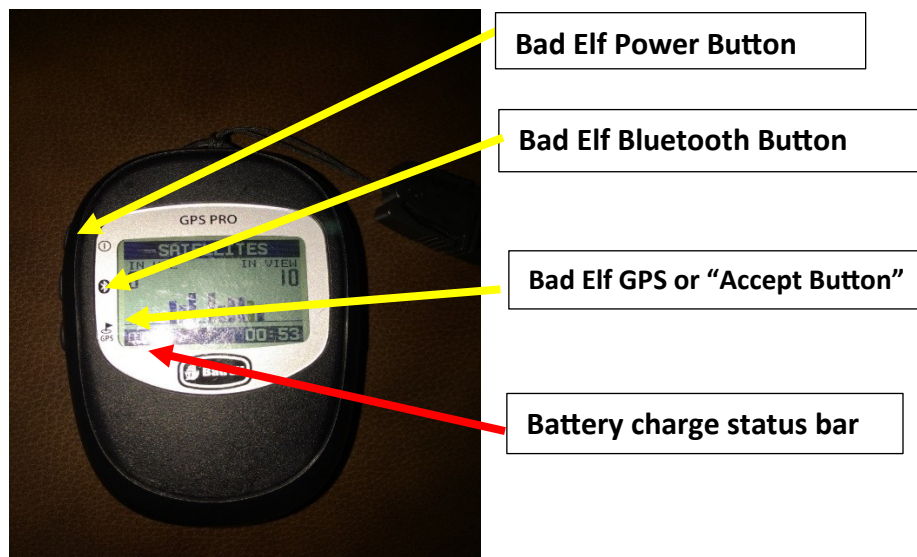# NIFA Navigation Event

Bad Elf GPS Data Logger Setup and Usage Instructions

Revised September 17, 2022

Setup:

1. Double check your Bad Elf inventory. Depending on your region, you should have received either 9 or 10 Bad Elf "kits," consisting of 2 Bad Elfs in a plastic storage container. Each kit is labeled, i.e, NIFA 1, etc. Within each kit, the Bad Elfs are each numbered, i.e, NIFA 1-1, 1-2 for kit 1, NIFA 2-1, 2-2 for kit 2, and so on. Included in each storage container are 2 charging cables and a set of instructions for the Bad Elf unit itself. ***PLEASE MAKE SURE ALL CHARGERS, INSTRUCTIONS, ETC REMAIN WITH EACH KIT AS SHIPPED TO YOUR REGION****

2. Using the charging cables included, be sure to charge each individual Bad Elf unit. A multiple port USB hub is recommended, or else plugging the units into any available USB port. While all of the Bad Elfs should have some residual charge remaining when you receive them, it is highly recommended that you charge them over night to ensure the units are fully charged before use. Be sure to allow sufficient time to accomplish this.

3. Bad Elf units are compatible with Apple i-devices using the Bad Elf app, free for download from the Apple store. It will be essential that at least one navigation judge, and preferably two have access to an Apple product to configure and download the units. These instructions are based on the use of an iPad, but should be similar for any of the compatible Apple devices.

   a. Prior to competition, sync each Bad Elf unit via Bluetooth to each Apple device to be used. This is accomplished by turning on the Bad Elf using the button in the upper left hand corner (see figure 1.)

      Figure 1:

Bad Elf Power Button

Bad Elf Bluetooth Button

Bad Elf GPS or "Accept Button"
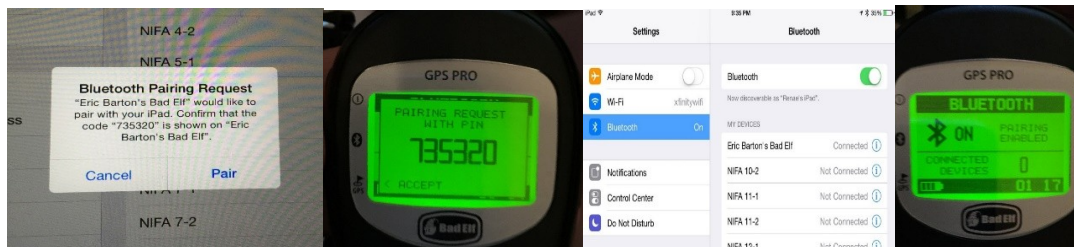
Battery charge status bar

Then, on your Apple device, touch the "settings" icon. Two columns should appear. In the left column, make sure Bluetooth is selected on by touching the word "Bluetooth," then making sure that the toggle switch next to the word "Bluetooth" in the right column is moved to the right with a green background (see figure 2.)
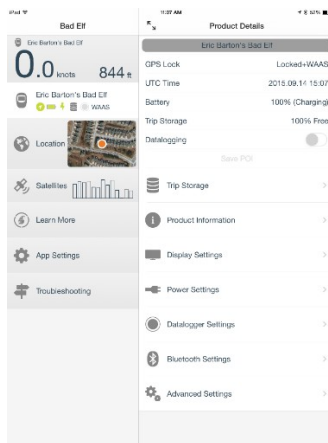
Figure 2:

Under "Other Devices" you should see the name of any Bad Elfs which are turned on and emitting a Bluetooth signal, i.e, NIFA 1-1, etc. (also see figure.) Touch the name associated with the Bad Elf you are attempting to sync with. After a few seconds, your Apple device will show a message with a Bluetooth Pairing Request that references a 6 digit numeric code (see figure 3.) At the same time your Bad Elf should show a message showing a pairing request with the same 6 digit code. (see figure 4.) Press the pair button on the Apple device and click the accept button on the Bad Elf (lower left button, see figure 1.) After a few more seconds, the Bad Elf should show on your Apple device under "My Devices" (see figure 5) and if you push the Bluetooth button on the side of the Bad Elf, you will see a screen saying Bluetooth at the top with the word "On" next to pairing enabled, along with the number of devices connected (see figure 6.)

Figures 3, 4, 5 & 6:

b. If a Bad Elf does not appear under "Other Devices," it may have had the Bluetooth turned off. To correct this problem, press the middle Bluetooth button (see figure 1,) until you get to a screen with "Bluetooth" written across the top, similar to that shown in figure 6, but with Bluetooth showing off. Hold the middle Bluetooth button for approximately 3 seconds until the word "Enabled" shows on the Bad Elf screen. After a few seconds, the Bad Elf should show under "Other Devices," and you can then proceed with the instructions shown in step 3a.

c. Repeat instructions listed under 3a for each Bad Elf device to be used in competition, and for each Apple device to which the Bad Elf is to be paired.

4. Once each Bad Elf is synced to your Apple device(s,) we need to configure both the Bad Elf app and the Bad Elf units. Open the Bad Elf app on one of your Apple devices. You need to be connected to the internet, preferably Wi-Fi, although a cellular connection will work (NIFA not responsible for any data charges). On the left side of your screen (see figure 7,) you should see a list of any Bad Elfs to which your iPad is connected (NIFA 1-1, etc,) as well as a notice saying how many trips are stored on this iPad, location icon showing your present position on a Google Maps type of background, a graphic showing how many satellites are currently being received, a learn more icon, an app settings icon and a troubleshooting icon.

Figure 7:

On the left side of the screen, select the first Bad Elf unit you want to configure. On the right side of the screen, Product Details will appear at the top. On the first line below this, the name of the Bad Elf, i.e, NIFA 1-1, will be shown. **UNLESS INCORRECT, DO NOT** change the name of the Bad Elf. Below this line, you should see the GPS Locked status (searching, locked, locked + WAAS, etc,) the UTC (or Z) time, battery status, percentage of trip storage free, and a data logging switch (should be "off" or to the left at this point.) Below those items will selection menus for Trip Storage, Product Information, Display Settings, Power Settings, Datalogger Settings, Bluetooth Settings and Advanced Settings.

a.   Starting on the left side of the screen, if any trips are showing stored on your iPad, it is recommended you delete them to start the SAFECON with a clean slate.

b.   Select the location icon, a larger map should open up showing your present location on a satellite image along with current latitude, longitude, speed and altitude. Make sure this information is consistent with your current location. If it is not, make sure the selected Bad Elf unit has a clear view of the sky and can receive GPS satellite signals. If necessary, turn off the Bad Elf, turn it back on and reconnect to the Apple device as specified in step 3.

c.   Select the app settings icon. When it opens, you will see a number of settings that can be changed under the App Settings heading on the right side of the screen. Below are the correct settings. If any of your settings are incorrect, just touch the item that needs to be updated and select the correct option.

Under Display:

Theme: Light or Dark is at user discretion

Under Display Units:

Speed: Knots

Altitude: Feet

Distance: Nautical Miles

Accuracy: Feet

Coordinates: Decimal Degrees (dd.ddddddddd)

Under Barometric Altimeter:

Altitude Source: GPS

Altimeter: in Hg

Pressure: in Hg

Under Map:

Map Mode: Satellite

Show Gauges: Select Off (Switch to left)

Under Trips:

Default Title: Date/Time

Route Color: Red

Under Satellites:

Show SNR:	Off

Under Trip Export:

GPX File:	Select On (Switch to right)
KML File:	Select On (Switch to right)
KML Elevation:	Absolute
Altitude Source:	GPS

Under Plug-In GPS:

Background Tracking:	Off

Under Accuracy:

Accuracy Method:	CEP

Under Raw Logging: Raw logging not applicable to NIFA GPS models

Under More Info:

App Version:	3.3.6 (1230) **as of 17Sep22, not a changeable Field
Release Notes:	No setting, information only.
Bad Elf blog:	No setting, links to the Apple app store.
Legal:	Legal disclaimers and credits, no settings.

d. Now it's time to check the settings on the Bad Elf units. All units are pre-set for NIFA requirements and locked to prevent changes. The double check is just to make sure all settings were locked in correctly prior to shipping. If you find an incorrect setting, please contact Taylor Newman, NIFA executive director or Ryan Perrin, NIFA Senior Chief Judge for further instructions.

e. Select the Trip Storage menu. When it opens, confirm that it reads NO TRIPS ON THIS BAD ELF. If any trips are present, select them and delete them from the Bad Elf.

f. You may select product information if you wish to view it, however at this stage, there is nothing you need do with this menu selection.

g. Select the display settings menu. When it opens, you will see a number of settings under the Display heading on the right side of the screen. Below are the correct settings:

Speed:	Knots
Altitude:	Feet
Distance:	Feet
Coordinates:	dd ddddddd (Decimal Degrees)
Time Zone:	UTC (Greenwich Mean Time)
Daylight Savings:	Off (Selector switch to left) DO NOT COPY FROM I-DEVICE
Backlight:	Momentary On
Accuracy Method:	CEP (default)

h Select the power settings menu. When it opens, you will see a number of settings that can be changed under the Power heading on the right side of the screen. Below are the correct settings:

Auto-on with USB Power:	No
Auto-off when idle:	Never

i Select the Datalogger settings menu. When it opens, you will see a number of settings that can be changed under the Datalogger heading on the right side of the screen. Below are the correct settings:

Datalogging:	Switch should be off for now, later instructions will advise when to turn on.
Logging Rate:	60 per min
Smart Filter:	Driving (over 10mph/16kph)
Auto-logging:	Disabled

j. Select the Bluetooth settings menu. When it opens, you will see a number of settings that can be changed under the Bluetooth heading on the right side of the screen (see figure 14). Below are the correct settings. If any of your settings are incorrect, just touch the item that needs to be updated, and select the correct option.

Enabled on startup:	Always
Pairing enabled:	Always
Allow PIN 0000:	Never
Auto-connect:	No devices
Anonymous Pairing:	No
Custom Bluetooth Name:	Yes
Streaming NMEA:	Default NMEA

k. Select the advanced settings menu. When it opens, you will see a number of settings that can be changed under the Bluetooth heading on the right side of the screen (see figure 15). Below are the correct settings:

SBAS/WAAS/EGNOS:	Enabled
ElfPort speed:	115200
Passcode Lock:	Locked

        1. Select passcode lock and verify following settings on submenu:

Update Firmware:	On
Change Settings:	On
Download Trips:	Off
Delete Trips:	Off

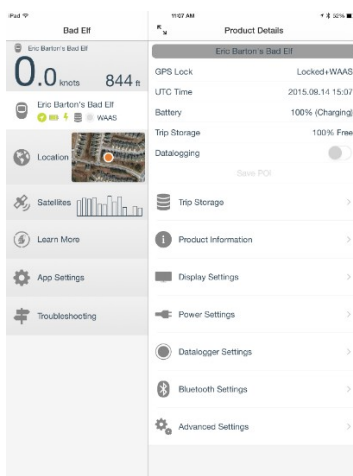**l.** Repeat steps 4d through 4k for each Bad Elf to be used in competition.

5. After completing steps 1-4, power down each Bad Elf unit to conserve the battery. With Bluetooth enabled, Bad Elf advertises up to 16 hours of battery life. Even if it is less, this should be more than sufficient to run a typical NIFA navigation event. If, for some reason, your navigation event is spread over multiple days due to weather or other reasons, you should re-do step 1.

Aircraft Installation:

Note: 2 people should be used for this procedure, with each person completing the steps individually for their Bad Elf, i.e. one person handles the #1 GPS, the other person handles #2.

1. Be sure to track which aircraft the kit number is being installed. This is best done using the navigation event heat sheet. Open the container and turn on both Bad Elfs, then if not already on, each of you turn on your Apple device and go to "settings," then "Bluetooth." Select the Bad Elf you're connecting to under "My Devices" and go to the Bad Elf app. If your device doesn't detect the Bad Elf under "My Devices," follow the instructions in step 3 under setup above to connect your device to the Bad Elf.

2. Place both Bad Elfs back into their container and secure the lid. Place the container in the aircraft. For 4-seat aircraft, place the container in either the backseat or baggage area, making sure that nothing is on top of the container. For C150/152 or other two seat aircraft, place the container in the baggage area behind the pilots, again making sure that nothing is on top of it. Since the contestant flying the aircraft will likely be in the planning stage at this point, be sure to tell the safety observer to make sure that nothing is placed on top of the GPS containers to avoid blocking the GPS signal.

3. On each of your Apple devices, open the Bad Elf application. On the left side of the screen, you should see any Bad Elfs that is connected to your device with the GPS name (NIFA 1-1, etc) showing. Select the applicable Bad Elf to start. On the right side of the screen, under the heading "Product Details," the Bad Elf name will be shown. Below that is a line showing the GPS status. It will either show searching, locked or locked+WAAS. Locked means the GPS has locked onto satellites and determined its position. Either locked or locked+WAAS must be shown for the remainder of the installation process to take place. Generally, the Bad Elfs acquire their position quickly, so this should not be a problem. ***If the Bad Elf does not show the units locked within a reasonable period of time, usually less than a minute, it may be necessary to move the container somewhere else in the aircraft where it has a clearer view of the sky.*** The fifth line below the GPS name will show a toggle switch for data logging. Touch this switch to turn on the datalogging (see figure 8.)

Figure 8:

4. After toggling the data logging on, select the Datalogger settings menu on the right side of the screen. Under the heading "Datalogger," ensure that the toggle switch for data logging is showing on. After this, touch the back button at the top of the screen.

5. On the left side of the screen, select the location icon. A larger map should open up showing your present location on a satellite image along with current latitude, longitude, speed and altitude. Make sure this information is consistent with your current location. If it is not, make sure the selected Bad Elf unit has a clear view of the sky and can receive GPS satellite signals. If necessary, turn off the Bad Elf, turn it back on and reconnect to the Apple device as specified in setup step 3.

6. Below the location icon is the satellite icon. Select this icon and make sure that the Bad Elf is tracking a reasonable number of satellites and is giving a horizontal, vertical and positional accuracy readout.

7. Make sure all steps are completed for both Bad Elf units in the kit. After that, you are done with installation of that kit and can move to the next kit and aircraft.

Recovery and Download:

Note: 2 people should be used for this procedure, with each person completing the steps individually for their Bad Elf, i.e. one person handles the #1 GPS, the other person handles #2.

1.   After the aircraft has come to a complete stop and shut down with the beacon off, retrieve the Bad Elf kit from the aircraft.

2.   Be sure to track from which aircraft the kit number is being recovered/downloaded. This is best done using the navigation event heat sheet. Each downloading individual should turn on their Apple device and go to "settings," then "Bluetooth." Tap to select the Bad Elf unit you wish to connect to and wait to see "Connected" next to the Bad Elf listed in "My Devices." If there are multiple returning aircraft at the same time, be sure you are connecting to the correct Bad Elfs as there may be several in range of your device. If your device doesn't detect the Bad Elf under "My Devices," follow the instructions in step 3 under setup above to connect your device to the Bad Elf.

3.   On your Apple device, open the Bad Elf application. At the top of the screen, you should see the Bad Elf connected to your device, (see figure 9) with the GPS name (NIFA 1-1, etc) showing. Toggle the data logging switch to "off" on the Bad Elf.

4.   ***Steps 4-7 must be completed separately for each Bad Elf in the kit.*** Now, it is time to download the GPS data. In the left column of the Bad Elf app, you should see an icon saying "Download 1 New Trip." Select the download and a progress bar will appear. Wait for the download to be complete. Once complete, you'll receive a pop-up message saying trip is safely downloaded and whether or not you want to delete it from the Bad Elf. Hit "Yes, delete it," to clear the Bad Elf for use in the next round. Once this is done, under the name of the Bad Elf in the left column, you'll see "1 Trip on this iPad" (may be more as the day goes on). Select the trip you just downloaded (if multiple trips, it will be the one not yet named and should be at the top of the list). At the top of the screen under Trip Details, change the trip name to PXXXX where XXXX = the PILOT contestant number. Make sure the contestant number you use is not the safety observer. You will need to obtain this information from the contestant as you are downloading. *****PROPER NAMING IS ESSENTIAL***.** When you download the 2nd Bad Elf in the kit, you will need to name the trip SXXXX.

5.   Underneath the trip name, you should see a satellite view with a plot of the route flown. (Satellite imagery will not show if no internet connectivity in download area.) It is ok to allow the student to see his/her plot if they wish. If the plot is incomplete or looks to be missing areas of data, stop and immediately download the other GPS, repeating steps 1-4, being sure to name the file from the 2nd unit appropriately SXXXX. Check the plot from the second download. If it is also incomplete, then you have a double failure, and the only option will be for the contestant to re-fly in order to be scored. Stop, notify the chief navigation judge and/or chief judge so that proper measures can be taken.

6. Assuming everything downloaded ok, you now need to export the trip file from your Apple device so that it can be opened in a PC and imported into the scoring program. If you have internet access, either cellular or Wi-Fi in the download area, that is ideal, but not absolutely necessary. There are multiple ways of sending the download data, we'll cover 3 of them here. Touch the "Share Trip" icon in the upper right hand corner of the screen, you will be given the options of Share GPX File, Share KML File or Share via E-Mail. Select share GPX File, and another window will open up giving you the options to text, e-mail, or share/send with other apps that may be installed on the Apple device, i.e, Google Drive. Below those will also be the option to copy, add tags or Save to Files.

    a.   **File sharing option 1:**

    From where we left off above, select e-mail. An e-mail screen will open up, enter the e-mail address of where you want to the file to go. Then, under subject, enter PXXXX or SXXXX (depending on which file you're sending.) This is because sending the file via e-mail does not let you name the file correctly. Changing the name of the trip in step 4 **DOES NOT** change the name of the file. By putting the PXXXX or SXXXX in the e-mail subject line, it allows the recipient to rename the file as needed after they receive it. This option also works in the event there is no internet connectivity in the download area as the e-mails can be saved as draft e-mails, which can then be sent once internet connectivity is restored.

    b.   **File sharing option 2:**

    From where we left off, touch the "Save to Files" option. You should see the option for either iCloud drive or On My iPad. Select On My iPad, and at top of the window, you'll see a grey box with a series of digits. This is the default file name provided by Bad Elf. Highlight that area and re-name to the PXXXX or SXXX as appropriate and hit save. This saves the file, with the correct name, to your iPad. You can copy or e-mail the files from the iPad as needed for scoring. This option will work whether or not there is internet connectivity in the download area.

    c.   **File sharing option 3:**

    This option requires that the Google Drive App be installed on the iPad. Some scorekeepers or chief judges will establish a Google Drive account for the navigation event. That folder(s) should be shared with you ahead of time so that you can save files directly to the Google Drive. Assuming you have Google Drive on the iPad, when you select Share GPX file, one of the icons with e-mail, text, etc should be the Google Drive app. Select Google Drive, and a new window will open up where you'll see a file named as a sequence of numbers with a .gpx extension. Select that file, re-name it to PXXXX.gpx or SXXX.gpx as appropriate (make sure the .gpx extension remains.) At the bottom of the window, under folder, you should be able to select the Google Drive that was shared with you ahead of time. Select the drive and then click upload in the upper right hand corner. This sends the file directly to the shared drive, which allows scorekeeping to begin scoring the event while it's still taking place.

7. After downloading of the kit is complete, return the GPS kit to the installation judges to re-install in a different aircraft for a later departure. Nothing else needs to be done with the kit at this point, any further steps will be completed by the installation judges per their instructions above.

8. Once the navigation event is over, and only after all your files have been e-mailed and/or saved using one of the above methods, you will need to clear the tracks off your device using the Bad Elf app. Click the icon on the left column that says "1 Trip on this iPad" (or however many trips are on it) and a list of trips will appear on the right. Select Edit in the upper right hand corner, and you will be able to select any trips that you want deleted. After selecting the trip(s) in question, touch the red trash can icon at the bottom of the screen to delete the trip(s.) You will be asked to confirm the deletion, click delete again, and you are done. *****DO NOT DELETE FROM APP UNTIL AFTER THE COMPLETION OF THE NAVIGATION EVENT. THE COPY ON THE APP IS THE ONLY BACKUP TO THE FILE WHICH YOU SAVED/SENT IN STEP 6. ONLY DELETE FROM THE BAD ELF APP AFTER CONFIRMING ALL FILES HAVE BEEN RECEIVED BY THE NAVIGATION EVENT SCOREKEEPER*****