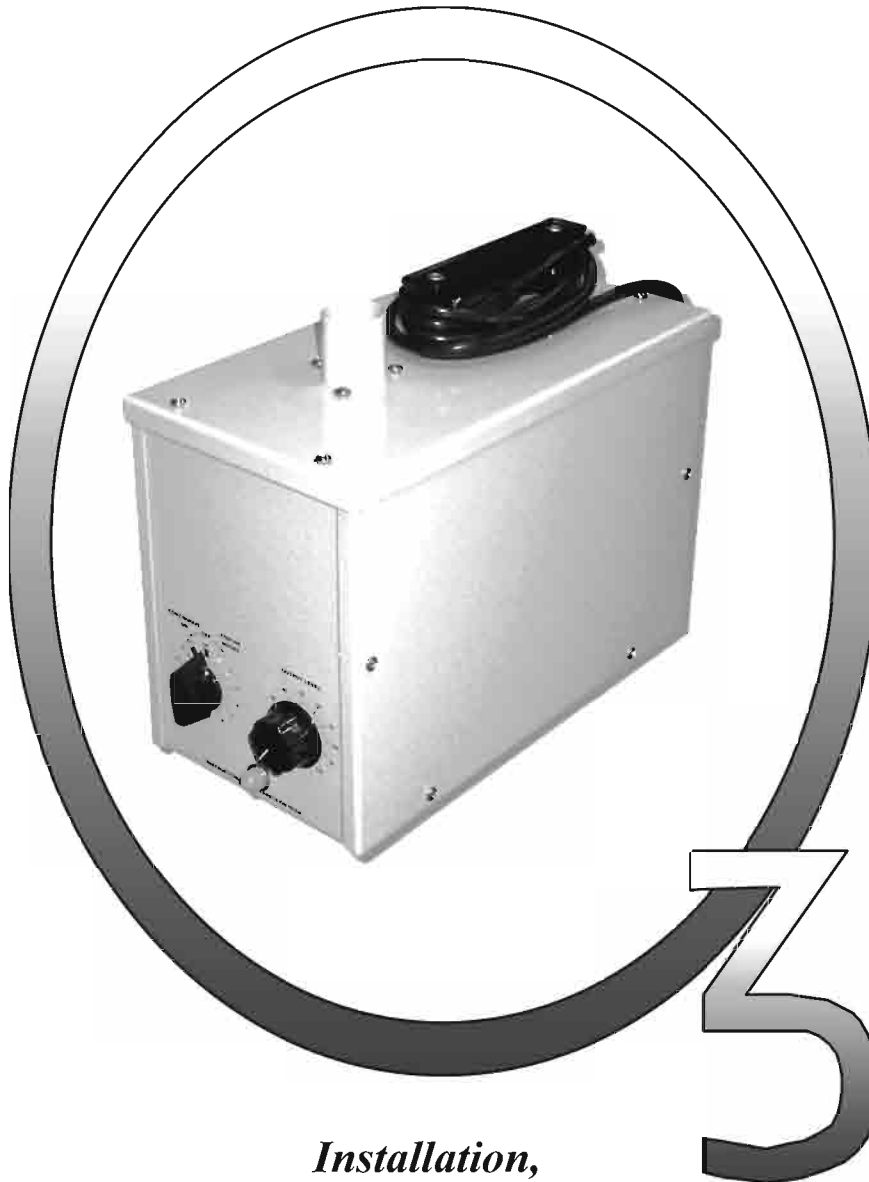


# ***DETAIL PLUS***

## ***ODOR NEUTRALIZER***



***Installation,  
Application & Service  
Instructions***

***FOR DETAIL PLUS MODEL 105A***



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# DETAIL PLUS ODOR NEUTRALIZER

Installation Section

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# DETAIL PLUS ODOR NEUTRALIZER

## Installation Section

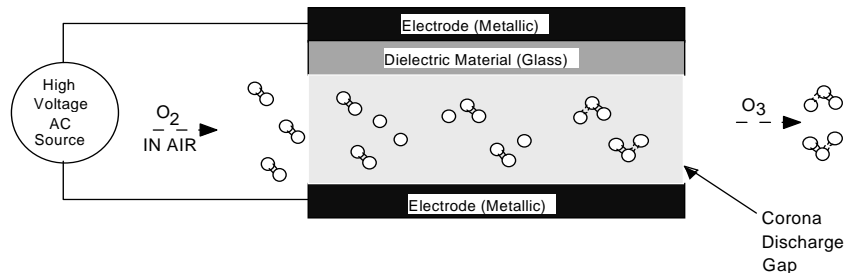
### UNDERSTANDING OZONE

#### What is ozone?

The earth's air is typically 21% (210,000 ppm) oxygen and 78% (780,000 ppm) nitrogen. The remaining 1% is made of miscellaneous chemicals, including ozone that makes up only 0.02 to 0.07% of the air, based on seasonal variation. An oxygen molecule ( $O_2$ ) is composed of two oxygen atoms with a stable bond. It has no color, odor, or taste, and its molecular weight is 31.9988. An ozone molecule ( $O_3$ ) is composed of three oxygen atoms instead of the normal two, but the bond between the third atom is very unstable. Ozone has a molecular weight of 47.998, and in concentrated form has a clear to pale blue color. In trace concentration form, it has a sweet clean fragrance associated with thunderstorms. At higher concentrations, the odor is sharp and pungent, and irritating to the eyes and lungs. Due to its instability, the ozone molecule reacts with the first molecule it can oxidize. It is this reaction mechanism of ozone that destroys the odors and other contaminants in the air.

The production of ozone is quite simple:  $3 O_2 \rightarrow 2 O_3$ . This basic reaction can be created in a high voltage electrical field. See the figure below, which shows how ozone is formed. The reaction occurs when the high voltage electrical field provides the energy that breaks one  $O_2$  molecule into two 'O' molecules. These 'O' molecules attach themselves onto two oxygen molecules, forming two ozone molecules. Once the ozone is introduced to other reactive molecules, it begins the process of oxidization, or breaking down, chemical structures into simpler or more stable compounds. Since it is air-borne, it reacts with available air-borne odors.

#### TYPICAL CONFIGURATION OF CORONA DISCHARGE OZONE GENERATION



When ozone is introduced into an area, it will begin to react with airborne odors. By the oxidization process, it begins to convert many odors into simple and stable compounds of carbon dioxide, water, and oxygen. This process may be a single step, or it may take several steps, which means that several molecules of ozone may be required to breakdown certain odors. This is why larger concentrations of ozone are needed to handle strong odors. During treatment, the amount of ozone that lingers in the air awaiting reaction with odors is referred to as **residual**. If the air is agitated, the residual ozone will be reduced due to the mixing and reacting with odor molecules. For this reason fans are recommended in many applications to speed up the reaction time and keep the residual ozone level at a minimum.

#### How can residual ozone be measured?

The nose can detect ozone concentration as low as 0.01 to 0.04 ppm. This is an extremely low concentration. This is similar to one penny in a million dollars. However, the nose has the ability to become desensitized to odors, and this is also true with ozone. Removing strong odors from garbage, sewage, and disasters, such as fires and floods, requires a high concentration of ozone. Commercial or industrial ozone generators can produce levels that exceed occupied limits. This means that when treating these odors, the areas of treatment are not to be occupied. Ozone in high concentrations is irritating enough to quickly cause someone to vacate the treatment area, if someone should inadvertently enter a treatment area. However, if ozone must be used in an occupied area then the ozone level is to be controlled for maintaining it below a safe level. Monitoring devices available are ozone badge monitors, manual pumps with ozone sensitive tubes, electronic ozone meters, and electronic ozone controls that limit the amount of ozone in the air.

#### What happens to excess ozone?

Why does the clean air fragrance, created during a thunder and lightning storm, disappear? Several reasons, including reaction with the large quantity of polluting emissions in the urban environment, and due to the fact that ozone is highly reactive and unstable. If there are no lingering contaminants for ozone to destroy, it will soon revert back to oxygen, from which it came. Ozone molecules reacting with other ozone molecules accomplish this. The half-life of ozone is generally 2-13 minutes. At a 12-minute half-life, ozone levels will drop to approximately 3% in about 66 minutes after the ozone generator is stopped. This is one of the many advantages of using ozone as a deodorizing agent. It does the job we want done and converts itself back to oxygen. This safety factor of ozone is also enhanced by a noticeable and irritable odor at high concentrations. A short life span and warning of high concentrations makes ozone capable of being used safely in many applications.

# DETAIL PLUS ODOR NEUTRALIZER

## Installation Section

### CONT'D - (UNDERSTANDING OZONE)

#### How much ozone is allowed by various regulatory and advisory agencies?

The Environmental Protection Agency (EPA) determines the amount of ozone for national air quality standards for ambient air. This value is presently 0.12 ppm per volume measured over one hour, and 0.08 ppm measured over eight hours. The Occupational Safety and Health Administration (OSHA) determines the amount of ozone for the workplace. This value is 0.1 ppm per volume for an 8-hour work shift. The U.S. National Institute for Occupational Safety and Health (NIOSH) advises that the immediately dangerous to life and health (IDLH) level is 5 ppm per volume for a maximum of 30-minute exposure. Ozone can clean the air of unwanted odors and bacteria and make the air better to breathe, but large concentrations or prolonged levels above 0.1 ppm, should be avoided. Ozone badges, sensing tubes, and electronic meters are available for measuring ozone. Also, ozone generators can be supplied with controls that limit the amount of ozone to levels below all regulated values.

#### What are proper precautions when using high levels of ozone?

- ❖ Use in uninhabited areas to prevent exposure of excessive.
- ❖ After the ozone generator's switch or timer is turned off, allow time for the ozone to revert back to oxygen before entering the area. The recommended time period is one to two hours.
- ❖ Ventilate the area thoroughly with fresh air after using ozone to eliminate problems for people with chemical sensitivities. Remember that just because you can smell a slight amount of ozone, doesn't mean that it is above recommended levels.
- ❖ Do not use in areas that are wet or have high humidity. Ozone reacts very fast in humid areas, but can produce a mild form of hydrogen peroxide when mixed with water. This might cause bleaching on some fabrics. Use a dehumidifier, or operate an air conditioner to remove excessive moisture.
- ❖ Remove all pets from the area while treating. If fish tanks cannot be moved, then cover them to prevent excess ozone from mixing with the water. Locate the aquarium oxygen pump so that it has fresh air to pump into the water. Remove plants, especially moist type, if treatment time is more than a few hours, or if located in a small room with an expected high concentration of ozone.
- ❖ Do not expose natural rubber (latex) to ozone, as it will cause it to deteriorate. Remove it from the treating area, or coat it with dry silicon spray. If VCRs, or other electronic equipment, are suspected of having rubber drive belts or other rubber components, cover them.
- ❖ Leather should only be exposed to ozone for a few hours. Over exposure can cause possible drying of material or cause some of the oils to be driven out.

Please note that if the ozone levels are monitored or controlled below safe levels then the above precautions are not necessary as the ozone level is controlled to a safe level.

#### What are some uses of ozone?

- ❖ Controls odors from garbage or waste compactors for industrial applications.
- ❖ Oxidizes odors from buildings sustaining fire and smoke damage.
- ❖ Destroys odors from clothing or fabrics damaged by fire or other disaster.
- ❖ Removes odors from offices, homes, schools, hotels, casinos, restrooms, autos, gyms, stores, etc.
- ❖ Retards or destroys bacteria in food storage on meats, fish, fruit and vegetables, eggs, etc.
- ❖ Destroys mold and mildew.
- ❖ Removes pet odors from kennels, pet stores, homes, clothing, etc.
- ❖ Controlling tobacco odors in restaurants, bars, smoking lounges.
- ❖ Eliminates odors from sewage lift stations or holding tanks.
- ❖ Removes exhaust hood odors from cooked food, or chemicals.
- ❖ Treats drinking water, bottled water, swimming pools, and wastewater.

After reviewing this list it is quite obvious that ozone is widely used. Why is it widely used? The answer is simple – it works. It works fantastic because it removes odors that no other process can match. Ozone needs special precautions that have been indicated; this useful chemical can be effectively applied by:

- ❖ Being knowledgeable about ozone.
- ❖ Utilizing ozone properly, following all safety requirements.
- ❖ Being aware that ozone has a self-destructive nature.
- ❖ Being aware of the odor of ozone, while using the proper tools and precautions to prevent exposure in excessive concentrations.

The bottom line is that ozone, like many effective chemical products, must be used properly and safely. You would never intentionally breathe strong chemical products; therefore, ozone gas should be used with the same common-sense precautions. As with all commercial and industrial manufacturers of ozone equipment, it is stressed that the units are used in unoccupied areas, unless other methods of control are utilized to limit the concentrations to regulatory values.

# DETAIL PLUS ODOR NEUTRALIZER

## Installation Section

### GENERAL

The Ozonator model 105A is an ozone generator. The model 105A produces **ozone** from oxygen taken from air in maximum concentration amounts of 0.001-0.002% by weight. The chemical formula for ozone is  $O_3$ , and it is a powerful oxidizer for the control and removal of odors. When ozone comes in contact with odors, it chemically breaks down the odors into lesser chemical compounds. Many times these lesser compounds are oxygen ( $O_2$ ), carbon dioxide ( $CO_2$ ), and water ( $H_2O$ ). This unit does not require any chemicals because ozone is produced electrically.

### CAUTIONS

Ozone is an extremely effective tool for use in odor control. However, it is an oxidizer, and like other industrial products, must be properly used. Certain cautions must be observed to prevent human and animal exposures to ozone over those permitted by the national or local governing bodies. When using in the USA, the governing bodies are OSHA and the FDA. When ozone is used in other countries, the national health or occupational safety standard of that country is the likely governing body for determining the permissible amounts of ozone exposure. In the USA, the maximum permissible exposure limit (PEL) of ozone concentration in enclosed and inhabited areas is 0.1 parts/million (ppm) over an averaged eight-hour work period. The ozone limit for immediate exposure is 5 ppm (30-minute exposure). **Do not** use this unit to accumulate ozone levels in occupied areas in excess of those permitted by governing bodies. These units are not designed to be used in hospital rooms or sick rooms. Additional control methods must be utilized if these machines are to be used in inhabited areas. **These methods must limit the exposure levels to those permitted by the appropriate governing bodies.**

When this unit is utilized without ozone controls or monitoring, then it is to be used in unoccupied areas where it is permissible to exceed the ozone levels set forth by the governing bodies. Higher ozone limits are typically required to effectively control industrial odors. However, caution must be used in these areas to avoid inadvertent occupation until the area can be properly ventilated.

This unit should never be used where a flammable gas or liquid might be drawn in through the air inlet or forced into the machine by other means. Flammable gases or liquids drawn into the electrical equipment may cause ignition of the gases. If flammable gas or liquid leak is possible, do not use the unit because a fire or an explosion could occur.

### INSTALLATION REQUIREMENTS

Installation must conform to applicable local codes.

### ELECTRICAL SUPPLY

The model 105A unit has been designed for 115VAC, 60Hz. It can also be provided in optional 230VAC, 50Hz. The power usage and airflow are as follows:

Models	Power	Air Volume Rating
105A	40 watts	16 cfm @ 60Hz, 13 cfm @ 50Hz

### IMPORTANT

To prevent damage to the equipment, be sure that the unit received is applicable to the electrical service in your area. In accordance with specifications of the National Electrical Code in the USA, or other applicable international codes, the 115V equipment is supplied with a three-prong (grounding) plug, which mates with a standard (three-prong) grounding wall receptacle (Figure 1). **Do not, under any circumstances, cut or remove the third (ground) prong from the cord set plug.** The 230V equipment is supplied in two configurations. It is supplied with a three-wire cord without the male plug (Figure 3), or in the European cord "Schuko" version (Figure 4). All cords must be a three-wire cord with a ground or earth wire and have the correct plug for the corresponding receptacle of that nation or locality.

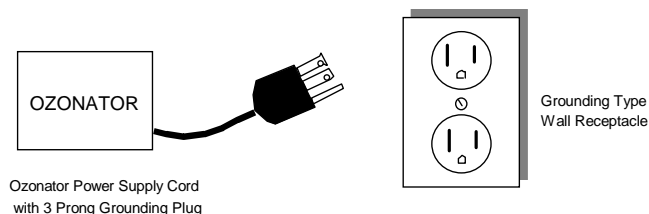


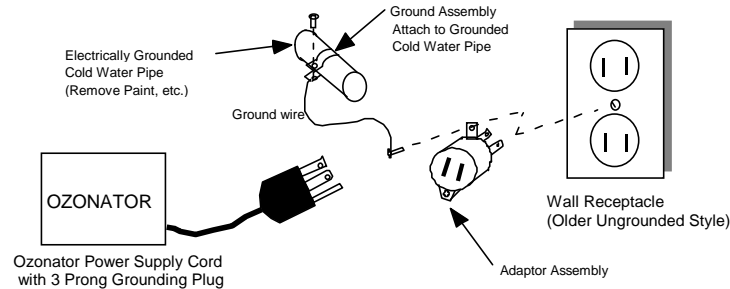
FIGURE 1

# DETAIL PLUS ODOR NEUTRALIZER

## Installation Section

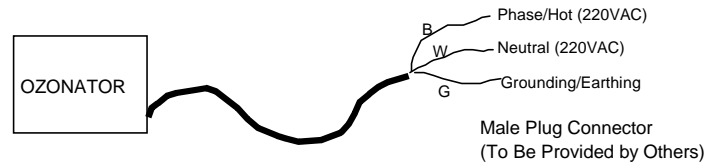
### CONT'D - (IMPORTANT)

**115VAC** - When a two-prong receptacle is encountered (Figure 2), a temporary connection may be made where local codes permit using an adapter (P & S #1919 or equivalent). The adapter provides a means for plugging a three-prong cord set into a two-prong receptacle. The adapter should not be used without a proper ground connection. Attaching the adapter ground wire to the receptacle cover screw will not ground the machine, unless it is known that the cover screw is grounded through the "house" wiring. To be certain to obtain proper ground when using this adapter, attach the machine ground wire to a metallic cold water pipe, as shown in Figure 2.

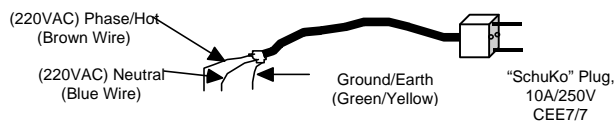


**FIGURE 2**

**230VAC** - Refer to Figure 3 for the model that is supplied with the cord without the male plug provided. If a cord is supplied by the manufacturer, the black wire will be the "phase" or "hot" wire, the white wire will be the "neutral" or "grounded current carrying" wire, and the green wire will be the "grounding" or "earthing" wire. Refer to Figure 4 for European model.



**FIGURE 3**



(All Cords Must Contain Grounding/Earthing Conductor)

**FIGURE 4**

**Do not, under any circumstances, cut or remove the third (ground) prong or wire from the cord set plug.**

### INSPECTION

Upon receipt of the Ozonator unit, remove it from the shipment box and remove the "Service Side" cover by removing the four screws and gently pulling down on the side panel. Once the service panel is removed, please view the unit and compare it to the internal view within this manual. Verify that the glass insulator tube is not broken and is pressed firmly against the gasket on the blower. Look for any other obvious damage that may have occurred during shipment. After completing the inspection and making any corrections, replace the cover.

### CHOICE OF LOCATION

The Ozonator equipment should be placed near the area to be treated, such as an adjoining room or space, and "piped" into the service area. This purpose is to allow fresh air to serve as supply air for the ozone generator. When such an installation is not practical, the machine should be placed directly into the immediate area to be treated. When the unit is to be placed outdoors, the unit should be located where it will be protected from the weather. Place the unit as best determined to prevent the entry of moisture through the rear air filter.

### EFFECTIVENESS

For the maximum performance, place the model 105A in an environmentally controlled area that has cool, dry air and a reliable power source. High humidity or moisture content, and high temperatures reduce ozone output and require more frequent maintenance. Also, the supply voltage should be no less than that for which it is designed since low voltage will reduce the ozone output.

# DETAIL PLUS ODOR NEUTRALIZER

## *How to use the Ozonator*

Removing odors from cars, vans, trucks, RVs, limousines, etc., can be difficult, if not impossible, using normal cleaning methods, and the expensive chemicals, or fragrant sprays. However, using ozone can turn a difficult problem into a profitable solution. Vehicles often are plagued with numerous odor problems, with the most common problem being tobacco smoke. Other common odors are: mildew, pets, sour milk, foods, decaying matter, vomit, body smells, urine, skunk, and general stale air odors. Ozone breaks these odors into chemical compounds that do not have odors. After treatment and adequate time for the ozone to change back to oxygen, the vehicle will have a fresh, clean, pleasant aroma, compliments of ozone.

Most car detailers, pre-owned car dealers, rental car companies, taxi companies, limousine services, bus services, RV rental and sales, yacht owners, etc., need to remove some of the odors described above. Vehicles that are clean and smell clean make happy owners, happy riders, happy renters, happy buyers, and happy sellers. All of this can be accomplished by adding an odor removal service to the normal cleaning already being provided.



The method of treating vehicles is simple. The vehicle should have the normal cleaning procedures such as cleaning, vacuuming, shampooing, etc. Finally, the vehicle should be treated for odor removal. Allowing a Ozonator to blow ozone into the vehicle, destroys the odors and provides that desired clean smell.

Do not treat the vehicle when the interior is hot, only when it is cool. Place the vehicle in a shaded area, and turn on the air conditioner and cool it down. Heat destroys the ozone before it can react.

Before starting the ozone treatment, crank the engine of the vehicle and place the air conditioner in the recirculate mode so that the ozonated air will be circulated through the vehicle air ducts, removing odors. The recommended time for duct treating is 10-15 minutes, minimum. Exit the vehicle and adjust the Ozonator timer to the desired treatment time. This starts the treatment. Adjust output to the desired level. For first time users, or for minimizing the treatment time, turn the generator up to the maximum setting. After the 10-15 minutes, open the vehicle door and turn off the vehicle. Do not linger in the vehicle, but exit and allow the ozone treatment to continue for the remaining selected time.

Treatment times will vary based on a few variables, such as the degree of the odor itself (most important), temperature of the vehicle, humidity of the outside air, and full voltage to the Ozonator. Treatment times will vary typically from 1 to 4 hours. Extremely large vehicle, such as vans, buses, RVs, limousines, etc., takes longer due to the larger volume. Placing a small fan inside the large vehicle will circulate the ozone thoroughly and help reduce the treatment time.



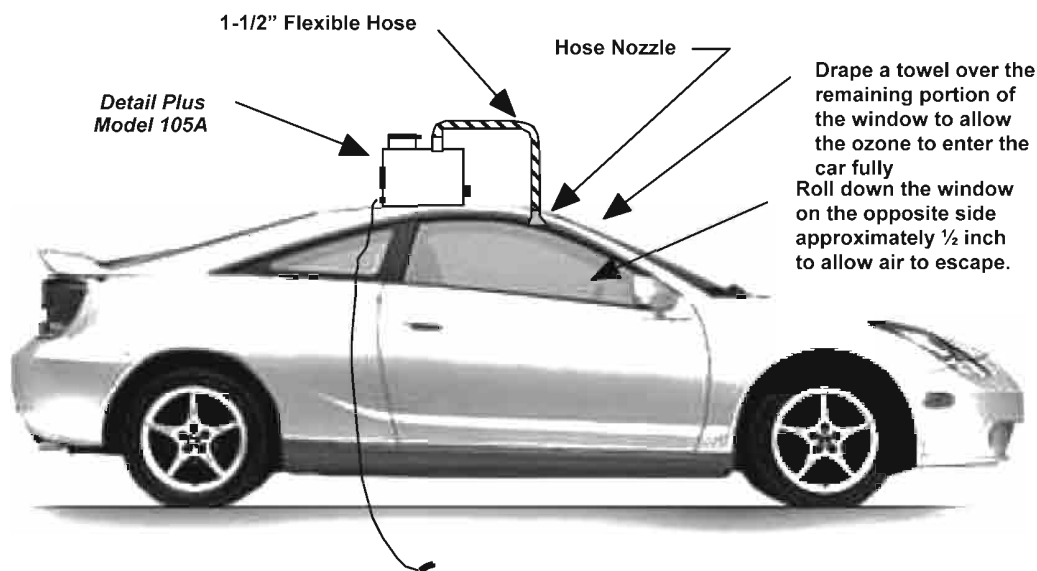
## PLACING UNIT IN THE VEHICLE

Locate the Ozonator in the most central location, as high as possible in the vehicle. Roll down at least one window about a 1/2 inch to allow some air into the car. Use the air conditioner as described previously. If mold and mildew in the ductwork is the problem, then operate the air conditioner on re-circulate for a longer period of time to maximize the ozone exposure.

Natural rubber surfaces are vulnerable to ozone. It is recommended that a dry silicon spray be applied to coat and protect rubber surfaces. Older autos and antique vehicles will have more natural rubber items such as rubber floor mats. Remove items such as these before treating. Neoprene door gaskets on newer vehicles should not require protection, but if concern exists, then use protectant. Either remove the items, or silicon protect any items that are believed to be rubber. Trunks of cars can be treated also, but if treating for more than a few hours, remove the spare tire as a precaution.

If any fabric treatment is to be applied to vehicle seats, carpets, or headliners, deodorize with ozone before applying the fabric treatment. Fabric treatments can lock odors into the fabric and release them slowly, if the odors are not removed before coated.

## PLACING UNIT OUTSIDE THE VEHICLE (using the **OPTIONAL** hose & nozzle)



Place the Ozonator on top of the vehicle and route a flexible hose with the *optional* nozzle kit from DETAIL PLUS into the window. Roll up the window until it will hold the nozzle in place and drape a towel or similar item over the remaining opening of the window. On the opposite side of the vehicle, roll down another window about 1/2 to 1 inch. This serves as a vent for the ozonated air being forced into the vehicle. Next, close the vehicle's doors.

## CAUTIONS

The Ozonator Model 105A is an industrial grade ozone generator and can produce amounts of ozone that exceed OSHA levels for inhabited working environments. Do not sit in the car when treating with ozone or expose anyone to excessive amounts of ozone. Once the Ozonator has been turned off, the ozone will revert back to oxygen within about 1 - 2 hours. The best procedure is to turn the Ozonator level knob to zero and allow the Ozonator fan to continue blowing. This will force the remaining ozone out of the car. It is recommended that windows and doors be opened for a few minutes after treatment to allow any ozone to be vented. If the car must be entered periodically during treatment, then an additional method to protect against excessive ozone is to use respirators with ozone cartridges.

Additional treatment ideas include placing a small circulating fan inside the vehicle to circulate ozone better. To treat specific areas, use the optional hose to direct ozone flow into those areas. Ensure that ozonated air goes under the seats to areas that might contain odors. Direct the ozone flow toward these problem areas. After treating, allow the vehicle approximately 15 - 30 minutes with the windows closed. Then roll down the windows and open the doors for 15 minutes. If slight ozone smell lingers in the vehicle, drive with the windows down to air out as necessary.



# DETAIL PLUS ODOR NEUTRALIZER

## Service Instruction Section

### ROUTINE MAINTENANCE

The Ozonator model 105A requires only routine maintenance for years of service. This occasional maintenance requires only minor cleaning and will take only a few minutes. Failing to routinely clean the unit will reduce the ozone output and require longer times for treatment. A complete failure to perform maintenance can cause a total failure of ozone output and a possible failure of Ozonator components, which voids the warranty.

The amount of time between cleaning will depend upon a few variables. Below is a list of important operating factors that increase the frequency for cleaning:

- ❖ Unit operated 24 hours a day.
- ❖ Unit operated 365 days a year.
- ❖ Unit mounted outdoors.
- ❖ Unit operated in a high moisture or humidity environment.
- ❖ Unit operated in an area of excessive dust or dirt.

The harder the service, the more often the maintenance is required. Ozonators, which are mounted outdoors, should be cleaned every 1-3 months. For fire restoration applications, check after every couple of jobs to determine if cleaning is necessary. Notice that if the unit is elevated above floor level, cleaning frequency will be less. This is because at floor level more moisture is drawn into the Ozonator. Dry cleaners, hotels, motels, vehicles, or air purification applications should require cleaning approximately every 2-3 months. Please note the above cleaning suggestions are averages. Check your equipment more often initially to determine if your use will allow you to go longer or shorter periods between cleanings.

An easy way to determine if your machine is really dirty is to listen to it. With a clean 105A, turn the ozone level knob to zero, and then turn on the machine. The blower will come on, and it has a low volume fan sound. Next, turn up the ozone knob briefly to hear the sound of corona being formed. This corona formation is the result of a high voltage causing an air gap to ionize. The sound is a low tone hissing or buzzing. A really dirty unit will have no corona sound. If a unit has too much moisture in it, a snapping or arcing sound occurs. Please shutdown the unit and perform the necessary cleaning.

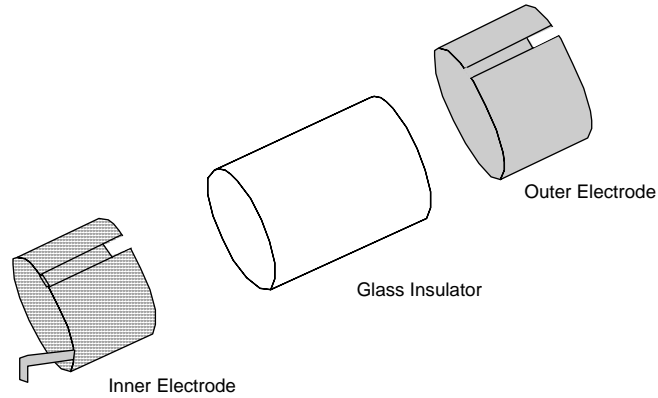
Routine maintenance consists of cleaning the air filter, cleaning the cabinet interior, cleaning of electrode and glass, and oiling the blower motor. All of these tasks can be performed by almost anyone following a few simple instructions. The Ozonator can be cleaned in the shop or on the job site. Cleaning supplies consist of clean water, glass cleaner, abrasive cleaner, abrasive brush, cleaning cloths or pads, and twenty-weight oil.

- ① Unplug the Ozonator, remove the air filter cover and filter on the rear of the 105A and clean it. The filter is of a sponge type material that can be cleaned by washing it out with water and possibly cleansing soap. Wash it out thoroughly and remove as much moisture as possible before reinstalling in the unit.
- ② Remove the left side cover that is labeled "Service Side" by taking out four screws and pulling down on the cover. Look at the inside of the cabinet and compare it to the internal drawings of the 105A in this manual. Identify the following components: the high voltage transformer, the electrode assembly, and the blower motor. The electrode assembly consists of an outer electrode, a glass cylinder, and a perforated inner electrode. See if the glass appears to be broken, dirty, smudged, or has a chalky appearance.
- ③ Clean the electrode assembly. Begin by removing the high voltage wire connected to the inner electrode directly. This requires removing the wing nut from this connection point. Be careful not to break the glass insulator tube. Next unscrew the generator holder's retaining clamp around the electrode. The glass can be carefully removed, as an assembly. Lay the electrode assembly on a table or counter for cleaning.
- ④ Disassemble the electrode. Remove the outer electrode by slightly springing it open and carefully sliding it off the glass insulator tube. If the outer electrode is stuck to the glass, soak the entire assembly in hot water (soapy if necessary), or in some other solution. Next, remove the inner electrode by slightly squeezing it together and sliding it out of the glass tube.

# DETAIL PLUS ODOR NEUTRALIZER

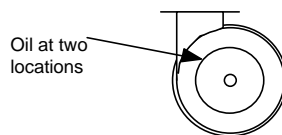
## Service Instruction Section

### CONT'D - (ROUTINE MAINTENANCE)



### SINGLE ELECTRODE ASSEMBLY

- 5 Clean each of the electrode components. Thoroughly clean the glass by normal methods used with glassware such as window cleaner, ammonia cleaners, or detergent and water. If the glass tube is extremely dirty, then clean thoroughly using a bottlebrush. The inner and outer electrodes should then be cleaned. To remove any oxidization that might have build up on the electrodes, use a stiff plastic brush with abrasive powders (Ajax or Comet), etc and for extreme oxidization, use a more abrasive means, such as a SOS pad, emery cloth, or in worst cases a small wire brush. The chalky substance on the aluminum electrodes is aluminum oxide that is a result of moisture. Clean the electrodes until they are back to the basic metal surfaces. Make sure to wash or wipe off any residue. Dry the electrodes and the glass tube thoroughly.
- 6 Reassemble the electrode assembly. Install the inner electrode into the glass tube until it is in the center of the glass (approximately 1 inches of clear glass on each end). Next, slide the outer electrode over the glass and align it with the inner electrode in the center of the glass.
- 7 Reinstall the electrode assembly into the cabinet. Look at the gaskets on the blower and verify it is in good shape. If it has any deterioration, please order a new one and change out at next cleaning. Next, insert the electrode assembly back into the generator holder and push the end of the glass firmly against the gasket on the blower, or plenum. Reattach the generator holder's retaining clamp around the electrode assembly. Tighten the clamp securely around the electrode assembly with the inner electrode tab directed toward the bottom of the cabinet. Connect the high voltage lead wire from the transformer back to the inner electrode tab. To prevent arcing, do not get the high voltage wire lead, bus bar, or inner electrode tab, too close to the side or rear of the cabinet. Please refer to the internal drawing of the cabinet in this manual to verify that all components look as shown.
- 8 Use a damp cloth to wipe out the interior of the cabinet to remove dust, dirt, etc. If a cleanser is required, use one that does not have an alcohol or hydrocarbon base that might be flammable. Excessively scrubbing the cabinet's exterior or interior might destroy the paint. Wipe the interior out with a clean, dry cloth.
- 9 Oil the blower motor with two drops of 20W oil for each end of the blower motor. Do not over oil. Once every three months should be adequate. Wipe off the motor and verify that no oil has leaked onto the bottom of the cabinet.



### OILING OF BLOWERS

- 10 Replace the cover and test the unit. Test by plugging in the unit and turning it on slowly to raise the ozone level. Determine if the corona sound occurs and the smell of ozone is present. The unit should be ready to put back into operation.

After cleaning, if no ozone is detected, or corona sound is heard, unplug the unit. Remove the door and verify that the glass electrode is up against the gasket, and that the transformer is connected to the inner electrode. If all appears correct, refer to the troubleshooting section of this manual for directions.

# DETAIL PLUS ODOR NEUTRALIZER

## Service Instruction Section

### TROUBLE-SHOOTING

Troubleshooting the Ozonator models require a familiarity with the machines, as well as general electrical troubleshooting and electrical safety skills. Testing can be done with a volt-ohmmeter, and some troubleshooting can even be done without electrical meters. However, do not attempt to do any troubleshooting until you are familiar with the function and components of the equipment. Do not attempt testing if any test or procedure is not fully understood.

Refer to the appropriate model's internal layout to follow operation and troubleshooting steps. Item numbers in bold will follow the descriptors below.

The Ozonator 105A uses a blower (**18**) to draw air in through the air filter (**20**) at the rear of the cabinet (**1**). Air is drawn into the open end of the glass tube (**6**), into the blower (**18**), and out the top of the cabinet (**1**). The glass tube (**6**) with inner and outer electrode(s) (**4&7**) is the location where the ozone is created. Ozone is generated in the high voltage electrical field between the inner and outer electrode(s) (**4&7**). The voltage level to the generator is adjusted by the level control on the side of the Ozonator. On model 105A, a rheostat (**19**) is used to adjust the voltage to the high voltage transformer (**16**). Manual control is supplied by the timer (**22A**), which controls the blower, as well as power to the level control. The timer can be adjusted up to a maximum of 12 hours, or operated continuously by turning the knob counterclockwise from the zero position.

Begin by removing the left side-cover that is labeled "Service Side" (**2**) and looking inside the 105A. Check for things that seem abnormal such as excessive dirt or film on cabinet, or any components. If a machine is stored for an extended period of time, moisture or humidity can cause a film to develop on some of the electrical components. Examine items that appear to need cleaning, such as the generator section (glass and electrodes). Look especially for components that appear to have heated or arced. These items can often determine what the cause of the problem is, and how to prevent it in the future.

On a following page is a list of symptoms, probable causes, and solutions to the problems. Please refer to this page for a starting point in troubleshooting the Ozonators. After extended service of the machine, any component can fail. However, the most common failures come from a lack of cleaning and maintenance.

### MOST COMMON ELECTRICAL TROUBLESHOOTING PROCEDURE

If the Ozonator blower will operate, but no ozone is detected, the first step is to check to see if the unit needs cleaning. Unplug the unit before removing the service side cover (**2**) to inspect the electrode (**4&7**) and glass tube (**6**). If they appear dirty or chalky, remove and clean as instructed under Routine Maintenance section of this manual. If the glass tube is not up against the gasket (**39**) on the blower (**18**), push it up against the gasket firmly.

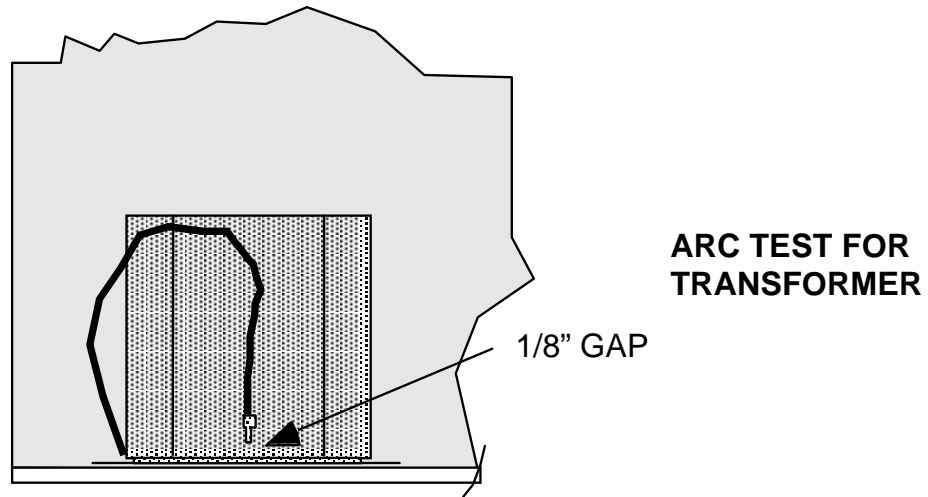
If everything above appears to be correct, test the unit while the door is removed. This can be accomplished by being careful to keep hands out of the inside of the cabinet. Turn down the ozone level control (**19**) to zero, plug in the unit, press in the door safety switch (**21**), and turn on the timer (**22A**). When the blower (**18**) comes on, turn up the ozone level control slowly. Listen for the distinctive "ionization" sound. It should intensify as the level increases. Verify that no arcing or sparking occurs. If an arc occurs, verify its location, then turn off the unit, and unplug the machine. Determine the reason for the arc, and correct. Typical problems can be dirty glass and electrodes, moisture in the electrode assembly, misalignment of the electrodes, a cracked glass, etc. If problem is not located, it is recommended that the high voltage transformer circuit be tested.

Proper testing of the high voltage transformer (**16**) cannot be done with most field meters. Actual voltage should be in excess of 6KV, but is of a high frequency. The best method of testing is by an "arc" or "spark" test to determine if high voltage is available. With the unit unplugged, disconnect the transformer's (**16**) high voltage wire from the inner electrode (**4**). Loop the high voltage wire down in front of the transformer and leave the wire approximately 1/8 inch from the bottom of the cabinet. Use electrical tape to hold the wire against the side of the transformer the correct spacing off of the transformer plate. Do not hold the wire or use a screwdriver to hold it in place. With the door off, verify that the ozone level knob (**19**) is turned to zero. Plug the unit in, hold down the door safety switch (**21**) and turn the timer (**22B**) on. The blower will come on. To "arc" test raise the ozone level knob (**19**) gradually toward the maximum setting. Typically when the knob reaches some point before 50%, an arc should occur from the high voltage wire to the bottom of the cabinet. The arc should be a strong arc, but should not damage the transformer plate. If a strong arc occurs, then the high voltage and control circuits are good. The problem is in the electrode-glass assembly and can be fixed by cleaning, or replacing electrodes or glass.

# DETAIL PLUS ODOR NEUTRALIZER

## Service Instruction Section

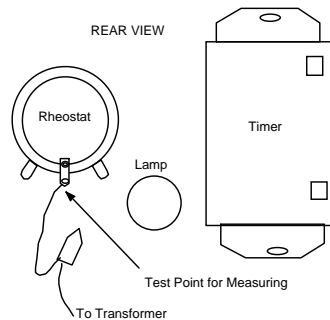
**CONT'D -  
(TROUBLE-  
SHOOTING)**



If the arc does not occur or is very weak, the transformer could be bad. Also, the voltage coming into the transformer might not be present or high enough. A 150VAC voltmeter is required to test the primary voltage coming into the high voltage transformer.

### Model 105A

On the model 105A, begin by verifying that the unit is unplugged. With an alligator clip, connect a 150VAC voltmeter from the center terminal on the rheostat (19) located on the front of the cabinet. Connect the other voltmeter probe to the cabinet ground with an alligator clip also. If the probes must be held inside the cabinet, be very careful not to come near, or in contact with the high voltage transformer lead, or the inner electrode (4) on the left. This most likely will have extremely high voltage present. Plug in the model 105A, set the ozone level control (19) to zero, turn on the timer (22A) and press in the door safety switch (21). The voltmeter should read approximately 90 volts. Adjust the ozone level knob to 50%, and the voltmeter should read approximately 100 volts. Adjust the ozone level knob to 100%, and the voltmeter should read approximately 120 volts. If these readings are observed, then the rheostat (19) is good. If the rheostat appears to be bad, unplug the 105A, then place an alligator clip between the two terminals on the rheostat (19) that have wires. This will bypass the rheostat and the unit will be at full output. Plug in the unit, turn on the timer (22A), press in the door safety switch (21), and the unit should come on at full output. If the "arc" test is being checked, it should produce a hot arc. If a hot arc occurs, then the transformer (16) is good and the rheostat (19) is bad. If a hot arc is not seen, then the transformer (16) is bad and should be replaced.



Replace all components with factory-approved components only. Failure to replace with factory-approved components could result in damage to equipment, or injury to personnel. Do not attempt to repair the machines unless you have a complete understanding of the procedure, and the proper test equipment is used. Call your local distributor for parts and assistance. Call the factory direct if a local distributor is unavailable or unknown.

# DETAIL PLUS ODOR NEUTRALIZER

## Service Instruction Section

### TROUBLE-SHOOTING LIST

**Note:** Before beginning troubleshooting problems, always refer to all diagrams and manual instructions. These units have high voltages in excess of 6KV and are high frequency.

Symptom	Probable Cause	Solution
Machine not working.	Power to the receptacle off.	Check receptacle for power.
	Not plugged into receptacle.	Plug in the unit.
	Cover not on good enough to close the door limit switch.	Tighten or adjust the cover.
	Main fuse blown.	Replace the main fuse on the rear of the cabinet.
	Failure of 12-hour timer.	Tap on timer knob in case it is stuck. Replace timer if necessary.
	Failure of door limit switch.	Replace the limit switch.
	Failure of blower motor.	Verify that blower motor will rotate and has not failed. Replace if necessary.
No Ozone or Low Ozone Output	Glass tube not up against the gasket on the blower.	Push the glass tube up against the gasket to prevent air from bypassing the generator.
	Ozone level setting too low.	Increase the setting.
	Dirty or oxidized glass tube and electrodes.	Clean the glass and electrodes, or replace them.
	Cracked glass insulator.	Replace the glass insulator tube.
	HV transformer failed.	Test transformer and replace if required.
	Rheostat failed	Test and replace components if required.
	Low or no air movement	Clean filter. Free the blower from obstructions and oil motor with 20W oil. Replace motor, if necessary.
Main Fuse Blown	Shorted rheostat.	Replace the component.
	Shorted blower motor.	Replace the blower motor.
	Transformer shorted.	Replace the transformer.
	Glass insulator tube is very dirty, has excessive moisture in it, or is cracked.	Clean the glass and electrodes, or replace the glass tube and electrodes.
	Wire insulation breakdown.	Locate the wire failure and replace.

# DETAIL PLUS ODOR NEUTRALIZER

## Service Instruction Section

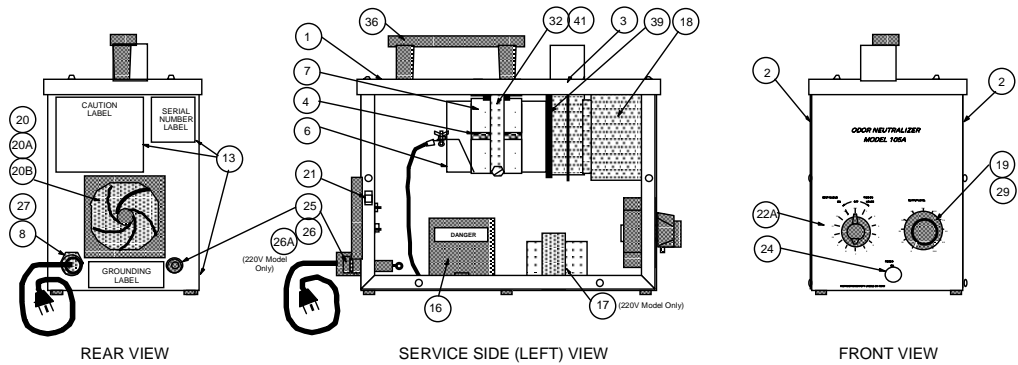
### PARTS LIST

ITEM #	OZONATOR PARTS DESCRIPTION	MODEL105A PARTS #
1	Enclosure Assembly	CAB10
2	Side Cover Assembly	CAB10SC
3	Gasket-Blower to Cabinet	GAS11
4	Inner Electrode	IE10
5		
6	Glass Insulator Tube	GL10
7	Outer Electrode	OE10
8	Line Cord	W1
9	Term Lug No. 10	R4161GSF
10	Term Lug No. 8	S4166S
11		
12	Wire Nut 16-18AWG	NP5115
13	Instruction Decals, Set of 3	LBCAU10, LBGND10, LBSS10
14	Cable Ties	ELAM
15	Cable Anchor	AAABMM
16	Transformer (HV) Step-up	T10
17	Transformer Step-down	T11
18	Blower Motor	BL10
19	Rheostat	RH10
20	Air Filter	AF10
21	Micro Switch (Door Safety)	S10
22A	Timer, 12 Hour	TR1
23		
24	Lamp, White	DS2
25	Fuseholder, Main	XF1
26	Fuses, Main	F10 (MDL 1/2)
27	Bushing, Strain Relief	8103-375
28		
29	Knob, Ozone Level	5151
30		
31		
32	Electrode Strap Assembly	EH10
33		
34		
35		
36	Handle	HDL10
37		
38		
39	Gasket-Glass to Blower	GAS10
40		
41	Electrode Holder Support Gasket	GAS12
42		
43		
44		
45		
20A	Air Filter Cover	AF10C
20B	Air Filter Base	AF10B

# DETAIL PLUS ODOR NEUTRALIZER

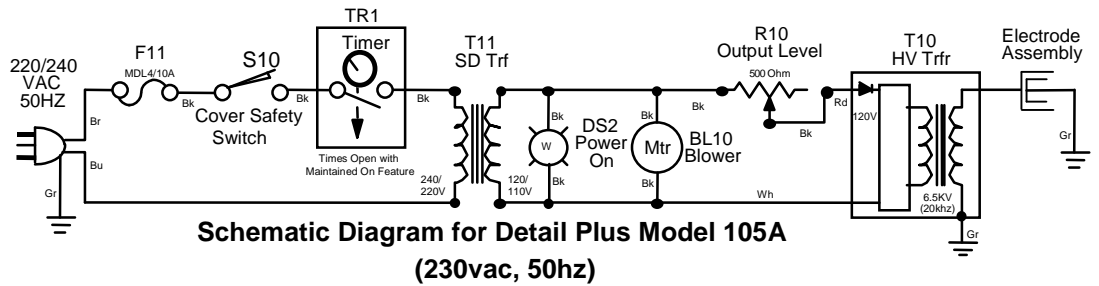
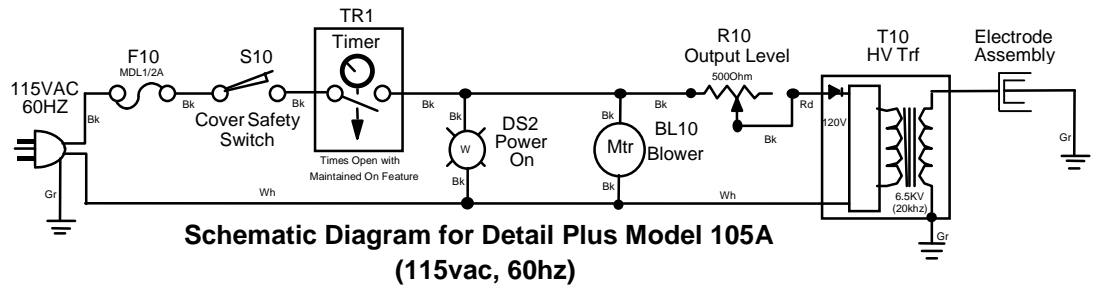
## Service Instruction Section

### Model 105A Drawing and Parts



DETAIL PLUS MODEL 105A

### Model 105A Schematic



# DETAIL PLUS ODOR NEUTRALIZER

Service Instruction Section

## MATERIAL SAFETY DATA SHEET -OZONE -

### SECTION I: PRODUCT IDENTIFICATION: OZONE

CHEMICAL FORMULA: O<sub>3</sub>

SYNONYMS: TRIATOMIC OXYGEN

CHEMICAL FAMILY: GASEOUS OXIDANT

CAS NO.: 10028-15-6

NIOSH: RTECS RS8225000

MANUFACTURER: DETAIL PLUS: P.O. Box 20755, Portland, Oregon 97294

EMERGENCY PHONE NUMBER: 1-800-284-9300 PRODUCT INFO/TECH SUPPORT: 1-800-284-0123

### SECTION II: COMPOSITION & PHYSICAL DATA:

MOLECULAR WEIGHT: 48.0 g/mole

SPECIFIC GRAVITY: 2.144 g/L

RELATIVE GAS DENSITY: 1.66

IONIZATION POTENTIAL: 12.52eV

MELTING POINT: -192.5°C

BOILING POINT: -111.9°C

VAPOR PRESSURE: >1 atm

WATER SOLUBILITY: 0.001% (0°C)

APPEARANCE AND ODOR: CLEAR TO BLUISH GAS WITH SHARP, PUNGENT ODOR.  
OZONE IS HEAVIER THAN AIR.

### SECTION III: HEALTH HAZARD DATA:

THRESHOLD LIMIT VALUE (TLV)/TIME WEIGHTED AVERAGE (TWA):

OSHA PEL/NIOSH REL: 0.1 ppm (0.2 mg/m<sup>3</sup>) 8-hr/day, 40hr/week

OSHA/NIOSH STEL: 0.3 ppm (0.6mg/m<sup>3</sup>) 15-min

OSHA/NIOSH IDLH: 5 ppm (10mg/m<sup>3</sup>)

WARNING PROPERTIES: ODOR THRESHOLD IS DETECTIBLE IN THE 0.01 TO 0.04 PPM RANGE, AND IS TREATED AS A MATERIAL WITH ADEQUATE WARNING PROPERTIES.

EFFECTS OF OVER EXPOSURE: IRRITATION OF NOSE AND THROAT AND MAY CAUSE, SHORTNESS OF BREATH AND/OR COUGHING, HEADACHES, FATIGUE, DROWSINESS, AND INFLAMMATION OF UPPER RESPIRATORY TRACT.

### SECTION IV: FIRST AID MEASURES:

INHALATION: REMOVE FROM AIR CONTAINING OZONE, INTO AREA WITH FRESH AIR. IF BREATHING IS DIFFICULT, A TRAINED PERSON SHOULD ADMINISTER OXYGEN.

### SECTION V: FIRE AND EXPLOSION HAZARD DATA:

OZONE IS MOST OFTEN GENERATED FROM AIR AT CONCENTRATIONS OF 1-2% BY WEIGHT. AT THESE CONCENTRATIONS OZONE IS NON- EXPLOSIVE.

FLASH POINT: N/D

AUTO IGNITION TEMP: N/D

UPPER AND LOWER FLAMMABLE LIMITS IN AIR: N/D

### SECTION VI: ACCIDENTIAL RELEASE:

EVACUATE AREA AND OPEN DOORS AND WINDOWS AND ALLOW AREA TO VENTILATE. OZONE IS UNSTABLE GAS AND DECOMPOSES TO OXYGEN WITHIN MINUTES TO HOURS.

### SECTION VII: REACTIVITY DATA:

STABILITY: UNSTABLE. SLOWLY DECOMPOSES TO OXYGEN FROM WHICH IT WAS MADE.

CONDITIONS TO AVOID: CONCENTRATING OZONE TO LEVELS (>20%) WHERE ITS REACTIVITY AND RATE OF DECOMPOSITION ACCELERATES.

INCOMPATIBILITY: OZONE IS CHEMICALLY REACTIVE WITH ALL OXIDIZABLE MATERIALS, BOTH ORGANIC AND INORGANIC.

### SECTION VIII: PROTECTION & PRECAUTIONS:

VENTILATION: GENERAL EXHAUST RECOMMENDED. INJECT FRESH AIR. AVOID WORK-ING IN OZONE GENERATING AREAS UNLESS OZONE LEVELS ARE BELOW PEL/TLV.

RESPIRATORY: RESPIRATORS MAY BE USED WHEN WORK PRACTICE CONTROLS ARE NOT TECHNICALLY FEASIBLE. USE NIOSH APPROVED RESPIRATOR.