oil change interval. Oil changes more frequent than 50 hours will give even longer engine life. In any case, always use 30HD or 10W30 engine oil with all of the following ratings: SF, SG, and CC. The various engines have different oil sump capacities. Make sure the oil level is maintained at the "FULL" level.

#### **SERVICE SCHEDULE**

##### **First 25 HOURS and Every 50 HOURS Thereafter**

- Change engine oil. \*
- Check engine for loose parts. \*
- Check propane system hoses for wear or damage. \*
- Check engine mount bolts. \*
- Check for leakage of engine oil at the various seals.\*
- Return engine to authorized service \* center for overall checkup.

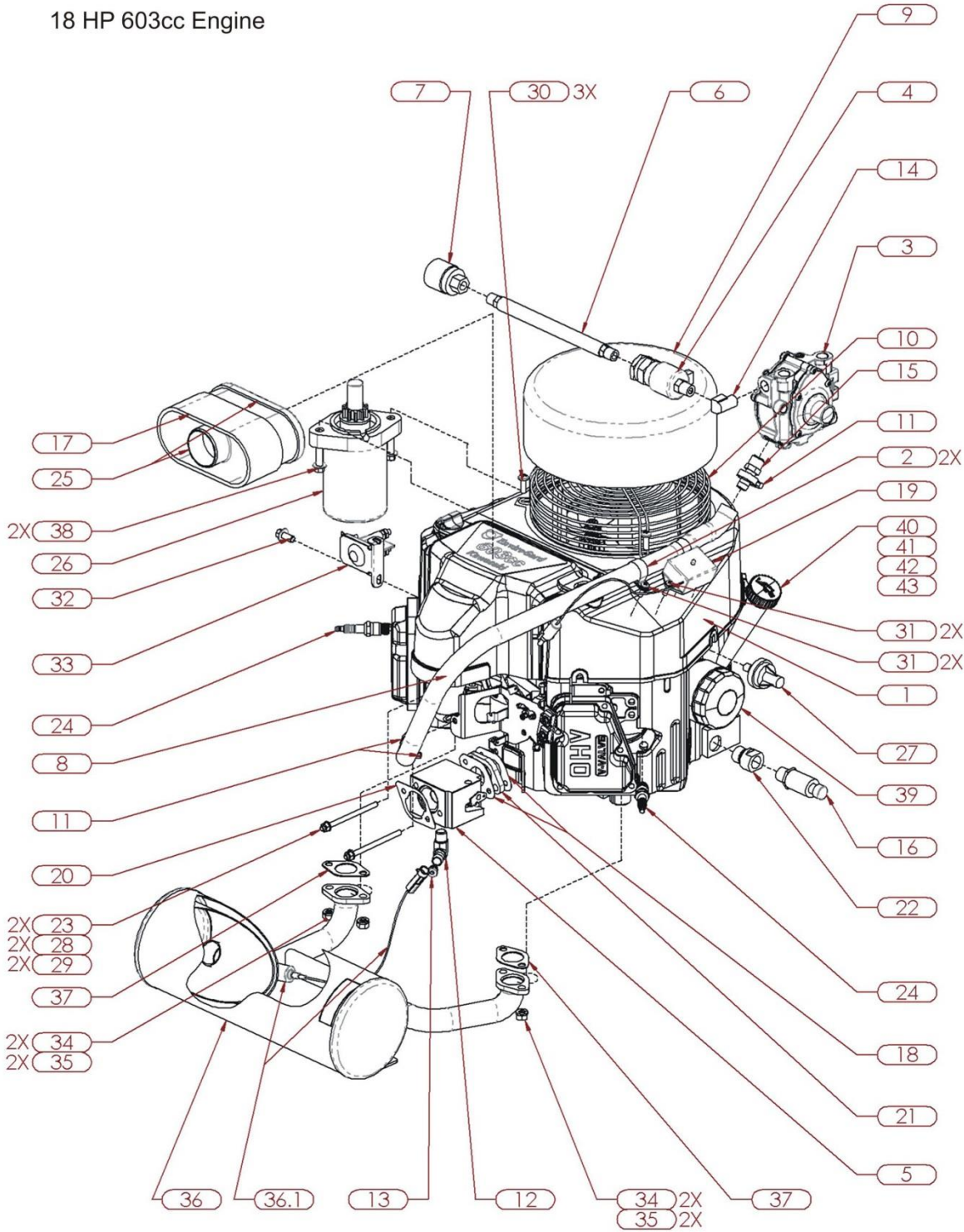
### TROUBLESHOOTING GUIDE

*Note: When trouble occurs be sure to check for simple causes, which at first may seem too obvious to be considered. For example, a starting problem could be caused by propane starvation due to an empty propane cylinder or an unopened service valve.*

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Starter Motor Does Not Operate	Weak or Dead Battery	Recharge or Replace Battery
	Ignition Switch Faulty	Check or Replace Switch
	Dead Man Switch Not Engaged*	Engage Dead Man Switch Prior to Engaging Starter
	Dead Man Switch Faulty*	Check or Replace Dead Man Switch
	For Additional Causes	See Engine Manual or Dealer
Engine Turns Over But Does Not Start or Run	Fuel Tank Not Connected	Disconnect and Reconnect Tank
	Fuel Tank Empty	Refill or Replace Tank
	No Fire at Spark Plug	Replace Spark Plug
	Engine Oil Pressure Low	Check and Fill Oil To Correct Level
	Oil Pressure Switch Faulty*	Check or Replace Oil Pressure Switch
	For Additional Causes	See Engine Manual or Dealer
Engine Runs with Loss of Power or Excessive Exhaust Fumes	Restriction in Air Cleaner	Service Air Cleaner
	Ignition System Misfire	Check or Replace Ignition Coils
	Poor Compression or Timing	See Engine Manual or Dealer
Engine Running Hot or Over Heating	Intake Screen or Bonnet Filter Clogged	Clean Screen and or Bonnet Filter
	Cooling Fins Clogged	See Engine Manual for Cleaning
High Oil Consumption	Numerous Causes	See Engine Manual or Dealer
Engine Knocks and Other Engine Noises	Numerous Causes	See Engine Manual or Dealer
Electric Clutch Will Not Engage*	Loose or Faulty Wiring	Check Wiring
	Clutch Switch Faulty	Check or Replace Clutch Switch
	Clutch Out of Adjustment	See Your Dealer

(\*If Unit Is Equipped With This Option)

18 HP 603cc Engine



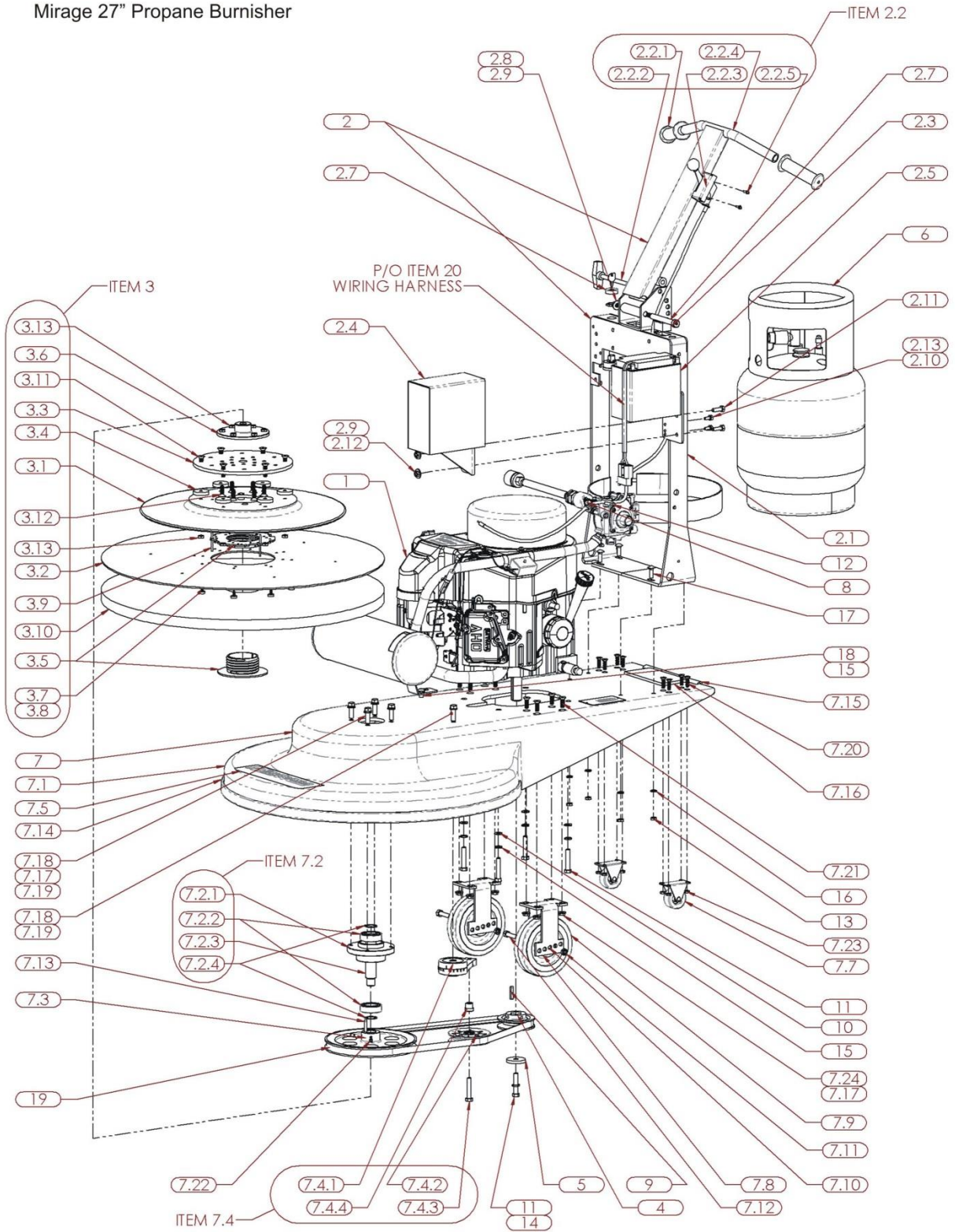
18HP 603cc Engine  
Parts List

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GKFS600ABCOV	KAWASAKI 603cc 18HP 12V PROPANE ENGINE ASSY	1
2	W1324	7/8 NYLON HOSE STRAP	2
3	W2606	N51-5A-C-3.0-NT REGULATOR	1
4	W2608	12V A152 LP FUEL LOCKOFF	1
5	W2628	PROPANE CARBURETOR, 603CC ENGINE	1
6	W2648-10.5	3/8 X 10.5" LP350 PSI HOSE W/ REGO MAIL FITTINGS	1
7	W2650	REGO COUPLING, FEMALE, RT-HAND	1
8	W2660	HOSE LP 1/2" X 12" 350PSI	1
9	W3305	KAWASAKI BONNET FILTER	1
10	W3311B	BONNET CAGE	1
11	F62004	5/16 HOSE CLAMP	2
12	F12634-00098	ELBOW, 1/4" MALE NPT TO 1/2" BARB W/ 1/8 FNPT	1
13	F68612	FITTING, CAP, 1/8" MNPT, DRILLED	1
14	F69881	1/4" NPT STREET ELBOW FEM/MALE, BRASS	1
15	F69932	1/2 NPT X 3/8 BARB	1
16	FE17409029909	1/4 TURN OIL DRAIN VALVE	1
17	K11013-7046	ELEMENT AIR FILTER (FOAM PRE-FILTER)	1
18	K11061-7096	GASKET, INSULATOR	2
19*	W2804	EMISSIONS CONTROL	1
20	K11061-7018	CARBURETOR GASKET, INTAKE FILTER	1
21	K16073-7007	INSULATOR, CARBURETOR	1
22	K59071-7004	ADAPTER, OIL DRAIN VALVE	1
23	K92004-7027	DOUBLE THREADED ROD, M6	2
24	K92070-7004	SPARK PLUG	2
25	K99999-0384	ELEMENT AIR FILTER	1
26	K21163-0727	STARTER MOTOR, 12V	1
27	W1325	NO. 2 POLE OIL PRESSURE SWITCH	1
28	K92015-1367	HEX NUT, M6	2
29	F33618	LOCKWASHER, HELICAL, 1/4"	2
30	F24051	BUTTON HEAD CAP SCREW, 1/4 - 28 X 3/4"	3
31	F28969	PAN HEAD PHILLIPS, #10-24 X 3/4"	4
32	F0160821	HEX BOLT, M8 - 1.25 X 16mm	1
33	W1305	SOLENOID, 12V	1
34	K92210-7027	HEX NUT, M8	4
35	461DA0800	LOCKWASHER, HELICAL, 8mm	4
36	W3240A	MUFFLER W/ CAT KA 603cc	1
36.1*	W2803	O2 SENSOR	1
37	K11060-7016	GASKET, MUFFLER MANIFOLD	2
38	130AA0830	HEX FLANGE SCREW, M8 - 1.25 X 30	2
39	K49065-7007	OIL FILTER	1
40	59231-7016	OIL FILLER TUBE	1
41	14075-7013	CAP ASSY & OIL GAUGE STICK	1
42	670D2016	O RING, 16mm	1
43	92153-7008	BOLT	1

\*EMISSIONS CONTROL OPTION



Mirage 27" Propane Burnisher



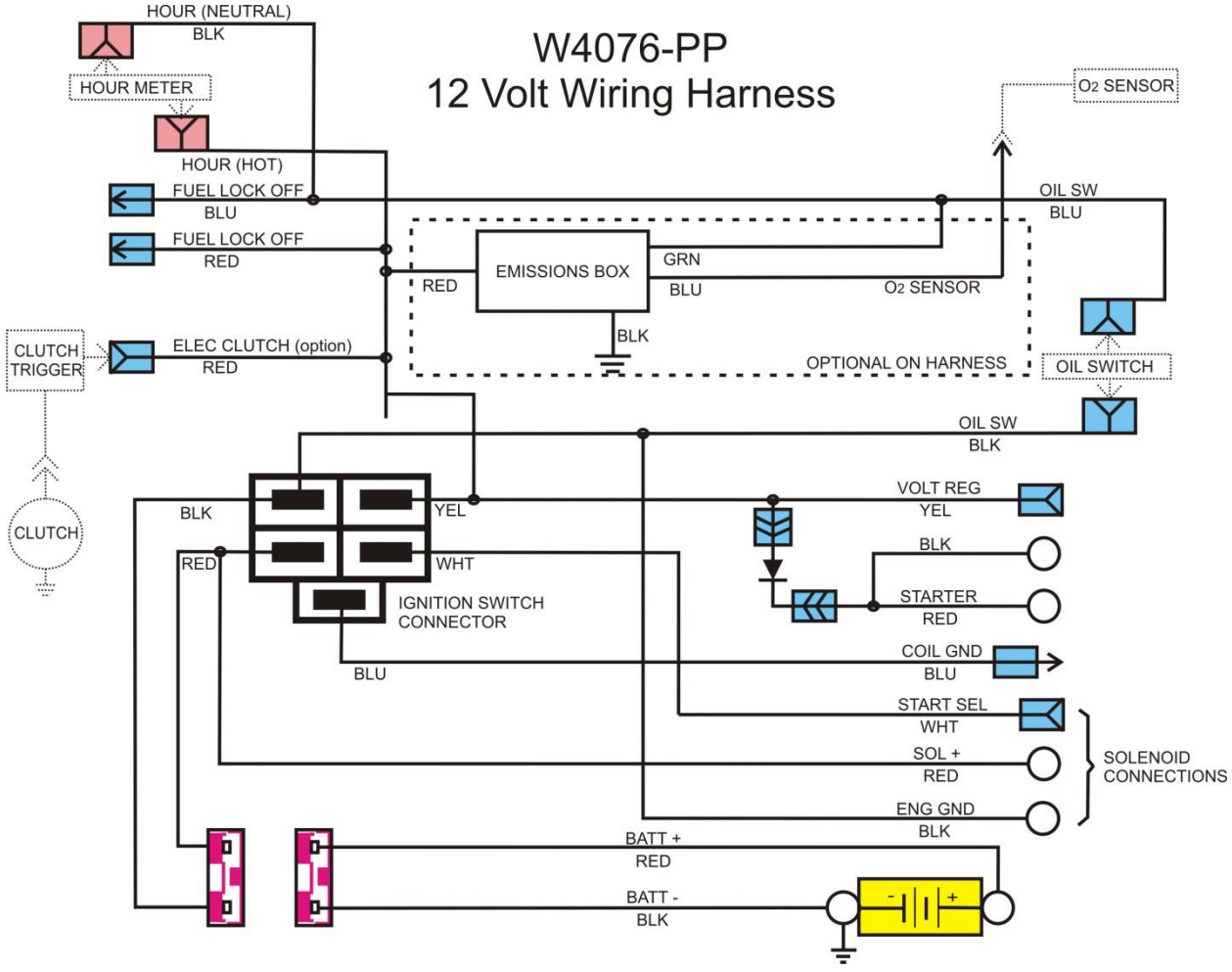
Mirage 27" Propane Burnisher  
Parts List

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	GKFS600ABCOV	KAWASAKI 603cc 18HP 12V PROPANE ENGINE ASSY	1
2	W4057A	12V BOTTLE CARRIER ASSY	1
2.1	W4057	BOTTLE CARRIER	1
2.2	W4060-1	T-HANDLE ASSY	1
2.2.1	W4050	HANDLE GRIP FOR T-HANDLE	2
2.2.2	W1454	T-HANDLE PIN W/ LANYARD, 3/8" X 4"	1
2.2.3	W4110	THROTTLE W/ CABLE 53 INCH	1
2.2.4	W4060	18" T-HANDLE	1
2.2.5	F31805	HEX WASHER SELF-TAPPING SCREW, #8 X 3/4"	3
2.3	W4312	RECTANGULAR HOUR METER	1
2.4	W4274	BATTERY BOX	1
2.5	W4359	MBTX 12V12A BATTERY	1
2.6	W1301	IGNITION SWITCH W/ HARDWARE KEY	1
2.7	F26362	SHOULDER BOLT, 1/2" X 4" (3/8 - 16)	1
2.8	F37024	HEX NUT, SELF-LOCKING, 3/8 - 16	1
2.9	F33006	FLAT WASHER, WIDE, 5/16"	3
2.10	F13002	HEX BOLT, 1/4 - 20 X 5/8"	2
2.11	F13055	HEX BOLT, 5/16 - 18 X 1"	2
2.12	F37021	5/16 - 18 SELF-LOCKING HEX JAM NUT	2
2.13	F33618	LOCKWASHER, HELICAL, 1/4"	2
3	21557A	27" PREMIUM PAD DRIVER ASSY	1
3.1	W1550	LARGE RISER	1
3.2	W1557	GRIPPER SURFACE 27 IN	1
3.3	W1653	10" COUPLER, 3" CENTER HOLE	1
3.4	W1652	1 1/2" COUPLER SPACER	6
3.5	W1508	CENTER LOCK II	1
3.6	W1016	FLANGE 5.00" DIAMETER	1
3.7	MC90262A011	COUNTERSUNK WASHER, #10 SCREW	8
3.8	F31586	FLAT HEAD PHILLIPS, #10 X 3/4"	8
3.9	F41031	POP RIVET, 3/16" DIAMETER	3
3.10	ON276	27" BURNISHING PAD	1
3.11	F24257	FHCS, 5/16 - 18 X 1 1/4", HEX SOCKET	6
3.12	F24256	FHCS, 5/16 - 18 X 1", HEX SOCKET	6
3.13	F37021	5/16 - 18 SELF-LOCKING HEX JAM NUT	12
4	W2040	PULLEY, 4", BK40-1 W/2 SS	1
5	W1220	CLUTCH WASHER	1
6	W2502	PROPANE TANK P#5461TC - 20LB. RT	1
7	W5021A	27" MINUTEMAN DECK ASSY	1
7.1	W5027-1	27" FRAME CAST ALUMINUM	1
7.2	W1060A-1	FRONT END BEARING ASSY	1
7.2.1	W1060-1	FRONT END BEARING HOUSING	1
7.2.2	W1055	BEARING 60252RS-C3	2
7.2.3	W1006	SHAFT 1 X 5 - 1/2	1
7.2.4	F68019	RETAINING RING, EXTERNAL, 1" SHAFT	2
7.3	W2075	PULLEY - 7.7 in BK77-1 W/2 SS	1
7.4	W1101A-C	ROTARY TENSIONER ASSY	1
7.4.1	W1101	ROTARY TENSIONER	1
7.4.2	W1102	ROTARY TENSIONER PULLEY	1
7.4.3	F13111	HEX BOLT, 3/8 - 16 X 2"	1
7.4.4	W1103	18.7mm X 9.7mm BORE TENSIONER SPACER	1

Mirage 27" Propane Burnisher  
Parts List Cont'd.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
7.5	W1200	MINUTEMAN DECK DECAL	1
7.6	W1199	MINUTEMAN NAME PLATE W/ SERIALIZATION	1
7.7	W4241	REAR CASTER	2
7.8	W4210	DELUXE WHEEL BRACKET (5-HOLE)	2
7.9	W4220	RUBBER WHEEL, 6" X 1 1/2"	2
7.10	W4218	3/8" COLSON WHEEL BUSHING	2
7.11	F37023	3/8 - 16 SELF-LOCKING HEX JAM NUT	2
7.12	W4221	AXLE FOR COLSON WHEEL	2
7.13	F58969	6mm X 32mm PARALLEL KEY	1
7.14	W4108	27" FRONT BUMPER STRIP	1
7.15	MC8507K24	NEOPRENE RUBBER EDGING	1
7.16	MC93625K95	NATURAL GUM FOAM-ADHESIVE	1
7.17	F33006	FLAT WASHER, WIDE, 5/16"	12
7.18	F13107	HEX BOLT, 3/8 - 16 X 1 1/4"	5
7.19	F33622	LOCKWASHER, HELICAL, 3/8"	5
7.20	F24225	FHCS, 1/4 - 20 X 1", HEX SOCKET	8
7.21	F24256	FHCS, 5/16 - 18 X 1", HEX SOCKET	8
7.22	F25469	SET SCREW, HEX SOCKET, 5/16 - 18 X 3/8"	2
7.23	F37018	1/4 - 20 SELF-LOCKING HEX JAM NUT	8
7.24	F37021	5/16 - 18 SELF-LOCKING HEX JAM NUT	8
8	F0216763	C-LOOP, 1/4"	1
9	F58969	6mm X 32mm PARALLEL KEY	1
10	F33006	FLAT WASHER, WIDE 5/16"	4
11	F13111	HEX BOLT, 3/8 - 16 X 2"	5
12	F38565	HEX WASHER BOLT, M6 X 20mm	1
13	F37021	5/16 - 18 SELF-LOCKING HEX JAM NUT	4
14	F33624	HEAVY LOCKWASHER, HELICAL, 3/8"	1
15	F33622	LOCKWASHER, HELICAL, 3/8"	5
16	F33620	LOCKWASHER, HELICAL, 5/16"	4
17	F21255	CARRIAGE BOLT, 5/16 - 18 X 1"	4
18	F24089	BUTTON HEAD CS, 3/8 - 16 X 5/8"	1
19	WBX50	50" COGGED BELT	1
20*	W4076-PP	WIRING HARNESS	1

\*ITEM SHOWN ON SEPARATE WIRING DIAGRAM SHEET



Notes

## Minuteman International Made Simple Commercial Limited Warranty

### REVISION O EFFECTIVE 4/1/2016

Minuteman International, Inc. warrants to the original purchaser/user that the product is free from defects in workmanship and materials under normal use. Minuteman will, at its option, repair or replace without charge, parts that fail under normal use and service when operated and maintained in accordance with the applicable operation and instruction manuals. All warranty claims must be submitted through and approved by factory authorized repair stations.

This warranty does not apply to normal wear, or to items whose life is dependent on their use and care, such as belts, cords, switches, hoses, rubber parts, electrical motor components or adjustments. Parts manufactured by Minuteman are covered by and subject to the warranties and/or guarantees of their manufacturers. Please contact Minuteman for procedures in warranty claims against these manufacturers.

**Special warning to purchaser** -- Use of replacement filters and/or pre-filters not manufactured by Minuteman or its designated licensees, will void all warranties expressed or implied. A potential health hazard exists without original equipment replacement.

All warranted items become the sole property of Minuteman or its original manufacturer, whichever the case may be.

Minuteman disclaims any implied warranty, including the warranty of merchantability and the warranty of fitness for a particular purpose. Minuteman assumes no responsibility for any special, incidental or consequential damages.

This limited warranty is applicable only in the U.S.A. and Canada, and is extended only to the original user/purchaser of this product. Customers outside the U.S.A. and Canada should contact their local distributor for export warranty policies. Minuteman is not responsible for costs or repairs performed by persons other than those specifically authorized by Minuteman. This warranty does not apply to damage from transportation, alterations by unauthorized persons, misuse or abuse of the equipment, use of non-compatible chemicals, or damage to property, or loss of income due to malfunctions of the product.

If a difficulty develops with this machine, you should contact the dealer from whom it was purchased.

This warranty gives you specific legal rights, and you may have other rights which vary from state to state. Some states do not allow the exclusion or limitation of special, incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions and limitations may not apply to you.

Model	Parts	Labor	Poly	Travel**
Cord Electric Group	5yrs	3yrs	12yrs	90 days
Battery Operated Group	5yrs	3yrs	12yrs	90 days

**Exceptions.....**

Model	Parts	Labor	Poly	Travel**
Port A Scrub, all models	1yr	6months	12yrs	90 days
A3S Blower	1yr	1yr	0	0
Phenom Dual Motor Upright Vacuums	2yrs	2yrs	0	0
Explosion Proof Vacuum	1yr	1yr	0	0
Propane Burnisher	1yr	1yr	0	90 days
**Travel, 2 hours max				

<i>Stand-alone Battery Chargers:</i>	One year
<i>Replacement Parts:</i>	Ninety days
<i>Batteries:</i>	0-3 months full replacement, 4-12 months pro-rate
<i>Polypropylene Plastic Tanks:</i>	12yr warranty, no additional labor

# ***“Excellence Meets Clean”***

**Minuteman is a Full Line Manufacturer of Sweepers and Scrubbers,  
for Industrial Facilities.**

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