USER MANUAL

RAMPAGE NAVIGATION HANDLEBAR CONTROLLER

(RNHC)

with Bluetooth


Manual for the Rampage Navigation Controller version 1.7.3

CONDITIONS AND NOTES FOR USING THIS MANUAL

This is the user manual for using the version 1.7.3 of the Rampage Controller open source as can be found on our website at https://www.rallyrampage.com

This design and code are made available for free as an open-source DIY project. Alternatively, the unit can be purchased as a finished built unit, from our website.

This RNHC unit was designed originally by Eugene Beetge from Rally Rampage, South Africa.

It is made available on this free open-source basis to assist in the support and growth of the rally, navigation and adventure bike industry, locally and abroad. Any additions, enhancements, changes or improvements to the project would be appreciated if it is done under the same conditions of sharing.

This project is done as a passion project and not for immediate financial gain. However, donations are appreciated and can be made on the website at https://www.rallyrampage.com

TABLE OF CONTENTS

UNDERSTANDING THE RAMPAGE NAVIGATION HANDLEBAR CONTROLLER

What is the Rampage Navigation Handlebar Controller?

The RNHC is a small electronic device that is mounted on your motorbike handlebar. It consists of a button unit, tethered to a small control box that contains the main electronics, bluetooth and backup battery. This little device uses Bluetooth to connect to your mobile phone or tablet that you use for navigation. Assuming your navigation device is mounted in front of you on your motorbike.

Once connected, the RNHC has 5 push buttons and one toggle switch that sends commands to your mobile to control certain features on your navigation apps on your mobile device from your motorbike handlebar.

This allows for a much safer and more convenient way to manipulate your navigation apps while riding. As an example, while riding you can zoom in and out of maps, centre maps or even turn your mobile screen off to save battery.

The unit in its standard form is programmed to send certain key commands to your chosen mobile app. Different apps allow for different commands to control their basic features.

We have preprogrammed our RNHC to send commands to 4 default mobile navigation Android apps. In reality, you can program it to accommodate up to 7 different apps using the buttons available on the RNHC unit or even more.

For this unit, we recommend using an Android device for navigating on your bike, as it allows for more flexibility, user-friendliness and more navigation apps and functionality at your disposal.

How does the controller actually work?

The buttons

The first portion of the unit consists of 5 push buttons and one toggle switch. This part of the unit is usually mounted on your handlebar on the left next to your grip, where you can easily access it with your left-hand thumb. Using your thumb, you should be able to push any of the 5 buttons as well as toggle the switch.

The controller box

Tethered to this button unit is the brain of the system. The small controller box consists of the remaining electronics, the Bluetooth tech as well as a built-in battery backup. This controller box can be fitted anywhere on your handlebar or rally tower, limited by the length of the CAT5 cable tether.

How its powered

For power, you can use the built-in battery, or use the USB connector, but it is advisable to also consider setting up a permanent power supply for the unit using its USB external plug. If you run the RNHC on permanent power, it will continuously keep the built-in battery charged for when you need it.

Using the controller with your mobile device

Once the controller is paired with your phone or tablet, using Bluetooth, the unit will send commands to your phone when you press any of the pushbuttons or toggle the toggle button.
If you use certain navigation apps on your phone, those commands from the unit can be used to control the apps on your phone and use some key functionally to navigate.

This allows key navigation functionality, fast and convenient, straight from your handlebar and thumb, to your navigation app on your phone.

Android apps that RNHC currently works with

There are hundreds of fantastic navigation apps (on Google Play Store for Android devices) out there in the market to navigate from your mobile device. However, after intensive practical testing and riding, we have narrowed down the default recommended apps on your mobile to use with the controller. The decision for using these apps was based mainly on:

- Their capability to be used with external commands and a keyboard type controller. Not all apps have the ability to use external keys and commands.
- Offline use. The ability to allow offline maps and navigation.
- User interface and user-friendliness.

Two of the apps we accommodate on the device are for normal adventure-type riding using maps and lines in the form of gpx, kml or kmz file formats. Navigation is traditionally associated with GPS style devices.

The other two default apps are for electronic roadbooks. Roadbooks are not commonly known but are very popular in rally-style riding such as Dakar, and allow for an amazing new experience in riding. Roadbooks carry many advantages over maps but require a little more skill and knowledge to use. With the rally world turning towards electronic roadbooks, we see the RNHC as the perfect tool for the amateur rider to get involved in informal roadbooks events.

The four apps that we programmed the controllers' buttons for are:

- **Locus Maps**
  - Locus is a great map-based navigation app with amazing functionality.
  - It runs offline as well as online and allows external controllers such as our RNHC unit.
  - It works with navigation files that include gpx, kml and kmz formats.
  - LINK: https://play.google.com/store/apps/details?id=menion.android.locus.pro

- **OsmAnd**
  - Very similar to Locus, this app does the same but with a slightly different user experience.

- It runs offline as well as online and allows external controllers such as our RNHC unit.
- It works with navigation files that include gpx, kml and kmz formats.
- LINK: https://play.google.com/store/apps/details?id=net.osmand

- **Rally Navigator**
  - This app is used for showing and riding with electronic roadbooks on your mobile device.
  - Using Rally Navigator on your desktop browser also allows you to create your own roadbooks from your GPX file of Google maps.
  - The app however does not run in portrait mode on your mobile which some people prefer as it is more in line with a paper-based roadbook.
  - This is the go to app for electronic roadbooks.
  - LINK: https://play.google.com/store/apps/details?id=com.rallynavigator.rallyroadbookreader

- **Piste Roadbook Reader**
  - This roadbooks reader is great and allows for portrait mode riding.
  - Its interface is slightly different to Rally Navigator and less traditional.
  - One of the biggest benefits of Piste is that you can also change your controller keys from within the app itself. Allowing more flexibility and functions.
  - LINK: https://play.google.com/store/apps/details?id=com.eroadbook

THE (RNHC) DESIGN

The design of the RNHC is based on form and function. The following image shows the different design elements.

The button box is made according to the open-source design files and will contain 5 push buttons and one toggle switch. Colours may vary based on what you buy locally.

At the rear of the button-box are the screws and plastics to fasten your button box to your handlebar. The tether cable exits from behind the box.
This is designed for left-hand use of the buttons.

Your main unit will have the two flip switches on the one end as well as the main mode-LED on the ‘top’ of the unit sticking out for visibility. Note the stickers to say POWER and MODE are recommended to be able to distinguish between the button functions. Else it can be very confusing.

On the other side of the unit is the exposed micro USB slot. This must not be covered as this is used for programming the board as well as powering the unit. This is also where you can do the permanent power option using this USB plug. The USB gap is extra large to allow the USB cable to go ‘into’ the box and to not damage the USB plug from riding with minor movements.

We use a normal CAT5 network cable as the tether between the boxes as it already has the minimum required 8 strands that the controller needs.
TIP! A good tip is to place a network female-female adapter in the middle. This makes it very convenient to unplug one portion from the other. Especially if the unit is fitted onto the bike. You can remove separate sections for field replacement or repairs.

USING YOUR RAMPAGE NAVIGATION HANDLEBAR CONTROLLER

Connecting to your mobile device with Bluetooth

These days all mobile devices come standard with Bluetooth built-in.
It is easy to connect your unit to your mobile navigation device (phone or tablet).

1. Turn its power on.
2. On your mobile device make sure the Bluetooth is active and search for local available devices in your area. You should be able to see your Rampage controller become available.
3. Select the unit from your mobile and click on PAIR. Most Bluetooth devices require a security PIN, but we made the RNHC to work without a security pin to allow for easy connection and reconnecting.
4. If the connection between the device and your phone was successful, your mobile should make a sound (usually like a cricket) to indicate the connection. It will also show that a 'keyboard' was added to your phone. This is absolutely correct as our controller loads itself as a Bluetooth keyboard on your phone to send the commands to the apps.
5. Clever little bugger.

Toggle buttons on the controller

Our design includes two toggle buttons on the controller box unit.

- The **one toggle button** is simply to connect and disconnect the built-in backup battery. If this is turned on, and you don't have permanent power to the unit, the battery will run the unit for hours, pending your battery size. If you are running a permanent power setup on your bike for the unit, turning on the battery button will keep it charged from the perm power. Without perm power, the battery button becomes your main on and off power switch.
- The **second toggle button** is your **MODE** button. This switches the unit between App Select Mode and Rider Mode. The modes do the following:
    - **App Select Mode**
        - App Select Mode is used to select which app on your phone you intend to use for navigating. This means your unit will send the correct commands required by your mobile navigation app. It starts sending the commands when pressing the controller buttons, to your mobile app, when it's turned back into Rider Mode.
    - **Rider Mode**

- This Rider Mode is used to send the actual commands to your mobile while riding.
- Once you select the appropriate app from the App Select Mode, you switch back to rider mode and the unit will send the preprogrammed commands to your phone when you press the various controller push buttons and toggle switch.
- Because you have 5 pushbuttons and a toggle switch with two positions, you can effectively send seven independent commands to your mobile app to manipulate the associated app on your mobile.

How to operate your RNHC device

If you use the device on its normal functionality, you will use both the App Select Mode as well as the Ride Mode, while navigating and riding.

Selecting the right app for commands using App Select Mode

Let's start by selecting the app you want to use on your mobile and making sure your RNHC is sending the right commands.

1. When turning on your unit, using the default code on the project, it will start blank without any soft app selected. You may see this by the green LED flashing when in Rider Mode.
2. You can turn your unit on with the App Select Button either in Select Mode or Rider Mode. The led will indicate the mode it's in. You simply need to flip the Mode switch to change the mode.
    a. If your main LED is flashing GREEN on startup, it means your unit does not have a soft app selected yet and it is in Rider Mode.
    b. If you turn the unit on and the red LED is on without flashing, it means your App Select Button is on and it's already in a state of waiting for your input to select a soft app.
3. To select the app for your unit you want to use on your mobile:
    a. Switch to App Select Mode
        i. Thus the red LED will be permanently on
    b. Choose one of the four pre-programmed apps by pressing the push buttons on your controller that corresponds to the app number.
        i. The top push button selects app 1 (Locus Maps) the second push button will select App 2 (Rally Navigator) and so on, for app 3 and app 4.
        ii. In App Select Mode
            1. Button 1 sets the controller up to send commands for Locus Maps.
            2. Button 2 sets the controller up to send commands for Rally Navigator.
            3. Button 3 sets the controller up to send commands for OsmAnd Maps.
            4. Button 4 sets the controller up to send commands for Piste Roadbook Reader.
    c. Each time you press a push button to select app 1 to 4, depending on the app you intend using on your mobile device, the main led will flash green the amount of times according to the app number. This is to indicate the unit has the right app selected.

i. For example: if you push button 2 to select soft app 2, Rally Navigation, the units led will flash twice to indicate the selection.
ii. For example: if you select soft app 3 to use OsmAnd, the green led will flash three times, showing your selection.
iii. Wait until the led has finished flashing and returns to solid red before selecting another app or turning to Rider Mode. You need to confirm the unit knows which app you chose.

d. Pressing Button 5 is **magic**
   i. Button 5 of your push buttons on your controller is programmed to read the voltage of the unit and give you a status report on your mobile device. Nifty.
   ii. This amazing feature gives you some insight into whether your battery of the unit is turned on, or if the permanent power is on and it tries to indicate if your battery might also be charging while on perm power.
   iii. If you press button 5 while in App Select Mode, the controller will send a text to your mobile with the battery info.
   iv. To see the text on your mobile device you simply need to be on your Home screen in Android or any text app such as a Notepad.
   v. If you are on your normal home screen on your Android device, the controller will simply open Google Search and send the text into the text bar of Google Search. Seeing as it's trying to effectively type a message for you to show the voltage.
   vi. A better option would be to simply open any notepad or text editor and press the push button 5 on your unit while in App Select Mode. The controller will send the text to your notepad and you can read the message which contains the voltage and assumptions.
   vii. **Fantastic**.

Using Rider Mode after selecting your soft app on your unit

- Once you have chosen your app and changed the controller's commands to be aligned with the app on your phone, you can turn your Mode Switch to Rider Mode.
- Once you have selected your softApp of choice in the App Select Mode, switch your Mode button back to ride mode.
- Your LED will turn from solid red (App Select Mode) to solid green.
- The green is to show you are in Rider Mode and the fact that it's solid and not flashing means it has an app selected and knows what to do when you start pressing push buttons.
- The commands associated with your app will then be sent to your phone according to the controller push button you press or the toggle switch direction you toggle.
- **NOTE**: The unit does not start the app automatically on your mobile device. It simply sends keyboard commands to your mobile device. You will still need to turn on your mobile and install the app of your choice.
- Open the app you want to use on your mobile, and that one that you selected on your RNHC must be the same app obviously.
- Once in the app, the commands coming from the controller should be the commands needed to control the core function of the app. Below is a list of the commands and their actions coming from the controller.
- **NOTE**: It's worth noting that Piste Roadbook reader allows you to set the incoming commands from the app itself. We have thus designed it so that the unit sends normal unique alphabet letters to the unit which you can then choose in the app according to the function you need.

DEFAULT COMMANDS FOR THE APPS

Standard commands assigned to your controller push buttons and toggle switch based on the navigation app you intend to use on your mobile

These are the standard commands assigned to each RNHC button for each of the four apps

SoftApp 1 : Locus Maps

Button	Code Assign		Function	Locus Maps
First push button	Button 1		Zoom in	Volume +
Second push button	Button 2		Zoom out	Volume -
Third push button	Button 3		Map up	r
Fourth push button	Button 4		Center map	c
Fifth push button	Button 5		Display on/off	d
Toggle forward	Button 6		Zoom in	Volume +
Toggle back	Button 7		Zoom out	Volume -

SoftApp 2 : Rally Navigator

Button	Code Assign		Function	Rally Navigator
First push button	Button 1		Trip Up	Volume +
Second push button	Button 2		Trip Down	Volume -
Third push button	Button 3		Not assigned	Not assigned
Fourth push button	Button 4		Scroll Up	Media Next
Fifth push button	Button 5		Scroll Down	Media Previous
Toggle forward	Button 6		Scroll Up	Media Next
Toggle back	Button 7		Scroll Down	Media Previous

SoftApp 3 : OsmAnd

Button	Code Assign		Function	Osmand
First push button	Button 1		Pan Up	Dpad_Up
Second push button	Button 2		Pan Down	Dpad_Down
Third push button	Button 3		Center ?	Keycode_C
Fourth push button	Button 4		Pan Left	Dpad_Left
Fifth push button	Button 5		Pan Right	Dpad_Right
Toggle forward	Button 6		Zoom In	Plus
Toggle back	Button 7		Zoom Out	Minus

SoftApp 4 : Piste Roadbook Reader

Button	Code Assign		Function	Piste
First push button	Button 1		Rb Scroll Fwd	w
Second push button	Button 2		Rb Scroll Rev	x
Third push button	Button 3		Trip +	a
Fourth push button	Button 4		Trip -	d
Fifth push button	Button 5		Media Play/Pause	q
Toggle forward	Button 6		Rb Scroll Fwd	d
Toggle back	Button 7		Rb Scroll Rev	q

Led colours and flashing explained

The main LED in your unit is a two colour LED. Usually red and green. Using the colours and flashing of the LED, it will indicate the different states of the unit and apps. By understanding the LED cookies and flashing behaviour, you can use the LED as an indicator of the mode the unit is in as well as the apps selected.

Here is a list of colours and flash codes.

- Green LED generally is to indicate Rider Mode.
- Red LED generally is to indicate App Select Mode.
- Green LED flashing shows the unit does not yet have a soft app selected yet. Turn the mode switch to App Select Mode and select an app for the unit.
- While the red LED is on, indicating it is in App Select Mode, when you press push buttons 1 to 4 on your controller the red LED will flash green the number of times, of the app number selected. This is to indicate the unit understands the app you selected. It's confirming the selection. Wait until it completes the flashing before proceeding. After flashing green, it will return to solid red. You can then either select a different app or press button 5 to check voltage or if you are satisfied with your selection, you can flip the mode switch back to Rider Mode and get going.
- Whilst in App Select Mode, pressing button 5 which is voltage reading, the red LED will rapidly flash green for 2 seconds indicating it is reading the voltage on the unit, and typing the result back to your mobile device for you to read. Check your mobile device as it will receive a text from your unit.

TIPS AND FREQUENTLY ASKED QUESTIONS

- Use a CAT5 connector between the controller and the buttons
    - We use a normal CAT5 network cable as the tether between the boxes as it already has the minimum required 8 strands that the controller needs.
    - A good tip is to place a network female-female adapter in the middle. This makes it very convenient to unplug one portion from the other. Especially if the unit is fitted onto the bike. This is very convenient to remove separate sections for field replacement, sweep outs or repairs.

- Consider using an external battery or connector
    - On your Adafruit Board, you have pins on the board to allow hard soldering wires that are linked to the battery supply. This works great to extend the battery power outside the box. Depending on your battery use (must be Lipo rechargeable batteries) you can then have an external connector as an emergency backup to plug a battery into your unit in the field. In case your internal battery doesn't work or your USB fails. Just another fail-safe.

- How to switch your LED state from red and green if your LED was soldered incorrectly
    - The Mode LED is a three-pin LED. It is sometimes difficult to solder the LED legs into place and know which leg represents green and which one represents red.
    - Don’t stress. You can fix this in the software.
    - Line 41 & 42 in the code version 1.7.3 sets the PINs for the LED. You can simply swap the values of A0 and A1 to the other and it will change the led colour.
    - From experience its best to have the colours represent the following modes:
        - RED: App Select Mode
        - GREEN: Riders mode

- Program your own buttons to match apps.
    - With some understanding of the code required, you can program the unit to send any keyboard keystroke to your unit. Depending on your app on your mobile, different keyboard commands can be used for different functions on different mobile device apps.
    - Find out if your Android app allows keyboard command and input. Then get those commands and simply program them into the code.

- How to start your unit with an existing default soft app loaded.

- In code line 70 the unit is set to start with no soft app selected. The green LED will flash on startup, indicating it doesn't yet have an app selected.
- This is very convenient if your unit resets while riding as you can identify that it lost power at some stage.
- However, if your power is good and constant, you might want to start the unit up in a default app to avoid having to select a soft app each time.
- You can easily do this by simply commenting out line 70 in the code and removing the comment indicators '//' in line 71.
- Select the app you want by changing the value of soft App according to the 4 apps in the code.
- By setting this in the active line 71, your unit will start up with the default app already selected.
- **Easy peasy**

THE END

We hope you enjoy this product and project as much as we do and encourage involvement and improvement.

To get in contact with Rally Rampage:

Visit the website at https://www.rallyrampage.com

Send an email to info@rallyrampage.com

Send a WhatsApp to +27 82 659 3035 (South Africa)

Enjoy!!