Attention: NEON

Installers - Designers - Assemblers

How to improve installation reliablity of **UL 2161 transformers** and reduce installation problems

****Read on....**

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We put the ON in NEON

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Ventex VT Series UL 2161 LISTED electronic power supplies are different. With the growing number of electronic power supplies being used in the sign industry and adoption of the UL2161 standard, sign builders will encounter some new situations. The following are guidelines to make the features and installation of Ventex VT series power supplies easier to understand. Using this information and following these suggestions during installation will help eliminate possible long or short-term problems.

What is UL 2161? UL 2161 is a standard created by UL to address the change in the 1996 National Electric Code. **This standard requires electronic power supplies, with secondary output greater than 2000V to ground, to have secondary ground fault protection**. This is now a requirement in UL 48.

How does this affect an electronic power supply? Previously, if electronic power supplies had secondary ground fault protection, the "trip point" was 25-35 mA to ground. **To be UL 2161 LISTED, that "trip point" is now a maximum of 15 mA to ground**. This "reduced trip point", along with **capacitance coupling**, could make all electronic neon power supplies seem more sensitive than products that you have used in the past.

What is capacitance coupling? Capacitance Coupling results from the magnetic field that surrounds every AC current carrying conductor, such as GTO cable or neon tubes. It has the ability to conduct AC current through air between the tubes, GTO, electronic power supply and any mounting surface. **This can rob current (mA) from the tubes resulting in a loss of brightness, cause over loading of the power supply or result in false tripping. These effects increase with as the voltage increases**.

If you have ever seen an unpowered tube glow while sitting next to tubes or GTO powered by an electronic transformer, that is an example of capacitance coupling. Stray capacitive current from the lit circuit is exciting the non-energized tube. Another example includes the dimming or tripping of a lit tube when you grasp it with your hand. When this happens, **you** are actually drawing current from power supply by capacitance coupling.

All signs have an “effective” ground plane. This could be the “can” of a channel letter or the wall, window or even Plexiglas that exposed neon tubes are mounted on. These ground planes are in effect electrical conductors. Any high voltage wiring, as well as neon tubes in the sign will have capacitance coupling to ground. **In extreme cases this can cause neon power supplies with GFI to “trip” due to excess ground fault current or over loading**.

What effects can Capacitance Coupling have on electronic transformers?

Over Loading - Some electric power supplies on the market can deliver currents or voltages in excess of the rated values when loaded with stray capacitance. This will result in over-heating and can cause premature failure of the unit. Ventex’s VT series incorporates a unique design which controls the current to prevent this.

Electronic Cross Talk can occur between power supplies, tubes, or GTO leads in multi-transformer applications. If the tubes or GTO leads on different power supplies are close, you may have a sign that will not light unless the power supplies are turned on in a specific order. If the power supplies are placed too close together, power supply overheating or overloading can occur.

False Tripping is a major problem caused by excessive capacitance coupling. Ventex VT series power supplies have patented circuitry to help eliminate most false tripping.

How can I minimize the effects of capacitance coupling?

Maximize the distance between tubes, GTO leads, cans, ground planes, etc. *Ventex recommends the GTO wire and glass tubes be 1.5” from any surface or ground plane*. While this is not always possible or practical, **any separation is better than direct contact with any surface**. GTO Sleeving will increase the GTO electrical insulation, but **will not** reduce capacitance coupling. In fact, it may even increase it. A key thought to remember which will help; Always treat the GTO wires with the same respect you treat the neon tubes!

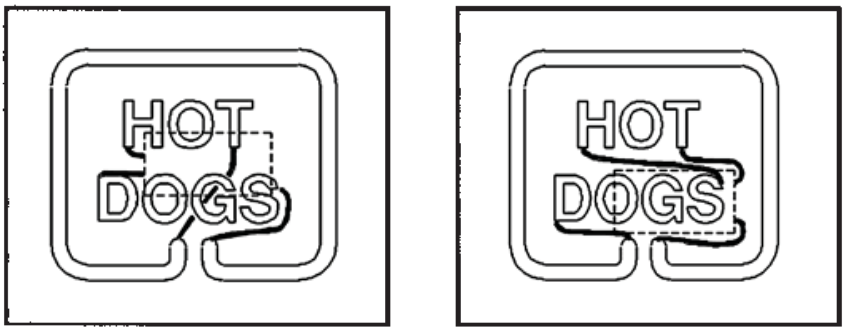
WIRING SUGGESTIONS FOR VENTEX VT SERIES POWER SUPPLIES

1. **Do Not run GTO leads from any electronic power supply in metallic conduit**. *If this is done, you will experience severe loss of driving distance and brightness, suffer GTO failure and possible false tripping*.

2. **Do Not load Ventex VT series power supplies with a mA meter or use a primary side dimmer**. *The VT series maintains 30 ma output regardless of load or primary voltage*.
3. **Do Not over load or under load**. The VT has protection and will "trip" if there is an over load of glass and/or excessive capacitance coupling, or if there is less than 4' of 12 mm argon (except for the VT4030 series).
4. **Keep GTO leads, particularly "Home Run" wires as short and as far from each other and all surfaces as possible**. *Ventex recommends 1.5 inches as a minimum if possible*.
5. **If a high voltage GTO cable has to be run through a thin sheet metal wall, special care must be taken. The sharp edge of a hole could cause rapid deterioration of the GTO cable. This can eventually cause a ground fault condition and "tripping"**. *Use the largest diameter hole possible and always use an approved bushing to center the cable in the hole*.
6. **If long jumper leads must be used, place these as close to the middle of the glass run as possible**. *The voltage and capacitive current will be lower closer to the middle of the sign, which will lessen the chance of over loading or tripping*.
7. **If leads have to cross, try to space them as far apart as possible and cross them at right angles.**
8. **Maintain as much space as possible between multiple power supplies, their tubes and wiring**. *This will minimize the effects of "electronic cross talk*."
9. **Balance glass load and "homeruns" as much as possible**. *This will minimize the chance of tripping*.
10. **In all signs it is best to wire from the "inside out"**. *This minimizes current loss due to capacitance coupling through the GTO and the chance of over loading and "tripping"*.

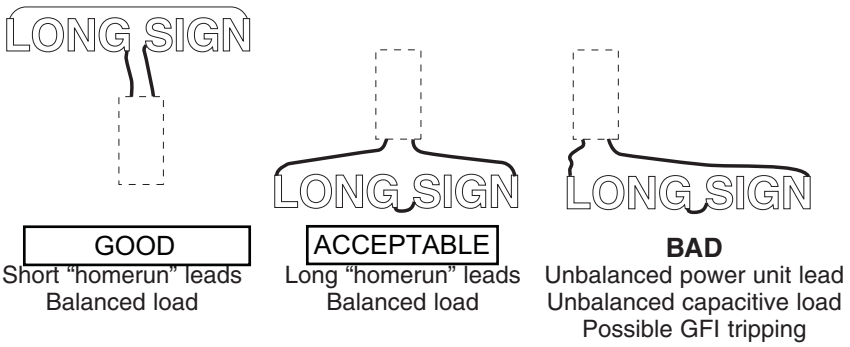
Examples of Wiring

Wiring a multiple unit sign with a border.

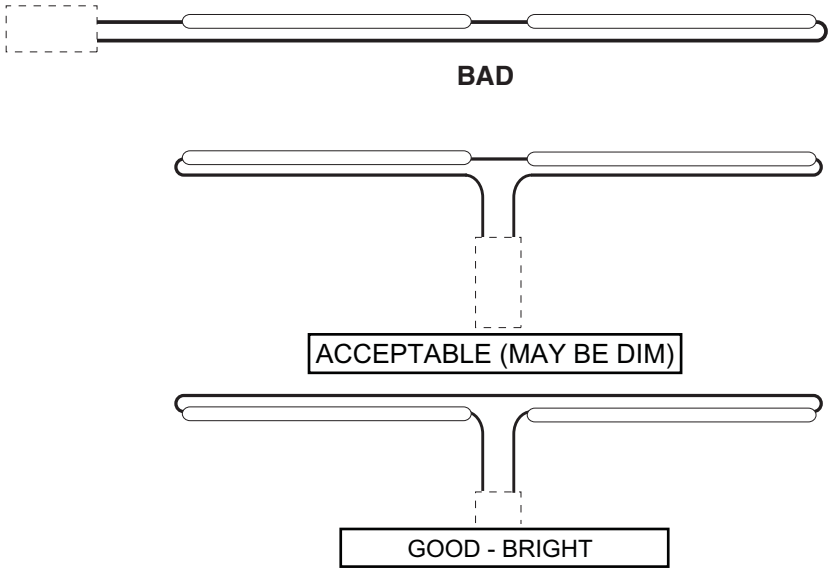


GOOD **POSSIBLE TRIPPING**

MORE WIRING EXAMPLES



Architectural or Cove Lighting can present problems with current loss and ground fault tripping if long or unbalanced homeruns are used.



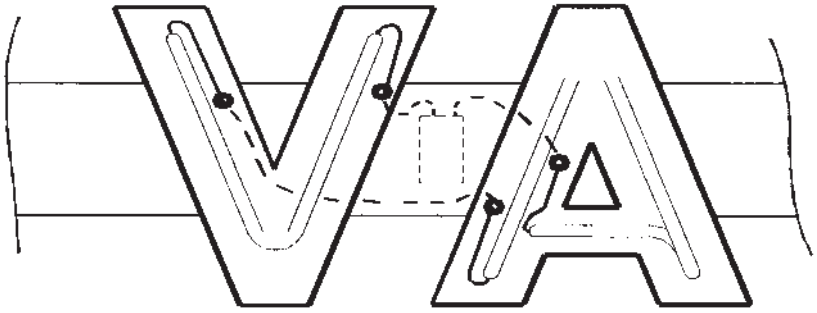
Note: The long jumper wires in the above installation must be kept away from all surfaces. If this is not done one of two problems could occur. The jumper could cause tripping or act like a capacitor and affect the brilliance of the tubes.

SPECIAL CONSIDERATIONS FOR WIRING CHANNEL LETTER UNITS

Odd stroke channel letters can present wiring problems. It will not be always possible to minimize the GTO cable length from the power unit. An example of a single stroke "V" is shown below with different methods of wiring. **For best performance, the leads must be supported away from the "can"**.

ACCEPTABLE	**GOOD**	**BAD**
Balanced lead lengths Balanced capacitive load	Short lead lengths Balanced capacitive load	Unbalanced lead lengths Unbalanced capacitive load Possible GFI tripping

MULTIPLE LETTERS ON ONE VT SERIES CL UNIT



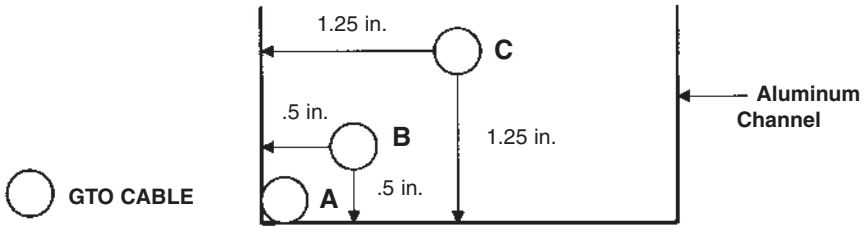
BUSHING

Note:

1. You will probably decrease the driving distance due to the proximity of metal and wiring. **In extreme cases, driving distance can be decreased by more than 20%**.
2. You may increase the possibility of false tripping due to unbalanced capacitance coupling to the various metal parts.

CAPACITANCE COUPLING AND DISTANCE

NOTE: Distance is the Best Cure to reduce Capacitance Coupling.



In the above illustration GTO Cable is shown in three different locations in an aluminum "can".

- **A.** The GTO is on the bottom of the "can" in a corner. **This situation causes maximum current loss. A loss of 1 mA per foot of GTO or more can occur depending on voltage and application**.
- **B. Current loss has been reduced by 70% by moving GTO cable .5 of an inch from the corner**.
- **C. Current loss from "A" has been reduced by 91% by moving the GTO cable 1.25 inches away from the corner and surfaces of the "can"**.

The Effect of Temperature on the Power Supply

Increasing temperature in Electronic Neon Power Supplies and Electro-mechanical transformers will reduce life. **An increase in temperature of 10oC (18 oF) will result in a reduction of life expectancy of about 50%. To ensure long life, any power supply mounted inside an enclosure must be adequately ventilated**.

Ventex VT series indoor power supplies have an operating temperature rating of 32_ to 104_F/0_ to 40_C. Outdoor CL models have a rating of –30_ to 122_F/-34_ to 50_C. **If the operating temperature cannot be maintained within these limits, then de-rate the driving distances as in the chart below**.

Ambient Temperature - Degrees F	104	113	122	131	140	149	158	167	176	185
Ambient Temperature - Degrees C	40	45	50	55	60	65	70	75	80	85
Indoor Unit - De-rating Factor	100%	92%	83%	75%	67%	58%	50%	42%	33%	25%
Outdoor Unit - De-rating Factor	100%	100%	100%	90%	80%	70%	60%	50%	40%	30%

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