5. Apply some Oatey tinning flux to the joint.
6. Heat the joint with a soldering torch.
7. When hot enough, remove the torch and touch the solder to the joint. If hot enough, the solder will flow through and around the strands.

Soldering the splice

8. Once the joint has cooled, apply ScotchKote to the soldered connection.

Applying ScotchKote sealer

9. Slide the heat shrink tubing back over the joint so that the tubing extends about an inch past the cut insulation on each end.
10. Use the torch to shrink the tubing tightly around the joint.

Splice before heating the shrink tube

Sealing the Saw Cuts

Before sealing, mix the cold-pour asphalt sealant thoroughly, using a drill and mixing wand

Use the SealMaster Cold-Pour Pot to apply the sealer in an even manner.

Asphalt sealant being poured. The pour pot is pulled, not pushed along the cut.

The finished product.

Sealing Concrete

Whenever possible, use existing expansion joints for cutting in concrete. This speeds the job and saves wear and tear on the saw blade.

Seal with a self-leveling sealer such as QuikRete or SikaFlex, designed especially for use on concrete. DO NOT use asphalt sealer on concrete.

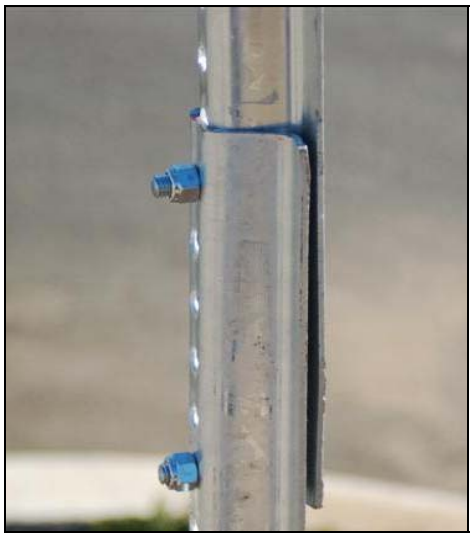
Always fill the cut completely with sealer. Any gaps will settle and become water collectors.

Installing Parking Lot Signs

“Attention Shopper” signs must be installed with the bottom of the sign at least 7 feet above the ground. This will require two pieces of 6 foot long U-channel, bolted together.

The signs should be installed at the very top of the U-channel with the back of the sign against the wide (flared) side of the U-channel.

Two pieces of 6 foot U-channel bolted together



To ensure the safety of store patrons, the bottom of the sign should be at least seven (7) feet above the ground.

Setting the Sign Posts

Use QuikRete fast setting concrete mix to anchor the sign posts into the landscaping.

Set the post into the hole and pour the dry QuikRete evenly around the base.

Pour water into the hole and mix. Make sure to keep the post absolutely vertical while the QuikRete sets up.

Containment Zone Striping

Striping should be placed approximately three feet from the antenna line (indicated by the chalk line in the photo below). Block off the area with traffic cones to prevent automobile traffic from crossing over the stripe until it is dry.

Use masking tape, placed nine inches (9”) apart. This will ensure a clean, straight stripe. Use a nine-inch (9”), ¾” NAP paint roller to apply the yellow traffic paint.

Painting the Stencils

A blowtorch can be used to cut down the drying time.

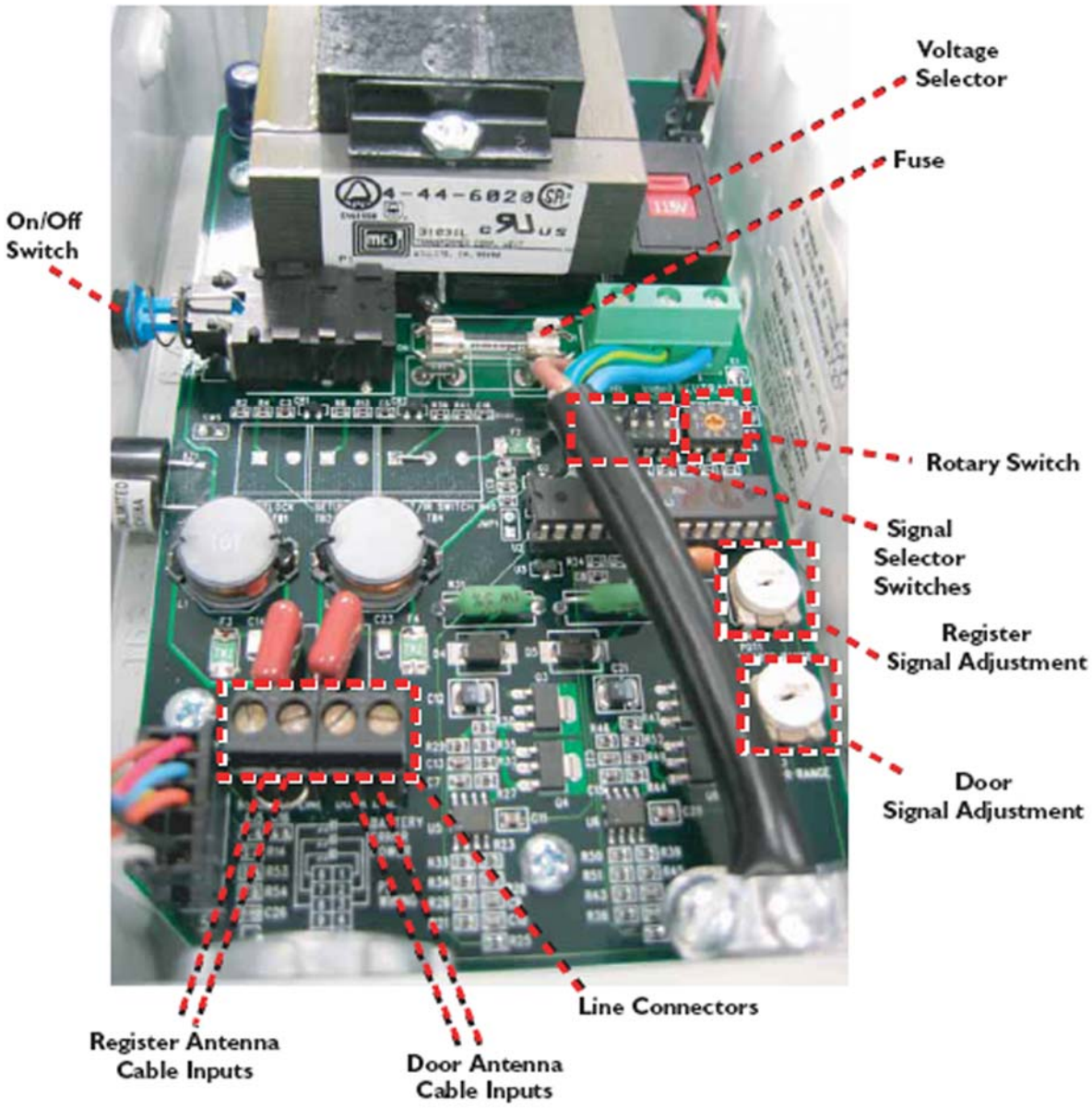
Center the shopping cart stencil on the stripe and paint with black traffic paint. Stencils should be spaced approximately five feet (5') apart.

A finished stripe with stencils.

6 ExitManager

ExitManager Front Panel

ExitManager – Inside Case



ExitManager Settings

ExitManager can be configured to generate a signal for a Standard Outdoor GS[1] application, a Standard Indoor GS1 application, or a Standard Indoor Purchek application, based on the settings of the Signal Selector switches shown in the tables below.

Outdoor GS[2] Application (One locking line)	Selector Switch Settings: 1 ▲ 2 ▲ 3 ▼ 4 ▼ 5 ▼ 6 ▼ Cable Termination Settings: • Locking Antenna terminates at the "Register Line" Loop Connector • Jumper Is Inserted into the Cable Inputs at the "Door Line" Loop Connector Rotary Switch Setting: 1

Indoor GS[2] Application (One lock line and one unlock line)	Selector Switch Settings: 1 ▲ 2 ▼ 3 ▲ 4 ▼ 5 ▼ 6 ▼ Cable Termination Settings: • Locking Antenna terminates at the "Register Line" Loop Connector • Unlocking Antenna Terminates at the "Door Line" Loop Connector Rotary Switch Setting: 0

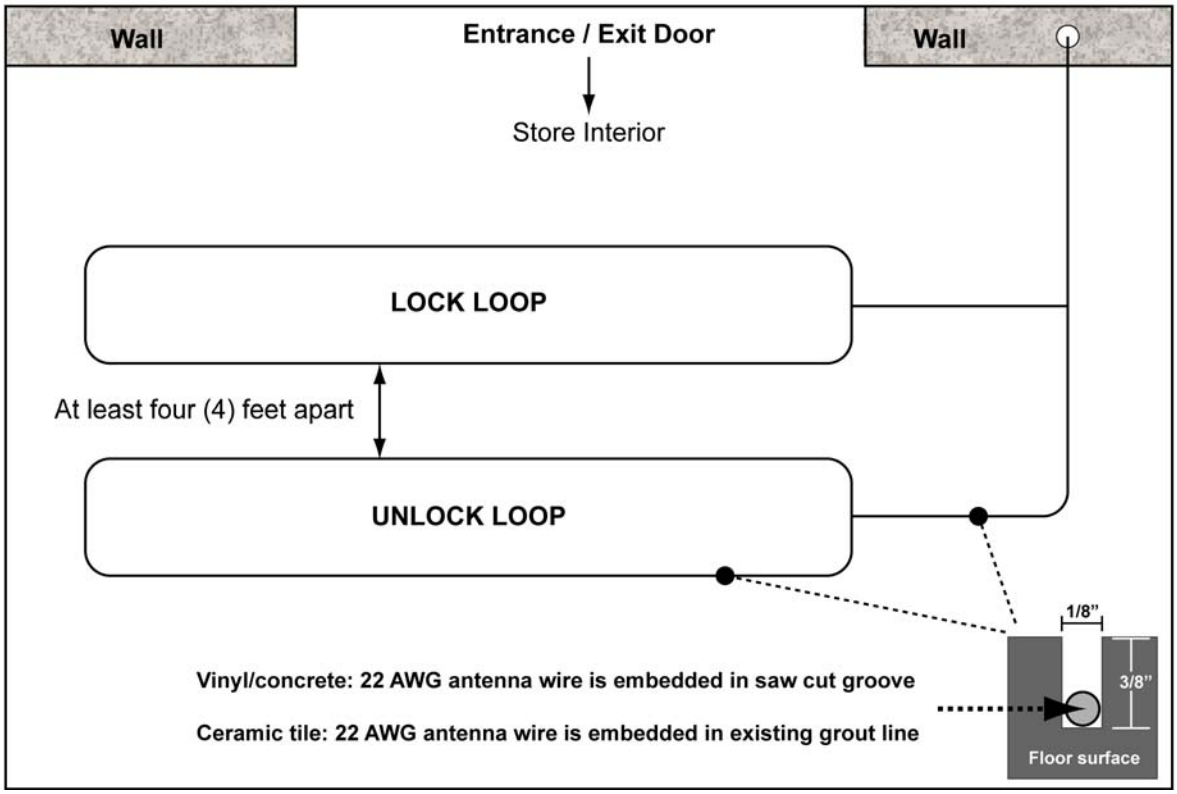
Indoor Purchek Application	Selector Switch Settings: 1 ▼ 2 ▼ 3 ▼ 4 ▼ 5 ▼ 6 ▼ Cable Termination Settings: • Locking Antenna terminates at the "Door Line" Loop Connector • Unlocking Antenna Terminates at the "Register Line" Loop Connector Rotary Switch Settings to set **Entry Permission Timings** (Setting – Timing) • 0 - 2 minutes • 1 - 15 minutes • 2 - 10 minutes • 3 - 30 minutes • 4 - 1 hour • 5 - 3 hours • 6 - 2 hours • 7 - 1 minute

7 Indoor Cart Containment Systems

System Layout

Using the ExitManager in combination with 22AWG antenna, it is possible to configure a cart containment system at the interior of a store's exit. Often times these systems are configured to provide an unlocking loop, in addition to a locking loop. This additional loop allows customers and store personnel to pull a locked shopping cart backwards two to three feet and unlock the wheel, eliminating the need for a store attendant with a Cartkey.

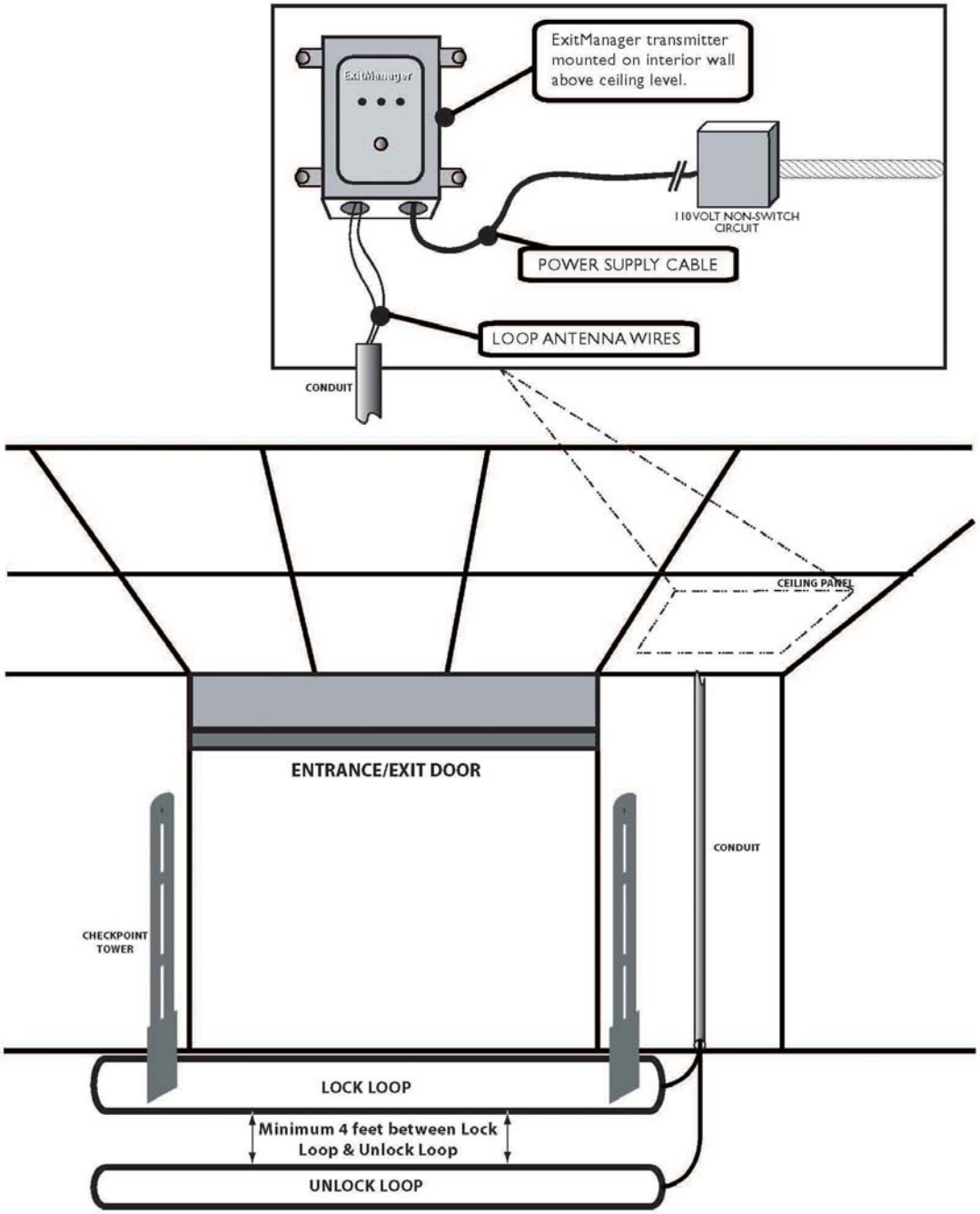
The antenna of an indoor system is generally embedded into the concrete slab below the carpet or vinyl-covered tile, or sometimes, in the grout lines of a ceramic tile floor surface. For systems where there is no electronic article surveillance (EAS) system in place, each loop or lock box should be configured to be two-feet wide, with a minimum of four-feet of separation between the two lock boxes. An example lock / unlock configuration is illustrated below.



In this example, the ExitManager is attached to the wall above the ceiling at the right side of the store exit. The 22AWG antenna is the routed down the interior of the wall and cut into the concrete slab below the floor surface.

System Layout with EAS System

In instances where there is an EAS system, it is best to configure the locking loop to be located either directly in front or behind the EAS towers, or to wrap around the EAS towers (see diagram on page 40). Installations with an EAS tower will require the locking line to be set to an output where the locking signal extends beyond the range of the EAS tower signal interference. It is important that the unlock loop be placed NO LESS THAN FOUR (4) FEET away from the locking line. It is best to use your SmartKey to determine the exact location where you can recognize a locking signal and then place the unlock line a minimum of one (1) foot beyond that point.



8 Store Training

Training the Store Personnel

Properly training the store personnel is an important part of the GS^2 System installation. Take care in representing yourself in a professional manner. Whoever is performing the training should change into a fresh Gatekeeper or Company work shirt prior to the training. Educating the customer on all aspects of the GS^2 System at time of installation will serve to improve the performance of the overall system.

The store personnel must be trained on the following features:

- Make certain that the store manager understands the perimeter boundary by walking the entire perimeter antenna with him/her.
- Instruct them to check the system daily by taking a cart equipped with the GS^2 Wheel to several locations along the system perimeter to insure that the system is fully operational. If the GS^2 Wheel does not lock at the perimeter antenna, repeat the test with several other carts. If none of carts appear to work properly, place a service call to building maintenance or Gatekeeper Systems.
- With an equipped cart, show the customer how a cart will lock when approaching the perimeter. It is important that the customer understand that the GS^2 Wheel will begin to lock three to four feet (3' to 4') in front of the perimeter antenna.
- Train the customer on how to unlock a locked cart. To unlock wheels, hold the cart key approximately 1.5 to 3 feet from the wheel and depress the unlock button while moving the key toward the wheel. **The wheel will be unable to lock again for 10-15 seconds, due to a programmed delay which allows a cart to be removed from the influence of the locking zone**.
- Train the customer how to change a battery on the CartKey. If there is difficulty locking and/or unlocking wheels, train the store to check the battery status in the CartKey.
- Perform training on the operation of the CentralTransmitter: the push button on the exterior of the CentralTransmitter reverses the signal of the system for approximately 30 seconds, unlocking all carts locked on the perimeter antenna. Train them on the meaning of the Status Lights and Audible Alarm.
- Walk the manager through the User Manual, included with the CentralTransmitter. Instruct the manager to keep the User Manual in a safe location for future reference. Indicate the 24-hour, toll-free Customer Support number printed on the User Manual and on the front door of the CentralTransmitter

Upon the conclusion of training, complete the GS^2 Training Acknowledgement and have it signed by the designated Store Trainer. You may also use the form to confirm receipt of equipment that is given to store personnel in person, such as CartKeys.

GS^2 TRAINING ACKNOWLEDGEMENT AND EQUIPMENT RECEIPT FORM

As the designated lead store trainer for operation of the Gatekeeper GS^2 Cart Containment System, I acknowledge the installation of the system has been completed to the store's satisfaction, the installation was completed in a workmanlike and professional manner, and that I possess a solid understanding of the system and will utilize the training and documentation I have received to train new employees as store management deems necessary.

(Please print clearly)

STORE NAME & NUMBER	NAME AND TITLE	DATE

I acknowledge I have taken possession of _____ Emergency Maintenance Kits from Gatekeeper Systems and _____ CartKeys from Gatekeeper Systems.

SIGNATURE	TITLE	DATE

STORE COMMENTS:

TOMORROW'S TECHNOLOGY FOR TODAY'S RETAILER

Installation Walk Through

Store Name: _____ Store Number: _____

1.Was installation was completed in a workmanlike and professional manner?

_____Yes _____No

2. Did the installation crew leave the parking lot in a clean condition?

_____Yes _____No

3. Is the antenna installed according to the approved site plan?

_____Yes _____No

4. Is the perimeter antenna sealed properly?

_____Yes _____No

6. Are there any follow up items that need to be completed?

_____Yes _____No

If yes, please list the items below:

_____

_____

_____

_____

Initial here: _____

GATEKEEPER SYSTEMS
GS2 CART CONTAINMENT SYSTEM

QUICK START SYSTEM GUIDE

The following is a brief summary of some of the highlights of the Gatekeeper User Manual and should be used in conjunction with the information outlined in the manual.

- Test the system daily. Equipped with a CartKey, push a cart to the perimeter boundary to ensure the GS2 Wheel locks. Unlock the wheel using the CartKey.
- If the GS2 Wheel does not lock, test a second cart. If the second cart does not lock, check the CentralTransmitter (typically located in the receiving, customer service or reception area). Confirm that power is being supplied to the unit. If the perimeter antenna has been damaged, the red light on the front of the CentralTransmitter will flash. Contact Gatekeeper Customer Service at 888-808-9433..
- Ensure that each employee responsible for retrieving carts is equipped with a CartKey while they are on duty. Make sure all new employees are aware of the location of the perimeter boundary.
- If the store utilizes an automatic “cart pusher”, each cart must be unlocked before adding it to the line. Never place a locked cart into a cart corral.
- Be aware that each CartKey has the ability to both lock and unlock carts. To lock a cart with a CartKey, simply press the red “Lock” button.
- When the CartKey battery is low, the display light on the face of the CartKey will flash. Using a coin, remove the rear battery cover and replace the battery. See User Manual for detailed instructions on battery replacement.
- If The GS2 Wheel does not unlock after depressing the “Unlock” button on the CartKey, you can reset the Wheel by performing the following steps:
    1. Hold the CartKey approximately 18” to 36” away from The GS2 Wheel. For best results, angle the bottom of the CartKey so it is oriented towards The GS2 Wheel.
    2. Depress the “Lock” button. This will reset The GS2 Wheel to accept the unlock signal.
    3. Next, depress the “Unlock” button. This should unlock The GS2 Wheel. If this fails, notify the store manager or lead store trainer.

If at any time you require product support or service, please contact

Gatekeeper’s 24-hour Toll Free Customer Service Hotline at:

888-808-9433

9 Communication and Documentation

Communication

Communication with the Gatekeeper office is an important aspect of your partnership with Gatekeeper.

Upon first arrival to the job site:

4. Call (888) 808-9433 x. 35.
5. Press '35' when the recorded message begins.
6. When prompted, provided the following information:
    - Store name & number
    - Installer name
    - Ticket number
    - Arrival time

Upon completion of the job:

1. Call (888) 808-9433 x. 35
2. Press '35' when the recorded message begins.
3. When prompted, provided the following information:
    - Store name & number
    - Installer name
    - Ticket number
    - Departure time
    - Total antenna linear footage

Documentation

Once an installation is complete, it is imperative that the following documentation is completed and sent to the Gatekeeper office within 48 hours:

- Completed Installation Work Order (see sample that follows)
- Training Acknowledgement
- Completed as-built drawing. Using the site plan mark your splice locations, also make any changes in antenna route.
- Pictures
- Central Transmitter location after it is mounted (label the picture as CT01).
- Asphalt sealed. (label the picture as ASPHALT01)
- Concrete sealed (label the picture as CONCRETE01)
- Parking lot sign (label the picture as SIGN01)
- Containment zone stripe (label the picture as STRIPE01).
- Front of store (label the picture as STORE01)

Problem Resolution

Should you encounter any technical issues, site plan layout challenges, or have scope of work questions while working on an installation or performing a service visit, please call the Regional Field Service Supervisor for the region you are working in (this applies to third party contractors):

- Paul Kammerer – West Region (West of the Mississippi) (949) 689-0454 mobile
- David Spence – East Region (East of the Mississippi) (804) 307-8048 mobile

10 Troubleshooting

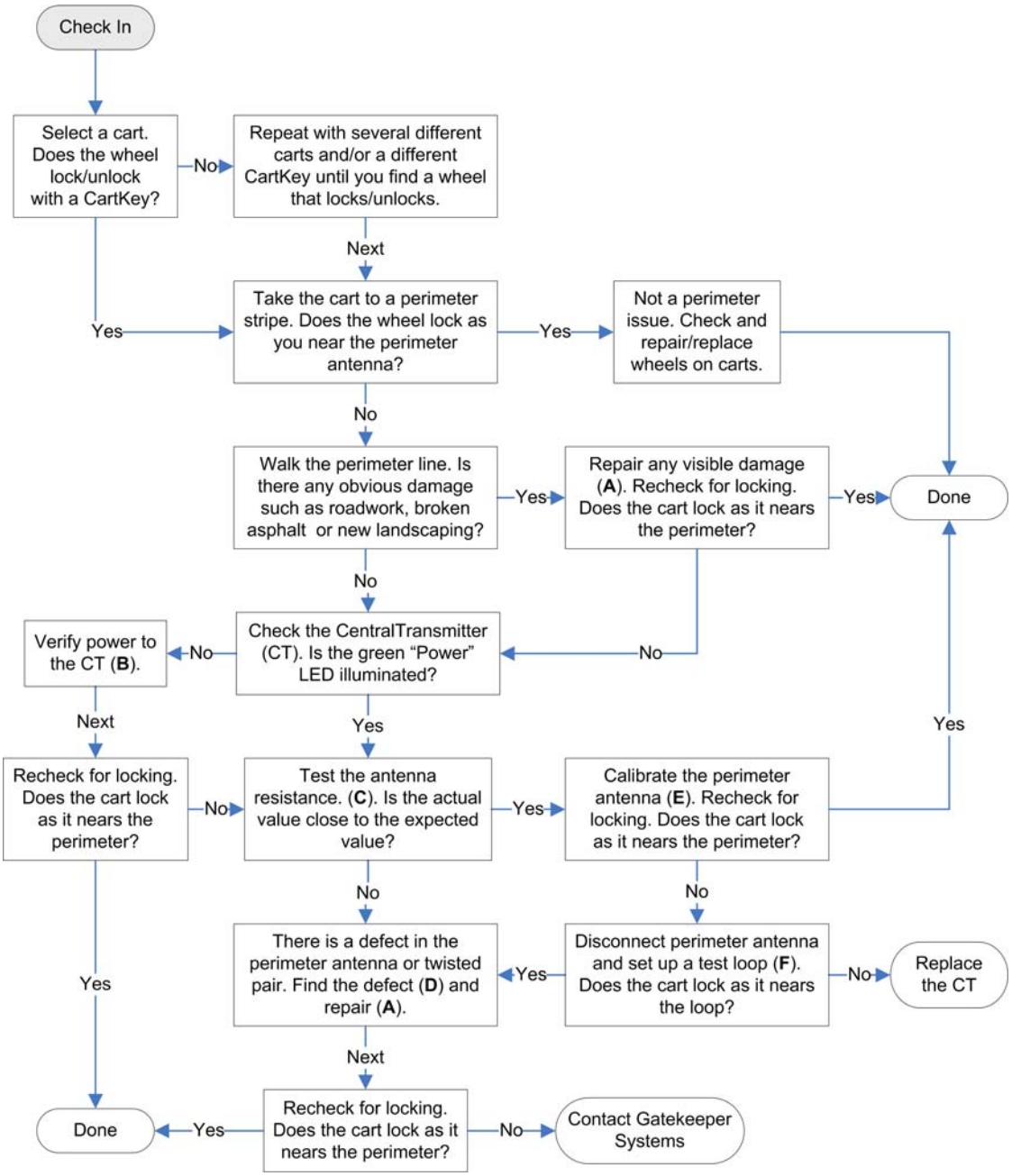
Diagnosing CentralTransmitter and Perimeter Antenna Issues

This section provides several flowcharts and processes for troubleshooting problems with the CentralTransmitter and perimeter antenna. Gatekeeper Systems Customer Service will attempt to gather information during the initial service call from the client, but sometimes the only information the technician may have on arrival is that "…the system doesn't work…"

The first action when arriving on site is to contact the store manager for an active store, or the construction superintendent for a store that is still under construction.

1. Introduce yourself to the person in charge and let them know:
    - why you're at their store,
    - what you plan to do,
    - what times you plan to be working,
    - about how long it should take,
    - the areas of the store to which you will need access,
    - how your work might impact their store operation.
2. Collect as much information as you can:
    - ask the manager to describe the problem from their perspective,
    - when did the situation begin,
    - is the problem intermittent or ongoing,
    - has there been any recent construction, landscaping, power outages, etc.,
    - are any other systems in the store currently experiencing problems?
3. Do a quick visual check of the CentralTransmitter area. Look for loose power cords, external damage to the box or conduit and any other obvious signs.
4. Start with the Main Troubleshooting Flow Chart on page 66. Letters in bold (**A**, **B**, **C**, **D**…) in the main flow chart refer to secondary flow charts or processes in this manual. The titles and page numbers for the secondary flow charts are shown at the bottom of the main flow chart page.

Main Troubleshooting Flow Chart



A – Splicing the Perimeter Antenna, page 46

B – Verifying Power to the CT, page 67

C – Checking Antenna Resistance, page 68

D – Finding a Perimeter Antenna Defect, page 69

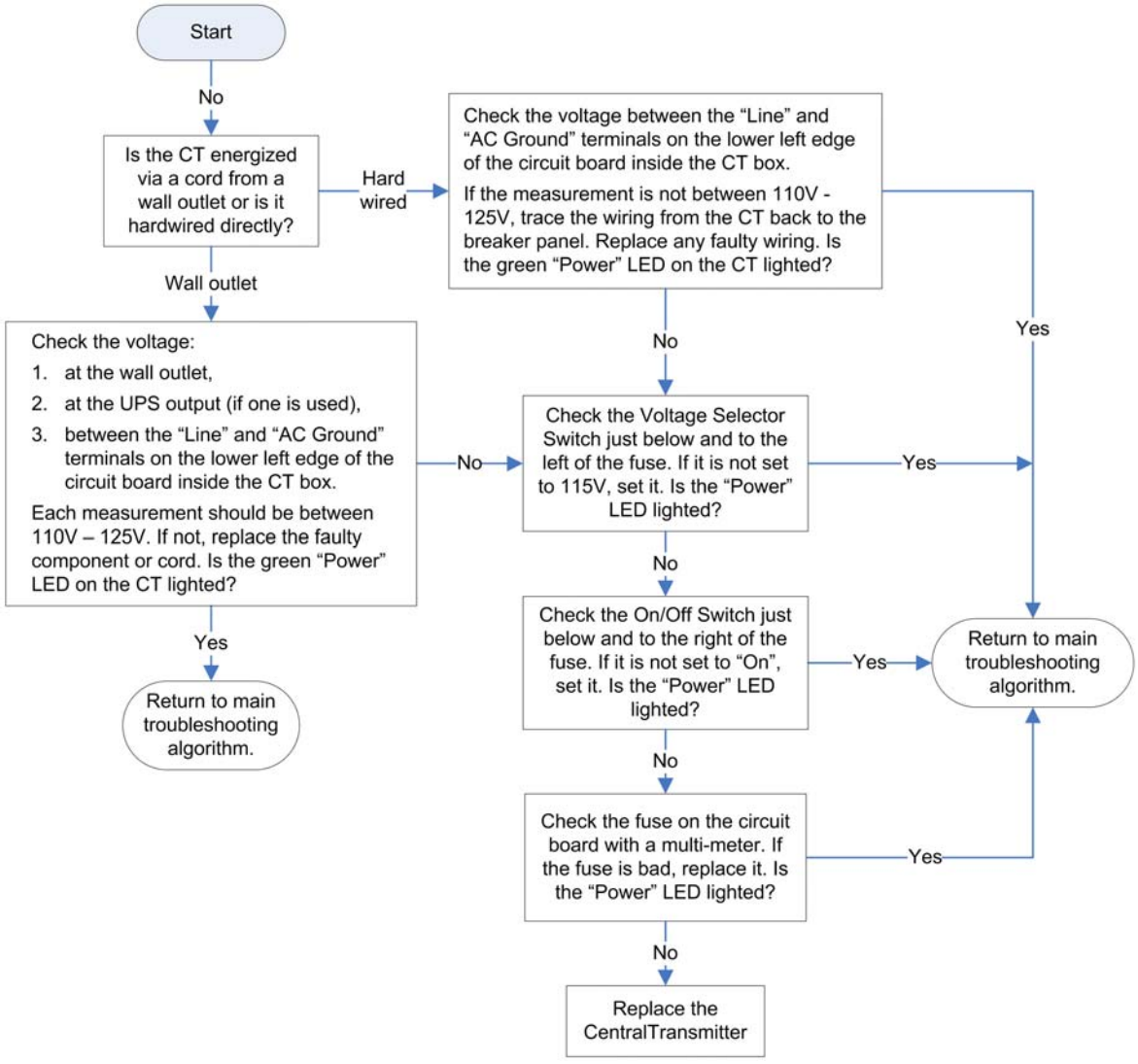
E – Calibrating the CT, page 30

F – Setting Up a Test Loop, page 73

Verifying Power to the CentralTransmitter

This flow chart is used to verify that there is an adequate power supply to the CentralTransmitter (CT). The flow chart assumes that the store power is on and that there is a voltage output from the circuit breaker supplying the CT is between 110V – 125V.

This flow chart can be used as a “stand alone” troubleshooting tool, but is most effective when used as part of the main troubleshooting flow chart.

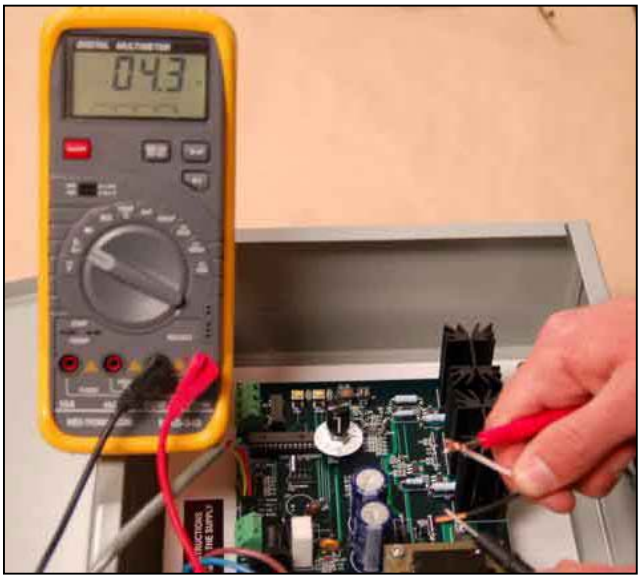


Checking Antenna Resistance

Set the multimeter to the ohm scale and touch the two leads together. This gives you a baseline value, which should be zero. If the value is not zero, calibrate the meter. If it is not possible to calibrate the meter to zero, make sure to add the baseline value to any measured value you get when testing the antenna resistance.

14 AWG antenna used with Gatekeeper Systems antennas will have a resistance of approximately 2.2 ohms per 1,000 feet of antenna. The value for twisted pair antenna will be slightly higher.

1. Use the formula above to calculate the expected resistance. Write the number down.
2. Turn off the power to the CT. Do not use the toggle switch, this de-energizes the board but there is still power in the transmitter. If the transmitter is hard wired (no cord), find the circuit breaker and de-energize the breaker.
3. Remove the loop antenna from the terminal block on the circuit board. Reading with the antenna connected will give a false value.
4. Touch one of the meter probes to one end of the antenna and one to the other end.
5. Record the reading and note whether the reading is steady or fluctuating.
6. Compare the expected value and the actual value. Use the table below to determine the probable cause of the malfunction, then return to the Main Troubleshooting Flow Chart and continue the troubleshooting process.



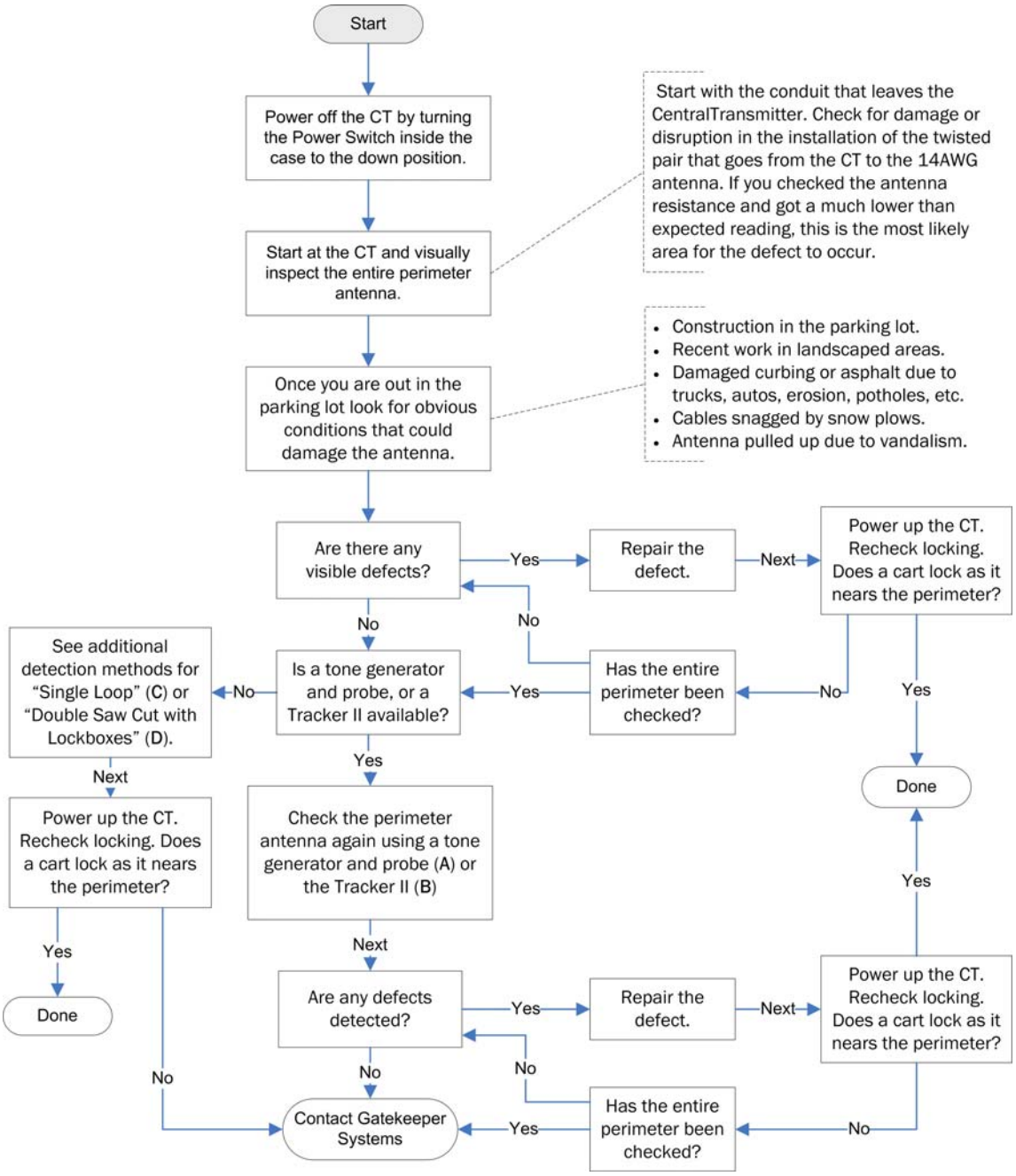
Using the multimeter to determine total antenna

Keep in mind that different multimeters have different sensitivities. Your results may not be exactly like the examples.

Value	Example	Probable Cause
Close to expected	2.0 – 2.4 ohms for a 1000 foot antenna.	Antenna is probably in good shape without nicks, breaks or shorts.
0	0	There is a complete break in the antenna.
Much lower than expected	1 ohm for a 1000 foot antenna.	This is usually due to a short in the twisted pair leading from the CT to the antenna.
Much higher than expected	1 K-ohm for a 2,000 foot antenna	This is frequently seen when a piece of metal has been driven through the wire, such as a sign pole or a metal spike for a parking bumper.
Fluctuating	Increases then decreases rapidly.	This is caused by a capacitance in the antenna, which means a non-insulated cable bleeding to ground. This could be at a bad splice or nick in the insulation that allows a short into wet ground.

Finding a Perimeter Antenna Defect

This flow chart details the process for detecting defects in the perimeter antenna. As with the main flow chart, secondary processes are indicated by bolded capital letters (**A**, **B**, **C**…) whose titles and page numbers are listed at the bottom of the page.



A – Using a Tone Generator and Probe, page 70

B – Using the Tracker II, page 71

C – Single Loop Installations, page 72

D – Double Cut and Twisted Pair with Lockboxes, page 72

Antenna Troubleshooting with a Tone Generator and Probe

One way of finding a break in the perimeter loop is by using a tone generator and probe combination. This tool is used in the telecommunication industry to locate phone cables and designate pairs, but is also very useful for locating breaks in the perimeter antenna.

Gatekeeper Systems recommends the Progressive Electronics 77HP Tracer 2 Tone Generator and the Progressive Electronics 200EP Speaker Probe. The benefits of these models are in the features of the probe:

- 2” speaker with adjustable volume,
- Red LED visual signal strength indicator,
- Terminals to accommodate headsets.

The tone generator and probe can be purchased as a kit, or as separate components. Both configurations are shown below. Each component requires a separate 9-volt battery.

The tone generator and probe should always be used with a set of headphones, as ambient noise makes it difficult to hear the subtle tone changes that indicate a break or short.

Tone generator and probe

To detect perimeter antenna breaks using the tone generator and probe:

1. Connect the tone generator to the two antenna output leads in the loop. This generates a signal down both sides of the loop.
2. Turn the tone generator on and then follow the perimeter loop with the speaker probe held near the perimeter wire.
3. When you reach an area where the volume of the tone drops way down, mark the spot.
4. Continue walking slowly until the volume picks back up. Make a second mark.
5. In a single loop configuration with 2,000 or more feet the distance between the two marks is usually 7 to 10 feet. The damaged section will be found in the center third.

Antenna Troubleshooting with the Tracker II

The Model 501 Tracker II is designed to locate the path and depth of buried cable, service wires, metallic pipe or conduit, and locate the end of a cut cable. The Tracker II transmitter is housed in an aluminum case and is powered by eight 1.5v AA batteries. The transmitter has an on/off control knob which is also used to adjust the output level and a LED indicating the battery condition. Effective range is greater than 4,000' in length and for depths up to 7'. The receiver is encased in an aluminum housing, mounted with an antenna and is powered by a 9v battery. The receiver has a speaker for listening to the signal, a meter for monitoring the signal level, a handset jack, an on/off volume control knob and an antenna for detecting the tone over the cable.

The tone generator and probe should always be used with a set of headphones, as ambient noise makes it difficult to hear the subtle tone changes that indicate a break or short.

1. Plug the cord set leads into the transmitter and clip the leads together.
2. Turn the transmitter control on and rotate fully clockwise. A bright LED indicates enough battery power. If the battery test light is not lit brightly change the batteries following the directions on the Transmitter housing.
3. Turn the transmitter off.
4. Connect the transmitter to the perimeter antenna:
    - Twisted Pair - connect a lead to each separate conductor within the cable. It is important to make sure that the shield and drain are not touching either conductor.
    - Antenna Loop Cable- connect one lead to the conductor and the other lead to earth-ground. This can be done via a screw driver or to a conduit that has been tested with a ground plug.
5. Turn the receiver control on and rotate clockwise to the 12:00 position.
6. Turn the transmitter on to the #3 position and pass the receiver antenna close to the transmitter. Any indication from the receiver indicates acceptable battery condition. If the receiver has no indication as it passes near the transmitter, change the batteries follow the directions on the receiver housing.
7. Walk along the perimeter antenna path with the end of the receiver held near the ground. The signal will diminish rapidly and be lost as you near and then pass the break.
8. Double back and check again. Make a mark where the signal disappears.
9. Reconnect the transmitter leads to the other side of the antenna and test from the other direction to confirm the location of the break before exposing the cable.

This same procedure can be used to locate cable splices and damaged cable. As the signal begins to fade mark the asphalt. You will see a larger area of weak signal.

Troubleshooting Single Loop Installations

With a single loop installation the troubleshooting becomes more difficult if the cable shows no obvious damaged areas. You must run a jumper cable across the loop breaking your loop up into smaller sections. This is difficult in a busy parking lot so be careful! Your jumper needs to be twisted into a piece of the loop cable. Run the jumper along side the existing cable. Follow the steps mentioned above and eliminate section by section. Once the problem is isolated and found re-splice your test locations.

Troubleshooting Double Saw Cut and Twisted Pair with Lock Boxes

Once you complete your Ohm reading, twist the two antenna loop cables together to close the circuit. Take your meter and walk the perimeter approximately half way around the locking zone. Look for an area where the cable can be accessed easily. If need be you can dig up the conduit in a landscape area or carefully remove the sealer in a section of parking lot. After exposing the cable, separate the loop into two sections. Because the cable is closed at the transmitter end of the loop, you can measure both sides as separate loops. Keep in mind your undamaged cable will read 2.2 ohms of resistance per 1,000 feet of cable. By measuring the two separate loops you can determine which direction the break is. Do not re-splice the cable at this point as you will want to twist the cable together to close off the bad section. Walk the perimeter cable again looking for any obvious damage. Nothing obvious, repeat the above test each time breaking the loop in half. This will shrink the area to find the damaged cable. Once the problem is isolated and found re-splice your test locations.

Replacing the Central Transmitter Fuse

Tools you will need:

- Circuit tester to check whether or not there is power to the fuse
- Fuse puller (not necessary, but strongly recommended - available at electronics or auto parts stores)
- Replacement fuse:
    - For a 9100 Central Transmitter: T-LAC TIME LAG 500ma 250volt
    - For a 9110 Central Transmitter: T-LAC TIME LAG 1amp 250volt

The fuse is located on the Central Transmitter board, and is labeled F2. To replace the fuse you must first remove power to the transmitter.

1. Remove power to the Central Transmitter by pulling the plug from the receptacle. If there is a battery back-up make sure you are pulling the transmitter plug, not the plug from the battery back-up. Do not depend on the toggle switch, this de-energizes the board but there is still power coming into the fuse. If the transmitter is hard wired (no cord), find the circuit breaker and de-energize the breaker.
2. Check the fuse with your electric meter and make sure there is no power to the fuse. Remove the fuse. The fuse is in a tight holder on the board, and is surrounded by sensitive electronic parts; care needs to be taken when removing it. There is a fuse removal tool available at electrical and auto part stores.
3. Replace the fuse with one of the following:
4. Plug in the power cord/ turn on the circuit breaker.
5. Push the toggle switch to the up or on position.
6. At this point the Green LED should light, indicating that the transmitter is energized.

Setting Up a Test Loop

When setting up a test loop, you bypass the perimeter antenna and attempt to lock a cart wheel using a small local antenna hooked directly to the CentralTransmitter (CT).

1. Power off the CT by pulling the plug from the wall outlet or de-energizing the circuit breaker at the panel.
2. Disconnect the perimeter antenna terminals from the terminal block.
3. Create a small local loop by connecting 10-15 feet of 14AWG antenna wire to the antenna terminal blocks.
4. Make sure the Field Strength Adjustment potentiometer knob is turned all the way to zero (0).
5. Power up the CT.
6. Place a cart with a working Gatekeeper wheel about three (3) feet from the loop.
7. Slowly turn up the Field Strength Adjustment knob and listen for the sound of the wheel beginning to lock.
8. If the wheel has not locked by the time you reach about a quarter turn on the knob, the CT probably needs to be replaced. It is usually not a good idea to turn the field strength any higher, as you may risk locking carts in nearby store areas.
9. When finished, return to the Main Troubleshooting Flow Chart on page 66.

Coupling

Definition: Coupling is the association of two circuits or systems in such a way that power may be transferred from one to the other.

In the context of Gatekeeper Systems, coupling may be present when the 7.8 kHz signal transfers from the antenna cable to surrounding conductive materials. Conductive materials can include conduits, data cables, pipes, and even moist ground. When the antenna crosses the path of any conductive material a signal is coupled onto this material. The degree of coupling is determined by how efficient a conductor the material is and how much output is being generated by the Gatekeeper CentralTransmitter.

A drain pipe (medium efficiency conductor) in the ground will absorb the signal but will travel only a small distance. A conduit with conductors inside (good conductor) will carry the signal much further; if the circuits inside the conduit are energized and carrying current, the signal will carry even further still. If the antenna path runs parallel to the conductive material within the field of the signal, the coupling is stronger than if the paths cross.

The best way to avoid coupling is to eliminate it in the installation process. By following the installation steps in the manual you will avoid a high percentage of coupling issues. In some instances coupling cannot be detected until the installation is complete. Due to the construction and remodel of retail establishments it is impossible to foresee all coupling scenarios. It is in dealing with these situations that the following troubleshooting techniques should be applied to eliminate this phenomenon.

Tools you will need:

- SmartKey $GS^{1.1}$ and GS^{2}
- Toner and Amplifier,
- Cable Tracker,
- Wheel and CartKey.

1. When you arrive at the store, find out from store personnel in which area(s) of the store or parking lot the carts are locking and if it is occurring on a regular basis.
2. Take a cart from the store's fleet and a matching test wheel from your stock, and any test device you may have for this system. Some stores have a mixed fleet. The most common is GS^{1} mixed with $GS^{1.1}$. The GS^{1} is the most sensitive wheel and should be your test wheel. A Smart Key will work with the $GS^{1.1}$ and GS^{2}. An inductive amplifier will work on all circuits if there is not a lot of electrical noise.

3. Make sure the test wheels work by cycling them with a CartKey. The coupling signal is usually weak and hard to detect. Locking the wheel usually takes place when the shopper stops to load their cart or to inspect the merchandise. Sweep the areas with the test equipment and pay close attention to floor drains, electrical circuits, and building support beams. Note any areas of concern.
4. Check the CentralTransmitter. If this is a digital system the coupling can be duplicated without interfering with store operations by sending an unlock signal through the system.
    - Power down the CentralTransmitter.
    - Place a jumper between the two poles on the unlock switch located on the door panel.
    - Turn the output level up until the unlock signal is present in your areas of concern. If you are using a wheel as your indicator, lock the wheel before sweeping the area and note the location where it begins to unlock. Remember that there is a delay before you can relock the wheel.
    - Once you see this signal, follow its source to see if the antenna cable is coupling with something that can be changed. This may require splicing in a test cable around the affected side of the building. If you can move the test cable to eliminate the unlock signal, this should also eliminate the coupling. This may take several attempts. Once the signal is eliminated then retune the CentralTransmitter to its previous state.
5. With the CentralTransmitter still transmitting the unlock signal, check the perimeter and adjust the output level to receive the signal at the desired level. The recommended level is three feet from the perimeter antenna. This provides you with approximately a six foot field.
6. With the CentralTransmitter still transmitting the unlock signal, re-sweep the areas of concern. Widen the sweep and move slowly. Be confident that the signal is not present.
7. Power down the Central Transmitter and remove your jumper.
8. Power up the Central Transmitter and return to the areas where the coupling was taking place.
9. Re-sweep the area to insure that your test wheel and the store's cart are no longer locking. Use your SmartKey to be sure that you do not see a stray signal in any of these locations.

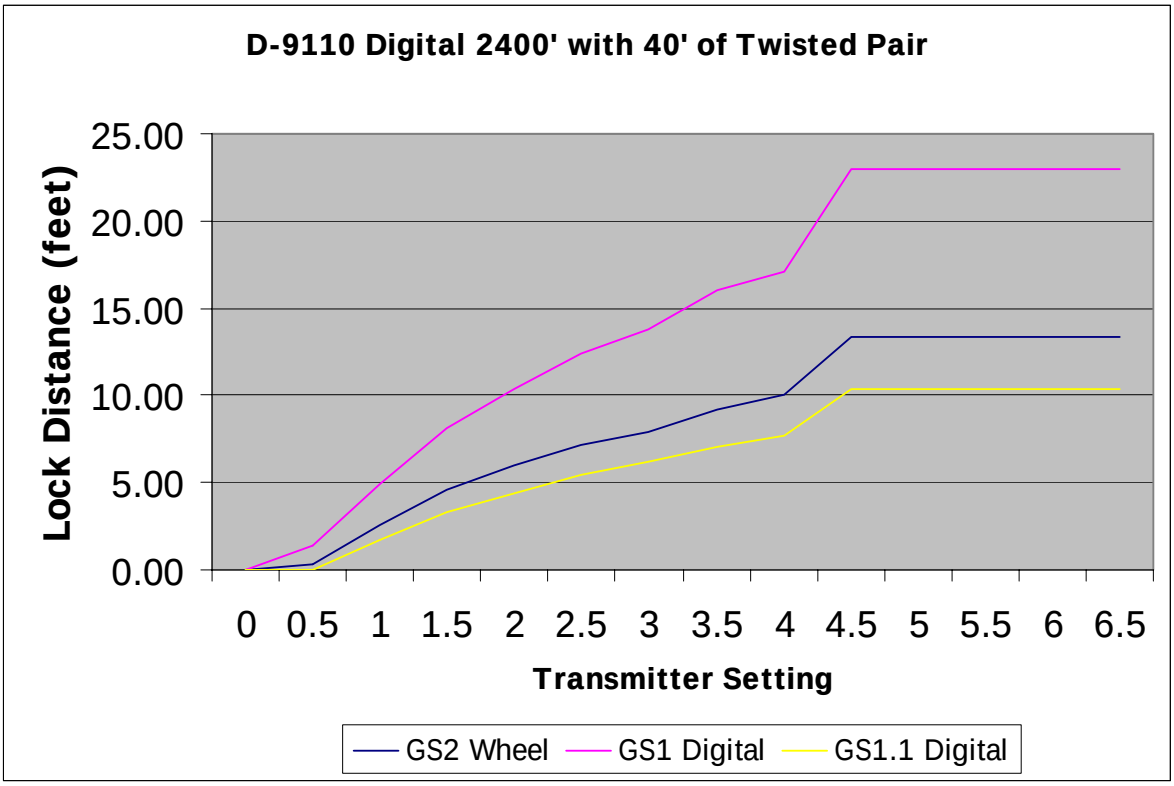
Mixed Wheel Environments

There may be several different types or revisions of Gatekeeper wheels at a single store location, especially if the stores have been using the Gatekeeper System for some time, or carts are routinely moved between different stores. It is important to understand the differences in these wheels and how they operate together (or not). The four types of wheels you are most likely to encounter are Analog, GS1, GS1.1, and GS2, as shown in the figure below.

Gatekeeper System wheel identification

Analog wheels (**Red** in color) are NOT compatible with any other version of Gatekeeper wheel. If you are providing service at an analog store, the only wheels that will work are the RED analog wheels. Grey or black wheels will not work.

All versions of **Grey** and **Black** colored wheels will lock in a GS System digital environment; however, they will react to the encoded signal at different ranges. The chart below indicates the locking range of three versions of digital Gatekeeper wheels, in an environment with a 2,400 foot locking line and 40 feet of twisted pair.



Wheel locking distance as a function of transmitter setting

When servicing a **digital** store, it is important to note the type of wheel present at the store, before you replace a wheel. As shown in the graph above, a GS2 or GS1.1 wheel will recognize the locking signal much closer to the perimeter antenna than a GS1 Wheel. It is possible that a GS1 wheel will lock at the perimeter antenna, but that a GS1.1 or GS2 wheel will not. The transmitter will need to be adjusted to allow for a locking range of approximately one to two feet (1' to 2') for the GS1.1 or GS2 and three to four feet (3' to 4') for the GS1. So, in the example illustrated above, you would adjust the CentralTransmitter to a pot setting of approximately 1 to 1.25, to achieve a locking range of two feet (2') for the GS1.1 or GS2 and four feet (4') for the GS1.

It is important that you NEVER leave a store without first checking the locking range of different wheel versions, at several different locations on the perimeter antenna.

11 Material Specification Sheets

This section contains specification for the following products.

- 14awg single conductor traffic cable (Anixter)
- 14awg two conductor twisted pair neutral (Belden)
- Tri-American cold pour loop fill
- SealMaster cold pour loop fill
- Crackmaster hot pour applicator
- Crackmaster hot pour sealant
- QuikRete concrete sealant (level surfaces)
- QuikRete concrete sealant (un-level surfaces)
- 3M ScotchKote electrical coating
- Thermoline – thermoplastic line stripe
- Core Cut concrete saw
- Tempo Tracker II, model 501
- Kleen Sweep 27

14AWG Traffic Loop

ANIXTER

Anixter Part No.	3SLC-1401-THHN
Manufacturer	ALL GENERIC VENDORS
Manufacturer Part Nos.	-
	-
Description	14-1/C LOOP DETECTOR CABLE 19 STR PVC/NYLON/PVC TUBE 600V IMSA 51-5

Attributes

Conductor Size/Gauge:	14 AWG
CONDUCTOR: Count	1 CONDUCTOR
Type	STRANDED
Material	BARE COPPER
Voltage Range:	600
Temperature Rating:	90 DEGREES CENTIGRADE
INSULATION: Material	PVC/NYL-PVC/NYLON
Screen/Shield:	UNSHIELDED
JACKETING: Material	PVC-POLYVINYL CHLORIDE
Armor:	NO
EARTH/GROUND WIRES:	NO
Composite:	NO
Product Type:	IMSA CONTROL
Approx. Wt. lb/1000 ft	29.8
Conductor Size AWG	14
No. of Cond.	19
Nominal O.D. (in.)	.250
Voltage	600
Unspsc Code	26121603

Twisted Pair (neutral)

Detailed Specifications & Technical Data

Belden CDT

BELDENCable

5100FE Non-Paired - New Generation®

For more information please call
1-800-Belden1

See Put-ups and Colors

Description:

Bare copper conductors, PVC insulation, cabled conductors, Beldfoil® shield tape (aluminum side out) with drain wire, PVC jacket. Sequential footage marking every two feet.

SUITABLE APPLICATIONS:

Suitable Applications	Intercom/PA Systems, Sound/Audio Systems, Fire Alarm Systems (For color Red only)

PHYSICAL CHARACTERISTICS:

CONDUCTOR:

Number of Conductors	2
Total Number of Conductors	2
AWG	14
Stranding	19
Conductor Material	BC - Bare Copper

INSULATION:

Insulation Material	PVC - Polyvinyl Chloride
Nom. Insulation Wall Thickness	.014 in.

OVERALL CABLING:

Overall Cabling Lay Length	2.75 in.

Overall Cabling Color Code Chart :

Number	Color	Number	Color
1	Black	2	White

OUTER SHIELD:

Outer Shield Material Trade Name	Beldfoil®
Outer Shield Type	Tape
Outer Shield Material	Aluminum Foil-Polyester Tape w/Shorting Fold
Outer Shield %Coverage	100 %
Outer Shield Drain Wire AWG	16
Outer Shield Drain Wire Stranding	19x29
Outer Shield Drain Wire Conductor Material	TC - Tinned Copper

OUTER JACKET:

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Twisted Pair (neutral) (cont).

Detailed Specifications & Technical Data

Belden CDT

BELDENCable

5100FE Non-Paired - New Generation®

Outer Jacket Material	PVC - Polyvinyl Chloride
Outer Jacket Nominal Wall Thickness	.015 in.

OVERALL NOMINAL DIAMETER:

Overall Nominal Diameter	.238 in.

MECHANICAL CHARACTERISTICS:

Operating Temperature Range	-20°C To +75°C
UL Temperature Rating	75°C
Bulk Cable Weight	45.8 lbs/1000 ft.
Max. Recommended Pulling Tension	125.4 lbs.
Min. Bend Radius (Install)	2.4 in.

APPLICABLE SPECIFICATIONS AND AGENCY COMPLIANCE:

APPLICABLE STANDARDS:

NEC/(UL) Specification	CL3R, FPLR
NEC Articles	725 or 760

FLAME TEST:

UL Flame Test	UL1666 Vertical Shaft

PLENUM/NON-PLENUM:

Plenum (Y/N)	N
Plenum Number	6100FE

ELECTRICAL CHARACTERISTICS:

Nom. Inductance	.15 µH/ft
Nom. Capacitance Conductor to Conductor @ 1 KHz	83 pF/ft
Nom. Cap. Cond. to Other Cond. & Shield @ 1 KHz	149.4 pF/ft
Nom. Conductor DC Resistance @ 20 Deg. C	2.54 Ohms/1000 ft
Nominal Outer Shield DC Resistance @ 20 Deg. C	3.44 Ohms/1000 ft
Max. Operating Voltage - UL	300 V RMS
Max. Recommended Current	8 Amps per conductor @ 25°C

PUT-UPS AND COLORS:

Item	Description	Put-Up (ft.)	Ship Weight (lbs.)	Jacket Color	Notes
5100FE 0021000	2 #14 PVC FS FRPVC	1000	51	RED	C
5100FE 0081000	2 #14 PVC FS FRPVC	1000	50	GRAY	C
5100FE 008500	2 #14 PVC FS FRPVC	500	28.5	GRAY	
5100FE 008U1000	2 #14 PVC FS FRPVC	U1000	49	GRAY	

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Tri-American Cold Pour

TRI - AMERICAN, INC.
Manufacturer of
ASPHALT PROTECTION PRODUCTS

980 AMES AVENUE, MILPITAS, CA 95035 (800) 782-6543 (408) 946-5788 FAX (408) 946-6077

TECHNICAL BULLETIN
LOOP SEALANT TA-500

COMPOSITION

TA-500 is a single component, asphaltic emulsion sealant, designed to fill and seal INDUCTIVE LOOP "SLOTS". TA-500 comes ready to use, requiring only stirring prior to use. Partial containers may be re-used if container lid is properly secured after use.
TA-500 is "POLYMER" modified, for greater flexibiliy, and adhesion in both asphalt, or concrete "SLOTS".

SPECIFICATIONS

TA-500 MEETS OR EXCEEDS THE STATE OF CALIFORNIA SPECIFICATION (CALTRANS) #8040-41A-15, for ASPHALTIC EMULSION SEALANTS.

SURFACE PREPARATION

"SLOTS" shall be free of dust, debris, and water prior to the application of TA-500. The use of an "air-jet" is recommended to achieve the above. "SLOTS" that are slightly damp or moist are recommended to assure desired penetration, and adhesion of TA-500 in the "SLOT".

APPLICATION

Mix TA-500 thoroughly prior to use. (when using a mechanical mixer, avoid over mixing, as this may entrain air into the "SLOT", and result in voids in the cured seal.) TA-500 can be poured directly from the container, or poured into any other suitable applicator. Apply TA-500 directly into the "SLOTS" and immediately "strike-off" using our easy to handle "V" shaped squeegee. This procedure will reduce waste, and assure that the "SLOT" is properly filled.

COVERAGE

TA-500 will fill, and seal approximately 30 linear feet of 1/4"x 2" "SLOTS" per gallon. This will vary depending on width/depth of the "SLOT", as well as application technique.

DRY/CURE TIME

Dry-time is approximately 1-hour in warm weather (70 degrees f.) This is the time required prior to vehicle traffic. For earlier traffic, cover TA-500 with a "Fine" dry sand. Dry-time will vary depending on weather conditions, and the amount of TA-500 on the pavement surface.

Cure-time will depend greatly on the width/depth of the "SLOTS" filled, and weather conditions. TA-500 may feel soft to the touch for several days after application, without affecting the final results. TA-500 cures by evaporation of water, unlike the "chemical cure" of other systems.

CLEAN-UP

Water can be used to clean TA-500 from tools, and equipment, prior to drying. A suitable petroleum solvent is required to remove dried product. Heavy residue can be removed with the use of a "steel" scraper prior to using solvent.

PACKAGING

TA-500 is avalible in 5, and 3 1/2 gallon plastic pails.

PRECAUTIONS

Do not store in direct sunlight, or in temps. above 100 degrees f.
TA-500 shall not be applied during or when rain is imminent.
Application temperatures shall be 50 degrees f. and rising.
Do not dilute or alter TA-500, use as received.
Keep away from children.
Protect from freezing.