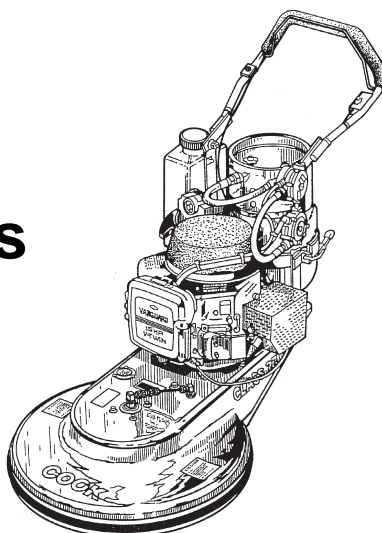


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# Clarke®

## Operator's Manual



## Propane Floor Stripper Equipment

### READ THIS BOOK

This book has important information for the use and safe operation of this machine. Failure to read this book prior to operating or attempting any service or maintenance procedure to your Clarke 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 cannot read English, have this manual explained fully before attempting to operate this machine.

Si Ud. o sus operadores no pueden leer el Inglés, se hagan explicar este manual completamente antes de tratar el manejo o servicio de esta máquina.

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

For new books write to: Clarke®, 2100 Highway 265, Springdale, Arkansas 72764.

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**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, or 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.

This Owner's Manual/Safety Procedures Guide has been prepared for the promotion of educational purposes only and Clarke does not claim or assume any responsibility for the operator's actions or safety. To be completely aware of what local authorities may require, contact the Fire Marshal of your community.

# 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;
- The methods used to determine the amount of potential exposure to CO produced by equipment.



**DANGER:** All LPG (Liquid Propane Gas) powered engines, including this engine, produce Carbon Monoxide (CO). It is a **LETHAL 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 machine

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 over exposure.

ALTO U.S. is 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 November 1997.

## Document Overview

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

### **Potential Effects of CO Exposure**

- **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 are the result of tissue hypoxia (lack of oxygen). The severity depends on the state of activity of the individual and his tissue oxygen needs.

### **Methods to Reduce The Risks of CO Poisoning**

- **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** (Burnishing versus Stripping) - When activity is concentrated to a smaller area as in a stripping application, air “stirring” must be forced by the 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 Equipment** - LPG engines are dependent on engine tune up, and air filter replacement. CO concentration (production) skyrockets when the air to fuel ratio becomes fuel rich. Follow the recommended Maintenance Schedule for the engine.
- **Safety Equipment Available.** - Envirogard automated fuel to air ratio monitoring and regulation providing an optimum combustion, three-way type catalytic converter to scrub CO, Hydro Carbons (HC), and Nitrous Oxide (NOx) 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.

# Engine Emissions and CO Safety

## **Potential Effects of CO Exposure**

- Work place/industry guidelines for CO exposure limits
- Definition of CO effects

### **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	PPM	
8:00-9:00	1 HR	100	
9:00-10:00	1 HR	25	
10:00-11:00	1 HR	25	
11:00-12:00	1 HR	50	
12:00-1:00	1 HR	50	
1:00-2:00	1 HR	50	
2:00-3:00	1 HR	50	
3:00-4:00	1 HR	50	
Time intervals =	8 HR	ppm =	400

400ppm/8HR=50ppm TWA

The current National Institute for Occupational Health and Safety (NIOSH), immediately dangerous to life and health concentration (IDLH) recommended level for CO is 1,200 ppm. 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 head ache, irritability, confusion, dizziness, visual disturbance, nausea, vomiting, and fainting can be experienced. Exposure for one hour to concentrations of 0.1% (1000ppm) in 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**

- Air Exchange and CO Diffusion
- Application Considerations (Burnishing versus Stripping)
- Air Quality Monitoring
- Room Size and Time Estimations
- Maintenance of Equipment
- Safety Equipment Available

### **Air Exchange and CO Diffusion**

The most reliable method to prevent CO Poisoning is to ensure all the 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.

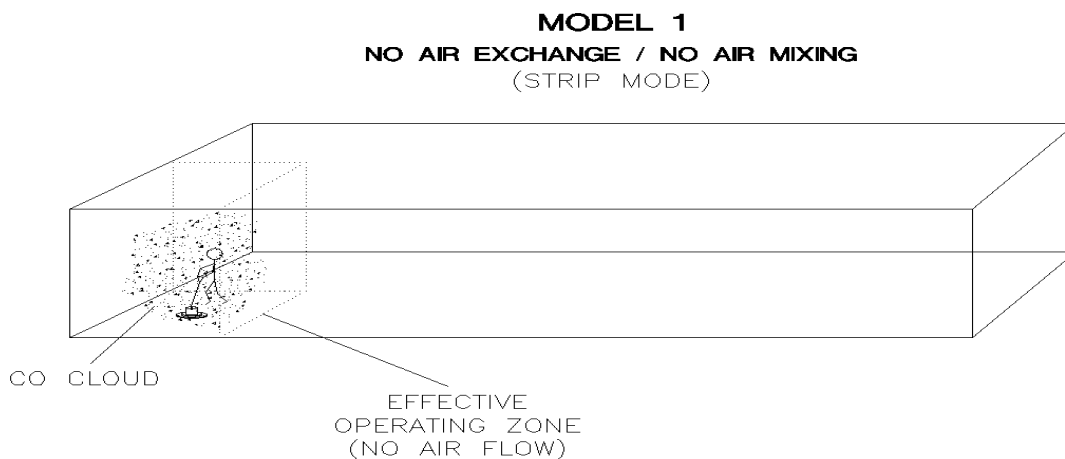
Air exchange rates (air exchange is defined as the exhausting of internal air to the external atmosphere), the size of the Effective Operating Zone, amount of CO produced, level of human activity, and the duration of exposure are all factors in the determination of the production of carboxyhemoglobin and the amount of CO blood saturation.

### **Application considerations (Burnishing versus Stripping)**

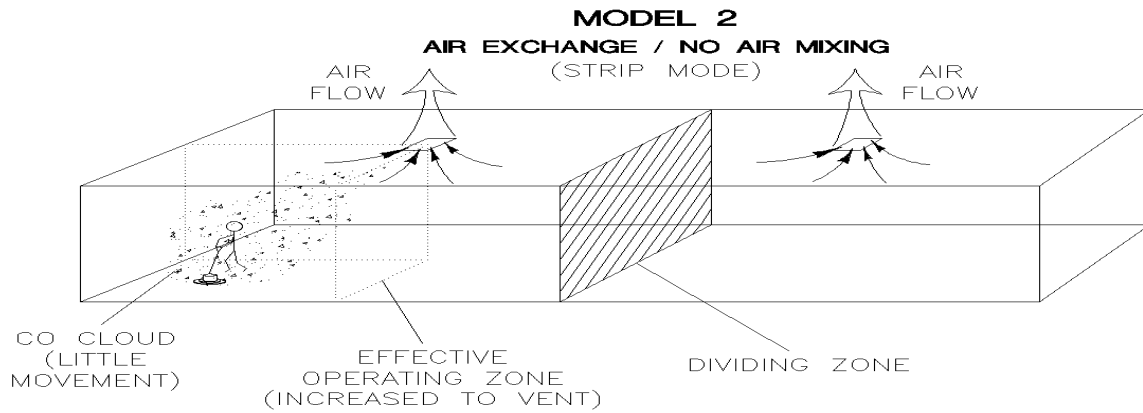
When using equipment over a large area in a short time, as in most burnishing applications, your Effective Operating Zone is large. When activity is concentrated to a smaller area as in stripping applications, the Effective Operating Zone is small and stirring or CO mixing **MUST** be forced by the use of fans to increase the Effective Operating Zone and reduce high concentrations of CO.

Caution: air mixing in itself may not be sufficient to reduce CO to a safe level.

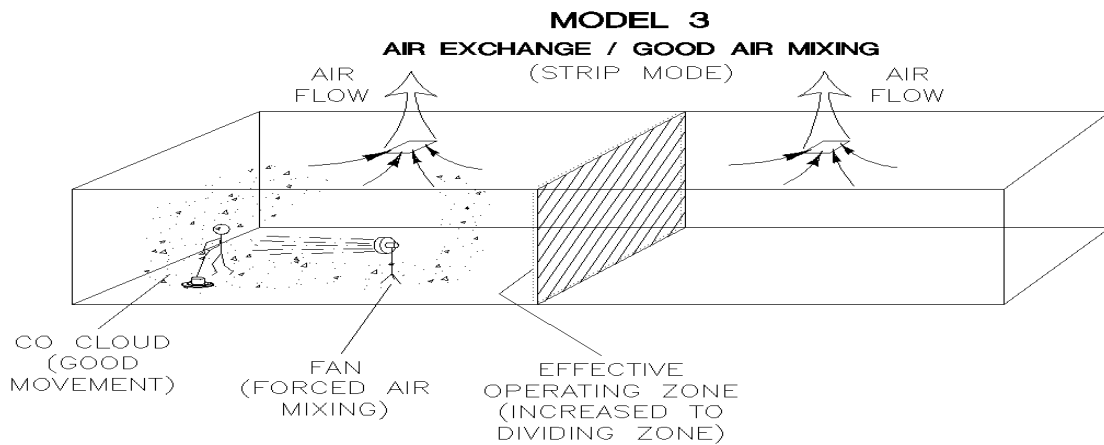
The Effective Operating Zone can be defined as the area covered in a given time.



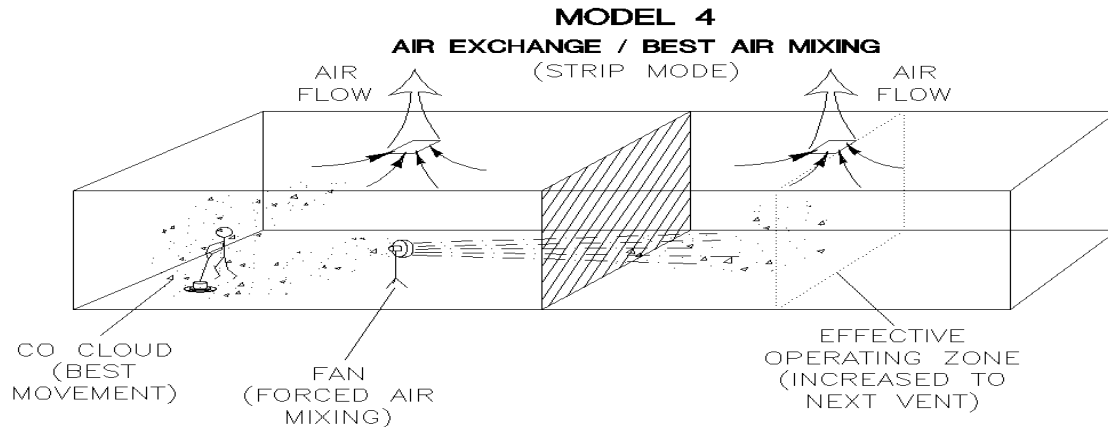
Stripping is quite a different type of operation than burnishing, and carries with it substantially more hazards, as stripping is a low movement operation compared to burnishing (less floor space for the same time). As shown in Model 1, the CO concentrations rise much quicker as the “Effective Operating Zone” is a very small area compared to the total building size.



Notice the CO concentration and the Effective Operating Zone with air exchange. The CO cloud is still concentrated in a small area. Note the “Dividing Zone” shown above, this is the line where airflow changes direction. In Model 2, air changes are cut in  $\frac{1}{2}$  as little or no CO crosses the Dividing Zone to be exhausted.



Notice the CO concentration and the Effective Operating Zone (Expanded to the Dividing zone) with air exchange and forced air mixing. The CO cloud is still concentrated on one side of the Dividing zone. Note the “Dividing Zone” shown above, this is the line where airflow changes direction. In Model 3, air changes are cut in  $\frac{1}{2}$  as little or no CO crosses the Dividing Zone to be exhausted.



Notice the CO concentration and the Effective Operating Zone (Expanded through the Dividing zone to the second vent) with air exchange and forced air mixing through the dividing Zone. The CO cloud is diluted with the available air in the building. Note the “Dividing Zone” shown above, this is the line where airflow changes direction. In Model 4, air changes are full as forced air mixing has moved and mixed the CO between all air zones.

### **⚠ 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. At present several brands sell in the fifty-dollar range. 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 hard-wired. 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 Hotline at 1-800-638-2772.

CO detectors for use in residential settings are not designed for use in typical 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 concentration and volume of CO production;

The size of the area;

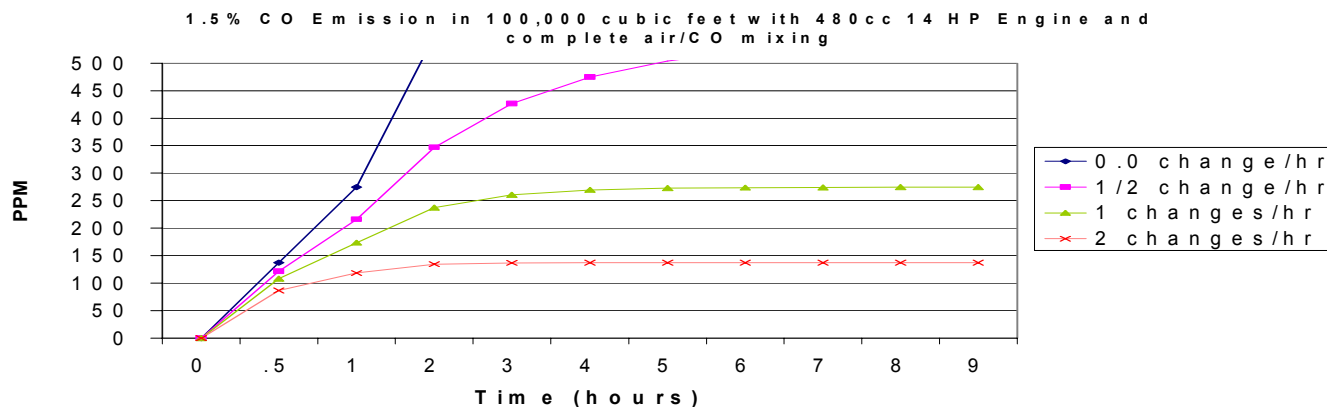
The amount of \*air exchange if any;

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.**

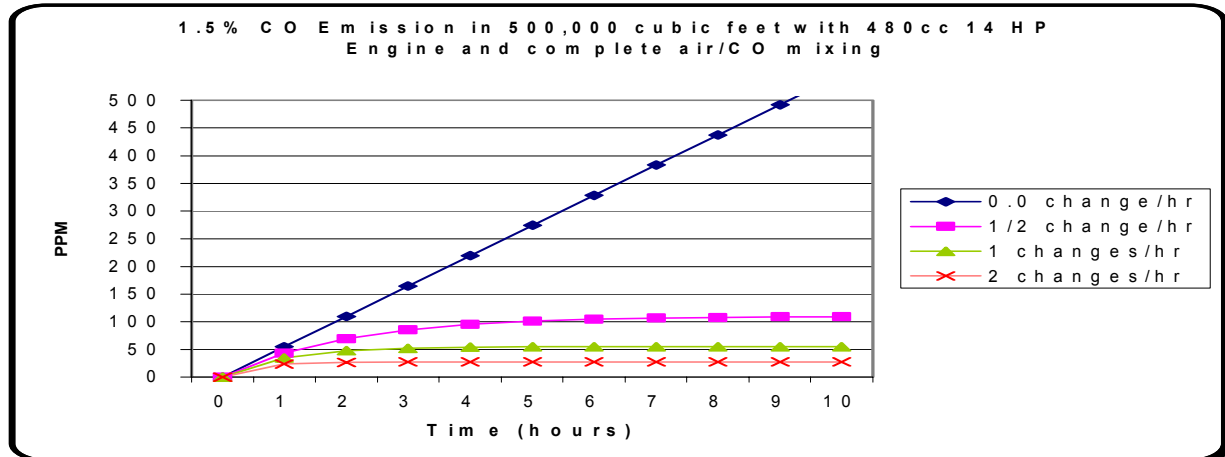




### 8 Hour Time Weighted Average (OSHA Method)

1.5 %CO 100,000cf	Hours Operation	1	2	3	4	5	6	7	8
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 changes/hr	22	51	84	118	152	186	220	255
	2 changes/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 time period)

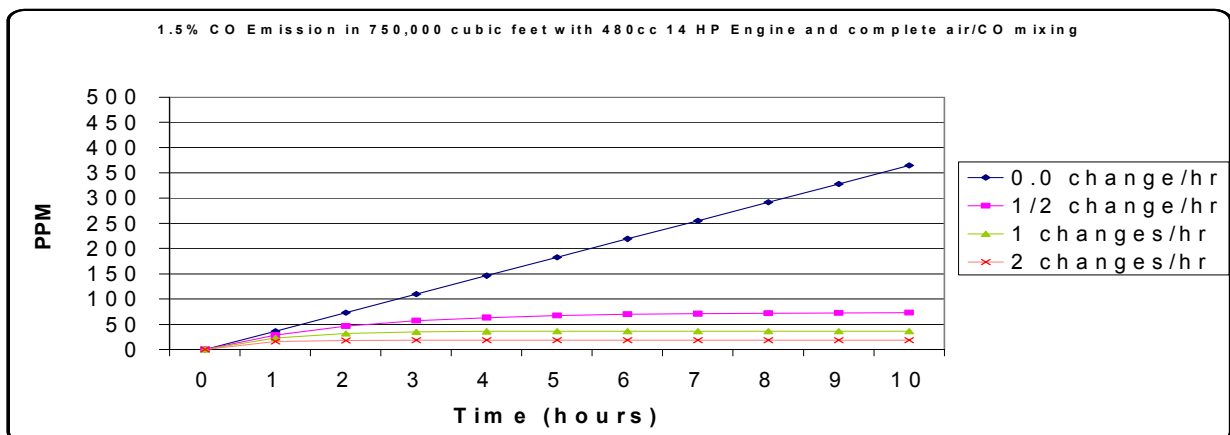


The Graph above depicts the relationships of air exchange to time and CO ppm with cubic feet area and percent CO emissions remaining constant.

### 8 Hour Time Weighted Average (OSHA Method)

1.5 %CO 500,000cf	Hours Operation	1	2	3	4	5	6	7	8
TWA (OSHA Method)	0 change/hr	17	51	103	171	257	360	479	616
	1/2 change/hr	14	35	62	92	123	156	189	223
	1 changes/hr	11	26	42	59	76	93	110	127
	2 changes/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 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 Operation	1	2	3	4	5	6	7	8
TWA (OSHA Method)	0 change/hr	5	14	27	46	69	96	128	164
	1/2 change/hr	4	9	16	24	33	42	50	59
	1 changes/hr	3	7	11	16	20	25	29	34
	2 changes/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)

### Maintenance of Equipment

 **Warning** The proper maintenance of equipment is vital to safe operation. LPG engines are dependent on engine tune up, and air filter replacement. CO concentration (production) skyrockets when the air to fuel ratio becomes fuel 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 Propane Floor Equipment Operator's Manual that were supplied with the equipment. Additional manuals may be obtained by contacting Clarke at 1-800-545-3454 or write to Clarke Customer Service, 2100 Hwy. 265, Springdale AR 72764.

### CO Safety Equipment Available




- Envirogard automated fuel to air ratio monitoring and regulation providing an optimum combustion
- Three-way type catalytic converter to scrub CO, Hydro Carbons (HC), and Nitrous Oxide (NOx) from the engine exhaust providing the lowest possible emissions
- High cubic feet per minute (CFM) fans (forced air mixing)
- Digital combustion analyzers for tail pipe emissions monitoring











# OPERATOR SAFETY INSTRUCTIONS







## WARNING

## AVERTISSEMENT

## ADVERTENCIA

- |   |  |
|---|--|
|  <b>DANGER</b> means:  | Severe bodily injury or death can occur to you or other personnel if the <b>DANGER</b> statements found on this machine or in this Owner's Manual are ignored or are not adhered to. Read and observe all <b>DANGER</b> statements found in this Owner's Manual and on your machine. |
|  <b>WARNING</b> means: | Injury can occur to you or to other personnel if the <b>WARNING</b> statements found on your machine or in this Owner's Manual are ignored or are not adhered to. Read and observe all <b>WARNING</b> statements found in this Owner's Manual and on your machine.                   |
|  <b>CAUTION</b> means: | Damage can occur to the machine or to other property if the <b>CAUTION</b> statements found on your machine or in this Owner's Manual are ignored or are not adhered to. Read and observe all <b>CAUTION</b> 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 Clarke 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 cannot read English, 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 source of 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 manufacturers air cleaner service instructions.
-  **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.
-  **WARNING:** Insulation installed in the new muffler may become loosened in the initial few hours of operation. This material will lodge in spark arrester in the muffler exit port. Onan requires that the spark arrester be removed and cleared of all debris after the first five hours of operation and as part of regular maintenance. Failure to perform this maintenance can result in severe engine overheating.

## Introduction

Clarke propane floor care equipment is manufactured in two basic concepts: the buffer/burnisher and the floor stripper. Both of these designs are truly PORTABLE equipment. Propane buffers 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 buffer should always be kept moving. The speed at which you walk will determine the results that you will obtain. Slower speeds create more heat and therefore more shine. Clarke recommends a moderate pace for best results and safe operation. **NEVER RUN WITH THE BUFFER!!** While a credible shine will still result, the danger of trying to stop the machine in an emergency situation is unacceptable. When buffing, avoid loose tile, electric outlets, door thresholds and any object which may come in contact with the pad other than the floor itself. **REMEMBER**, the pad is turning very rapidly.

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

-  **CAUTION:** *Overfilling the propane tank is the number one cause of problems with a propane machine. 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 lockoff/regulator assembly. This voids the warranty on affected parts of the machine. To avoid problems, read and understand fully, the section "Filling and Storing Propane Tanks."***

**OVERHEATING** is a major cause of engine failure. Keep the cooling air bonnet filter clean. Protect your machine; 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. Clarke recommends changing the oil **on a regular schedule**, perhaps exceeding that which is found in the engine manufacturers' manual. Checking the oil daily, before putting the machine to work, is a good habit to get into and could save you the downtime and expense of replacing the engine due to oil starvation. **AFTER AN OIL CHANGE, MAKE SURE YOU HAVE REPLACED THE OIL SUPPLY BEFORE RESTARTING THE ENGINE.**

## 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 Tanks

Propane tanks are constructed according to ASME or Federal DOT #4ET20 pressure safety codes. Including the tank, all valves and fittings are UL Listed. Propane gas is noncorrosive and will not rust the inside of a tank. Should the tank exterior become damaged or rusted, discontinue use. **DO NOT** tamper with tank gauges or safety relief valves. **NEVER** use a tank not intended for use with a propane buffer. **DO NOT** substitute tanks that are used with a barbecue grill, etc. Clarke recommends having propane tanks tested once a year by an authorized National LP Gas Association sanctioned propane dealer.

The fuel tank is supplied directly from the manufacturer and is void of fuel. This tank must be **purged** at the time of the first fill. Local fuel vendors should be familiar with this operation and will provide this service.

### Recommended Purge Procedures

How to purge new LP-Gas Buffer 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 container and placing it into service. Air in the container 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 container.

**To purge a container, the following steps should be taken.**

Purging of containers should be performed in an approved area (see NFPA #5 8) using NPGA #13 3.89(a) procedure.

1. Determine if the container 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.
2. 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 to vapor 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. Repressurize the container with odorized LP-gas vapor to 15 psig.
7. The container is now ready to be filled with LP-gas.
8. Once filled, check all fittings and tank openings for leaks using an approved leak detector solution.
9. The container is now ready to be placed in service. Add DOT and OSHA labels.

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

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

### Refilling & Storing Propane Tanks

The NFPA Technical Committee prohibits the storage of such containers in buildings. There are few exceptions to this rule. In other words, propane tanks 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 tanks in small enclosed areas. The tank(s) must be in a secure, tamper-proof storage enclosure that provides safety from accident or vandalism. **PROPANE TANKS SHOULD ALWAYS BE TRANSPORTED, INSTALLED AND USED IN AN UPRIGHT POSITION.**

#### **OVERFILLING PROPANE TANKS IS HAZARDOUS.**

The tank should **NEVER** be completely filled with liquid propane. 80% of the total tank volume is to be considered at **ALL** times as full. **EXPANSION MUST BE ALLOWED FOR.** Propane Buffer tanks 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 in its side, as the tank is refilled. When the escaping vapor starts to give way to liquid, the device must be quickly closed and the propane nozzle turned off.

**\*\*IMPORTANT\*\* The engine and the fuel system on your floor care machine are designed to run on fuel vapor, not fuel liquid. Overfilling the propane tank will result in damaging the lockoff and/or regulator. This will VOID the WARRANTY on these components.**



## 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 and tighten the bolts to 30-50- ft/lbs.
2. BONNET FILTER - Make sure the bonnet air filter atop the engine is clean. It should be changed hourly and thoroughly cleaned before reuse.
3. Check the engine OIL LEVEL.  
\*\* HONDA - **DO NOT** screw the dipstick in to get reading.  
\*\* KAWASAKI - **DO** screw the dipstick in to get reading.
4. Fill the tank following the instructions as given under the previous heading: "Refilling And Storing Propane Tanks." In addition, if your buffer came with an "80% Safety Fill Tank" then it should ONLY be filled through the threaded valve with the larger diameter that is covered by a yellow cap to ensure a "Full" level that is safe.
5. PAD AND PAD HOLDER - Inspect the condition of the pad and pad holder. Is there a pad? Is it properly attached? What is its condition? Ensure the pad is clean and has at least a thickness of 1/3 inch. ALWAYS turn off the engine to clean or replace pad.
6. TANK and FUEL LINES - The tank has already been covered but do the fuel lines show any sign of wear and tear, such as cracks or any corrosion? Screw the brass fuel line fitting onto the tank 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 fuel line fitting is COMPLETELY seated into the service valve.

### Starting the Engine

1. Plug in 110 volt starter cord on models so equipped.
2. We recommend setting the throttle on models with 110 volt starter to the following positions:  
\*\* HONDA - Set throttle/choke to the "choke" position.  
\*\* KAWASAKI - The KAWASAKI single cylinder and Kawasaki twin cylinder engines are designed to be started in the **IDLE** throttle position. This creates a 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 fuel so the engine will not start. Proper maintenance will insure easy starting.
3. Open (counterclockwise) the service valve on the propane tank about one and a half turns.
4. Ensure the buffer is tilted back so that the pad is off the floor on all machines without a clutch.
5. 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.
6. Open the "choke" until the engine runs smoothly. (HONDA ONLY)
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 Trouble Shooting Guide.

### Stopping The Engine

1. Close (clockwise) the service valve on the propane tank.
2. ALWAYS allow the engine to run until it stops from lack of fuel.  
\*\* ONLY IN AN EMERGENCY should the "stop" position on a HONDA throttle or the "kill switch" on a KAWASAKI and ONAN models be used.
3. Disconnect the fuel line from the tank.
4. REMEMBER, when you are finished with the machine, store the propane tank outside the building, in a safe place away from heat or direct sunlight.

## Maintenance And Adjustments

### Emission Control Information

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

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

### Tampering w/Emission Control System Prohibited

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

Among those acts presumed to constitute tampering are the acts listed below:

Do not tamper with the original emission related part.

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

### General Maintenance and Adjustments

1. **Fuel 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 machine if carbon monoxide levels exceed OSHA standards.
2. **Pad replacement.** Tilt the machine back on its rear caster 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.

## Maintenance And Adjustments

3. **Belt replacement.** Tilt the machine on its side (observing the following precautions) and block securely.  
\*\*KAWASAKI and HONDA single cylinder - **Do not turn the carburetor side down.** Oil will enter the intake manifold and may cause engine damage. Turn the machines with the exhaust side down.  
\*\*KAWASAKI twin cylinder - Do not tilt the machine on its nose as this is where the carburetor is located. It is okay to turn this model on either its left or right side.
  - (a) Remove pad.
  - (b) Use a suitable wrench to secure the top of the shaft and spin off the pad driver and remove it from the machine.
  - (c) Remove old belt carefully and completely.
  - (d) Install new belt and adjust the pressure of the Lovejoy tensioner.
  - (e) Reinstall pad driver.

### Recommended 20 Hour Maintenance Items -

- >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.

### Recommended Oil Change Intervals

Do not exceed the 20 hour oil change interval. Oil changes more frequent than 20 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, CC. The various engines have different oil sump capacities. Make sure the oil level is maintained at the "FULL" level.

### Recommended 200 Hour Maintenance

Return machine to authorized service center for overall checkup.

## Trouble Shooting

- When troubles occur, be sure to check the 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. If you don't check for this, starter burnout could result.
1. **KAWASAKI - "SURGING IDLE"** - To smooth out the engines' idle characteristics, adjustment is provided by an idle screw on the lower left side of the carburetor as viewed from the operator's position. The screw is bright steel and 1/4" in diameter with a Phillips head on it. Rotating the screw clockwise will increase the idle speed and this should cure the "surging idle". IF IT DOES NOT, call our customer service department for assistance.
  2. **EXCESSIVE VIBRATION** - Look for the following possibilities:
    - (1) Pad is off center. Remove and reinstall.
    - (2) Pad Driver is bent or cracked. (Possibly from striking a curb or bolt in the floor.) Replace immediately with a new part only.
    - (3) Bearings in Front End Assembly are worn. Place machine on its side where the muffler is mounted. Grip Pad Driver and move up, down and from side to side to check for slack in the bearings. If this is the case, then to effect a proper repair, the bearings should be replaced and possibly the shaft.
    - (4) Check to see if the bolts on shaft housing are tight. Look to see if the nuts, bolts and spacers on the Flex Coupler Assembly are all in place and tight.
  3. **ENGINE STARTS AND IDLES, BUT WILL QUIT AS THE THROTTLE IS ADVANCED** - It is possible that the propane tank's service valve is faulty. To check for this, close the valve completely and then reopen very slowly while you listen for a "click" when the gas begins to travel through the valve. If you hear this very slight noise, then what is happening is the valve is only partially opening. This allows enough gas through to start and idle the engine, but not enough for full throttle operation. As the throttle is increased, allowing more air to enter the intake, the engine will quit from fuel starvation. Call your dealer or the factory for instructions on where to have the service valve replaced. Meanwhile, to get by, you can continue to open the service valve until you don't hear a "click" and then the engine will run normally. IF IT DOES NOT, call our customer service department for further assistance.
  4. **THE BUFFER SEEMS TO RUN WELL BUT DIES DOWN WHEN THE PAD IS PLACED ON THE FLOOR OR SOON THEREAFTER** - Check for the same problem as in #3.
  5. **EXCESSIVE NOISE FROM UNDER BUFFER** - If this problem has developed after use of the machine from new, then the first place to check is the Lovejoy Tensioner. As a new belt wears in, it naturally stretches a bit and the tensioner will begin to rattle. Place the buffer on its side (with the muffler down) and reset by taking up the slack in the belt and tighten the Lovejoy Tensioner.

## Trouble Shooting

6. **STARTER WILL HARDLY TURN THE ENGINE OVER or THE SOLENOID JUST CLICKS ON 12 VOLT OPTION MODELS** - The battery is likely low in charge. This can be remedied by recharging the battery using a 12 volt battery charger at 4-12 amperes. The battery is located under the frame at the rear of the buffer. The positive post is the one with the RED cable attached to it. Follow the instructions that came with the battery charger. REMINDER: this will continue to happen unless the buffer's engine is run for sufficient time between starts to recharge the battery.
7. **KAWASAKI V-TWIN - ENGINE BACKFIRES LOUDLY AND REGULARLY SUDDENLY** - Check the sparkplug boots. One of them is likely cracked, possibly due to contacting a corner of a shelf or a door frame. Remove the sparkplug lead from the sparkplug and replace the boot with a new one. The engine should now run normally. IF IT DOES NOT
- contact our customer service department for further assistance.
8. **KAWASAKI SINGLE CYLINDER - HARD STARTING** - You've tried the normal methods and the engine still refuses to start and run. Remove the fuel hose from the cylinder and press in on the valve which is inside the quick coupler fitting on the end of the hose. This will release the built up pressure in the system and care should be taken not to be "burned" by the escaping gas. Then reattach the fuel line to the propane cylinder but DO NOT open the service valve. Set the throttle at approximately 1/2 and press the starter button. Allow the engine to turn over about 2 or 3 times and then open service valve at least 1 1/2 full turns. The engine should now be running. IF IT DOES NOT, contact our customer service department for further assistance.

## NOTES

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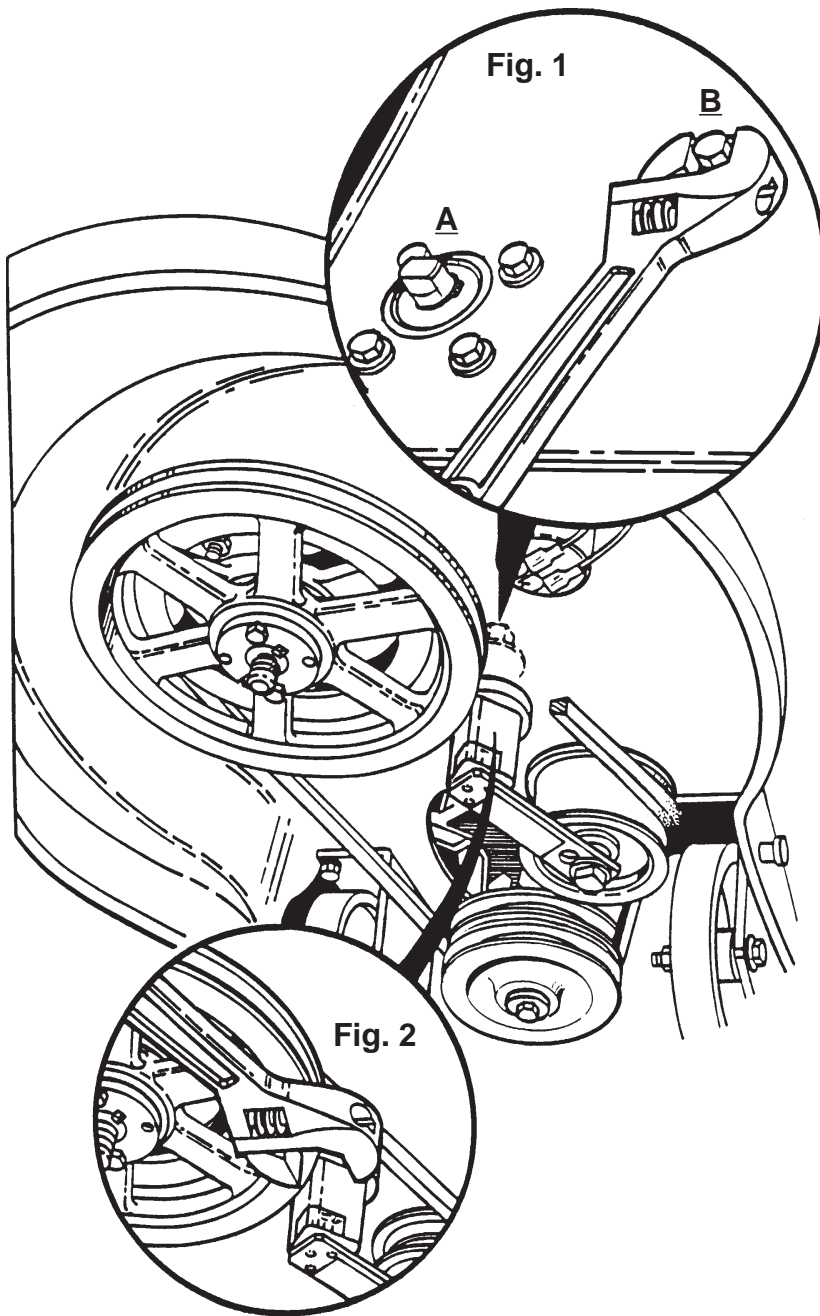
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# **Clarke®**

**Propane Floor  
Stripper  
Equipment  
Section II  
Parts Manual**

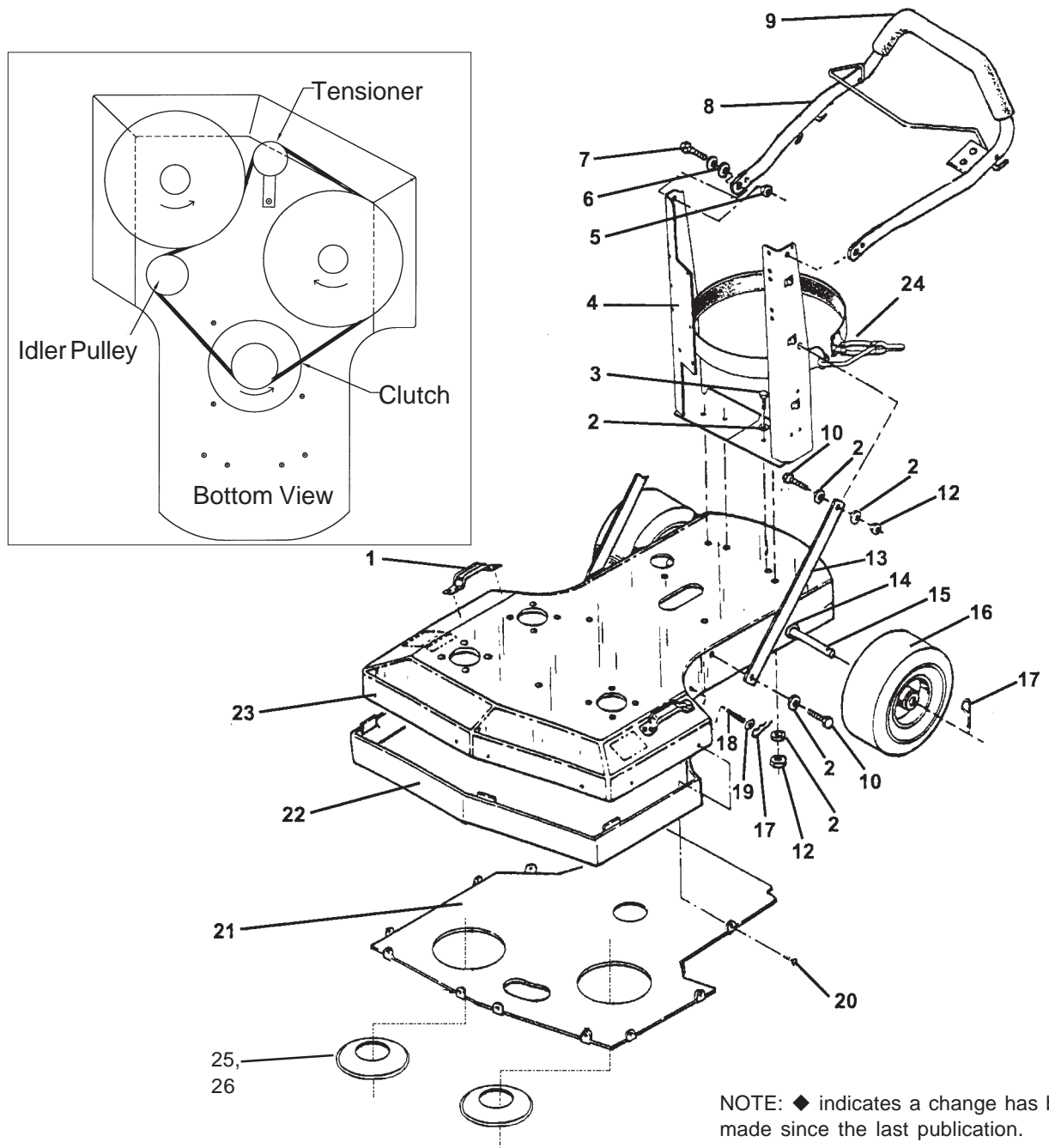
(70093A)

Clarke®  
Stripper Conversion Procedures



- Step 1.)** While machine is cool, remove front splashguard, air tires and axle.
- Step 2.)** Tilt machine on muffler side of engine, opposite carburetor.
- Step 3.)** Hold shaft in place with wrench (Fig. 1A) and remove strip brush by rotating it counterclockwise (bottom view).
- Step 4.)** Loosen tensioner bolt counterclockwise (Fig. 1B).
- Step 5.)** Remove B-51 belt from the larger front pulley and install B-47 belt onto the smaller front pulley.
- Step 6.)** Turn tensioner counterclockwise (Fig. 2) until tensioner arm reads at the 30° mark on the tensioner base.
- Step 7.)** While holding tension against belt, tighten bolt clockwise (Fig. 1B) making sure to torque securely.
- Step 8.)** Install pad-driver assembly while holding shaft with a wrench, and rotating clockwise. (Fig. 1A)
- Note:** Same procedures are necessary for converting back to stripper mode.

**Clarke®**  
**Frame Assembly 28" Twin Strip 11/05**



NOTE: ◆ indicates a change has been made since the last publication.

Ref.	Part #	Description	Qty.	Ref.	Part #	Description	Qty.
1	99063A	Handle, "D" Style (ZZ16)	2	14	98485A	Collar (H064)	4
2	170860	Washer, Flat (H069)	14	15	98643A	Axle, 28" Strip (W527)	1
3	98462A	Screw (H025)	4	16	98632A	Tire, 10" Air (W521-27A)	2
4	98612A	Bottle Carrier (W30)	1	17	98489A	Pin, Cotter	4
5		See Page 14, Fig. 1	--	18	68013A	Stud, Screw	2
6		See Page 14, Fig. 1	--	19	98457A	Washer, Fender (H018)	2
7		See Page 14, Fig. 1	--	20	98486A	Screw (H066)	12
8		See Page 14, Fig. 1	1	21	67551A	Shield, Splash	1
9		See Page 14, Fig. 1	1	22	38017A	Guard, Splash	1
10	85813A	Screw (H061)	4	23	98627A	Frame, 28", Twin (W5000)	1
12	920110	Nut (H007)	6	24	55720A	Latch	1
13	98611A	Bracket, Support (W29)	2	25◆	30571A	Guard, Splash	2
				26◆	98453A	Rivet	8

**Clarke®**



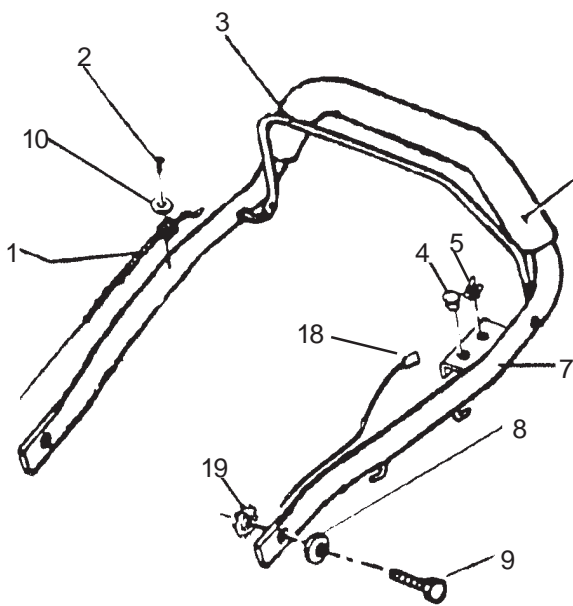
**Clarke®**  
**Stripper Frame Assembly/Strip Buff Combo 11/05**

Ref #	Part No.	Description	Qty
1	98489A	Pin, Cotter (H077)	4
2◆	80152A	Washer	2
3	98632A	Tire, 10" Air (W521-27A)	2
4	98485A	Collar, 5/8" Shaft (H064)	4
5	98641A	Axle, Strip (W525)	1
6	85813A	Screw	2
7	170886	Washer	12
8	98644A	Bracket, Axle (W528)	1
9	98612A	Carrier, Bottle (W30)	1
10	98462A	Screw (Strip Buff Combo Only)	4
11	98448A	Nut, Lock (Strip Buff Combo Only)	1
12	98447A	Screw (Strip Buff Combo Only)	8
13	98648A	Caster, Rear (W531)	1
	50399A	(Strip Buff Combo Only)	(1)
14	920110	Nut	8
15	58539A	Spacer, Tensioner	1
16	98652A	Pulley, Double (W54B)	1
17	58538A	Spacer	1
18	98973A*	Tensioner, Lovejoy (XC44B) Includes items a, b & c	1
19	68013A	Stud	2
20	10630A	Assembly, Wheel (Strip Buff Combo Only)	2
21	98451A	Washer, Lock	1
22	98457A	Washer, Fender	2
23A	98772A	Splashguard (W98-21)	(1)
23B	38018A	Spashguard (W98-24)	(1)
24A	98624A	Frame, Class 21 (W50-21)	(1)
24B	98625A	Frame, Class 24 (W50-24)	(1)
25	98628A	Meter, Hour (W51)	1
26	49774A	Harness, Ground (Black)	1
27	49773A	Harness, Power (Red)	1
28◆	88305A*	Screw, M10-1.25 x 50	1
29	98477A	Rivet, Alum	3
30	99042A	Belting, 6" White (ZZ01)	1
31	69881A	Bracket, Splashguard	1
32	980210	Washer	1
33	55702A	Latch and Bolt	1

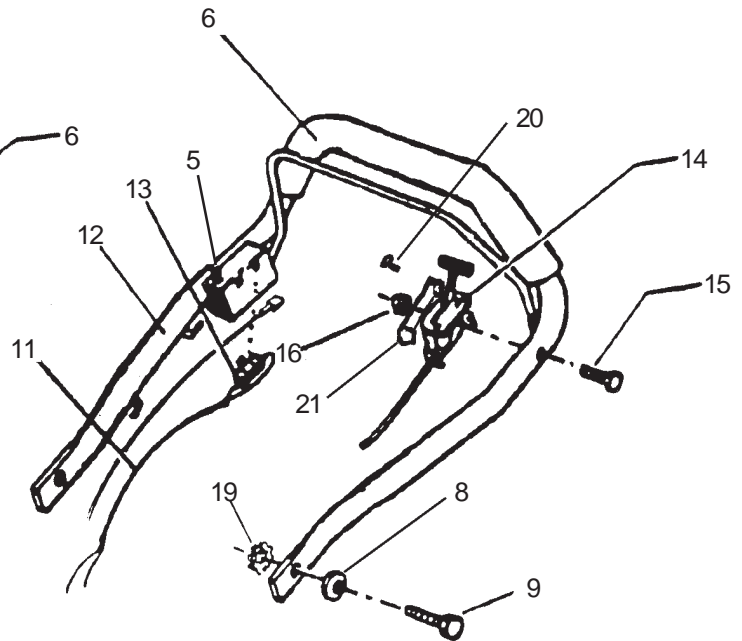
**NOTE:** \* Applies to Twin Strip Only

**NOTE:** ◆ indicates a change has been made since the last publication of this manual.

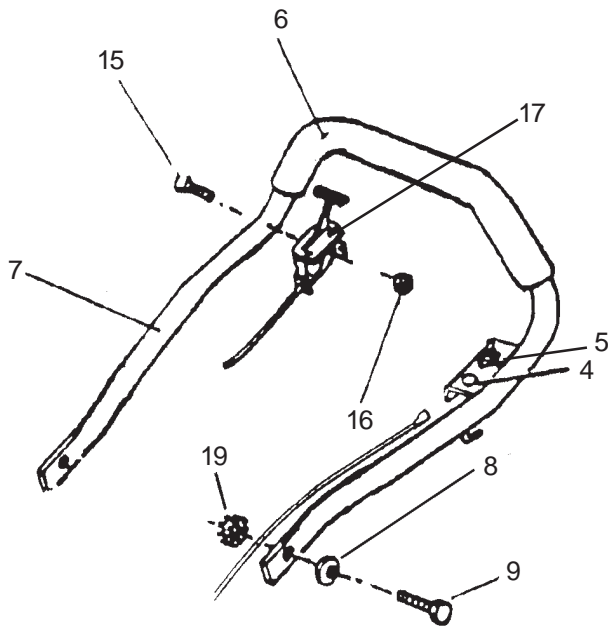
Clarke®  
Handle Assembly 11/99



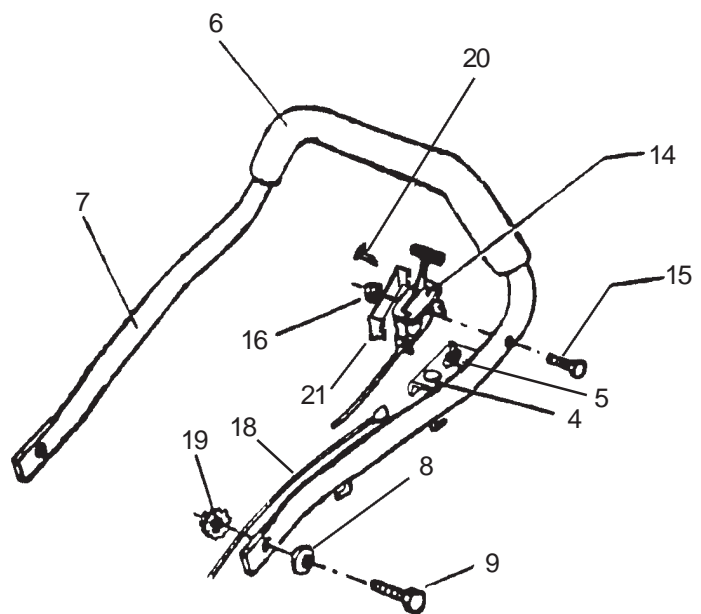
**Fig. 1**  
Centrifugal Clutch  
(UL listed machines)



**Fig. 2**  
Electric Clutch  
(UL listed Machine)



**Fig. 3**  
V-Twin Non-Clutch

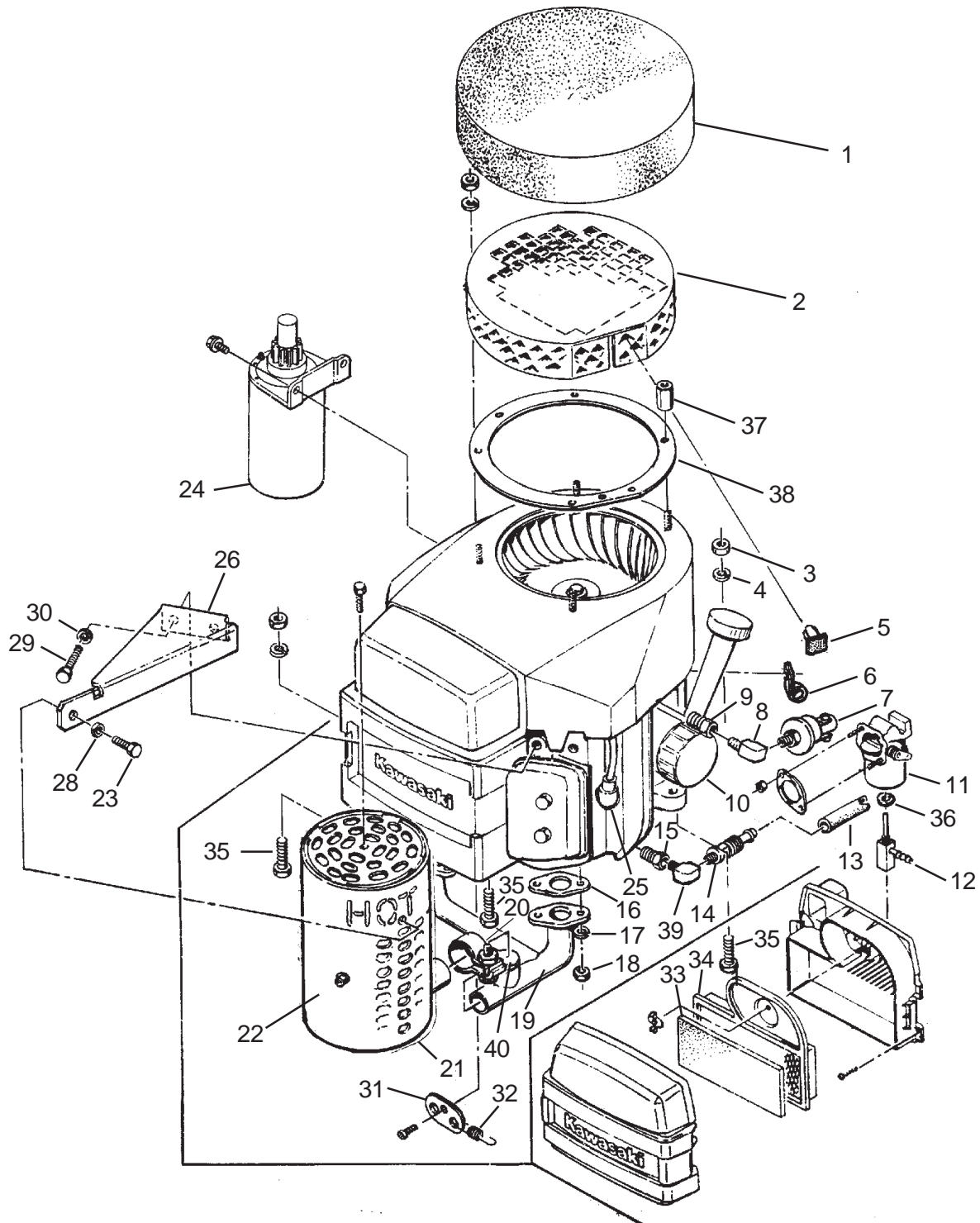


**Fig. 4**  
Single Cylinder Non-Clutch

**Clarke®**  
**Handle Assembly Parts List 11/99**

<b>Ref #</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty</b>
1A	50024A	Cable, U.L. Throttles KAW. Twins (W710)	(1)
1B	52960A	Cable, Throttle KAW. Single	(1)
1C	50289A	Cable, Throttle KAW. 14 Adj.	(1)
1D	50290A	Cable, Throttle KAW. 17 Adj.	(1)
2	98487A	Screw, (H066)	1
3	98618A	Lever, Bar, U.L. (W40U)	1
4	52041A	Plug, ½ Button	1
5	98757A	Kill switch, Vanguard (W731)	1
6	98622A	Grip Tube, Handle (W431)	1
7	98617A	Handle, Upper (W40)	1
8	98468A	Washer (H031)	2
9	85735A	Screw	2
10	98497A	Washer	1
11	98717A	Wire, (B006)	3'
12	98619A	Handle, Upper U.L. (W401)	1
13	98563A	Switch, Electric Clutch (W08)	1
14	98744A	Cable, Throttle, L.H. (W71)	1
15	85702A	Screw	1
16	81102A	Nut (H035)	1
17	98749A	Cable, Throttle, R.H. (W712)	1
18	49772A	Harness (Briggs & Stratton only)	1
19	98469A	Washer	2
20	962559	Screw	2
21	50767A	Bracket, Throttle	1

Clarke®  
 Engine Assembly 6/00  
 KAWASAKI FH 500V  
 "V" Twin






**Clarke®**  
**Engine Assembly 6/00**  
**KAWASAKI FH 500V**  
**"V" Twin**

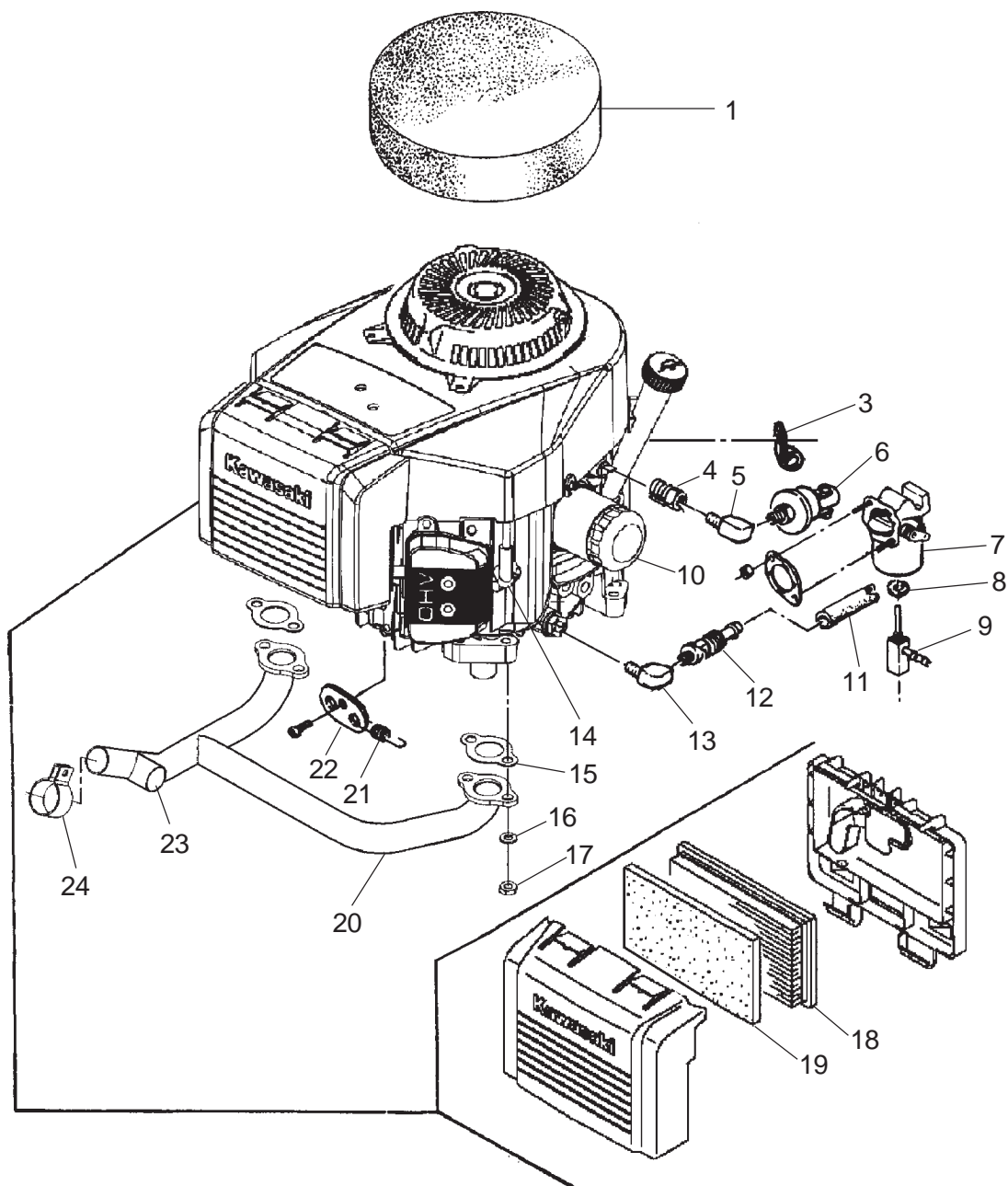
Ref #	Part No.	Description	Qty
1	50028A	Bonnet KAWASAKI	1
2	60047A	Bonnet Cage	1
3	920110	Nut	3
4	170860	Lock Washer	3
5	98978A	Velcro Stud	2
7	47436A	Oil Switch	1
8	852841	Elbow St.	1
9	50360A	Adaptor	1
10	50027A	Oil Filter	1
11	50001A	Carburator	1
12	60003A	Spud	1
13	98756A	Hose	1
14	98805A	Oil Drain	1
14A	50239A	"O" Ring	1
15	50238A	Adaptor, Oil Drain	2
16	50023A	Manifold Gasket	1
17	980652	Washer	2
18	80049A	Nut	4
19	50003A	Manifold	1
20	50017A	Clamp	1
21	50002A	Catalytic Convertor	1
22	60010A	Heat Shield	1
23	85398A	Screw	4
24	50019A	Starter	1
25	50004A	Spark Plug	1
26	60062A	Bracket	1
28	424704	Lock Washer	3
29	198213	Screw	2
30	980652	Lock Washer	2
31	60017A	Spring Clip	1
32	98751A	Spring	1
33	50021A	Pre-Filter	1
34	50005A	Filter	1
35	86108A	Screw	3
36	80074A	Washer	1
37	80073A	Nut	4
38	60209A	Gasket	1
39	98755A	St. Elbow	1
40	57161A	Plug	1
NI	70139A	Engine Service Manual	1
NI	70137A	Engine Parts Manual	1

Engine Kit 50031A (less Catalytic Convertor):

Includes engine converted for LP fuel and the additional components 1, 2, 5, 7, 8, 9, 13, 14, 15, 16, 17, 18, 19, 20, 24, 31, 32, 37, 38, 39, & 40.

 **WARNING:** Improper installation of fuel components may result in asphyxiation or explosion. This component must be adjusted to factory emissions' specifications after installation. The adjustments must be accomplished by a trained LP engine mechanic using emissions testing equipment.


Clarke®  
 13 HP Engine Assembly 9/04  
 KAWASAKI FH 381V  
 "V" Twin




**Clarke®**  
**13 HP Engine Assembly 9/04**  
**KAWASAKI FH381V**  
**"V" Twin**

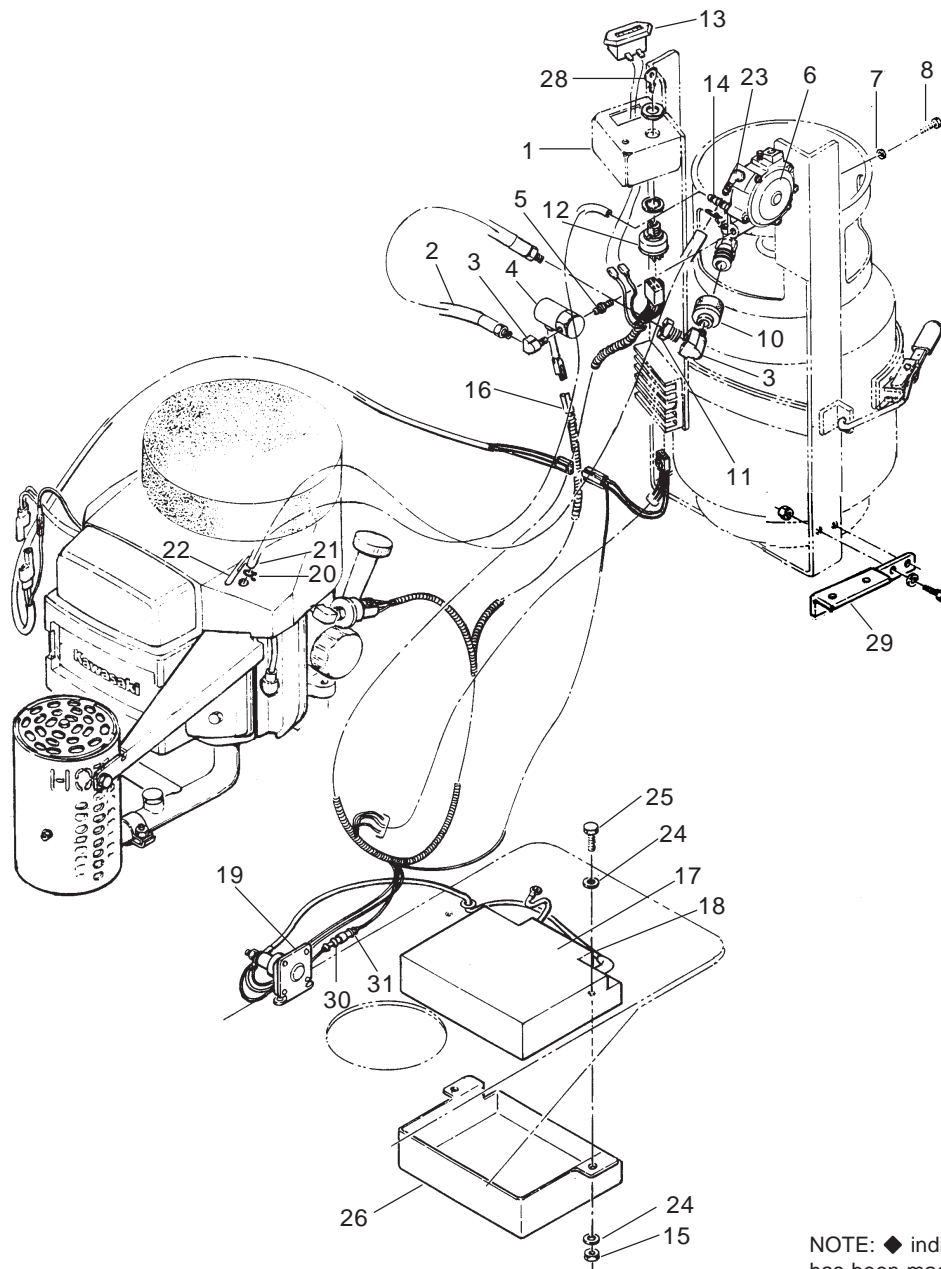
Ref #	Part No.	Description	Qty
1	53388A	Bonnet KAWASAKI	1
3	52553A	Cable Clamp	1
4	50360A	Adaptor	1
5	852841	Elbow St.	1
6	47436A	Oil Switch	1
7	10805A	Carburetor FH381V	1
8	80074A	Washer, Wave, <sup>5</sup> / <sub>16</sub>	1
9	60003A	Spud	1
10	50027A	Oil Filter	1
11	98756A	Hose	1
12	98805A	Oil Drain	1
12A	50239A	"O" Ring	1
13	98755A	St. Elbow	1
14	50015A	Spark Plug	2
15	52825A	Manifold Gasket	2
16	980652	Washer, Lock, <sup>5</sup> / <sub>16</sub>	4
17	80049A	Nut, Hex	4
18	53574A	Filter	1
19	53590A	Pre-Filter	1
20	61560A	Manifold, Exhaust	1
21	98751A	Spring	1
22	60017A	Spring Clip	1
23	57161A	Plug	1
24	50017A	Clamp	1
NI	61559A	Catalytic Convertor	1
NI	53494A	Muffler	1
NI	50019A	Starter	1
NI	70862A	Engine Service Manual	1
NI	70863A	Engine Parts Manual	1

Engine Kit 10789A (less Catalytic Convertor) *certified*  
*w/Catalytic Convertor only:*  
Includes engine converted for LP fuel and the additional  
components 1, 6, 7, 8, 9, 13, 14, 16, 17, 18, 19, 31, 32, 39 & 40.  
Catalytic Converter Kit: P/N 10808A

 **WARNING:** Improper installation of fuel components may result in asphyxiation or explosion. This component must be adjusted to factory emissions' specifications after installation. The adjustments must be accomplished by a trained LP engine mechanic using emissions testing equipment.

 **WARNING:** Federal Regulations prohibit any exhaust element to be removed or replaced with components other than those included in the original engine design.

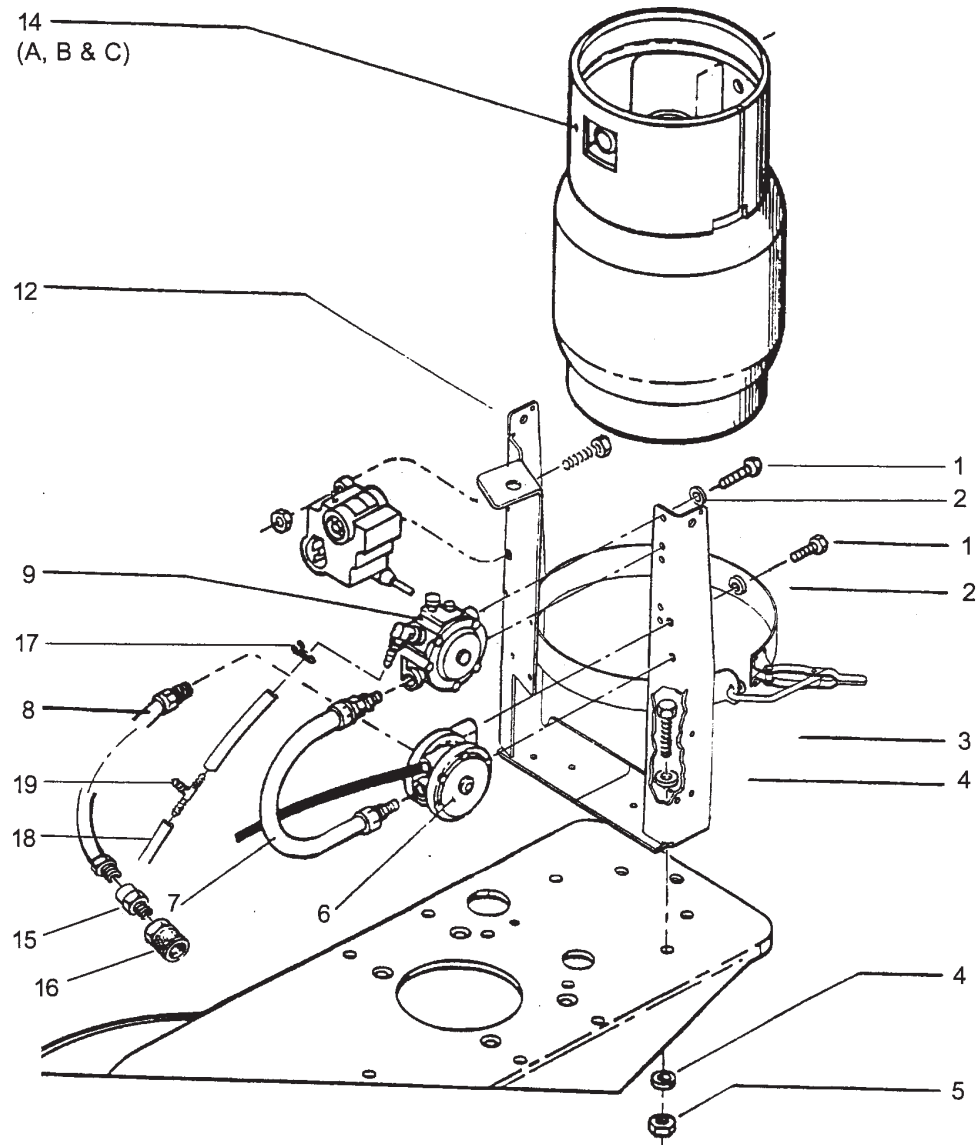
**Clarke®**  
**12 Volt Fuel System 11/05◆**



NOTE: ◆ indicates a change has been made since the last publication of this manual.

Ref.	Part #	Description	Qty.	Ref.	Part #	Description	Qty.
1	60006A	Switch Cover	1	16	40004A	14 HP Wiring Harness	1
2	50299A	Hose, 3/8" LP	1	16a	40000A	17 HP Wiring Harness	1
3	170040	Street Elbow	2	17	98711A	(W6821) Battery, 12 Volt Non-spill	1
4*	98668A	(W58) Lockoff, 12V. Fuel	(1)	18	98706A	(W6815) Cable, Battery 11" Red	1
5*	98838A	(XA53-6) Nipple, 1/4 Hex	(1)	19	98701A	(W6811) Solenoid, 12 Volt	1
6	18124A	(XA53C) Regulator Asm. 12V	1	20	98473A	(H041) Clamp, 5/8 Wire Type	2
7	980657	(H040) Washer, 1/4 Lock	2	21	98825A	(XA50) Hose, 3/8 fuel	2 ft.
8	98472A	Screw, Button, 1/4-20 x 0.62	2	22	98826A	Vac Hose, 3/16	2 ft.
9	Page 20	(MAC811) Tank, Polished Alum.	1	23*	98831A	(XA53-ZZ) Elbow, 1/4 Street 90°	(1)
10	98858A	(XA58F) Coupler	1	24	87025A	(H068) Washer, Flat	4
11	59620A	Check Valve	1	25	85700A	(H084) Screw, Hex, 1/4 -20 x 1	2
12	98703B	(W6813) Switch, Ignition	1	26	98712A	(W6822) Box, Battery	1
13	912226	Hour Meter	1	27	98613A	Felt	1
14	693303	Hosebarb	1	28	98705A	Key	1
15	81102A	Nut, Lock, 1/4 -20	2	29	69882A	Bracket, Regulator	1
				30	42919A	Fuse	1
				31	43006A	Fuse Holder	1

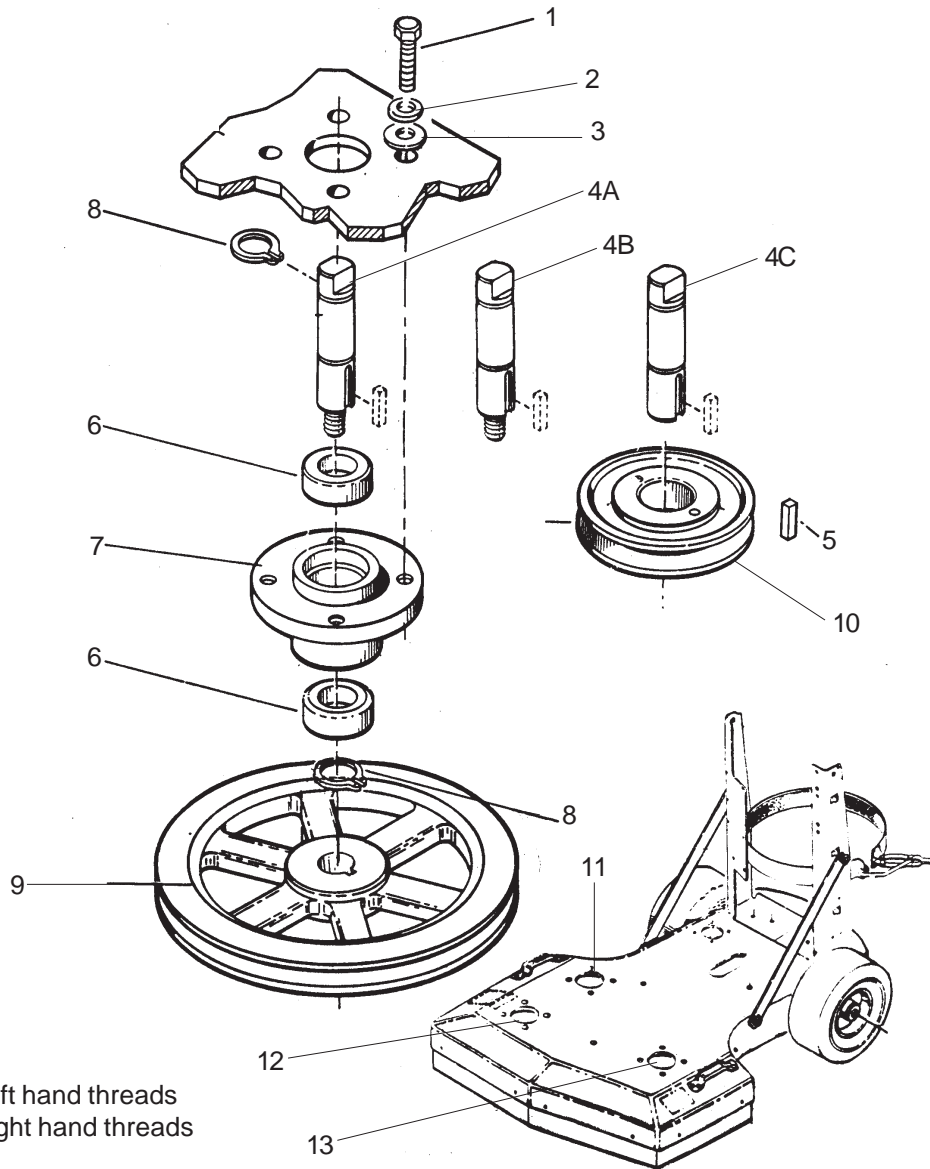
**Clarke®**  
**Vacuum Fuel System Assembly Drawing 8/00**



Ref.	Part #	Description	Qty.
1	98472A	(H039) Screw	4
2	980657	(H040) Washer, Lock	4
3	Page 11	Screw	
4	Page 11	Washer, Flat	
5	Page 11	Nut, Lock	
6	16619A	Lockoff w/Fittings	1
7	98843A	(XA53AD) Hose, Assembly #3	1
8	Page 19	Hose to Tank	1
9	18123A	Regulators Asm., Vacuum System	1

Ref.	Part #	Description	Qty.
12	Page 11	Carrier, Bottle	(Ref)
14A	98421A	(MAC815) Tank, Alum. Polished	(1)
14B	98422A	(MAC816) Tank, Steel Painted	(1)
14C	98422B	Tank, Aluminum Painted	(1)
15	Page 19	Check Valve	1
16	Page 19	Coupler, Propane	1
17	Page 19	Hose Clamp	3
18	Page 19	Hose, Vacuum	1
19	98666A	Tee	1

**Clarke®**  
**Bearing Assembly Twin Strip 6/00**



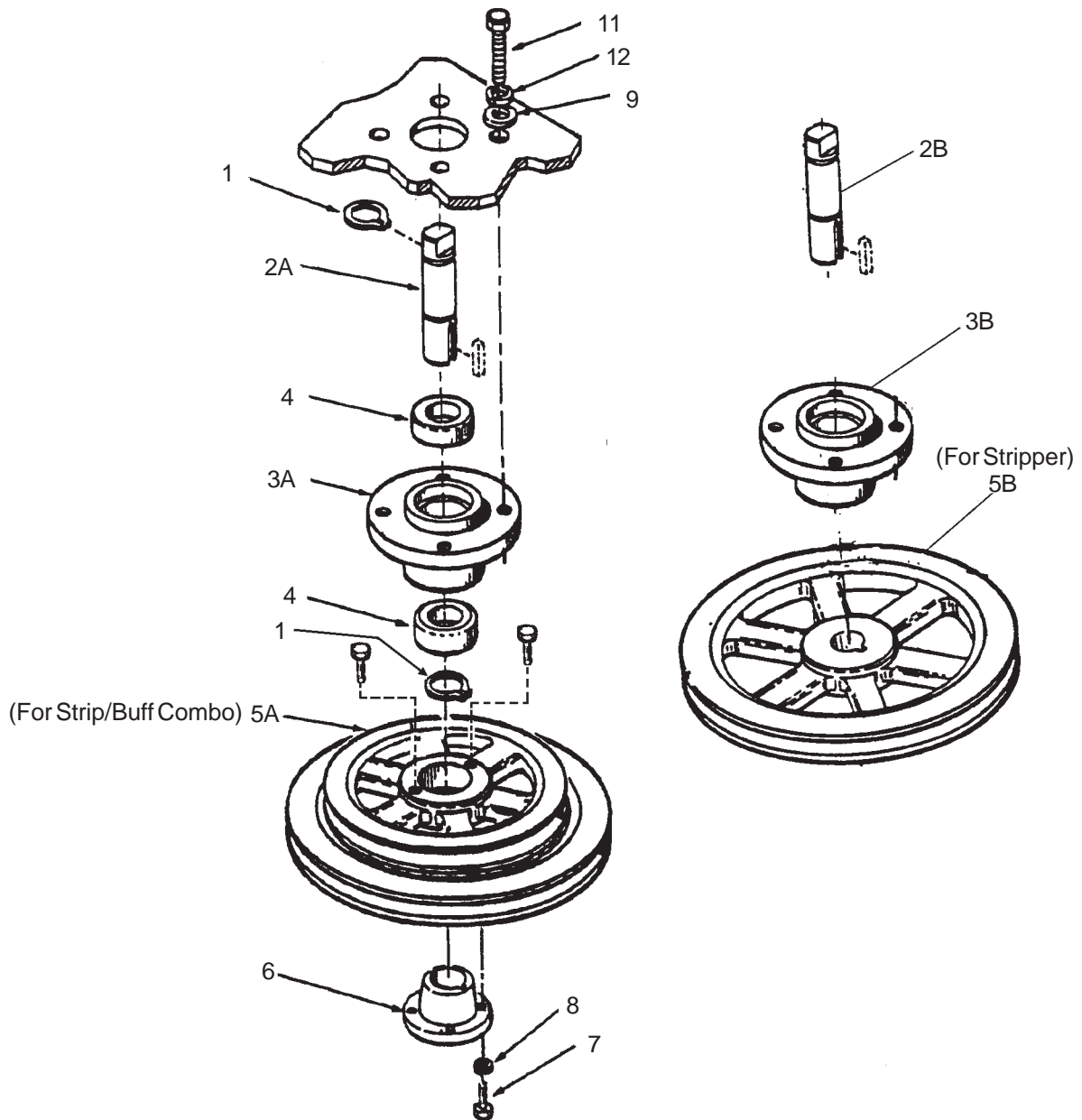
**NOTE:\***

A. Item 12 has left hand threads

B. Item 13 has right hand threads

Ref.	Part #	Description	Qty.
1	98450A	(H010) Screw	4
2	98451A	(H011) Washer, Lock	4
3	980687	(H009) Washer, Flat	4
*4A	98569A	(W10HS) Shaft, Right-Hand	(2)
*4B	98568A	(W10HL) Shaft, Left-Hand	(1)
*4C	50025A	Jack Shaft	(1)
5	65305A	Keystock	3
6	98660A	(W551) Bearing	6
7	98658A	(W55HAS) Housing, Aluminum	3
8	98460A	(H022) Snap Ring, Internal	6
9	99049A	Pulley	2
10	98579A	Pulley	1
11	10007A	Kit, Bearing, Jack Shaft (Pre-Assembled) (Includes 4C, 6, 7, 8)	1
12	10648A	Kit, Bearing, L.H. Strip (Pre-Assembled) (includes 4A, 6, 7, 8)	2
13	10645A	Kit, Bearing, R.H. Strip (Pre-Assembled) (includes 4B, 6, 7, 8)	1

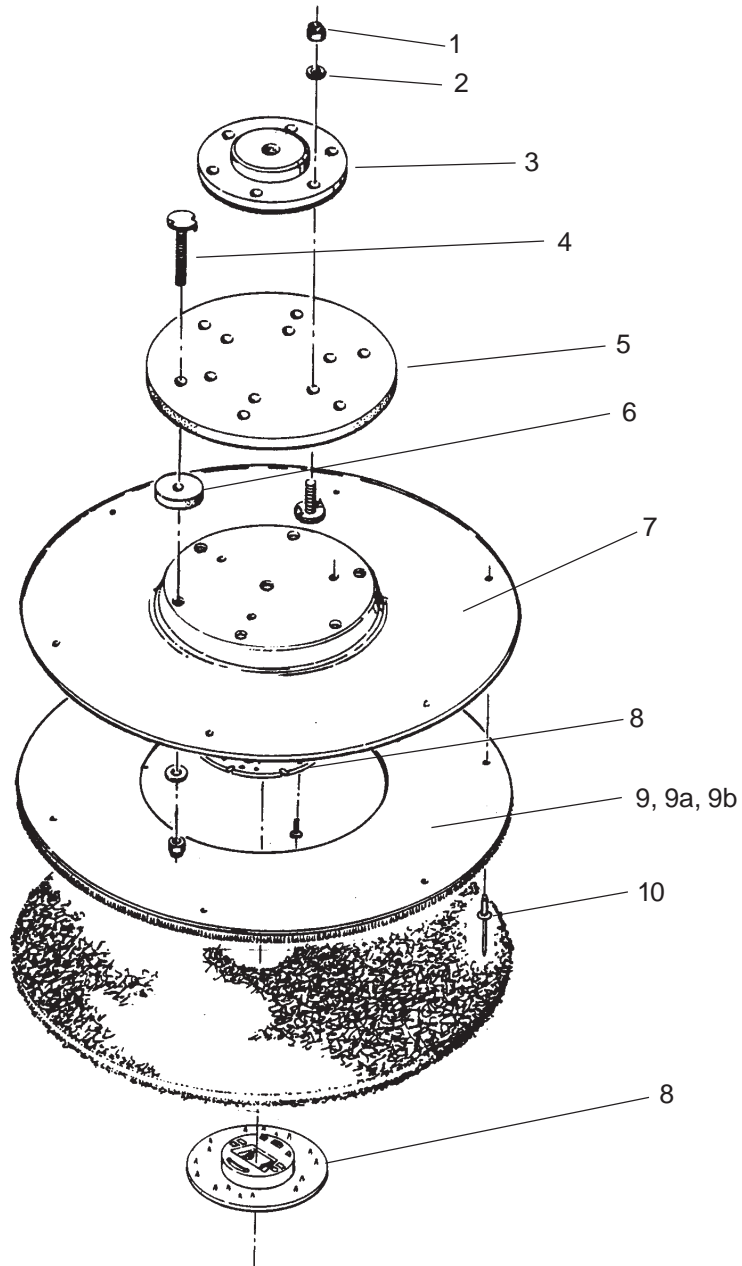
Clarke®  
Bearing Assembly 21" Stripper 11/05◆



**NOTE:**◆ indicates a change has been made since the last publication of this manual.

Ref.	Part #	Description	Qty.	Ref.	Part #	Description	Qty.
1	98460A	Snap, External, 1" (H022)	2	7	85700A	Screw (H084)	4
2A	98575A	Shaft (W105S)	1	8	980657	Washer (H040)	4
2B	98567A	Shaft (W10H)	1	9	980687	Washer, Flat (H009)	4
3A	98658A	Housing, Aluminum (W55HAS)	1	10	98451A	Washer, Lock (H011)	4
3B	98657A	Housing, Aluminum (W55HA)	1	11	98450A	Screw (H010)	4
4	98660A	Bearing (W551)	2	Note	10647A	Kit Bearing, 21" Combo	1
5A	Page 21	Pulley, Assembly (W131)	1			Pre-Assembled, (includes 1,2A, 3A, 4)	
5B	Page 21	Pulley, (ZZ12)	1	Note	10643A	Kit Bearing (Stripper Only)	1
6	191803	Bushing (W13) <b>(Strip/Buf Only)</b>	1			Pre-assembled (includes 1, 2B, 3B, 4)	

**Clarke®**  
**Pad Driver Assembly 11/05**



NOTE: ♦ indicates a change has been made since the last publication of this manual.

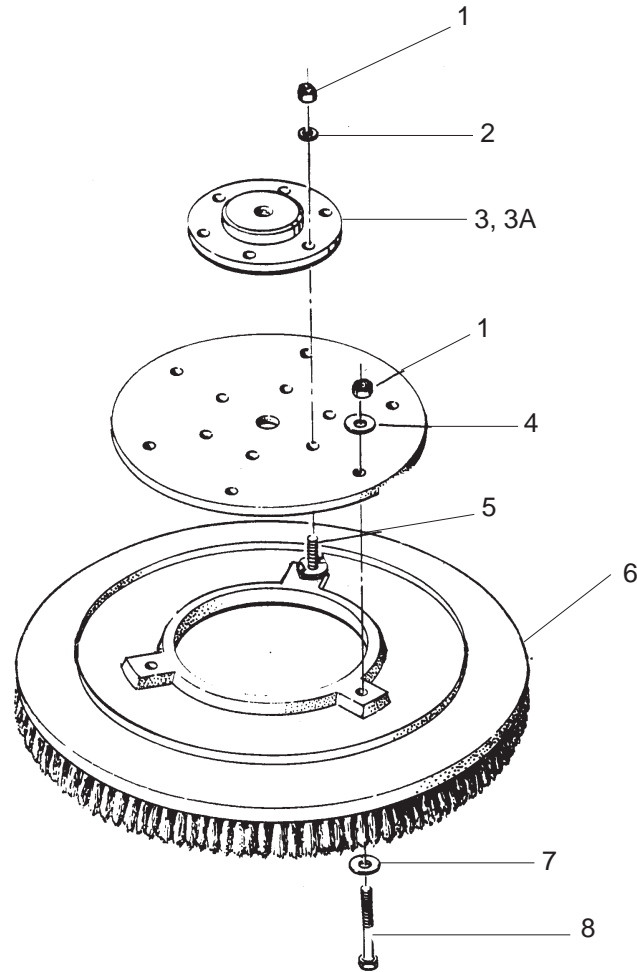
Ref #	Part No.	Description	Qty.
1	920110	Nut	6
2	980652	Washer, Lock (H006)	12
3	98566A	Plate, Shaft (W10)	2
4	98601A	Bolt, Elevator (W18)	12
5	98591A	Coupler, Belting (W15)	1
6	98600A	Spacer, Coupling (W17)	6
7	98594A	Disk, Powder Coated 21" (W16-21P)	1
8	56941A	Centering Device	1
9	98605A	Pad Gripper Ring (W20)	(1)
9a	50867A	Gripper Pad, 24"	(1)
9b	50868A	Gripper Pad, 27"	(1)
10♦	98453A	Rivet, Pop, Aluminum (H013)	11*

Pre-assembled pad driver assemblies includes items 1,2,3,4,5,6,7,8,9,10 21" - 17532A

\* 3 for center-lok pad retainer to disk and 8 for pad gripper to disk.



**Clarke®**  
**Brush Assembly 11/05**



NOTE:◆ indicates a change has been made since the last publication of this manual.

Ref #	Part No.	Description	Qty.
1	920110	Nut, Lock	9
2	980652	Washer, Lock	6
3	98572A	Shaft Plate (Left Hand Threads)	1
3a	98566A	Shaft Plate (Right Hand Threads)	1
4	98457A	Washer (HO18)	6
5	98601A	Elevator Bolt (W18)	6
6A	99065A	14" Brush Assembly	1
6B	99066A	20" Brush Assembly	1
6C	99070A	23" Brush Assembly	1
7	98457A	Washer	6
8◆	85816A	Bolt	3
9	98591A	Coupler Belting	1

Brush Assemblies Complete

10043A	14" Brush Assembly (Left Hand)
10040A	14" Brush Assembly (Right Hand)
10039A	21" Brush Assembly
10041A	23" Brush Assembly

## Belt Selection Chart

	98984A	51023A	98986A	191676	98987A	51038A	191672	98988A	98990A	98991A	98992A	98993A	98994A	98996A	98997A	98998A	99001A
Belt Size	B38	B40	B41	B43	B44	B45	B46	B47	B49	B50	B51	B52	B53	B54	B55	B56	BB60
21 Std. Twin		●															
21 Std. Single			●														
21 w/Clutch				●													
21 w/Battery	●																
21 Strip											●						
21" Combo			●			●											
22 Standard	●																
22 w/Clutch			●														
22 Strip							●										
24 Standard					●												
24 w/Clutch									●								
24 w/Battery							●										
24 Strip									●								
27 Standard												●					
27 w/Battery														●			
28 Strip																	●
Strip/Buf			●			●											
24 Onan													●				
27 Onan									●								

## Pulley Chart

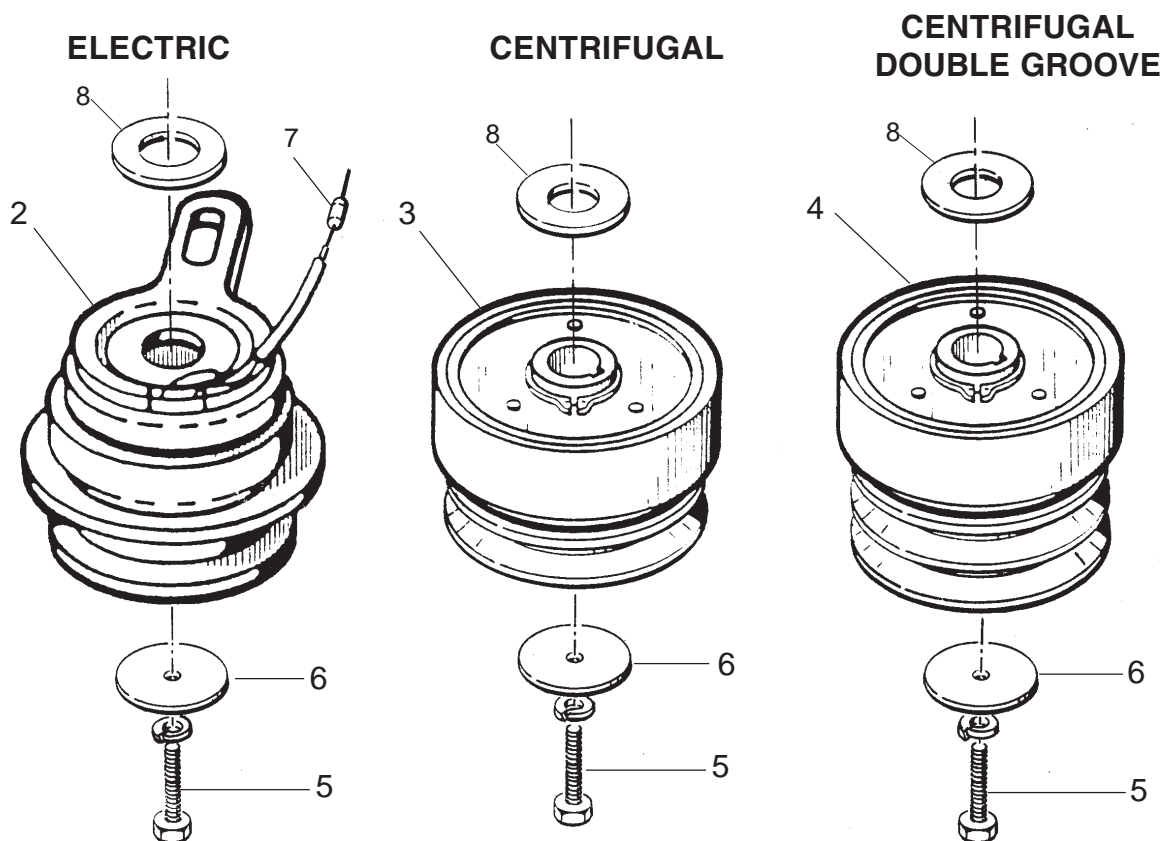
### Engine Shaft

Part #	Description	Where Used
1 98579A	3.5 x 1 Pulley (W11)	All Burnishers w/o clutch
2 98583A	Electric Clutch (W14)	All Burnishers w/electric clutch
3 98585A	Centrifugal Clutch (W142) (All Strippers)	All Burnishers w/centrifugal clutch
4 98588A	Double Centrifugal Clutch (W144)	All Strip/Buf combinations
5A 98491A	Bolt	All machines except Strip/Buf combinations
5B 98474A	Bolt	All Strip/Buf combinations
5C 50054A	Screw - KAW. 14 HP	With Clutch
5D 50031A	Screw - KAW. 17 HP	With Clutch
6 98586A	Washer (W412)	All Clutches
7 98695A	Capacitor	All Electric Clutches
8 98476A	Spacer	With Clutch

### Front-End Shaft

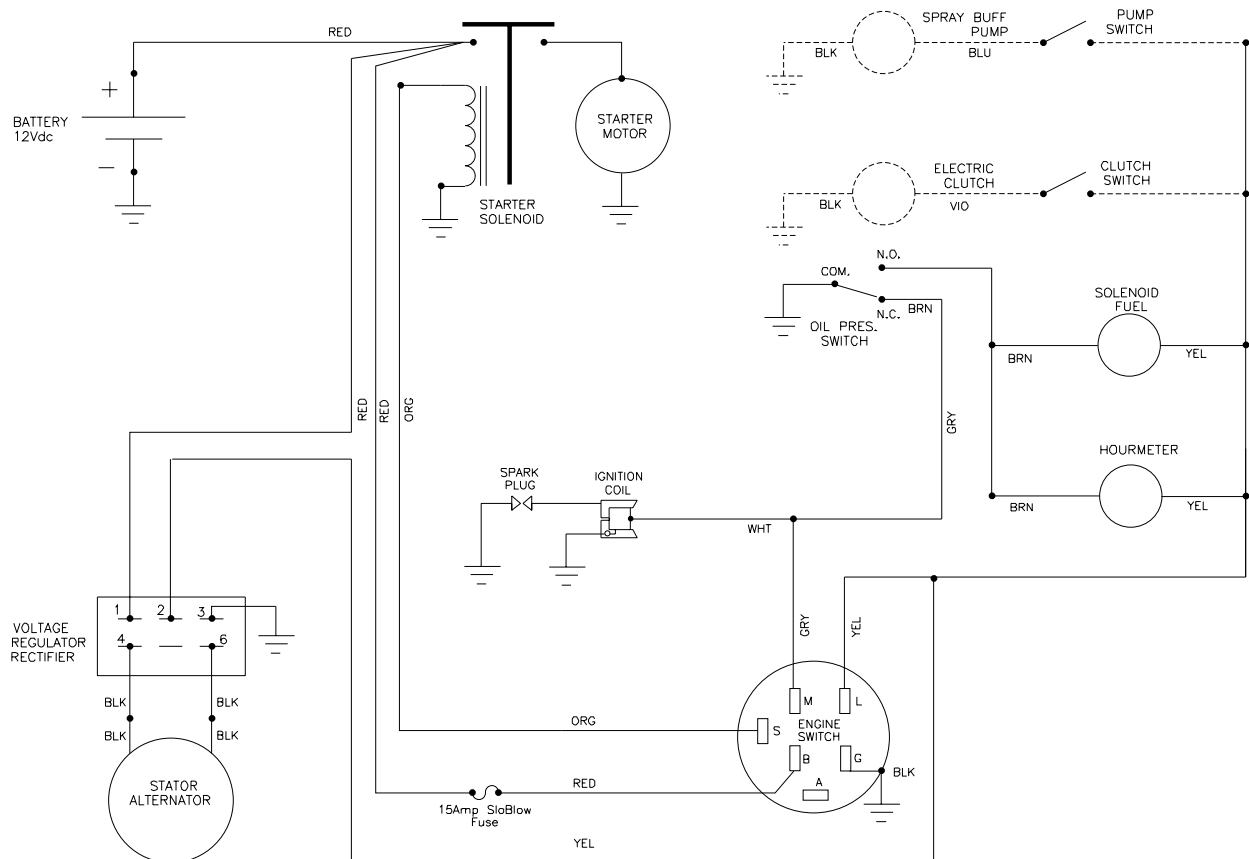
Part #	Description	Where Used
98581A	Pulley 6.0 x 1 (W12A)	21 & 22 w/o clutch
99033A	Pulley 7.5 x 1 (ZZZU13)	21 & 22 w/clutch, 24 w/o clutch & 27 Onan
98565A	Pulley 8.5 x 1 (W09)	27 w/o clutch
99059A	Pulley 10.0 x 1 (ZZ14)	24 & 27 w/clutch
99049A	Pulley 12.0 x 1 (ZZ12)	All Strippers
98582A	Pulley 7.5 & 10.0 (W131)	Strip/Buf combinations
191803	Bushing (W13)	All Strip/Buf Pulleys

## Clutch Variations



**Clarke®**  
**KAWASAKI 14 HP Single**  
**Electrical Schematic 12V D.C. System 5/99**

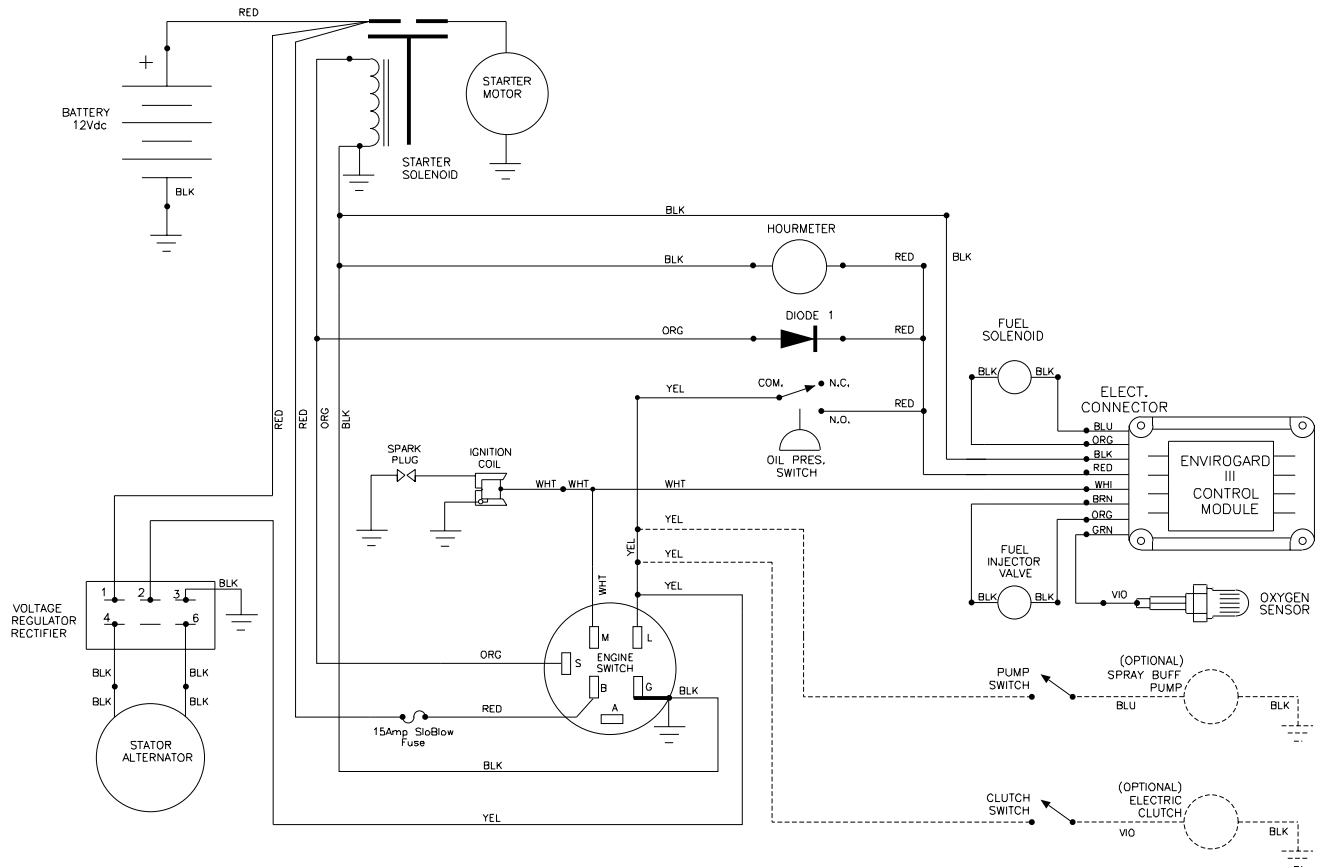
ELECTRICAL SCHEMATIC  
 KAWASAKI 14HP SINGLE  
 12 Vdc SYSTEM



**KEY SWITCH TEST**

SWITCH POSITION	CONTINUITY
1. OFF	G + M
2. RUN	L + B
3. START	L + B + S

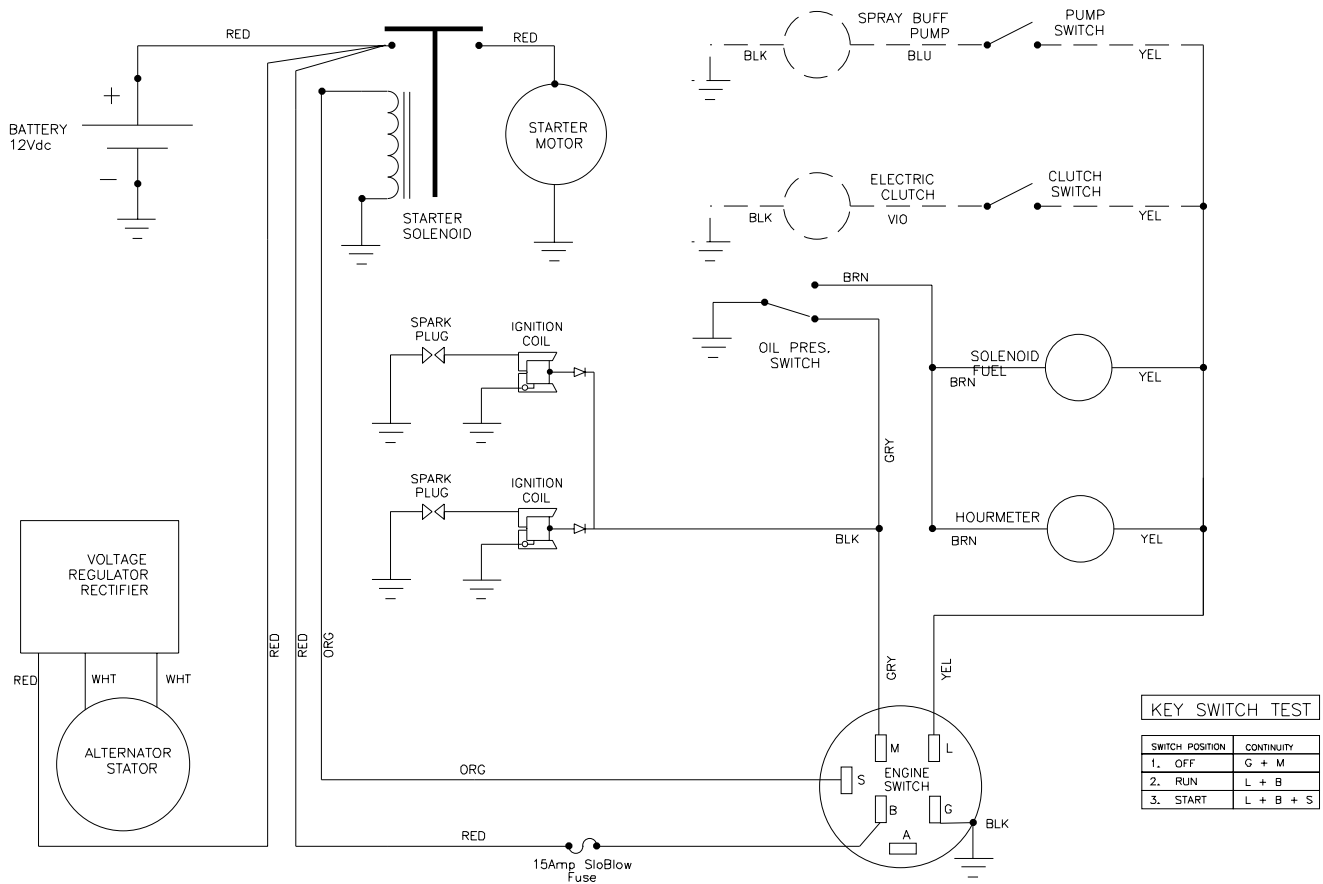
**Clarke®**  
**KAWASAKI 14 HP Single**  
**Electrical Schematic Envirogard III 12V D.C. System 5/99**



**KEY SWITCH TEST**

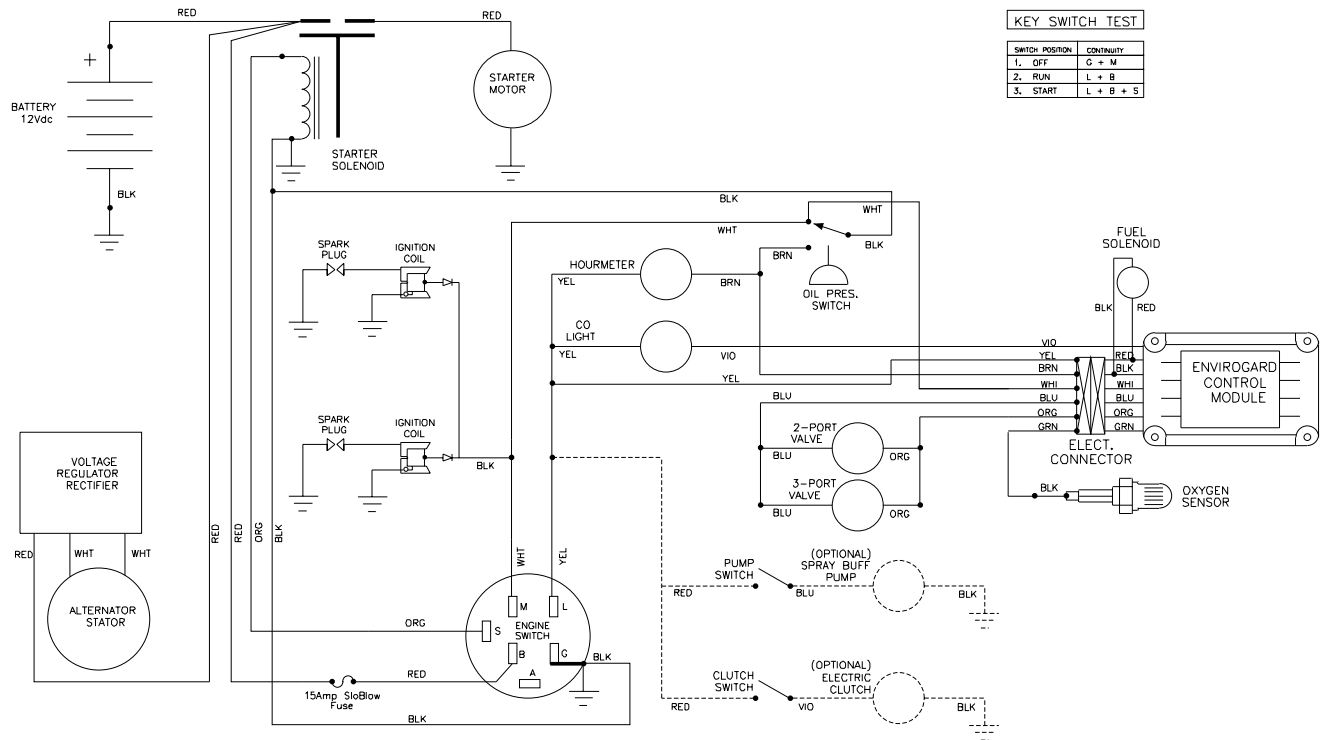
SWITCH POSITION	CONTINUITY
1. OFF	G + M
2. RUN	L + B
3. START	L + B + S

**Clarke®**  
**KAWASAKI 17 HP Twin**  
**Electrical Schematic 12V D.C. System 5/99**



**Clarke®**  
**KAWASAKI 17HP**  
**Envirogard IV Twin**  
**Electrical Schematic 12V D.C. System 5/99**

ELECTRICAL SCHEMATIC  
KAWASAKI 17HP TWIN ENVIROGARD  
12 Vdc SYSTEM



## This image shows a full page of blank, lined paper. It features approximately 28 horizontal blue or grey lines spaced evenly apart, typical of standard notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines, text, or other markings present.



# CLARKE PRODUCT SUPPORT BRANCHES

## U. S. A. Locations

### PRODUCTION FACILITIES

**Clarke®**, Springdale, Arkansas  
2100 Highway 265  
Springdale, Arkansas 72764  
(479) 750-1000  
**Customer Service - 1-800-253-0367**  
**Technical Service - 1-800-356-7274**

**American Lincoln®**, Bowling Green, Ohio 43402  
1100 Haskins Road

### SERVICE FACILITIES

**Clarke®**, Elk Grove, Illinois 60007  
2280 Elmhurst Road  
(847) 956-7900

**Clarke®**, Denver, Colorado 80204  
1955 West 13th Ave.  
(303) 623-4367

**Clarke®**, Houston, Texas 77040  
7215 North Gessner Road  
713-937-7717

### SERVICE AND SALES FACILITY

**American Lincoln® / Clarke**, Madison Heights,  
Michigan 48071-0158  
29815 John R.  
(810) 544-6300

**American Lincoln® / Clarke**, Marietta, Georgia 30066  
1455 Canton Road  
(770) 973-5225

### SALES AND DISTRIBUTION CENTER

**Clarke®**, Secaucus, NJ 07094  
74 Henry Street  
(201) 864-5503

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**Clarke®**  
**Clarke American Sanders**  
**Clarke**  
**Customer Service Headquarters and Factory**  
2100 Highway 265  
Springdale, Arkansas 72764  
(479) 750-1000  
**Technical Service**  
1-800-356-7274

## European Locations

### PRODUCTION FACILITIES

ALTO Danmark A/S, Aalborg  
Blytaekkervej 2  
DK-9000 Aalborg  
+45 72 18 21 00

ALTO Danmark A/S, Hadsund  
Industrikvarteret  
DK-9560 Hadsund  
+45 72 18 21 00

### SALES SUBSIDIARIES

ALTO US - Canada, Ontario (Canada)  
4080 B Sladeview Crescent Unit 1  
Mississauga, Ontario L5L 5Y5  
(905) 569 0266

ALTO Overseas Inc., Sydney (Australia)  
1B/8 Resolution Drive  
Caringbah NSW 2229  
+61 2 9524 6122

ALTO Cleaning Systems Asia Pte Ltd., Singapore  
No. 17 Link Road  
Singapore 619034  
+65 268 1006

ALTO Deutschland GmbH, Bellenberg (Germany)  
Guido-Oberdorfer-Straße 2-8  
89287 Bellenberg  
+49 0180 5 37 37 37

ALTO Cleaning Systems (UK) Ltd., Penrith  
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B.P. 44, 4 Place d'Ostwald  
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+31 184 677 200

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Aminogatan 18  
Box 4029  
S-431 04 Molndal  
+46 31 706 73 00

ALTO Norge A/S, Oslo (Norway)  
Bjornrudveien 24  
N-1266  
+47 2275 1770

## **Clarke® LIMITED U.S. WARRANTY**

Clarke Industrial/Commercial Floor Product is warranted to be free from defects in workmanship under normal use and service, when operated and maintained in accordance with Clarke's Maintenance and Operations Instructions. The warranty period is from the date of purchase and is subject to the conditions below.

### **2 YEARS FOR PARTS AND SERVICE LABOR** (See exceptions below)

This warranty is extended only to the original purchaser for use of the product. Clarke will repair or replace, at its option, any part that is proven to be defective in material or workmanship. Exceptions include electric clutches and 110 volt starters which are warranted for a period of ninety (90) days only. Parts repaired or replaced under this warranty are warranted only during the balance of the warranty period or ninety (90) days thereafter, whichever is the greater. This warranty does not cover normal wear parts such as electrical cable, rubber parts, and engine maintenance parts such as filters or spark plugs. This warranty covers the engine components related to the LP fuel system. All other engine components are covered by the engine manufacturer. This warranty does not cover paint or appearance items, misuse, neglect, or failure to maintain as recommended by the manufacturer. The company disclaims any responsibility for loss of time, transportation, commercial loss or other incidental or consequential damages.

### **BATTERY WARRANTY**

The battery will be warranted by Clarke for a period of 6 months from the machine date of purchase. The defective battery must be returned to Clarke. Returned batteries that are only in need of recharging will not be warranted.

### **EMISSION CONTROL SYSTEM**

In California the emission control system is warranted to the original owner and each subsequent owner for a period of two (2) years from the date of delivery to the original owner.

### **STATED WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED**

Clarke's liability under this warranty is limited to repair of the product and /or replacement of parts and is given to purchaser in lieu of all other remedies, including INCIDENTAL AND CONSEQUENTIAL DAMAGES.

THERE ARE NO EXPRESS WARRANTIES OTHER THAN THOSE SPECIFIED HEREIN. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THE FACE HEREOF. NO WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY, SHALL BE IMPLIED. A warranty registration card is provided with your Clarke product. Return the card to assist Clarke in providing the performance you expect from your new floor machine.

If difficulty develops with the product, you should:

- a) Contact the nearest authorized Clarke repair location or contact the Clarke Service Operations Department, 2100 Highway 265, Springdale Arkansas 72764, for the nearest authorized Clarke repair location. Only these locations are authorized to make repairs to the product under this warranty.
- b) Return the product to the nearest Clarke repair location. Transportation and/or freight charges to and from the repair location must be prepaid by the purchaser.

**Clarke reserves the right to make changes or improvements to its machine without notice.**

**Always use genuine Clarke Parts for repair.**

# **Clarke®**

**2100 Highway 265  
Springdale, Arkansas, 72764**