1400 Series AudioNav Keypad
Technical Manual

RNIB
Tried and Tested

Product Features

The AudioNav keypad is an ADA compliant assistive USB device offering menu navigation by means of audible content description.

Users with impaired vision, reading difficulties or impaired fine motor skills can navigate through menus or directories that would typically be presented on a visual display or touch screen. Screen content is represented and summarised by recorded or synthesized language via a headset or handset.

This provides a set of menu selection keys which are differentiated in a way that makes the product easier to use by people with visual impairment. In addition, a standard 3.5mm headphone socket is provided. This allows customers to plug their headset into the module and receive audio instruction to help them navigate the use of the equipment.

The externally mounted version of the AudioNav provides options for manufacturers and operators to permanently affix an AudioNav device to the outer casing of a host terminal or to adjacent surfaces such as walls or service counters. This is especially useful when existing self-service installations must be upgraded to meet current accessibility mandates.

An optional 'Quick Release Cradle' allows the AudioNav to be detached from the host system for use as a hand-held device. In this hand-held configuration AudioNav can, if required, be passed directly to any user with limited reach or impaired dexterity.

Used in combination with SpacePole™ products this externally mounted version of the AudioNav can be conveniently positioned and adjusted to ensure maximum accessibility. The Extended Footprint version "AudioNav EF" adds volume and playback speed control keys.

By use of the utility software, default illumination status and 'wake-up' behaviour can be selected. The USB codes can also be changed. Connection to the host is via a single USB cable.

Keypad
- Keypad is available in standard , extended footprint or externally mounted versions, with the following keys :
- A 4 way directional key providing UP, DOWN, LEFT and RIGHT navigation.
- A central ENTER key
- An illuminated audio volume key
- Additional keys on the EF version
- Illuminated 3.5mm audio jack socket (illumination under software control)
- Orientation switch in underpanel version to allow portrait or landscape mode.
- Mini-USB socket for connection to host (external version has fitted cable)
- Ground point for additional ESD protection.

USB Interface
- HID keyboard
- Supports standard modifiers, i.e. Ctrl, Shift, Alt
- HID consumer controlled device
- Advanced audio device
- No special drivers required
- Audio Jack Insert / Removal sends USB code to host
- Versions with microphone support need to be set as the default recording device in the Sound Panel
- Products with microphone support have been tested with the following voice assistants:- Alexa, Cortana, Siri and Google Assistant.

Bluetooth
- Option to include Bluetooth functionality so that the device can be used with the Touchless-CX app.
- This is disabled as factory default,
-

Support
- Windows compatible utility for changing the USB Code Tables
- API for custom integration
- Remote Firmware update support

Typical method for audio module volume control using the API

User Action
- Plug in the headphone jack

Host
- Host system detects the connection
- Sets volume level to initial default
- Repeating message :

"Press the volume key at any time to increase the volume level"

User Action
- Presses the volume key

Host
- Host system changes the volume on each key press (up to a max limit, then revert to default)

Host
- Message stops if volume key is not pressed inside 2 seconds.

User Action
- Remove the headphone jack

Host
- Volume reset to default.

Underpanel Version

Part Number 1406-34001 6 KEY DEVICE + USB AUDIO

The AudioNav is for underpanel use in either portrait or landscape orientation. There are 2 sets of fixing lugs :

- for weld studs on steel panel (1.2mm – 4mm thick), and

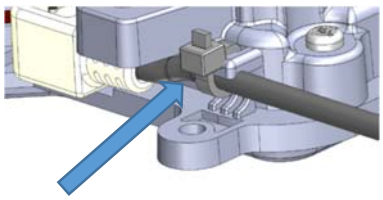
- for threaded inserts on plastic panel (3mm thick).

An orientation switch is provided so that the keypad can be fitted in portrait or landscape orientation.
This sends a USB code to the host : factory default is landscape

(Landscape = switch position I shown in picture)

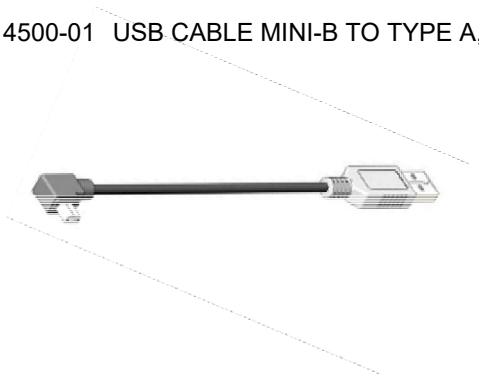
The keypad is designed to be installed underpanel onto M3 weld studs.
Download CAD File for panel cutout drawing.

It is recommended to use a cable tie for strain relief on the USB cable.
(Use 2.5mm nylon cable tie, RS 233-402 or equivalent)



Accessories / Cables

4500-01 USB CABLE MINI-B TO TYPE A, 0.9m



Underpanel Version – Alternative

Part Number 1406-35011-ALT 6 KEY DEVICE + USB AUDIO (Alternative version) White LED

The AudioNav is for underpanel use in either portrait or landscape orientation.

The alternative version has been created in response to the temporary shortage of microprocessor chips.

It has a different rear case and a different microprocessor

This version has the following features :-

- The rear case only has one set of fixing bosses in position B – see next page for details
  If you need to use the other set of bosses then we add on a plate to replicate these.

  PN 1406-35011-ALT is the alternative version (White LEDs).
  1406-35011-ALTP is the alternative version (White LEDs). with the plate fitted

- Internally there is a different microprocessor used.
  - This has different firmware
  - This still works with the API
  - This produces the same key code outputs
  - This is identified as a different version if you are using the Utility
  - The version can be queried remotely using the bcd device value = 0x0168 (std version 0x0200)

- The panel cutout, USB connection, output code table, performance are unchanged

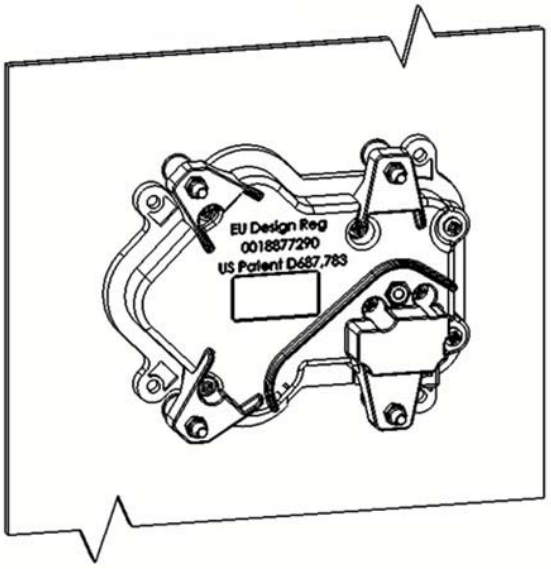
- The grounding wire is not required on the alternative AudioNav because the internal circuit has been improved with additional ESD suppression.

- There is a complete set of CAD files available to download for this alternative version

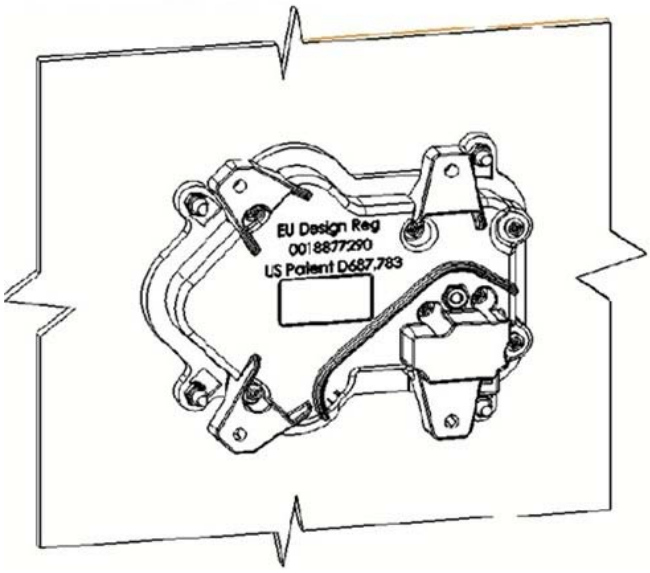
The 'original' AudioNav includes two sets of fixing bosses.

Rear view of the 'original' AudioNav installed using option A and option B.

Fixing points, position A



Fixing points, position B



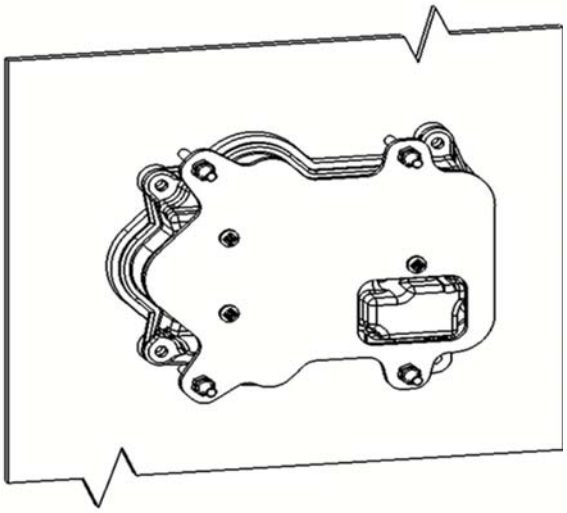
Rear view showing the alternative hardware version of the AudioNav

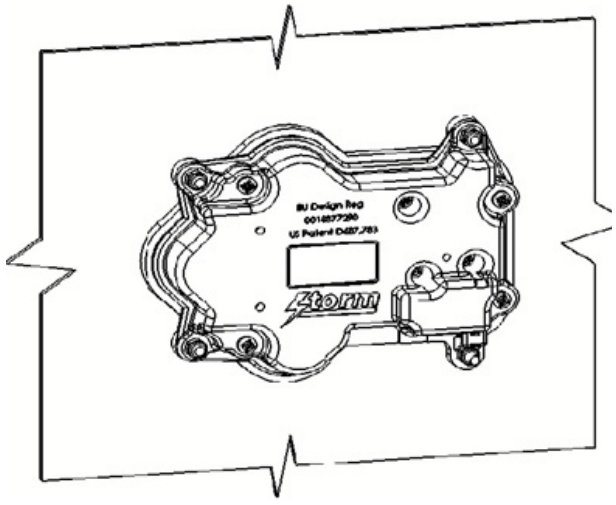
Fixing points, position A – rear plate required

The plate is supplied free of charge on request

Fixing points, position B – no change required

Fixing Position B still requires M3 x 12 mm studs.
Note that the bosses are now 7mm thick
(was 4mm previously)





On the alternative hardware version the cable tie is supplied fitted

Externally Mounted Version

Part Number	1406-33002	6 KEY DEVICE + USB AUDIO (includes 2m Cable)
	1406-QR000	Quick Release Bracket Kit (includes Qty 4 T20 M4 x 10mm screws)

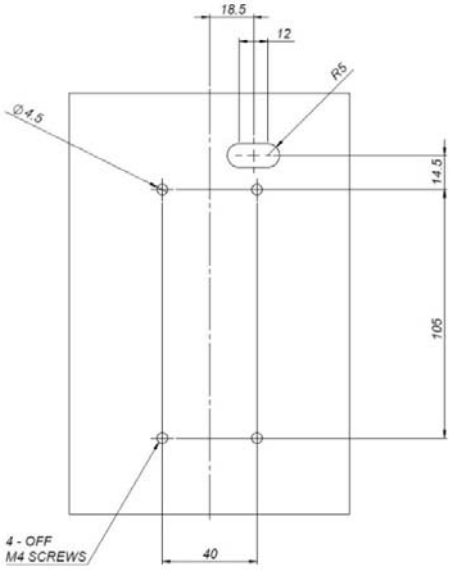
The externally mounted AudioNav is for use either fixed directly to a panel, or on a stand.

For direct panel fixing use M4 screws through the panel into the brass inserts on the rear of the AudioNav

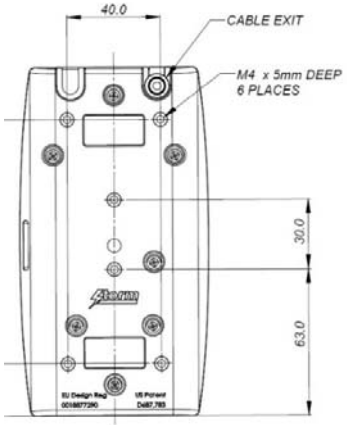
If used with a Spacepole stand then use the Quick Release Bracket kit

Compatible with Spacepole Stack [STP101-02]

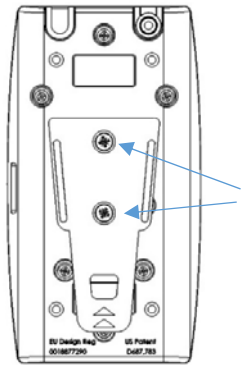
Panel Detail



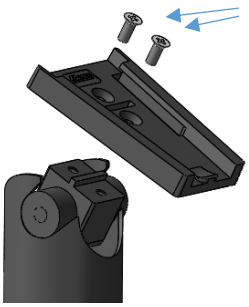
Rear View



Rear View with QR Kit



Fit clip to AudioNav with 2 screws



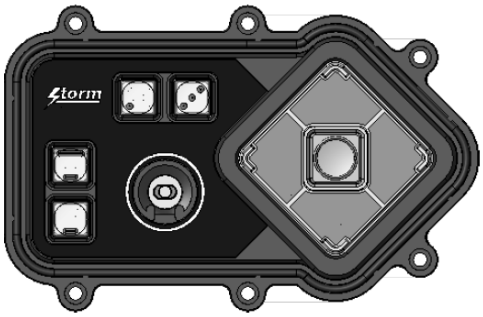
Fit bracket to stand With 2 screws

Extended Footprint Version

Part Number

1409-34011 – 9 Key Device + USB (vertical)
1409-35011 – 9 Key Device + USB + BLE (vertical)

1409-34013 – 9 Key Device + USB (horizontal)
1409-35013 – 9 Key Device + USB + BLE(horizontal)



An AudioNav EF product with additional keys to adjust the speed of speech reproduction, and to have a two key sound volume adjustment. This version also supports voice input from the headset microphone

The AudioNav EF is for underpanel install : there are portrait & landscape versions (and Bluetooth option for both)

There are 3 sets of fixing lugs :

- for weld studs on steel panel (1.2mm – 4mm thick), and

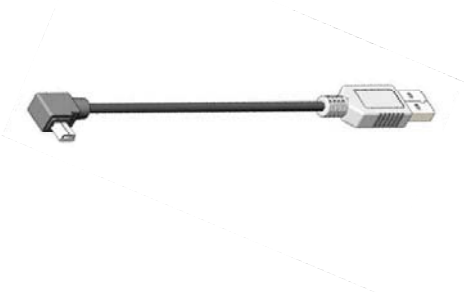
- for threaded inserts on plastic panel (3mm thick).

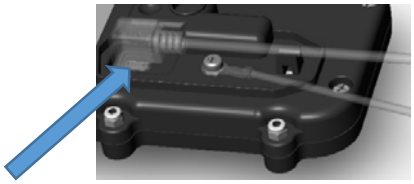
The keypad is designed to be installed underpanel onto M3 weld studs.
Download CAD File for panel cutout drawing.

It is recommended to use a cable tie for strain relief on the USB cable.
(Use 2.5mm nylon cable tie, RS 233-402 or equivalent)

Accessories / Cables

4500-01 USB CABLE MINI-B TO TYPE A, 0.9m





Specifications

	Underpanel	Externally Mounted	Extended Footprint
Rating	5V ±0.25V (USB 2.0) 130mA (max)	5V ±0.25V (USB 2.0) 130mA (max)	5V ±0.25V (USB 2.0) 190mA (max)
Connection	mini USB B socket	USB A Male 2.0	mini USB B socket
Compatibility	Storm Interface products are developed primarily for use with current and supported Microsoft Windows® platforms. For use with a non-Windows® platform, please contact Storm Interface for advice. Compatibility with non-Windows® platforms or operating systems cannot be guaranteed.		
Audio	3.5mm jack socket illuminated	3.5mm jack socket illuminated	3.5mm jack socket illuminated
Audio Output level	30mW per channel max into a 32ohm load	30mW per channel max into a 32ohm load	30mW per channel max into a 32ohm load
Bluetooth Interface (BLE)	Supported in some versions		
Dimensions	Overall 105 mm x 85mm x 28mm	Overall 150mm x 82mm x 34mm	Overall 138mm x 90mm x 28mm
Cable	Not Included	2 M (includes coiled section)	Not Included

Order Codes

Part Number	LED	BLE	Mic Input	Part Number	LED	BLE	Mic Input	Part Number	LED	Orientation	BLE	Mic Input
1406-34001	Green		✓	1406-33002	Green		✓	1409-34011	White	Vertical		✓
1406-34011	White		✓	1406-33012	White		✓	1409-34013	White	Horizontal		✓
1406-35011	White	✓	✓					1409-35011	White	Vertical	✓	✓
								1409-35013	White	Horizontal	✓	✓
1406-35011-ALT	White	✓	✓									
1406-35011-ALTP	White	✓	✓									
1406-ALTFIX	Fixing plate with screws											

Performance/Regulatory

	Underpanel	Externally Mounted	Extended Footprint
Operational Temp	-20°C to +70°C	-20°C to +70°C	-20°C to +70°C
Impact Rating	1K08 (5J)	1K08 (5J)	1K09 (10J)
Vibration/Shock	ETSI 5M3	ETSI 5M3	ETSI 5M3
Key Operational Life	4 million	4 million	4 million
Water / Dust sealed	IP65	IP54	IP65
Certification	CE / FCC/ UL /UKCA	CE / FCC/ UL/UKCA	CE / FCC/ UL /UKCA
ADA	ADA Compliant	ADA Compliant	ADA Compliant

Connectivity

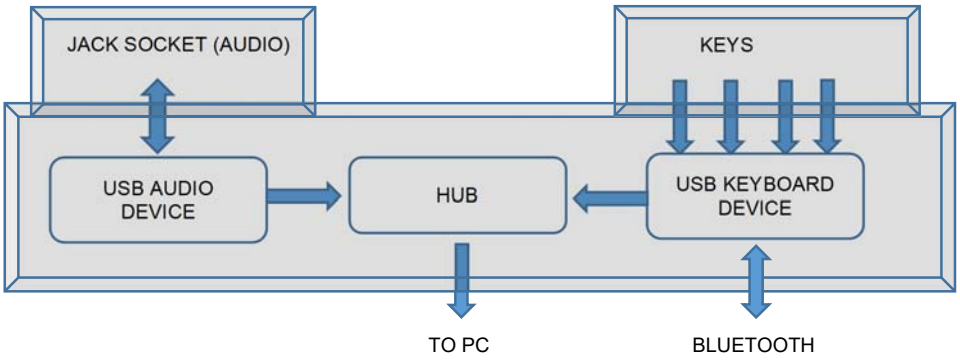
The USB interface comprises an internal USB hub with connected keyboard and audio module.
This is a composite USB device and no additional drivers are required.
PC based software utility and API are available to set/control: -

- Volume key function
- Illumination level control
- Customise the USB codes

USB Device Information

USB HID

The USB interface comprises a USB HUB with keyboard device and audio device connected.



The following VID/PID combinations are used:

For USB HUB:	For Standard Keyboard/Composite HID/ Consumer Controlled device	For USB Audio device
• VID – 0x0424 • PID – 0x2512	• VID – 0x2047 • PID – 0x09D0	• VID – 0x0D8C • PID – 0x0170

This document will concentrate on the Standard Keyboard/Composite HID/Consumer Controlled device. This interface will enumerate as

- Standard HID Keyboard
- Composite HID-datapipe Interface
- HID Consumer Controlled device

One of the advantages of using this implementation is that no drivers are required.

The data-pipe interface is used to provide the host application to facilitate customisation of the product.

Supported Audio Jack Configurations

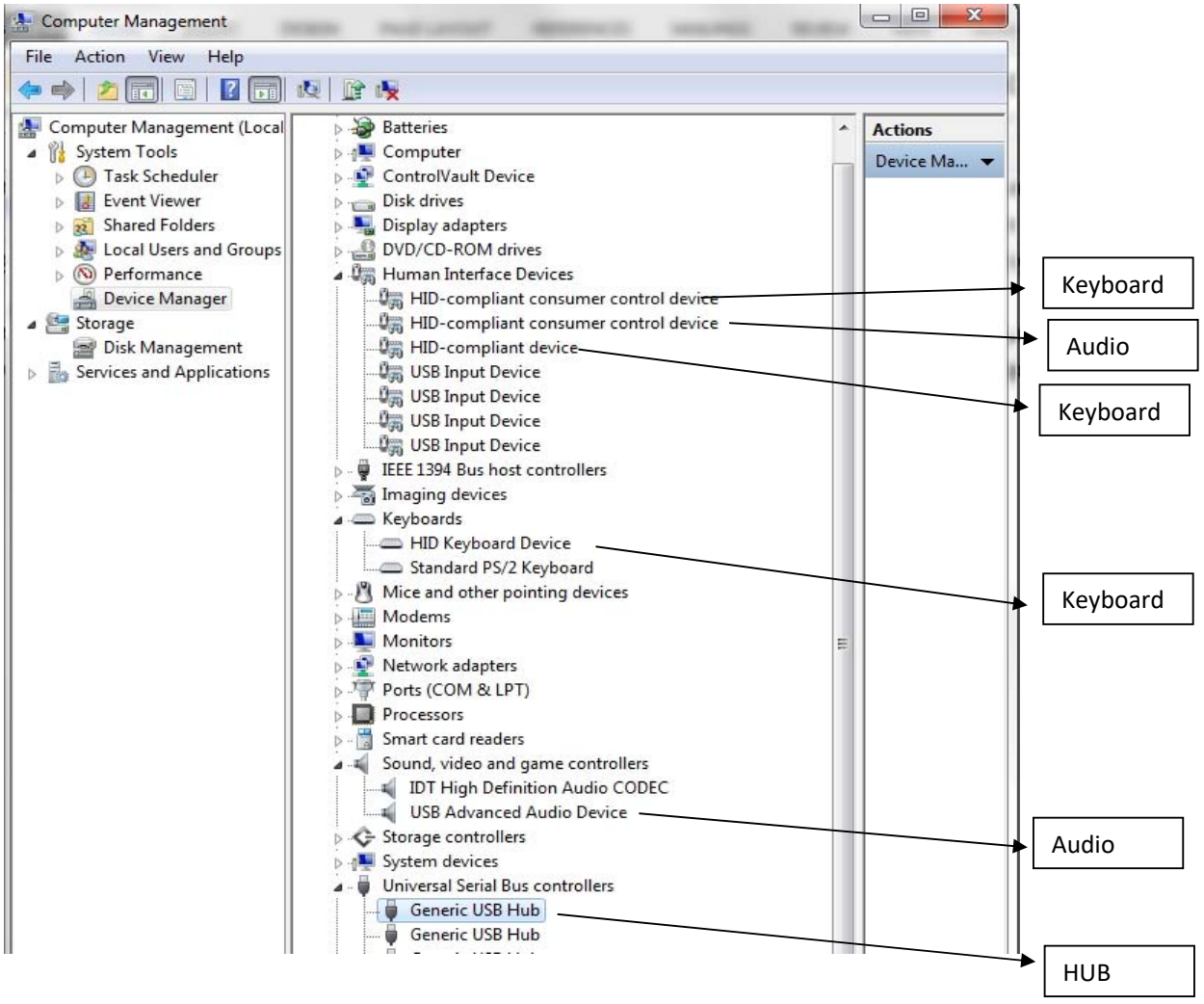
The following jack configurations are supported.

Notes: Application software should always ensure the same audio is present on both Left and Right Channels for correct mono operation.

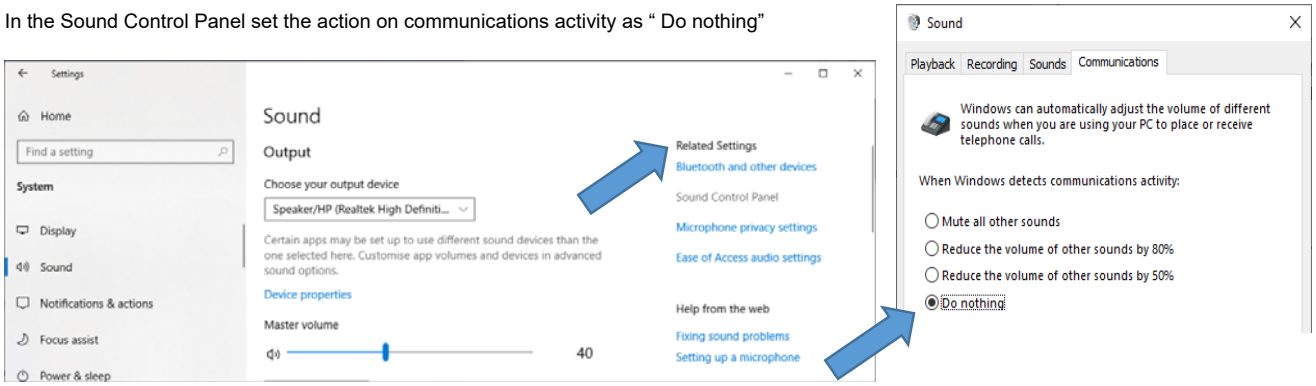
Device Manager

When connected to a PC, the keypad should be detected by the operating system and enumerated without drivers. Windows shows following devices in the Device Manager:

(Note that other audio devices will need to be disabled in Device Manager otherwise they will take priority).



In the Sound Control Panel set the action on communications activity as " Do nothing"

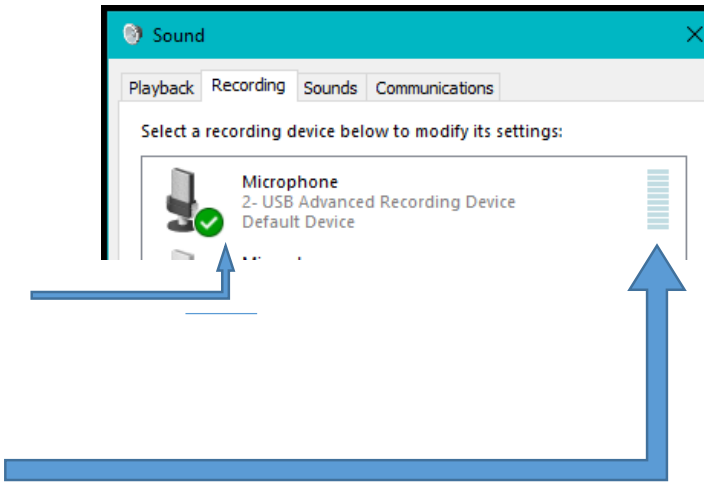


Microphone Support

The device will enumerate as a sound device (no special drivers are required) and will show up on device manager as a USB Advanced Recording Device

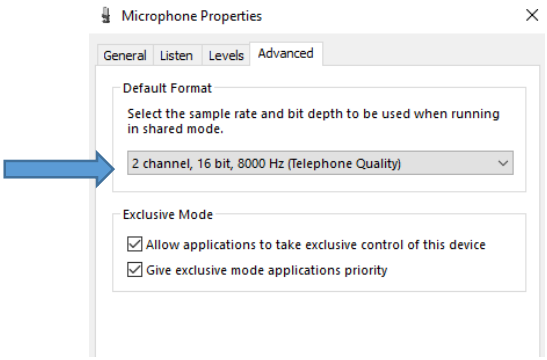
Open the sound panel it will show up as per the screenshot below :

For any windows application ensure that the microphone is set as the default device



If you speak the bar on right hand side will indicate that the microphone is picking up voice.

It is recommended for speech recognition that the sample rate is set to 8 kHz : click on Properties and then select the sample rate (in the Advanced tab).



Bluetooth Interface

The Storm Touchless-CX app enables kiosk users to intuitively navigate content displayed on a kiosk touchscreen. This is achieved using their personal smartphone or tablet device, without having to physically touch the kiosk screen. This touchless kiosk interface minimizes the transfer of bio-hazardous material and may also improve accessibility for those with limited reach or dexterity. The user downloads the Storm **Touchless-CX** app to their smartphone or tablet device (the app is available for free on Playstore and Appstore). They can then use the kiosk directly via the Audionav. Note that audio content over Bluetooth is not supported.

GET IT ON Google Play

Download on the App Store

The AudioNav stores an identifier (this is initially set to be the serial # of the AudioNav, can be changed using the software utility - usually changed to be the name / identifier of the kiosk in which it is installed).

An overview of operation is shown below.

STEP 1

When opened the app scans for Storm BLE enabled devices.

Each Storm BLE device has a unique identifier stored internally.

STEP 2

Any Storm BLE enabled devices found, are listed on the app screen.

The user taps the device they wish to connect to.

If several terminals are found they will all be listed as available for selection.

STEP 3

When the user is connected to a Storm BLE device, the device identifier is shown at the top of the app screen.

Kiosk content can then be navigated with the user's smartphone/tablet.

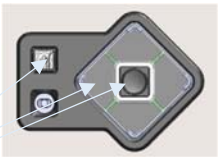
When finished the user can disconnect manually.

Automatic disconnection will occur if the user closes the app or moves away from the kiosk.

STEP 4

The tabs at the bottom of the app screen can be used to select either 'touchpad' or 'simulated' keypad mode.

1. Manual disconnect
2. Device identifier



To enable the Bluetooth function orient the device correctly as shown and follow the instruction below :-

For the AudioNav	Press in order and hold all at the same time for 5 sec :	Centre + Left + Volume
For the AudioNav EF Horizontal –	Press in order and hold all at the same time for 5 sec :	Select + Left + Speed Up
Vertical –	Press in order and hold all at the same time for 5 sec :	Select + Down + Volume Up

After you have pressed the keys the LEDs will flash to confirm that you have enabled Bluetooth.

Code Tables

The default and alternate USB code tables are shown below.

Landscape

Portrait

The standard AudioNav can be used in landscape or portrait mode. The conventional orientation is landscape – if you move the switch to portrait mode the output codes are adjusted to suit the new orientation.

	FACTORY DEFAULT CODE TABLE				ALTERNATE CODE TABLE				CUSTOMISED CODE TABLE
	LANDSCAPE		PORTRAIT		LANDSCAPE		PORTRAIT		
Function	**Hex**	**USB**	**Hex**	**USB**	**Hex**	**USB**	**Hex**	**USB**	
Right	0x4F	Right Arrow	0x4F	Right Arrow	0x4F	Right Arrow	01 02	Multimedia Vol Up	Set initially to the factory default values
Left	0x50	Left Arrow	0x50	Left Arrow	0x50	Left Arrow	01 04	Multimedia Vol Down	
Down	0x51	Down Arrow	0x51	Down Arrow	<0x01><0x04>	Multimedia Vol Down	0x4F	Right Arrow	
Up	0x52	Up Arrow	0x52	Up Arrow	<0x01><0x02>	Multimedia Vol Up	0x50	Left Arrow	
Select	0x28	Enter	0x28	Enter	0x28	Enter	0x28	Enter	
Jack IN	0x6A	F15	0x6A	F15	0x6A	F15	0x6A	F15	
Jack OUT	0x6B	F16	0x6B	F16	0x6B	F16	0x6B	F16	
Volume	0x6C	F17	0x6C	F17	0x6C	F17	0x6C	F17	
Orientation Switch									
I Landscape	0x6D	F18	0x6D	F18	0x6D	F18	0x6D	F18	
II Portrait	0x6E	F19	0x6E	F19	0x6E	F19	0x6E	F19	

Extended Footprint Version

Function	Hex	USB
Right	0x4F	Right Arrow
Left	0x50	Left Arrow
Down	0x51	Down Arrow
Up	0x52	Up Arrow
Select	0x28	Enter
Jack IN	0x6A	F15
Jack OUT	0x6B	F16
Volume Up	01 02	Windows Multimedia Codes
Volume Down	01 04	
+ Speech Rate	0x72	F23
- Speech Rate	0x73	F24

External Mount Version

Function	Hex	USB
Right	0x4F	Right Arrow
Left	0x50	Left Arrow
Down	0x51	Down Arrow
Up	0x52	Up Arrow
Select	0x28	Enter
Jack IN	0x6A	F15
Jack OUT	0x6B	F16
Volume	0x6C	F17

Using the Windows Utility to change USB Codes

Each product version has its own (free to download) version of the utility
If any other keypad utility software is installed (e.g EZ-Key Utility) then you should un-install that before you start.

System Requirements

The utility requires .NET framework to be installed on the PC and will communicate over the same USB connection but via the HID-HID data pipe channel, no special drivers are required.

Compatibility

Windows 10	✓
Windows 8	✓
Windows 7	✓
Windows Vista	✓
Windows XP	Only if you install .NET framework

The utility can be used to configure the product to

- Select Code Table
- LED brightness (0 to 9)
- Test AudioNav
- Create customised keypad table
- Reset to factory default
- Change Bluetooth settings
- Load Firmware

API for controlling the AudioNav device from the Host Computer

It is also possible to control the AudioNav device programmatically using an API (free to download) from a host that has USB capabilities.

	Instructions	Utility	API
AudioNav AudioNav External Mount	☑	☑ v11.0	☑ v7.0
AudioNav EF	☐	☑ v2.1	☑ v1.0

Change History

Technical Manual	Date	Version	Details
	29 July 15	1.0	First Release
	12 Aug 15	1.2	Screenshots updated
	01 Sep 15	1.3	API added
	08 Oct 15	1.4	Added amended function for h/v switch on p6
	20 Nov 15	1.5	Added cable tie picture to page 2.
	08 Sep 17	1.6	Update and added Remote Update Instructions
	25 Jan 18	1.7	Added RNIB logo and Externally mounted version
	13 Sep 19	1.8	Added EF version and split off Utility/API
	02 Sep 20	1.9	Added PNs for mic support versions
	02 Sep 20	2.0	Add note re Voice Assistant Support
	02 Dec 20	2.1	Add Code table for EM version
	16 Mar 21	2.2	Add Sound Panel Note to page 9
	22 Jun 22	2.3	Add BLE versions and multi key codes
	08 Jun 23	2.4	Add Alternative version
	11 Aug 23	2.5	BLE refs removed
	04 Oct 23	2.6	BLE refs reinstated

Product Firmware	Date	Version	Details
AudioNav	29 Jul 15	2.0	Updated so that only vol up / down works as a consumer device.
	10 Aug 15	4.0	H/V Code table switchover fixed for std table
	25 Feb 15	5.0	Jack In/Out debounce increased from 400ms to 1.2 sec
	25 Mar 17	6.0	Improve stability
	18 Oct 17	7.0	Added 8 digit SN, set LED default brightness to 6, improved recovery process.
AudioNav (BLE)	22 Jun 22	4.0 BLE	Introduced Version 4 BLE on Bluetooth product
	08 Jun 23	6.0 BLE	Bluetooth disabled when shipped
	30 Jun 23	7.0 BLE	Reinstate the function of the H/V switch to swap output codes for device orientation.
	04 Oct 23	8.0 BLE	Change to use new Bluetooth module Firmware STLv03
AudioNav - alternative	02 Jun 23	ABTv03	product descriptor set to "AudioNav168" bcdDevice set to to 0x0168
	30 Jun 23	ABTv04	Modified the API timeout for exchanging information between host and AudioNav, from current 3000ms to 400ms. Reinstate the function of the H/V switch to swap output codes for device orientation.
	04 Oct 23	ABTv05	New Bluetooth module Firmware STLv03
	11 Nov 23	ABTv06	Correct Utility Function for disabling BLE (was not working)
AudioNav EF	14 Aug 19	2.0	Initial Release
	20 Apr 20	3.0	Bug fix for Speech rate key press