# BMK SkyLink 434MHz
Firmware v1.4
GPS Model Locator User Manual

The BMK SkyLink unit is a 'non-display' receiver for the BMK AltiLoc GPS transmitter and is an alternative to the BMK FlexiDisplay. SkyLink will receive GPS, altimeter and other data from any AltiLoc on the selected radio channel and display information on the BMK Finder phone app to enable quick, efficient tracking for users of model aircraft, drones, falcons and other applications. For Free Flight model aircraft, SkyLink also provides RCDT capability with the option to increase DT with compatible BMK timers. SkyLink is configurable via the BMK Finder app(available from Apple Store and Google Play) to allow different radio channel and RCDT codes to used.

Features

- **Battery Life/Type:** up to 60 hours / 320mAh LiPo
- **Bluetooth Version:** 4.0 (BLE)
- **Radio Receiver Sensitivity:** -112dBm
- **RCDT Output Power:** 22dB, BMK B1 and B2 compatible.
- **USB-C Charge Current:** 100mA
- **Onboard Memory:** 4KB. It stores the last received 200 beacon data in this memory if the phone is not connected. And transfers to the phone in event of connection.
- **Last Known Location:** the BMK Locator(Finder) App records and shows the last known location of the received beacons.
- **Firmware update over Bluetooth:** You can use the BMK LOADER app to update the firmware with a few clicks. (available from Apple Store and Google Play)
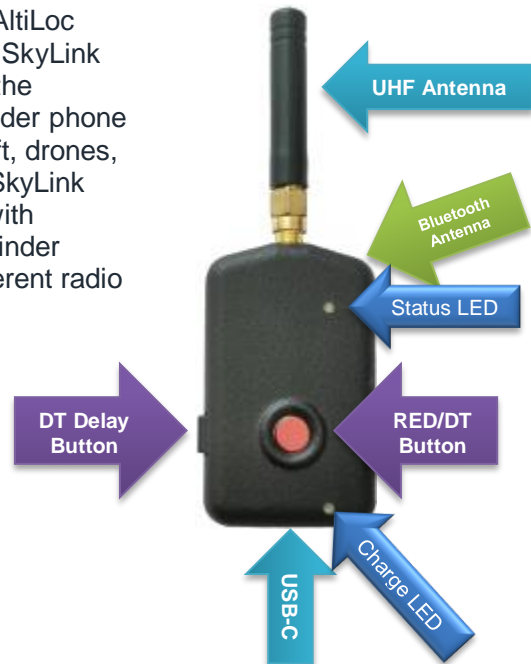
RED BUTTON
- Power ON (Press once)
- Transmits DT Signal to the compatible BMK Receivers and RCDT equipped timers. (Press once, repeat if neccesary)

DT DELAY BUTTON (aka. Abad+)
- Power OFF (Press & hold for >5 seconds, green LED will flash and it will bleep, then release button)
- DT time extends 30 seconds per press with compatible timers (see applicable timer specifications and manuals for more details).
  * This feature introduced on 18 September 2023 for all BMK RCDT equipped timers.

LEDS
- Green LED lights when the unit operational and flashes when the beacon data received.
- Red LED lights when charging. It will turn off when the carge completed.

USB-C Socket
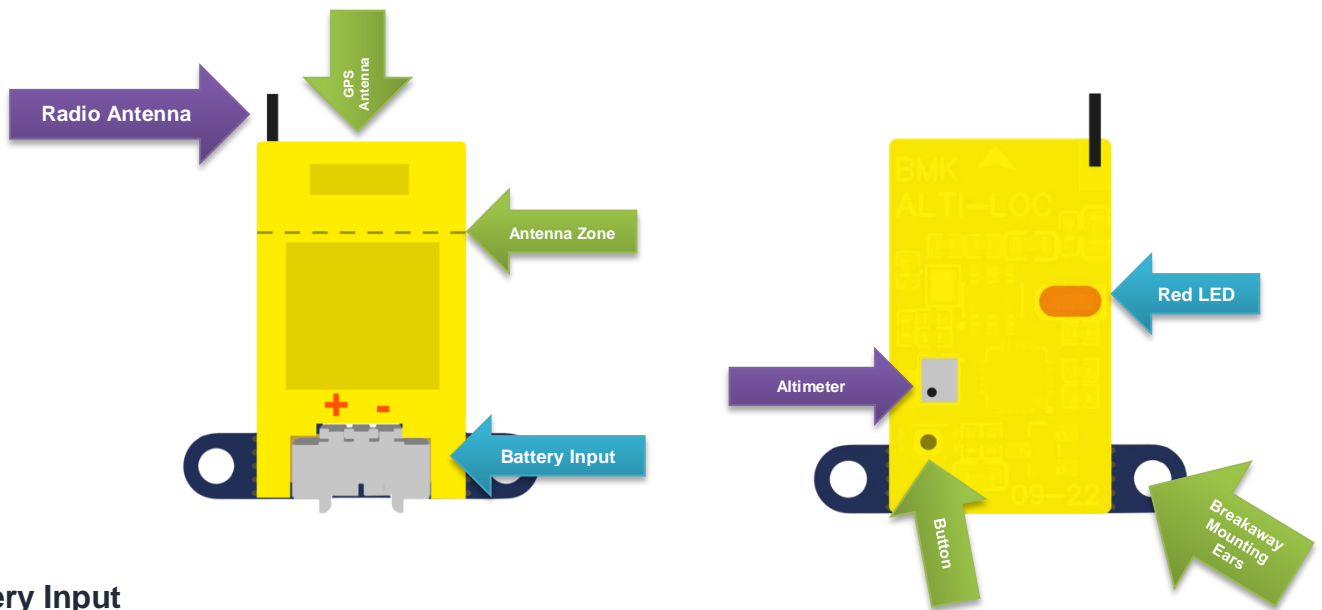- Charges the onboard 320mAh battery in ~3.5 hours.

UHF Antenna Socket
- Female SMA Antenna socket for antenna connection. You can use any compatible UHF antenna.

Bluetooth Antenna
- It's an onboard antenna under the enclosure.

BMK AltiLoc GPS Beacon

Battery Input

- MicroJST 1.25mm socket
- Compatible with 1-3S Lithium battery (3.5-13v)
- Current consumption: 30mA@flight, ~7mA@stationary, 1mA@gps-off
  * a typical 100mAh LiPo battery will be enough for an avarage flight day.

Radio Antenna

164mm long Gauge 8 Steel Guitar Wire

GPS Antenna

Ceramic GPS Antenna.
Top 8mm of the beacon must be out of the carbon fiber fuselage. (Marked as Antenna Zone above)

Altimeter

The hole of the barometric pressure sensor must be always open to measure the air pressure.
Keep away from the direct airstream or wind to measure correct altitude.

RED LED

The LED shows the device status, blinks when transmitting and fast blinks when the GPS locked.

Breakaway Mounting Ears

You can break these ears by using a small plyer or wire cutter.

Beacon Features

- 20x21x6mm with ears, 13x21x6mm without ears.
- 1.5g weight.
- GPS Beacon current consumption: 30mA@flight, ~7mA@stationary, 1mA@gps-off
- Update rate: 0.5s@climbing, 1s@flight, 4-8s@stationary
- The range: up to 20km in the air(clear UK conditions)
- Low battery mode: The beacon disables the GPS unit for lower battery consumption and transmits the last locked GPS point if the battery is under 3.3v. You can still receive this location info and signal strength value until 1.8v.
- Altimeter: 0.1m resolution. The reading range is -1000m to +5500m).
- 434-435MHz , 40 channels, 25khz channel spacing.

Battery Life

- Supplied 40mA button batteries will be enough for 1 hours of flight or 4-5 hours of stationary use.
- 100mAh battery will be enough for an avarage flight day. (1 hours in the air + 10 hours on the ground)

SkyLink Operation

The SkyLink unit receives data from any AltiLocs on the selected radio channel and displays them on the BMK Finder app using a BLE link.

SWITCHING ON AND OFF

The unit is switched on by pressing the red button for once, and switched off by pressing the DT Delay (aka. Abad+) for more than 5s; the green LED will flash and it will bleep, then release the button.

RCDT OPERATION

If the unit is on the red button will operate the RCDT transmitter with a single or continuous. If the unit isn't on, pressing and holding the red button will switch on the unit and then operate the RCDT in sequence; this is useful if you forgot to switch on the SkyLink and need to use the RCDT urgently.

DT TIME EXTEND

With compatible timers pressing the DT DELAY(aka. Abad+) button will extend the set DT time for 30 seconds with every button press. The compatibility of timers and the amount of DT extend is defined in the individual timer specifications and manuals.

*   The timers will allow this command only if they are counting down for DT. They will ignore the command if they are in a different state of the flight.
** This feature introduced on 18 September 2023 for all BMK RCDT equipped timers.

BLUETOOTH CONNECTIVITY

BLE operates whenever the unit is operational and provides the communication link between the SL and mobile device during use.

GREEN LED

The green LED will flash and a beep will sound when data is received from any AltiLoc on the radio channel selected. It will also flash on switch on and switch off.

RED LED

The red will be lit when the unit is connected to a USB charger via the USB C charge socket. It connected and not lit, the SkyLink battery will be fully charged to 4.2v in approximately 3.5 hours.

BMK Finder Operation

The BMK Finder application (app) provides display options to the user of the GPS Locator System, using commercial mapping to display AltiLoc beacon positions and additional data in real time, and the option to indicate last positional data for beacons held in memory. The app is available in both Apple IOS and Android formats free of charge from here :-

Google Store :
https://play.google.com/store/apps/details?id=com.bmk.modell ocator

Apple Store:
https://apps.apple.com/app/id1660730356

SkyLink transfers all received beacon data in the radio channel to the application through the Bluetooth (BLE) link. All beacons within range will be tracked simultaneously and their data will be transmitted to the application for monitoring and tracking purposes. It is recommended that the SL and mobile phone are kept is close proximity during operational use. It is not recommended to separate the SL and mobile device. *DO NOT pair the SkyLink device with your phone's Bluetooth; this device operates without pairing.

SKYLINK SELECTION

When first used, switch on the SkyLink and then activate the app which will ask if you want to connect to it. If you want to change the SkyLink once connected, for example to track another flier's model, then touch the Bluetooth icon(top-right) and choose the new unit from the menu list. Note that you can't connect two hand units to BMK Finder at any one time, so it will be necessary to disconnect one before connecting to

another.

After successful connection with the SkyLink, the main display is as follows :
- Selected beacon data including altitude, distance, speeds, time since last received data etc.
- Bluetooth icon – Green = active
- Bin icon
- My Beacon Filter icon – Green and no cross bar = active
- Tabular Output icon
- SkyLink Settings icon
- Position of active beacon or last position of beacon
- Position of app display and direction of display
- Map options icon
- App Settings icon
- Altitude history – green = climbing, red = descending
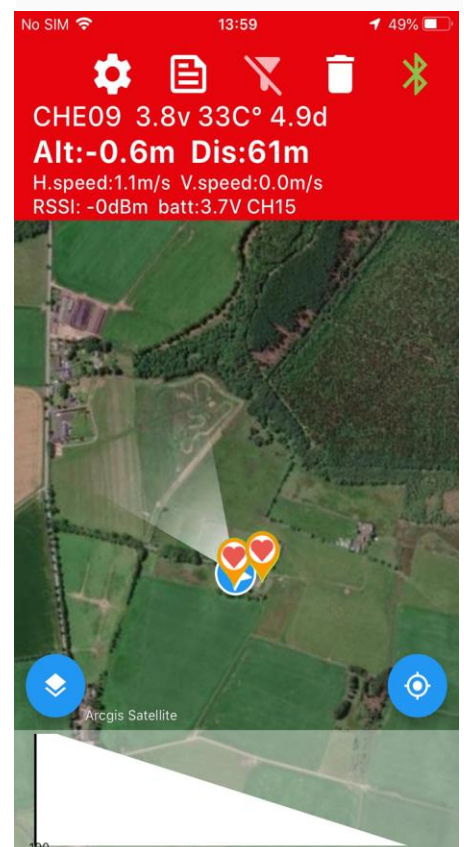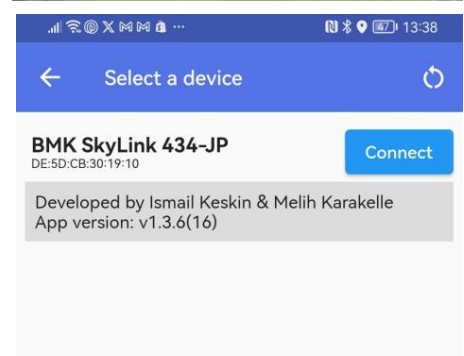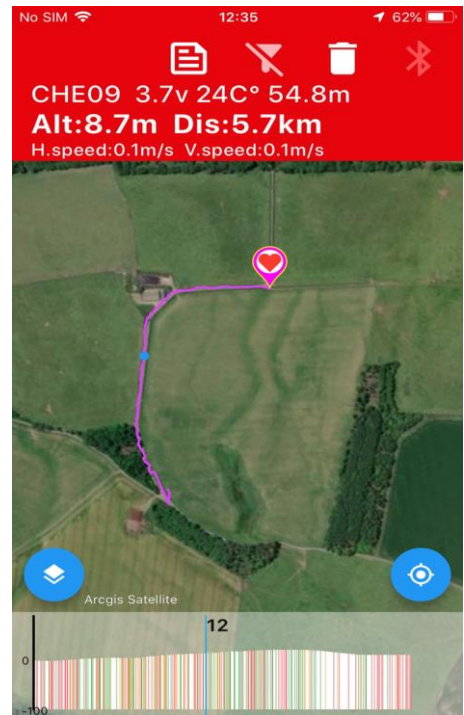
BEACON SELECTION

You can select an AltiLoc Beacon ID either by touching the beacon's icon, or by touching and holding anywhere on the map screen, for a few seconds. From the list, touch the beacon ID you want to track, the beacon icon will change from orange outline (untracked) to a pink outline (tracked) and the appropriate information will be displayed on the banner. You may need to zoom out the map to show a beacon at distance.
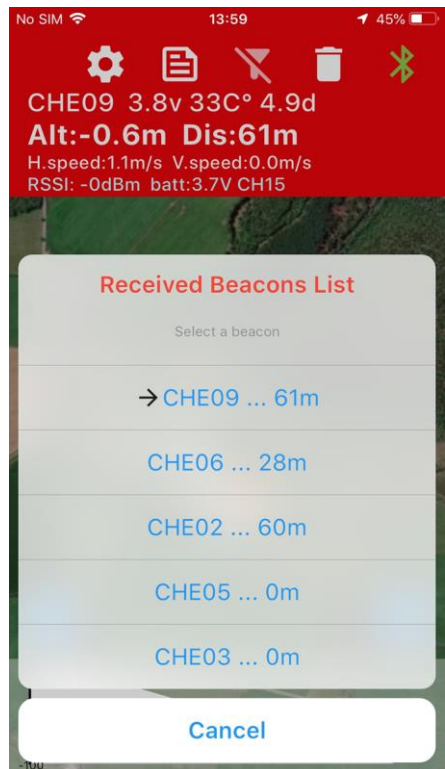
When the selected beacon is within range of the SkyLink, the upper banner will change from red (un-connected) to blue (connected) and the data will be updated. There is also an audio message (see details later) which confirms the beacon is connected to SkyLink.

Note particularly the RSSI (signal strength) value which is useful when in close proximity to the beacon.

Touching the Center icon (bottom right of screen) for a short time will change the 'searchlight' (user position icon on map) to rotate on rotation of the phone or tablet.


MAP SELECTION

There are six different maps comprising satellite, drawn, and hybrid options available in sequence by pressing the map tiles icon (bottom-left). Here are three of the current options :
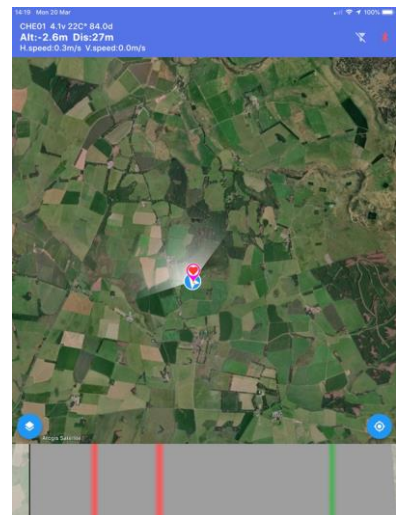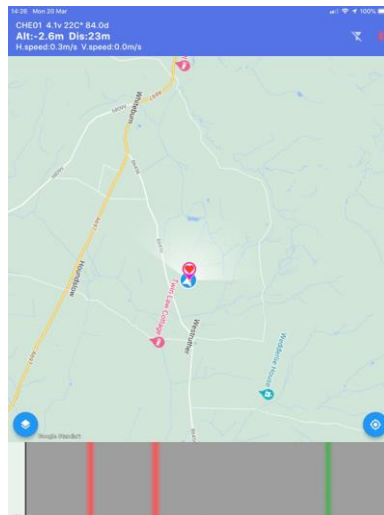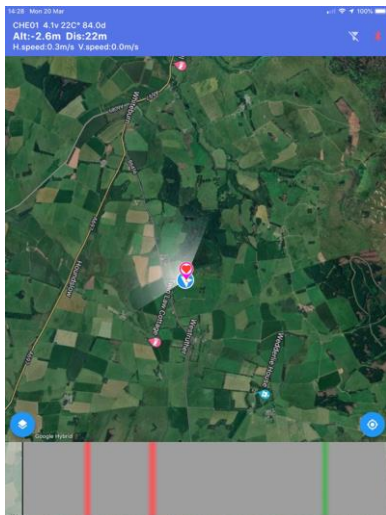
BEACON MENU OPTIONS

Touch a beacon icon for a few seconds and a menu appears :-

- Beacon ID – Renamed option shown first, the original beacon ID in brackets

- My Beacon – Mark the beacon as yours and the (?) icon will be replaced with a heart figure. Identifyıing your beacon will allow you to filter others by using the My Beacon Filter (see below).

- Rename – To allow user defined names such as 'Slinky Jim'.

- Position Data – link to Google Maps

- Clear Fight Data – removes path and altitude history

- Delete Beacon – removes beacon icon and data for that session
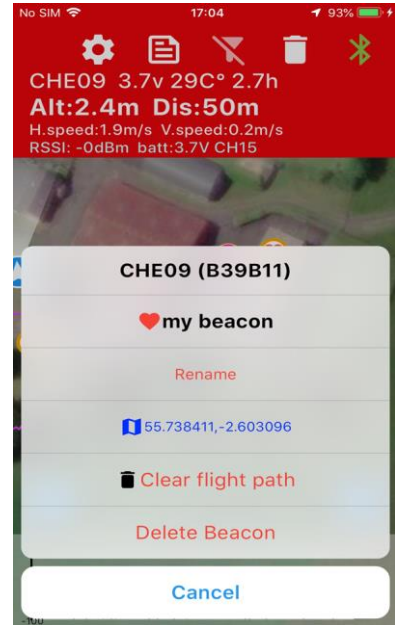
BEACON FILTERING

When first displayed, a beacon will have a grey centre heart which will turn red when identified as a My Beacon. To remove from the display any beacons not identified using the My Beacon option, use the filtering icon; it will turn green when in use and the cross bar will be removed.

ALTITUDE HISTORY

The grey bar at the bottom of the main screen is the beacon's altitude history that is populated as the beacon moves.

The image shown is a test, ie not showing a real flight, but the elements are the same. As the beacon moves away from you a purple line is drawn showing its path. If the beacon is active then a small green dot appears next to the beacon icon, otherwise there is no dot. The altitude history is shown as bars, green for climbing flight, red for descending flight. Touching the altitude history brings up a blue dot on the red flight path, and if you hold and move right or left, the blue dot will move along the flight path and display the altitude value at that position. In the example above, a height of 12m is shown roughly half way along the beacon's path, identified by the blue dot.

All flight paths will be drawn consecutively unless they are removed via the Clear Flight Data option in the beacon menu.

Tip : If the beacon appears stationary and there is no green dot then the Bluetooth link has likely failed, perhaps because the display is momentarily too far from the FlexiDisplay. Touch the Bluetooth icon and re-connect to the SkyLink or FlexiDisplay if appropriate.
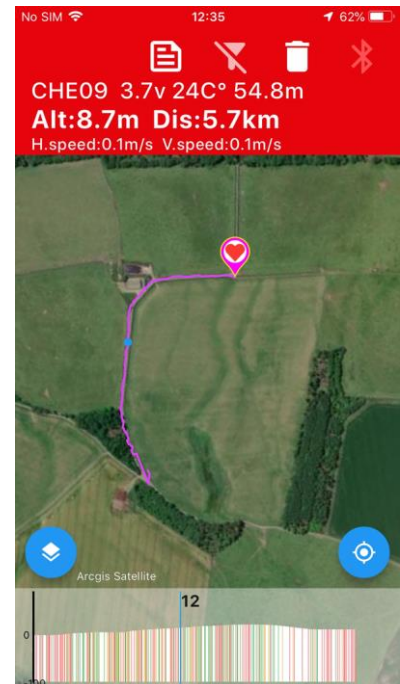
BEACON PATHS

Beacon paths are displayed whenever the SkyLink is connected and the beacon is/has been moving, otherwise just the beacon icon, showing it's last received position, is displayed.

However it is not necessary to have BLE connection established at all times for beacon data to be available. SkyLink will record the last transmitted position for any beacons on the selected radio channel that were active during the current session (ie since switched on) and furthermore records the last 200 received data points. These points may overlap or be shared between multiple beacons if they are online at the same time.

This data can be displayed on BMK Finder by re-establishing the BLE link and waiting ~15s while the data is retrieved and displayed. Note that data points are only displayed when the appropriate beacon ID is selected, otherwise it will remain blank. Also note that the data can only be downloaded once.
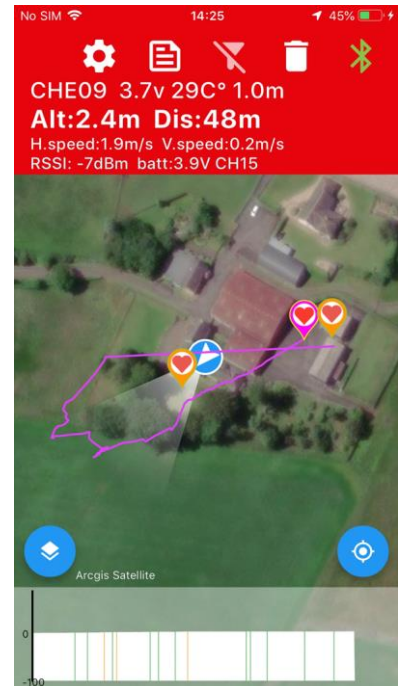
The paths, shown as purple lines, are recorded by BMK Finder unless removed; there are two methods :-

    1) To remove a single beacon's path(s), use the Clear Flight Path option in the beacon menu as shown above.

    2) To remove all beacon paths, use the Bin icon on the upper banner. Press this icon and a menu appears.

If activated, all saved paths will be removed but last position icons and all beacon data, ie re-names and/or My Favourites, are retained.

Unless removed by the Delete Beacon option in the beacon menu, the last received position of any previously active beacons will be retained in the app's memory indefinitely and can be displayed by selecting the appropriate beacon from the list. For example, in this header data the beacon ID CHE09 was last active 3.3 minutes previously.

EXCEL FILE EXPORT

Data for flight paths can be output for analysis. The data is formatted in columns showing :-

- Beacon ID on top line only

- Column 1 – Date/time

- Column 2 – Latitude

- Column 3 – Longitude

- Column 4 – Altitude via pressure altimeter (not GPS)

The data can be downloaded via the Table icon. There is no physical limitation for the data size since it's stored in your phone's memory, but clearing the path data before flight recommended if you want to analize it without confusion.

SKYLINK CONFIGURATION SETTINGS

As a headless unit it is impossible to directly configure the unit for different parameters but it can be configured via the Settings icon which only appears when SkyLink is connected via BLE.

Press the settings icon and a menu appears that allows the user to set :-

- Radio Channel Number

- RCDT Code

- SkyLink unit name

When the Save button is pressed, the settings are only saved to SkyLink if the red button is pressed within 2s to avoid un-solicited changes by bad actors.

AUDIO MESSAGES

BMK Finder has some audio messages to aid the user :-

"Beacon connected" or "Beacon signal lost". These occur within 10s of a beacon signal being newly received or newly lost respectively.

"Beacon Battery Low" and "Device Battery Low". This occurs if the voltage drops below ~3.5v.
Note that the SkyLink battery voltage is shown on the upper banner bottom line, next to the RSSI value.

Currently SkyLink has only been configured for English (British).

FIRMWARE UPDATE

SkyLink hang units has Bluetooth OTA cabability for an easy firmware update process.

You can find the **BMK LOAD** firmware update tool from Apple Store and Google Play.
* The app will be ready to download from 1 October 2023

Enabling the OTA Mode

- Make sure the device is OFF,
- Press and hold the side DT Delay button,
- Press and hold the RED button,
- Hold both button for at least 6 seconds,
- The Green LED will blink smoothly then start flashing at 2 Hz to indicate its in OTA mode.
  *It will return back to the working mode in 3 minutes if you don't update it.

Updating Firmware

- Make sure the OTA mode enabled on SkyLink(above)
- Make sure Bluetooth is enabled on your phone.
- Run the BMK LOADER app.(picture.1)
- The app will load the available firmwares from internet in 1-2 seconds.(or load from the app cache if no internet connection available.) .(picture.2)
- Click the UPLOAD button next to the SkyLink 434 firmware.
- The instructions and confirmation message will popup(picture.3)
- The Skylink device will apear in the device list as BMKDFU.(picture.4)
- Click the UPLOAD button and wait until the firmware update finished. You can follow the process from the status bar below.
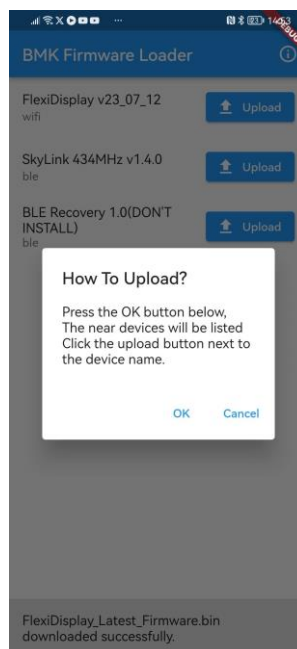- The device will restart automatically after the pudate process completed.

  * The device will cancel the OTA mode in 3 minutes but the update process may take 2 minutes. So, please enable the OTA mode just before updating the firmware or the firmware can be corrupted after 3 minutes. If that happens, repeat the enabling OTA and Upload process.
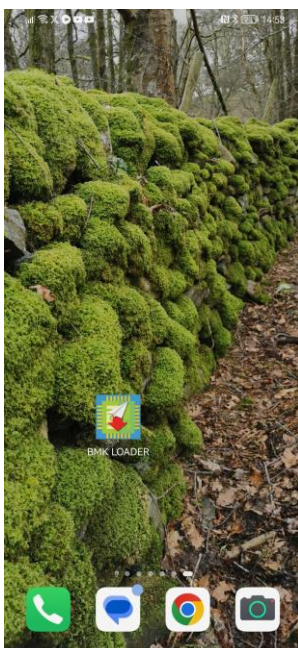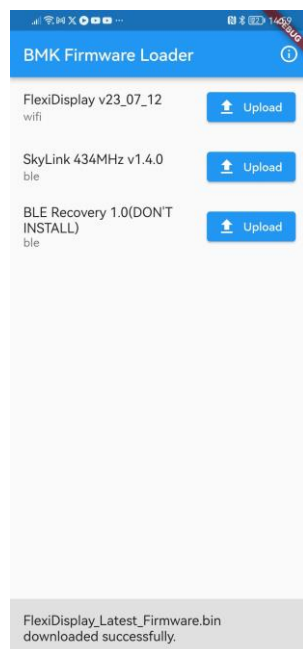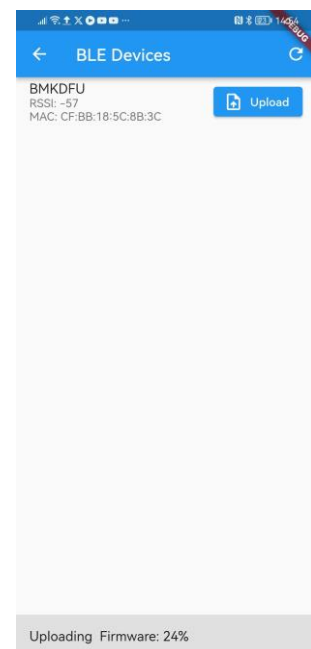

Picture.1   Picture.2   Picture.3   Picture.4

Single Page Field Manual for SkyLink 434MHz

Turn ON & OFF

1. Click the RED button to turn it on
2. Press and hold the side button ~6 seconds until hear a beep then release.

Charging

Do NOT store the batteries more than 4 weeks at fully charged(4.2V). 3.7V will be best for a longer battery life.

SkyLink 434MHz

1. Plug the USB-C cable to the charge socket.
2. The RED LED will turn on during the charging. It takes about 3-4 hours for a depleted battery.

GPS Beacon

1. Plug the Micro USB cable to the 25mA Charger,
2. Plug the battery and the RED LED will turn ON until fully charged then it will turn to GREEN.
3. The charge time is ~1.5 hours for a 40mAh battery and 4 hours for 100mAh.

Changing the Antenna

The stock antenna is selected for general use and small enough to fit in your pocket but sometimes you may need a better and bulky antenna if you are planning a long range flight etc. Please bare in your mind:

- You can search for 433MHz, 434MHz and UHF antennas. There is no consensus on their names.
- Compare the signal strength readings to make sure your new antenna is better than stock antenna.
- The antenna connector must be SMA MALE (Not RP-SMA MALE). There must be a little pin in the antenna connector.

The Phone App and Settings

- **Installing the BMK Locator App**
  - Search for 'BMK Locator' on the Apple App Store or Google Play Store to download the latest version.
  - Ensure that Bluetooth is enabled on your phone before running the app.
  - **DO NOT** pair the SkyLink device with your phone's Bluetooth; this device operates without pairing.
  - Grant the requested permissions to the app if it prompts you after installation.

- **Runnign the App for the First Time**
  - Make sure SkyLink is working.
  - To discover a device, click on the (⧖) icon located in the top-right corner. You can refresh the device display by clicking the refresh button in the top-right corner.
  - Click the "Connect" button next to the device name to establish a connection.

- **Changing the Skylink Channel, DT Code and Bluetooth Device Name**
  - Select the settings icon on the map screen (top-left).
  - Modify the Channel number, RDT Number, and Name fields.
  - Press the SAVE button
  - The device will emit a continuous beep for 2 seconds. To confirm and save the settings, press the RED button; otherwise, the changes will be disregarded.

Credits:
Beta Testers and people behind the most of the features:
Chris Edge
Julian Pennington

Person behind the Abad+ DT Delay button idea:
Javier Abad

Manual Authors:
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