Product Overview		Page
	Product Features, Part Numbers & Specifications, Code Table	2
	USB Device Information	3

Windows Utility

Change History

RNIB

Tried and
Tested

Product Features

Audio Interface Module with an integrated sound processor. This accessible ADA compliant device provides for connection of a personal headset, handset or other sound reproduction devices; enabling users to hear audio content generated by the host system. The device features white, highly visible illuminated, tactile keys for sound volume control. An illuminated 3.5mm jack plug socket is easily located and identified by a raised tactile headset icon. Connection to the host system is via a Mini B USB socket with an integrated cable anchor. A suitable USB Mini B to USB A cable is sold separately

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.

Available in vertical or horizontal versions, with the following features :

- Volume up/down keys

- 3.5mm Illuminated Jack Socket

- Jack insert/removal detection USB code

- Raised Headphone symbol

- Mini USB socket for connection to host

- Reverse printed dark silver colour front label , also available with black colour label

- Designed for under panel install to a 1.2mm - 2mm thick panel. CAD drawing available on request.

Order Codes

AT02-43001	AudioComm Module USB (Vertical Orientation)	Silver Label
AT02-430H1	AudioComm Module USB (Horizontal Orientation)	Silver Label
AT02-53001	AudioComm Module USB (Vertical Orientation)	Black Label
AT02-530H1	AudioComm Module USB (Horizontal Orientation)	Black Label
4500-01	USB CABLE – ANGLED MINI-B TO B, 0.9M LONG	

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
- Factory set to Multimedia Volume Up / Down Keys (alternate code table)

| Function	HID USB Codes	Hex
Volume Up	Multimedia Vol Up	<0x01><0x02>
Volume Down	Multimedia Vol Down	<0x01><0x04>
Jack IN	Keyboard F15	0x6A
Jack OUT	Keyboard F16	0x6B

Support

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

USB Device Information

USB HID

The USB interface comprises a USB HUB with keyboard device and audio device connected.
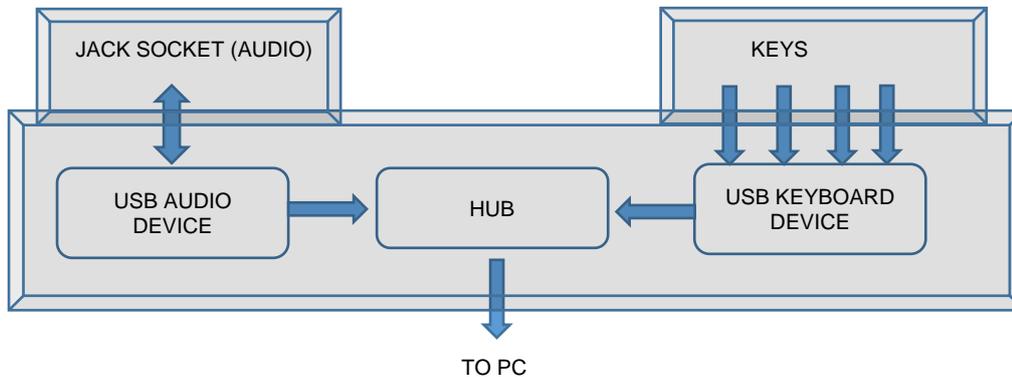
The following VID/PID combinations are used:

For USB HUB:	For Standard Keyboard/Composite HID/ Consumer Controlled device	For USB Audio device
• VID – 0x0424	• VID – 0x2047	• VID – 0x0D8C
• PID – 0x2512	• PID – 0x0A3B	• 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. Headsets with microphones can be used. (microphone input is supported on this product)

Device Manager

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

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

Audio-Comm devices

Device Manager — □ ✕

File   Action   View   Help

⬅ ➡ | 🖼 | 🔢 | 🖼

∨ 🖥 MIS00217
  ∨ 🔊 Audio inputs and outputs
    🎤 Microphone (7- USB Advanced Audio Device) ———————→ Microphone
    🔊 Speakers (7- USB Advanced Audio Device) ———————→ Audio out
    🔊 Speakers / Headphones (Realtek High Definition Audio)
  › 🖥 Computer
  › 💾 Disk drives
  › 🖥 Display adapters
  ∨ 💿 DVD/CD-ROM drives
    💿 HL-DT-ST DVD+-RW GHB0N SCSI CdRom Device
  ∨ 🎮 Human Interface Devices
    🎮 HID-compliant consumer control device ———————→
    🎮 HID-compliant consumer control device ———————→ Volume
    🎮 HID-compliant consumer control device ———————→ Up/Down
    🎮 HID-compliant system controller
    🎮 HID-compliant vendor-defined device
    🎮 HID-compliant vendor-defined device
    🎮 HID-compliant vendor-defined device ———————→ Keyboard
    🎮 USB Input Device
    🎮 USB Input Device
    🎮 USB Input Device
    🎮 USB Input Device ———————→
    🎮 USB Input Device ———————→ USB Devices x 4
    🎮 USB Input Device ———————→
    🎮 USB Input Device ———————→
  ∨ ⌨ Keyboards
    ⌨ HID Keyboard Device ———————→
    ⌨ HID Keyboard Device ———————→ HID Keyboard
  › 🖱 Mice and other pointing devices
  › 🖥 Monitors
  › 🖥 Network adapters
  › 🖨 Ports (COM & LPT)
  › 🖨 Print queues
  › 🖨 Printers
  › 🖥 Processors
  › 💾 Software devices
  ∨ 🔊 Sound, video and game controllers
    🔊 Realtek High Definition Audio
    🔊 USB Advanced Audio Device ———————→ Audio
  › 🖥 Storage controllers
  › 🖥 System devices
  ∨ 🔌 Universal Serial Bus controllers
    🔌 Generic USB Hub ———————→ Hub
    🔌 Generic USB Hub
    🔌 Generic USB Hub
    🔌 Generic USB Hub
    🔌 Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #1 - 8C26
    🔌 Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #2 - 8C2D
    🔌 Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
    🔌 USB Composite Device
    🔌 USB Composite Device
    🔌 USB Composite Device

Code Tables

The available USB code tables are shown below.

The product ships with the alternate code table loaded (so that up / down are multimedia volume control keys)

Function	DEFAULT CODE TABLE		ALTERNATE CODE TABLE		CUSTOMISED CODE TABLE	
	Hex	USB	Hex	USB		
Uo	0x68	F13	<0x01><0x02>	Multimedia Vol Up	Up Arrow	Set initially to the factory default values
Down	0x69	F14	<0x01><0x04>	Multimedia Vol Down	Down Arrow	
Jack IN	0x6A	F15	0x6A	F15	F15	
Jack OUT	0x6B	F16	0x6B	F16	F16	

Using the Windows Utility to change USB Codes

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.

Compatability

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
- Create customised keypad table
- Reset to factory default
- Update Firmware

Installing the Configuration Utility

To install the Configuration Utility **doubleclick on the downloaded .exe file and the Setup Wizard will launch**

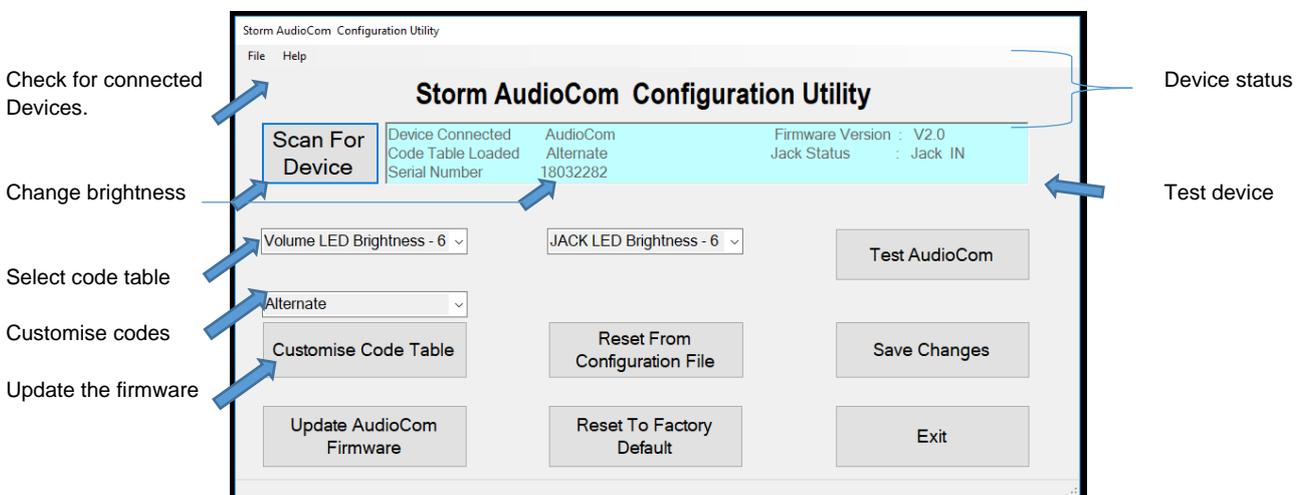Select the folder where you would like this installed

Choose you would like to install for all users of this pc (everyone) or just yourself (just me)

Click Next to start the installation

On complete a shortcut will be installed on your desktop.
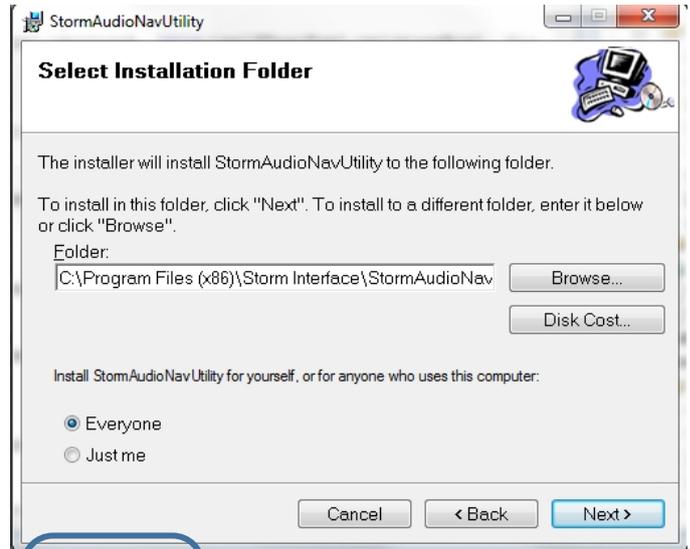
Double-click this to start the Utility and the following screen will appear. If an Audio Comm is connected it will be detected automatically and the details displayed. The available functions are described in detail on the following pages

Check for connected Devices.

Device status

Change brightness

Test device

Select code table

Customise codes

Update the firmware

Select Code Table

The user can select from three tables:

| Function	DEFAULT CODE TABLE		ALTERNATE CODE TABLE		CUSTOMISED CODE TABLE	
	Hex	USB	Hex	USB		
Uo	0x52	Up Arrow	<0x01><0x02>	Multimedia Vol Up	Up Arrow	Set initially to the factory default values
Down	0x51	Down Arrow	<0x01><0x04>	Multimedia Vol Down	Down Arrow	
Jack IN	0x6A	F15	0x6A	F15	F15	
Jack OUT	0x6B	F16	0x6B	F16	F16	

Once a table has been selected then the keypad will hold that configuration unless it is disconnected.

Once the keypad has been disconnected that configuration will be lost unless you save the configuration in memory by clicking on "Save Changes"
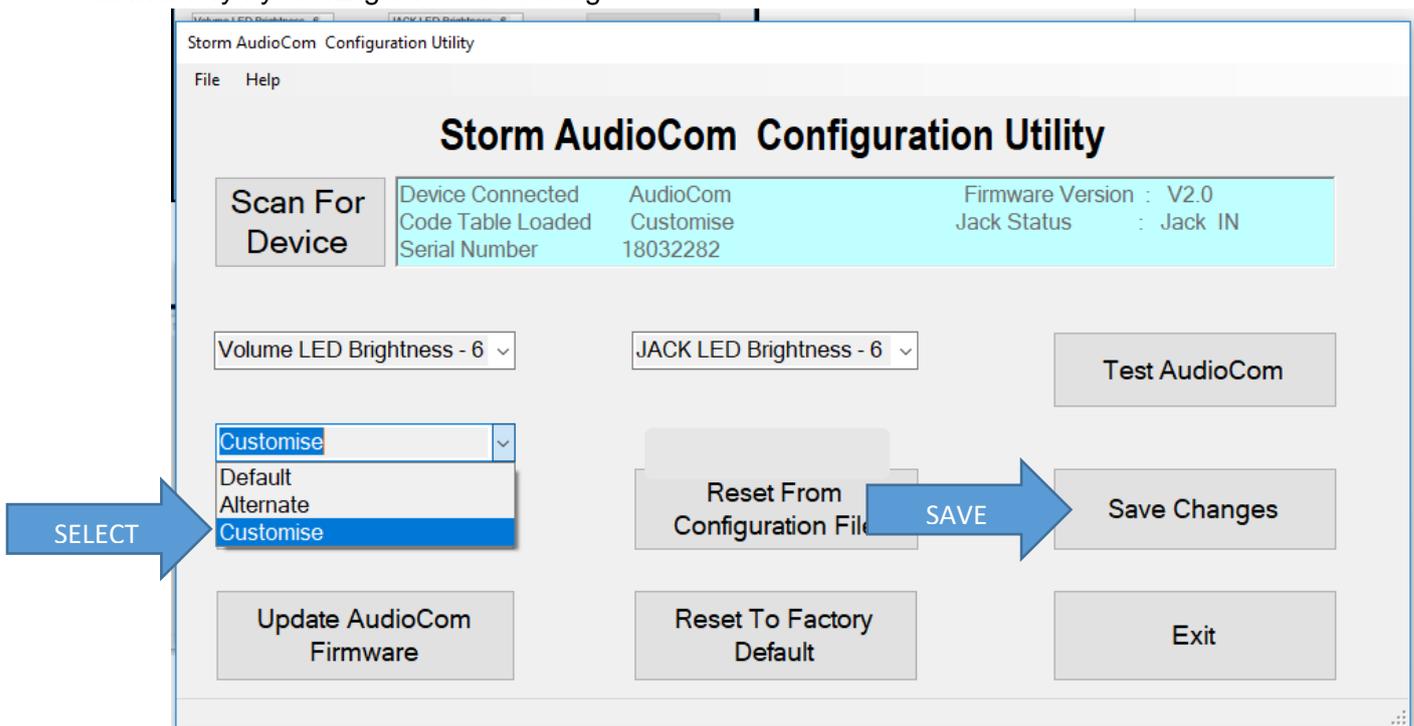
LED Brightness

This will set the brightness of the LEDs. The selection is from 0 to 9.
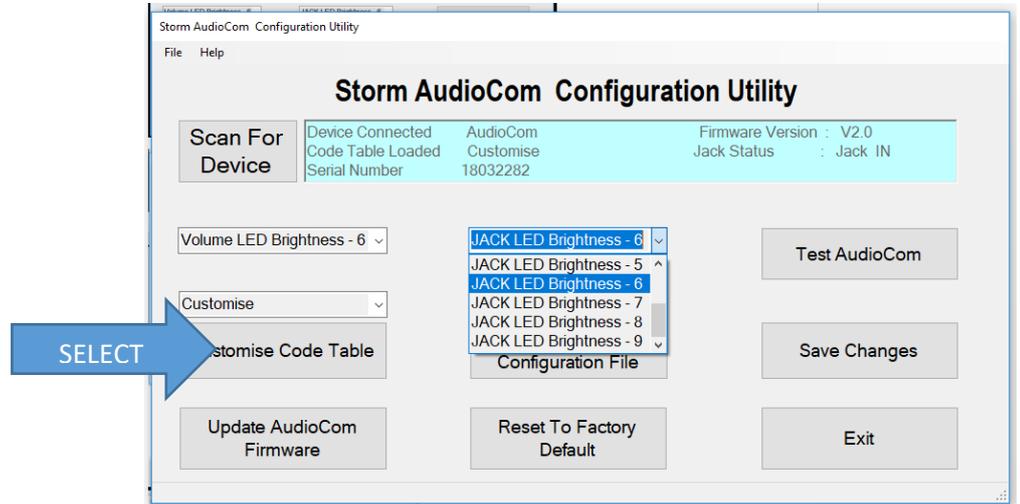
Test

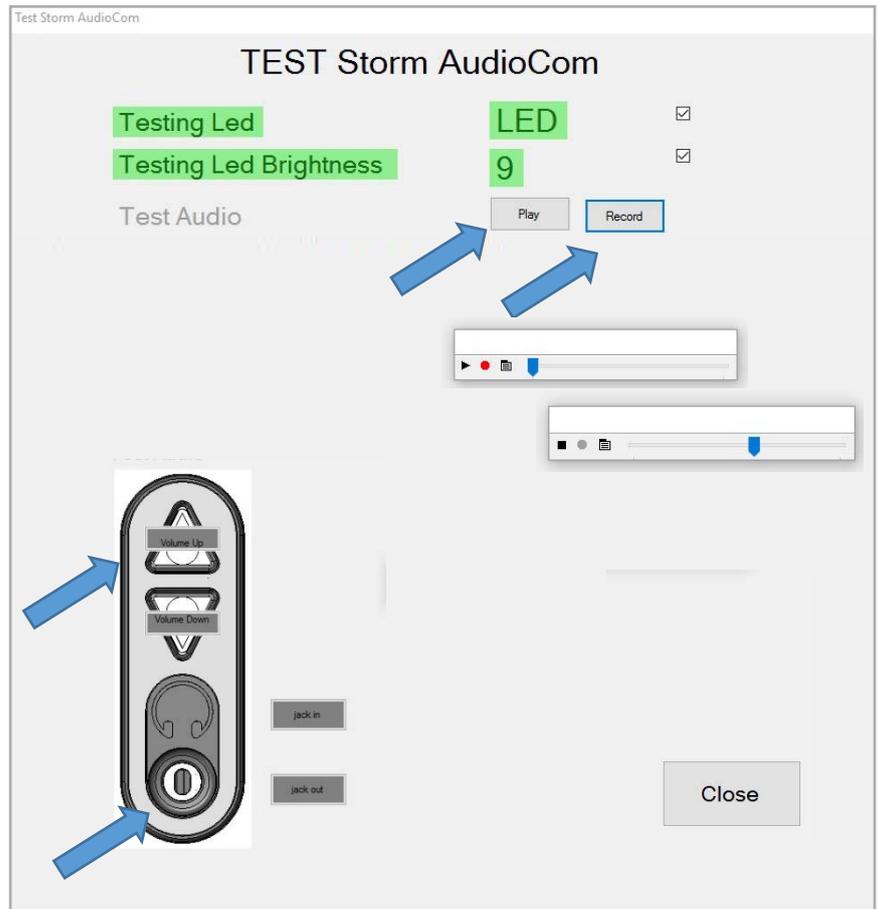This will test all the functions

- LEDs will flash
- LED brightness will cycle

Test Audio
- Plug in headphones
- Listen to Audio
- Press Record , Start.
  speak into microphone –
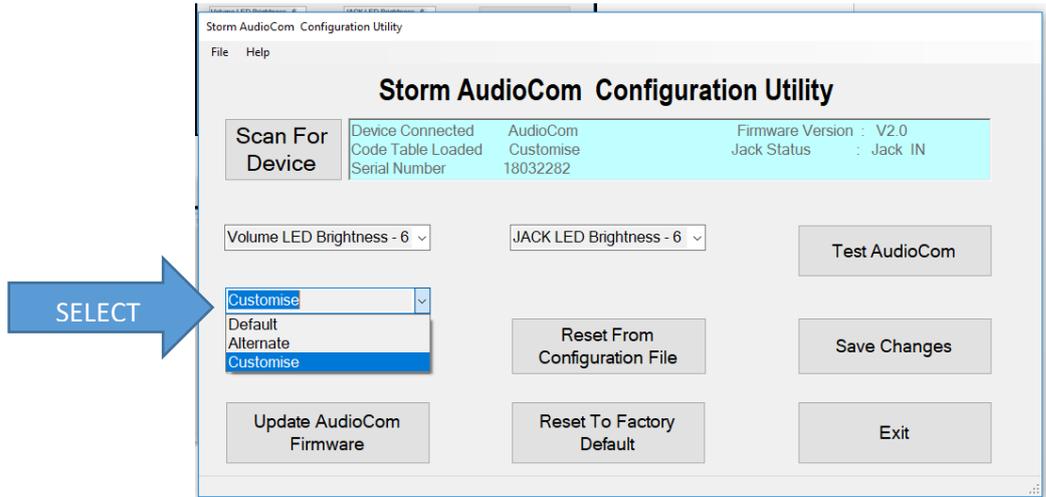 you will see the progress bar

Test Keys, Jack In.Out
- Press Up and Down keys
  Vol Up / Down will confirm

- Remove / Insert headphones
  Jack In / Out will confirm

Press close when finished.

Customise Code Table

Select the Customise table, and then click on

Customise Code Table

Note that Multimedia Control Codes (Vol Up / Down) are not available in Customised Table.

The following will be displayed when "Customise code" is clicked.

The current customised code table will be displayed from memory on the keypad.

Attached to each key is another button ("NONE"), this shows the modifier for each key.

To customize a key, click on the key and
Key Code combo box will appear, with "Select Code"

.
Now press on the down arrow on the combo box:
This will display all the codes that can be selected.

These codes are the ones defined by USB.org.

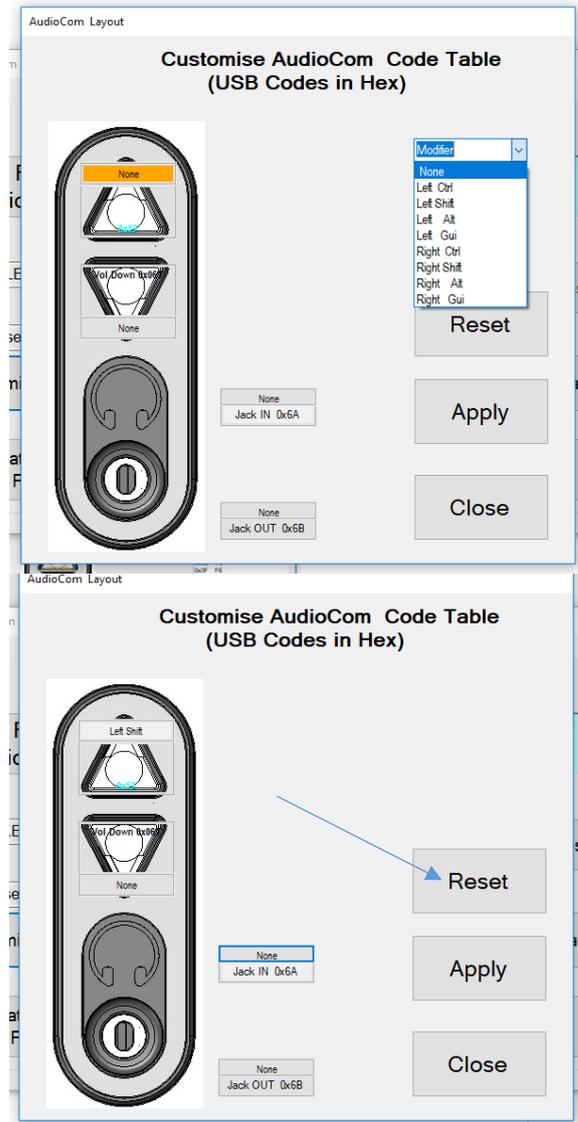Once code is selected, the code will be displayed
on the selected button.

In this example I have selected "e" and code is represented by 0x08 and button colour will change to Aqua.
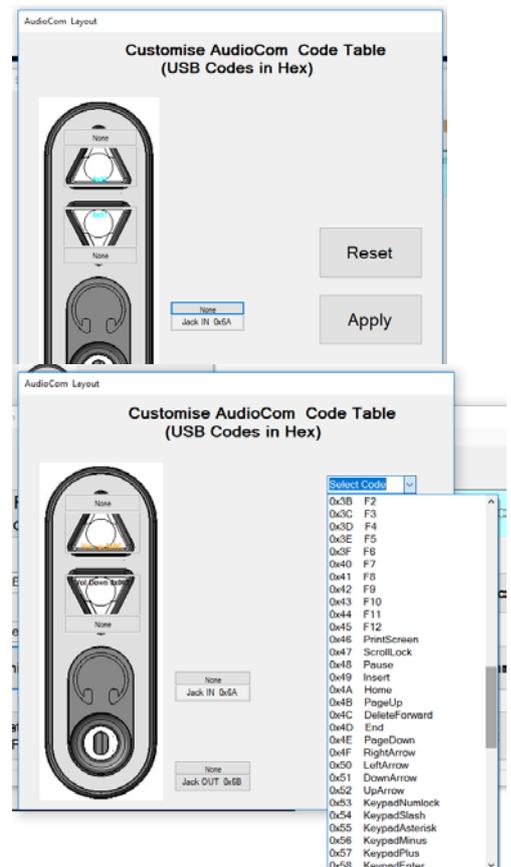
Press the "Apply" button and the code will be
sent to the AUDIOCOMM.

When you press key "Down" on keypad,
"e" will be sent to the relevant application.

If you did not want the current setting then click on "Reset" then all buttons will revert to original coding
and then click on "apply" to send this coding to Audiocomm keypad.

"Close" will exit the customize form and return back to main screen.

Saving Changes

If you don't press
"Save Changes"
your changes will not
be saved to the keypad.
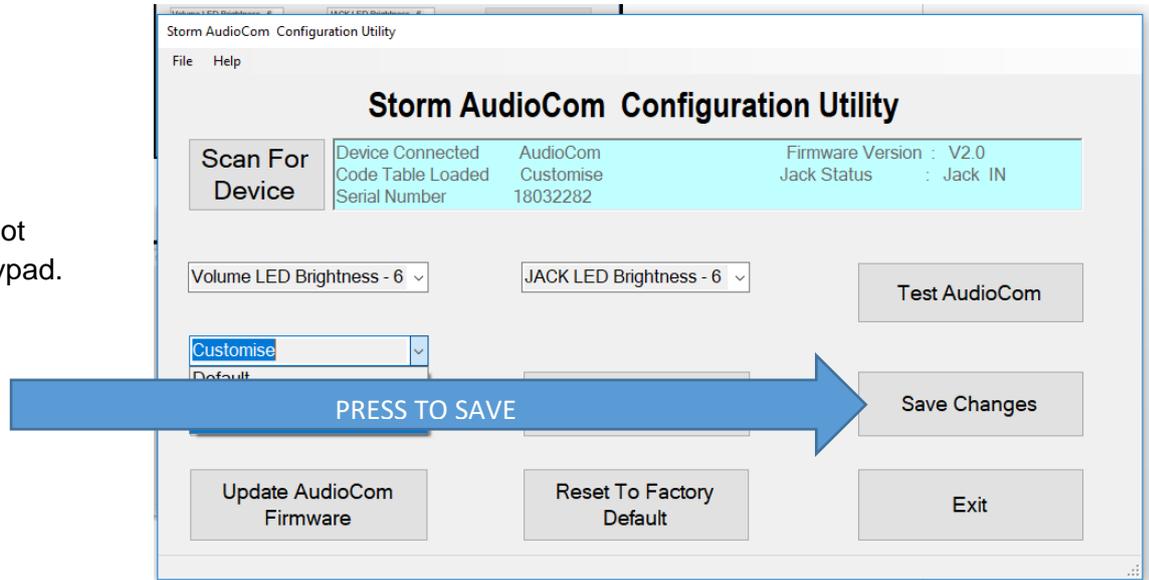
Factory Default

Clicking on "Factory Default" will
reset the keypad to the default code table
Code Table – Default
LED brightness – 9

API for controlling the AudioComm from the Host Computer

This section provides details on how the AudioComm™ can be controlled from a host that has USB capabilities.

The API incorporating this command set is downloadable from *www.storm-interface.com.*

Device Communications and Message Format

The AudioComm uses the ASCII/binary Message format described below. Every message that is sent from a host should be acknowledged with the control byte ACK (0x06). A retransmission should be initiated if an NAK (0x15) is received or if no acknowledge is received at all.

Message Formats

A	Alpha character, 'A'-'Z' and 'a' - 'z'
C	Control character one byte in length.
H	Hexadecimal characters, '0'-'9', 'A'-'F'
N	Numeric character, '0'-'9'
S	Special characters, entire character set 0x00 - 0xFF

ASCII Message Format

	Message Field	Type	Length	Description
1	STX	C	1	Control character Start of Text = 0x02
2	Message Id	H	2	Defines the type of message and format of the data field
3	Data Length	H	2	Hexadecimal value represented in ASCII defines the number of bytes in the data field. '00' to 'FF'. Maximum data field size is 256 bytes.
4	Data Field	S	var	In binary format
5	ETX	C	1	Control character ETX = 0x03
6	LRC	C	1	Longitudinal Redundancy Check Digit, calculated on all previous data including STX

Controlling the AudioComm from the Host Computer

Message Definitions and Error Codes

Here is a general table describing the message Ids, more detailed descriptions for each message Id follows. When a message is one way only, the Message Id. is the same for both the message and response.

ID.	Message	Description
01	Device Status Request	Host to AUDIOCOM keypad – Output the firmware version and all currently selected parameters
02	LED Brightness	Host to AUDIOCOM keypad – adjust led brightness. (default: 6)
03	Reserved	
04	Reserved	
05	Load New code table	Host to AUDIOCOM keypad – Load new code table
06	Reserved	
07	Keypad Table	Host to AUDIOCOM keypad – Select layout table 0 – Default Table 1 – Alternate Table 2 – Customised
08	Reserved	
09	Write to default	Host to AUDIOCOM – AudioCom writes configuration data from ram to flash.
10	Reset to factory default	Host to AUDIOCOM – Reset device back to factory default
11	Reserved	
12	Load Firmware	Host to AUDIOCOM – Sets the AudioCom to detect the device loader for firmware loading
13	Reserved	
14	Set serial Number	Host To AUDIOCOM – Sets the Serial Number (only used for factory)
15	Get Jack Status	Host To AUDIOCOM – Gets the status of Jack

Error Code

Every response message contains one of the following error codes:

00	No error
01	Command not recognized
02	Command not support at this stage
03	Parameter not supported
04	Hardware fault

.

Controlling the Keypad from the Host Computer

List of Messages

(Structure of Messages from Host to AudioComm is on the following pages)

| ID	Name	Description
01	Device Status Request	Output the firmware version & selected parameters
02	LED Brightness	Adjust volume key led brightness.
03	Reserved for future use	
04	Reserved for future use	
05	Load New code table	Load new code table
06	Reserved for future use	
07	Keypad Table	Select layout code table
08	Reserved	
09	Write to default	AudioCom writes configuration data from ram to flash
10	Reset to factory default	Reset device back to factory default
11	Reserved for future use	
12	Load Firmware	Sets the AudioCom to detect the device loader for firmware loading
13	Reserved for future use	
14	Set Serial number	Sets the serial number of device, only used for factory
15	Get jack status	Retrieves the status of the Jack

Device Status (01)

Host sends this message to request the status of the AUDIOCOM keypad

AUDIOCOM **Status Response**

Secure device sends this message to Host in response to the Device Status message.

	Data Field	Type	Length	Description	
ec	Error Code	SH	2		
Lb	Volume Key LED Brightness	SN	1	Value (0 – 9)	
Jl	Jack led brightness	SN	1	Value (0 – 9)	
Li	Reserved_1	SN	1	Reserved_1	
Lo	Reserved_2	SN	1	Reserved_2	
Di	Reserved_3	SN	1	Reserved_3	
Do	Reserved_4	SN	1	Reserved_4	
Js	Jack status	SN	1	Retrieves the status of Jack: 0 – Jack out, 1- Jack In	
Kt	Keypad Table	SN	1	0 – Default Table 1 – Alternate Table 2 – Customised Table	
Kc	Keycode	SH	8	Customised keycode for each key	
fw	Firmware Version	ANS	20	Left justified, if Firmware Version is less than 20 then just add enough spaces after the Firmware Version until this field is completed, for instance, "123456" becomes: "123456 "	

Host sends this message to request information from the AUDIOCOM

Host Device		AUDIOCOM
[01]	⟹	
	⟸	[01][ec][lb[Rs][Li][Lo][Do][Di][8*kc][fw]
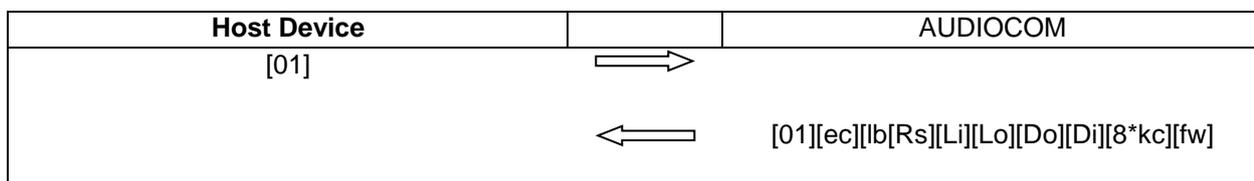
LED Brightness Command (02)

Host sends this message to control brightness of LEDs

	Data Field	Type	Length	Description
1	Select LED	SN	1	0 – Volume key led, 1 – Jack Led
2	LED brightness	SN	1	0-9

LED Brightness Command Response

	Data Field	Type	Length	Description
ec	Error Code	H	2	

Host Device		AUDIOCOM
[02][lb]	⟹	
	⟸	[02][ec]
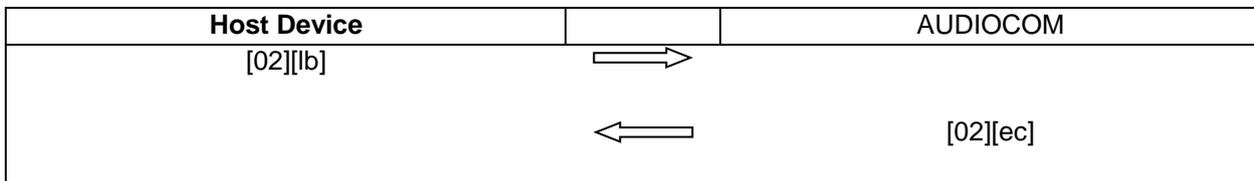
Note: LED brightness of 0 value indicates LEDs are off

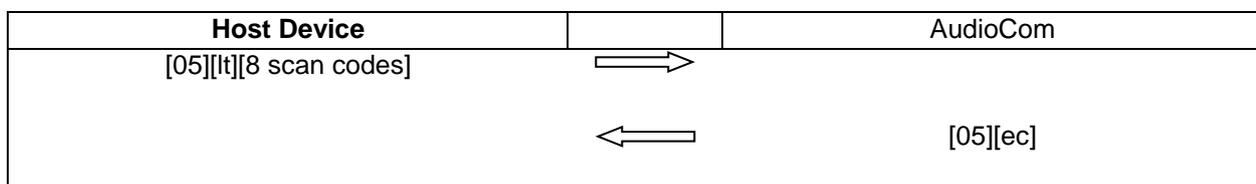   LED brightness of 9 value indicates full brightness

reserved (03)

Reserved (04)

Load New Key Code Table Command (05)

Host sends this message to Load New Code Table

	Data Field	Type	Length	Description
1	Load New Code Table	SH	8	Key Code Table:

Load New Table Command & Response

	Data Field	Type	Length	Description
ec	Error Code	H	2	

Host Device		AudioCom
[05][lt][8 scan codes]	⟹	
	⟸	[05][ec]

Note: Length is always 8,

Format of table is as follows:

<modifier for key 1><code for Key 1><modifier for key 2><Code for Key 2>..........etc

The code table is specified in the user manual together with the modifier code. For example to program the following for 4 way :

Key 1 – A

Key 2 – a

Key 3 – 9

Key 4 - !

<0xE1><0x04><0x00><0x04><0x00><0x26><0xE5><0x1E>

Note: 8 bytes must be sent, for unused key code pad the values with 0x00.

Note: For shift modifiers there is a left and right modifiers value defined. So we can use 0xE1 – Left Shift and 0xE5 – Right shift. Similarly there is left and right Alt

Reserved (06)

Keypad Table Command (07)

Host sends this message to set code table to be used.

	Data Field	Type	Length	Description	
1	Code Table	SN	1	0 – Default Table 1 – Alternate Table 2 – Customised Table	

Keypad Command & Response
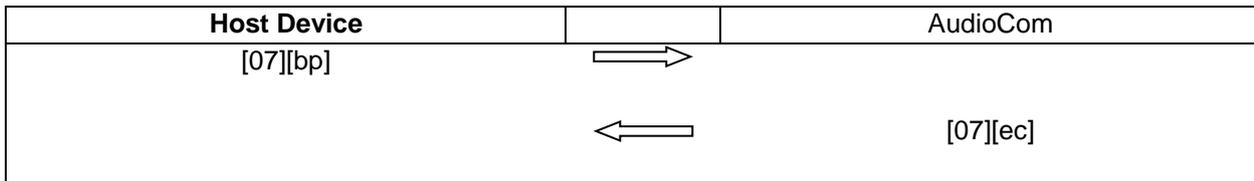
	Data Field	Type	Length	Description
ec	Error Code	H	2	

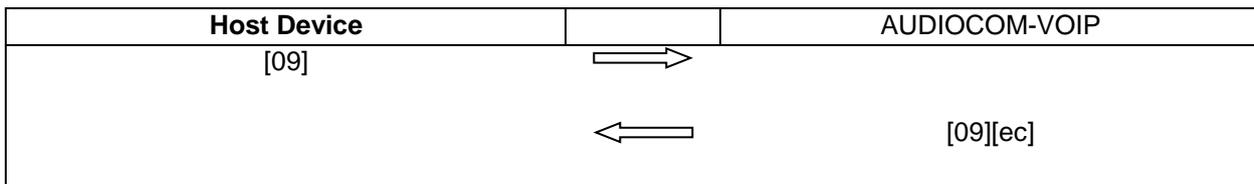| **Host Device**		AudioCom
[07][bp]	⟹	
	⟸	[07][ec]

Reserved (08)

Write Config Data To Flash command (09)

Host sends this command to request the AUDIOCOM to write the configuration data from RAM to FLASH.

This command has no data associated with it.

RAM to FLASH Command & Response

	Data Field	Type	Length	Description
ec	Error Code	H	2	

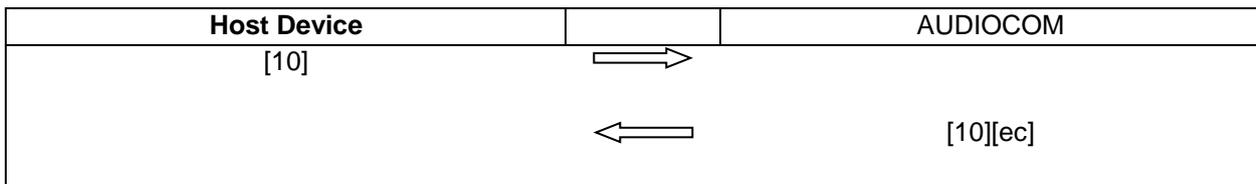| **Host Device**		AUDIOCOM-VOIP
[09]	$\Longrightarrow$	
	$\Longleftarrow$	[09][ec]

Reset To Factory Default command (10)

Host sends this command to request the AUDIOCOM to reset parameters back to factory default.

This command has no data associated with it.

Reset To Factory Default Command & **Response**

	Data Field	Type	Length	Description
ec	Error Code	H	2	

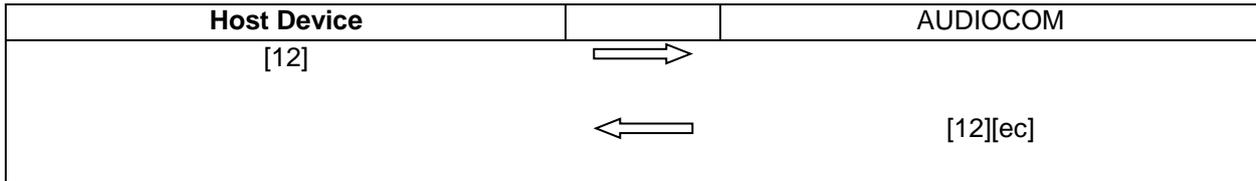| Host Device		AUDIOCOM
[10]	⟹	
	⟸	[10][ec]

Enable BSL Command (12)

Host sends this command to request the AUDIOCOM to start downloader

Enable BSL **Command & Response**

	Data Field	Type	Length	Description
ec	Error Code	H	2	

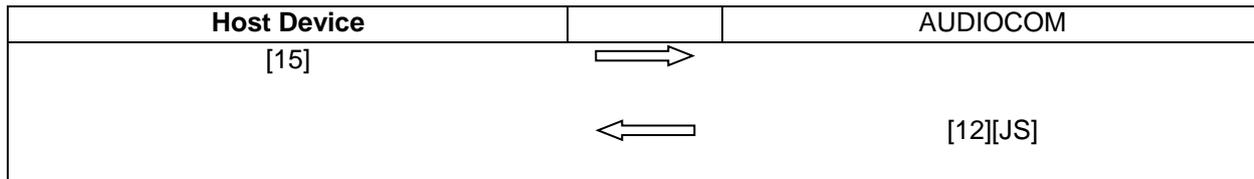| Host Device		AUDIOCOM
[12]	⟹	
	⟸	[12][ec]

Reserved (13)

JACK Status (15)

Host sends this command to request the AUDIOCOM to retrieve jack status

Jack Status **Command & Response**

	Data Field	Type	Length	Description
ec	Error Code	H	2	

Host Device		AUDIOCOM
[15]	⟹	
	⟸	[12][JS]

JS – Jack Status
Jack IN – 1
Jack Out - 0

Change History

Tech Manual	Date	Version	Details
	14 Nov 18	1.0	First Release

Configuration Utility	Date	Version	Details
	14 Nov 18	1.0	First Release

Product Firmware	Date	Version	Details
	1 Nov 18	ATv02	First Release

API	Date	Version	Details
	5 Apr 19	1.0	First Release