

# TransGard™

SUBSTATION PROTECTION

Keep animals out. Keep the power on.



## MANUAL FOR **Installation and Maintenance**



# INTRODUCTION

This manual will present a basic graphic overview of the components, installation, activation, operation and maintenance of your TransGard fence. Please refer to your TransGard technical support contact for specific questions not covered in this material or call (717) 900-6140.

While TransGard fences are designed for easy installation and activation by substation managers, TransGard also offers an installation service. For information about this service, contact TransGard at (717) 900-6140.



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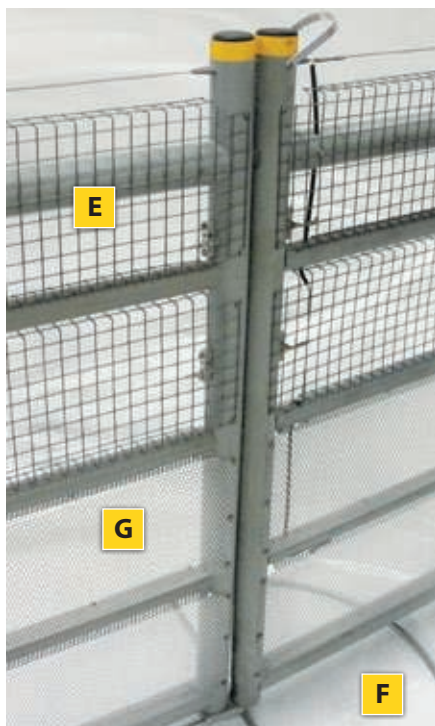
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# PREPARING FOR INSTALLATION

## Components

TransGard substation fencing is simple to install, durable, and offers the following benefits:

- A ALERT STROBE**  
Provides clear indication of system function
- B DIGITAL VOLTMETER**  
Precise indicator of system voltage
- C CONTROL PANEL**  
Accessible voltmeter, on/off switch & LED indicator controls
- D MAIN ENTRYWAY**  
Non electrified access point



- E MODULAR DESIGN**  
Lightweight PVC panels can be installed by as few as two people
- F GALVANIZED STANDS**  
No postholes or foundation required for installation
- G SNAKE PANELS (OPTIONAL)**  
Specially designed section can be added to prevent incursion from snakes as small as 1/4" in diameter



**H POWER SOURCE**

Fence may be erected and plugged into any AC outlet in the main panel box within hours

**I TIGHT CLEARANCES**

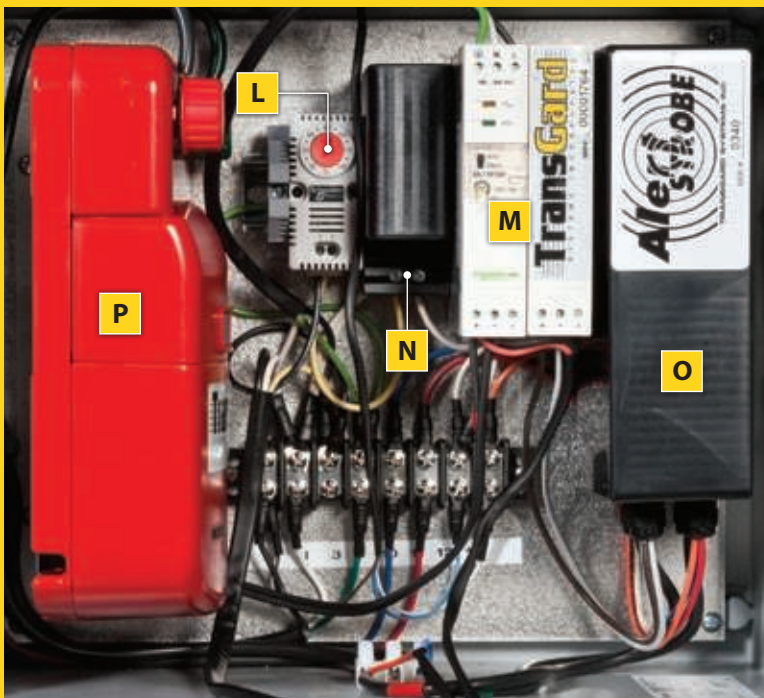
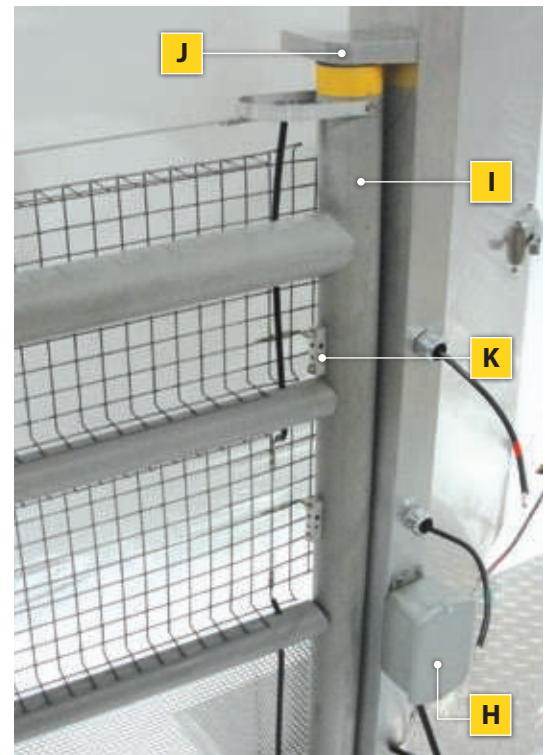
Eliminates animal incursions

**J SAFETY HINGE**

Prevents accidental contact of entryway door with fence

**K TERMINAL BLOCKS**

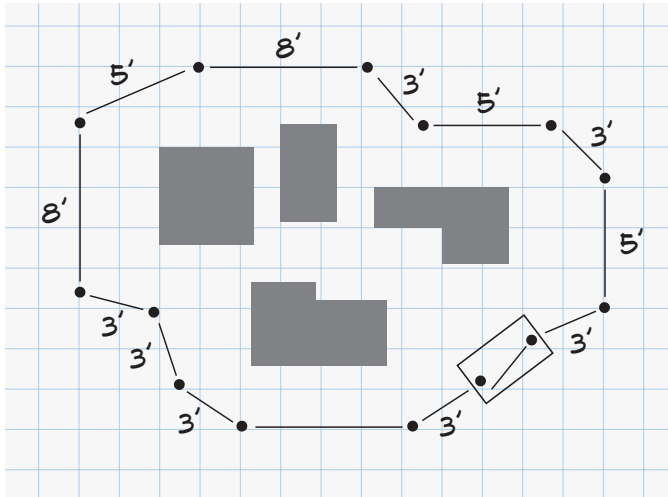
Simple connections shorten installation time



## INSIDE THE CONTROL CENTER

- L THERMOSTAT**
- M POWER SUPPLY**
- N HEATER**
- O ALERT STROBE MODULE**
- P ENERGIZER**

## Positioning the Fence



Before beginning installation, design your fence layout on paper to determine total area, equipment to be enclosed, driving lanes, spacing, corners and other factors.

When determining your fence's position around a substation, consider the following:

**FOR THE PRIMARY ENTRYWAY:**

- Proximity to AC power source
  - Proximity to yard office or gate
- 
- Proximity to frequently accessed areas
- 
- Traffic flow inside the yard



**FOR THE SECONDARY GATEWAYS:**

- Place these optional entryways at a position along the perimeter where frequent access is required

### FOR THE FENCE PANELS:

- Select as level a terrain as possible to assure a plumb fence
- Avoid sharp angles between panels

## Placement of Entryway and Galvanized Stands

**IMPORTANT INSTALLATION TIP:** Raking at the base of a fence, before and after fence component placement, is critical for several reasons, including fence stability, the reduction of panel-to-panel gaps and panel-to-ground gaps.

First, secure the Primary Entryway into position. The Entryway will remain in a fixed position, so it must be the first element of the system to be placed.



- Rake a shallow depression in the gravel large enough to accommodate the base of the Primary Entryway.



- Work the Primary Entryway into the gravel using a side-to-side motion. Rake gravel into any gaps around the base of the Primary Entryway.

- Be sure the Primary Entryway rests on a firm, level surface, both side-to-side and front-to-back.

If optional Secondary Gateways will be used, install them into position using the same technique.

## Placement of Entryway and Galvanized Stands *(Continued)*



**KEY POINT:** For strength, stability, and easier service access, make sure that each Galvanized Stand faces the same direction around the entire fence perimeter. Then, make sure each panel is resting on both a long and short post of its bordering stands.

Next, beginning with the Primary Entryway, place Galvanized Stands 10 feet apart.

- Starting on each side of the Primary Entryway (and any Secondary Gateways, if applicable) measure to the point where the first stand will be located. Continue in each direction placing a Galvanized Stand at each interval until your measurements meet at predetermined points along the fence perimeter.

**KEY POINT:** For strength and stability, allow for some zig-zag from panel to panel along extended, straight sections of fence. A too-straight layout can make your fence more vulnerable to windy conditions.





## Connecting Panels to Primary Entryway

- With the nearest Galvanized Stand in place, mark a line in the stone from the Primary Entryway to the stand, and a circle around the base of the stand. Remove the stand and rake a trench 3-4" deep from the Entryway to the stand location. Then rake a level area 3-4" deep where the stand will be placed.

- Loosen the screws and remove the top fence bracket from the Primary Entryway frame.

- Lift the Fence Panel and slide one end onto the stand. Slide the other end over the bottom bracket on the Primary Entryway frame.



- Remove the black cap from the Fence Panel end post at the entryway and install the upper fence bracket into the top of the panel end post.



- Re-attach the upper fence bracket to the Primary Entryway frame.



## Connecting Panels to Primary Entryway *(Continued)*

- Install the insulator sleeve onto the long post of the stand. It is critical to place insulator sleeves on the long posts of all galvanized stands.



**KEY POINT:** Because the Primary Entryway (and any Secondary Gateways) are in a fixed position, you must start installing the fence at the gateways, and extend in both directions from them. Fence assembly should then proceed by adding panels in each direction from Primary Entryways and Secondary Gateways. The location where the final fence panels will be joined together should offer more flexibility for completion of the fence.

## Connecting Panels to Secondary Gateway(s)

- Secondary Gateways (optional) are used for enclosures that require multiple access points along the fence perimeter.
- Installation of Fence Panels to any Secondary Gateways follows the same instructions as connecting panels to the Primary Entryway.



## Panel Installation

Modular fence panels form the perimeter of the fence. To install one panel to an adjacent panel:

- Install an Insulator Sleeve onto the long post of the Galvanized Stand before installing each panel.
- Simultaneously place one end of the Fence Panel onto the short post of the Galvanized Stand and the other end of the Fence Panel onto the long post of the adjacent Galvanized Stand.

**KEY POINT:** Failure to install Insulator Sleeves may result in short circuiting and fence failure due to incidental electrical contact between stainless steel screws and the Galvanized Stand.

**REMINDER:** *Placement of Fence Panels on one short and one long post will ensure a more stable fence, especially against high winds.*



- Make sure the two adjacent fence panels butt against each other evenly. Place the metal strap loop over the adjoining posts to hold in place.

- Repeat with successive panels until enclosure is complete.



**NOTE:** *During panel installation, the Galvanized Stands may need to be raised or lowered, using a base of gravel, to ensure level installation and that the bottom of the panel runs parallel to the surface of the ground.*

## Primary Entryways to Panels

The electrical connection from the Primary Entryway to the panels provides power from the power source to the rest of the fencing system.

**KEY POINT:** Primary and secondary entryways are insulated from the fence voltage. Substation personnel may enter and leave the substation via these points without fear of being shocked.



- Identify the two black insulated wires on the Primary Entryway. These insulated wires must be attached to the small terminal blocks on the Fence Panels adjacent to the entryway.

- Partially insert 1/4-20 x 1/2" stainless steel Phillips head screws (provided) into each terminal block to be connected to Primary Entryway.

- Place the positive (red taped) insulated wire in the top terminal block. Place the negative (green taped) insulated wire in the bottom terminal block.

- Secure the insulated wires by firmly tightening the screws on both terminal blocks. Do not overtighten.

- Repeat this process for the connections on the opposite side of the Entryway.



**NOTE:** *Electrical connections for the Secondary Gateway panels follow the same instructions as those for the Primary Entryway panels.*

## Panel to Panel

Jumper wire connections allow voltage to flow from fence panel to fence panel, completing the circuit for the fencing unit.

**NOTE:** *All panel-to-panel connections should be made from inside the fence perimeter.*

**NOTE:** If installing snake panels, proceed to “Installation of Snake Guards” on Page 16 before making panel-to-panel electrical connections.

- Partially insert a 1/4-20 x 1/2" stainless steel Phillips head screw (provided) into each terminal block on the adjacent ends of the Fence Panels to be connected.

- Insert a jumper wire through the bottom hole of the terminal block on one panel, leaving approximately 1/2" of excess wire showing on the inside of the fence. Tighten the jumper wire to the terminal block.



- Next, push the jumper wire through the bottom hole of the terminal block on the adjacent panel.



## Panel to Panel *(Continued)*

**IMPORTANT INSTALLATION TIP:** Do not over-tighten the jumper wires. Over-tightening can weaken or damage the jumper wire.

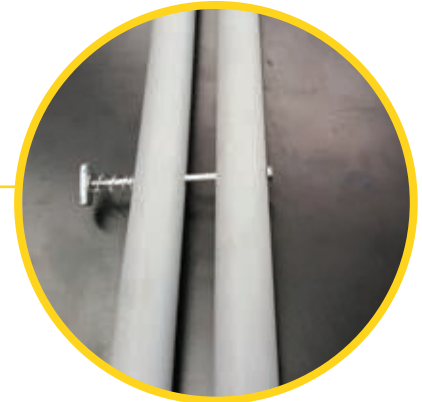
- Close any gap between the Fence Panels by pulling the ends of the post panels together as you secure the jumper wires.
- Remove slack from jumper wires by pulling the wire gently with lineman's pliers. While wire is taut, secure the jumper wire by tightening the screw in the terminal block.
- Bend or trim any excess wire in toward the inside of the Fence Panel.
- Use a 1/8" Allen wrench to make sure the set screw (connecting the "L"-shaped connector to the fence wire mesh) is tight. NOTE: This set screw is in the top hole of the terminal block.



## Installation of Optional Snake Guard

For use in conjunction with optional Snake Panels

Snake Guards prevent snakes as small as ¼" in diameter from entering a substation through the spaces between adjacent Snake Panels. Snake Panels with Snake Guards are recommended in habitats where snake activity is present.



- Snake Guards are specially sized lengths of PVC designed to block any gaps between Snake Panels.



- Install the Snake Guards on each adjacent Fence Panel. By hand, separate the two tubes of the Snake Guard and slide the guard down to the base of the stand keeping the spring nut on the inside of the fence and the black caps on top. Re-close the metal strap loop connecting the panels.

**NOTE:** Ensure the joining panels have the smallest gap possible before installing the Snake Guard. This will guarantee the tightest fit and best overall protection.



## Installation of Optional Snake Guard *(Continued)*



- When installing the electrical connections, the lower jumper wire also serves to secure the snake guard in place.

## Final Site Preparation

- After assembling all fence panels, use a rake to completely cover the stands and the bottom rail of the fence frame with gravel on both the inside and outside of the entire fence perimeter.



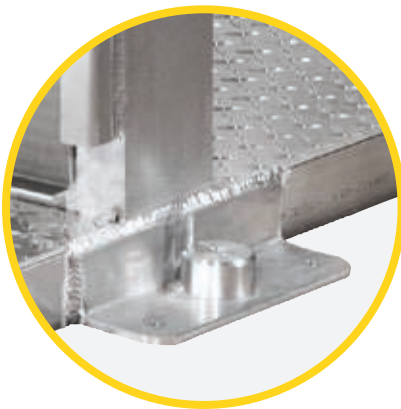


# Connecting to Power and Activating Fence

**NOTE:** *Before connecting the power, open the Control Center box and remove all packing materials.*

- Be sure the Primary Entryway's base has been grounded, all panel connections have been checked, and all technicians are clear of the fence.

**KEY POINT:** Failure to install Insulator Sleeves may result in short circuiting and fence failure due to incidental electrical contact between stainless steel screws and the Galvanized Stand.



- Tie the Primary and Secondary entryways to a station ground. There is a flange at the bottom of the Entryway for a grounding clamp.

**NOTE:** The fence is equipped with a cord that can be plugged into a 110/120V AC source — a temporary wiring that enables the fence to be operational on the day it is installed. For long-term operation, the system should not use the temporary cord for power, but rather should be hardwired into a 15–20-amp breaker or fuse.



# Connecting to Power and Activating Fence *(Continued)*

- Close the gate and connect the fence to its 120V power source.

**NOTE:** *the Alert Strobe will flash red.*

- Turn on the power to the fence. **NOTE:** *the Alert Strobe will turn a steady green and the Red LED on the face of the Control Center will light.*



- When the power is on, the Digital Voltmeter on the front of the Control Center should read around 10kV and the LED's arc should pulse up into the green light range.



- Walk the perimeter of the fence and listen for any snapping noises which would signal a short in the fence from a loose connection or missing Insulator Sleeve.

## The Control Center

### A ALERT STROBE

The Alert Strobe, which includes a module and two-condition LED light, provides a clear visual indication of whether a TransGard fence is functioning properly. A steady green light indicates the system is operating normally. A flashing red light indicates that the main on/off switch is turned to the off position or the fence is not functioning properly.

### B DIGITAL VOLTMETER

The digital voltmeter provides a precise digital indication of the system's voltage. By placing the voltmeter on the front of the panel, substation personnel can easily see the numeric values of voltage pulsing through an operating TransGard fence.

### C ON/OFF SWITCH

### D RED LED

### REMOTE MONITORING

This unit can be integrated into a substation's supervisory control and data acquisition (SCADA) system, to provide 24-hour remote monitoring. If the fence voltage falls below 6kV, the Alert Strobe board provides notification via SCADA.





# Maintenance Access/ Fence Reconfiguration

- TransGard's modular design allows you to remove — or swing open — a section of the fence temporarily for maintenance jobs or other work. You can also add panels to change the configuration of the fence perimeter.



**KEY POINT:** As noted on Page 8, it is important that each panel is installed with one end post resting on a long post and one post resting on a short post of its bordering Galvanized Stands. Another reason for following this step carefully is to ensure the above step to access the substation via any panel.

- To remove an entire section of fence, remove the Jumper Wires and Snake Guards (if Snake Panels are being used), and lift the panel off the stands.
- To swing open a section of fence, remove the Jumper Wires, lift the end of the panel that is on the short post of the stand up about 6" and rotate the fence open like a gate.
- To change the fence configuration, remove panels as described above and add new panels based on the instructions in previous sections of this manual.



**IMPORTANT:** In order to maintain the integrity of the fence system, when a section of fence is taken out it must be re-installed following these installation instructions.

# Customized Installation and Supplemental Equipment

**NOTCHING PANELS FOR OBSTACLES.** You may have to make modifications to the bottom edge of a fence panel in order to accommodate cable trays, trend ways, containment berms and other irregularities that can't be moved or altered. To create notches in fence panels for these obstacles, carefully measure the section of the panel you want to remove, and cut the section using a jigsaw or PVC saw and tin snips.



**ANCHORING FENCING INTO A CONTROL BUILDING.** There may be occasions where a substation manager may want to connect a TransGard fence to a structure on the substation site. To do this, use masonry screws to install the flush mount stands to the structure and to attach the clamps to firmly anchor the panels into the structure on both sides of the structure. Mount fence panels as instructed in the earlier section of this manual. Dig a small trench across the front of the structure and run insulated high voltage wire inside of a conduit on the ground along the trench. Connect the insulated wires to the panels bordering the structure. Rake stone across the conduit to secure the connection.



**LINE GUARDS (SPINNERS)** TransGard recommends the installation and maintenance of line guards on all distribution lines leading out of the fenced in area. Install line guards in a way that will drop falling animals well outside the perimeter of the fence system. Install line guards with line clamps to keep them from sliding toward the fence line. In addition, consider pole wraps that prevent climbing animals from using nearby wooden poles for substation access.

# INSTALLATION DOs and DON'Ts



**DO** prepare the fence site by raking a shallow depression to accommodate the Galvanized Stands and bottom rail of Fence Panels

**DO** place panels in a zig-zag pattern for stability

**DO** face all Galvanized Stands in the same direction around the perimeter of the fence.

**DO** make sure to place the ends of each Fence Panel on one short and one long post of the bordering Galvanized Stands

**DO** place Insulating Sleeves on the long post of each Galvanized Stand

**DO** rake stone and gravel on the inside and outside of the bottom rail of all Fence Panels

**DON'T** overtighten the Jumper Wire connections

**DON'T** activate power to the fence until all Entryway doors have been closed and all technicians are clear of the fence



## Overview



This section provides an overview of basic, post-installation maintenance and troubleshooting recommendations related to your TransGard substation fencing. For additional information, view the TransGard Installation Video at [www.transgardfence.com](http://www.transgardfence.com).

For specific questions not covered or resolved in this manual, refer to your TransGard technical support contact, or call (717) 900-6140.

**KEY POINT:** Unless otherwise noted, turn the TransGard fence off at the main Control Panel switch before performing maintenance functions.

## Routine System Maintenance

TransGard recommends substation operators perform the following basic maintenance steps annually to ensure optimal operation of the fencing.

### ■ WALK THE FENCE PERIMETER

Make a visual inspection of the fence, looking for gaps between or under panels. Listen for “snapping” sounds that may indicate an electrical fault. Ensure each long post is covered by an Insulator Sleeve.



### ■ CHECK CONNECTIONS

Power off the TransGard fence. Check all jumper wire connections between panels. Tighten the connections as needed, following guidelines in the previous Installation sections.

### ■ CHECK THE VOLTAGE

Whenever visiting the substation, check the Control Center to ensure the system is on and that the fence is energized. When the fence is operating properly, the Alert Strobe will appear green and the Digital Voltmeter should read around 10 Kv. (See “Troubleshooting” section for details on handling problems with low voltage.)



## Routine System Maintenance *(Continued)*

### ■ CONFIRM PROPER PANEL REINSTALLATION

If any Fence Panels have been removed for maintenance or access to the substation, make sure they have been reinstalled correctly, including snake guards on any snake panels. Check to ensure there are minimal gaps between panels. Backfill any gaps under panels and completely cover stands with substation stone.

### ■ PREVENT INSECT NESTING

Check all post tops for black rubber stopping caps. These caps serve as a barrier to bees, hornets and other flying insects that may see the posts as potential nest sites. Replace any caps that are missing or deteriorated. Replacement caps are available from TransGard.

## Managing the substation environment

TransGard fencing offers consistent long-term protection. However, changes around a substation's footprint can compromise system effectiveness: plants grow, wildlife populations change, and the topography surrounding a site can erode. Take the following steps at least once per year to ensure the substation environment will not adversely affect reliability.



### ■ CLEAR DEBRIS

Check the entire fence perimeter to make sure no debris has fallen or been blown against the fence. Debris can drain the Energizer, reducing the effectiveness of the system as well as the Energizer's lifespan. Turn off power to the fence as a safety precaution before removing debris.



## Routine System Maintenance *(Continued)*

### ■ COVER FENCE BASE

Check that the bottom PVC fence rail and the base of the stands are completely covered with gravel inside and outside of the entire fence perimeter. If necessary, add gravel to close gaps that could provide entry to climbing animals and snakes.



### ■ FOLIAGE REVIEW AND REMOVAL

Check for any overhanging branches or brush growth around the substation that may provide a nimble climbing animal access. Remove all vegetation growing inside the substation. Cut back tree branches that hang over the perimeter fence. If necessary, schedule trimming or removal.

### ■ INSTALLATION OF SUPPLEMENTAL EQUIPMENT

TransGard recommends the installation and maintenance of line guards (spinners) on all distribution lines leading out of the fenced in area. Install line guards in a way that drops climbing/falling animals well outside the perimeter of the fence system. Install line guards with line clamps to keep them from sliding toward the fence line. In addition, consider pole wraps that prevent climbing animals from using nearby wooden poles for substation access.

## Maintenance Access

TransGard's modular design allows you to temporarily remove — or swing open — a section of the fence for substation maintenance or other work. You can also add panels to change the configuration of the fence perimeter. Follow these steps for removal and reconnection of a fence panel:

- To remove an entire section of fence, remove the jumper wires and Snake Guards (if Snake Panels are being used), and lift the panel off the stands.
- To swing open a section of fence, remove the jumper wires, lift the end of the panel that is on the short post of the stand up about 6" and rotate the fence open like a gate.
- To change the fence configuration, remove panels as described above and add new panels based on the instructions in the TransGard Installation Manual.
- When reconnecting panels, be sure to follow instructions in the Installation Guide on proper panel installation and connection of jumper wires.



## Troubleshooting

During proper system operation, the DC voltage is output from the Control Center to the fence panel directly to the left of the Primary Entryway. The voltage travels through all fence panels and returns to the Control Center from the fence panel directly under the Control Center. In the unlikely event that the Digital Voltmeter on the Control Panel registers no voltage or low voltage (less than 5kV), consider the following:

### “No Voltage” reading

- Using a handheld voltmeter (Fault Finder), check the voltage on the first panel to the left of the Primary Entryway. If no voltage registers there, the fault is in the Control Center. Fault Finders are available from TransGard.
- Check that all connections inside the Control Center are secure.

- Check that all Insulator Sleeves are properly installed.



- Check the connections at all fence panels.



## Troubleshooting *(Continued)*

### “Low Voltage” reading

A low voltage reading may result from a number of causes. Take the steps below to identify the location of the problem. Fault Finders are available from TransGard.

#### ■ LISTEN FOR INDICATIONS OF UNSECURED INSULATOR SLEEVES.

Walk the perimeter of the fence and listen for “snapping” sounds. This indicates an electrical fault. There should be an Insulator Sleeve on the long post of each stand. If an electrical fault is isolated to a post, remove the rubber post cap using a flathead screwdriver to make sure the Insulator Sleeve is properly installed.

#### ■ INSPECT JUMPER WIRE CONNECTIONS

Power off the TransGard fence. Check all jumper wire connections and tighten the Phillips screws on the jumper wire connection blocks as needed. For systems newer than 2005, also check the “L-Connector” connection and tighten the set screws as needed using a 1/8” Allen wrench. These are the socket head set screws in the jumper wire connection blocks that attach the “L-Connectors” to the wire mesh. For more information, see Page 14.

#### ■ TEST FOR FAULTY FENCE PANELS

Using a handheld voltmeter (fault finder) or other appropriate device, perform a test of the panels using the steps below. Fault Finders are available from TransGard.



- Check the voltage on the top section of wire mesh at the panels to the right and left of the Primary Entryway. The two voltages should be at least 5kV and approximately equivalent to each other.
- If there is the correct voltage on the panel to the left of the entryway but not on the panel to the right of the entryway (below the control center) there is a short somewhere on the fence perimeter. Check adjacent panels systematically – moving either left-to-right or right-to-left – until you get a voltmeter reading that indicates a correct panel voltage. This will indicate the break in the voltage from panel to panel.
- Inspect for loose or worn connections between the correct voltage panel and low-voltage panel. Secure or replace as required.

## Troubleshooting

### ■ TEST THE ENERGIZER.

If the fence output voltage is still less than 5kV and you have not identified any shorts or faulty panels, disconnect the fence leads from the Energizer's positive and negative terminals and check the Energizer output with a fault finder.



- If the leads are disconnected and the LED on the front of the fence Energizer is flashing red, the Energizer is faulty and must be replaced. If the LED on the front of the fence Energizer is flashing green, the Energizer is operating properly.
- If the Energizer yields an output of less than 5 kV at the positive (red) terminal, it should be replaced. Expected Energizer life is 3–5 years.
- The replacement Energizer must be a low-impedance pulsing type, have at least two Joules of output energy, and a DC voltage output between 9kV (min) and 11kV (max).
  - For optimal performance, install a TransGard replacement fence Energizer, which has been specially engineered for TransGard substation fencing. To order a replacement Energizer, contact TransGard.

## FOR MORE INFORMATION

Contact TransGard at (717) 900-6140  
or email [info@transgardfence.com](mailto:info@transgardfence.com).

View the TransGard Installation Video at [www.transgardfence.com](http://www.transgardfence.com)





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