



Fuel Point® System

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# Ground Antenna Installation Instructions

**MDE-4530**  
**(formerly C35982)**

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## Approvals

Gasboy, Greensboro, is an ISO 9001:2000 registered facility.

### Underwriters Laboratories (UL):

UL File#	Products listed with UL
MH4314	All dispensers and self-contained pumping units
MH6418	Power operated Transfer Pump Models 25, 25C, 26, 27, 28, 72, 72S, 72SP, 72X, 73 and 1820
MH7404	Hand operated Transfer Pump Models 1230 Series, 1243 Series, 1520 and 1720 Series
MH10581	Key control unit, Model GKE-B Series Card reader terminals, Models 1000, 1000P Site controller, Model 2000S CFN Series Data entry terminals, Model TPK-900 Series Fuel Point Reader System

### New York City Fire Department (NYFD):

NYFD C of A #	Product
4823	9100A, 9140A, 9152A, 9153A, 9800A, 9840A, 9850A, 9852A, 9853A, 9140
4997	9822A, 9823A
5046	9100Q, 9140Q, 9152Q, 9153Q, 9800Q, 9840Q, 9852Q, 9853Q

### California Air Resources Board (CARB):

Executive Order #	Product
G-70-52-AM	Balance Vapor Recovery
G-70-150-AE	VaporVac

## National Conference of Weights and Measures (NCWM) - Certificate of Compliance (CoC):

Gasboy pumps and dispensers are evaluated by NCWM under the National Type Evaluation Program (NTEP). NCWM has issued the following CoC:

CoC#	Product	Model #	CoC#	Product	Model #	CoC#	Product	Model #
95-179A2	Dispenser	9100 Retail Series, 8700 Series, 9700 Series	91-019A2	Dispenser	9100 Commercial Series			
95-136A5	Dispenser	9800 Series	91-057A3	Controller	1000 Series FMS, 2000S-CFN Series			

## Patents

Gasboy products are manufactured or sold under one or more of the following US patents:

### Dispensers

5,257,720

### Point of Sale/Back Office Equipment

D335,673

Additional US and foreign patents pending.

## Trademarks

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### Registered trademarks

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Fuel Point®  
Gasboy®  
Keytrol®  
Slimline®

Additional US and foreign trademarks pending.

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# Table of Contents

---

1 – Introduction . . . . .	1
Purpose . . . . .	1
Intended Users . . . . .	1
Related Reading . . . . .	1
Abbreviations and Acronyms . . . . .	2
Warranty . . . . .	2
System Overview . . . . .	3
Ground Loop Communications - General Information . . . . .	4
Ground Antenna System Layout . . . . .	4
Fueling a Vehicle Using Fuel Point® Ground Antenna System . . . . .	4
Authorizing a Gate Opening Using Fuel Point Gate Antenna System . . . . .	6
Fuel Point Gate Parameters . . . . .	6
2 – Component Overview . . . . .	7
Required Components . . . . .	7
Fueling With a Ground Antenna . . . . .	7
Gate Feature Using a Ground Antenna . . . . .	7
Additional Fuel Point Gate Site Components . . . . .	7
Fuel Point Gate Vehicle Components . . . . .	8
3 – Installation . . . . .	9
Important Vehicle Parameters – Read Before Proceeding . . . . .	9
Antenna Parameters for Opening a Gate with Fuel Point Ground Loop Communications . . . . .	9
Antenna Parameters for Fueling with Fuel Point Ground Loop Communications . . . . .	10
Installing A Fuel Point Ground Antenna For Fueling . . . . .	13
C09822 Junction Box . . . . .	13
For Installing a Flush-mount J-Box Antenna . . . . .	13
C09716 Antenna Sealant . . . . .	14
For Installing a Direct Buried and Sealed Antenna . . . . .	14
C07364 Surface Mount Antenna Installation . . . . .	15
Ground Antenna Used for Gate Control . . . . .	16
Locating and Installing the Fuel Point Ground Antenna . . . . .	16

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# 1 – Introduction

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## Purpose

The *Gasboy Fuel Point Ground Antenna Installation Manual* is provided to assist you in installing the ground loop communications ground antenna for the Fuel Point® system. This manual should be supplied to the installer prior to installation to ensure that your components are installed properly. Faulty installations are the major cause of system malfunctions. The system components must be installed as described in this manual to ensure the reliability and proper operation of the system. Read this entire manual before starting installation.

Gasboy provides a toll-free number for customers and installers having any questions pertaining to the installation: 1-800-444-5529.

## Intended Users

This manual provides information for Authorized Service Contractors (ASCs) or Customer Service Contractors (CSCs) to install the Fuel Point Ground Antenna.

## Related Reading

The following documents contain related information and may be helpful when using this manual:

Document Number	Title	GOLD Library
C35628	FPR Installation Manual	Gasboy Fuel Management Products
C35699	Vehicle Module Installation Manual	Gasboy Fuel Management Products

## Abbreviations and Acronyms

The following table contains a list of abbreviations and acronyms used in this manual.

<b>Abbreviation/ Acronym</b>	<b>Definition</b>
ASC	Authorized Service Contractor
CFN	Cash Flow Network
CSC	Customer Service Contractor
FMS	Fuel Management System
FPR	Fuel Point Reader
OTR	Over The Road
PCB	Printed Circuit Board
VM	Vehicle Module

## Warranty

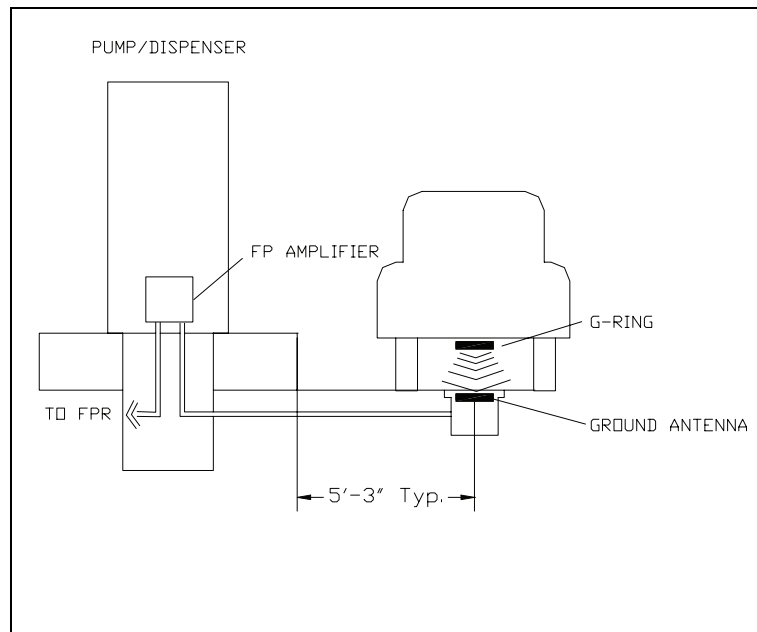
For information on warranty, refer to Gasboy's Warranty Policy Statement - MDE-4255. If you have any warranty-related questions, contact Gasboy's Warranty Department at its Greensboro location.

## System Overview

Fuel Point adapts to listed Gasboy Fuel Management Systems (FMSs) for hassle-free fueling. System applications determine actual components required. Your system may consist of several or all of the following components:

- A Gasboy FMS (listed models 1000, 1000P-Series 1000 with Receipt Printer, or 2000S CFN)
- Fuel Point Reader (FPR)
- For hose wire communications: pumps/dispensers modified using Listed Dispenser and Hose Retrofit Kits, I/S Pre-Amp and vehicles equipped with Vehicle Modules (VM) and T-Rings installed on fuel collars
- For Ground Loop Communications: a ground antenna, an I/S Pre-Amp. and vehicles equipped with VMs with G-Ring inputs and G-Rings installed underneath

**Figure 1-1 Fueling with Ground Antenna**



## Ground Loop Communications - General Information

A Gasboy FMS equipped with an FPR can be configured to authorize a vehicle for fueling or for opening a gate using ground loop communications. See *C35628 FPR Installation Manual* for additional details.

Fueling with Ground Loop Communication is available with a Gasboy CFN system only. Ground Loop Communications requires a ground antenna installed in or on the pavement at the fueling island or gate location. There are three installation options for ground antennas to meet a variety of site requirements:

- Flush-Mount J-Box
- Direct Buried and Sealed
- Surface Mounted

Vehicles are equipped with a special VM containing Ground Loop Communications circuitry (C09668). In addition, a G-Ring is attached under the vehicle. For gate applications using Hose Wire communications, the G-Ring is installed in addition to the T-Ring antenna attached at the fuel tank opening. See *C35699 Vehicle Module Installation Manual* for VM and vehicle antenna ring installation details.

## Ground Antenna System Layout

When a Fuel Point-equipped vehicle G-Ring is over or near the ground antenna, the vehicle's ID is communicated to the FPR and, if authorized, the pump will automatically be made available to fuel. The vehicle-to-FPR communications must be maintained during the entire fueling operation. When the vehicle drives out of the communications range, the pump is shut off and returned to an idle state, ready for a new transaction. The fueling event is logged and relevant data stored by the FMS unit.

## Fueling a Vehicle Using Fuel Point Ground Antenna System

### IMPORTANT INFORMATION

Successful installation requires the special Fuel Point ground antenna manufactured by Gasboy and careful attention to the instructions that follow. Do not try to use the loop detector supplied with the gate controller or the manufacturer's entrance loop instructions.

To fuel using the Gasboy ground loop communications system, the site should meet certain criteria. The following parameters must be considered:

- Each hose outlet (nozzle position) must be dedicated to only one lane. Lane-oriented pumping units are recommended (such as Gasboy 9800A and 215A/216A Satellites with suffix Z or equal).
- One ground antenna per hose outlet.
- Ground antennas are normally aligned with the nozzle position (when stored or hung up).

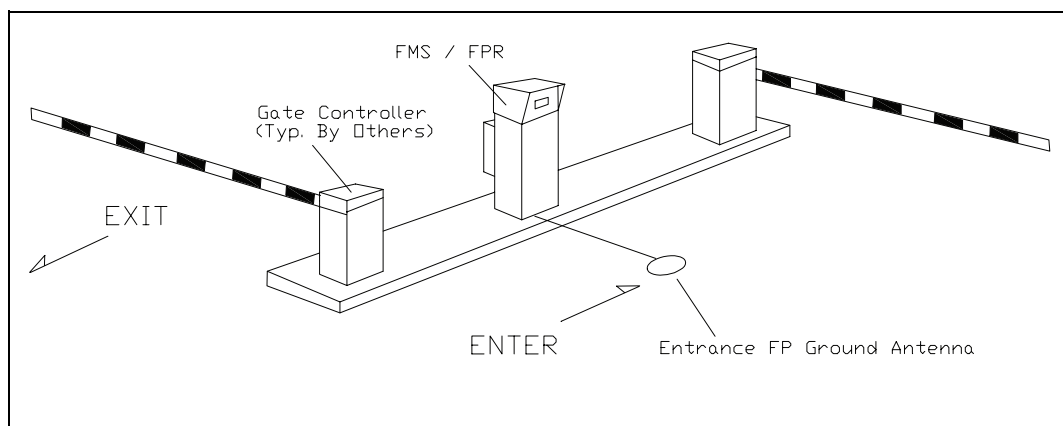


- This is the natural alignment for fueling; so drivers will not require special training.
- Other locations (other than aligned with nozzle) are acceptable but should be supplemented with a sign or other visual aid like a line painted on pavement.
  - The ground antenna is a 6 inches diameter molded ring. Read radius for vehicles is 20 inches to 48 inches, dependent on the type of vehicle being fueled. The closer the vehicle ring or antenna is above the ground antenna, the greater the read zone.

G-Ring Height Above Pavement	Effective Communications (Read Radius)	Typical Vehicle Types for this range
12"	48"	Cars, Small Vans and Trucks
18"	30"	Transit Buses, OTR Trucks
24"	24"	School Buses
30"	20"	Large Vehicles

- It is important for vehicle G-Rings to be centered over the ground antenna. When lanes are not clearly defined, provision should be made to ensure that vehicles stop to fuel with the vehicle over the center of the ground antenna (spaced at a proper distance from the pump). A painted center line or traffic control devices (traffic cones) can be used to funnel vehicles to the pump at the proper spacing.
- In applications with more than one dispenser per lane, the ground antennas must be located so that the effective read diameters do not overlap. Spacing the ground antenna (spacing pumps) at a distance of 10' center-to-center will ensure proper operation. Refer the chart about this spacing aspect on "[G-Ring Height](#)" on page 5.
- Normally, vehicles should approach the pump to fuel from the same direction. For applications where the fill tube varies from side to side, it is important to locate the ground antenna in the center of the fueling lane and to locate the vehicle G-Rings at or very close to the center of the vehicle (side to side).

**Figure 1-2 Gate Installation (Typical)**



## Authorizing a Gate Opening Using Fuel Point Gate Antenna System

The gate controller is a separately purchased device and is not part of the Fuel Point System. It is configured to be opened from a relay closure provided by a Fuel Point-equipped FMS.

Gates vary greatly, depending on the brand and model. During the overall system design, please review the following operational procedures **with an authorized representative of the gate manufacturer.**

The standard gate opening switch or detector normally used is replaced by the Fuel Point Gate System. The triggering device is replaced by a Fuel Point Ground Antenna that operates with a Fuel Point-equipped vehicle.

## Fuel Point Gate Parameters

When a Fuel Point gate-equipped vehicle is over the ground antenna (or traveling over the ground antenna at a speed not exceeding 5 MPH) the VM number and system ID are read by the Fuel Point system via the G-Ring and ground antenna installed in the pavement. Authorization generally requires 3-4 seconds. If the vehicle is *authorized* to enter the site, the system sends a relay closure to the gate controller, logs the event and stores the data. The gate controller controls the opening and closing of the gate.

*Note: Fuel Point-equipped vehicles traveling in excess of 15 MPH or faster will not be authorized.*

## 2 – Component Overview

### Required Components

System components vary depending upon the type of installation you are establishing:

#### Fueling With a Ground Antenna

The following system components are required for fueling with a Fuel Point ground antenna:

- A CFN system configured for ground loop communications
- FPR
- Fuel island ground antenna and vehicle with VM and G-Ring

#### Gate Feature Using a Ground Antenna

The following system components are required for the Fuel Point ground antenna gate feature:

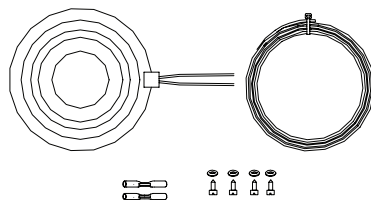
- A dedicated CFN system with Gate Relay Control PCB or using the fuel island reader and a relay in a PCU dedicated to opening a gate  
~OR~  
A Fleetkey system as a dedicated gate reader, programmed for gate
- FPR
- Gate Opening Ground Antenna and Vehicle with VM and G-Ring

The additional system components required for the operation of the Fuel Point as both a fueling and a gate system are listed below.

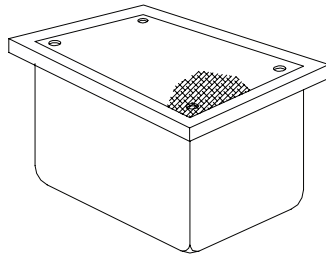
#### Additional Fuel Point Gate Site Components

- Ground Antenna Kit (C07362) consisting of 6 inches molded antenna, lead-in cable and connectors. You need one antenna per hose location. The antenna kit is installed using one of the following optional components:

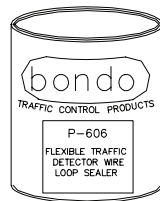
**Figure 2-1 Ground Antenna Kit**



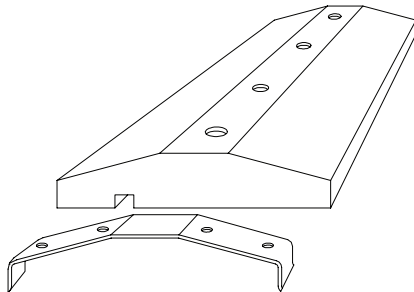
- For **Flush-Mount J-Box** application, use Flush Mount Antenna Kit (C09822). This is normally used at new sites where major reconstruction is anticipated to the pavement. The antenna can be installed or poured in place and conduit run to the FPR location. Kit includes a 6 inches x 8 inches x 6 inches deep composite plastic weather-tight enclosure. Ground antenna enclosure cannot be constructed of metal. Designed for use in driveways, parking lots, and other off-road applications which may be subject to occasional non-deliberate heavy vehicles. Enclosure is furnished complete with stainless cover mounting hardware that provides access to the antenna and is rated for light traffic use.

**Figure 2-2 Flush Mount Antenna Kit**

- For a **Direct Buried** application, use antenna sealant (C09716). Sealant is normally used at existing sites where little pavement construction is anticipated and surface or flush mounting is not an option. The sealant is easy-to mix, two-part epoxy, and is fast curing. One gallon is sufficient for sealing approximately four single ground antennas.

**Figure 2-3 Antenna Sealant**

- For a **Surface Mounted** application, use Surface Mount Antenna Kit (C07364). A surface mounted antenna provides a visual indication for the antenna location and easy access to the antenna. The surface mount housing is lightweight Traffic Yellow composite plastic measuring 6 feet X 10 inches x 2 inches high. It is maintenance-free and durable, designed to mount the antenna kits (C07362). The housing can be field drilled, or sawed for special applications. It is furnished with housing mounting hardware for mounting to concrete pavement. An optional kit (C07365) is available for mounting to macadam.

**Figure 2-4 Surface Mount Antenna Kit**

## Fuel Point Gate Vehicle Components

Vehicle components required for ground loop communications are the same for both fueling and gate control applications: a VM with gate circuitry, and a G-Ring. See *C35699 Fuel Point Vehicle Module Installation Manual* for details.

## 3 – Installation

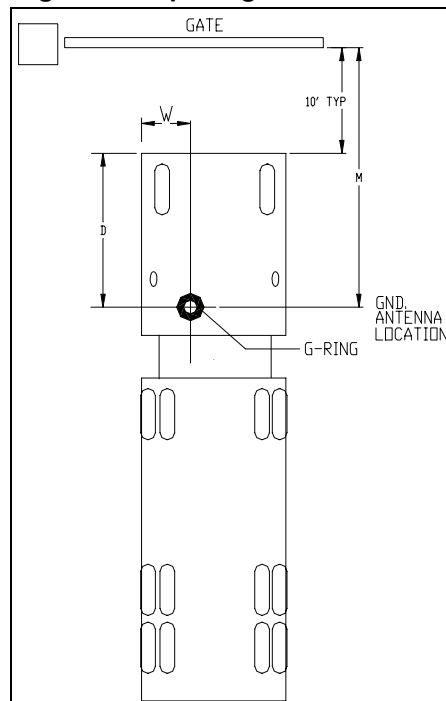
### Important Vehicle Parameters – Read Before Proceeding

#### Antenna Parameters for Opening a Gate with Fuel Point Ground Loop Communications

Location of a ground antenna to be used for gate authorization is normally a matter of locating the ground antenna in advance of the gate to ensure communications and providing an 8-10 feet clearance between the vehicle and gate. One of each type of vehicle to be fueled should be modified with G-Ring and VM in accordance with instructions found in *C35699 Vehicle Module Installation Manual*. Before starting the ground antenna installation, each vehicle type should be measured, and dimensions that locate the G-Ring in respect to the vehicle front bumper recorded. These dimensions are then used to design and lay out the ground antenna installation. For a site using ground antenna communications for fueling and gate use, use the instructions in the next section “[Antenna Parameters for Fueling with Fuel Point Ground Loop Communications](#)” on page 10 to locate the G-Ring on the vehicle.

*Note: Vehicles equipped with G-Ring that travel over the ground antenna at speeds of 15MPH or greater will not be authorized.*

**Figure 3-1 Opening a Gate with Fuel Point Ground Loop Communications**



- The G-Ring must be properly installed according to instructions found in *C35699 Vehicle Module Installation Manual*. The location of the G-Ring is an important factor and must be considered before starting to install the ground antenna. Measure and record each vehicle type along the length of the vehicle and determine (dimension D) the distance between the G-Ring and front of the vehicle. Add 8-10 feet to this dimension to locate the minimum distance between the ground antenna and gate.
- Measure each vehicle type from the G-Ring center to one side of vehicle (dimension W). If the G-Ring is on or near the vehicle centerline, the ground antenna will be located in the center of the pavement lane.
- The G-Ring must travel over or stop within the ground antenna's 'effective communications range' (see Figure 3-1) which typically is a 48 inches diameter circle (minimum) centered on the ground antenna. Gate sites and vehicle types vary greatly. Visual aids such as painted center lines, centerline flush reflectors embedded in pavements or traffic control devices can be used to guide or channel vehicles over the antenna.

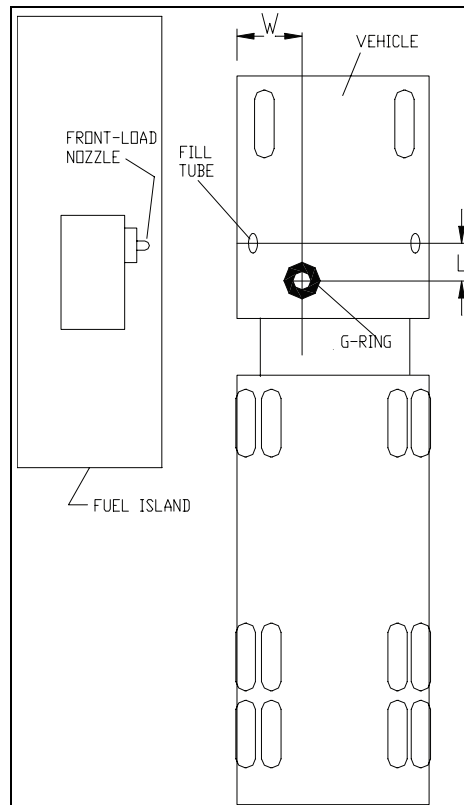
## Antenna Parameters for Fueling with Fuel Point Ground Loop Communications

Drivers are accustomed to stopping their vehicles with the fuel fill tube aligned with the hose nozzle in the stored position (hung up). The antenna locations, both vehicle G-Rings and the ground antenna are installed with this in mind. One of each type of vehicle to be fueled should be modified with G-Ring and VM in accordance with instructions found in *C35699 Vehicle Module Installation Manual*. Before starting this installation, each vehicle type should be measured and dimensions recorded that locate the G-Ring in respect to the fuel fill tube and vehicle length and width. These dimensions are then used to design and lay out the ground antenna installation.

### IMPORTANT INFORMATION

The G-Ring must be properly installed according to instructions found in *C35699 Vehicle Module Installation Manual*. The location of the G-Ring is an important factor and must be considered before starting to install the ground antenna. Measure each vehicle type along the length of the vehicle. Determine and record the distance (dimension L) between the fuel fill tube and the G-Ring. For best results, this dimension should be 12 inches maximum. If dimension L is between 0-4 inches, lay out the ground antenna so that it is centered on the hose nozzle stored position. This dimension is critical. If it is greater than 4 inches or if it varies greatly from vehicle to vehicle, drivers may have difficulty aligning the vehicle for fueling.

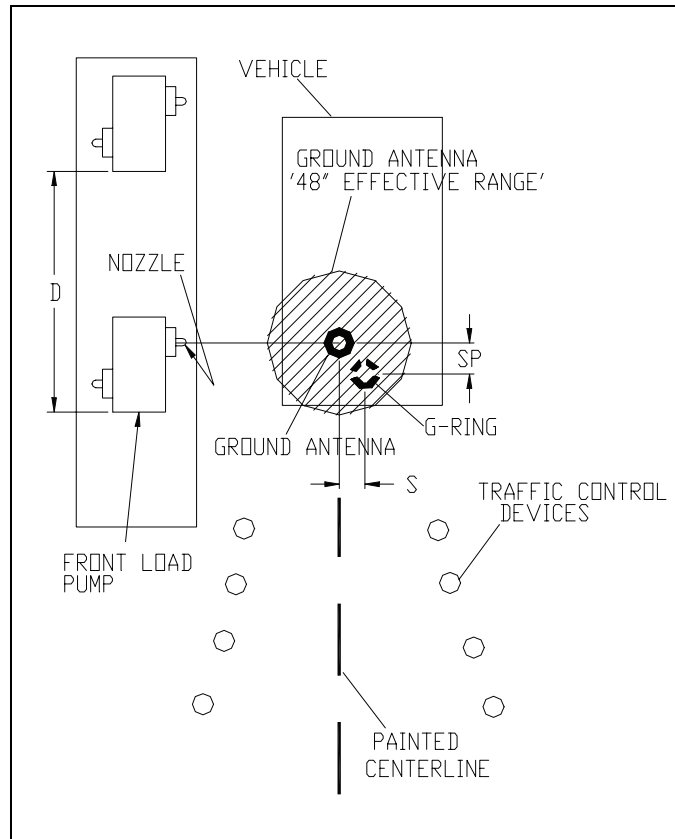
Measure and record each vehicle type from the G-Ring to fill tube side of vehicle (dimension W) with the G-Ring centered on the vehicle. Small vehicles (cars, mini-vans and pickup trucks) are approximately 5 feet wide, making this dimension approximately 30 inches. Large trucks are approximately 7 feet wide making this dimension W=42 inches. Add 2 feet or 24 inches to dimension W for clearance between vehicle and fuel island curb. The resulting dimension is the distance from the ground antenna to the fuel island curb.

**Figure 3-2 Fueling with Fuel Point Ground Loop Communications**

The third area for design consideration is “alignment” of the vehicle’s G-Ring to the ground antenna. The G-Ring must be within the ground antenna’s ‘effective communications range’ which is a 48 inches diameter circle centered on the ground antenna. For communications to occur, the driver must stop to fuel with system antenna in proper relationship. In Figure 3-3, refer to dimensions S and SP which represent the amount of misalignment allowed. With side to-side alignment, S, is at or near zero the vehicle stop point, SP, can vary at least of 2 feet prior to or after the ground antenna. If S=18 inches, SP is reduced to 21 inches minimum. Many devices can be incorporated to aid drivers as the pumps are approached. Painted center lines, reflectors mounted in pavements or traffic control devices can be used to guide or channel vehicles to the pump to insure antennas are properly aligned.

### IMPORTANT INFORMATION

While fueling, ensure that you do not leave the ignition switch on. This results in some vehicles emitting electrical noise that may impact the communications range and interrupt the fueling process.

**Figure 3-3 Alignment of the Vehicle G-Ring to the Ground Antenna**

- The fourth design consideration is the relationship between the adjacent ground antenna or distance between two pumps on the same fuel island (dimension D). See Figure 3-3. Ten foot (10 feet) ground antenna spacing is recommended to guarantee no cross talk between two adjacent units. This is determined by multiplying the maximum 48 inches radius x 2 and adding 2 feet. If antenna must be spaced less than 10 feet, use the following table to determine the effective communication range based on G-Ring heights for vehicles being fueled. The dimensions are for G-Rings installed with at least 1 inch spacing between the G-Ring and a solid metal vehicle surface. Contact your Gasboy distributor before installing antenna spaced less than 10 feet.



# Installing A Fuel Point Ground Antenna For Fueling

Ground Antenna Installation Components are available in three (3) styles to meet most common site requirements.

- Flush-Mount J-Box
- Direct Buried and Sealed
- Surface Mount

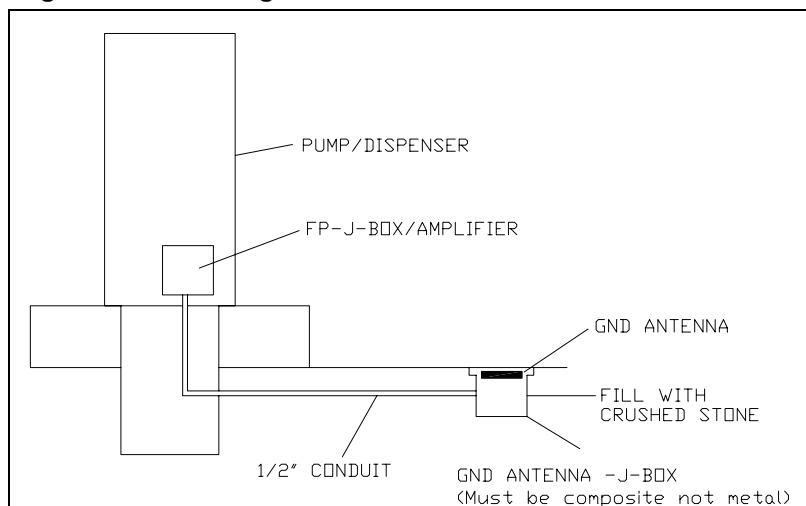
For fueling, the ground antenna should be located at half the width of a vehicle plus two feet, or approximately 5 feet-3 inches out from the island and is normally aligned with the nozzle's on-hook position on the pump. The major factor affecting the final location is the relationship of the vehicle G-Ring to the gas fill tube. Ideally, the vehicle G-Rings will be mounted near the fill tube to take advantage of drivers' experience in stopping to fuel. The mounting styles and applications are explained below.

## C09822 Junction Box

### For Installing a Flush-mount J-Box Antenna

The antenna J-Box and conduit are designed for use at new sites or sites requiring extensive pavement rework. Prior to pouring pavement, a flush-mounted composite plastic box is installed in the pavement and 1/2 inch conduit routed to a Fuel Point amplifier installed in the base of the pump. The antenna from antenna kit (C07362) lays freely on top. Leave slack in the wiring to allow removal of the cover for service.

**Figure 3-4 Installing a Flush-mount J-Box Antenna**



# C09716 Antenna Sealant

## For Installing a Direct Buried and Sealed Antenna

Locations where minimum pavement reconstruction is expected can bury the ground antenna in a 7 inches x 7 inches x 2 inches deep recess chiseled in the pavement.

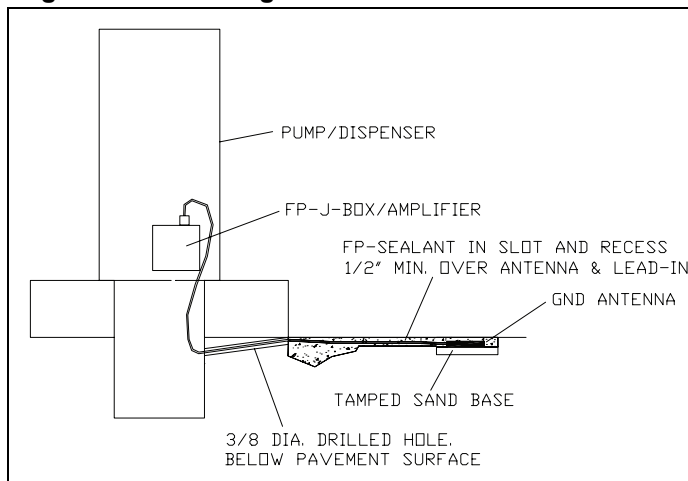
- 1 Saw a 3/16 inch x 1 inch deep slot that will be used to route the antenna lead into the Fuel Point amplifier.
- 2 At the island, chisel in a second recess to allow drilling a 1/2 inch diameter hole starting below the pavement and at an angle into the base of the pump.



### WARNING

Ensure that you use appropriate sealing fittings to fill in any holes in the secondary fuel spill containers.

**Figure 3-5 Installing a Direct Buried and Sealed Antenna**



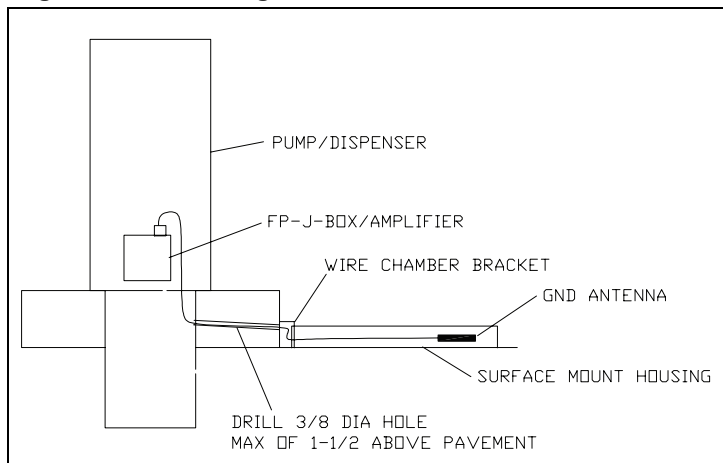
- 3 After machining the pavement, flush the recesses and slots free of debris.
- 4 Add dry sand and tamp to fill the antenna recess, leaving a 1 inch deep recess.
- 5 Route lead-in cable supplied from the antenna recess to the FP Amplifier mounted in the base of the pumps and wire to antenna with butt connectors supplied.
- 6 Mix 1/4 gallon of sealant with hardener according to instructions on the container and seal the antenna and lead-in slot. Sealant should be used only in the top 1/2 inch of the installation.

## C07364 Surface Mount Antenna Installation

The Fuel Point antenna can be surface mounted at indoor or covered sites or where weather conditions permit.

- 1 Locate the antenna housing with the nozzle and mark pavement and housing outline on the side of the island.
- 2 Drill a ½ inch diameter hole (within the housing outline and not more than 1-1/2 inch above pavement) into the base of the pump.
- 3 Attach the C07362 antenna in the recess on the bottom of housing. Attach cable using butt connectors supplied and route and clamp cable in machined slot.

**Figure 3-6 Installing a Surface Mount Antenna**



- 4 Attach metal wire chamber bracket to the island end of the housing using the self threading screws supplied.
- 5 Slide housing bracket against island. Drill all mounting holes. Install threaded inserts and attach housing to ground.

## Ground Antenna Used for Gate Control

### IMPORTANT INFORMATION

Successful installation requires the special Fuel Point ground antenna manufactured by Gasboy and careful attention to the instructions that follow. Do not try to use the loop detector supplied with the gate controller or the manufacturer's entrance loop instructions.

Gate applications can use any of the installation methods described previously in the [Installing A Fuel Point Ground Antenna For Fueling](#) section. When not using **Surface Mount**, the installation should include pavement markings or other alternate methods to ensure that the vehicles are routed over the ground antenna.

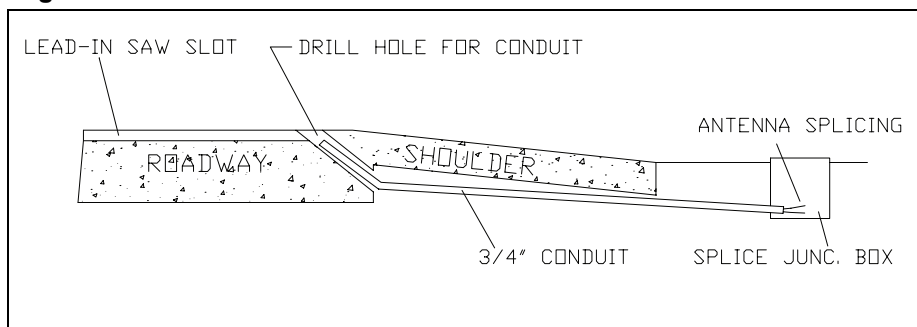
### Locating and Installing the Fuel Point Ground Antenna

- 1 Mark the ground antenna position, normally centered in the lane leading to the gate. A single ground antenna is good for lanes up to 12 feet wide.

*Note: For **Direct Buried and Sealed** applications, ensure that the pavement is stable and at least 3 to 4 inches thick. If the pavement is unstable, the ground antenna location should be excavated and repaired before proceeding.*

*Note: For Surface Mount ground antenna on macadam, order optional Macadam Surface Mount Kit C07365 in addition to the C07364 Surface Mount Kit.*

**Figure 3-7 Conduit and Junction Box Detail**



- 2 Calculate the minimum distance between the gate and ground antenna by measuring the distance between the front of the vehicle to the G-Ring mounting location and adding 10 feet (clearance between gate and vehicle). If this dimension varies between vehicles, use the greater distance for your calculation.

For optimum operation, the vehicle's G-Ring should pass directly over the ground antenna. For vehicles with properly installed rings (36 inches maximum height above ground and G-Ring spaced minimum of 1 inch from a solid metal surface), the G-Ring can be a maximum of 20 inches off center. For Flush Mount J-Box or ground antenna direct buried and sealed, painting a center line will help align vehicles with the ground antenna. Using the Surface Mount technique will provide this visual aid.

Ground antenna installation is the same as described previously in the [Installing A Fuel Point Ground Antenna For Fueling](#) section, except that the lead-in cable will be routed to a roadside junction box as shown in Figure 3-7.

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