HAWKEYE 5500 USER GUIDE

HawkEye 5500

User Guide

Version 4.1

Part Number: 300500

NOTICE

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TABLE OF CONTENTS

NECESSARY EQUIPMENT 43

INSTALLATION PROCESS 43

Verify Installed Firmware Versions 45

VERIFY VIA BLUETOOTH...45

VERIFY VIA DIAGNOSTIC COMMAND SERVER 46

Diagnostics...47

Availability of Command Server...48

ID - Identification 48

SYS – System information 48

IRI – Iridium Information 49

GPS – Position Information...49

GSM – Cellular Information...50

PWR – Power Status Information..51

SHORTCODE – Rapid GPS messages 51

OUTBOX – Messages Leaving System 52

INBOX – Messages Arriving to System (User Messages)...52

SET – Configure the unit...53

OBD – Vehicle Integration 56

ACC – Accelerometer Information 57

Appendix A – Revision History...58

Appendix B - FAQ 59

Appendix C – Troubleshooting 60

Diagnostic Tests...60

PERFORM A POWER-UP TEST 60

FORCE THE UNIT INTO A FACTORY RESET MODE..60

Support..61

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INTRODUCTION

Thank you for purchasing the HawkEye 5500 Tracking Unit! This easy-to-read User Guide details the unit's features and functionality. Device parameters are managed via Blue Sky Network's SkyRouter system. For more information, please see the SkyRouter User Guide.

About HawkEye 5500

Blue Sky Network's powerful HawkEye 5500 contains advanced features for enhanced resource management and operational efficiency. It features a Bluetooth interface that connects tablets and smartphones to the Iridium network using Blue Sky Network's mobile app (available for Apple iOS and Android). The HawkEye 5500 can be installed in compact spaces and easily moved between assets, rendering it the perfect choice for an ultraportable, on-the-go, global satellite solution.

Control Panel Description
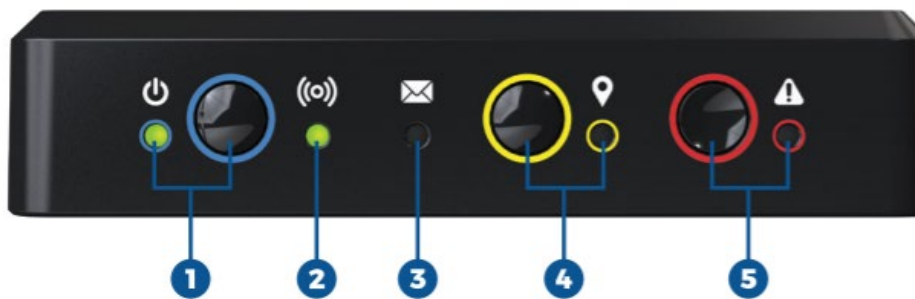
The control panel contains multiple LED indicators and buttons that enable unit operations. The descriptions below reference the photo above in accordance with the numerical value.

1. **Power / Charging Button LED**
   - Green = Power On & Good
   - Yellow = Battery < 50%
   - Red = Battery < 15%
   - Red Blink = Dead Battery
   - Blinking = Charging
   - Pink Blink = Unit in Bootloader Mode

2. **Signal Status LED**
   - Green = Cellular Mode
   - Purple = Iridium Mode
   - Yellow = Poor Signal
   - Red = Bad Signal
   - Red Blink = No Network Route

3. **Message Waiting LED**
   - Green = Unread Message

4. **Action Button & Transmit LED**
   - Green = Message Pending Transmit
   - Blinking = Message Transmitting

5. **Emergency Button / LED**
   - Red Blink = Emergency Requested
   - Red Solid = Emergency Active

NOTE: During power up, the Signal Status LED will briefly show RED as the unit acquires signal. If the LED remains RED for long periods of time, or turns RED during normal operation, signal has been lost.

Bottom Panel Description
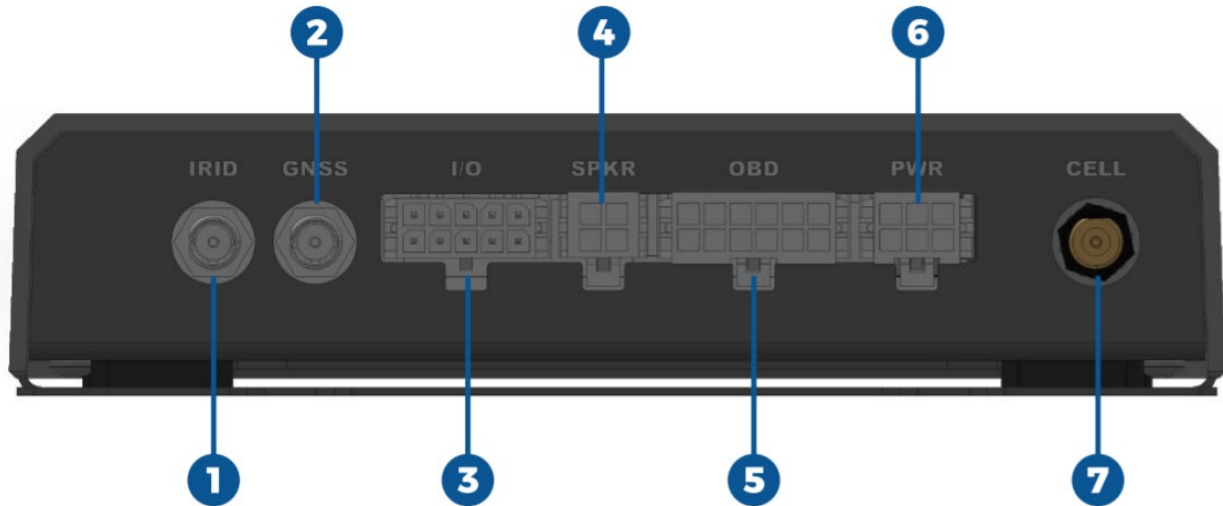
The bottom panel contains information for unit identification and activation. If you experience issues with the unit, this information will be necessary to work with support.

#1, 2, & 7 Antennas

1	Cellular (Optional External Antenna)
2	Iridium
3	GPS (Active)

#3 Emergency Switch & IO

1	Emergency Switch +	
2	Analog IN	
3	Emergency Switch IN	
4	Digital IN #1	2.5VDC = Active
5	Emergency Switch LED	
6	Digital IN #2	2.5VDC = Active
7	Emergency Switch Ground	
8	1-Wire	
9	RS-232 OUT	
10	RS-232 IN	

#4 Audio Out

1	+10-32 VDC Power
2	Speaker -
3	Speaker +
4	Ground

#5 OBD (Vehicle Interface)

1	Single Wire CAN (GMW 3089)
2	SAE J1850 Bus +
3	MS CAN High
4	Chassis Ground
5	Signal Ground
6	CAN (J-2234) High
7	ISO 9141-2 (K-Line)
8	SAE J1850 Bus -
9	MS CAN Low
10	CAN (J-2243) Low
11	ISO 9141-2 (L-Line)
12	Battery Power

#6 Power & Ignition

1	+10 – 32 VDC IN
2	Power Ground
3	10 – 32 VDC Ignition IN
4	Digital OUT #1
5	Spare
6	Digital OUT #2

TECHNICAL SPECIFICATIONS

CONNECTIVITY
Cellular
- GSM (2G)
  - Bands: 850,900,1800,1900 (quad band)
- UMTS (3G)
  - Bands: 800,850,900,1900,2100
- LTE CAT M1/NB1
  - Bands: 2-5,8,12,13,20,25,28
- Built in cellular antenna w/ optional external
- User-accessible SIM

GPS
- Full GNSS support (GPS, Galileo, GLONASS, BeiDou)
- 72-channel receiver
- 2.5m, 0.05m/s, 0.3 degrees accuracy
- Automatic spoofing & jamming protection
- Dedicated active GPS antenna

Iridium
- Iridium 9603N Modem
- External iridium antenna

Bluetooth
- Bluetooth 5.0 LE (+8 dBm transmit power)
- Bluetooth beacon / sensor support

VEHICLE INTEGRATION
Ignition Sense
- Power on unit with ignition
- Power off unit with ignition w/ optional timer

OBD Integration (Vehicle Interface)
- ISO 15765-4 (CAN)
- ISO 14230-4 (Keyword Protocol 2000)
- ISO 9141-2 (Asia, Europe, Chrysler)
- SAE J1850 VPW (GM)
- SAE J1850PWM (Ford)
- ISO 15765
- ISO 11858 (raw CAN)
- GMLAN Single Wire CAN (GMW3089)
- Ford Medium Speed CAN (MS CAN)
- SAE J1939 OBD Protocol

IO / PINS
- 2x digital IN (pull up, max 35v)
- 2x digital OUT
- 1x analog IN
- 1x remote emergency switch w/ LED indicator
- 1x ignition sense
- 1x 1-Wire Interface
- 1x RS-232 interface

LEDs
- Power
- Network status
- Emergency
- Message waiting
- Action status

OPERATING PARAMETERS
Electrical
- External power
  - 10-32VDC (12 watts peak)
- Internal battery
  - 18650 Li-ON (PCB protected) (3.7v @ 3500mAh)
  - User replaceable
- Power consumption
  - Charge: ~5 watts
  - Transmit: ~3.4 watts
  - High power run: ~2 watts
  - Low power mode: ~0.4 watts (~1 year standby)

Environmental
- Operating temperature range: -40°C to +85°C
- Operating temperature range (on battery): -20°C to +60°C
- Charging temperature range: 10°C to +45°C
- Storage temperature range: -40°C to +50°C
- Operating humidity range: ≤ 75% RH
- Storage humidity range: ≤ 93% RH

MECHANICALS
Size & Weight
- Dimensions: 140mm x 110mm x 132mm (5.5 x 4.3 x 1.25 inches)
- Weight: 0.6lb
- IP54 Rating

OTHER
- Internal speaker (basic tones)
- External speaker (waveform) (passive or powered)
- High precision accelerometer
- Waypoint / action button

GETTING STARTED

Please see the HawkEye 5500 Installation Guide for information on proper device installation.

Mounting

The HawkEye 5500 should be securely fastened to ensure proper operation of features such as crash and rollover detection. Failure to do so may cause these features to become unstable and unusable. There are 2 methods of fastening the unit to a vehicle, with bracket mounting being preferred:

MOUNTING WITH JUST UNIT

Each side contains holes that can be used to affix the unit via tie straps.
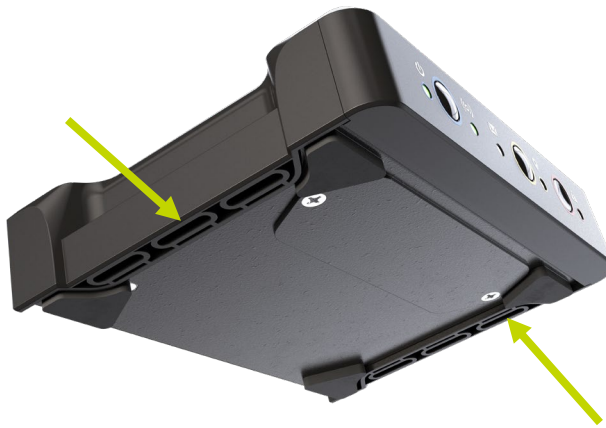
MOUNTING WITH BRACKET

The HawkEye 5500 has an optional mounting bracket that can be secured to a vehicle using screws or tie straps. The unit then clips into the bracket for easy installation and removal. The bottom plate can also be combined with other adhesives (e.g., Velcro).

NOTE: There is limited room between the bottom of the bracket and the bottom of the unit. Ensure that you have low enough profile screws and thin enough ties before proceeding with installation.
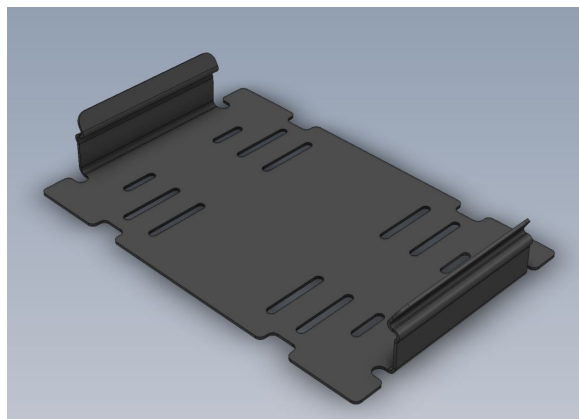
Power

The HawkEye 5500 requires power input of 10.5 – 32 VDC in order to operate and charge the internal battery. Depending on enabled features and normal report rate configurations, the internal battery can be used to power the unit for a short period of time if the power is not supplied externally.

The internal battery can be removed and charged using an approved lithium battery charger. For more information about approved battery chargers, please contact your account manager.

If necessary, the unit can operate without an internal battery present. Doing so will cause the unit to take longer to acquire its location upon power up and may disable some advanced features.

NOTE: A low battery event will be sent to the server if the unit's battery becomes low during operation.

Charge

IMPORTANT: The battery should only be charged in environments between 10ºC (50ºF) to 45ºC (113ºF).

NOTE: Charging the battery occurs automatically if the unit is installed in a vehicle and is attached to a vehicle power source. When the battery is depleted, the power LED light will flash RED, and the unit will not power on.
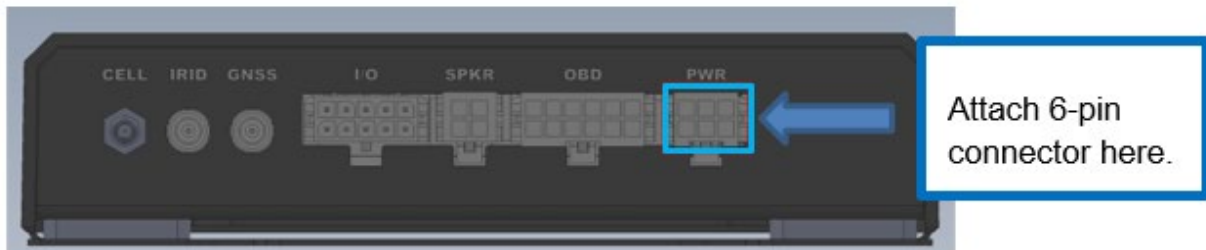
To charge the HawkEye 5500, (1) Attach a 6-pin connector to the 6-pin plug found on the back of the unit. Then, (2) Plug the charging cable or auto accessory adapter into the appropriate power source, supplying 10 – 28VDC operating/charging voltage.

The unit will need at least 4.5 hours for the internal battery to completely charge. Once fully charged, the Charging Indicator LED will be GREEN. Remove the charging cable or auto accessory adapter from its power source, then disconnect the connector from the back of the HawkEye 5500 Power Port.

BATTERY NOTICE

Your HawkEye 5500 is equipped with a rechargeable battery. The care of this battery is important for extending both battery life and device use time while in portable mode.

Here are some acts that will allow the battery to produce maximum charge and discharge cycles:

- Never deplete the battery to exhaustion.
- Turn the unit off when not in use.
- Recharge the battery after each use.
- Ensure the battery is more than 50% charged if you plan to store it for more than 30 days.

Under normal conditions, the battery should be at peak performance for the first year; charge cycles up to 1,000 are not uncommon when used properly. Depleting the battery significantly reduces the likelihood of achieving optimal cycles.

Activate

By default, all installed Blue Sky Network tracking units are shipped to customers in an un-activated state. **Your HawkEye 5500 unit must be activated prior to use.**

All activation requests must be submitted by the Blue Sky Network SkyRouter Administrator on file. An activation request can be submitted through our website by using the link below:

https://blueskynetwork.com/contact/activate-service/

You should receive an immediate email confirmation that your request has been submitted and another email once the requested services have been activated. Please make sure your contact details are accurate so that we can contact you if there are any problems processing your request.

Power On

When powering on the HawkEye 5500, the unit should be in a position to acquire good signal strength to lessen the time for the device to acquire its first satellite lock. The unit can power on via:

1) Sense of ignition power through the wiring harness.
   NOTE: When using this method, the front panel button will have no effect and the unit will report 'Ignition On' instead of 'Power On.'

2) Manual press of the blue front panel button (button must be held until unit powers on).
   NOTE: When using this method, the ignition line will have no effect on unit power and the unit will report 'Power On' instead of 'Ignition On.'

Power Off

To turn the unit off, press the blue power button or remove ignition power. The power LED will turn PURPLE, then all LED lights will turn off. Press the power button repeatedly to force the unit off. **NOTE**: Ignition power MUST be removed for the unit to power down.

Shutdown time can be configured remotely via SkyRouter; by default, it is set to 30 seconds. During this time, the unit will attempt to send a Power Off/Ignition event and all remaining stored positions. If it is unable to do so within the timeframe, the device will power off without sending an event.

By default, the unit will not generate new position messages during the power down sequence. This can be overridden in SkyRouter if the device is powered on via ignition, allowing the unit to continue generating new reports for a period of time after vehicle shut down.

A common use case for this is a delivery vehicle that makes frequent stops and wishes to keep Bluetooth communication running while the vehicle is in its off state.

Speaker (Internal & External)

INTERNAL SPEAKER

The HawkEye 5500 contains an internal speaker that can supply simple tones during certain events. This feature provides user feedback during operations including:

- Button press feedback – single chirp on button press
- Emergency mode active – unique tone that repeats every 5 seconds during emergency mode
- Speed limit exceeded – unique series of tones that repeats every 1 second while speeding
- Geofence boundary crossed
- Power on/off
- New message arrival

By default, the internal speaker is enabled. To commence silent operation, in SkyRouter, navigate to Manage > Device Parameters > Edit the desired device. Click the Unit tab on the left-hand side of the screen and un-tick the box in the Internal Speaker section.

Internal Speaker 🔊

🔘 Internal speaker is used to play power up, power down, button press, speeding, and emergency mode notifications.

☑ Enable the Feature

EXTERNAL SPEAKER

The external speaker (if connected) will mirror the tones of the internal speaker. This speaker can be powered or passive and is capable of being tied into the vehicle audio system.

To connect external audio connection, please see the section regarding rear panel pinout and the sample wiring diagram found in the Installation Guide.

ANTENNAS

The HawkEye 5500 requires the use of external GPS and Iridium antennas. In its default configuration, the cellular and Bluetooth antennas are located internally in the unit. Blue Sky Network does offer an external cellular antenna configuration.

Signal Strength

The HawkEye 5500 Iridium and GPS antennas are external to the unit. It is recommended that both antennas be positioned in a location where they have clear visibility of the sky and should not be angled at a degree greater than 8° in reference to the horizon.

The Iridium satellite constellation is comprised of 66 low-earth orbit (LEO) satellites that traverse the sky every 8 to 10 minutes. At any given time, there may be 1 to 3 satellites in view at varying locations in the sky, at times as low as the horizon.

Unobstructed sky view for optimal performance.

8°

IMPORTANT: Transmission from the antenna may be affected by, and can affect, the operation of other systems. It is the operator's responsibility to evaluate the location for any possible RF interference. The antennas should be positioned at least 39 inches (1 meter) from any L-band antennas, particularly GPS, TCAS, and Transponder antennas.

External Antenna Requirements

Below are the HawkEye 5500 external antenna requirements. Blue Sky Network can provide antenna kits for most scenarios. Please contact us if you have any questions or need an antenna.

Iridium Antenna
- Passive antenna
- Frequency: 1616 – 1626.5 MHz
- Impedance: 50 ohms
- Polarization: RHCP
- Operating temperature: -40 to +85°C
- SMA male connector

Cellular Antenna
- GSM (2G) Bands:
    - 850,900,1800,1900 (quad band)
- UMTS (3G) Bands: (3G variant)
    - 800,850,900,1900,2100
- LTE Cat M1/NB1 Bands: (LTE variant)
    - 2, 3, 4, 5, 8, 12, 13, 20, 26, 28

GNSS Antenna
- Active antenna: 3V – 5V
- Frequency: 1575 – 1609MHz
- Impedance: 50 ohms
- Polarization: RHCP
- Operating temperature: -40 to +85°C
- SMA male connector

NOTE: Blue Sky Network recommends following the maximum attenuation requirements for the coax cable and connectors that link the antenna to the HawkEye 5500 unit. The signal loss budget, including the antenna cable and all connectors, from the antenna to the HawkEye 5500 unit is < 2dB @1626MHz. Blue Sky Network Installation Kits include a low-loss coax antenna cable sized to meet this requirement.

COMMUNICATION CHANNELS

Iridium

The HawkEye 5500 contains an Iridium 9603N transceiver that utilizes Iridium's satellite network to transmit and receive satellite messages anywhere on the planet.

When under external vehicle power, this modem is always powered on and attached to the satellite network in case a message needs to be quickly sent or received. If under battery-only power or low power mode, the modem may be shut down to preserve battery power.

Cellular

NOTE: It may take up to several minutes to locate a cellular connection upon first boot of the HawkEye 5500 in a new area.

The HawkEye 5500 contains a cellular modem for scenarios such as a city where cellular coverage is widespread or for increased bandwidth and responsiveness when the Iridium satellite network may experience low signal strength.

The unit comes in 2 module configurations for cellular: 2G/3G and 2G/LTE. Both models provide global support, and there may be differences in unit behavior due to technological differences.

Blue Sky Network ships all HawkEye 5500s with global cellular SIM cards and provides competitive service plans that work in nearly every country on the planet. Please contact us for more information about cellular service plans.

REPLACING THE SIM

By default, there are no configurations necessary for the cellular modem to function with the internal SIM card. If you choose to use a different carrier, the SIM card slot can be found in the battery compartment.

To replace the SIM card:

1) Remove the battery door to take out the battery.
2) Press in on, and then release, the SIM card to discharge it.
3) Insert the replacement SIM card in the proper orientation and press in to lock it in place.

To complete setup, configure the APN, username, and password through the HawkEye Link Bluetooth application or via the commands listed in the Diagnostics section.

Primary or Secondary Channel

In its default configuration, the HawkEye 5500 contains a cellular modem and an Iridium satellite modem. The cellular communication channel is used by default as the primary means of mobile-terminated (in) and mobile-originated (out) messages.

SkyRouter supports the following configurations:

- Cellular Primary, Iridium Secondary (default configuration)
- Cellular Only
- Iridium Primary, Cellular Secondary (not advisable)
- Iridium Only

In SkyRouter, navigate to Manage > Device Parameters > Edit the desired device. The Tracking tab contains the Network Selection section where you can choose which network the device will attempt to utilize and the duration before the unit fails over to your secondary choice.

When transmitting a message in a mode with a fallback, the following algorithm is observed:

1) Is the primary channel on network and does it have strong enough signal?
2) Attempt to transmit on primary channel until timeout (configurable) or error occurs.
3) Is the secondary channel on network and does it have strong enough signal?
4) Attempt to transmit on secondary channel until timeout or error occurs.
5) Queue message for later retry.

Message Queueing

The HawkEye 5500 has two message categories:

- **Low priority**: Normal GPS reports delivered in order from newest to oldest.
- **High priority**: Events, text messages, forms, and other user-created messages delivered from oldest to newest.

If Iridium or cellular signal is weak or unavailable, the unit will queue a maximum of 20 messages from each category for later delivery. When the queue is maxed out, the oldest message will be dropped to make room for the newest one.

Data Security & Encryption

The HawkEye 5500 supports AES-256-GCM encryption of all data coming from and going to the unit. The setup process requires coordination with Blue Sky Network as well as a special service plan that may be more expensive than a standard plan due to the increased size of transmissions.

If using the cellular SIM provided by Blue Sky Network, additional security measures can be provided. Please contact us for more information or if you have service plan questions.

CONFIGURATIONS

Below are unit configuration methods and the changes that each method typically makes.

1) **Parameters**: Device behavior and how it will react in situations automatically.
2) **Profiles**: How Bluetooth applications interact with the unit.
3) **Device Setup**: Contains settings that are configured only once during initial unit setup.

All set up and configurations can be completed remotely through the GSM or Iridium connection in SkyRouter or locally through the Bluetooth or RS232 interface.

NOTE: At the time of publication, local configuration requires the use of a custom application.

Parameters

NOTE: Before using your HawkEye 5500, we recommend that you verify and update unit parameters to prevent unexpected data usage. By default, Blue Sky Network configures the HawkEye 5500 at the factory setting of a 2 minute report while the unit is moving and 10 minute report while stationary.

All HawkEye 5500 system parameters are managed in SkyRouter. Adjusting the parameters will change your unit's behavior and can affect airtime. Some parameters control the frequency at which normal position reports are sent; others will generate events that are sent in addition to normal position reports.

SkyRouter Administrators can customize the parameters from the SkyRouter interface and update units remotely (the unit must be powered on and have sufficient signal strength to receive the update). Please review the SkyRouter User Guide for information about sending parameter updates.

PARAMETER EXPLANATION

Almost every setting is remotely configurable via the parameter system. Please refer to the Reporting Features section for information on the unit's available features and feel free to contact us regarding additional training on features.

See the SkyRouter User Guide for information on using the SkyRouter parameter set system.

Profiles

Profiles are used to configure external accessories that may or may not be attached to the unit. Profile values typically do not affect the unit's core behavior. SkyRouter Administrators can manage and customize a unit profile in SkyRouter and then remotely update units in the field.

For more information about profiles, please see the SkyRouter User Guide.

SHORTCODES

ShortCodes are special types of events that users can manually send to include additional attributes to their trip. HawkEye 5500 profiles are used to configure the ShortCode functionality that is available through the HawkEye Link app with a smartphone and Bluetooth connection.

There are 10 ShortCodes that can be configured. Some events are preconfigured to send special types of location-enabled events including Start, Stop, Available, Picking Up, and Dropping Off. The other option is Text, which allows users to customize this event inside SkyRouter.

Please review the SkyRouter User Guide for more information about configuring profiles, assigning and sending profiles to units, and verifying that a unit has acknowledged receipt of a profile update.

Device Setup

The core device setup configuration settings are accessible via the [diagnostics command server](). These settings typically do not need to be modified once configured and are available anywhere the diagnostics command server is available.

REPORTING FEATURES

To enable and disable reporting features, in SkyRouter, navigate to Manage > Device Parameters > Edit the desired device. Click the tabs on the left-hand side of the screen to make configurations.

POWER/ENGINE ON & POWER/ENGINE OFF

There are 2 methods to power on the unit: 1) Press and hold the power button on the front of the unit and 2) Use the installed vehicle harness to detect the position of the key and the operation of the engine. Depending on the method used, the unit may generate a 'Power On' or an 'Engine On' report. A reciprocal 'Power Off' or 'Engine Off' report is created upon vehicle power down.

Ticking the box will produce a drop-down menu allowing you to determine how long the unit should remain on after power off.

GPS REPORTING: 'NORMAL REPORTING'

The unit's core function is to report its location to SkyRouter on a timed interval or when a condition occurs. If this report is triggered by a timer or by normal unit operation, it is considered a 'Normal Position' and is denoted in SkyRouter as such.

NOTE: This occurrence can also be referred to as 'GPS Reports,' 'Pings,' or 'Check Ins.' Since these terms coincide with other unit features, this document refers to this feature as 'Normal Position.'

All generated positions consist of latitude, longitude, speed, heading, time, and fix quality. The generated GPS message format depends on the application's use case. Please contact your account manager if you plan to use the unit at speeds of 254 mph or in a scenario where altitude is an

important component in position. All event positions (not normal) always include altitude and support for higher speeds. The precision for position components is listed below.

- Latitude & Longitude = ~1.1m
- Heading = 1°
- Speed = 1mph
- Altitude = 1m

NOTE: Additional information or increased precision above the default configuration may result in the need for a different service plan.

The unit supports 3 modes of normal reporting:

1) **Moving Reporting**: This report rate is used if the vehicle is moving. It can be disabled, allowing for reduced usage to identify stops, specifically.
2) **Stationary Reporting**: If the vehicle is stopped for a specified amount of time (5 minutes by default) in the same location, this report rate is used. This feature can also be disabled, allowing for decreased or no reporting to improve service plan usage.
3) **Turn Detection Reporting:** This feature will transmit unit position anytime it completes a turn, enabling accurate tracking of a vehicle's exact path. **WARNING:** This feature may *drastically increase* service plan usage and should not be used unless required.

The following pictures show the default reporting settings that can be changed remotely in SkyRouter.

NOTE: Tick the 'Show Advanced' box to view and edit the Report of Turn Detection section.

EMERGENCY

⚠️ When emergency mode is engaged, the unit stops sending normal reports and instead sends emergency reports at a predefined interval (15 seconds by default).

Upon entering emergency mode, the unit's emergency LED light on the control panel will blink RED until it has successfully sent the emergency activation message to SkyRouter. Then, the light will turn solid RED and remain so until emergency mode is deactivated, or the unit is rebooted.

The HawkEye 5500 has multiple ways to analyze and implement an emergency state:

- **External Switch**: The unit enters emergency mode when the external switch inside the vehicle is pressed for at least 3 seconds. If activated in this manner, the mode can be deactivated by pressing and holding the external switch for at least 3 seconds.

- **Front Button**: Press the emergency button on the front panel. Deactivate by pressing and holding the front button for at least 3 seconds.

- **SkyRouter**: Emergency mode can be activated and deactivated remotely through SkyRouter.

- **No-Go Geofence**: If the unit is inside a No-Go Geofence, emergency mode will activate and remain active until the unit exits the geofence or it is removed.

- **Smart Event**: A Smart Event allows an administrator to define how a unit should react under certain circumstances. One action output is emergency mode activation. Depending on the Smart Event activation, the mode can be canceled by the user or once the Smart Event condition is no longer met. See the Smart Events section for more information.

When emergency mode is exited or canceled, the unit reverts to normal reporting and generates an emergency cancellation message.

Choose how often the device reports to SkyRouter during emergency mode in Quick Position.

EMERGENCY

This feature utilizes the unit's GPS to accurately detect if the vehicle has exceeded the remotely configurable speed limit. If this happens, the unit transmits a message to SkyRouter indicating that a speeding event has taken place. Optionally, the unit can continue to report this value at a timed internal for as long as the unit is above its speed limit.

An audible tone will play from the internal (if enabled) and external (if connected) speaker while the unit is in overspeed condition and until it returns to a speed below the set limit.

On this screen, you can set the speed limit, the duration (in seconds) that the unit must be traveling above speed, and how frequently the unit will transmit the speeding message to SkyRouter.

Speeding 🕑

❓ The device sends the speeding event at a specified interval while the device is traveling faster than the speed limit.

☑ Enable the Feature

How often is the speeding event issued

1 Minute	▼

How many seconds must the device be traveling above speed

5

Speed limit

70	mph ▾

FIRST MOVEMENT FROM STATIONARY

This feature will report a 'Movement' event upon a change from stationary to moving states, allowing operations teams to be alerted when a vehicle is on the move. **NOTE**: The unit must be fully stationary to trigger this event. See the GPS Reporting section for more information.

This state change event is disabled by default and can be remotely enabled under the Events tab.

First Movement From Stationary ⇒

❓ Upon transition from stationary to moving this event will be sent.

☑ Enable the Feature

WAYPOINT / ACTION BUTTON

A 'Waypoint' is a singular position report that indicates a location of interest to the operations team. Press the yellow button on the front of the unit to send a waypoint location to SkyRouter.
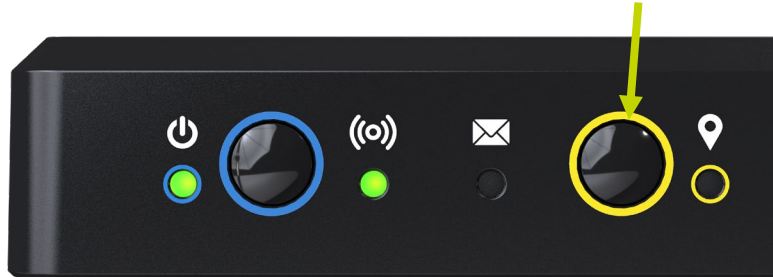
PING

During unit operation, there may be a period of time between reports, and the operations team will not know the vehicle's exact current location. They can issue a ping request in SkyRouter, which will cause the unit to generate a 'Ping Reply' with the vehicle location upon reception.

NOTE: If the vehicle is out of cellular or satellite contact due to service outage or network loss, it may take some time for the unit to receive and reply to the ping request.

ENGINE IDLING

The idling feature helps prevent excessive fuel usage by sending an event to SkyRouter if it detects that the vehicle has been stationary for a period of time while the engine is running.

Enable or disable the feature on the screen below as well as select the time period until the vehicle is considered idling. **NOTE:** The idling feature operates independently of the stationary (reporting) state of the vehicle.

LOW BATTERY

The unit contains a backup battery that can power the device for a short period of time. Once the battery reaches 20% of its capacity, the unit will generate a 'Low Battery' event to indicate that it has been operating off internal battery and it is getting low.

OBD / VEHICLE INTEGRATION

The HawkEye 5500 supports nearly all legislated OBD protocols and even some non-legislated ones. Due to the nature of vehicle manufacturing and government regulations, not all vehicles support all features. Much of the information available over the OBD interface is specific to each manufacturer.

For more information about supporting specific vehicle features or features not described below, please contact your account manager. Current OBD values can be seen by using the commands listed in the Diagnostics section.

DATA STORAGE & LOGGING

The HawkEye 5500 can be configured to store and offload vehicle diagnostic information collected during vehicle operation. This data can be useful for investigating vehicle-related problems or safety-related incidents. You can access it through Bluetooth, RS232, or the cellular interface.

By default, the unit can store data that is recorded at 2 second intervals for a time period of 24 hours. Due to the amount of data that is flowing through the vehicle diagnostics system, increasing the number of items recorded may reduce the maximum age of data that it can store.

DIAGNOSTIC TROUBLE CODE / CHECK ENGINE LIGHT

Upon detection of a 'Diagnostic Trouble Code' (e.g., check engine light), the unit will transmit the identifier(s) of the code(s) to SkyRouter where they can be viewed, and appropriate action taken. This detection process is constantly running during unit operation but will only send the codes upon first detection during that power cycle. The unit will send the codes again on unit reboot if the codes are still present.

Use this screen to disable Diagnostic Trouble Code reporting (enabled by default).

Diagnostic Trouble Codes (DTC)

ℹ Report vehicle issued DTC codes to SkyRouter.

☑ Enable the Feature

ENGINE COOLANT / OIL OVERHEAT

The unit will generate an 'Engine Maintenance' event to SkyRouter to indicate overheating if the coolant temperature exceeds 110°C (230°F) or the oil temperature exceeds 132°C (270°F).

NOTE: Not all vehicles support the ability to report engine oil temperature.

AGGRESSIVE DRIVING

An 'Excessive Braking' event is created and sent to SkyRouter anytime the accelerometer detects a high acceleration G-Load or a high G-Load during the braking process. This event is also triggered if the accelerator pedal sensor is greater than 80% for more than 5 seconds.

ODOMETER REPORTING

Built-in odometer reporting is present in all vehicles sold in the U.S. on or after 2018. It may be present in older vehicles if the manufacturer implemented the feature. If present, this value will be collected and transmitted during unit power down.

If this value is not present in the vehicle system, the 'Odometer' feature can still be used by manually configuring the initial odometer value during installation. From that point on, the GPS inside the unit will be used to accumulate an accurate odometer value, which will be transmitted on power down.

NOTE: The odometer value will be inaccurate if the vehicle is operated in backup odometer mode without the unit on.

For information about configuring the odometer, see the Command Server section.

ACCELEROMETER

The Accelerometer is used to detect unit conditions that are not possible using other sensors. **NOTE:** For proper operation, the unit should be securely attached to the vehicle and should ideally be oriented horizontally as opposed to vertically.

ROLLOVER

Upon power up, the unit calibrates the location of gravity. If the orientation of gravity changes more than 60% during operation for more than 3 seconds, the unit considers itself in roll-over state and issues a 'Rollover' event to SkyRouter (enabled by default).

Due to the nature of rollover detection, an accident involving rapid rollover multiple times may not be detected as a rollover due to the rapid rotation of the vehicle.

Roll Over ⚖️

❓ If the device detects that its orientation has flipped, this event will be triggered.

☑ Enable the Feature

CRASH / SUDDEN IMPACT

If the unit detects a large G-force (>= 5g) in any axis, a 'Crash' event will be sent to SkyRouter. This feature is enabled by default.

Crash 🚗

❓ If the device detects a violent change in velocity, this event will be triggered.

☑ Enable the Feature

AGGRESSIVE DRIVING

Aggressive driving is constantly being monitored by the unit's internal accelerometer in addition to being detected via the vehicle integration. Aggressive driving is split into 2 different types of reports:

1) 'Aggressive Acceleration'
2) 'Hard Breaking'

Both reports are triggered if the internal accelerometer detects G-force of 0.5g in a linear direction. 'Hard breaking' is distinguished between 'Aggressive Acceleration' by detecting if the vehicle speed is increasing or decreasing.

IDENTIFICATION CARDS & TAGS

The HawkEye 5500 can utilize Bluetooth to provide the ability to read identification cards and tags. Any identified cards or tags set up in SkyRouter can be linked back to the assigned user or personnel.

Cards and tags can be set up in SkyRouter under Manage > Cards & Tags. Once set up, any identified cards and tags will appear in the *position history report* and the active trip at the time of.

The behavior for this feature is different depending on the technology being utilized.

BLUETOOTH-BASED CARDS

Bluetooth-based cards and tags come in various shapes and sizes and can be utilized for both cargo and personnel identification. Most typically, they come in the form factor of an identification badge that occupants of the vehicle keep on their person. Depending on the power level of the cards, they can be detected both in the cab of the vehicle and in any attached tractor trailers.

Bluetooth cards based on the *Eddystone* format will be automatically detected shortly after the vehicle starts moving from a stationary state (see the Stationary Reporting section). The event report will contain information about any cards or tags that were detected. If the vehicle becomes stationary again, the cycle will repeat, and a new report will be generated with identification cards detected upon next movement.

NOTE: The 'Identification' event is only generated once movement begins, ensuring that the cards detected are in the vehicle and not around or passing by it. If no identification cards are located, a report will not be generated.

GEOFENCES

The Geofence feature allows you to create polygonal and circular geographical regions. The unit can automatically change its configuration once inside the area. When an asset enters or exits the region, the user will be notified.

Polygon-based Geofences can have up to eight sides while circular Geofences can define a center and a radius. The unit can store up to 75 Geofences and the user can stack up to 10 Geofences on top of each other. When Geofences are stacked, behavior changes will be applied from only the last Geofence entered. For more information, see the SkyRouter User Guide.

The HawkEye 5500 supports the following Geofence features:

- **Polygonal Geofences** (max 8 points)
- **Circular Geofences** (defined by diameter)
- **3D Geofences**
  - *Upper altitude bounds*
  - Lower altitude bounds
- **AVR 1.0 Geofence Features**
  - *No Go Zone* – Emergency mode will engage and a 'No Go Enter' event will be generated. SkyRouter will behave as if the unit is in emergency mode.
  - *No Report Zone* – All GPS-based reporting will stop functioning. Upon leaving this zone, reporting will resume as normal.
  - *Change Report Rate Zone* – The normal report rate will change to this interval.
  - *Designate as Depot* – The event 'Depot Enter' will be generated. Additional data offloading will happen at this point if configured.
  - *Speed Limit Change* –The speed limit value will be overridden with the defined value in the Geofence. This allows for variable speed limits based on geographic region.

NOTE: Geofences that span across the data boundary (cross from positive longitude to negative longitude) are not supported.

GEOFENCE VIOLATIONS

Within 30 seconds of violating the Geofence boundary, the unit will report its current location to the server as well as the state and name of the violated Geofence.

I/O – INPUTS & OUTPUTS

The unit contains 2 digital OUT (switches) that will go to ground upon activation, 2 digital IN (switches) that will be considered active if they sense > 2.5V-DC, 1 analog IN that can sense changes in voltage levels, a 1-Wire interface, and an RS232 interface. These sensors enable the use of advanced features through 3rd party accessories. Some potential uses of these sensors include:

- Ignition interlock to prevent operation of vehicle until driver is authorized
- Remote door and vehicle locks
- Remote engine killing unit
- Fuel level sensors
- Temperature sensors
- Door sensors
- Gunfire detection sensor
- Warning lights

If you have an accessory system that you would like to use with the HawkEye 5500 or wish to explore integration options, please contact your account manager for more information.

All I/O functions that drive events require use of the Smart Events system.

RS232 INTERFACE

The HawkEye 5500 has an RS232 interface that can be used as an auxiliary method of connecting and communicating to the unit in situations where wireless communications is a safety or security hazard. The RS232 interface is tied to the diagnostics interface; see that section for information on issuing commands.

The following settings should be observed when connecting to the RS232 port:
- Baud Rate: 115200
- Data: 8-bit
- Parity: None
- Stop Bits: 1-bit
- Flow Control: None

BLUETOOTH

The HawkEye 5500 utilizes the Bluetooth 5.0 Low Energy standard to provide the best performance to power consumption available. The Bluetooth interface supports messaging applications, diagnostics, beacons, and custom applications.

HAWKEYE LINK APPLICATION

To access additional features, you will need to download and install the Blue Sky Network HawkEye Link application on your Apple iOS or Android mobile device, available on the iTunes store (Apple iOS) and the Google Play store (Android).

The HawkEye Link App uses your mobile device's Bluetooth module to connect to the HawkEye 5500 unit. Once connected, you gain access to the following:

- Status information
- Current location information
- Diagnostic information
- Two-way messaging (free form text)
- Customizable on-demand location waypoints
- Digital forms
- Unit configuration & setup
- Firmware updates
- Operator login
- Geofence & speeding violation alerts

For more information, see the HawkEye Link User Guide, available on the BSN support site.

NOTE: The HawkEye 5500 has an inbox size of 10 inbound text or raw messages.

WARNING: Using some of the app's features, such as sending and/or receiving email, forms, and ShortCodes, will use service plan data when sent or received from the HawkEye 5500.

BLUETOOTH BEACON

The HawkEye 5500 supports sensors, switches, and identification cards that follow the Bluetooth beacon standard. This can be used for features such as automatic driver identification, cargo tracking, remote emergency switch, or temperature monitoring.

Please contact your account manager for information on specific use cases and supported beacons.

SECURE PAIRING

By default, Bluetooth pairs with the HawkEye 5500 in 'Just Works' mode, which provides ease of connection but does not provide the highest level of security for the connection channel.

The HawkEye 5500 offers a 'Secure Pairing' feature that requires a pairing code be set and then supplied during the initial pairing operation with the unit to strengthen security. For your convenience, this code is only necessary the first time a tablet or phone is paired with the unit.

Enable the High Security Pairing feature in SkyRouter by navigating to Manage > Device Parameters > Edit desired device > Unit tab.

Bluetooth Security ✦

❓ By default, Bluetooth works in a mode that is easiest to use but allows anyone to connect to the unit. To limit connections, set a pairing code.

☐ Require High Security Pairing Code

CUSTOM APPLICATIONS

The HawkEye 5500 utilizes a communication protocol to create custom applications that perfectly meet your operational needs. Custom applications provide you with direct access to the unit sensors and allows you to transmit other critical business data through the satellite or cellular network.

Please contact us if you wish to explore this option further!

DRIVER / PASSENGER / CARGO IDENTIFICATION

The HawkEye 5500 can identify drivers, passengers, and cargo through 2 identification systems, allowing the operations team to be alerted to the movement of people and cargo in addition to the vehicle. This can be helpful in monitoring cargo that leaves the asset when it is not supposed to or being notified when unauthorized personnel use the vehicle.

BLUETOOTH ID & CARGO CARDS

Under the *Eddystone* protocol, Bluetooth beacons can be used to identify drivers, passengers, and cargo. This system employs a battery-powered Bluetooth module inside a card or other form factor to transmit its identification information at various programmed ranges.

Benefits	Drawbacks
• Configurable transmit range of 1m – 200m, depending on obstructions. • Ability to detect cargo inside trailers from the cab. • Ability to embed additional identification information. • No additional receiving hardware is required, and the unit can be located anywhere in the vehicle.	• The card must be replaced once the internal battery dies.

Bluetooth beacons come in many shapes and sizes. If you are interested in exploring how to use this system in your operation, please contact us for more information.

The HawkEye 5500 detects which cards are present once a vehicle is underway and notifies SkyRouter of additional cards detected, or any that were present but no longer visible to the unit.

REPLACING THE BATTERY

The HawkEye 5500 has a user-replaceable battery that is accessible by removing the screws on the door on the bottom of the unit. The unit uses a standard-sized 18650 battery that can be recharged in any standard Lithium-Ion battery charger.
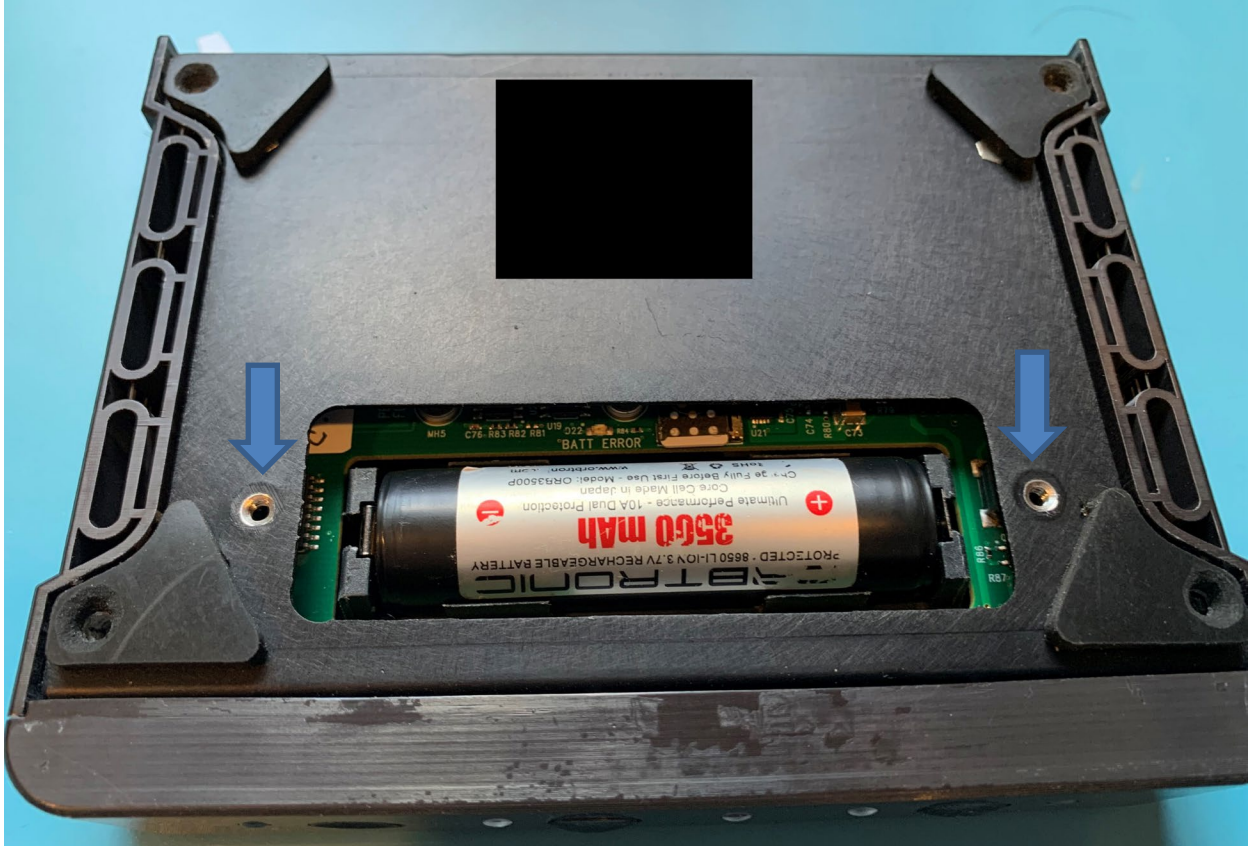
Please note that if the battery is inserted incorrectly, the unit will not function until the direction of the battery is fixed.

WARNING: While the battery used by the HawkEye 5500 may look generic, it is a very specific type of protected cell that is necessary for proper operation and unit safety. Please contact us if you would like to purchase additional batteries.

FIRMWARE UPGRADE

It is possible for customers to update the firmware on the HawkEye 5500 unit if required. Occasionally, updates are released and may include new features and/or improvements. Upgrading firmware can take place locally via the Bluetooth application or through cellular connection.

FIRMWARE COMPONENTS

The HawkEye 5500 contains multiple onboard systems, each with their own firmware that may be required to be upgraded independently of the others.

Blue Sky Network releases firmware in packages. Each package contains all the firmware necessary to upgrade to that package version from any other version. Package versions ensure that every firmware in that package will work with any other firmware that is part of that same package.

Additionally, each firmware component contains its own firmware version. This means that a single firmware package may over time have multiple versions of the core firmware as bug fixes are released. Generally, only bug fix releases will be included in an existing package.

Component	Purpose
Core Firmware	The main system that controls the modems and GPS
Core Bootloader	BIOS for the main system
Expansion Firmware	The expansion system that controls the OBD and sensors
Expansion Bootloader	BIOS for the expansion system
Bluetooth Firmware	Bluetooth module code for connecting with applications and upgrading firmware

FIRMWARE UPGRADE VIA BLUETOOTH

WARNING: This method allows for you to install conflicting firmware versions and is discouraged. Pay careful attention to the package version.

The Bluetooth firmware upgrade process utilizes the HawkEye Link application to manually install each individual component. The firmware upgrade speed may be dependent on the Bluetooth platform itself or its version on the device performing the upgrade.

NOTE: This method does not require the unit to be activated and on network.

NOTE: It has been observed that Android is significantly slower at upgrading the unit than Bluetooth.

NECESSARY EQUIPMENT

1) HawkEye 5500 unit (ideally connected to external power source
2) HawkEye Link Application (from iOS App Store or Google Play)
3) Tablet or Phone
    a. iOS or Android
    b. Bluetooth 5.2+ (ok to assume last few years are safe)

UPGRADE PROCEDURE

1) Power on the HawkEye 5500 unit
2) Open the HawkEye Link application
3) Connect to the unit (it may show up as HE or HE XXXX). See HawkEye Link User Guide for further assistance
4) Navigate to Settings > Update Firmware
5) From the dropdowns, select the following:
    a. Product: *HE5500*
    b. Version: *The version and component you wish to upgrade*
6) Click the green 'Update' button
7) Wait for the firmware upgrade to complete. **NOTE:** This may take a while to complete
    a. **WARNING: DO NOT MOVE THE UNIT OUT OF RANGE OF BLUETOOTH**
    b. **WARNING: DO NOT REMOVE POWER FROM THE UNIT**
    c. **WARNING: DO NOT CLOSE THE APPLICATION DURING UPGRADE**
8) Follow the prompt on the screen to reboot the unit as instructed
9) ***Repeat the process for all remaining firmware files in the package version***
10) Perform the steps described in the <u>Verify Installed Firmware Versions</u> section to confirm that the firmware has been applied.
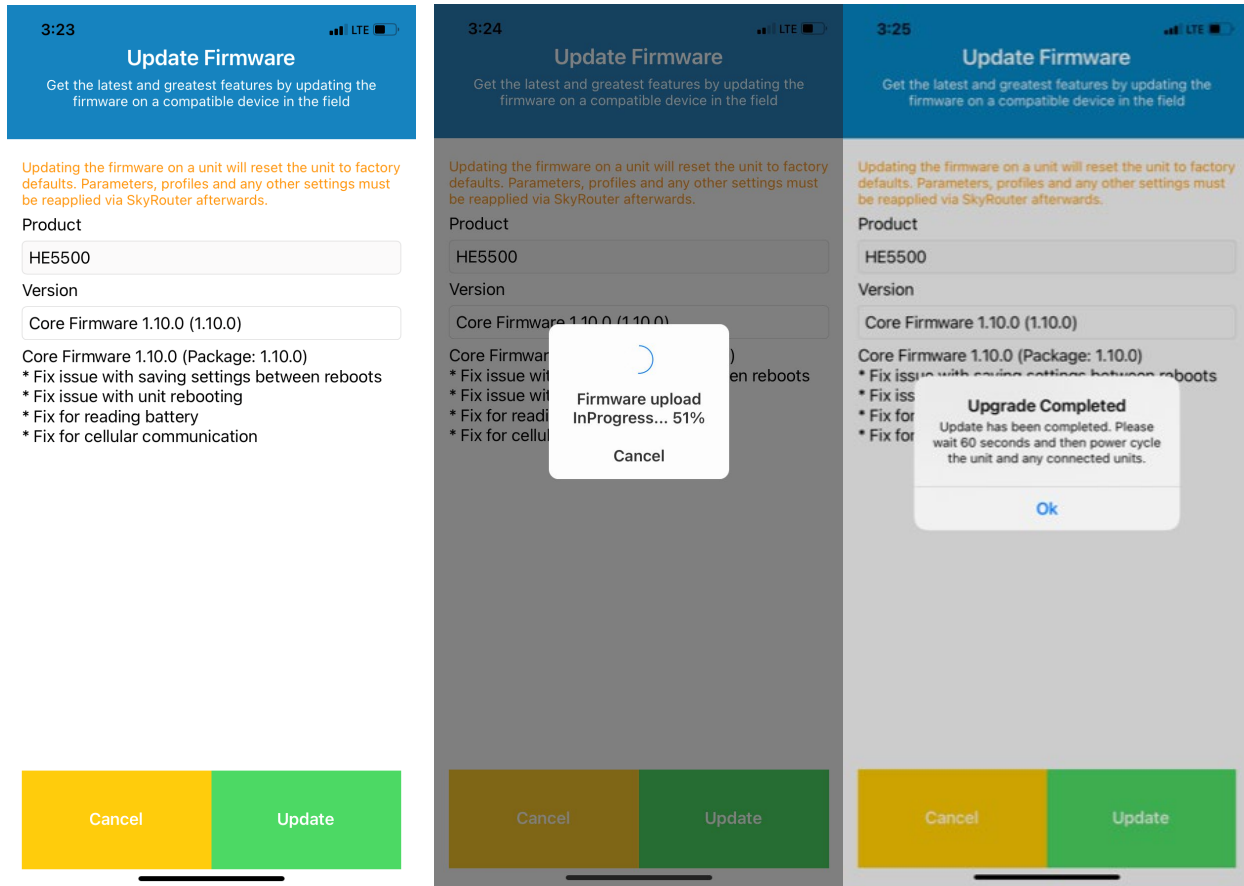
FIRMWARE UPGRADE VIA CELLULAR CONNECTION

The cellular firmware upgrade process is the preferred and default method for performing upgrades on the device. It uses the device's cellular network connectivity to locate, download, and apply all firmware components that are part of a firmware package.

The cellular firmware upgrade process can be initiated via any interface that has access to the Diagnostic Command Server. The unit does not have to be located near the initiator of the upgrade.

At the time of writing, the Diagnostic Command Server is the default command interface for SMS and RS232. The interface can be accessed via Bluetooth by using the RX/TX command server characteristic and via the GSM or Iridium connection using the Remote Command protocol.

WARNING: Please ensure you have enough time to complete the install process, as it cannot be stopped once started.

WARNING: This process relies on the local cellular network connection and may not succeed if no network connection is available.

NECESSARY EQUIPMENT

1) A method for triggering the firmware upgrade process
2) A HawkEye 5500 unit that is activated, attached to cellular network, and attached to external power

INSTALLATION PROCESS

1) Determine the firmware package that you wish to install.
2) Confirm the unit is attached to a cellular network by issuing **GSM** and verifying that **ONNET** is set to **T**.
3) Send the command **FW:package version** (e.g., **FW :1.10.0**) to the unit.
4) Ensure the unit replies with the same command you entered.
5) As the device starts each potential firmware download, a 3 tone sequence will play 5 times before applying the images.
6) Wait until unit has rebooted. If after 10 minutes it has not happened, the firmware process has failed.
7) Perform the steps described in the [Verify Installed Firmware Versions](#) section to confirm that the firmware has been applied.
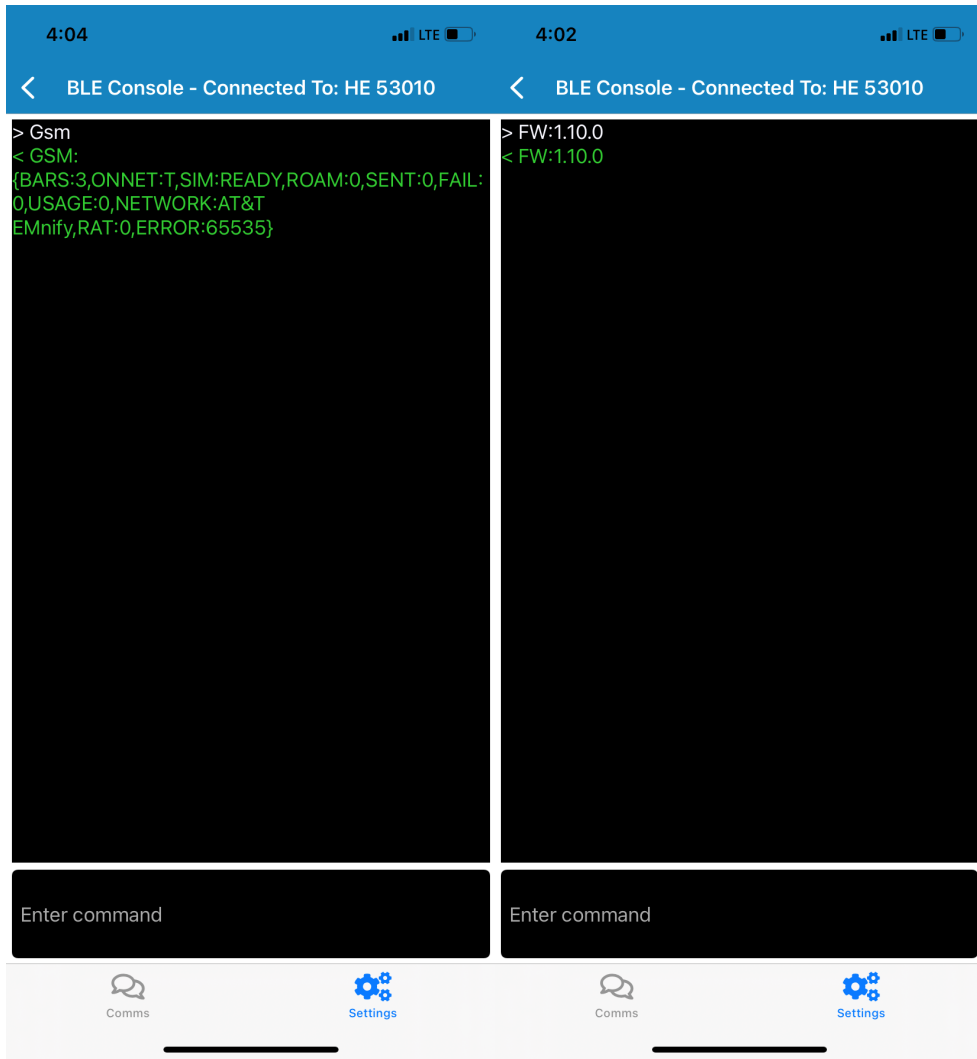
Verify Installed Firmware Versions

VERIFY VIA BLUETOOTH

To verify via Bluetooth, connect to the unit and navigate to the Settings screen, where you will find the current firmware versions loaded on the unit.
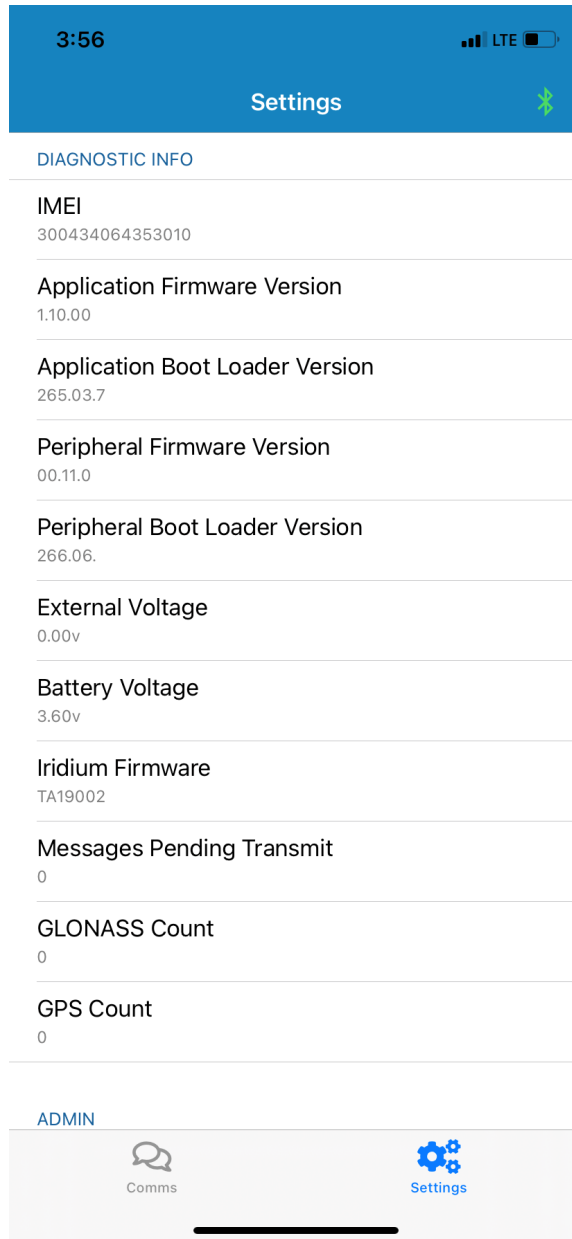
VERIFY VIA DIAGNOSTIC COMMAND SERVER

To verify firmware installation, issue the **ID** command to the unit via the Diagnostic Command Server. The response will contain the current active firmware and bootloader versions of all components in the system.

NOTE: The below picture does not show all possible properties in the command response.
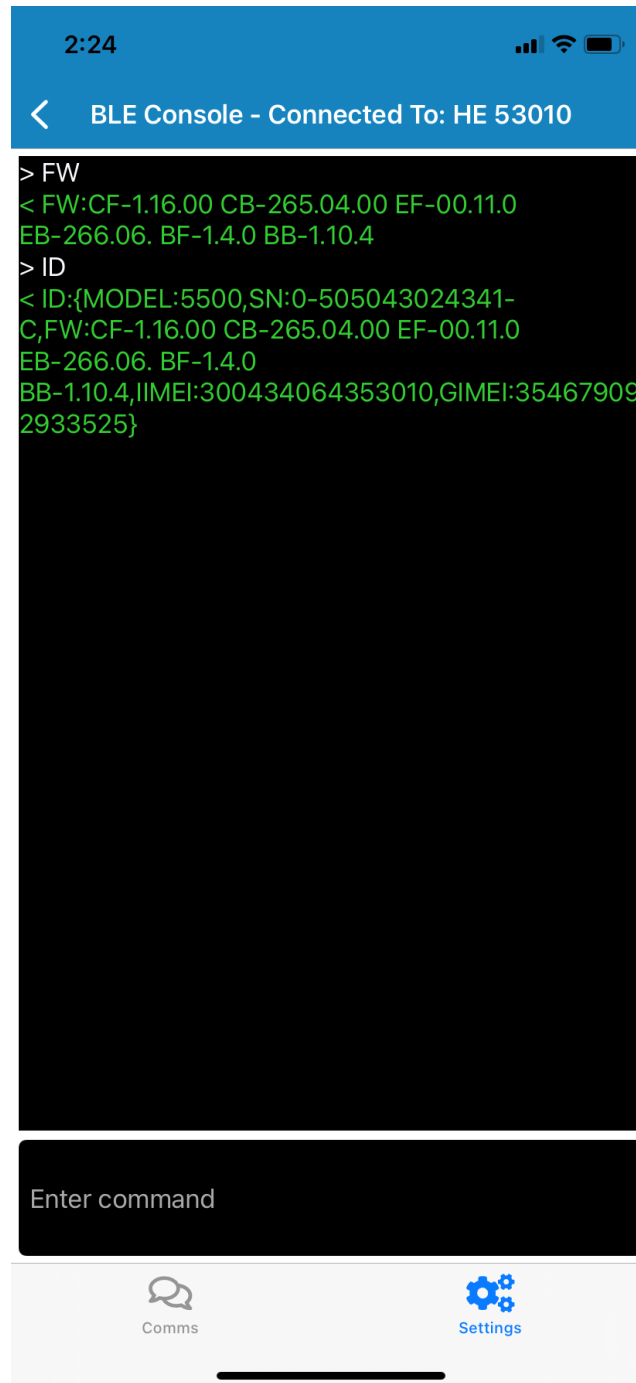
DIAGNOSTICS

The HawkEye 5500 has advanced diagnostics that are available through multiple connections. The diagnostics system consists of command > response formats that can be used to do the following:

1) Set the unit configurations
2) Read the unit configurations
3) See operating low-level settings and values
4) Enable unit features and perform reboots
5) Initiate remote firmware updates
6) Put unit into diagnostic test mode

The format of a command is: ***command key*:*command value***

Sending a command value of *?* or with no value will return the current value of the command only if it holds a value. For example, **REBOOT** does not have a value, so **REBOOT:?** will return nothing.

If a command is requested that is not understood, the result will be: ***UNKNOWN COMMAND***

The response is limited to 500 characters for the whole response and 250 characters per command. <u>Commands are case sensitive</u>.

Commands are grouped into several sections based on functionality. Below are available groups:

Command Key	Result
HELP	List of command groupings
ID	Information about model, serial, modem, and firmware
SYS	Current system status information
IRI	Iridium modem status and diagnostic information
GPS	GPS position status and diagnostic information
GSM	GSM modem status and diagnostic information
PWR	Status and diagnostic information for power state of the unit
SHORTCODE	Retrieving and sending ShortCodes
OUTBOX	Information about outbound messages and ability to send a message
INBOX	Information about inbound messages and ability to manage mailbox
SET	Settings related to unit configuration
OBD	Vehicle integration status and diagnostics
ACC	Onboard accelerometer information

AVAILABILITY OF COMMAND SERVER

The command server is available through the following interfaces:

1) RS232 - This is the default interface for RS232
2) Bluetooth - This can be accessed by reading and writing to the RX/TX CMD server characteristic
3) Cellular SMS - This is the default interface for SMS request / responses
4) Iridium - This can be accessed by utilizing the Remote Control protocol

ID - Identification

The **ID** command key provides information about the system. Issue **ID:** to return the current value for all commands listed below or **ID:Subcommand** for the specific result.

Subcommand	Will Return:
HELP	This command list
MODEL	Model name of the product (HE5500, HE7300, etc.)
FW	Current firmware version
SN	Board serial number and board revision
IIMEI	Iridium IMEI
GIMEI	Cellular IMEI

SYS – SYSTEM INFORMATION

This command returns current status information about the system. Issue **SYS:** to return the current value for all commands listed below or **SYS:Subcommand** for the specific result.

Subcommand	Will Return:
HELP	This command list
IRI	Result of running *IRI:BARS:?,ONNET:?,USAGE:?*
GSM	Result of running *GSM:BARS:?,ONNET:?,SIM:?,ROAM:?,USAGE:?*
GPS	Result of running *GPS:FIX:?,HDOP:?,STATS:?*
INBOX	Result of running *INBOX:NUM:?*
OUTBOX	Result of running *OUTBOX:NUM:?*
PWR	Result of running *PWR{EXT:?,BATT:?,BLVL:?*
TIME	Current system time

IRI – IRIDIUM INFORMATION

This command returns current information about the Iridium modem. Issue **IRI:** to return the current value for all commands listed below or **IRI:Subcommand** for the specific result.

Subcommand	Will Return:
HELP	This command list
BARS	Current signal strength in bars from 0 – 5
ONNET	Indicates if the modem is attached to the network or not
SENT	Total number of messages sent over Iridium since boot
USAGE	% total of usage of the unit on the Iridium channel vs cellular
FW	Modem firmware version
MTCOUNT	Number of mobile terminated messages waiting to download
MTRING	Verifies if the modem has been asked to check for messages by the network
MOSTAT	The status of any current sent operation: 0 = Idle, 1 = Send in Progress, 2 = Send Success, 3 = Send Timeout

GPS – POSITION INFORMATION

This command returns current information about the GPS system. Issue **GPS:** to return the current value for all commands listed below or **GPS:Subcommand** for the specific result.

Subcommand	Will Return:
HELP	This command list
FIX	Current GPS Fix 1 = No Fix, 2 = 2D Fix, 3 = 3D Fix
HDOP	Horizontal Dilution of Precision
LAT	Current latitude
LNG	Current longitude
ALT	Current altitude in meters
HEAD	Current heading in degrees
SPEED	Current speed in KPH
SATS	Current number of satellites in view
JAM	Verifies if jamming has been detected

	0 = Unknown, 1 = None, 2 = Interference, but OK, 3 = Yes, GPS Invalid
ODO	GPS odometer in km since last boot of unit

GSM – CELLULAR INFORMATION

This command returns current information about the cellular modem. Issue *GSM:* to return the current value for all commands listed below or *GSM:Subcommand* for the specific result.

Subcommand	Will Return:
HELP	This command list
BARS	Number of signal bars from 0 – 5
ONNET	If the modem is currently on network
SIM	The current SIM status (anything other than READY is an error)
ROAM	If the module is currently attached to a network and considered roaming
SENT	Number of messages sent over this network since boot
FAILED	Number of messages that failed to send over this network since boot
USAGE	% usage of transmissions on this network vs Iridium
NETWORK	Name of the network that the unit is attached to
RAT	Radio Access Technology 0 = None/Not Registered, 1 = 2G/GPRS/EDGE, 2 = 3G, 3 = 4G/LTE

PWR – POWER STATUS INFORMATION

This command returns current information about the power status of the unit. Issue **PWR:** to return the current value for all commands listed below or **PWR:Subcommand** for the specific result.

Subcommand	Will Return:
HELP	This command list
EXT	Internal power rail voltage
BATT	Internal battery voltage
BLVL	Internal battery voltage %
IGN	If ignition power is detected (HE5500 only)
CHG	If the internal battery is currently charging
CURR	Current internal current in mA
BREM	Battery life remaining %
BTTF	Battery seconds until full (if charging)
BTTE	Battery seconds until empty (if not charging) (approximated)
BATTRESET	Command to reset internal battery algorithm

SHORTCODE – RAPID GPS MESSAGES

This command can be used to list and send ShortCodes. Issue **SHORTCODE:** to return the current list of ShortCodes or **SHORTCODE:Subcommand** for the specific result. Units can store up to 10 ShortCodes and they are remotely configured via SkyRouter.

Subcommand	Will Return:
HELP	This command list
num 0 – 9	ShortCode text and command for ShortCode at index (num – 1) Response will be: type,text
SEND	Send a ShortCode. Value should be number 0 – 9. The response will be an identifier that can be queried from **OUTBOX** to see its send status

OUTBOX – MESSAGES LEAVING SYSTEM

This command can be used to interrogate the outbound message queue. Issue **OUTBOX:** to return the items currently in the queue or **OUTBOX:Subcommand** for the specific result.

Subcommand	Will Return:
HELP	This command list
NUM	Number of pending items to transmit
Q	Number of items in the high priority queue (user + system)
LIFO	Number of items in the low priority queue (user + system)
SEND	Put the raw value field supplied directly into the high priority queue. The result will be the items queue identifier
STAT	The identifiers of the queue items that are in the outbound queue and have not yet been sent. These identifiers are assigned if it was a user-generated message through Bluetooth or the diagnostics server. The result is a list of comma-separated identifiers. If an identifier is present, that means it is in the queue to be sent. Identifiers roll over at 255

INBOX – MESSAGES ARRIVING TO SYSTEM (USER MESSAGES)

This command can be used to interrogate the inbound message queue for the unit. Issue **INBOX:** to return the items currently in the queue or **INBOX:Subcommand** for the specific result.

NOTE: This queue is emptied by any Bluetooth connected application during normal operation.

Subcommand	Will Return:
HELP	This command list
NUM	Number of items currently in the inbox
READ	Read the oldest item in the inbox. The result will be the raw data of the message. Max number of characters is 50
DEL	Delete the oldest item in the inbox

SET – CONFIGURE THE UNIT

This is a command with a special execution that is used to configure settings on the unit. It needs to be issued *without* the command key **SET** being present. For example, the subcommand GSM.APN in this table should be executed as purely **GSM.APN:google.com** instead of **SET:GSM.APN:google.com.**

Subcommand	Will Return:
HELP	This command list
CELLULAR SETTINGS	
GSM.APN	The cellular modem's current APN value. Supplying a value will set the APN for the unit and attempt modem re-initialization **NOTE**: If using the 4G/LTE module, this value is often provided by the network automatically.
GSM.USER	The cellular modem's current APN user authentication value. Supplying a value will set the user and enable authentication. Supplying "" will empty the field
GSM.PIN	The cellular modem's current SIM PIN. Supplying a valid value will set the value. Supplying "" will empty the field
GSM.PW	The cellular modem's current APN password authentication value. Supplying a value will set the password and enable authentication. Supplying "" will empty the field **NOTE**: Setting a password is not supported when operating in 4G/LTE mode
GSM.MNO	The network operator that the cellular modem should be configured with. This setting only applies to 4G/LTE variant of product 1 = SIM Determined, 2 = AT&T, 5 = T-Mobile 19 = Vodafone, 31 = Deutsche Telekom, 100 = Standard Global (default) **WARNING:** This setting should not be changed unless required to
GSM.URL	The server URL that cellular packets will be delivered to. This should not be changed
GSM.PORT	The server PORT that cellular packets will be delivered to. This should not be changed
AES SETTINGS	
AES.KEY	The encryption key to use when encoding/decoding data. This key must be in sync with the server in order to operate. The key cannot be recovered. If a key is set, the result of a read request will be '1'

AES.ENABLED	Indication if the encryption is enabled or disabled. If this is set to 0, encryption will not be used when transmitting or receiving messages. This has no effect on the encryption state on the server, which will reject unencrypted messages if the server is set to use encryption
DIAGNOSTICS	
DIAG.SIMUL	If GPS simulation mode is enabled
DIAG.DEBUG	If diagnostic debug mode is on
DIAG.TEST	If the hardware test mode is enabled. See Perform a Power-Up Test
GENERAL CONFIG	
ISPEAKER	If the internal speaker is enabled or disabled
SOS	If the unit is in emergency mode. If this value is set, the enable or disable request will be processed as if the front panel of the button was pressed. This command will echo the requested state even if the unit denies the request to exit SOS mode
PKT	The format of normal GPS messages 0 = Legacy Reporting, 1 = Compressed Aviation (altitude & high-speed support) 2 = Compressed Land/Marine (default on the HE5500)
APP	The units core mode. **DO NOT SET THIS** 0 = Portable, 1 = Vehicle (default on HE5500), 2 = Aviation
ROUTING	The current network preference
MT	Send the unit a mobile-terminated config packet as defined in the *HawkEye 5500 Server Protocol*. The command value must be encoded in *Base64* and acknowledgements will be returned encoded in *Base64*
REMOTE COMMANDS	
PING	The unit will send a 'Ping Reply' to the server
CHECKIN	The unit will perform a server check-in to check for new MT messages **NOTE**: This command does not return a response if the value is set to 'S'
REBOOT	The unit will perform a hardware reboot
FW	The unit will perform a hardware update. The until will echo back the request and then attempt to contact the server to download the latest firmware. If this request is performed over cellular SMS, the until will send an SMS upon completion of the firmware update or a 'TIMEOUT' if the firmware fails to download. See Firmware Upgrade Via Cellular Connection for more information.

	If no package number is provided, the FW command will return the installed firmware version in the following order: Core, Core BL, Exp, Exp BL, BT, BT BL
RPT	The unit will send a report with the code provided. A code must be provided and can range from 0 – 255. See the server protocol document for valid codes.
FWUPDATE	If a firmware upgrade process fails to apply an image, the user can issue a *FWUPDATE:X* command and attempt to apply the image indicated by X as defined in the table below. If the requested image is not available to retry, the command will respond with "No Valid IMAGE NAME" 1: Core BL, 2: Core App, 3: Exp BL, 4: Exp App, 5: BT App
RESET COMMANDS	
RESET.PARAM	Resets parameters to their default values
RESET.PROF	Resets profile settings to their default values

OBD – VEHICLE INTEGRATION

This command set is used to view and interrogate the vehicle integration system. Issue **OBD:** to return the list of the current value for most of the subcommands in this section. These settings may not be present on every connected vehicle. Most values are cleared on restart of the unit.

Subcommand	Will Return:
HELP	This command list
DTC	Number of diagnostic trouble codes seen in the attached vehicle
CEL	If the vehicle's check engine light is on
LOAD	The current engine load percentage 0-100%
THROTTLE	The current throttle percentage 0-100%
RPM	The current vehicle engine 1 RPM
SPEED	The current vehicle speed (0-255 km/h)
TEMP	The current vehicle engine 1 coolant temperature (Value – 40º C)
OIL	The current vehicle engine 1 oil temperature (Value - 40º C)
ODO	The current vehicle odometer value (km). This value can be from the vehicle itself or accumulated through the GPS. Providing a value will set the baseline GPS odometer which will then begin accumulating
PIDS	Returns a list of support vehicle diagnostic PIDS detected on the vehicle

ACC – ACCELEROMETER INFORMATION

This command set is used to interrogate the unit's onboard accelerometer. Issue *ACC:* to return all subcommand values. Most of these values are initialized after a calibration period of 10-30 seconds upon power up and may produce unreliable results if requested before calibration is completed.

Subcommand	Will Return:
HELP	This command list
VECTOR	Amplitude of acceleration detected in Gs, includes 1g of gravity
ROLL	Percentage of roll of unit compared to unit on flat surface **NOTE**: This value is not reliable when unit is in the PITCH orientation
ROLL_CAL	Calibrated roll of unit based on orientation detected during power on **NOTE**: This value is not reliable when unit is in the PITCH orientation
PITCH	Percentage of pitch of unit compared to unit on flat surface **NOTE**: This value is not reliable when unit is in the ROLL orientation
PITCH_CAL	Calibrated pitch of unit based on orientation detected during power on **NOTE**: This value is not reliable when unit is in the ROLL orientation
ORIENT	The detected orientation of the unit UNKNOWN = Accelerometer cannot detect orientation (initial state) UP = Unit is on flat surface with feet on solid level surface DOWN = Unit is upside down compared to UP P_FORWD = Unit is pitched forward with the front panel facing down P_BACK = Unit is pitched backward with the rear panel facing down P_LEFT = Unit is rolled on its left when looking at the front panel P_RIGHT = Unit is rolled on its right when looking at the front panel
CORDS	The raw accelerometer values provided by the module. The format is of x:0.1234;y:0.1234;z:0.1234 with gravity included in the results

APPENDIX A – REVISION HISTORY

Date	Revision	By	Description
8-Jan-20	1.0	AAM	Initial Release
31-Mar-20	2.0	CR	Updated to be feature complete
15-June-20	3.0	CR	Cleanup of document and addition of icons
23-June-20	3.1	CR	Added no network route LED behavior
1-July-20	3.2	CR	Added accelerometer command server commands
27-July-20	3.3	CR	Added identification card section
26-Aug-20	3.4	CR	Added MT command to diagnostics section
26-Oct-20	3.5	CR	Clarified firmware updates section Added new power commands to the diagnostics section
29-Oct-20	3.6	CR	Add section about bootloader factory reset mode
11-Nov-20	3.7	BF	Add new FW update commands
16-Dec-20	3.8	CR	Add new RESET commands
7-July-21	3.9	MZ	Cleanup of document and information updates
29-Dec-23	4.0	MZ	Updated template, logo, and address

APPENDIX B - FAQ

We've compiled a list of frequently asked questions and answers here. If you are still unable to resolve your issue, please contact Blue Sky Network Technical Support and we will be happy to help!

1) The HawkEye 5500 won't turn on.
   - Try fully charging your HawkEye 5500 (at least 4.5 hours) and then attempt to power on the unit again. When charging, the charging LED light will change from red to yellow to green to indicate that it has passed 15% charged and 50% charged. The power LED will stay solid GREEN when unit is fully charged.

2) The HawkEye 5500 turns on, the power LED flashes, and then it turns off.
   - Try charging your HawkEye 5500 unit. When the HawkEye 5500 battery is too low, it will turn itself off automatically.

3) The HawkEye 5500 turns on and the power LED continuously flashes PURPLE.
   - The unit is in bootloader mode. This can be because of hardware failure or by powering the unit on while depressing the waypoint button. Remove power from the unit and power it down via the power button, then attempt to power on again. If it exhibits the same condition, contact support for further troubleshooting.

APPENDIX C – TROUBLESHOOTING

DIAGNOSTIC TESTS

These procedures are intended to assist with diagnosing a HawkEye 5500 portable unit that is not reporting to the SkyRouter servers.

Once the troubleshooting procedures below have been performed, please do not hesitate to forward your test results to https://support.blueskynetwork.com/ for review.

PERFORM A POWER-UP TEST

With the unit powered on, connect to the command server, and issue the 'TEST' command. The unit will then do the following:

1) Cycle all LEDs
2) Play tone over internal speaker
3) Play tone over external speaker
4) Enter emergency mode and report, then exit emergency mode.

If the device passes all tests and you can see position reports on SkyRouter, you should assume that the device is functioning as expected. To end the test, issue the 'TEST' command again.

FORCE THE UNIT INTO A FACTORY RESET MODE

If the unit becomes inoperable and will not take a new firmware image via Bluetooth or cellular, it may be necessary to force the unit into factory reset mode. Once in factory reset mode, a new firmware can be loaded.

To force the unit into factory reset mode, power on the unit while pressing the yellow waypoint button for 10 seconds. Once the unit is in bootloader mode, the power LED will blink PINK/PURPLE.

From here, you can install a new core firmware utilizing the Bluetooth method.

SUPPORT

Blue Sky Network is committed to providing the highest level of service and support. If you have any questions or concerns, please feel free to contact us by email or phone; contact information is available at the bottom of this page. For self-help, please visit https://support.blueskynetwork.com/.

Thank you for choosing Blue Sky Network!

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