



Invisible Fence® Brand  
Boundary Plus® 2.0 Fence  
Field Test Plan

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## Boundary Plus® 2.0 System MVP-3 Field Test Plan

BP 2.0 4-PORT HOST	RIG00-16936
BP 2.0 COMPUTER COLLAR UNIT	RIG00-16937
BP 2.0 LONG WIRE MODULE 10X	RIG00-16947
BP 2.0 BATTERY MODULE	RAC00-16946
BP 2.0 INDOOR SHIELDS® WIRED	RAC00-16949
BP 2.0 INDOOR SHIELDS® WIRELESS	RAC00-16950
BP 2.0 PROGRAMMING TOOL	RAC00-16951



26 August 2019

## Contents

1	Preface.....	3
1.1	Field Testing.....	3
2	Introduction.....	3
2.1	Product Description.....	3
2.2	Test Objectives.....	4
3	Field Test Timeline.....	5
3.1	Overview.....	5
3.2	Timeline.....	5
4	Setup and Operation Instructions.....	6
4.1	Desktop App.....	6
4.2	Device Program Tools.....	6
4.3	Boundary Plus 2.0 Receiver and Battery Module.....	6
4.3.1	Receiver Setup.....	7
4.4	Boundary Plus® 2.0 4 Port Host Transmitter.....	10
4.4.1	4 Port Host Transmitter and 2 Port Host Shields® Transmitter Setup.....	11
5	Testing Protocol.....	13
5.1	Internal Testing.....	13
5.1.1	Tabletop Test.....	13
5.1.2	On Loop Test.....	16
5.2	External Testing – On Pet.....	17
5.2.1	Initial Installation.....	18
5.2.2	Bi-Weekly Check-in.....	19
6	Appendix.....	19
6.1	Test Participants.....	19
6.2	Field Test Forms.....	20
6.2.1	Internal Test Form.....	20
6.2.2	Install Form.....	20
6.2.3	Check-in Form.....	20

## 1 Preface

### 1.1 Field Testing

New products and updates to existing products must be developed, tested and iterated multiple times before being offered to customers. Field Testing is a critical step in the iteration cycle, helping to find flaws that would otherwise reach the end consumer. The purpose of Field Testing is to minimize risk, by making sure the product works as intended and as expected and to uncover limitations that can be mitigated through awareness and process implementation. Pro Staff members that do not fully complete the field test process conversely maximize risk to their dealership, RSC, the Invisible Fence® Brand Network and ultimately the end consumer.

THERE WILL BE FLAWS. There would be no reason to field test if everything was designed perfect the first time (or second or third time). Your job as a Pro Staff member is to do your best to find issues that can be addressed before the products are released to the network. It is not to complain about or give up on testing because issues are found. Testing takes time and effort. Waiting for others to complete testing then submitting forms when no testing or minimal testing has been completed is not helpful.

What YOU do helps YOU! It also helps everyone in the network. We need and appreciate your help.

## 2 Introduction

### 2.1 Product Description

Boundary Plus® 2.0 is a connected system based on a new transmit signal type that will operate at three new operating frequencies (15kHz, 20kHz or 25kHz). This permits operation in Boundary Plus mode and traditional mode where currently signal interference prevents acceptable operation. The system will consist of a connected 4-port module-based control panel that can be configure one of seven ways (Hub, Hub/Transmitter, Transmitter, Hub/GPS, Hub/Transmitter/GPS, Transmitter/GPS or GPS Base [future]), connected indoor and outdoor Shields® units, connected Doorman™ Pet Door (future) and connected receiver. Each transmitter is configurable to a unique signal field code and each receiver is individually configurable to each transmitter (i.e. action taken by the receiver when receiving the unique transmit code) through selections made in the customer account via CLOUD services.

Communication and signal field codes are all configured via Device Identifiers. All devices within a system will have unique Device ID's, similar to GPSC. The Device ID is made up of two parts, a three digit Network Identifier (Family) and a two digit Device Identifier. When the Boundary Plus 2.0 System is released the Device ID's will be assigned by Blue, similar to the way GPSC is done today. For this application and testing, Device ID's will be assigned manually. Just like with GPSC, the Network Identifier and Device Identifier have specific values. The Network ID only needs to change if two or more systems are adjacent. The Network ID must be the same for all devices on the property for them to communicate. Network ID's range from 001 to 599. Due to specific requirements, all Device ID's, in a specific order, have been assigned to each device type. The device types below should be assigned Device ID's in the order listed.

Receivers:	63, 87, 79, 62, 61, 59, 55, 47, 31
Hub/Transmitter:	96, 97, 98
Shields® Wireless:	01, 02, 04, 08, 16, 32, 64
Shields® Wired:	88, 84, 82, 81, 76, 74, 73

## 2.2 Test Objectives

This test plan provides the framework for evaluating the performance of the Invisible Fence® Brand Boundary Plus® 2.0 system. The containment and avoidance side of the product along with RF communication are ready for evaluation. Testing will begin with an internal test of the product followed by an “in field/on pet” evaluation period. The overall objective is to uncover any items requiring attention before product release to the Invisible Fence Brand network. The units will be tested for the following:

- 1) Transmitters (4 Port Host transmitters, 2 Port Host Shields® transmitters)
  - a) Ease of use, Look, Feel
  - b) Generating acceptable size signal fields
  - c) Break Alert operation (4 Port)
  - d) BBU operation and alert (4 Port)
    - i) Life
  - e) Low receiver battery alert (4 Port)
  - f) Setting retention
- 2) Receiver
  - a) Ease of use, Look, Feel
  - b) Activation occurs as expected with correction expected
    - i) Boundary - Traditional and BP
    - ii) Avoidance
  - c) All available functions operate as expected
  - d) Battery performance
    - i) Fit
    - ii) Life
  - e) Durability
    - i) Cracking
    - ii) Waterproof
  - f) Effective dog containment
- 3) Interference mitigation
  - a) Adjacent to Dog Watch® System
  - b) Adjacent to any other system
  - c) Adjacent to or same property as auto mower or other interferers
- 4) RF range

This field test will not evaluate the Wi-Fi functionality, Tech/Mobile App, Customer App, complete system set up and operation. A follow up field test will be conducted to address these items.

NOTE: This field test is LARGE. This is a full fence system test. Not having a complete Tech App and Blue functionality means all setup will be completed manually. All of this product is new, and setup is not intuitive. This document includes setup instruction along with the field testing requirements.

## 3 Field Test Timeline

### 3.1 Overview

The field test timeline for this product will allow for enough time to complete internal testing to become familiar with the equipment prior to installation at the test site. All external testing should be conducted at real properties on dogs. Equipment will remain at test sites until all testing is complete. It is recommended that test sites are nearby and easily accessible. Staff, family and friends that can monitor the equipment and pets are the best candidates.

The field test may be extended pending feedback from the team. Additional tests may be added to further investigate issues or firmware may be updated to address items. Please do not return any equipment until asked to do so.

### 3.2 Timeline

04 SEPT 2019	Send out Pro Staff notification memo and schedule kick-off meeting
10 SEPT 2019	Hold Field Test kick-off call / Ship units to Pro Staff
03 OCT 2019	Send out Boundary Plus 2.0 Test Plan, Reporting Forms, Hold web call
06 OCT 2019	Begin Internal Testing week of 10/06
11 OCT 2019	Submit Internal Test Forms to RSC - <a href="mailto:colczyk@invisiblefence.net">colczyk@invisiblefence.net</a>
14 OCT 2019	Pro Staff call – Check-in Q&A
15 OCT 2019	Begin External Testing
25 OCT 2019	Submit Install Forms to RSC – <a href="mailto:colczyk@invisiblefence.net">colczyk@invisiblefence.net</a>
29 OCT 2019	Pro Staff calls will be scheduled weekly (Every Tues) – (Feedback/Concerns)
03 NOV 2019	Bi-weekly Check – Week of 11/3
08 NOV 2019	Submit Check Forms due to RSC – <a href="mailto:colczyk@invisiblefence.net">colczyk@invisiblefence.net</a>
17 NOV 2019	Bi-weekly Check – Week of 11/17
22 NOV 2019	Submit Check Forms due to RSC – <a href="mailto:colczyk@invisiblefence.net">colczyk@invisiblefence.net</a>
01 DEC 2019	Bi-weekly Check – Week of 12/1
06 DEC 2019	Submit Check Forms due to RSC – <a href="mailto:colczyk@invisiblefence.net">colczyk@invisiblefence.net</a>
15 DEC 2019	Bi-weekly Check – Week of 12/15
20 DEC 2019	Submit Check Forms due to RSC – <a href="mailto:colczyk@invisiblefence.net">colczyk@invisiblefence.net</a>

Phase 2 of the field test should start around this time. This will include a firmware update to the 4 Port Host transmitter to add WiFi capability, adding the WiFi module (if not already included), Web Portal, Tech App and Customer App. If phase 2 is not ready, the current timeline will be extended to continue monitoring the installs.

## 4 Setup and Operation Instructions

### 4.1 Desktop App

The Desktop App used for this field test will only be used for field testing. It is not a representation of the final application. Parts of the App function but should not be used while some options are available but do not link to anything. Selecting options that are not being tested “should” not cause damage to the devices, however, doing this could put devices into modes that invalidate the test. Reporting on issues outside of the testing protocol will not be helpful.

NOTE: App has been updated multiple times. Unused functions may no longer be available.

Click the following link: [BP2TechnicianApp-0.0.0.8-windows-installer](#)

- 1) An install file will download to your computer.  
This file will be at the bottom of your screen or in the Downloads folder.
- 2) Double click the .exe file and follow prompts to install the App.

- 3) A shortcut will be saved to your desktop.  
This shortcut will overwrite previous versions of the App on the Desktop.

NOTE: It will not overwrite previous versions pinned to the taskbar. Remove the pinned shortcut and re-pin the new App.



**Reminder:** This is a field test only Application. Closing and reopening the App may be required when switching devices. It is recommended that you connect the device first then open the App.

### 4.2 Device Program Tools

Similar to the Invisible Fence® Brand GPS containment system, the Boundary Plus® 2.0 devices require program tools, Image 1, to establish communication with devices in order to set system configuration, update firmware, view and adjust settings and view diagnostics. A new program tool has been developed for use with the receiver and will function similar to the GPS 3.0 Programming Tool. The GPS 3.0 Programming Tool (RIF00-16436), used with the GPS Mobile unit, will be used to access the configuration memory of the 4 Port Host transmitter and the 2 Port Host Shields® Wired & Wireless transmitters. The program tools connect to the computer and devices the same as with the GPS system.



Image 1

### 4.3 Boundary Plus 2.0 Receiver and Battery Module

The Receivers and Battery Modules you received are the 2<sup>nd</sup> Pre Pilot build in production level plastics. Not all of the receiver features have been implemented, however, form, fit and function of the Receiver/Battery Module is in its final state pending feedback. Part of this field test will be to evaluate the look, feel and first impression ruggedness of the Receiver and Battery Module.



Image 2

### 4.3.1 Receiver Setup

Programming settings into the Receiver requires the use of the Program Tool sent with your test units or received during Salesforce training.

- 1) Plug a USB to USB mini cable (CF3000/GPSC) into your computer and plug the cable into the Program Tool.
- 2) Insert Program Tool into Receiver and rotate 1/8<sup>th</sup> turn. The Program Tool will only fit smoothly in one direction and will only work in one direction. Image 3 below shows the correct orientation.



Image 3

- 3) Open the Desktop App.  
 The Desktop App will open on the Firmware Updater tab (Image 4). In the event new firmware is required during this field test, the firmware and instructions will be sent out to the Pro Staff.
- 4) Select the Collar tab at the top of the App (Image 4).
- 5) This tab displays information about the network and Receiver that is connected. This page shows information about the connected device (column 1), the current settings of the device for the selected transmitter (column 2) and the selectable options to program into the device (column 3). Columns 2 and 3 are broken down into three set groups, Device/Network ID, System Frequency and Receiver Function. Each are programmed individually using the orange bars with the chevrons.

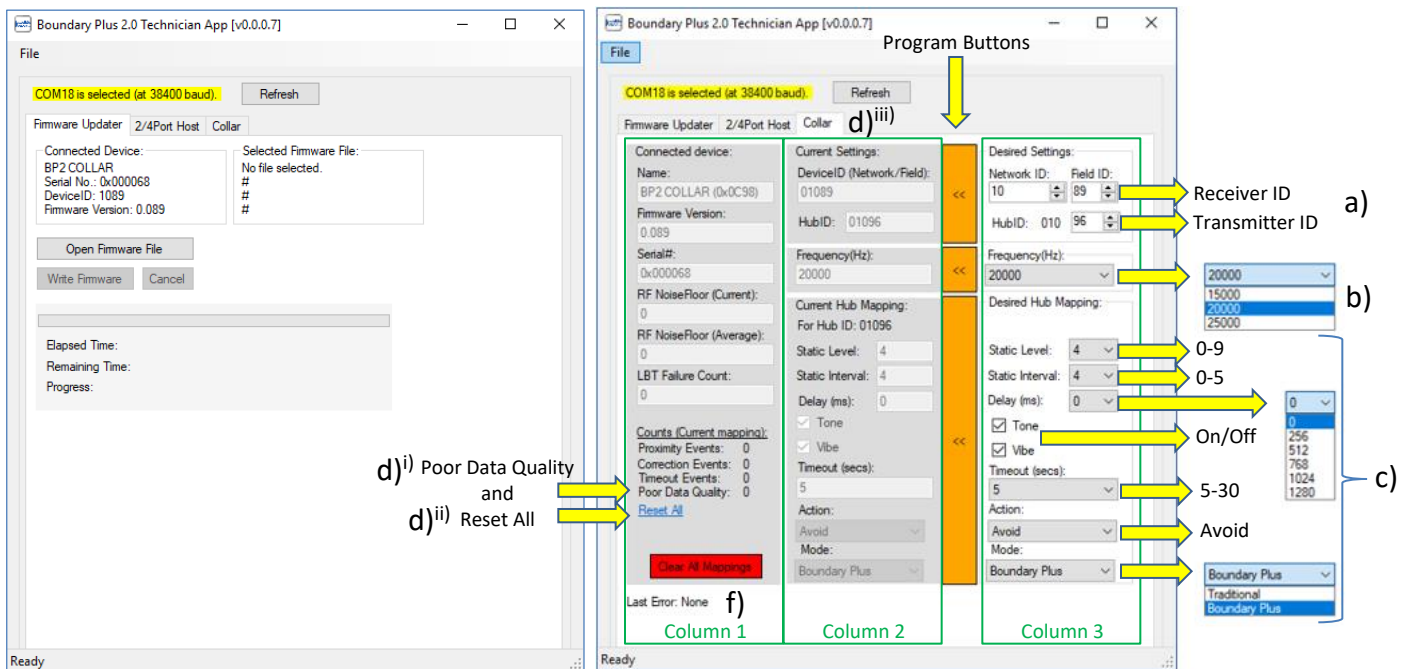


Image 4

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Field Test Plan

- a) Device ID's
  - i) Row one/column three: This is the Device ID for the receiver connected to the App.
    - (1) Network ID (001-599) does not need to change unless systems are adjacent. For testing, use network 010 for all devices. This is due to the limitations of the Field Test App.
    - (2) Field ID is the Device ID. Refer to Section 2.1 for specific Device Identifiers.
  - ii) Row two/column three: This is the device type this receiver's settings will activate to. This must be changed to each transmitter (4 Port Host transmitter and 2 Port Host Shields transmitter) to set receiver functions for each. **The receiver MUST be set back to the 4 Port Host Device ID (96) for RF communication.** Setting the receiver functions for the 4 Port Host last will ensure this happens.

NOTE: Plan the system and assign Field/Device IDs for all devices prior to programming. This will make the process easier. (i.e. All network IDs will be 010, Receiver #1 will be 01063, Receiver #2 will be 01087, Receiver 3 will be 01079, 4 Port Host transmitter will be 01096, Shields Wireless #1 will be 01001, Shields Wireless #2 will be 01002, Shields Wireless #3 will be 01004 and Shields wired will be 01088. All of this will automatically be done in Blue when the system is released to the network.

- iii) Select the top Program Button to enter these selections into the Receiver.
- b) Frequency (Hz): 15 KHz (15000), 20 KHz (20000) or 25 KHz (25000).
  - i) Select from the dropdown menu – Frequency must be the same across all devices on the property.
  - ii) Select the middle Program Button to send the selected frequency to the Receiver. The programmed frequency is now displayed under Current Settings (column 2).
- c) Receiver functions.
  - i) Select options from the dropdown menus.
    - (1) Static Level: 0-9, Similar to MicroLite levels with more granularity.
    - (2) Static Interval: Pulse Rate, Similar to MicroLite pulse rates.
    - (3) Delay: 0-5 (changed from image), Correction delay ~1/3 second intervals.
    - (4) Tone/Vibe: Enable/Disable.
    - (5) Timeout (secs): 5-30, Correction failsafe.
    - (6) Action: Action the Receiver takes when receiving signal from device in the first set group (Hub ID).
    - (7) Mode: Traditional/Boundary Plus, How the Receiver interacts with the signal.
      - (a) Select option from the dropdown menu. Boundary Plus should ONLY be selected for the 4 Port Host transmitter used as a boundary.
  - ii) Select the Program Button to send selected functions into the Receiver.
- d) Poor Data Quality count and the *Reset All* button: Will be used when interference testing.
  - i) Poor Data Quality count displays the number of signal packets that are partially decoded and rejected.
  - ii) Reset All Button resets all counts in this section.
  - iii) Refresh Button (at the top center) refreshes counts when connected via USB cable.
    - (1) When not connected, Counts history is saved at one-hour increments.
- e) Clear All Mappings Button resets all receiver functions associated with all transmitters.



The information below shows the data that is programmed into a receiver as options and transmitter interactions are set up.

1. Receiver serial number (0C98000068)
  - a. 0C98 = Boundary Plus 2.0 Gen 1 Receiver
  - b. 000068 = Serial number (hexadecimal)
2. Receiver Device ID (01089)
  - a. 10 (010) Network ID
  - b. 89 Receiver ID #
3. Hub Device ID (01096) – The Hub this receiver communicates with
  - a. 10 (010) Network ID
  - b. 96 Hub ID #
4. Frequency – 20000 (20 kHz)
5. Mapped Shields transmitters – Shields with Device ID’s of 01001, 01002, 01004 and 01008. Each of the receiver’s settings are unique to the Shields it interacts with.
6. Mapped Hub/Transmitter – Device ID 01096

NOTE: Both network IDs are the same - 010

```

[C],PRINTNV[NV],0x03,0x01,0x00000D00,0x0C98,0x00000068 1
2, 3, 4 [NV] 1089,1096,0,0,0,0,ENABLERF,0,20000,-0.75,1.00,1.06
[NV],1,0x00040000,0x00000000,0x00000000,0x00000000,0
[NV],0x00000000,0x00000000,0x00000000,0x00000000
[NV],0x00000000,0x00000000,0x00000000,0x00000000
MAPID: 0: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 1: 0x00A25214: 0,0,1,1,2,5,2,10: 0,0,0,0
MAPID: 2: 0x00721212: 0,1,0,1,2,1,2,7: 0,0,0,0
MAPID: 3: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 4: 0x00816016: 0,1,1,1,0,6,1,8: 0,0,0,0
5 { MAPID: 5: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 6: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 7: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 8: 0x00511012: 0,1,0,1,0,1,1,5: 0,0,0,0
MAPID: 9: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 10: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 11-94
MAPID: 95: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
6 { MAPID: 96: 0x00532012: 0,1,0,1,0,2,3,5: 0,0,0,0
MAPID: 97: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 98: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
MAPID: 99: 0x00000000: 0,0,0,0,0,0,0,0: 0,0,0,0
    
```

#### 4.4 Boundary Plus® 2.0 4 Port Host Transmitter

The 4 Port Host is similar to the motherboard of a computer. Just like peripherals of a computer system (i.e. hard driver, RAM, Bluetooth, etc.), the 4 Port Host has four ports to access different peripherals. Port 1 consists of an onboard 150 MHz RF device used to communicate to and from other Invisible Fence® Brand connected devices. Port 2 supports a removable Wi-Fi module used to communicate with the end user's router. Port 3 supports a removable transmitter module used to drive BP 2.0 signal on the loop wire. Port 4 (future use) will support a removable GPS module that will add GPS Base Reference to the system.

Refer to image 5:

- 1) Loop Error/WiFi/Dog Out Indicators
- 2) Alert Silence/WiFi Button (bottom half of the display)
- 3) Port-1, 150 MHz RF Radio, RF cable, RF antenna
- 4) Port-2 Edge Card Connector, Transmitter Module, Loop Connector
- 5) Port-3 Edge Card Connector, Wi-Fi Module, WiFi Antenna
- 6) Port-4 Edge Card Connector, GPS Base Reference
- 7) Program/BBU Port (GPS Battery)
- 8) Mounting Clip
- 9) Power Connector, Indoor Avoidance Adaptor

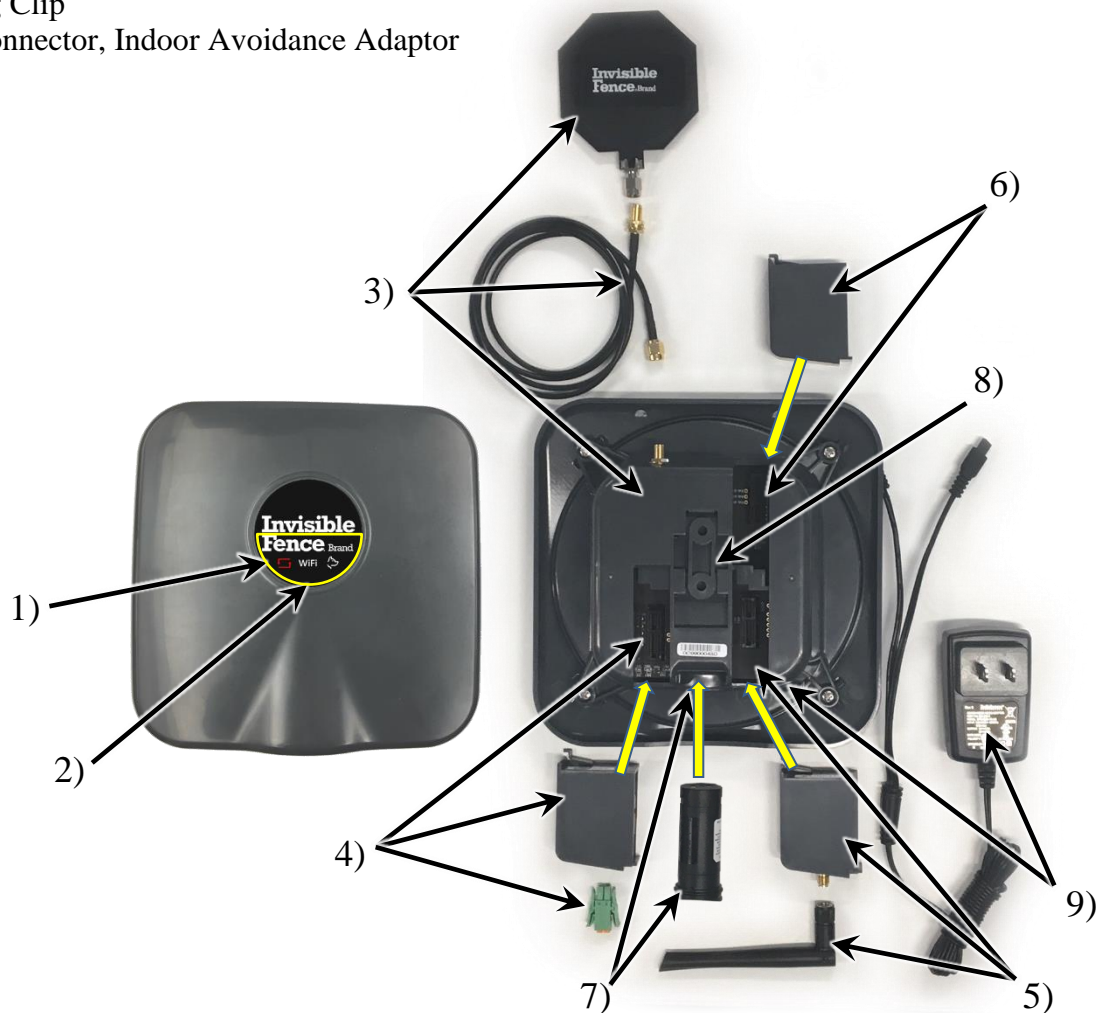


Image 5

#### 4.4.1 4 Port Host Transmitter and 2 Port Host Shields® Transmitter Setup

Programming settings into the 4 Port and 2 Port Host requires the use of the GPSC 3.0 Programming Tool. Refer to Images 5, 6 and 7.

**NOTE:** The 2 Port and 4 Port battery chambers have a design flaw on the field test units. Additional force will be required to engage the Program Tool the first few times. Engaging and disengaging the tool multiple times will help remove the excess plastic. It will be easier to do without the USB cable connected.

- 1) Insert the Transmitter Module into the 4 Port Host (Image 6). This should already have been done when updating the firmware.
- 2) Plug a USB to USB mini cable (CF3000/GPSC) into your computer and plug the cable into the GPS 3.0 Program Tool.
- 3) Insert the Program Tool into the Device, press the tool all the way in and rotate 1/8th turn. Image 6 below shows the correct orientation for both the 2 Port and 4 Port transmitters. Engaging the tool backwards will damage the tool.
- 4) The logo will begin flashing. The Break-Alert will activate within a few seconds if no loop is connected.
  - a) Press and hold the Alert Silence/WiFi button 1-3 seconds then release the button to silence alarm (Image 5 #2).
- 5) Open the Desktop App.

The Desktop App will open on the Firmware Updater tab (Image 6). In the event new firmware is required during this field test, the firmware and instructions will be sent out to the Pro Staff.
- 6) Select the 2/4 Port Host tab at the top of the App (Image 7). This tab displays information about the network and Transmitter that is connected.
- 7) **Column 1** shows information about the connected device, **column 2** shows the current settings of the device and **column 3** shows the selectable options to program into the device. Programming is completed using the orange bars with the chevrons.
  - a) Select settings in column 3.
    - i) Device ID should be set to 10 (Network ID) and 96 (Field ID) for all 4 Port Hosts. Refer to Section 2.1 for 2 Port Host Shields® unit IDs.
    - ii) Frequency (Hz): 15 KHz (15000), 20 KHz (20000) or 25 KHz (25000).
      - (1) Select from the dropdown menu – Receiver and transmitter frequencies must be the same.
    - iii) Field Range (mm): 456-3952 (4 Port Host), 456-2888 (2 Port Wired), 456-1368 (2 Port Wired). Number will snap to the nearest half foot when sent to device.
      - (1) Highlight and enter number or use arrows.
    - iv) TX Rate (sec): 3-32, Signal field packet rate. 2 Port Host Shields Settings (3, 4 or 8). 4 Port Host transmitter settings (16 or 32). Should be set at 32 for boundary.
      - (1) Select from the dropdown menu.
    - v) Slave Mode Flags: (Shields) Should always be MODE\_NORMAL
  - b) Select the Program Button to send selected functions into the 2 Port Host Shields or 4 Port Host transmitter.

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Field Test Plan**



Image 6

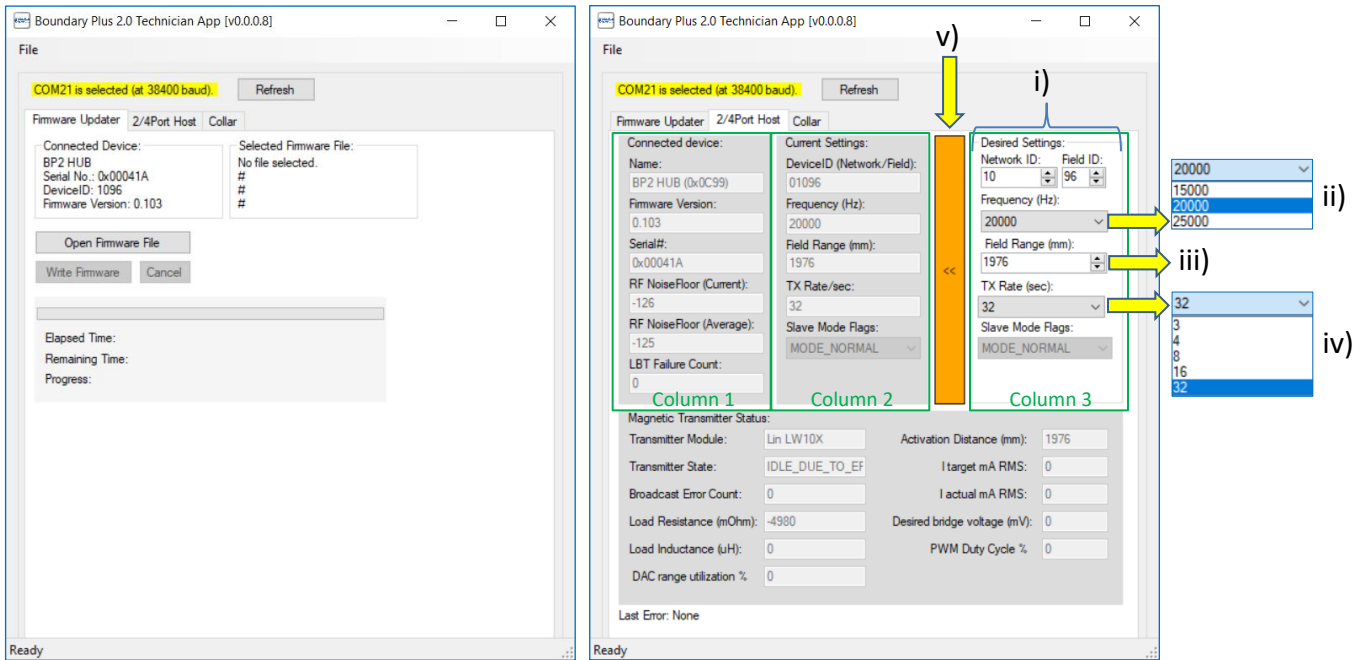


Image 7

## 5 Testing Protocol

### 5.1 Internal Testing

It is important to become familiar with the setup and operation of the test equipment before heading out on your field test adventure. Ensuring the equipment is working and you are comfortable with the equipment will only lead to a more enjoyable and satisfying field test experience. Follow the instructions below to begin your journey. Use the information in section 4 to accomplish setup.

**IMPORTANT:** Ensure the firmware in all of the test units is updated prior to testing. Refer to the October 2<sup>nd</sup> memo for installation instructions.

#### 5.1.1 Tabletop Test

Equipment required: (1) 4 Port Host transmitter, (2) Receivers, (2) 2 Port Host Shields® Wireless transmitters, (1) 2 Port Host Shields Wired transmitter, both Program Tools and cable, computer and (2) 3 foot pieces of loop wire. Table to perform Tabletop Test is preferred but not required.

**REMINDER – When released, all equipment setup will be done in Blue.**

- 1) Install Desktop App onto PC if not already done.
  - a) Follow instruction in section 4.1 to install Desktop App.
- 2) Update the firmware of all units if not already done.
  - a) Follow instruction in the October 2<sup>nd</sup> memo to complete.
- 3) Test Equipment Setup
  - a) 4 Port Host transmitter (Image 6)
    - i) Attach loop wire to the transmitter module.
    - ii) Connect to computer via USB cable and Program Tool.
    - iii) Open App and click on the 2/4 Port Host tab.
    - iv) Program (Section 4.4.1)
      - (1) Network ID: 010
      - (2) Field ID: 96
      - (3) Frequency: 15000
      - (4) Range: 1000
      - (5) TX Rate: 32
  - b) 2 Port Host Shields Wireless transmitter #1
    - i) Program
      - (1) Network ID: 010
      - (2) Field ID: 01
      - (3) Frequency: 15000
      - (4) Range: 456 (Range can be adjusted on unit)
      - (5) TX Rate: 3
      - (6) Slave Mode Flag: MODE\_NORMAL
  - c) 2 Port Host Shields Wireless transmitter #2
    - i) Program
      - (1) Network ID: 010
      - (2) Field ID: 02


**Invisible Fence® Brand  
Boundary Plus® 2.0 System  
Field Test Plan**

- (3) Frequency: 15000
- (4) Range: 456 (Range can be adjusted on unit)
- (5) TX Rate: 8
- (6) Slave Mode Flag: MODE\_NORMAL
- d) 2 Port Host Shields® Wired transmitter
  - i) Attach loop wire to the underside of device. (2) #6-32 screws are required. These can be taken from an Indoor Shields Plus transmitter. If no screws are available, correction posts can be used.
  - ii) Program
    - (1) Network ID: 010
    - (2) Field ID: 64
    - (3) Frequency: 15000
    - (4) Range: 456 (Range can be adjusted on unit)
    - (5) TX Rate: 3
    - (6) Slave Mode Flag: MODE\_NORMAL
  - e) Receiver #1

NOTE: Set all corrections to levels you are willing to feel.

- i) Program to interact with Shields Wireless transmitter #1 (Section 4.3.1).
  - (1) Network ID: 010
  - (2) Field ID: 63
  - (3) Hub ID: 01 (Field ID for Shields Wireless #1) - Select top Program button to view and select settings.
  - (4) Frequency: 15000 - Select middle Program button to set frequency.
  - (5) Static Level, Static Interval, Delay, Tone, Vibe, Timeout: Your Choice
  - (6) Action: Avoid
  - (7) Mode: Traditional
- ii) Program to interact with Shields Wireless transmitter #2
  - (1) Hub ID: 02 (Field ID for Shields Wireless #2) - Select top Program button to view and select settings.
  - (2) Static Level, Static Interval, Delay, Tone, Vibe, Timeout: Your Choice – Different
  - (3) Action: Avoid
  - (4) Mode: Traditional
- iii) Program to interact with Shields Wired transmitter
  - (1) Hub ID: 88 (Field ID for Shields Wired) - Select top Program button to view and select settings.
  - (2) Static Level, Static Interval, Delay, Tone, Vibe, Timeout: Your Choice – Different
  - (3) Action: Avoid
  - (4) Mode: Traditional
- iv) Program to interact with the 4 Port Host transmitter
  - (1) Hub ID: 96 (Field ID for 4 Port Host) - Select top Program button to view and select settings.
  - (2) Static Level, Static Interval, Delay, Tone, Vibe, Timeout: Your Choice – Different
  - (3) Action: Avoid
  - (4) Mode: Traditional
- f) Receiver #2
  - i) Program to interact with Shields Wireless transmitter #1 (Section 4.3.1).

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Boundary Plus® 2.0 System  
Field Test Plan**

- (1) Network ID: 010
  - (2) Field ID: 87
  - (3) Hub ID: 01 (Field ID for Shields® Wireless #1) - Select top Program button to view and select settings.
  - (4) Frequency: 15000 - Select middle Program button to set frequency.
  - (5) Static Level, Static Interval, Delay, Tone, Vibe, Timeout: Your Choice – Different from Receiver #1.
  - (6) Action: Avoid
  - (7) Mode: Traditional
  - ii) Program to interact with Shields Wireless transmitter #2
    - (1) Hub ID: 02 (Field ID for Shields Wireless #2) - Select top Program button to view and select settings.
    - (2) Static Level, Static Interval, Delay, Tone, Vibe, Timeout: Your Choice – Different
    - (3) Action: Avoid
    - (4) Mode: Traditional
  - iii) Program to interact with Shields Wired transmitter
    - (1) Hub ID: 88 (Field ID for Shields Wired) - Select top Program button to view and select settings.
    - (2) Static Level, Static Interval, Delay, Tone, Vibe, Timeout: Your Choice – Different
    - (3) Action: Avoid
    - (4) Mode: Traditional
  - iv) Program to interact with the 4 Port Host transmitter
    - (1) Hub ID: 96 (Field ID for 4 Port Host) - Select top Program button to view and select settings.
    - (2) Static Level, Static Interval, Delay, Tone, Vibe, Timeout: Your Choice – Different
    - (3) Action: Avoid
    - (4) Mode: Boundary Plus
- 4) Tabletop Test – Ensure table is not metal or test is not completed on concrete floor with rebar
- a) 4 Port Host transmitter (Loop wire connected, unit powered and BBU inserted)
    - i) Break-Alert Test
      - (1) Test 1
        - (a) Disconnect loop – Does Break-Alert LED and sound activate? 
        - (b) Reconnect loop – Does Break-Alert LED and sound turn off?
      - (2) Test 2
        - (a) Disconnect loop – Does Break-Alert LED and sound activate?
        - (b) Press and release push button on front of lid – Does Break-Alert sound turn off?
        - (c) Reconnect loop – Does Break-Alert LED turn off?
    - ii) BBU Test
      - (1) Remove AC power – Does Logo flash?
      - (2) Replace AC power – Does Logo return to solid?
    - iii) Power Test – Complete with Receiver set to Traditional (#1)
      - (1) Find edge of signal field – Mark it
      - (2) Remove AC power – Does receiver activate at mark?
    - iv) Document all findings on Internal Test Form. Add detailed comments if needed.
  - b) 2 Port Host Shields Wireless transmitters (Powered with battery only)

NOTE: Shields unit push buttons are not “press and release.” They are “press, hold and release.” (i.e. Press the button, hold until the display changes, release the button)



- i) Range Test
  - (1) Measure range for each setting starting at 1.5 and ending at 4.5.
    - (a) Range is measured from the center of the Shields® unit to where the receiver begins activating. Provide separation between Receivers and metal tape measures (Image 8).
  - (2) Test both Shields Wireless units with both Receivers.
    - (a) Add AC power and test Receiver #1 with Shields #1 only.
  - (3) Document all findings on Internal Test Form. Add detailed comments if needed.



Image 8

- c) Receiver #1 Test (Battery inserted).

Test receiver in all four transmitter signals.

  - i) Activation: As expected?
  - ii) Delay: As expected?
  - iii) Time out: Approximately the timeout setting?
  - iv) Tone and Vibe: As expected?
  - v) Corrections: As expected?
    - (1) Corrections should already be set different for all transmitters. Refer to the Internal Test for all of the settings chosen.
  - vi) Document all findings on Internal Test Form. Add detailed comments if needed.
- d) Receiver #2 Test (Battery inserted)
  - i) Same as Receiver #1 tests.
  - ii) Document all findings on Internal Test Form. Add detailed comments if needed.
- 5) Tabletop Test #2
  - a) Same test at 20 KHz
- 6) Tabletop Test #3
  - a) Same test at 25 KHz
  - b) Allow battery to remain in the receivers for 70 minutes.
    - i) Verify Receivers record Counts (refer to 4.3.1 - Tech App, Collar tab, Column 1, Counts).

### 5.1.2 On Loop Test

The On Loop Test is completed on a real property's fence loop. A real loop is required to test the function of the 4 Port Host Transmitter. Upon power-up, the 4 Port Host Transmitter calculates the impedance of the loop. The impedance of the loop determines the energy required to provide enough current to create the specific field width set. The earth, wire jacket, copper in the wire, wire gauge, area of the loop, loops within loops, proximity of wires (loops and twisted), metal objects on the property (proximity to wire and



permeability of metal), environmental magnetic noise, etc. all play a part in the resulting impedance of a loop. This is the reason two loops that appear to be exactly the same, perform very different.

Real properties are also required to test the function of the receivers in true environmental conditions. This includes interaction with BP 2.0 signal fields that occupy the same space as other “noise” on the property. This “noise is not limited to just other pet containment systems or auto mowers but any spurious magnetic fields. The receiver is also required to perform as expected in all situations. Real properties provide the random situations that cause issues with performance. Performance issues of current systems include, but are not limited to, areas near loop corners, steep slopes, driveways, near fencing, stray signal, signal bleeds, etc. These unique conditions combined with signal interferers provide situations that cannot be reproduced in the laboratory setting.

### 1) Test Setup

This test can be performed on any loop over 300 feet in length. This loop should be a relatively simple layout with no current issues. Settings can be left the same as from prior test.

- a) 4 Port Host Transmitter
    - i) Frequency: Choose any frequency – 15 KHz, 20 KHz or 25 KHz.
    - ii) Range: Choose any range – 456-3952. (Should provide typical signal field or activation height)
    - iii) TX Rate: 32.
    - iv) Connect to loop wire and power-up unit.
  - b) Receiver #1
    - i) Same frequency as 4 Port Host
    - ii) Same setup as Tabletop Test.
  - c) Receiver 2
    - i) Same frequency as 4 Port Host
    - ii) Same setup as Tabletop Test.
- ### 2) Test #1
- a) Perform same test as Tabletop Test #1.
  - b) Test for proper activation at corners, slopes, other areas of expected issue.
  - c) Boundary Plus (Receiver 2)
    - i) Activation and deactivation occur at various angles and movements as expected.
    - ii) Activation and deactivation occur at all speeds as expected.
    - iii) Free Pass operates as expected.
  - d) Receiver 1
    - i) Measure field width – Wire to activation.
  - e) Receiver 2
    - i) Measure activation height.
- ### 3) Test #2
- a) Select a different Frequency from Test #1.
  - b) Select a different Range from Test #1.

## 5.2 External Testing – On Pet

On pet testing provides us with real life data on how the system performs. Along with knowing how the system performs for pet containment, it will give us an idea of how well the 4 Port Host will suppress surges. When you feel comfortable with the equipment you can begin the external phase. It is recommended that systems be tested at properties that are close by and can be accessed at any time.

Family, friends and staff members that can keep an eye on things are always the first choice. Ensure that when performing tests, any pet at the test site is contained by some other means.

### **5.2.1 Initial Installation**

An Installation Form will be completed on-site for each test location. Each test location will have (1) 4 Port Host transmitter, at least (1) Receiver, (2) 2 Port Host Shields® Wireless transmitters and (1) 2 Port Host Shields Wired transmitter. More Shields units may be placed at one location. The objective is to get all of the devices in the field. The 4 Port Host transmitter is designed to be installed with an LP4100 or LP4200 surge protector. The following information will be documented while installing the test systems.

It is recommended all devices are configured in the office. Transmitter ranges should be set on-site and receiver correction levels can be set on-site, if needed.

- 1) Testing information – Dealership, Person performing tests
- 2) Property info - Test site address, estimated loop wire
- 3) Receivers
  - a) Serial Number
  - b) Type of pet
  - c) Serial Number
  - d) Network and device ID
  - e) Frequency
  - f) Settings for each transmitter
- 4) Transmitters
  - a) Serial Number
  - b) Location
  - c) Serial Number
  - d) Network and device ID
  - e) Frequency
  - f) Final range setting
  - g) Transmit rate
- 5) Site check
  - a) Verify signal field/receiver activation
    - i) Activation: As expected?
    - ii) Delay: As expected?
    - iii) Time out: Approximately the timeout setting?
    - iv) Tone and Vibe: As expected?
    - v) Corrections: As expected?
    - vi) Document test locations
  - b) Verify activation near adjacent fields if available
  - c) 4 Port Host transmitter
    - i) Test Break-Alert
    - ii) Test BBU operation
  - d) Check site for signal bleeds

## 5.2.2 Bi-Weekly Check-in

We will schedule Bi-weekly check-ins with a weekly call to keep feedback rolling in. The calls may be moved to bi-weekly as the testing progresses. Document all findings on the Bi-Weekly Check-in Form.

- 1) System Evaluation
  - a) Check all test locations documented on the Installation Form for expected operation with all receivers.
  - b) Verify signal field width and activation height at each test location on the property.
  - c) Verify all device setting remain unchanged from setup.
  - d) Each Receiver - Verify counts exist for each transmitter.
- 2) Homeowner / Pet Owner
  - a) Review past week with homeowner to identify any issues that may have occurred.

# 6 Appendix

## 6.1 Test Participants

The following Pro Staff members will be participating in the field test.

	Invisible Fence® Brand Pro Staff	Member	Tx
1	COD - Atlanta	Chris Jezek	4
2	COD - Florida	Eric Wolfram	4
3	COD - Chicago	Matt Schluter	4
4	COD - Raleigh	Vance Bryson	4
5	COD - Charlotte	Shane Johnson	4
6	Invisible Fence Brand of Upstate NY	Tony Hettinger	4
7	Invisible Fence of Central Indiana	Ryan Kavich	4
8	Invisible Fence of NEPA	Shawn Prohaska	4
9	Canine Company	John Kaminski	4
10	RSC SE	Chuck Schobert	4

## 6.2 Field Test Forms

### 6.2.1 Internal Test Form

### 6.2.2 Install Form

### 6.2.3 Check-in Form

#### FCC: USA

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a specific installation. If interference does occur to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult Customer Care, the dealer, or an experienced radio/TV technician for help.

CAUTION: Modification or changes to this equipment not expressly approved by Radio Systems Corporation may void the user's authority to operate the equipment.

#### IC: Canada

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

**WARNING: This Device must be used in such a way as to maintain at least 20 cm separation distance between the transmitter's antenna and the body of the user or nearby persons.**