## Manual v5.2 RC1 Rev A

Key Specifications

- Best-in-Class Configurable Bluetooth 4.0 + BLE and Wireless Audio
- Embedded Software and Stack that provides an abstraction layer of the Bluetooth Link
- Controlled via UART or GPIO interfaces
- Profiles: HFP and AG 1.6, PBAP, MAP, A2DP1.3 Sink and Source, AVRCP1.5
- Multipoint Support
- True Wireless Stereo (TWS) support
- Supports data transfer over BLE, SPP, iAP1, and iAP2[1] protocols
- Supports aptX, AAC, SBC, and MP3 codecs
- Supports digital audio input and output I2S, PCM, SPDIFF at sample rates 39kHz - 50kHz
- Supports analogue audio input and output from module ADC and DAC
- Future proof - uses the latest hardware and supports firmware upgrade (DFU)

Description

Melody is an embedded firmware running on the BC127 module. It offers both Classic Bluetooth and Bluetooth Low Energy functionality. It provides all functions needed for designing a wireless Audio device that can connect seamlessly to Smartphone applications and deliver the best audio quality and user experience
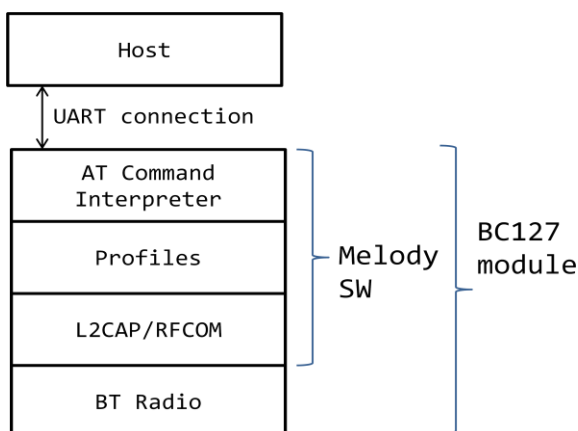
Applications

- Wireless Speakers, Docks and Headsets
- SmartPhone Controlled Audio Systems
- Automotive Infotainment Systems
- Medical Devices
- High Quality Audio Streaming
- Gaming Accessories and MP3 Players

---

[1] iAP1 and iAP2 protocols are available to Apple MFI Licensees. Please, contact BlueCreation for access to the Melody-MFI Manual.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 1 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Blue Creation

Introduction

Melody is an embedded firmware solution running on the BC127 module. It includes an application, the Bluetooth profiles and the Bluetooth protocol stack both for Classic Bluetooth and Bluetooth Low Energy. It therefore allows using the BC127 module to develop a Bluetooth device without detailed knowledge of the Bluetooth standard. Melody provides a simple high level UART-based command interface. So the Bluetooth module can be controlled from a host processor.

Setting Up - Equipment

To start you need to have:

a) A Bluetooth Development board such as BC127-DEVKIT. Please contact sales@bluecreation.com for more information.

b) A computer with a serial port running a serial terminal, such as PuTTY or HyperTerminal for Windows or an equivalent program, to communicate over the COM interface.

Connect your PC to your Bluetooth module using the serial port. By default, Melody uses the following UART settings:

- Baud rate   : 9600bps
- Data bits   : 8
- Stop bits   : 1
- Parity bit   : No parity
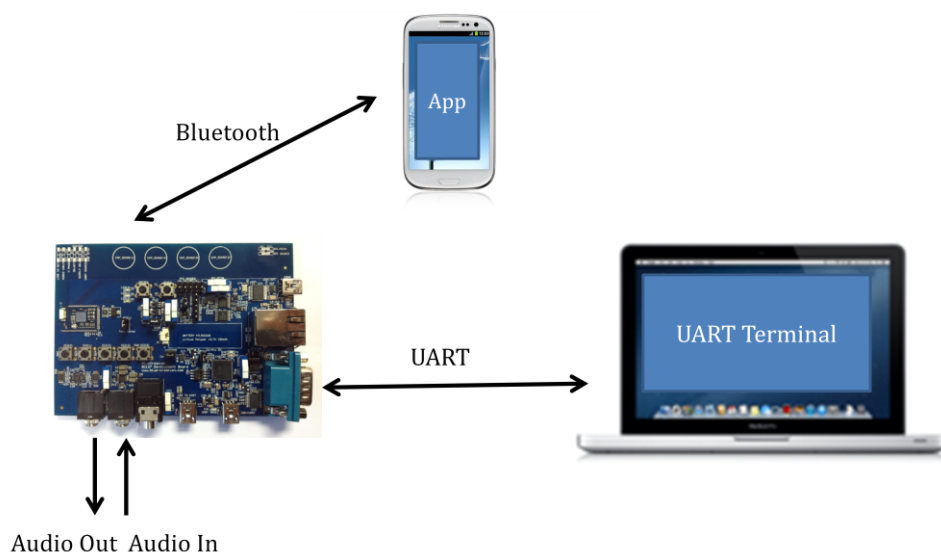- HW Flow Control : Disabled

Figure 1: Example configuration

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 2 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Manual v5.2 RC1 Rev A

Once you have configured your serial terminal and opened the COM port, power up the development kit. You should see a prompt appear on the screen of the terminal. If you see a prompt and a READY, the module is ready to operate.

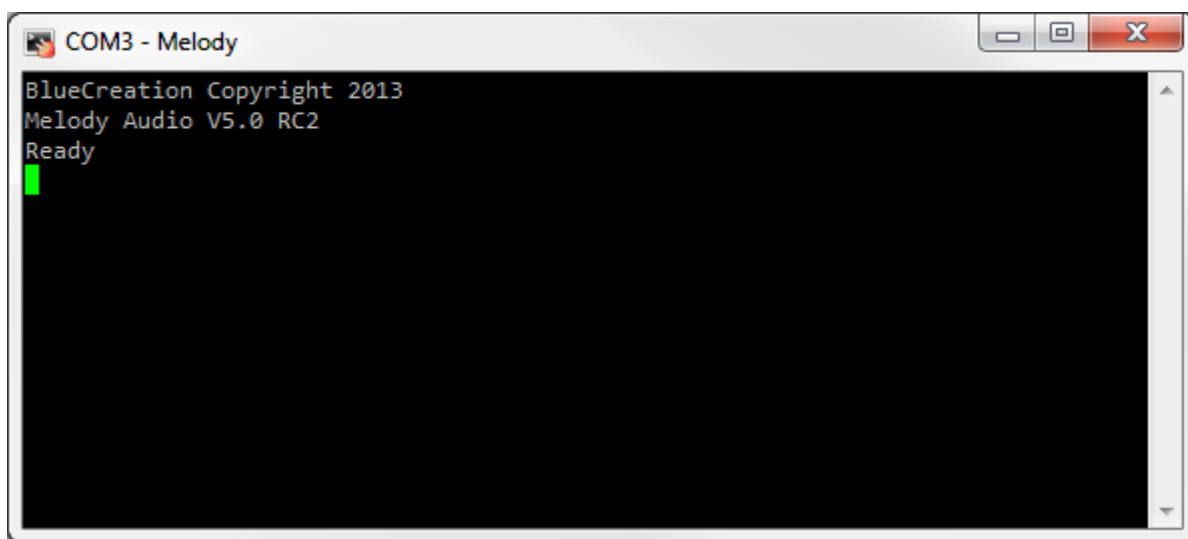You are now ready to control the module!

Figure 2: Melody initial load

If you do not see the prompt and READY appear, please check:

1) That the module is powered ON and receiving power
2) The UART settings on your serial terminal are the same as above
3) The module is preloaded with Melody firmware

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Page 3 of 39

Manual v5.2 RC1 Rev A

Melody Default Behaviour and Operating Modes

When Melody boots with factory default settings, it will be discoverable. Any Bluetooth enabled phone or other Bluetooth device will be able to see it, if it scans for (discovers) Bluetooth devices. Melody will appear as 'BlueCreation-XXXXXX'[2]

When Melody boots with factory default settings, it will be in Command Mode. In this mode, Melody parses the commands coming from the UART and executes them. This allows control over the Bluetooth. Once connected, Melody will transparently transfer any audio stream to the DAC (by default), or I2S or PCM (when configured). If a SPP connection is established, the user can enter Data Mode. This is a mode in which Melody simply passes over data received to the UART acting as a simple data pipe. The Data Mode is explained later in the document in more details.

To switch between Melody operating modes: Command Mode and Data Mode, the following commands are used:

Command	Switch *from:*	Switch *to:*
$$$$	Data Mode	Command Mode
ENTER_DATA	Command Mode	Data Mode

Table 1: Operating mode commands

---

[2] XXXXXX will be six hexadecimal digits that correspond to the last six hexadecimal digits of the device Bluetooth address. If you are using the BC127-DEVKIT, the LED will be flashing alternatively to indicate It is Discoverable

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 4 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Bluetooth Commands

When in Command mode, the module accepts commands from the host via the UART interface. The generic syntax for commands is:

COMMAND (parameter_1) (parameter_2) … (parameter_n)\r

with a space between each parameter and a carriage return ('**\r**' or **0x0D**) at the end of each command.

Commands need to be completely entered within the specified command timeout (400ms by default). Melody will return an '**OK**' after each command to indicate that the command was executed. An '**ERROR**' will be returned if the command has not been executed or if the parameters are wrong.

The different commands to control the Bluetooth link are listed in alphabetical order below. Mandatory parameters are listed in "**( )**" optional parameters are listed in "**[ ]**".

Please note that all optional **[link_ID]** parameters are **mandatory** for Multipoint and TWS operation. For all commands that list **[link_ID]** as parameter, please supply the link id[3] of the link you would like that command to be applied to.

UART Command	Description
$$$$	Exit Data mode
ADVERTISING (mode)	**OFF** stops BLE advertising, ON starts BLE advertising
ANSWER	Accepts an incoming call on the HFP link
BATTERY_STATUS	Returns the battery status of the battery attached to the module by detecting the voltage level
CALL [link_ID] (number)	Dials the number on the HFP link In AG no parameter is passed, and command initiates a bidirectional HFP audio connection between devices.
CLOSE (link_ID)	Terminates the Bluetooth Profile connection. **linkid** is a number that defines the connection ID. **all** closes all links
CONFIG	Shows all configuration registers
CVC_CONF (type) [(key) (length)]	Read or write the CVC configuration stored on the module. **type** can be **WB** or **NB**. If only **type** parameter is supplied all 4 config keys for this type will be displayed. If **key** and **length** parameters are present, the key indicated will be written with a value of size length. **key** can be 0 - 3 **length** is in 16 bit words and can be 0 - 64. 0 will delete the key. The CVC_CFG command will reply with OK/ERROR. If length was supplied after OK a raw list of upto 24 space separated words followed by carriage return has to be supplied. Each carriage return will be replied to with an OK/ERROR if the operation is

[3] For a mapping of profiles and link ID's please see Appendix C.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom Page 5 of 39

t. +44 (0)1223 420 252 e. info@bluecreation.com www.bluecreation.com

	successfully. If more than the length words are supplied the overall operation will fail.
`DFU`	Puts the device in DFU mode[4]
`DISCOVERABLE (mode)`	**OFF** makes the device non discoverable ON puts the module in discoverable mode[5]
`DUT`	Enters DUT mode to use testing tools with the serial port and default UART configuration for production
`END [link_ID]`	Ends a call on the HFP/AG link
`ENTER_DATA`	Enters Data mode
`HELP`	Returns available list of commands
`GET (config_name)`	Reads the value of a configuration parameter.
`INQUIRY (timeout) [TWS]`	Searches Bluetooth devices in the area for maximum period of time (equal to 1.28s * **timeout**). Timeout takes a value between 1 and 48. Supplying the optional **TWS** parameter will only show TWS devices.
`LICENSE <flag>`	This command is used to retrieve the license keys for APTX and cVc if <flag> is omitted. If <flag> is set to APTX or CVC, then it will retrieve the corresponding license key.
`LICENSE <flag>=<value>`	This command is used to set the license key to either APTX or cVc. <flag> can be either CVC or APTX. <value> is 5 words consisting of the license key (e.g. 1111 2222 3333 4444 5555)
`LIST`	Lists paired devices in the format `LIST (BT addr) (Space separated list of supported profiles)`
`MUSIC [link_ID] (instruction)`	Controls the music stram state and sends AVRCP instructions (if AVRCP available)(Instruction=PLAY, PAUSE, STOP, FORWARD[6], BACKWARD[4]) Please use the A2Dp link ids for multipoint.
`NAME (BT_addr)`	Returns the friendly name of device with the provided Bluetooth address
`OPEN (BT_addr) (profile)`	Establishes a connection with a given Bluetooth address (formatted as 12 Hexadecimal digits with no separators. e.g.: 3859F9CCB893) and a certain profile. **profile** can be: SPP, A2DP, AVRCP, MAP, HFP, PBAP[7]. If **profile** is left blank, SPP will be assumed
`PASSKEY (type) (key)`	This function is used to respond to a SSP user passkey confirm (type 1) or request (type 2), as indicated by a PAIR_PASSKEY notification. For confirmation, use key=1 to accept and key=0 to reject. For passkey request, please supply 6 digit passkey as requested.
`PIO (PIOx) (state)`	Sets the PIO state to the required level. **PIOx** is in [1,12]; **level** is 0 for low, and 1 for high

[4] DFU allows downloading a new firmware upgrades onto the Bluetooth module via the UART interface and allows users to upgrade melody to new releases.
[5] `DISCOVERABLE ON` will disconnect all active classic connections.
[6] Only available when acting as Sink to A2DP connection i.e. CLASSIC_ROLE=0 X
[7] AVRCP requires an active A2DP connection; PBAB requires an active HFP connection.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 6 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

POWER (mode)	**OFF** disconnects all active connections and puts the device in limbo mode, where it is not connectable, or discoverable. As a consequence, the UART commands that cannot be executed are rejected. **ON** returns the device to a connectable state.

PULL_PBOOK (pbook)	If no parameter is specified downloads the phone book of the connected phone.
	`(pbook)` can be:
	`phonebook` – download phone book (same as no parameter)
	`outgoing` – download outgoing calls list
	`incoming` – download incoming calls list
	`missed` – download missed calls list
	`combined` – download the combined calls list
	
	The response format is:
	`PBAP_PB NAME: Name`
	`PBAP_PB TEL: number`
	`PBAP_PB OK when download completes`

PULL_ABORT	Aborts an active phonebook download. By default, the PBAP profile will not be closed if an active download is in process. Aborting the operation is required before closing the pbap profile.
REJECT	Rejects an incoming call on the HFP link
RESET	Resets the device
RESTORE	Unpairs all paired devices and Restores configuration to factory settings; Writing settings needs to be followed by **WRITE** and **RESET** for the changes to take effect.
SCAN (timeout)	Searches BLE-enabled Melody devices in the area for maximum period of time (given in seconds). Use the value of 0 for an infinite timeout. Scans are stopped when a connection is attempted or when they time out.
RSSI	Returns the receiver signal Strength of the link. -70dBm is a good link, -80dBm is a poor link
SEND ([link_ID] or [profile]) ([characters] or [size])	Sends characters or data through a selected profile (SPP or BLE). If no profile is specified, it will send to the first connected profile in the order (BLE, SPP). If Multipoint or ENABLE_RAW_DATA is set the first supplied parameter **must** be a link id; For single point this must be a profile. If in Raw Data mode the second parameter must be the length of the data to be sent. The command will return status based on the availability of space to send the data and profile connection status. Raw data of 'length' bytes must be sent over UART immediately afterwards. Melody will return into normal command mode after that length has been received. A notification will be sent by melody indicating the status of the data send. For BLE length is limited to 128bytes. When Raw Data is not enabled the second parameter is a string that must not exceed 128 characters. The string **may not** contain: 0x00, 0x08, 0x0D.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 7 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Blue Creation

`SET (config)=value`	Sets a new value to a configuration parameter.
`STATUS`	Lists the device status for Classic and BLE: `STATUS (Classic status) (BLE status)` Where (Classic status) can be: `OFF, CONNECTABLE DISCOVERABLE, CONNECTABLE, CONNECTED` and (BLE status) can be: `OFF, IDLE, ADVERTISING, CONNECTED`. and Link status for established links in the format: `LINK (link id) CONNECTED (BT_Addr) (Audio_Codec/AVRCP_State)` (if applicable)
`SWAP`	Multipoint only. Swap between two active A2DP streams.
`TOGGLE_VR`	Start/Stop Voice call command on the phone
`TONE`[8] `(flag) (value) (flag) (value) ...`	Plays a tone based on the input. A tone **must** have at least 1 note. A note **must** have a length parameter. **Please refer to Appendix B** for full information regarding, flags, accepted values and descriptions. Flags : Tempo `TE 0 – 4095` Timbre `TI 0 – 7` Volume `V  0 – 255` Decay `D  00 – FF` (enter value in hex[9]) Note `N  A – F +` octave 0 – 9 eg AF7, A7, AS7 Length `L  1,2,4...64 or 3,6,12...96` triplets
`TRANSFER_CALL [link_ID]`	This command will transfer the audio between Melody and the phone in a call. If the audio is in Melody, then after this command, the audio will be on the phone. Note that some phones disconnect the Bluetooth link when the audio is transferred back to the phone
`UNPAIR`	Clears the list of previously paired devices
`VERSION`	Returns information on the firmware version number
`VOLUME [link_ID] (flag)`	`flag` can be: `UP` increases the volume. `DOWN` decreases volume. `HFP` returns the speaker volume of the connected HFP link `MIC_MUTE` returns the MIC state of the mic `A2DP` returns the speaker volume of the connected A2DP link If no arguments are sent, then volume will print the current volume levels. `UP` and `DOWN` are valid for A2DP and HFP.

[8] Currently not supported over digital audio output.
[9] Parsed as fixed point of the following format in binary bbbb.bbbb or hexadecimal X.X

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 8 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

	Note Melody stores specifics and different volume levels for each profile. Please note that is there is no active connection, VOLUME will return ERROR. Please use only A2DP and HFP link id's to get the volumes of those links. Note: In CLASSIC_ROLE=0 (sink) volume changes the local volume or if the remote side supports it, indicates a volume change and the sides synchronise volumes using AVRCP Absolute volume. This does not affect the stream volume. In CLASSIC_ROLE=1 (source) volume changes are sent over the air as Absolute volume commands. No local/stream volume change is applied. In order to change the stream volume or control input levels, please use the INPUT_GAIN configuration.
VOLUME [link_ID] (flag)=(value)	**flag** can be: **HFP** sets <value> as the current speaker volume of the connected HFP link **MIC_MUTE** <value> can be ON or OFF to MUTE and UNMUTE the mic **A2DP** sets <value> as the current speaker volume of the connected A2DP link Note: **<flag>** ranges between 0 and 15, and if there are no valid connections, **HFP** or **A2DP** will return ERROR Note: MIC gain will not take effect if cVc is enabled since it will be part of the cVc tuning. Note: In CLASSIC_ROLE=0 X (sink) volume changes the local volume or if the remote side supports it, indicates a volume change and the sides synchronise volumes using AVRCP Absolute volume. This does not affect the stream volume. In CLASSIC_ROLE=1 X (source) volume changes are sent over the air as Absolute volume commands. No local/stream volume change is applied. In order to change the stream volume or control input levels, please use the INPUT_GAIN configuration.
WRITE	Store configurations.

Table 2: Command Mode Bluetooth Commands

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 9 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Manual v5.2 RC1 Rev A

PIO Control

By default, Melody can also be controlled by PIOs. This allows Melody to work autonomously without the need of a host processor as in a wireless speaker for example. The table below lists the UART commands that also have a PIO equivalent. This PIO functionality can be turned off (See configuration parameters).

Please note that when in Multipoint, PIO controls will take effect on the primary (lower/even number) link id;

GPIO[10]	Melody Classic Role	UART Equivalent	Description
`VREGEN single`	0	`DISCOVERABLE ON`	If Sink, Melody will become discoverable. This disconnects all connections.

`VREGEN long`	All	`SET CLASSIC_ROLE=1`
		`SET AUTOCONN=1`
		`RESET`
			Enable Source mode and auto connection and resets Melody. On reset and failing auto-connection, Melody will start inquiry and pairing to first device with RSSI below the threshold set in the RSSI_THRESH configuration.[11]

`PIO_0 single`	All	`VOLUME UP`	Increases volume for HFP and A2DP
`PIO_1 single`	All	`VOLUME DOWN`	Decreases volume for HFP and A2DP
`PIO_2 single`	All	`MUSIC PLAY/MUSIC PAUSE/ANSWER/END`	Starts playing music or stop playing music for A2DP Source and Sink. If there is an incoming HFP call it will answer the call. During an ongoing call it will end the call.
`PIO_2 long`	0	`CALL`	If Melody is Sink, it will initiate a CALL (last number redial).
	1	`CALL`	If Source, it will initiate a call (CALL).
`PIO_4 single`	All	`MUSIC BACKWARD`	Sends AVRCP instruction BACKWARD
`PIO_5 single`	All	`MUSIC FORWARD`	Sends AVRCP instruction FORWARD (Next track)

Table 3: Command Mode General PIO Bluetooth Commands

Note: 'single' is defined as any press and release that happens within 999ms. 'long' is defined as holding the PIO high for 1000ms. A repeated 'long' press will be detected if the PIO is held high for multiples of 1000ms.

---

[10] Refer to BC127 Datasheet for location of PIO on the module pinout.
[11] Please note that this may fail if there is another discoverable device below this threshold. Please press VREG again and repeat procedure.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 10 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Manual v5.2 RC1 Rev A

PIO Functionality with PIO Control Disabled

If PIO control is disabled (SET GPIOCONTROL=OFF), PIO(0) and PIO(5) are used as the table below.

Please note that when in Multipoint, PIO controls will take effect on the primary (lower/even number) link id;

PIO	Type	Description
PIO_0	Output	High if Melody is connected Low if Melody is not connected
PIO_5	Input	High to enter data mode Low to enter command mode

Table 4: PIO control and indication

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 11 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

LED Indications

By default, the module has LEDs control enabled. This allows the module toggle the LEDs:

Please note that Classic and Smart indication occur on different LEDs and will be displayed concurrently based on state.

Classic State	LED pattern (repeating)
Discoverable	Fast Flash Toggle LED 0 and LED1
Connected Sink	LED 1 flashes once approx 2.5s
Connected Source	LED 0 flashes once approx 2.5s
Connectable Sink	LED 1 blinks slowly
Connectable Source	LED 0 blinks slowly

Table 5: LED Patterns Classic

Smart State	LED pattern (repeating)
Idle/Off	LED 2 off
Advertising	LED 2 blinks slowly
Connected	LED 2 flashes once approx 2.5s

Table 6: LED Patterns Smart

Other states	LED pattern (once)
Powering On	All LEDs On for 1s
Powering Off	All LEDs quick blink 3 times.
Off or DFU	All LEDs off

Table 7: Other indications

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 12 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Manual v5.2 RC1 Rev A

Configuration Commands

When Melody is in Command mode, the user can configure general parameters for the module. These parameters are stored in the RAM memory. If required, the parameters can be stored to Flash memory. When the module reboots, it will boot with the parameters that are saved to Flash memory.

There are 4 main commands to configure parameters. The commands to modify configuration parameters are described below. Mandatory parameters are listed in "`( )`" optional parameters are listed in "`[ ]`".

Command	Description
`GET (config_name)`	Reads the value of a configuration parameter.
`RESTORE`	Restore configuration parameters to default factory settings.
`SET (config_name)=param _1 param_2 ... param_n`	Sets a new value to a configuration parameter.
`WRITE`	Write configuration changes to Flash memory. This command writes all the current configuration parameters to non-volatile memory. These are then read at boot-up time.

Table 8: General Configuration Commands

Note: If the module boots up with PIO_0 high, the factory default configurations are reset. This allows reverting to a known and working configuration state if severe problems are encountered.

The different configuration parameters are described in alphabetical order in the table below. Once modified, many configuration parameters will not take effect before a reboot. Therefore they need to be stored to Flash before rebooting.

Configuration Parameter	Description	Default	Requires Reboot
`AUDIO=(value)`	AUDIO allows to route the A2DP audio stream: 0 – Analogue 1 – PCM Master 2 – PCM Slave 3 – I2S Master 4 – I2S Slave 5 – SPDIF Note: When using options 1 to 4, HFP calls are mono (only left channel).	0	Yes

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 13 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

`AUTOCONN=(value)`	0 – Disabled 1 – Auto-connects on Reset (the device will try to reconnect to previously paired devices with all possible profiles) 2 – Auto-connect to specific address on Reset. (Melody will try and connect with the Bluetooth address specified by the REMOTE_ADDR parameter) *Note:* Melody will store up to 8 paired devices in its persistent memory. So AUTOCONN=1 means it will try to connect to each one and attempt a number of times (MAX_REC) before giving up. When the pairing memory is full, Melody will erase the oldest paired device. So the 8 stored paired devices are the 8 most recently paired devices	0	Yes

`BATT_THRESH=(chrgLvl)`
`(crit) (low) (lvl0)`
`(lvl1) (lvl2) (lvl3)`
	Set the battery voltage level thresholds.
	These are used internally by the battery charger to determine behaviour, and also reflect the responses to the BATTERY_STATUS command.
	chrgLvl – charge voltage limit threshold – charging will stop once battery reaches this voltage (in 1 mV)
	crit – critical battery level – device will shut off until charged above this level (in units of 20mV)
	low – low battery level (in units of 20mV)
	lvl0 – Level 0 (in units of 20mV)
	lvl1 – Level 1 (in units of 20mV)
	lvl2 – Level 2 (in units of 20mV)
	lvl3 – Level 3 (in units of 20mV)
		4250 145
		150 155
		165 175
			Yes

`BAUD=(value)`	UART Baudrate (9600, 19200, 38400, 57600, 115200, 230400, 460800, 921200)	9600	No
`BLE_ROLE=(value)`	Chooses the BLE role of the device: 0 - BLE disabled 1 - Peripheral 2 - Central	1	Yes
`BPS=(value)`	This is only for I2S and PCM Codecs. It defines the number of bits per sample. 8,13,16 supported for PCM 16 and 24 for I2C. (24 and 32 bits per sample will be LSB zero padded 16bit values). Note: To configure I2C input resolution, use the I2C config.	16	Yes
`CLASSIC_ROLE=(role)` `[mode]`	Sets the device role for the classic Bluetooth profiles HFP and A2DP; profiles supported in source are: HFP, A2DP, AVRCP, and SPP Role can be 0 - Sink	0 0	Yes

Manual v5.2 RC1 Rev A

	1 – Source Mode can be: 0 – single point 1 – multipoint 2 - TWS		
`CMD_TO=(value)`	Guard time for detecting a $$$$ command to switch from data mode to command mode. There should be 20ms x CMD_TO between the last character and the $$$$. And there should be 20ms x CMD_TO after the $$$$ for the command to be recognised.	20	No
`COD=(value)`	Configures Class of Device	240404	Yes
`CODEC=(Codec) (Fs) (Mode) [hfpBias] [a2dpBias]`	CODEC is a decimal representation of 3 bit value specifying which codecs are to be enabled: 0 – No extra codecs (SBC only) (bitmap 000b) 1 – aptX enabled (bitmap 001b) 2 – MP3 enabled (bitmap 010b)[12] 4 – AAC enabled5 (bitmap 100b) [5] 7– All extra codecs (bitmap 111b) [5] Fs - (Sample Rate in Hz) 39000 to 50000, Note: For digital audio this parameter needs to be set to something in range. For analogue output 0 indicates that the output sample rate will be the same as the sample rate over the air. Mode: 0 is Mono, 1 is Stereo Note: HFP audio connections only support 44100 and 48000 sample rates over I2S.	0 0 1 1 0	Yes
`CONN_TO=(value)`	Time Melody stays connectable (in seconds) after a connection has been established in Multipoint. Values accepted: 0 – 65534. 0 – never stop being connectable;	0	No
`DEEP_SLEEP=(value)`	Enable and Disable Deep Sleep	OFF	No
`DEVICE_ID=(word_1) ... (word_8)`	The Device ID sets the configuration parameters for the Device ID Profile. This profile sets the following as an SDP record so that remote devices can get extra information about the product: Vendor Id source (2 bytes) Vendor Id(2 bytes) Product Id(2 bytes) BCD version (2 bytes)	0000 0000 0000 0000 0000 0000 0000 0000	Yes

---

[12] Please contact BlueCreation if you require MP3 and AAC support as these are not provided with Melody by default.

Blue Creation.   St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 15 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Blue Creation

	Software version (8 bytes) For more information about these settings, refer to Device ID profile specification on the bluetooth.org adopted specification page		
`DISCOVERABLE=(value) (timeout)`	Mode defines discoverable scheme after boot: 0 – non discoverable 1 – discoverable after reconnection failed, if auto-connect is enabled 2 – discoverable immediately overrides auto-connect Timeout defines time to discoverable after boot (timeout=0 means infinite, number is value in milliseconds to be discoverable before going into deep sleep).	1 0	Yes
`ENABLE_A2DP=(value)`	Enables and disables A2DP profile	ON	Yes
`ENABLE_ANDROID_BLE=(value)`	Enables and disables Android BLE support.	OFF	Yes
`ENABLE_AVRCP=(value)`	Enables and disables AVRCP profile (depends on A2DP profile)	ON	Yes
`ENABLE_BATTERY_IND=(value)`	Enables and disabled the iOS battery indication[13]	ON	No
`ENABLE_HFP=(value)`	Enables and disables HFP profile and AG in Source mode	ON	Yes
`ENABLE_HFP_CVC=(value)`	Enables and disables cVc Note: CVC is not supported by AG	OFF	Yes
`ENABLE_HFP_NREC=(value)`	Sets the HFP NREC flag, which tells the AG not to use its internal Noise Reduction/Echo Canceller algorithm. We suggest you set this to ON if using CVC or an external noise reduction platform.	OFF	Yes
`ENABLE_HFP_WBS=(value)`	Enables and disables Wide band speech support Note: WBS is not supported by AG	ON	Yes
`ENABLE_LED=(value)`	Enables and disables LED support in Melody	ON	No
`ENABLE_MAP=(value)`	Enables and disables MAP profile	ON	Yes
`ENABLE_PBAP=(value)`	Enables and disables PBAP profile (depends on HFP profile)	ON	Yes
`ENABLE_SPP=(value)`	Enables and disables SPP profile	ON	Yes
`ENABLE_SPP_SNIFF=(state) (min_interval) (max_interval) (attempt) (timeout) [duration]`	Enables SPP only connections to go into sniff mode which allows Melody to use low power modes. These values take effect if SPP is the only connected profile **state:** **OFF** – active	OFF 0 0 0 0 0 30	No[14]

[13] Due to iOS behaviour, this needs to be changed before initial Pairing to iOS device. Changing after that will not remove indicator on iOS.
[14] Changing the sniff parameters require the connection to restart.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 16 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

	ON – passive (if all parameters are 0) – sniff with passive (with all parameters supplied) Parameters: **min_interval**: the minimum interval of the sniff period **max_interval**: the maximum interval of the sniff period **attempt**: Determines for how many slots the slave shall listen when the slave is not treating this as a scatternet link. **timeout**: Determines for how many additional slots the slave shall listen when the slave is not treating this as a scatternet link. **duration**: the time to stay in this sniff state.		
`FLOW_CTRL=(value)`	Enables and disables UART Flow Control	OFF	Yes
`FORCE_ANALOG_MIC=(value)`	Forces the use of the analogue input for MIC when a digital interface is selected in AUDIO (I2S, PCM, SPDIF)	OFF	Yes
`GPIOCONTROL=(value)`	Enables and disables PIO control	ON	Yes
`I2S=(value)`	Configures the I2S parameters. I2SConfig is a 10 bit value represented by the 10 LSB of a 4 digit hexadecimal number: **Bit [0]:** Justification format: 0 - left justified; 1 - right justified. **Bit [1]:** Left Justify delay: 0 - MSB of SD data occurs in the first SCLK period following WS transition; 1 - is MSB of SD data occurs in the second SCLK period. **Bit [2]:** Channel polarity: 0 - SD data is left channel when WS is high; 1 - SD data is right channel. **Bit [3]:** Audio attenuation enable (On SD_IN): 0 - 17-bit SD data is rounded down to 16bits; 1 - the audio attenuation defined in bits [7:4] is applied over 24 bits with saturated rounding. Requires Bit [10] to be 0. **Bits [7:4]:** Audio attenuation configuration in 6dB steps. **Bits [9:8]:** Justify resolution of data on SD_IN: 00 - 16-bit; 01 - 20-bit; 10 - 24-bit; 11 – reserved. **Bit [10]:** 16 bit crop enable: 0 - 17-bit SD_IN data is rounded down to 16bits; 1 - only the most significant 16bits of data are received. Note that for Master mode the Master clock is generated at `Fs*2*bps*2` Hz. The word clock is generated at `Fs` Hz, where Fs is taken from the `CODEC` config and bps is supplied by the `BPS` config. Note that for slave mode operation at 16bps the Master clock supplied must be at least `Fs*2*bps*4`.	0200	Yes

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

Page 17 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

`INPUT_GAIN=(value)`	Sets the analogue input gain. Values supported are 0 - 15	15	No
`LOCAL_ADDR=(value`[15]`)`	Contains the local Bluetooth address of the device.	N/A	No
`MAX_REC=(value)`	Maximum times to try to reconnect to a device in PDL	2	Yes
`MUSIC_META_DATA=(value)`	Enable(ON) and disable(OFF) AVRCP 1.3 metadata notifications sent by Melody.	ON	No
`NAME=(value)`	Friendly Name; Last 6 symbols of the name XXXXXX are the last 6 symbols of the Bluetooth address	BlueCreation-XXXXXX	Yes
`NAME_SHORT=(value)`	Short Name, used for Melody Smart Advertisements, maximum of 7 characters, where XXXXX are the last 5 hex digits of the Bluetooth address	BCXXXXX	Yes
`PARITY=(value)`	UART Parity (1=none, 2=even, 3=odd)	1	No
`PIN=(value)`	Pin Code	0000	
`REMOTE_ADDR=(value)`	Address of device to auto connect to on reset. Works only if devices are paired. Will attempt MAX_REC times and then go discoverable	0	Yes
`RSSI_THRESH=(value)`	Set threshold for Source RSSI pair/connection	-75	Yes
`SPP_TRANSPARENT=(value)`	Enable SPP Data Mode immediately on SPP connection. For multipoint this is only active on the primary link.	OFF	Yes
`SSP_CAPS=(value)`	Set SSP capabilities for this device. Accepted values are: 0 – display only 1 – display yes/no 2 – keyboard only 3 – no display, no keyboard (i.e.JustWorks) 4 – display and keboard 5 – reject SSP request	3	No
`TWS_MODE=(value)`	Set the TWS mode. Mode can be: 0 – Auto (Master is Left Ch, Slave is Right Ch) 1 – Left Ch 2 – Right Ch 3 - Stereo	0	No
`UUID_DATA=(word0)` `(word1)`	Change the default value for Melody Smart Data Characteristic UUID	89F7 D93C	Yes
`UUID_SPP=(byte0) ...` `(byte15)`	Change the UUID for the SPP profile	00 00 11 01 00 00 10 00 80 00 00 80 5F 9B 34 FB	Yes
`UUID_SRV=(word0)` `(word1)`	Change the default value for Melody Smart primary service UUID (BLE)	68E3 28F0	Yes

Table 9: Configuration Parameters and values

---

[15] Please note that value is a read only.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

Page 18 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Event Notifications

Melody uses 'notifications', or text prompts, to notify the host of events in the Bluetooth link (for example, completed commands or incoming connections), to provide information, or to require action. Notifications are generated only when Melody is in command or remote configuration mode.
 The syntax used is **NOTIFICATION [link_ID] (Parameter).**

Event	Description
`ABS_VOL=[link_ID] (value)`	The current absolute volume set as an integer in the range 0 – 127 (representing 0 – 100% as per spec).

`AVRCP_MEDIA [link_ID] (property: value)`	`ARTIST: string`
	`TITLE: string`
	`ALBUM: string`
	`NUMBER: integer`
	`TOTAL_NUMBER: integer`
	`PLAYING_TIME(MS): integer`

`AVRCP_PLAY [link_ID]`	When an AVRCP play event is received from the remote device
`AVRCP_STOP [link_ID]`	When an AVRCP stop event is received from the remote device
`AVRCP_PAUSE [link_ID]`	When an AVRCP pause event is received from the remote device
`AVRCP_FORWARD [link_ID]`	When an AVRCP forward event is received from the remote device
`AVRCP_BACKWARD [link_ID]`	When an AVRCP backward event is received from the remote device
`CALL [link_ID] (phone number)`	In HFP mode, indicates that there is an incoming call form the supplied phone number. In AG mode, indicates that the handsfree wants to establish ha call to this number.
`CALL_ACTIVE [link_ID]`	Indicates call is in progress (SCO is connected and audio is routed)
`CALL_END [link_ID]`	Indicates call has been ended (SCO is disconnected and audio is routed)
`CLOSE_OK (profile) [link_ID]`	A connection has been successfully closed for the profile indicated/ Maximum reconnection attempts have been reached and Melody will no longer attempt reconnection
`CLOSE_ERROR (profile) [link_ID]`	A connection could not be closed for the profile indicated.
`CVC_CFG (TYPE) (KEY) [value]`	TYPE – WB or NB for wideband and narrowband CVC keys. KEY is the key id 0 – 3; Value – is the key value in ASCII representation of 16bit hexadecimal words. Value will not be present if the key is empty.
`ERROR`	Error when a command has not been executed or the parameters are not correct
`HANGUP [link_ID]`	When HFP voice call is disconnected
`INQUIRY (BDADDR) (COD) (RSI)`	Returned after an INQUIRY command is used if there are discoverable devices nearby. Returns Bluetooth address, class of device and RSSI
`LINK_LOSS [link_ID] (profile)`	The link specified by link id and profile has suffered link loss
`MAP NEW_SMS MAP_MSG_BEGIN NAME: (from)`	Indicates a text message has been received on the phone. Note: all fields are passed on as raw data, as received from the phone. The

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

Page 19 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

`TEL: (phone)`
`CHARSET: (charset)`
`ENCODING: (encoding)`
`MSG: (message)`
`MAP_MSG_END`
	contents of those fields is implementation specific to the phone and may vary between models and manufacturers.

`OPEN_ERROR (profile)` `[link_ID]`	A connection has failed or there was a link loss for the profile indicated
`OPEN_OK (profile)` `[link_ID]`	A connection has been successfully established for the profile indicated
`PAIR_ERROR (Bluetooth` `address)`	When the module fails to pair with the remote device with the address specified
`PAIR_OK (Bluetooth` `address)`	When the module successfully pairs with the remote device with the address specified

`PAIR_PASSKEY`
`(BDADDRESS) (TYPE)`
`[PASSKEY]`
	A SSP passkey request is being made. Depending on type these may require user action.
	TYPE:
	0 – Passkey request. Enter passkey using the PASSKEY command
	1 – Confirm passkey. Display passkey and have user confirm passkey using the PASSKEY command
	2 – Display passkey. Display passkey for user.
	Note: the PASSKEY parameter will not be supplied for type 0.

`PAIR_PENDING`	When the module is starting to pair with a remote device
`READY`	Melody is ready to take commands
`RECV IAP ([characters]` `or [size+data])`	Data received from the IAP link. When in raw data mode, second parameter is raw data bytes in the form: {length_MSB, length_LSB, data_byte 0,...,data_byte(length-1)} There will be no trailing \n\r after a raw data receive packet.
`RECV SPP [link_ID]` `(characters)`	Data received from the SPP link
`RECV BLE [link_ID]` `(characters)`	Data received from the BLE link
`RING [link_ID]`	Indicates that a call on HFP has sent a ring indicator (in-band ringing should be heard).

`SCAN (BT ADDRESS) (<BT`
`SHORT NAME>`
`(ADVERTISING FLAGS)`
`(RSSI)`
	Returned after calling SCAN and contains information about advertising devices. If the advertising data does not contain a short name, UNKNOWN will be displayed. The Advertising flags indicate device capabilities: 0x0A indicated this is a General Discoverable Dual Mode device (such as Melody), 0x02 indicates this is a General Discoverable Single mode device (such as Melody Smart).

`SEND_ERROR`	SPP packet could not be sent.
`SEND_OK`	Packet has been sent successfully

Table 10: Melody Notifications

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 20 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Data Mode

When the module is connected, it will parse all received data, to identify commands. However, for SPP connections and in order to speed up data rate, the host can put the module into Data Mode. In Data Mode, the module becomes a transparent link and forwards any data received from the UART to the SPP connection. Melody no longer parses the incoming UART stream. To return to Command Mode, one has to stop sending data for a period of time equal to or greater than the set command timeout (CMD_TO) and send '$$$$' via the UART line, within the command timeout.

cVc and HFP 1.6 Wide Band Speech (WBS)

Melody 4.0 adds support for Clear Voice Capture (cVc) which is an algorithm provided by Cambridge Silicon Radio (CSR) for echo and noise cancellation and HFP 1.6 which adds Wide Band Speech (WBS) to supported codecs. cVc enabled is required for WBS to work. The commands for enabling cVc and WBS are in the parameters table. The use of cVc requires a license key. Please contact info@blue-creation.com or your distributor for more information about cVc.

Pairing

When discoverable, Melody will accept any pairing request from devices in range. By default Melody will use secure simple pairing (Bluetooth 2.1 and above). If the devices trying to pair are older (Bluetooth 2.0 and below), Melody will accept the older pairing procedure.

For Bluetooth 2.1 devices and newer Melody will accept any pairing request using the 'Just Works' Bluetooth 2.1 method. This means that the module will accept any connection from Smartphones and other devices. The user of the device will not be required to enter a PIN code.

For Bluetooth 2.0 devices and older Melody will require a PIN code to accept a connection. The PIN code is set to 0000 by default, but can be reconfigured. This means that the phone user will be required to enter the pin code in order to pair successfully.

Blue Creation.   St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 21 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Power management

Melody is configured to reduce the power consumption in both connected and not connected state.

Not Connected

By default, if Melody is not connected, it will be connectable and stays discoverable for a certain amount of time (configurable). If connection is lost, Melody will attempt to reconnect the number of times specified by the MAX_REC parameter. After that, and if Deep Sleep is enabled, Melody will go into Deep sleep mode (a very low power consumption mode). In this mode Melody will not be discoverable or able to accept any connection. This allows reducing current consumption to a minimum when the device is not connected and not operational. In order for Melody to get out of this mode, a random character has to be sent through the UART. After a 20ms wake-up time the module will be operational again. If GPIO commands are enabled, any GPIO change will also get Melody out Deep Sleep.

Note: Waking Melody up will not disable Deep Sleep and the module will go back into Deep Sleep after the command is executed. It is recommended if Deep Sleep is enabled, to always send a carriage return before a command. This will not return anything if Melody wakes up from Deep Sleep and will return ERROR if Melody is already awake. After sending the carriage return, wait for 20ms (the chip wake-up time) and then send the command. The chip will stay awake for 1s after the last byte is received on the UART.

 Connected:

When Melody is connected, it is set-up to reduce power consumption while maintaining the connection. In this state, Melody will automatically establish a link policy to allow it to reduce power consumption while still being able to receive link updates.

Note: If Deep Sleep is enabled, Melody will go into deep sleep after 50ms of no activity.

Melody Source

Melody 5 adds support to source HFP-AG and A2DP source. This mode can be activated by setting the CLASSIC_ROLE=1 configuration to ON, writing, and resetting the device. Once Melody is reset, it will disable all profiles that are not supported in source mode.

In source mode, Melody can pair and connect with another Melody in sink mode or to regular headsets. It can then stream music over A2DP to the headset, send AVRCP commands for control, and start a voice call with the headset.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 22 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Melody Multipoint

Melody 5.2 supports Multipoint allowing two connections for the HFP/AG, A2DP, AVRCP, and SPP profiles.

To enable Multipoint Melody needs to be configured to be in CLASSIC_ROLE=X 1, X - any accepted value.

This forces all commands and notifications to use the [link_id] parameter, to allow for control of the two connection instances per profile. GPIO control will only work on the primary (lower number) connection, if established.

Melody TWS

Melody 5.2 includes True Wireless Stereo (TWS) support. TWS allows two Melody boards to connect to each other and share audio that is being streamed to one of them. The Melody boards can be configured to play back Left, Right or Stereo channels. This allows the use case for true wireless stereo speakers over Bluetooth.

To enable TWS Melody needs to be configured to be in CLASSIC_ROLE=X 2, X - any accepted value. If Melody is in CLASSIC_ROLE=1 X, CLASSIC_ROLE will be reverted to CLASSIC_ROLE=0 2.

Please note that in TWS mode, volume controls are only available on the A2DP link to the streaming device.

DFU (Device Firmware Upgrade)

Melody versions above 4 RC2 support firmware upgrade. This can be done over UART from your PC using the Melody Device Firnware Upgrade Tool available from BlueCreation. Please contact sales@bluecreation.com for more details.

You can use DFU to upgrade to a newer version of Melody and add additional features.

Blue Creation.   St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 23 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

General Notes

- BlueCreation's products are not authorised for use in life-support or safety-critical applications. Use in such applications is done at the sole discretion of the customer. BlueCreation will not warrant the use of its devices in such applications.

- While every care has been taken to ensure the accuracy of the contents of this document, BlueCreation cannot accept responsibility for any errors. BlueCreation reserves the right to make modifications, corrections and any other changes to its products at any time. Customers should obtain the latest information before placing orders.

- BlueCreation, other products, services and names used in this document may have been trademarked by their respective owners. The publication of this information does not imply that any license is granted under any patent or other rights owned by BlueCreation.

- Refer to http://www.bluecreation.com/ for more information. BlueCreation® is a trading name for Cambridge Executive Limited.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

Page 24 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

New features

- Melody 5.2 RC 1
    - Multipoint support
    - TWS support
    - Raw Data send for all profiles
    - Classic and Smart states displayed separately
    - LED indications updated to reflect new state structure
    - Configurable Secure Simple Pairing (SSP) support (out of band pairing not supported)
    - Microphone Bias control for both A2DP and HFP links
    - Access to CVC configuration keys
    - Timeout before entering Sniff mode for SPP is now configurable.

- Melody 5.0 RC11
    - Melody now goes into connectable mode (Classic) if all classic connections are closed, but a BLE connection remains open.

- Melody 5.0 RC10
    - Melody parser accepts all octet values. Melody SEND functions will accepts all input other than backspace (0x08) and carriage return (0x0D). Those are currently reserved for deleting the last character in the input buffer and issuing a command.
    - UART now additionally supports 230400, 460800, 921200 bps.
    - Battery charging and threshold parameter configuration added (`BATT_THRESH`)
    - iOS battery indication enable/disable configuration added (`ENABLE_BATT_IND`)
    - Android 4.3 BLE support configuration added (`ENABLE_ANDROID_SUPPORT`)
    - SPP Sniff parameters are now also applied to iAP connections (on MFI builds)
    - Source pairing procedure configuration added ability to choose RSSI level (`RSSI_THRESH`)

- Melody 5.0 RC9
    - Added configuration to retrieve local Bluetooth address (`LOCAL_ADDRESS`)

- Melody 5.0 RC8
    - Added SPP Sniff parameter configuration (`SPP_SNIFF`)

.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 25 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Manual v5.2 RC1 Rev A

Appendix A: Tone parameters and flags

Tones are defined as a sequence of notes described with pitch (N or TN) described through length (L), tempo (TE), loudness (V), timbre (TI) and decay (D). All of these parameters can be individually set for each note, changed at any place in the tone string or omitted (all except length) to use default values. Below you can find tables describing the different parameters and the flags used to set them and the values accepted.

Parameter	Flag	Accepted value and meaning
`Tempo`	`TE`	0 – 4095 Given in quarter notes (crotches) per minute. If no tempo is specified, default is 120.
`Timbre`	`TI`	0 – 7 Defines timber of following notes. Please see Table 9 for all available timbres. Default is 0 (Sine).
`Volume`	`V`	0 – 255 Sets the volume for the tone. Default is 255 (max).
`Decay`	`D`	00 – FF Takes a hexadecimal values that is interpreted as a fixed point decimal number according to this format 0000.0000. Eg 15 = 1.5. As each tone is played, its volume decreases with a variable rate. Low values for this parameter cause notes to decay very quickly, whereas high values cause the notes to continue with an almost constant volume. A value of 005 (meaning 0.5) will cause each note to reach zero halfway through its duration giving a staccato feel. A value of 20 (meaning 2.0) will cause each note to reach half its initial volume when the next note starts. The default value is 20. This allows notes of the same length to be tied together with TN.
`Note`	`N`	This describes a note pitch in the format: `Note{F/S}[octave]` Note is any note in A – G or R. R is used for a rest or pause. It has to be described for consistency with an octave eg R0.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Page 26 of 39

Manual v5.2 RC1 Rev A

		The optional F or S following that indicates if the note is Flat or Sharp. Note, not all notes have flat and sharp variants. The mandatory octave parameter gives the note octave. It takes values between 0 – 9. A note is describes as `G4` or `AS7` for example. Each note **must** have a length parameter associated with it and following immediately after: `G4 L 1`
Tied Note	**TN**	Ties note to next one. This means that the pitch of the note appears to change (as opposed to a new note starting), and the volume continues to decay from the　　　previous note. An appropriate decay must be set for this to work. Tied Notes are described in the same manner as Notes.
Length	**L**	Ringtone duration. Please look at Table 10 for details.

Table 11: TONE parameter detailed description

Timbre Value	Timbre Description
0	Sine wave
1	Square wave
2	Sawtooth wave
3	Triangle wave
4	Triangle wave (asymmetric)
5	Clipped sine wave
6	Simulates a plucked instrument

Table 12: Timbre value and description

Length Values	UK Notation	American Notation
1	Semibreve	Whole note

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Page 27 of 39

2	Minim	Half note
4	Crotchet	Quarter note
8	Quaver	Eighth note
16	Semiquaver	Sixteenth note
32	Demisemiquaver	Thirty-second note
64	Hemidemisemiquaver	Sixty-forth note
3	Minim triplet	Half note triplet
6	Crotchet triplet	Quarter note triplet
12	Quaver triplet	Eighth note triplet
24	Semiquaver triplet	Sixteenth note triplet
48	Demisemiquaver triplet	Thirty-second note triplet
96	Hemidemisemiquaver triplet	Sixty-forth note triplet

Table 13: Note length values and description

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

Page 28 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Appendix B: Use case example:

1. Discovering and pairing with devices

Discovering a phone from Melody and initiating paring:

Make sure BT is on and the phone is discoverable if you want to be able to see it in Melody. Look for discoverable devices.

`>INQUIRY 15`

Melody will return a list of discoverable device Bluetooth addresses and device classes.

`>INQUIRY {BT ADDRESS} {DEVICE CLASS} {RSSI}`

If you do not know your phone's BT address, but you know its name you can have Melody resolve device names.

`>NAME {BTADDRESS}`

Melody will return:

`>NAME {BT ADDRESS} {DEVICE NAME}`

Keep doing that until you find the correct device. Take note of its BD address. Type in:

`>OPEN {BD ADDRESS} {PROFILE}`

This will automatically pair Melody and the device and open the respective profile connection. Have in mind that pairing is sometimes linked to specific profiles; therefore it is best if you open all profiles that you want to use with the given device while the two devices are still in pairing stage.

Melody will respond with a status `OPEN_OK/OPEN_ERROR`   for each opened profiles.

Discovering Melody from a phone and initiating paring:

Use status command to make sure Melody is discoverable

`>STATUS`

If not, type:

`>DISCOVERABLE ON`

Now look for devices from your mobile phone. Select and initiate pairing with Melody. This should also automatically connect the phone to Melody for all available profiles.

Melody will display `OPEN_OK` /OPEN_ERRPR confirmations for every profile connection opened.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 29 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Manual v5.2 RC1 Rev A

2. Tones

The Tone command is used to play back tones on the Melody/BC127 audio output. Tones are mixed with any ongoing audio playback.

These are some example tones that demonstrate some of the Tone command capabilities:

```
>TONE TE 400 V 64 TI 0 N C5 L 8 N R0 L 32 N E5 L 8 N R0 L 32 N G5 L 8 N R0 L 32 N
B5 L 4 N R0 L 1 N C6 L 2 TN C6 L 8
```

A sample tone is played back.

```
>TONE V 64 N C6 L 4 V 128 N C6 L 4 V 255 N C6 L 4 V 128 N C6 L 4 V 64 N C6 L 4
```

A variable volume single note is played back.

```
>TONE V 128 TI 0 N C4 L 8 N D4 L 8 N E4 L 8 N F4 L 8 N G4 L 8 N A4 L 8 N B4 L 8 N
C5 L 8
```

A musical scale starting from C4 and omitting any flat and sharp tones is played.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 30 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Blue Creation

3. Music (A2DP & AVRCP)

This use case assumes devices are paired.

If A2DP and AVRCP are not connected open those profiles now. This can be done either by connecting to Melody from the phone or by connecting from Melody:

>OPEN {BT ADDRESS} A2DP
>OPEN {BT ADDRESS} AVRCP (if supported)

Initiate playback on phone.

Now use Melody to control playback, if AVRCP is open and supported:

>MUSIC PAUSE pauses playback

>MUSIC PLAY resumes playback

>MUSIC FORWARD plays next song

>MUSIC BACKWARD starts current song from beginning or if repeated in quick succession plays previous song

>VOLUME UP increases Melody DAC volume

>VOLUME DOWN decreases Melody DAC volume

>MUSIC STOP stops playback

Note: On phones that support AVRCP 1.3 and newer song information is displayed

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 31 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

4. HFP & PBAP

This use case assumes devices are paired.

If HFP and PBAP (if supported) are not connected open those profiles now. This can be done either by connecting to Melody from the phone or by connecting from Melody:

```
>OPEN {BT ADDRESS} HFP
>OPEN {BT ADDRESS} PBAP
```

Making a call:

```
>CALL {NUMBER}
```

To accept or reject an incoming call

```
>ANSWER or >REJECT
```

To end any call:

```
>END
```

To pull the phonebook from the phone

```
>PULL_PBOOK
```

Note: Pulling the phonebook will just display phonebook information. Melody will not store and cannot utilize this data in any way.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Page 32 of 39

5. Data transfer (SPP)

This use case assumes devices are paired.

Note: a special application on the phone is needed in order to use SPP and connection to SPP needs to be initiated from that application.

To send data to the phones type:

```
>SEND {CHARACTERS}
```

Whenever data is received from the phone it will be displayed as follows:

```
>RECV SPP {character}
```

Data mode can be used to increase data throughput.

To enter data mode, type:

```
>ENTER_DATA
```

Everything sent over UART will then immediately be forwarded to SPP and vice versa.

To exit DATA mode, type:

```
>$$$$
```


```
In ENABLE_RAW_DATA mode:
```


```
>SEND 0 {size}
```

```
<OK
```

```
>{raw data of length 'size' bytes}
```

```
<OK
```

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 33 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

6. Data transfer (BLE)

Note: For BLE: a special application on the phone is needed to scan for, discover, connect and interact with the Melody service to transfer data.

To send data to the phones type:

```
>SEND {CHARACTERS}
```

Whenever data is received from the phone it will be displayed as follows:

```
>RECV BLE {character}
```

In ENABLE_RAW_DATA mode:

```
>SEND 12 {size}
<OK
>{raw data of length 'size' bytes}
<OK
```

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

Page 34 of 39

t. +44 (0)1223 420 252 e. info@bluecreation.com www.bluecreation.com

7. HFP-AG

Set Melody to source mode and reset to start the new mode.

```
>SET CLASSIC_ROLE=1
```

```
>WRITE
```

```
>RESET
```

Open a connection with a headset using the HFP-AG profile

```
>OPEN {BT ADDRESS} HFP
```

Make a voice call and open audio

```
>CALL
```

To end any call:

```
>END
```

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Page 35 of 39

8. Music Source (A2DP & AVRCP)

This use case assumes Melody is in source mode and devices are paired. Melody has a music player connected to its stereo input jack.

If A2DP and AVRCP are not connected open those profiles now. This can be done either by connecting to Melody from the phone or by connecting from Melody:

```
>OPEN {BT ADDRESS} A2DP
>OPEN {BT ADDRESS} AVRCP (if supported)
```

Use Melody to control playback:

`>MUSIC PLAY` starts playback

`>VOLUME UP` increases Melody ADC volume

`>VOLUME DOWN` decreases Melody ADC volume

`>MUSIC STOP` stops playback

Issuing AVRCP commands on the headset will result in an event, and in case of AVRCP_PLAY and AVRCP_STOP, an immediate effect will occur alongside the event.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 36 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

9. Music Source (A2DP & AVRCP)

This use case assumes Melody is in source mode and devices are paired. Melody has a music player connected to its stereo input jack.

If A2DP and AVRCP are not connected open those profiles now. This can be done either by connecting to Melody from the phone or by connecting from Melody:

```
>OPEN {BT ADDRESS} A2DP
>OPEN {BT ADDRESS} AVRCP (if supported)
```

Use Melody to control playback:

`>MUSIC PLAY` starts playback

`>VOLUME UP` sends Set Absolute Volume command to headset/sink

`>VOLUME DOWN` sends Set Absolute Volume command to headset/sink

`>MUSIC STOP` stops playback

Issuing AVRCP commands on the headset will result in an event, and in case of AVRCP_PLAY and AVRCP_STOP, an immediate effect will occur alongside the event.

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 37 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

10. BLE Central Role

This use case shows how Melody can be used in the BLE Central role.

Enable BLE Central role:

```
>SET BLE_ROLE=2

>WRITE

>RESET
```

On the partner device(s), issue the ADVERTISING ON command.

Scan for BLE-enabled Melody devices:

```
>SCAN 10
```

Melody will return a list of discovered devices:

```
>SCAN {BT ADDRESS} <{BT SHORT NAME}> {ADVERTISING FLAGS} {RSSI}

> ...

>OK
```

Open a BT connection to a selected device:

```
> PEN {BT ADDRESS} BLE

>OPEN_OK BLE
```

Melody connects to the partner's Melody service and is ready for data exchange.

```
>SEND hello

>OK
```

On message reception, a notification is issued:

```
>RECV BLE hello
```

Blue Creation. St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 38 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com

Appendix C: Link ID and Profile Mapping

Link ID	Profile
0	SPP 0
1	SPP 1
2	A2DP 0
3	A2DP 1
4	AVRCP 0
5	AVRCP 1
6	IAP
7	N/A
8	HFP/AG 0
9	HFP/AG 1
10	PBAP 0
11	N/A
12	BLE
13	N/A
14	MAP
15	N/A

Table 14: Link Id and profile mapping

Blue Creation.   St John's Innovation Centre, Cowley Road, Cambridge, CB4 0WS, United Kingdom   Page 39 of 39

t. +44 (0)1223 420 252   e. info@bluecreation.com   www.bluecreation.com