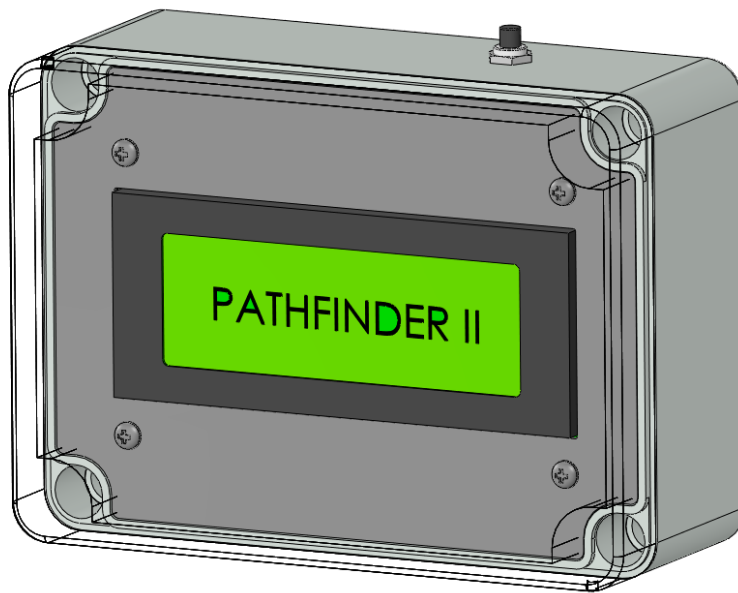


# Pathfinder II

(Patent Pending)

**Aerial Marker Ball – Power Lines  
Position Locating System**

## Users Guide



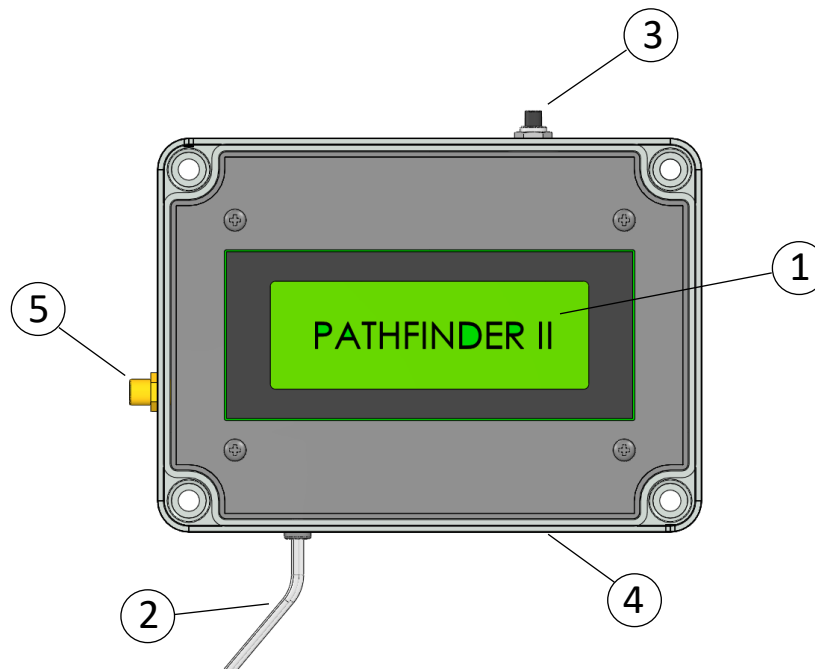
**Document Number: OAS-636-UGPFII**

**Revision: IR**

## GETTING STARTED

### System Overview

- **Pathfinder II:** The Pathfinder II (PF II) is the second generation of the Aerial Marker Ball Locating System. The PF II is comprised of a single module that provides a visual display of the marker ball location based upon the distances the user inputs into the system.
- The PF II is typically located on the floor within the pilot's line of sight of the marker ball location.



**Figure 1.0**  
**PF II Control Unit**

Referring to Figure 1.0

1. LCD Display
2. Wire leads (Refer to Appendix A for wiring details)
3. Integrated "select" switch
4. USB Mini for field loadable software updates
5. GNSS Antenna Cable Connection (Antenna: GPS-14986 by Spark Fun)

## Functional Overview

Refer to the Functional Overview Figure 2.0 for the following Key:

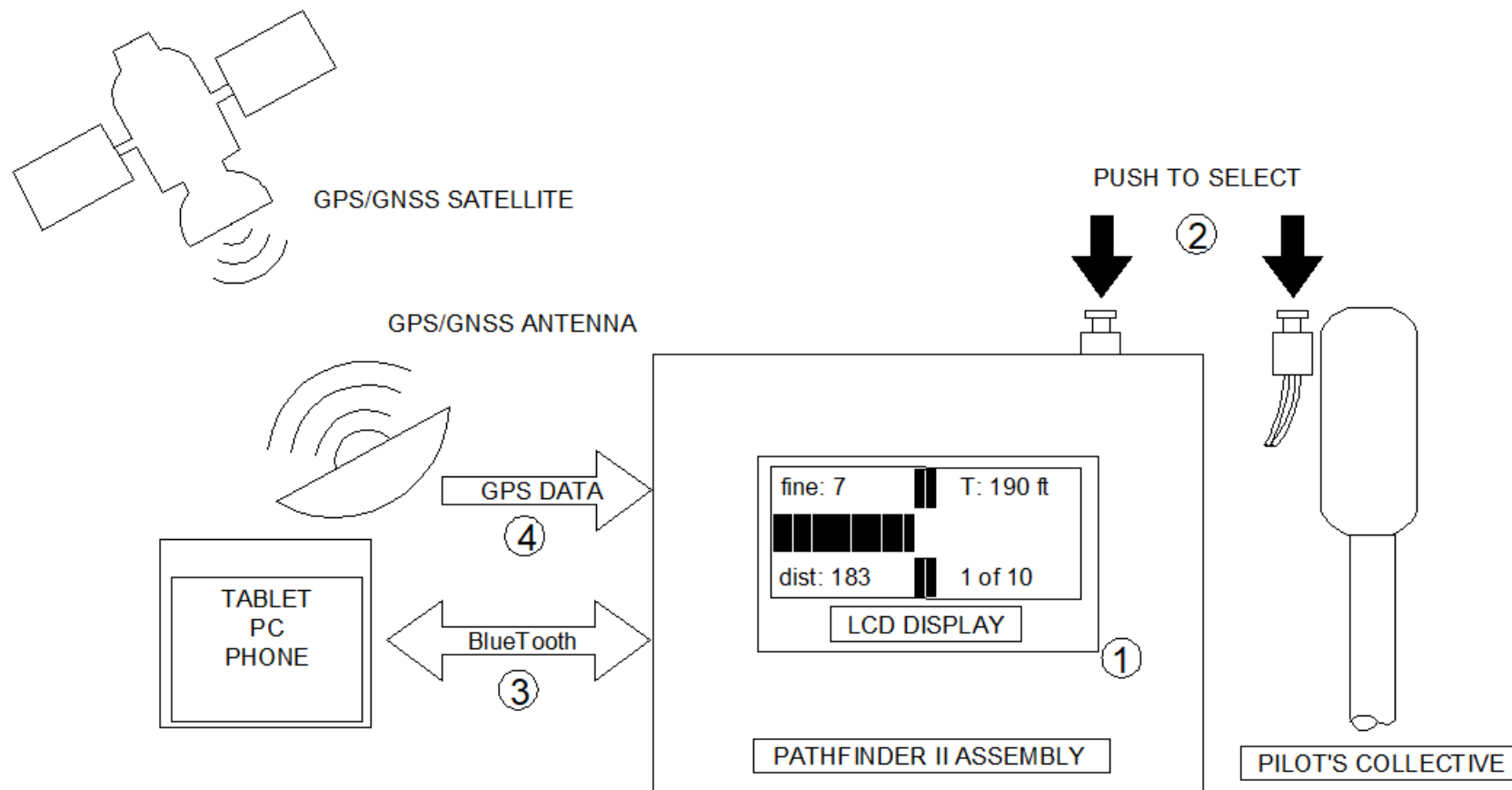
1. After power is applied the LCD ① will display the welcome banner. The LCD will then display a prompt for system setup. If a change to the setup is desired, push the select switch ② within 5 seconds. If a setup is not required, the setup request will time out, and the system skips to step 4.

**NOTE:** The select switch ② is located on the PF II and can also be separately wired to the Pilot's collective (see Appendix A). Either switch will perform the same function.

**NOTE:** The system select switch should remain pushed until the display changes. When the display changes, release the switch. This is to prevent unintended and momentary switch inputs from altering the system.

2. The LCD will now display a request to pair the PFII Bluetooth to your phone or tablet Bluetooth ③. See Appendix B for Bluetooth details.
3. Once the Bluetooth is paired and connected, the PF II will send setup instructions to your phone or tablet.
4. After the setup is complete the PF II will capture the GNSS/GPS satellite ④. While waiting for the GPS satellite to be captured, the PF II will display "Waiting for GPS"
5. After GPS capture, position the helicopter at the first tower (i.e. Distance = 0) and then push the system select switch. The PF II will now display the distance to the marker ball within the zone that the helicopter is positioned within.

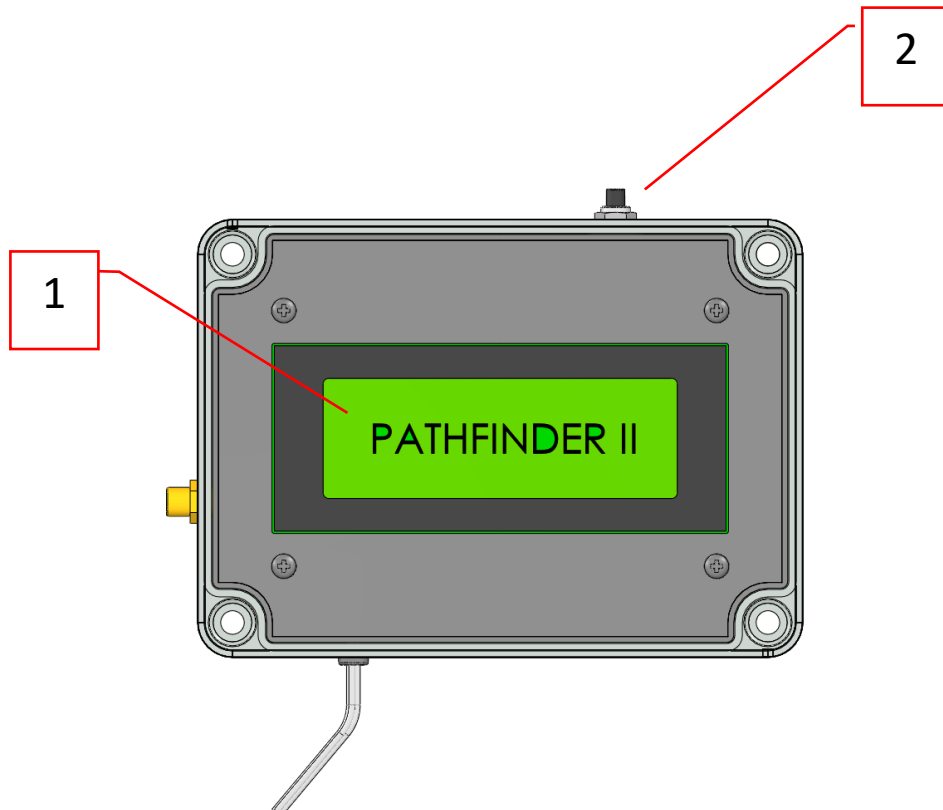
**NOTE:** The helicopter may enter and exit any of the marker ball zones in any order. The PF II will resolve and indicate which zone the helicopter is located within. The pilot may locate a marker ball, fly to the base location and collect another ball, and then return to any of the marker ball zones.



**Figure 2.0**  
**Functional Overview**

## Key Functions

### PF II Module



1

#### LCD Display

- This display provides all the setup and distance/location information to the pilot

2

#### Select Switch

- This switch is used for setup commands, system start, system pause and system reset

## BASIC OPERATION

### Standard Setup and Marker Ball Location Cycle

**Step 1:** Apply power to the PF II

**Step 2:** After the Welcome Banner is displayed, within 5 seconds push the system select switch (as prompted). If you do not want to change the setup, wait for the system to time out, and the “Push to Start” prompt will be displayed.

**Step 3:** Pair your phone/tablet to the PF II (see Appendix B)

**Step 4:** Once paired and connected push the system select switch again.

**Step 5:** Refer to Figure 3.0 for the following setup items.

Distance #1: This is the distance (D1) from the tower (starting point) to the first marker ball. Typically, this is a different distance than Distance #2.

Distance #2: This is the distance (D2) from (D1) (first marker ball) to the second and subsequent marker balls. Typically, Distance #2 (D2) will be the same for the rest of the span.

Threshold: This is the distance that the PF II uses to transition from one marker ball zone to the next. For example, if the threshold is set to 10 feet, the display will remain within the current marker ball zone until the helicopter is 10 feet into the next marker ball zone. The PF II will then automatically transition to the next marker ball zone. This is applicable to both directions of marker ball zone entry.

Total Points: This is the total number of marker balls within the span.

**NOTE:** The maximum number of points is 12.

Backlite: Turn the display backlite On or OFF

**Step 5:** (continued)Change Fields:

**No:** Selecting No retains the field displays with no changes.

**Yes:** Selecting Yes will allow the user to turn a field On or Off.

Resolution F1: This field displays the resolution of the bar graph. This field is automatically displayed as **coarse** (current location <80% of distance to next ball) or **fine** (current location >80% of distance to next ball). For example, if the coarse amount is 30, then each bar graph segment is 30 feet.

Target F2: This field displays the distance to the next marker ball location.

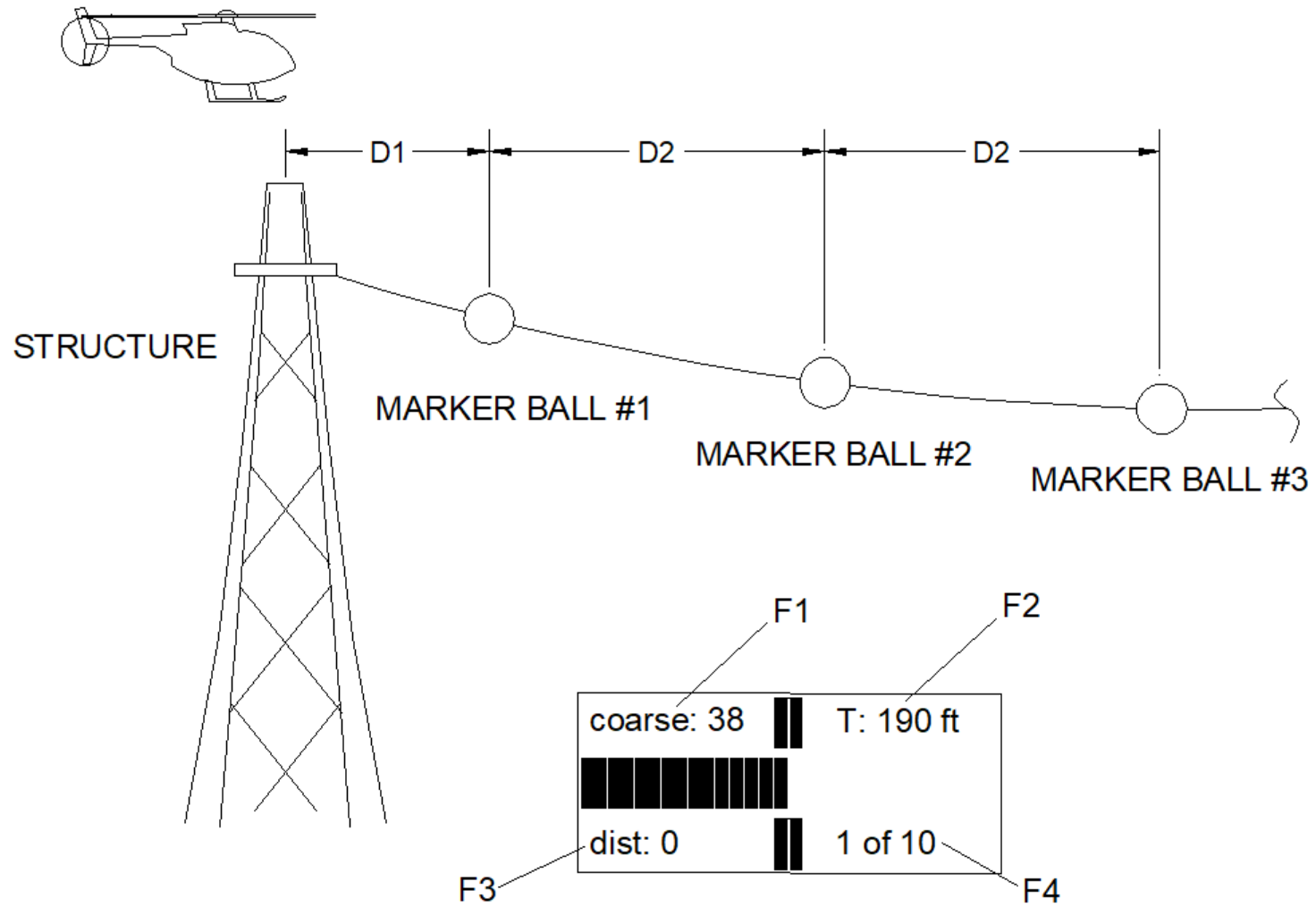
Distance F3: This field displays the distance the helicopter has moved towards the target marker ball location.

Zone F4: This field displays the current marker ball zone number that the helicopter is located within, and the total number of marker ball zones.

You will then be prompted to End the Setup. If **yes**, the setup is complete. If **no**, the setup is repeated.

**Step 6:** The LCD will now display “Push to Start”. Position the helicopter to the structure (start point) and push the system select switch when ready. The LCD will now display:











RESOLVING... 1 of (total number)
-------------------------------------





**Figure 3.0**  
**Basic Operation**



**Step 7:** After the zone location is resolved, the display will operate per the following sequence:

<p>The helicopter is located 10 feet into the first marker ball zone. The Target Distance (1<sup>st</sup> Ball distance from Structure is 190 feet). The Bar Graph is not visible since coarse is 30 feet.</p>	<p>coarse: 30  T: 190 ft</p> <p>dist: 10  1 of 10</p>
<p>The helicopter is now 150 feet into the first marker ball zone. The bar graph displays 5 segments since the coarse level is 30 feet per segment (30 x 5 = 150 feet)</p>	<p>coarse 30  T: 190 ft</p> <p>dist: 150  1 of 10</p>
<p>The helicopter is now 190 feet into the first marker ball zone and has arrived at the Target. The segments are now in the fine mode at 7 feet per segment (the fine segment is narrow).</p>	<p>fine: 7  T: 190 ft</p> <p>dist: 190  1 of 10</p>
<p>The helicopter is now 225 feet into the first marker ball zone and has passed the Target. Depending upon the Threshold Level, a transition to the next marker ball may occur.</p>	<p>fine: 7  T: 190 ft</p> <p>dist: 225  1 of 10</p>
<p>As a final illustration, the helicopter is -25 feet out of the first marker ball zone (or before the structure).</p>	<p>coarse 30  T: 190 ft</p> <p>dist: -25  1 of 10</p>

**Step 8:** In this example, after the next zone location is resolved, the display indicates the 2nd Target is at 250 feet. The Helicopter is 10 feet into the 2nd marker ball zone.

<p>coarse: 40  T: 250 ft</p>
<p>dist: 10  2 of 10</p>

## **Other Features**

Pause: The system may be paused by pushing the select switch until the ‘System Paused’ message is displayed. Pushing the select switch again will return the system to an operational mode.

Reset/Next Structure: The system may be reset by pushing and holding the system select switch. The system will initially display “System Paused” and then indicate a reset. This reset feature may be used to move to the next structure for marker ball locations.

Field Software Updates: If field software updates are required, the programming port may be utilized with a Micro USB (data sync). Detailed load instructions shall be provided with the software code.

## Messages

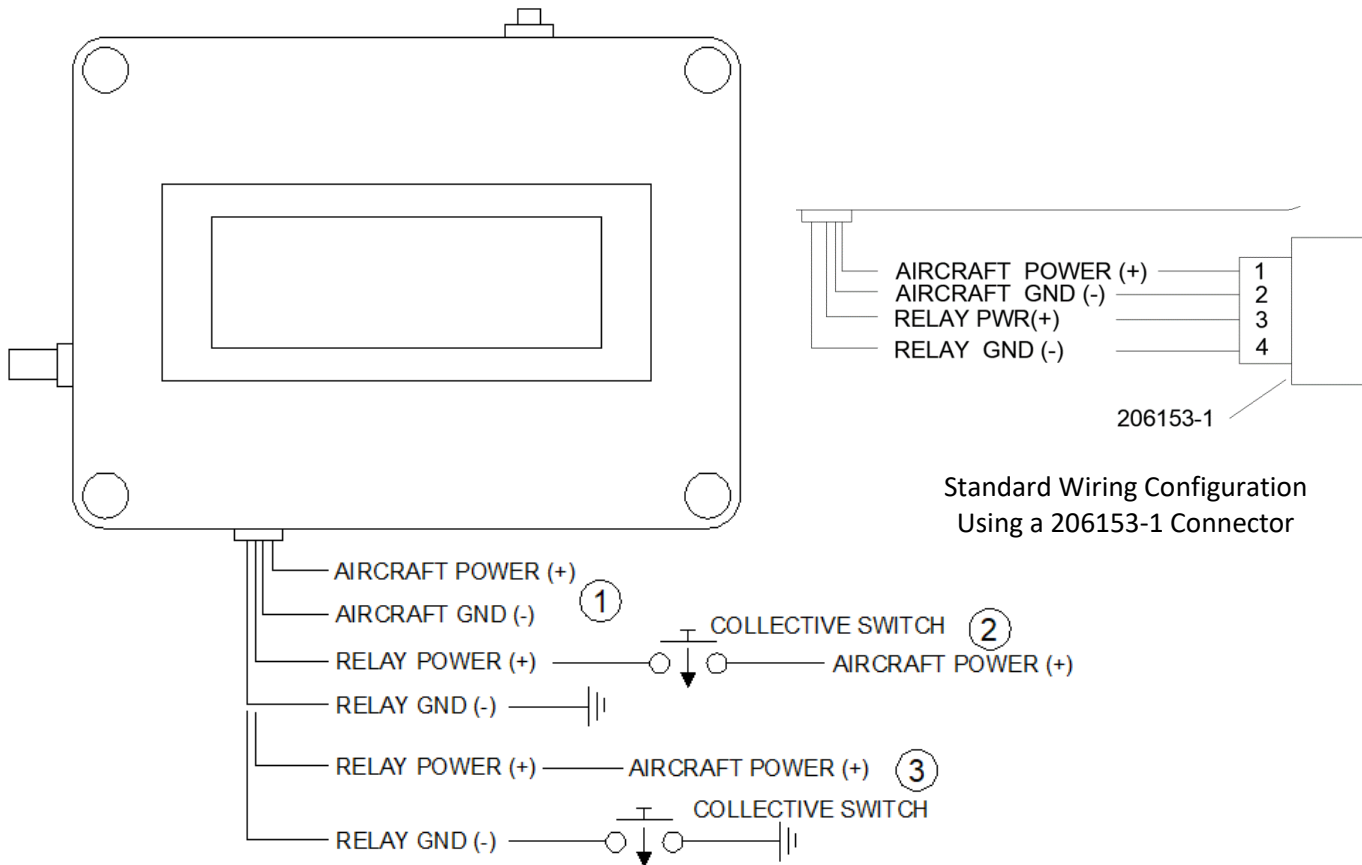
“Waiting for GPS”: This indicates that the PF II is waiting for the GNSS satellite signal to be obtained.

“Out of Range”: This indicates that the PF II is located at a distance farther than the total distance between the structures. Once the PF II is within this distance this message will be removed.

“Resolving”: This indicates that the PF II is determining which marker ball zone the helicopter is located within.

## Appendix A

### Wire Connections



Standard Wiring Configuration  
Using a 206153-1 Connector

① Connect these wires to aircraft power and ground. The aircraft power wire should have a fuse or circuit breaker with a rating not to exceed 3A.

② These wires actuate an internal relay that will provide a switch select function. If the aircraft collective switch adds and removes **power** (as shown) then wire as shown.

OR

③ These wires actuate an internal relay that will provide a switch select function. If the aircraft collective switch adds and removes **ground** (as shown) then wire as shown.

## **Appendix B**

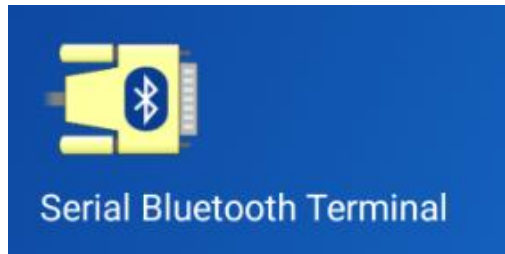
### Bluetooth

To connect the PF II to your phone, laptop or tablet follow these instructions:

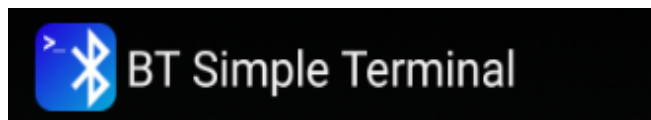
1. On your device, deactivate Bluetooth
2. Power up the PF II and stop at the “Paired/Y=Push” prompt.
3. On your device activate the Bluetooth
4. Search for the device “Pathfinder nnnn”

NOTE: nnnn is the 4-digit serial number

5. if a password is required enter “1234”
6. your device should indicate the Pathfinder is paired
7. Open the Bluetooth APP on your device and select the Pathfinder nnnn
8. Here is a partial list of Bluetooth terminal APPs that may be used:
  - a. Serial Bluetooth Terminal



- b. BT Simple Terminal



Many other Bluetooth Terminal APPs are available in the Android and Apple stores. Search for “Bluetooth Terminal”