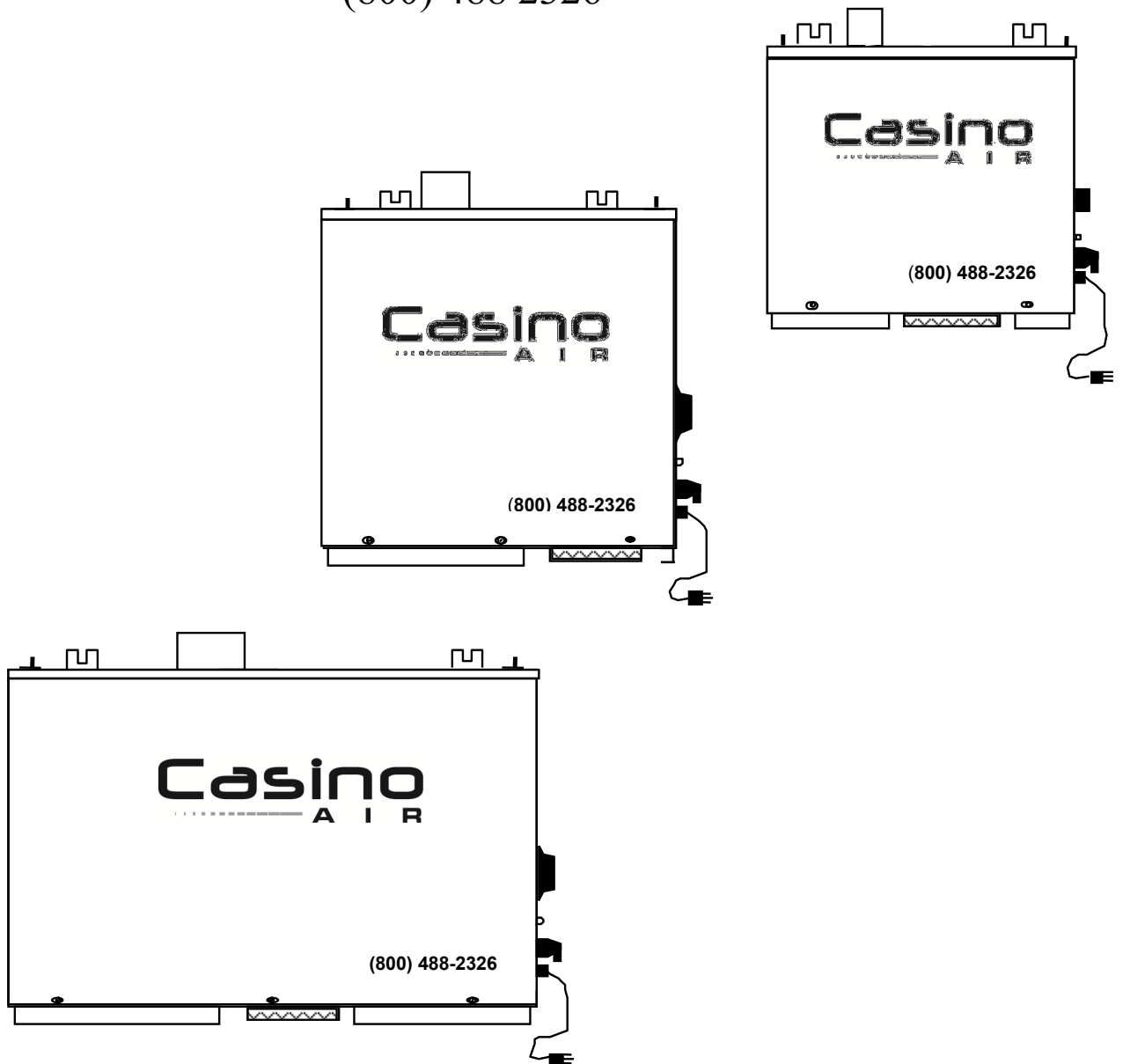


Casino

..... A I R

MOLECULAR OXIDIZERS

(800) 488 2326



***INSTALLATION, APPLICATION AND SERVICE
INSTRUCTIONS FOR GX SERIES***

CASINO AIR MOLECULAR OXIDIZERS

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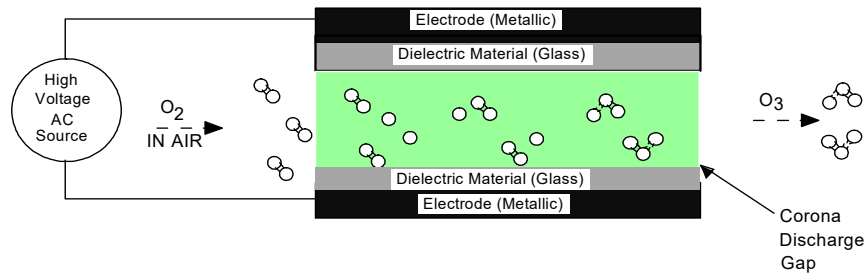
UNDERSTANDING OZONE

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 oxidation 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 or longer exposure times 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. This is why it is recommended that fans be used 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, require a high concentration of ozone. **WARNING: COMMERCIAL OR INDUSTRIAL OZONE GENERATORS CAN PRODUCE LEVELS THAT EXCEED OCCUPIED LIMITS. THIS MEANS THAT WHEN TREATING THESE ODORS, THE AREAS OF TREATMENT MUST NOT BE OCCUPIED.** If ozone is used in an occupied area, the ozone level must be maintained at a safe level. Monitoring devices available are: ozone badges, 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 the reaction with the large quantity of polluting emissions in the urban environment, and due to the fact that ozone is unstable and highly reactive and 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 concentration, makes ozone capable of being used safely in many applications.

CASINO AIR MOLECULAR OXIDIZERS

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. The EPA value is presently 0.12 ppm per volume measured over one hour, and 0.08 ppm measured over eight hours. **Ozone exposure limits in the workplace are set by the Occupational Safety and Health Administration (OSHA) and by the U.S. National Institute for Occupational Safety and Health (NIOSH). OSHA limit is 0.1 ppm per volume for an 8-hour work shift. And limit for 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.** As mentioned previously, ozone generators can be supplied with controls that limit the amount of ozone to levels below all regulated values.

GENERAL

The Casino Air models CA500GX, CA1000GX, CA1500GX, and CA2000GX are ozone generators. The Casino Air (CA) models produce **ozone** from oxygen taken from air in concentration amounts of 0.002% by volume. The chemical formula for ozone is **O₃**, 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 (O₂), carbon dioxide (CO₂), and water (H₂O). The units do 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.** 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). **THESE UNITS SHOULD NOT BE USED IN OCCUPIED AREAS NOR ARE THEY DESIGNED FOR USE IN HOSPITAL ROOMS OR SICK ROOMS. ADDITIONAL CONTROL METHODS ARE REQUIRED TO ENABLE THESE MACHINES ARE TO BE UTILIZED IN INHABITED AREAS. THESE METHODS MUST LIMIT THE EXPOSURE LEVELS TO THOSE PERMITTED BY THE APPROPRIATE GOVERNING BODIES.** Refer to the Indoor Air Quality Section of this manual or contact Casino Air for additional information.

Although higher ozone limits are typically required to effectively control industrial odors, **caution must be used to secure such areas to avoid inadvertent entry until the area can be properly ventilated.**

THESE UNITS 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 Casino Air units have been designed for 115V, 60Hz or 220-240V, 50/60Hz operation, AC only. The nominal power usage and airflow of each unit are as follows:

Models	Power	Air Volume Rating
CA500GX	170 VA	75/62 cfm @ 60/50Hz
CA1000GX	340 VA	120/100 cfm @ 60/50Hz
CA1500GX	490 VA	300/250 cfm @ 60/50Hz
CA2000GX	570 VA	300/250 cfm @ 60/50Hz

CASINO AIR MOLECULAR OXIDIZERS

Installation Section

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, CE or Europe, 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 user must supply a male plug to match local receptacle configurations. In all configurations the cords must be three-wire cords with a ground or earth wire and have the correct plug for the corresponding receptacle of that nation or locality.

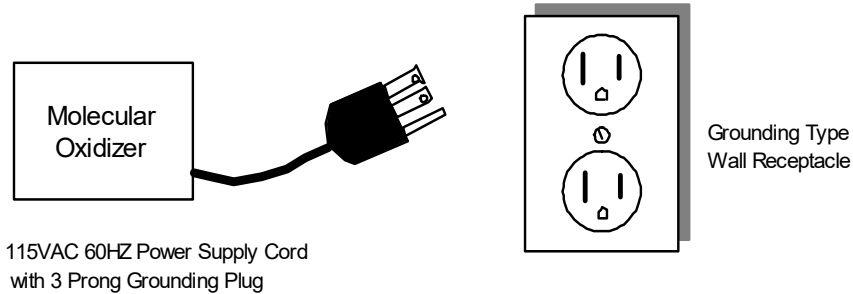


FIGURE 1

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.

230VAC -- Refer to Figure 2 for the 220-240VAC, 50HZ CE model that is supplied with the (CE) cord.

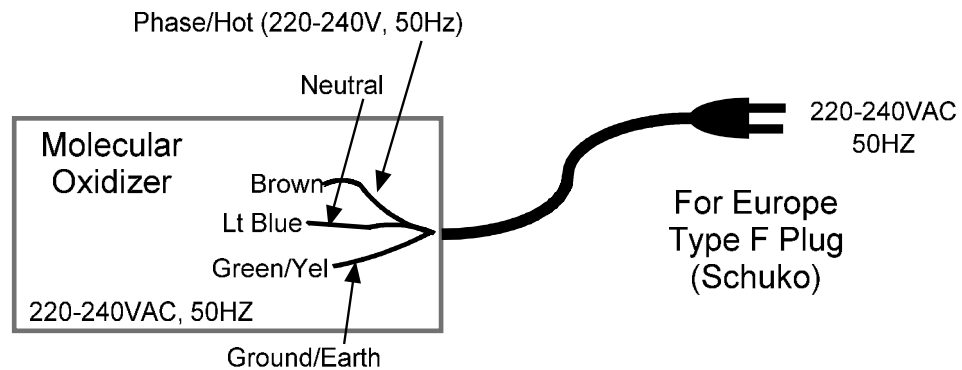


FIGURE 2

INSPECTION

Upon receipt of the Casino Air unit remove it from the shipment box, and remove the service cover by removing the bottom screws and gently pulling down on the cover. Once the cover is removed, please view the unit and compare it to the internal view of the appropriate unit within this manual. Verify that no obvious damage has occurred during shipment. After completing the inspection and making any corrections, replace the cover.

CHOICE OF LOCATION

The molecular oxidizer equipment should be placed near the treatment area, 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, or ordered with the weatherproofing option. Place the unit as high as possible to prevent the entry of moisture through the bottom filter.

EFFECTIVENESS

For the maximum performance, place the molecular oxidizer units 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.

CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

ROUTINE MAINTENANCE

The molecular oxidizer requires routine maintenance for years of service at maximum ozone output. 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 molecular oxidizer components, which voids the warranty.

Below is a list of important operating factors that increase the frequency for cleaning:

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

The harder the service, the more often the maintenance is required. Notice that if the unit is elevated above floor level, cleaning frequency could be less. This is because at floor level more moisture & dirt are drawn into the molecular oxidizer. Normal air purification applications should require cleaning approximately every 2-3 months. However in areas where high humidity or rainfall and/or areas that have airborne dust exists, such as deserts or construction sites, the unit will need more frequent monitoring or maintenance. Please note the above cleaning suggestions are averages. Check your equipment more often initially to determine if it will allow 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 molecular oxidizer, turn the level control knob to zero so that only the blower is operating. Next, turn up the output knob briefly to hear the sound of corona being formed. Verify that all the modules are operating from the indicator lights. 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 little to no corona sound. If a unit has too much moisture in it or is dirty, a snapping or arcing sound may occur. Please shutdown the unit and perform the necessary cleaning.

Inside the cabinet look for moisture and wipe and dry moisture from the cabinet. The ozone section (left) of the cabinet has the external air entering and ozonated air exiting it. The left side is more prone to moisture due to the airflow through it. The right side of the cabinet has the controls and is separated to reduce moisture exposure from outside air. Keep this area clean and dry to minimize the moisture on the components located therein.

When doing unit maintenance, turn off the unit and unplug the power cord. The molecular oxidizer has an electrostatic air filter on the bottom of the cabinet. It should be washed out and cleaned periodically with some type of liquid soap and water. They are designed for years of service, or they can be swapped out and cleaned at a later date. When opening the cabinet for maintenance of the ozone modules look for any signs of moisture ingress and dry off components with power turned off or the unit unplugged.

Inspect each of the electrode modules and normally clean the electrode assembly glasses with glass cleaner or moist cloth to remove any dust, dirt, or corrosion from the glass tubes. Wipe carefully between the glass tubes, and dry off completely before re-installing the assembly. In most all cases the electrode assembly will need to be removed from the plenum chamber it is mounted on. Disconnect the power wires and remove the screws holding it to the plenum chamber. Do this for all modules.

For modules in dirty and/or wet locations a glass cleaner or soap and water may not be adequate to remove the build-up on the glass electrodes. This can also occur if the unit has not been cleaned periodically as instructed. For these cases there are some other more aggressive methods that may need to be utilized. In these cases the electrode assembly will need to be removed as described previously. The first method is to use acetone (finger nail polish remover) along with Q-Tips, a soft cloth, and/or a small bottle brush to wipe off the deposits on the glass electrodes. It may be necessary to thoroughly clean between the electrodes with the cloth or bottle brush. Acetone is a flammable substance so it is to be handled away from any flame producing source. Once the glass electrodes are clean, wipe off the glass tubes with a moist cloth, and allow each one of them at least 5 minutes for any liquid to evaporate. Reinstall the electrodes and then either turn down the output level control to "ZERO", or remove the fuses to each module. Turn on the blower and allow it to operate for at least 1 minute drawing air over the electrode tubes to provide further drying of the glass. Then return to normal service.

The second method of cleaning caked on deposits from the glass electrodes is by the use of some fine grit emery cloth. Select 320 or higher grit cloth and wet it down. Optionally use liquid soap as well. Carefully use the emery cloth to clean the deposits off of and specifically between the glass electrodes. Once each tube has been cleaned, wipe the tubes down with a moist cloth to remove any loose material. Allow the tubes to dry and then reinstall into the cabinet. Then return to normal service.

After cleaning if there are any problems refer to the troubleshooting section of this manual for directions.

CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

TROUBLE-SHOOTING

Troubleshooting the Casino Air 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.

When the CA500GX, CA1000GX, CA1500GX, or the CA2000GX is properly operating it draws air in through the air filter (20) on the bottom of the cabinet (1). Air passes by the airflow switch (36), across the electronic modules (4) and through the transformer/electrode assemblies (6), and into the blower or plenum chamber (35) where it is drawn out by the blower (18), and discharges through the top of the cabinet (1). If the blower (18) is operating adequately the airflow switch (36) which will allow voltage to the variable transformer/output level (19) to provide power to the electronic module (4), and the high voltage transformer/electrode modules (6) where the ozone is created in a high voltage electrical field between the electrodes.

Proper maintenance will reduce the likelihood of component failure Attached is a list of symptoms, probable causes, and solutions to unit problems. Refer to the appropriate model's internal layout to follow operation and troubleshooting steps. Item numbers in bold will follow the descriptors below.

Models CA500GX, CA1000GX, CA1500GX & CA2000GX

Nothing Operating

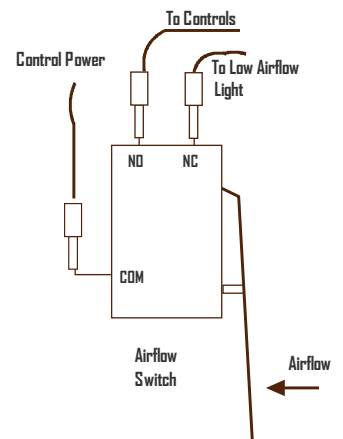
If the CA500GX, CA1000GX, CA1500GX, or CA2000GX will not operate at all, begin by removing and checking the main fuse (25 & 26). Use an ohmmeter to determine if the fuse is good (do not depend on visual inspection). If blown, replace it with identical size and type of fuse. If the fuse is good replace it and then unplug the power cord (8) and removing the door cover (2). Verify that the door pin on the right lower side was aligned and depressing the door safety switch (21). You do this by plugging the unit back in and pressing in the door safety switch and seeing if the unit will turn on. Be careful and do not touch the electrodes as they operate at a very high voltage. If this is not the problem then unplug the unit again and check for abnormal things, such as excessive dirt or film on components. Examine items that appear to need cleaning, such as the electrode section or blower. Verify that all disconnecting terminal blocks are properly connected. Look especially for components that appear to have overheated or arced. Look over the wiring and equipment to see if anything mechanically seems wrong, such as loose wires, broken components, etc. Check the door safety switch (21) on the lower right edge and verify it clicks when it is depressed. Verify that the on/off switch (22) is operational with an ohmmeter if necessary. If the power cord is plugged in, the main fuse, main fuse holder, door safety switch, and the on/off switch are good and in the on position then the blower (18) and the white power on light (24) should come on. At this point if the unit is not working take a 120VAC voltmeter and refer to the schematic on the rear of the door and test for voltage from the main fuse holder to the load side of the on/off switch to see where the loss of voltage occurs. Replace the necessary component.

Power Light On, But Blower Not Operating

If any of the units has the white power on light illuminated, but the blower (18) is not operating first check the terminal blocks to verify they are properly connected. If wiring and terminal are good then it is possible that the blower motor has gone bad, or something has overloaded it and it has turned off due to internal thermal switch. Unplug the unit and remove the cover for inspection and testing. Locate the wiring from the blower to the terminals. Plug in the unit and activate the door safety switch (21) and turn the unit on. If the blower doesn't come on or is acting erratically measure the voltage at the terminals to the blower. The voltage should be approximately 120VAC. If voltage is not present check the wiring. If voltage is present but the blower does not come on, disconnect the terminal block and remove the blower. Try spinning the blower fan blades to see if it is stuck or dragging. Verify that there is nothing in the blower housing causing the blower not to work. Replace with a blower from Clean Air factory only. There are factory modifications made to this blower that are necessary. Remove any adaptors in the discharge of the blower for installing in a new blower assembly.

Blower Operating, But Low Airflow Red Light On

If the unit is blowing, but the red "Low Airflow" light (23) is on, then the airflow switch is not activated. First remove the air filter from the bottom while the unit is operating to see if it is dirty and preventing adequate air flow from entering the cabinet. If the red light goes off then clean the air filter and replace it, making sure the red light stays off. However, if this does not solve the problem, look at the discharge piping for obstructions and remove them. But then if nothing is obvious from the outside, unplug the unit and remove the front cover to inspect the airflow switch (36) to see what is preventing it from operating.



CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

CONT'D - (TROUBLE- SHOOTING)

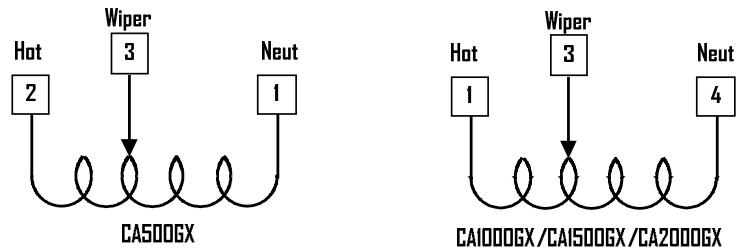
Manually push the paddle on the switch towards the rear of the cabinet plate to see if you can hear the switch click. If you cannot hear the switch click or are not certain, then remove the wires from the switch and use an ohmmeter to test the switch. If the contacts are bad, install a new airflow switch (36). Plug in the unit and test at this point and be careful not to come near the electrode section due to high voltage. Press in the door safety switch (21), and use a wooden pencil or non-conducting rod to push the paddle of the airflow switch toward the rear of the cabinet. Turn the output level control (19) up to about 50% and the electrode assembly (4) should energize and the HV transformer/electrode assembly (6) should energize and make ozone. Note that the airflow switch will not activate on its own with the door off, as airflow will not be directed across it unless the air comes through the bottom air filter.

Unit Operating, No Red Lights, But No Ozone

Check Variable Transformer

If any of the module fuses (34) are bad then the Module On light (24) will not come on. Replace the fuse with the correct size. If this is not the problem then unplug the unit and remove the cover. Inspect the output level (variable transformer 19) and verify that the brush and windings on the rear of the device are not corroded and are coming into clean contact with each other. If the carbon brush assembly (43) is not coming in contact with the windings on then rear, it may be that they have become stuck. On models 10GA and 20GA it is possible to remove the screw from the rear plate of the output level that is holding the brush in place. It is spring loaded into a small slot and should pop out when the screw is removed. Clean the brush assembly with a clean cloth or similar removing any film or corrosion. Be careful not to break the carbon brush as it is very brittle. Next clean the slot that holds the brush. Something like Q-Tip will work to remove any film that might be holding the spring action from pushing the brush toward the winding. Once everything is clean the replace the brush in the slot and verify that the brush does contact the windings properly. If necessary clean the windings with a pencil eraser or ammonia or contact cleaner. Allow to dry before energizing.

If the output level (19) is clean then it can be tested with a 120VAC voltmeter. Begin by removing all of the module fuses (34) so that there is no load on the variable transformer (19). Plug in the unit, press in safety switch (21) with something that will hold it down, turn the on/off switch (22) on and use something to activate the airflow switch (36). Below is a schematic of the variable transformer (19) for the following testing.



Take a voltmeter and measure the voltage between terminals (hot) and (neutral) on the output level controller (19). It should read approximately 120VAC. Next raise the output level up to 50% and measure the voltage between terminals for the wiper and neutral. It should be approximately 60VAC (50% of 120VAC). Turn the knob up to 100% and the voltage between the wiper and neutral should read approximately 120VAC. If not then the output level controller (19) is bad and needs to be replaced. If there is any uncertainty about this test, it can be bypassed for test purposes. Disconnect the wire on the wiper and connect it to hot wire. This bypasses the output level controller and puts full output to the ozone modules. Test this by turning the on/off switch (22) off and installing one or more module fuses (34) into their fuse holders (25). When the unit is turned back on, by depressing safety switch (21) and airflow switch (36), then the blower (18) should blow and ozone modules (6) should be energized and make ozone.

Replace any necessary components to make the unit work properly up to this point. If the unit works properly up to this point, then move on to testing the electronic module and the high voltage transformer.

Check Electronic Module

If the unit blower (18) will operate, the low airflow switch (36) is operating, and the variable transformer (19) is operating correctly, but no ozone is detected, the first step is to check to see if the electrode assemblies need cleaning. Unplug the unit and remove the front cover (2) to inspect the HV transformer/electrodes (6). If they appear dirty or contaminated, clean them as instructed under Routine Maintenance section of this manual. If everything above appears to be correct, and the unit has been tested up to the variable transformer (19) and airflow switch (36), then testing the electronic modules (4) are the next step. Please note that each set of electronic modules and electrode assemblies are to be done one at a time. Disconnect the terminal blocks (17) so that only one unit is tested a time. Also remove the module fuses (34) that are not under test.

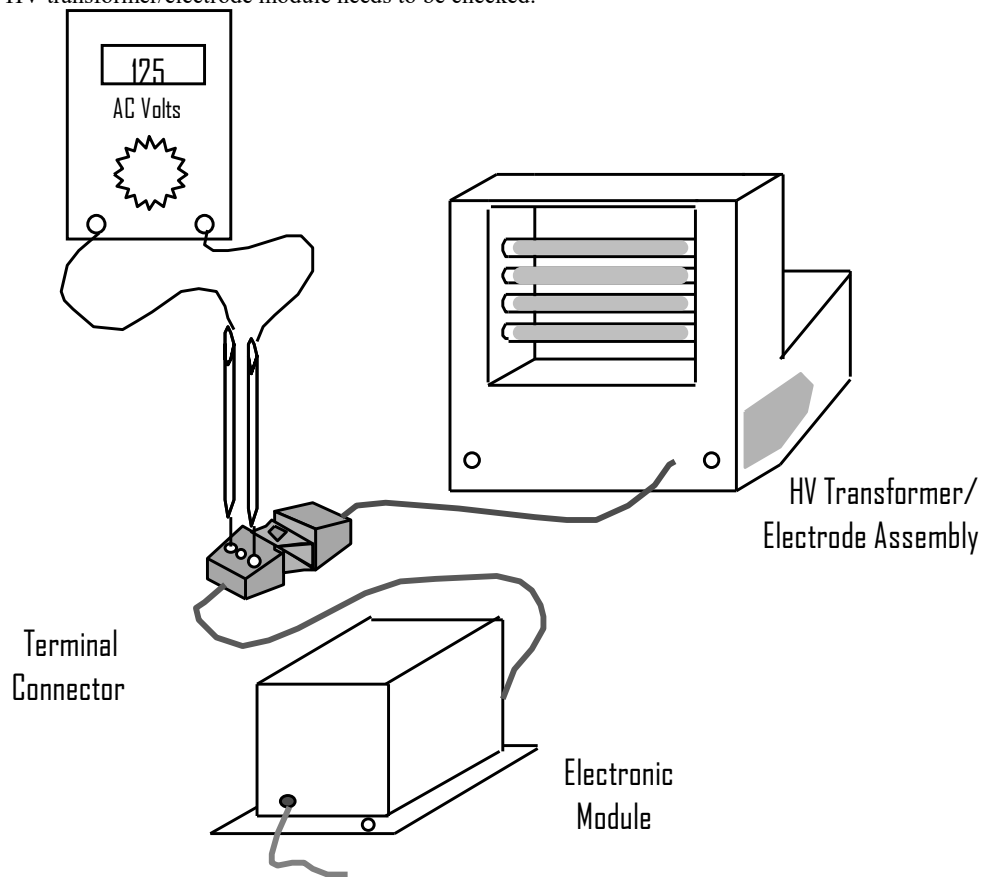
CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

CONT'D - (TROUBLE- SHOOTING)

Be careful to keep hands out of the inside of the cabinet while it is energized. Plug in the power cord (8), press in the safety switch (21) located on the lower right edge of the cabinet, and then turn on the on/off switch (22). The blower (18) should come on. Next activate the airflow switch (36) with a non-conducting rod and turn up the output level controller (19) and you should hear and see the distinctive "ionization" sound coming from the electrode section (6). Verify that no arcing or sparking occurs outside of the gap between the electrodes. If unusual arcing occurs around the electrodes or HV module, 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 on the electrode assembly, a cracked glass, etc. If problem is not located or if no corona is being formed between the glass electrodes, it is recommended that the electronic module (4) be circuit be tested.

To test the electronic module (4) locate the terminal connector that connects the electronic module (4) to the HV transformer/electrode (6). Remove the cover from the terminal connector which has 3 terminals. The two outside terminals are used and the center terminal is not used. Prepare to make a voltmeter reading to the two outside terminals. Plug the power cord (8) back in, press in the safety switch (21), turn on the on/off switch (22), and activate the airflow switch (36). The voltage on the two outside terminals should read approximately 125VAC. If the level is zero or much lower, then replace the electronic module. If the voltage is present then the HV transformer/electrode module needs to be checked.



Check High Voltage Transformer/Electrode Assembly

The only field testing of the high voltage transformer/electrode assembly (6) that can be done at this point is to test by substituting in another assembly (6) because these assemblies are sealed systems. If possible and wire lengths allow, disconnect the suspected faulty assembly (6) and plug into a good electronic module (4) already in the cabinet. If it doesn't work, then you know the high voltage transformer/electrode assembly is faulty. The actual voltage between the glass electrodes is in excess of 10KV, and is of a high frequency. Do not touch the electrode assembly with hands, or other materials while it is operational or under test. Also do not touch or connect any conductive materials between the electrode assembly and the grounded cabinet. If the glass electrodes are broken the material inside is conductive silicon and is not hazardous. Remove the defective part and replace the high voltage transformer/electrode assembly.

Check each set of electronic modules and HV transformer/electrode assemblies. 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 Casino Air for parts and assistance.

CASINO AIR MOLECULAR OXIDIZERS

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 10KV.

Symptom	Probable Cause	Solution
Machine not working.	Power to the receptacle off.	Check receptacle for power or tripped GFI.
	Cover not on good enough to close the door limit switch.	Tighten or adjust the cover.
	Main fuse blown.	Replace the main fuse with spare fuse.
	Failure of on-off switch or timer.	Replace on-off switch, contacts, or timer.
	Failure of door limit switch.	Replace the limit switch.
	Failure of blower motor.	Verify that blower motor will rotate and has not failed. Replace blower if necessary.
No Ozone or Low Ozone Output	Airflow switch is not activated	Check to see if airflow switch is operating or if inlet or outlet is blocked. Replace airflow switch if necessary.
	Ozone level setting too low.	Increase the setting.
	Dirty or oxidized glass electrodes.	Clean the glass electrodes.
	Cracked glass electrodes.	Replace the HV transformer/electrode assy.
	Blown ozone module fuse.	Verify fuse is blown and replace. Check cause.
	Electrode module failed	Test electronic module and replace if required.
	Dirty, worn, or broken variable transformer wiper (brush).	Clean or replace the variable transformer wiper.
	Variable transformer failed.	Test and replace components if required.
Main Fuses Blown	Low air movement (blower not operating).	Clean filter. Free the blower from obstructions Replace motor, if necessary.
	Shorted variable transformer	Replace the component.
Ozone Mod Fuses Blown	Shorted blower motor.	Replace the blower motor.
	Electronic module shorted.	Replace the electronic module.
	Wire insulation breakdown.	Locate the wire failure and replace.

CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

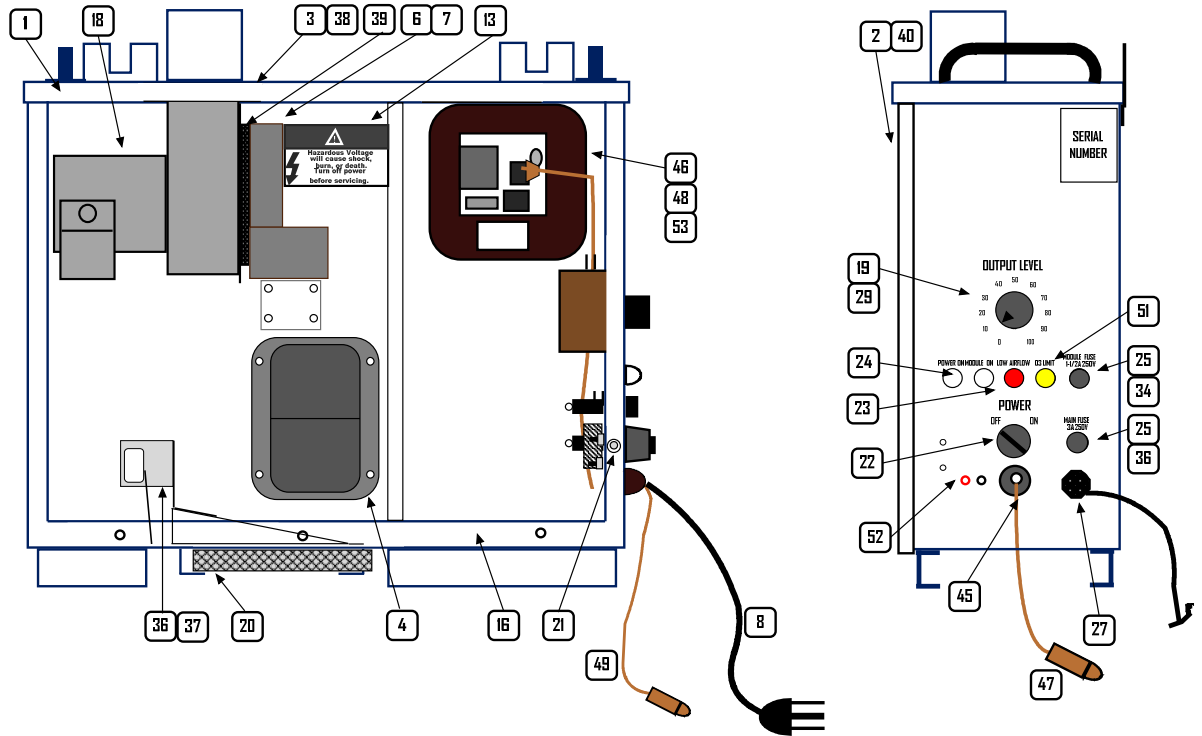
PARTS LIST

ITEM	PARTS DESCRIPTION	CA500GX P/N	CA1000GX P/N	CA1500GX P/N	CA2000GX P/N
1	Cabinet Assembly w/Barrier				
2	Cover Assembly				
3	Gasket -Blower to Cabinet				
4	Electronic Module 5G				
5					
6	HV/HF Transformer/Electrode Module 5G				
7	Electrode Bracket				
8	Line Cord 8ft 16AWG/14ft 14AWG				
9	Terminal Lugs #10				
10	Terminal Lugs #8				
11	Butt Splices				
12	Wire Nut 18-16AWG				
13	Instruction Decals (3)				
14	Cable Tie				
15	Cable Tie Anchor				
16	Terminal Blocks - Cut to Length (12/strip)				
17					
18	Blower and Motor				
19	Variable Transformer for Output Level				
20	Air Filter Enhanced Electrostatic				
21	Door Safety Switch				
22	Selector Switch				
23	Indicator Light Red				
24	Indicator Light White				
25	Fuse Holder, Panel Mount Screw Cap				
26	Fuse Main, 250V Slow Blow				
27	Bushing Strain Relief - Line Cord				
28					
29	Knob, Output Level				
30	Adaptor for Blower, Rectangular to Round				
31	Adaptor for Motor Housing, 4.5"D, 4 Holes				
32					
33					
34	Fuse Ozone Module, 1.5A Slow Blow				
35	Plenum Chamber (Alum)				
36	Airflow Switch				
37	Airflow Scoop				
38	Blower Discharge Screen				
39	Gasket - Electrode Assembly to Plenum				
40	Gasket Set for Cover & Barrier (1/2"W)				
41	Teflon Washer, Motor Shaft				
42	Gasket - Blower to Plenum				
43	Brush for Superior Variable Transformer				
44	Standoff, 1/2" 10/32				
45	Bushing Strain Relief - Sensor Cord (optional)				
46	Ozone Sensor Card (optional)				
47	Ozone Sensor Head 0.1ppm (optional)				
48	Ozone Sensor Card Enclosure (optional)				
49	Ozone Sensor Cable - 25ft (optional)				
50	Indicator Light Green (optional)				
51	Indicator Light Yellow (optional)				
52	Test Terminal Red & Black w/Cord (optional)				
53	Ozone Sensor Control Relay (optional)				
54	Selector Switch DP Sensor Bypass (optional)				
55	Sequence Timer (optional)				
56					

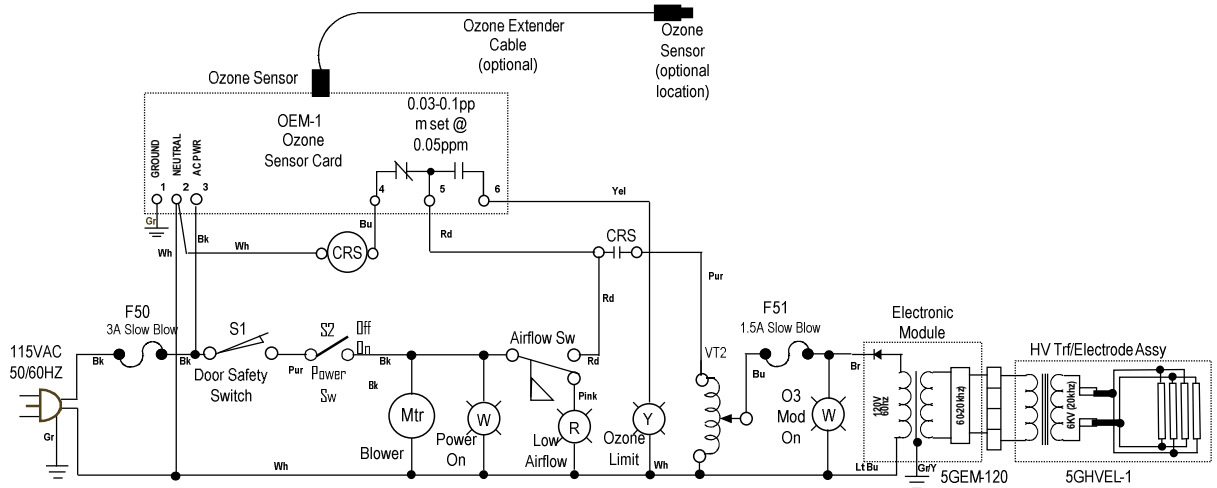
CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

Model CA500GX
Drawing and Parts
(Sensor)



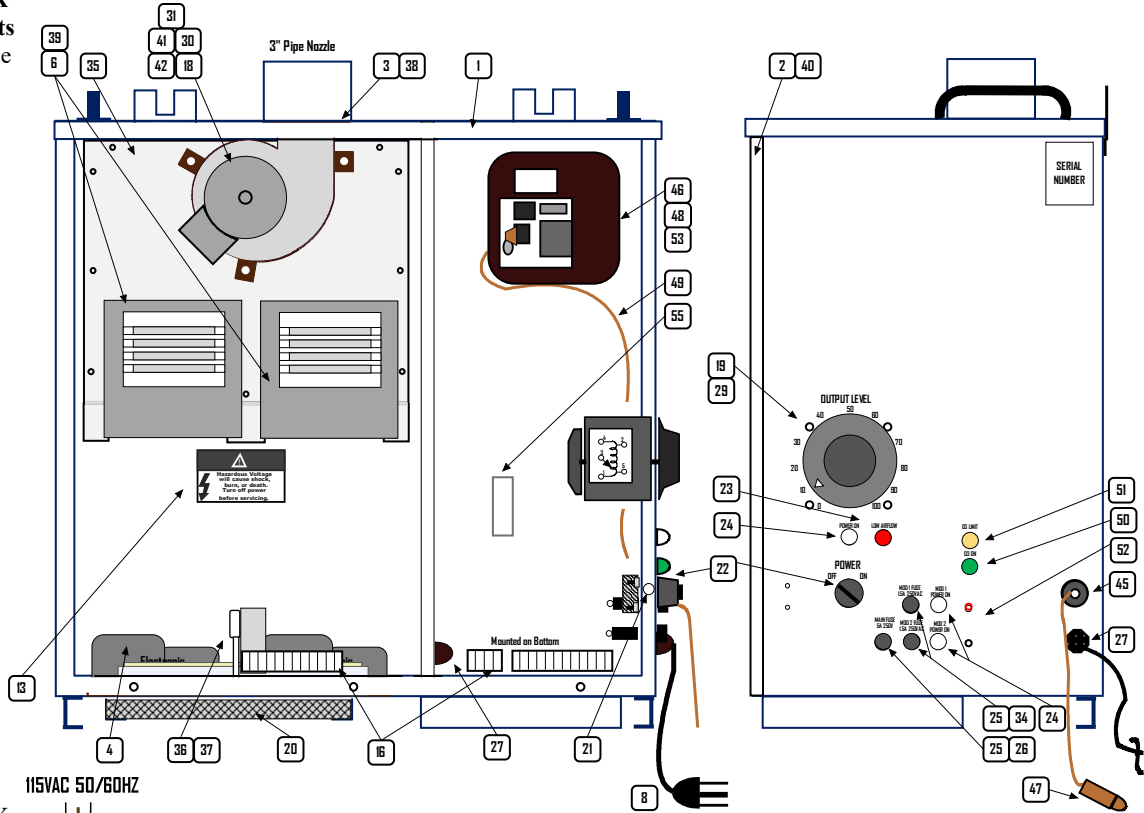
Model CA500GX
Schematic
(Sensor)



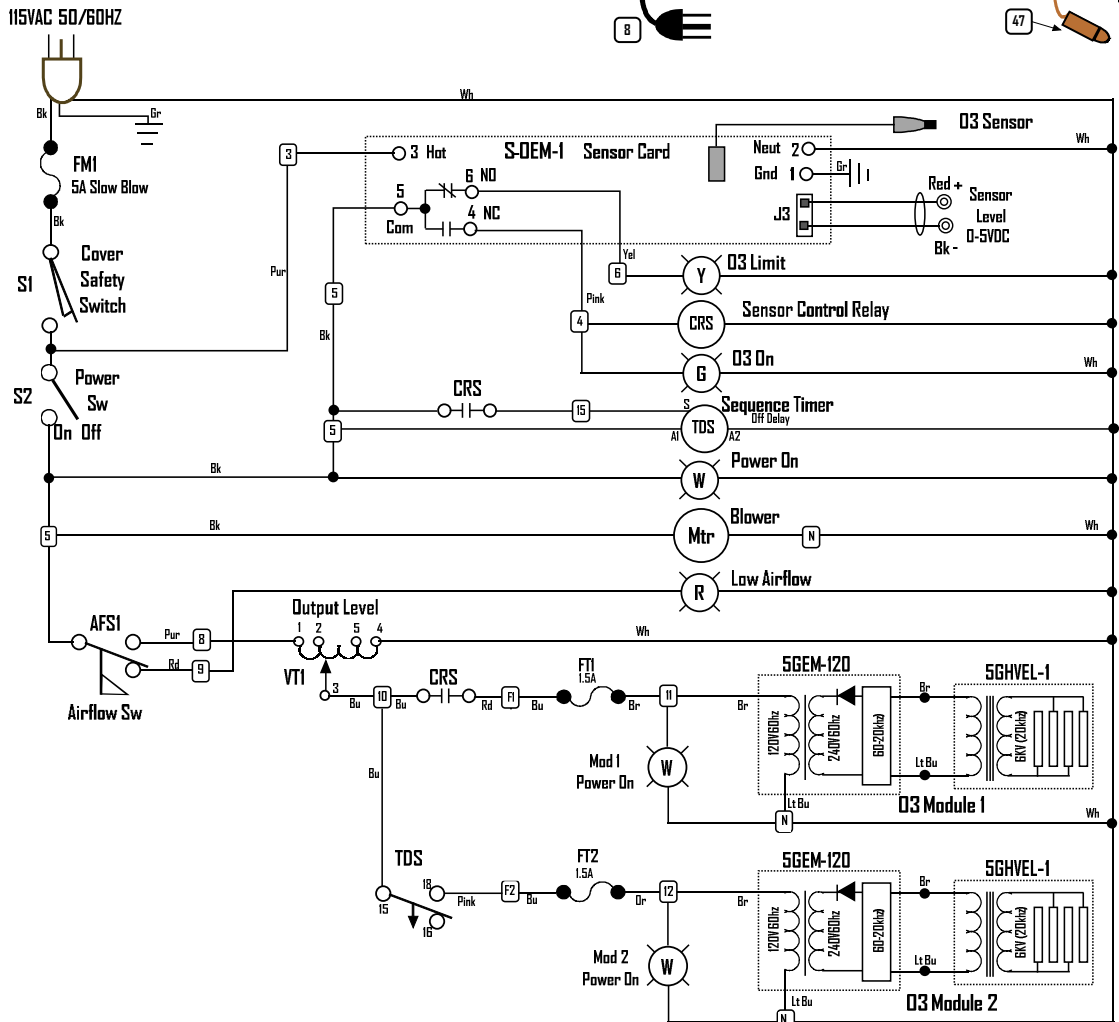
CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

Model CA1000GX
Drawings and Parts
(Sensor & Sequence
Timer)



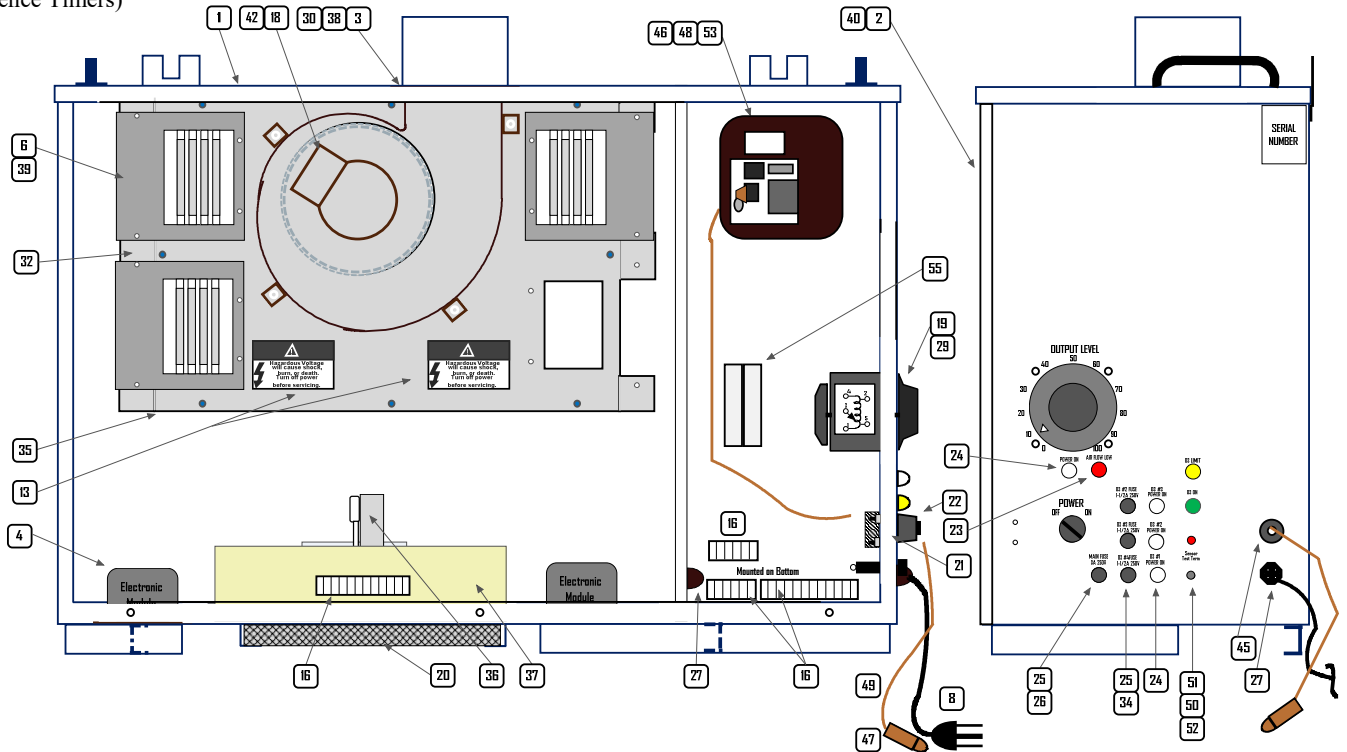
Model CA1000GX
Schematic
(Sensor & Sequence
Timer)



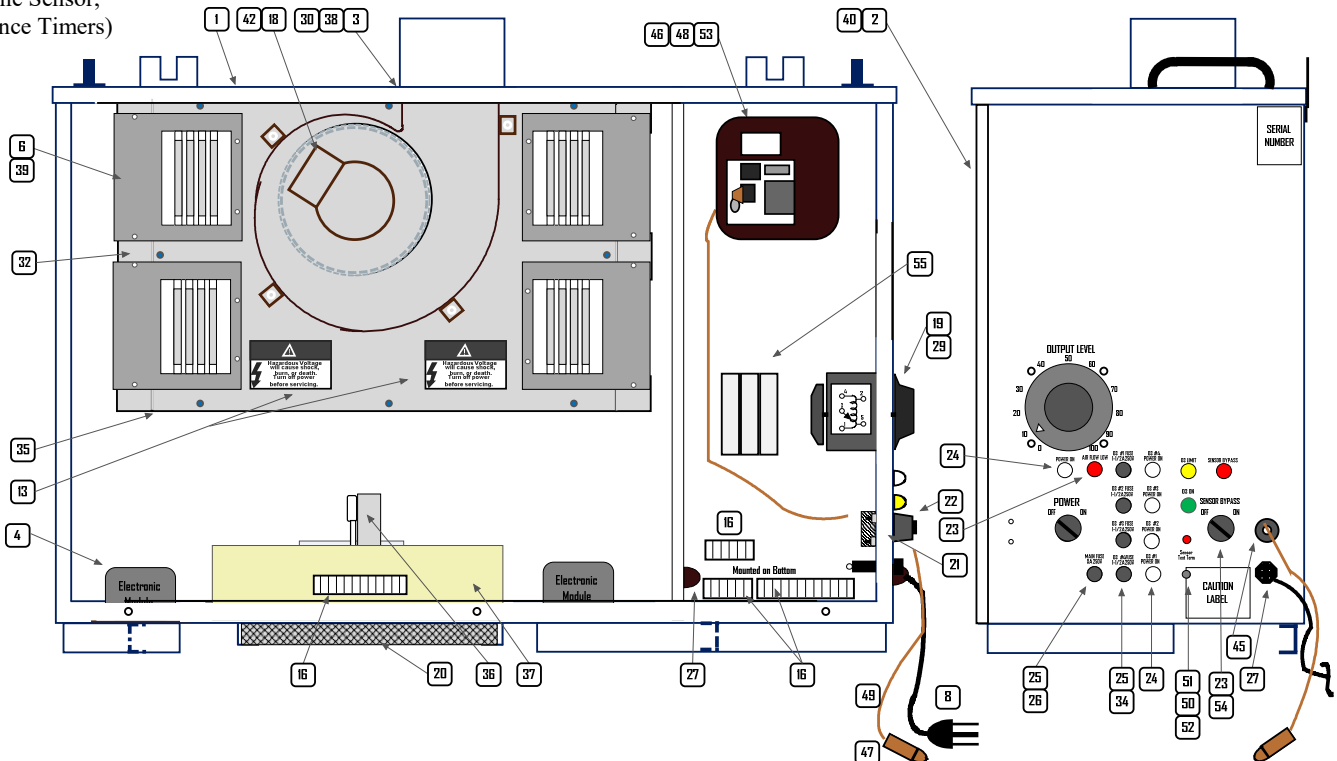
CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

Model CA1500GX Drawings and Parts (Ozone Sensor, Sequence Timers)



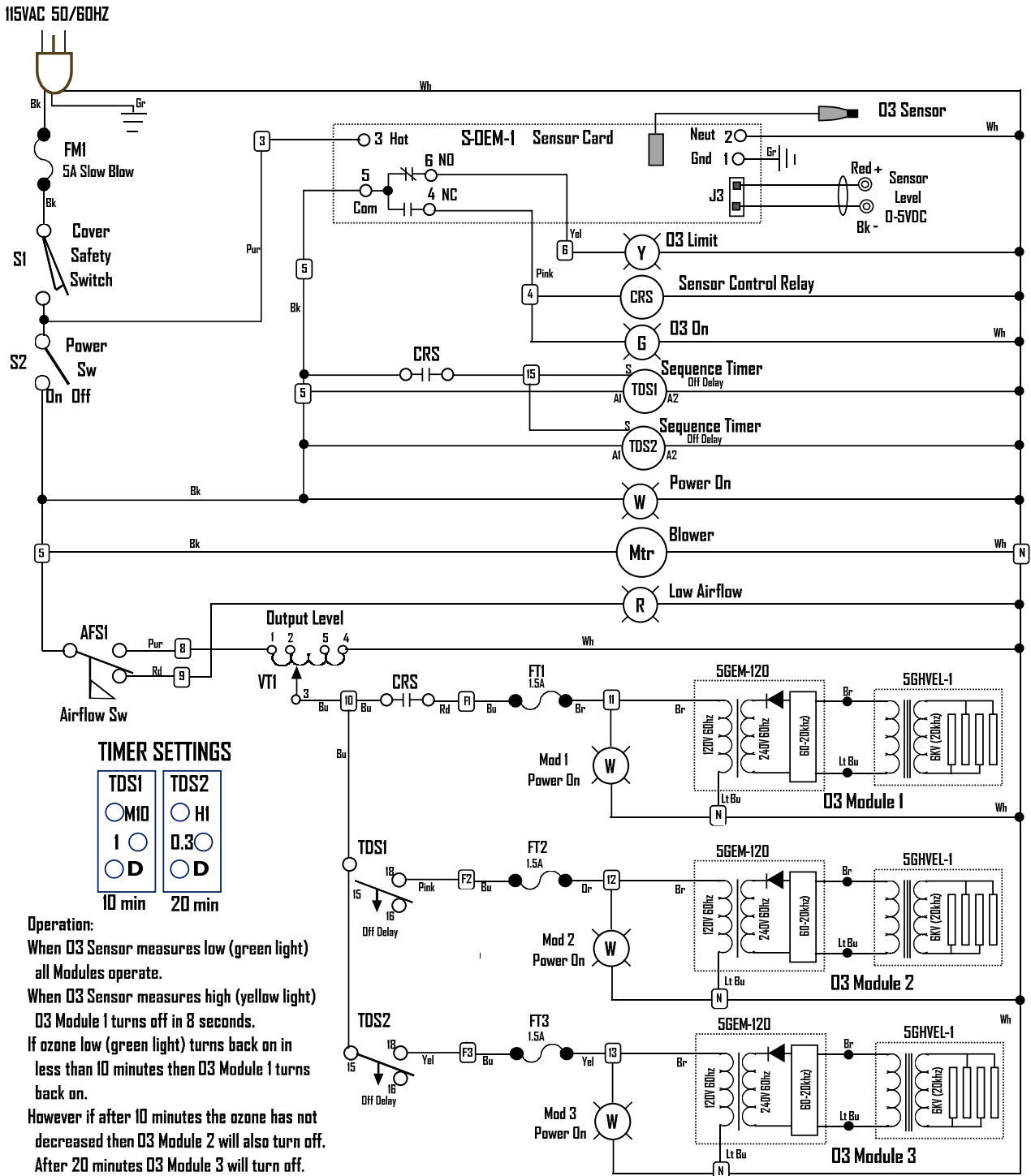
Model CA2000GX Drawings and Parts (Ozone Sensor, Sequence Timers)



CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

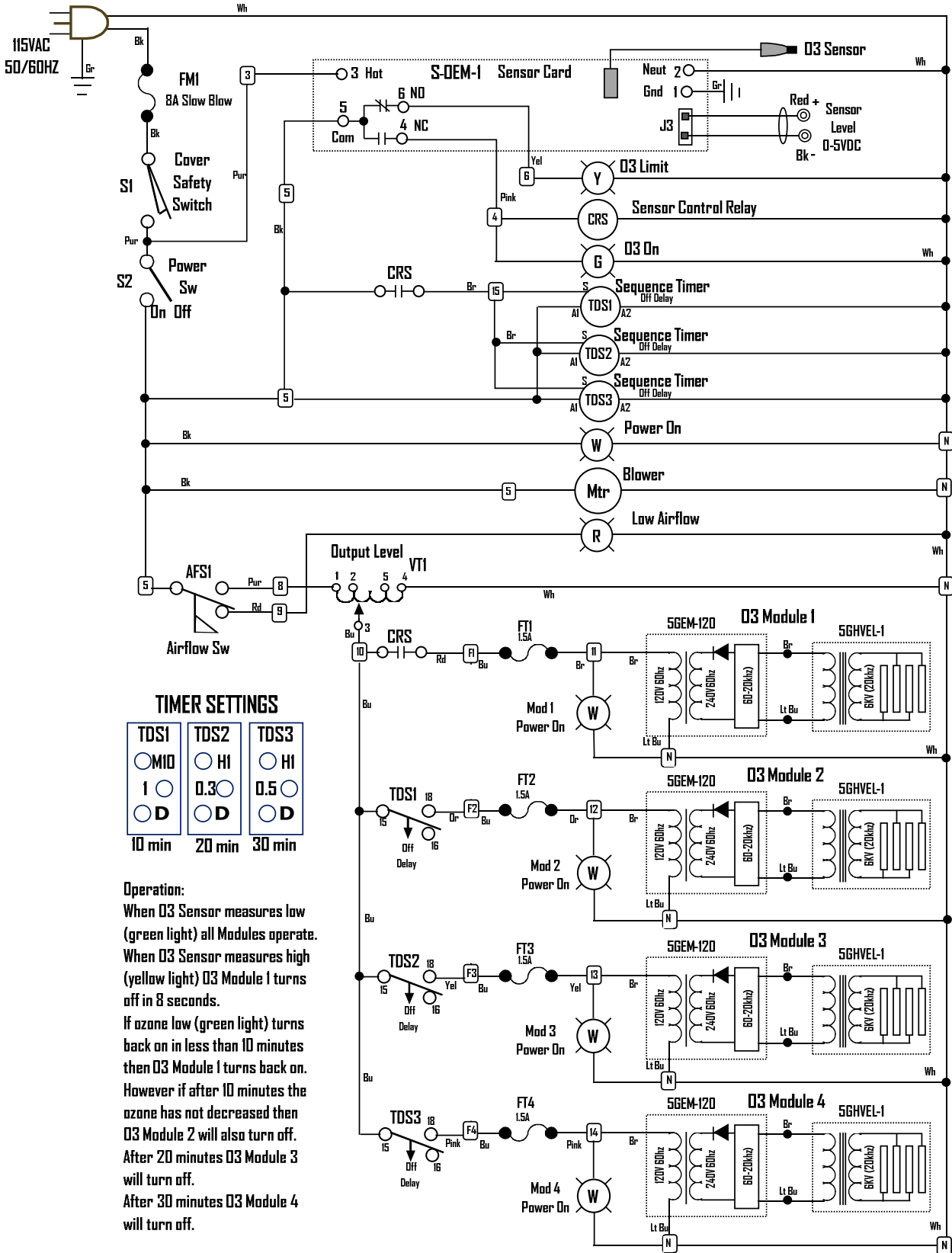
Model CA1500GX Schematic (Sensors & Sequence Timers)



CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

Model CA2000GX
Schematic
 (Sensors & Sequence
 Timers)



CASINO AIR MOLECULAR OXIDIZERS

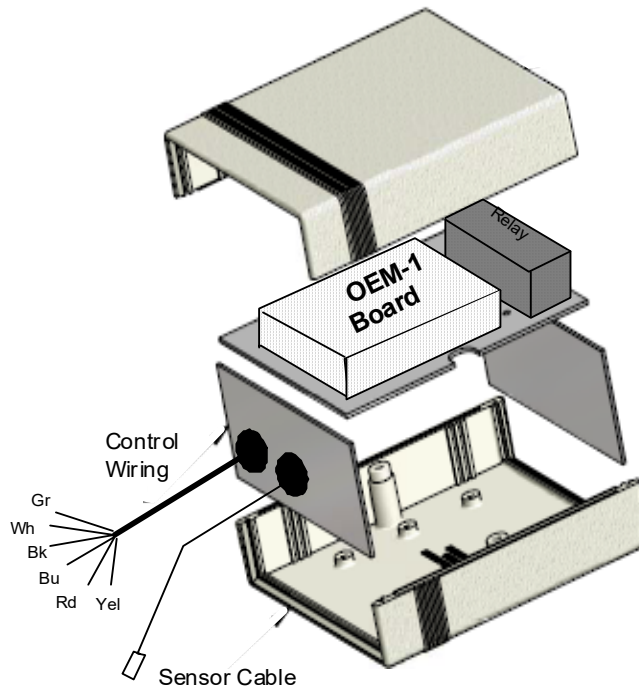
Service Instruction Section

Ozone Sensor Testing

INSTALLATION

The OEM-1 sensor board can be mounted in ozone equipment by two methods. First method is mounted exposed where the card is installed inside the ozone generator attached by two mounting feet to the cabinet bottom. The sensor is then either installed in the card so that it measures ozone coming in from the air filter opening, or an extender cord can plug into the card and allow the sensor to be placed outside the cabinet. With this installation normally an additional relay is installed adjacent to the card to provide control functions for turning on and off the ozone output and provide a contact should external indication be needed.

The second method of installation is for the sensor board/card to be installed in a plastic enclosure. The sensor relay will also be mounted inside the enclosure and wiring will be routed out of the box. The box will be mounted to the bottom of the ozone cabinet with feet. Purpose of the housing is to provide environmental protection to the sensor board. To monitor the LEDs on the board during trouble shooting, the cover of the plastic housing will need to be removed. When using the housing, the sensor always requires the use of a sensor extender cord.



The OEM-1 board should be powered up continuously for it to properly and quickly respond to measured levels of ozone. When the board is powered initially, the Green and Yellow LEDs will turn on, and after a few seconds if the ozone level is below the setpoint, the Yellow will turn off. When the ozone level rises above the setpoint, the Green turns off, and a few seconds later the Yellow turns on. When the Yellow turns on, the relay is also activated, turning off ozone production in the ozone generator. When the ozone level drops, the Green turns on and then the Yellow turns off, and relay turns the ozone generator back on.

The OEM-1 board is typically factory calibrated for a 0-0.1 ppmv value of ozone. The sensor head measures the amount of ozone, and sends an electrical signal back to the OEM-1 board where the value is compared to the setpoint. The setpoint adjustment potentiometer R14 corresponds to levels of ozone in percentage. Example is that at 100% on R14, the setpoint is equal to 0.1 ppmv (100 ppbv). This is maximum OSHA level allowed. Normally the unit is normally set about 45% which equals to 0.045 ppmv (45 ppbv). This is below the EPA level of 0.05 ppmv for continuous exposure to ozone. R14 should not be adjusted below 30 or it will not operate properly. The sensitivity will keep the unit off, including Green Led. If the unit operates improperly, such as on/off operation, then the card and sensor should be tested.

Refer to the data sheet on the sensor system for more detail information on the specifications of the board and sensor. All repairs to the sensor board must be done by the manufacturer, especially in warranty applications. The sensor heads are generally not repairable, and will need replacement if found to be defective.

CASINO AIR MOLECULAR OXIDIZERS

Service Instruction Section

Ozone Sensor Testing (continued)

TESTING

1. Verify that the card is powered up, indicated by Green LED illuminated. If not, then measure the voltage on terminal blocks 2 & 3 for 120VAC input. If no voltage, check ozone generator for blown fuses, open door, faulty safety switch, etc. The unit will not operate until power is restored. Check also that transformer fuses are good. Ohm the fuses as they may burn open in the top part of the fuse, invisible to the eye.

2. Next verify that the sensor is operating properly. The sensor is a replaceable item that typically needs replacement every 1-2 years. It is inexpensive, and simply plugs into the card, or the sensor cable. To test the sensor, remove it from the point of installation in the duct or room. Place the sensor head in a clean air environment so that it is not exposed to ozone. Give it a moment or two for exposure to air without ozone. Take a voltmeter set for DC volts and measure the voltage between the two pins on J3 on the figure below. The voltage level being measured is the voltage level coming in from the sensor head. For example if the sensor head is measuring a level of 0.05 ppmv (50 ppbv) then the voltage measured would be approximately 0.5VDC. Or if the level was 0.1 ppmv (100 ppbv), then the voltage would be 1.0VDC. If the value is above the setpoint then this might be the reason the unit will not turn on. To try to reset the board, try raising the value of R14 and see if the Yellow turns off. If not then set R14 back to its original setting. If the level is below 1VDC, try to stimulate the sensor to drop lower by taking a felt tip marker and placing the tip near the end of the sensor. The vapors coming off the felt tip will cause opposite effect from ozone. If the voltage does not drop then the sensor is bad. If the voltage drops, but drifts back above the setpoint, then most likely the sensor is still bad. It may need further testing where it can be powered up in a no ozone environment. Note the voltage jumps to 5VDC if the sensor is removed.

3. If the sensor appears to be bad, replace it with a sensor that is known to be good. Repeat the tests to verify the unit is working properly. Remember that the sensor head will not operate accurately until it is given time to warm up and calibrate. When a sensor is first plugged in it normally reads a value of about 0.046 - 0.200VDC. It may slowly creep up, but should stabilize. You may need a small portable ozone generator to verify operation of sensor. Once operation is acceptable, install the sensor head back into operating location.

4. Another point of testing is operation of the relay on the OEM board. The relay has 5A contacts and should these stick, or burn open then system operation would be incorrect. The relay on the OEM board operates the larger sensor relay which controls in most case the primary voltage to the HV transformers which produce the ozone. When the sensor indicates ozone level above setpoint, the relay de-energizes the HV transformer(s). The ozone production should turn on when the Yellow turns off, and vice versa. If it may be necessary to test the OEM relay contacts then making voltage measurements or removing the wiring and testing with an ohmmeter maybe required. The card will need replacement if the relay is bad or if operation can not be restored by these tests.

