GOLDEN EAGLE (GE)

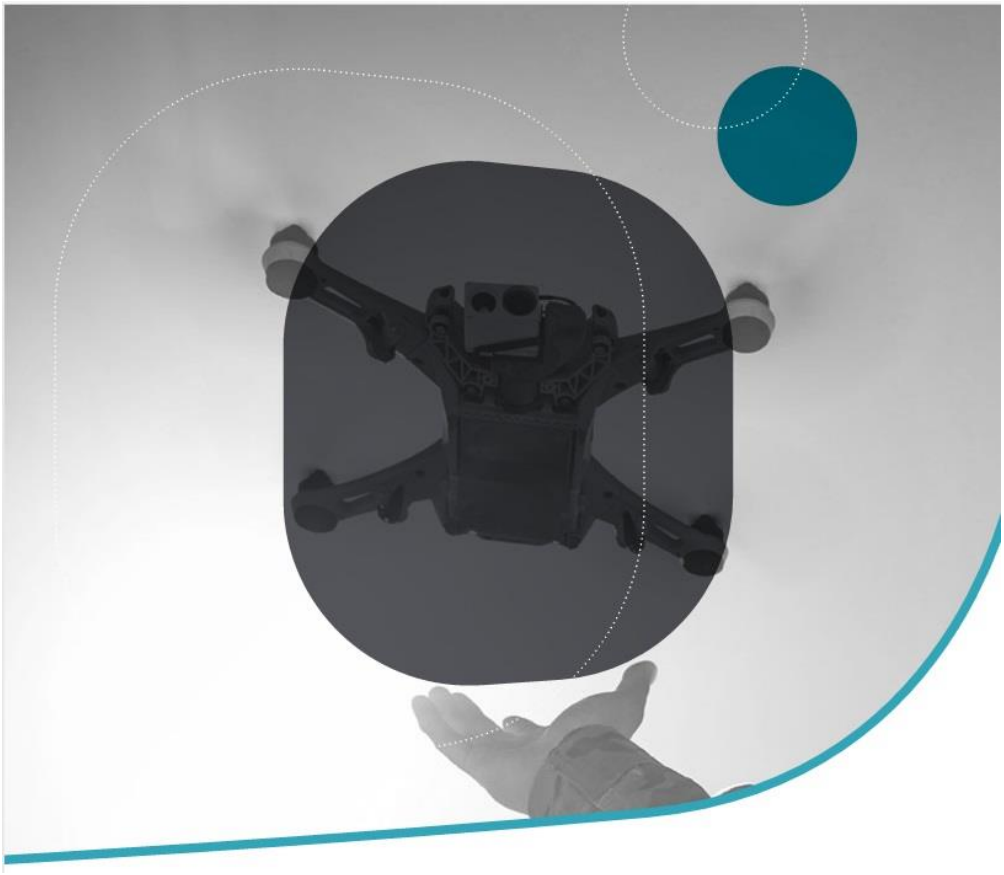
Small Unmanned Aircraft System (sUAS)

&

TEAL AIR CONTROL (TAC)

Ground Station

OPERATOR'S MANUAL



Teal Part # 60056
Revision A
15 July 2022

TEAL™

A RED CAT COMPANY

OVERVIEW

This manual covers the following Teal products:

- Teal Golden Eagle (GE) Small Unmanned Aircraft System (sUAS)
- Teal Air Control (TAC) Ground Station
- TAC Software and Applications
    - Teal QGroundControl (Teal QGC) Software App
    - Teal TAC Settings Software App
    - Teal Updater Software App
    - Teal Documentation Software App
- Teal Performance Battery Pack
- Teal Battery Charger and Power Supply
- TAC 4-Point Harness

A quick start guide for the Golden Eagle and the TAC are included in Golden Eagle hard case and also available electronically at:

https://tealdrones.com/support/documents/

or by scanning this QR code:

WARNINGS, CAUTIONS, AND NOTES

Please ensure that you observe identified warnings and cautions for operating procedures before attempting to operate any equipment to prevent any potential personal injury, damage to equipment, or Federal Aviation Administration (FAA) violations:

WARNING: An operating procedure or practice which, if not correctly followed, could result in personal injury or loss of life.

CAUTION: An operating procedure or practice which, if not strictly observed, could result in damage to, loss of, or destruction of equipment, data, or surrounding property.

NOTE: An operating procedure, condition, etc., which is important or helpful to highlight.

SECURITY: An operating procedure, condition, etc., which is important or helpful to highlight for cyber security best practices.

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KIT CONTENTS

GOLDEN EAGLE KIT CONTENTS

TEAL-BRANDED HARD CASE

CONTENTS:

1x TACTICAL DRONE CASE
1x GOLDEN EAGLE sUAS
2x CLOCKWISE PROPELLERS
2x COUNTERCLOCKWISE PROPELLERS
1x GIMBALLED FLIR HADRON EO / IR CAMERA
1x GIMBAL / CAMERA PROTECTIVE COVER
1x QUICK START GUIDE

FIELD REPAIR KIT

CONTENTS:

1x 128 GB MICRO SD CARD
1x TORX T8 SCREWDRIVER
6x TORX ARM ATTACHMENT SCREWS
1x CLOCKWISE ROTOR ARM
1x COUNTERCLOCKWISE ROTOR ARM
2x CLOCKWISE PROPELLER ASSEMBLIES
2x COUNTERCLOCKWISE PROPELLER ASSEMBLIES
1x QUICK REFERENCE CHECKLIST

INCLUDED BUT PACKAGED SEPARATELY:

2X TEAL PERFORMANCE BATTERY PACKS
1X BATTERY CHARGER POWER SUPPLY w/ AC POWER CORD
1X BATTERY CHARGE ADAPTER

TEAL AIR CONTROL (TAC) KIT CONTENTS

TEAL-BRANDED HARD CASE

CONTENTS:

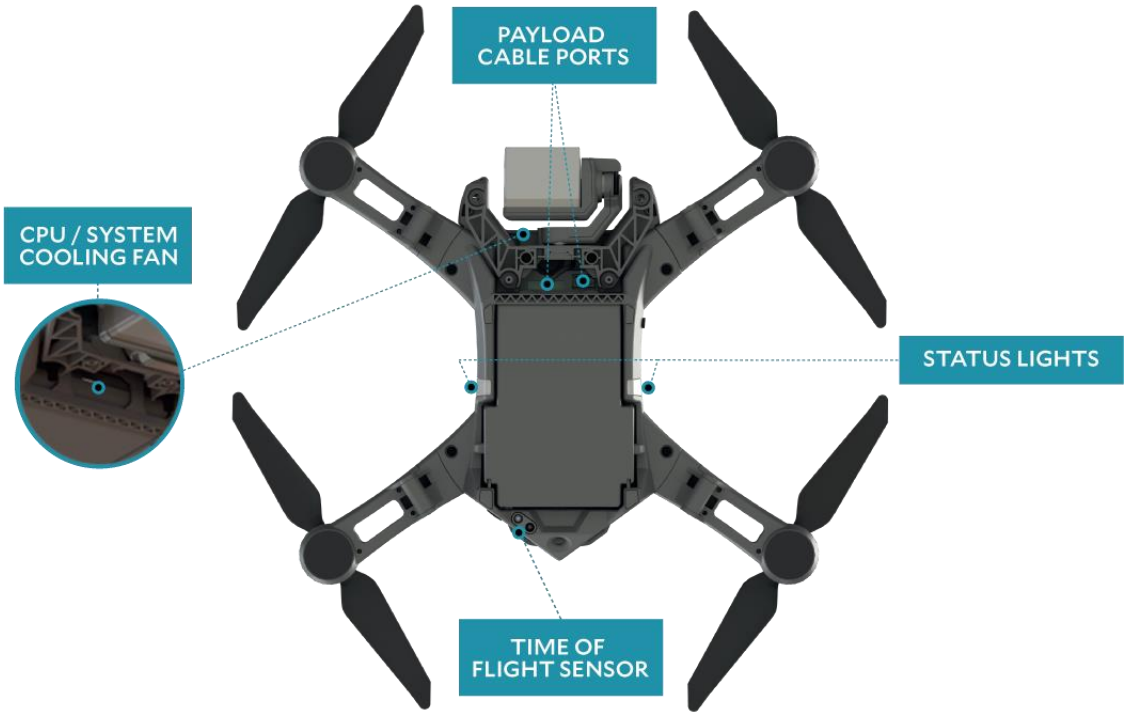
1x TAC & INTERNAL RADIO PER TAC SKU (1800 MHZ OR 2400 MHZ)
1X USB3 DATA CABLE
1X TAC 4-POINT HARNESS KIT
1X TAC HARNESS INSTRUCTION CARD

INCLUDED BUT PACKAGED SEPARATELY:

2X TEAL PERFORMANCE BATTERY PACKS
1X BATTERY CHARGER POWER SUPPLY w/ AC POWER CORD
1X BATTERY CHARGE ADAPTER

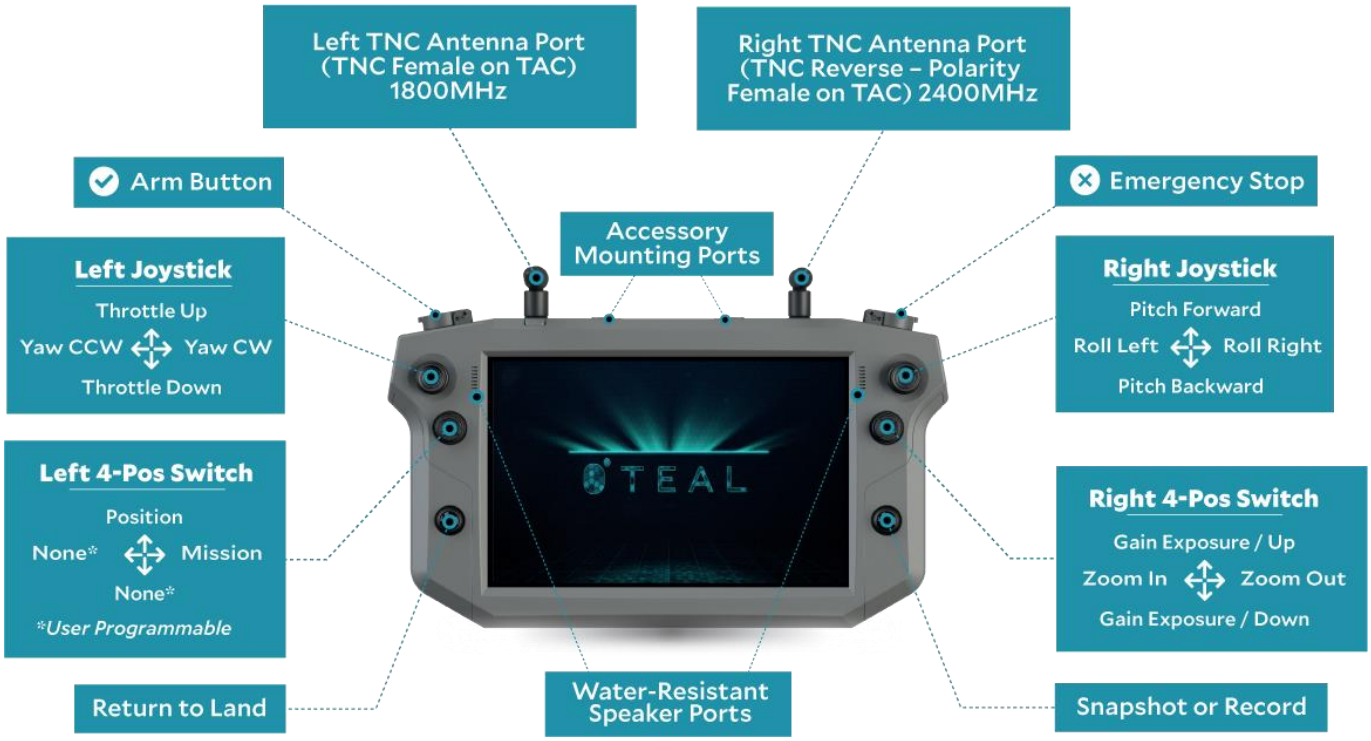
GOLDEN EAGLE sUAS OVERVIEW

The following diagram illustrates the major components of the Golden Eagle:



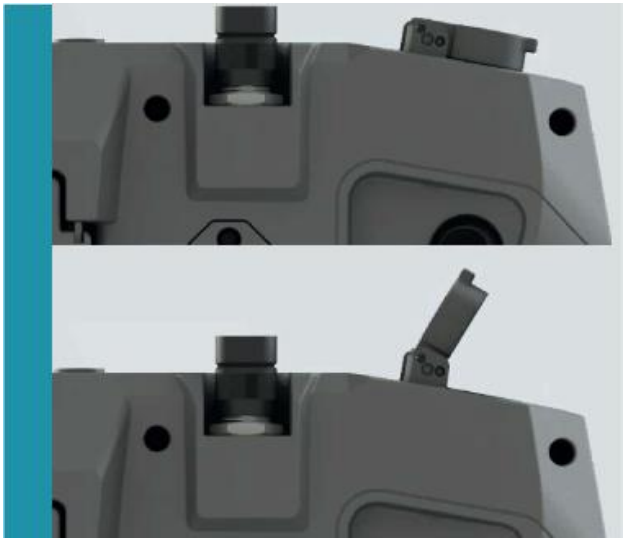
TAC CONTROLS OVERVIEW

The TAC has a mirrored set of left/right buttons, controls, and ports on the front and rear panels and along the narrow top panel. The left and right-hand sets on the front panel each include a joystick, a 4-position switch, and a momentary button. The left and right-hand sets on the rear panel each include two momentary buttons. e top panel includes a left and right-hand momentary button, each protected with a spring-loaded flip-guard door to prevent accidental actuation. These controls are use-programmable. The out-of-the-box default programmed functions shown here:



ARM & EMERGENCY DISARM

The top panel includes a left and right-hand momentary button, each protected with a spring-loaded flip-guard door to prevent accidental actuation.



The default (and recommended) function for the **left top button** arms the drone, which automatically starts the motors.

The default (and recommended) function for the **right top button** disarms the drone (also known as the Emergency Stop (E-stop)), which automatically kills the motor electrical connections.

The arm and disarm/E-Stop functions are also found in a confirmation window on the TAC.

WARNING!

Disarming the Golden Eagle while in flight will cause it to free-fall, possibly causing property damage, air vehicle damage, and/or serious injury or death to people or objects below.

DEFAULT CONTROLS

Please refer to the TAC CONTROLS OVERVIEW screen for joystick/button locations.

THROTTLE UP / ASCEND

To ascend, move the left joystick straight up. The farther the joystick is moved from its centered position, the faster the drone ascends in its fixed vertical axis.

THROTTLE DOWN / DESCEND

To descend, move the left joystick straight down.

YAW LEFT / CCW

To rotate the drone counterclockwise (CCW) around its vertical axis, move the left joystick to the left.

YAW RIGHT / CW

To rotate the drone clockwise (CW) around its vertical axis, move the left joystick to the right.

PITCH FORWARD

To accelerate in a forward direction, move the right joystick up.

PITCH BACK

To accelerate in a reverse direction, move the right joystick down.

ROLL LEFT

To roll the vehicle toward the left, move the right joystick left.

ROLL RIGHT

To roll the vehicle toward the right, move the right joystick right.

GETTING STARTED

ESTIMATED TIME: 75-95 Minutes
Follow along with our instructional videos on our website at:
https://tealdrones.com/support/video/

- **Getting Started: Teal Golden Eagle Drone**
- **TAC Hardware: Teal Golden Eagle**
- **Linking Components: Teal Eagle Drone**

CHARGE THE BATTERY PACKS

Both the Golden Eagle sUAS and the Teal Air Control (TAC) ground station each require one Teal Performance Battery Pack.

Each battery pack must be charged on the Teal Battery Charger before commencing any flight.

NOTE: Battery packs are shipped from the factory in a "shipping mode" and will not charge in this state. Tap the Power Button once, then connect the battery pack to the charger.

Battery packs fully charge in 65 minutes, and charge from 10% to 80% in 35 minutes if immediately needed. Battery packs that have been exposed to low temperatures (32 ºF (0 ºC) or lower) for more than one hour must be pre-heated on the charger before flight. The amount of time this takes will vary upon the starting temperature of the battery pack.

The battery may be removed from the charger at any time.

The Charger Power Supply may be operated from AC voltages ranging from 100-240 VAC. The removeable AC cord can be replaced with an appropriate cord for that particular region.

NOTE: A battery pack that is not connected to either a Golden Eagle or a TAC will shut itself off after three (3) seconds after an attempt to power itself on. This is normal behavior.

WARNING!

If improperly stored, lithium-ion batteries such as the Teal Performance Battery Pack may become unstable, overheat, damage cells, and potentially catch on fire.

Store batteries between -4 ºF to 113 ºF (-20 ºC to 45 ºC). Do not keep batteries in hot vehicles!

CAUTION!

Remove the battery pack from the charger once it is fully charged to prevent damage from prolonged heating.

Charge within the limits of 32 ºF to 113 ºF (0 ºC to 45 ºC). Do not operate charger in direct sunlight to avoid exceeding temperature limits.

Unplug the charger power supply when not in use to prevent unnecessary heating and wear on electrical components.

Always power down the Golden Eagle and TAC before removing and replacing battery packs.

CHARGING INSTRUCTIONS

Insert the DC charger power cable into the charger.

Plug the AC power cord into an AC outlet. The green LED is illuminated when power is applied.

Tap the power button once. This activates the battery and it can now be charged.

Insert the battery pack onto the charger, fully engaging the side latches with the charger.

The battery pack is at 100% charge when all five (5) LEDs are lit.

Remove the battery pack from the charger by pulling back the two (2) side latch release buttons and then pull the battery pack vertically off the charger.

PREPARE THE GOLDEN EAGLE

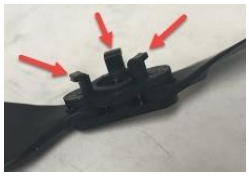
Unfold all four (4) arms and securely lock each into their fully extended position.

Attach the propeller (prop) assemblies to the motors by matching up the hardware:

The two (2) clockwise (CW) prop assemblies have black rivets securing their blades, and the two (2) CW propeller motors have a black ring below the spring.

The two (2) counterclockwise (CCW) prop assemblies have silver rivets securing their blades, and the two (2) CCW propeller motors have a silver ring below the spring.

NOTE: CW prop assemblies lock into place by turning it in a CCW direction, and CCW prop assemblies lock into place by turning it in a CW direction.



To attach a prop assembly to a motor, line up and insert the three (3) bent legs on the underside of the prop assembly into the three (3) slots on the motor.

Push down to compress the spring on the shaft, then rotate a quarter turn until it hits its mechanical limit. Allow the spring to push the hub up into its locked position.

WARNING!

Replace the arm if the arm lock mechanism is worn and does not securely lock.

Replace any propellers if they are nicked or cracked.

Remove the gimbal protective cover by pulling it directly away from the drone.

Insert and securely latch a fully charged battery pack into the battery compartment of the drone, located on the bottom of the drone airframe.

Verify that both battery pack latches are fully engaged with the drone airframe to securely capture the battery pack.

Insert the optional SD Card into the card slot in

the airframe.

NOTE: The SD Card **MUST** be inserted with the gold pads up (this is normally considered “upside-down”)!

PREPARE THE TAC

You will need to attach the antenna(s), insert a fully charged battery pack, and secure the optional 4-point harness before operating the TAC.

TAC ANTENNA(S)

If not already installed, attach the antenna(s) by securely screwing the end in a clockwise direction onto the TNC connector(s) on the TAC.

Teal TAC 2.4GHz ISM Band MIMO Antenna

Teal TAC 1.8GHz Antenna

TAC BATTERY PACK

Insert and securely latch a fully charged Teal Performance Battery Pack into the TAC battery compartment.

Verify that both battery pack side latches are fully engaged with the TAC housing to securely capture the battery.

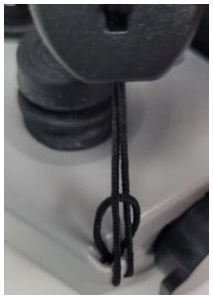
TAC OPTIONAL 4-POINT HARNESS

A 4-point adjustable harness is included with the TAC kit is that can be attached to the TAC. This is optional but may help prevent operator fatigue by supporting the weight of the TAC and to help maintain the TAC in an optimal operating position.

Unbuckle the four (4) loop ends from the harness.

Feed each buckle cord loop through an attachment point at each corner of the TAC.

Feed each buckle through its own cord loop and pull it tight.



Reattach the four (4) loop-end buckles to the harness.

Make sure that the two (2) harness straps with the plastic loops are the ones attached to the top two (2) attachment points.

POWER UP THE TAC

Press and hold the TAC battery pack power button for four (4) seconds, then release. Verify that the center LED is lit, indicating that the battery power is on.

Press and hold the TAC tablet power button for two (2) seconds, then release. The tablet will then display an animated Teal logo, indicating a successful start-up.

Swipe up to start the Teal QGroundControl (Teal QGC) application when prompted.

At this time, you can upload maps, create missions, define safety parameters, and all other user setting preferences, such as units of measurement. Please see the TAC DETAILS section for more information.

POWER UP THE GOLDEN EAGLE

Press and hold the drone battery power button for four (4) seconds, then release.

Verify that the center LED is lit, indicating that the battery pack power is on.

Listen for exhaust fan start-up.

Verify that the illuminating side panel lights turn on, indicating successful system start-up. This will take approximately 15 seconds.

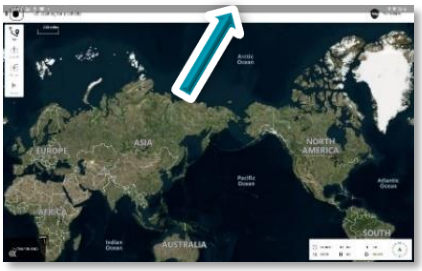
Verify gimbal start-up, indicated by its movement to a properly centered level and forward-facing position.

ACCESS THE APPS

The TAC is built around a Samsung Galaxy Tab Active Pro tablet PC running the Android operating system. A number of Android applications are installed on the TAC.

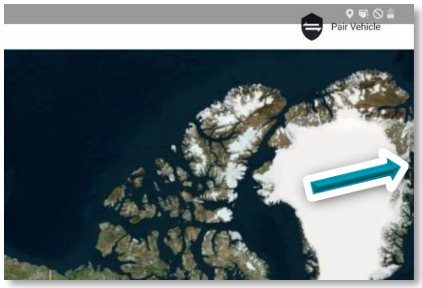
The Teal QGroundControl (Teal QGC) app is launched upon system bootup.

Touch anywhere along the top edge of the screen and swipe downward.



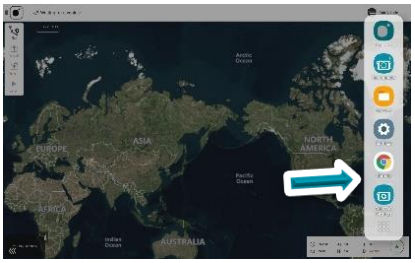
A very narrow vertical gray side-bar menu tab appears in the right edge of the screen.

Touch and slide this gray side-bar menu tab to the left. This opens a vertical sidebar menu that show the most recently used apps.



Touch this icon at the bottom right of the sidebar menu to see all available apps.

Touch the icon for the app that you would like to launch.



PAIR/CONNECT THE TAC WITH THE GOLDEN EAGLE

NOTE: Most GE/TAC kits come already paired and only need to be reconnected. The system remembers the relationship and re-establishes link upon Teal QGC launch.

The icon to initiate both the pairing and connecting functions is the same and following these instructions will result in a successful connection between the Golden Eagle and TAC. Please see the PAIRING section in GOLDEN EAGLE sUAS DETAILS for more details/options.

Stand at least 25 feet away from the drone.

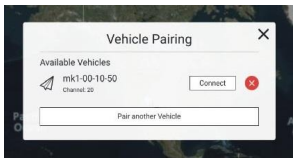
Ensure the GPS lock is acquired. This ensures the correct flight mode.

NOTE: GPS lock is indicated by a three-tone chime from the drone, as well as indicated on the TAC screen at the top satellite icon.

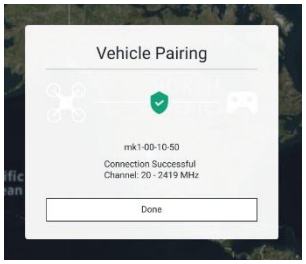
Open the Teal QGC application on the TAC.

Touch the SHIELD icon in the top-right corner of the FLY SCREEN to connect/pair the TAC with the drone.

Select CONNECT.



When the pairing is complete, a CONNECTION SUCCESSFUL status will appear.



Click DONE to exit and return to the FLY SCREEN. The vehicle ID should now be visible at the top of the TAC screen.

FLIGHT MODES

Out-of-the-box, the Golden Eagle automatically defaults to either Position Mode or Manual Mode. Position Mode is the safest manual mode for new pilots.

It will also default to Altitude Mode if it loses GPS signal while in flight.

If the Golden Eagle acquires GPS before it is paired with the TAC, the system will automatically be set to Position Mode.

If the Golden Eagle is paired with the TAC before it acquires the GPS, the system will automatically be set to Manual Mode, but can then be set to Position Mode by moving the left castle switch up. The system can be set to Position Mode both before and during flight.

The flight mode will be announced audibly from the TAC as well as visibly at the top of the TAC screen.

CAUTION!

Ensure that you are in the desired flight mode before arming the drone.

NOTE: GPS lock is indicated by a three-tone chime from the drone, as well as indicated at the top of the TAC screen on the satellite icon.

Additional flight modes can be programmed but are recommended for only experienced drone pilots. A brief description of each mode is provided here.

POSITION MODE

Position Mode is an easy-to-fly mode and is the safest manual mode for new pilots. Position Mode controls the attitude, altitude, heading, and horizontal position of the drone.

Position Mode requires GPS. All the joysticks, switches, and buttons are the default functions are detailed in the TAC CONTROLS OVERVIEW.

The roll and pitch joystick controls speed over ground in the left-right and forward-back directions.

The throttle and yaw joystick controls speed of ascent-descent and the rate of rotation on the horizontal plane.

When the joysticks are released and centered, the Golden Eagle will actively brake, level, and be locked to a position in 3D space, compensating for wind and other forces.

Instructions on how to program the joysticks, switches, and button functions are found in SETTINGS section of this manual.

MANUAL MODE

Manual Mode is the most difficult flight mode to operate in, as only the attitude and heading are stabilized. Manual Mode is NOT pre-assigned by default to any control on the TAC.

The roll and pitch joystick controls speed over ground in the left-right and forward-back directions.

The throttle and yaw joystick controls speed of ascent-descent and the rate of rotation on the horizontal plane.

When the joysticks are released and centered, the Golden Eagle will NOT stop rotating around the axis, nor be stabilized in any way.

ALTITUDE MODE

Altitude mode is the safest **non-GPS** manual mode for new pilots. Altitude mode controls the attitude, altitude, and heading. The pilot must control the horizontal position and the drone is prone drifting with the wind if uncorrected.

The roll and pitch joystick controls speed over ground in the left-right and forward-back directions.

The throttle and yaw joystick controls speed of ascent-descent and the rate of rotation on the horizontal plane.

When the joysticks are released and centered, the Golden Eagle will level and be locked into the current altitude and will continue to move along with any wind currents.

RTL is not available in this flight mode.

MISSION MODE

Mission Mode will execute a predefined autonomous flight plan that is created on or uploaded to the TAC. The flight plans may be uploaded before or during flight. Mission Mode requires GPS. No user intervention is required in Mission Mode.

CAUTION!

Any TAC stick movement will change the drone from Mission Mode to Position Mode.

WARNING!

The Golden Eagle sUAS is not intended to perform acrobatic maneuvers, such as flips, rolls, and loops. Intentional aerobatics may result in an unrecoverable loss of control of flight, and all warranties are void if attempted.

FLY SCREEN OVERVIEW

The fly screen automatically starts up when the TAC is powered on. The fly screen is used to command and monitor the drone and includes the following functions:

- Run the automated pre-flight checklist, if enabled
- Control missions
- Arm / disarm the drone, to include the E-stop function
- Takeoff / land / Return to Launch (RTL)
- Go to or orbit a particular location
- Switch between the map view and video view
- Display video, mission, telemetry, and other information for the drone

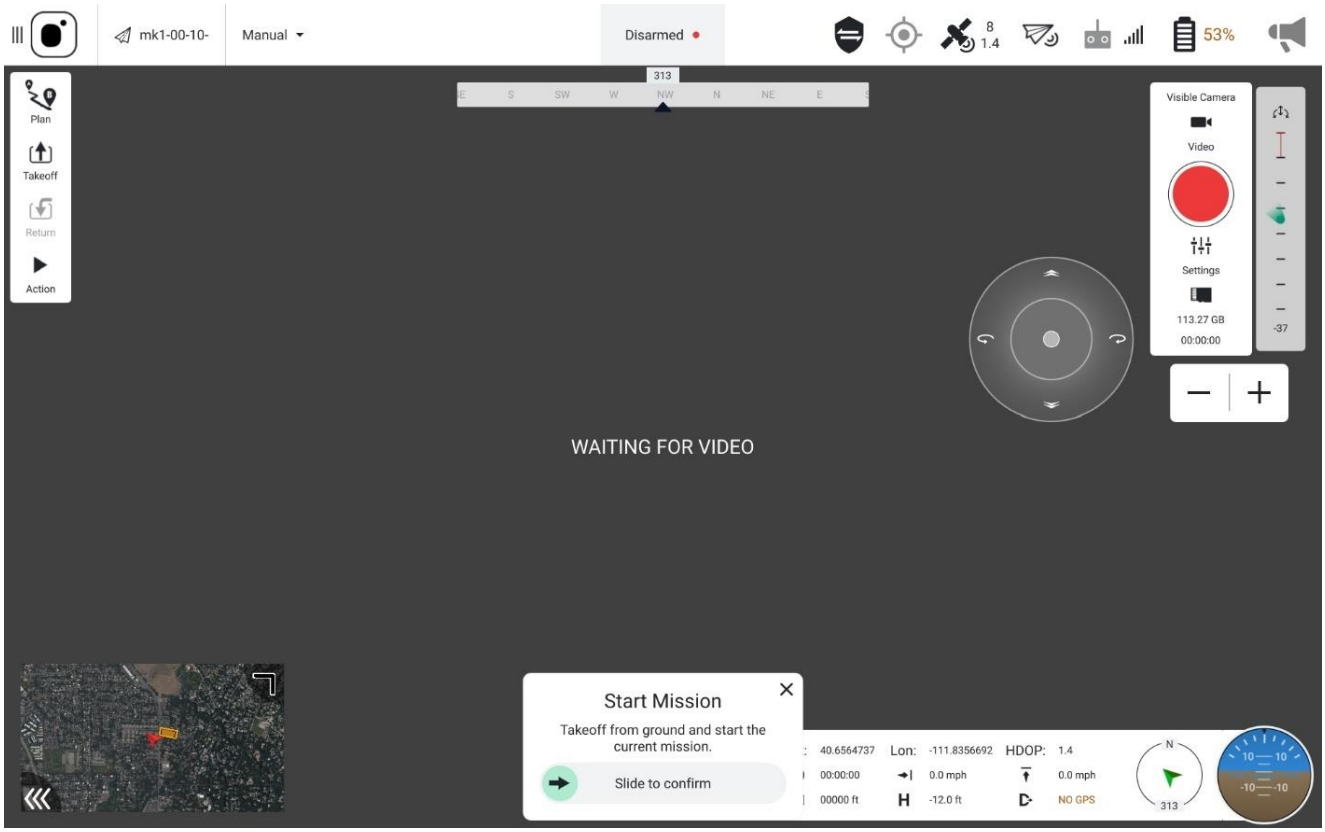
FLY SCREEN MAP OVERVIEW

The entire background of the fly screen can be either map view or the video view. Tapping the smaller screen in the left bottom corner will swap the screens.

The map displays the position of the TAC, the drone when paired, and the mission (when programmed). The map can be repositioned with a finger. The map automatically re-centers after ten (10) seconds if the position of the drone is moved off the screen.

To zoom in on the map, touch the screen with two fingers and slide them apart. To zoom out on the map, touch the screen with two fingers and slide them together.

More in-depth information is in the FLY SCREEN DETAILS section for guidance on what functions are available in-flight.



FLY SCREEN MAIN TOOLBAR

The Main Toolbar horizontally spans the width of the screen at the top of the Fly screen and displays system information.

Status icons are displayed when Teal QGC is connected to a vehicle. Some can be clicked on to show detailed information.

These icons/indicators are:

VIEW-SELECT MENU

Touch the Teal logo at the far left of the MAIN TOOLBAR to reveal a vertical VIEW-SELECT MENU. This menu allows the user to access the following features, which are discussed more in detail throughout the manual:

FLY: Control and monitor the drone and view streaming video while in flight.

PLAN: Create autonomous missions.

ANALYZE: Download logs and access the MAVLink console.

VEHICLE SETUP: Configure and tune the vehicle.

PHOTOS: Manage downloaded photos, and view photo metadata.

SETTINGS: Configure the Teal QGC app.

PAIRED VEHICLE IDENTIFIER

This icon displays the UID (Unique Identifier) of the paired vehicle. If a vehicle is showing here, then the telemetry link between the TAC and drone is established.

FLIGHT MODE INDICATOR

The flight mode indicator displays which flight mode the system is in. **Touch** this icon to display a drop-down menu to select either Altitude Mode or the Position Mode.

This is an alternative to selecting the flight mode via the **left castle switch**.

ARMED / DISARMED STATUS

Centered on the Main Toolbar is an indicator of whether the vehicle is currently armed or disarmed. **Touch** this icon to display a confirmation slider box to arm (if currently disarmed) or disarm (if currently armed) the drone.

This is an alternative to the **left top button** which arms the drone, and the **right top button** which disarms the drone (also known as the Emergency Stop or E-stop).

PAIRING ICON / SHIELD ICON

Touch the shield icon to view information about the connected vehicle. **Touch** the shield icon to connect/pair the Golden Eagle and the TAC, or to unpair/disconnect the TAC from the drone.

NOTE: Loss of link between the drone and TAC will result in an "SOS" tone from the drone.

REGION OF INTEREST ICON

This is currently under development.

GPS STATUS ICON

The upper number of the icon indicates the satellite count, and the lower number indicates the current horizontal dilution of precision (HDOP) value. A very good HDOP value is below 1, and an acceptable HDOP value is below 2.

Touch this icon to view details of GPS Count, GPS Lock, HDOP, the Vertical Dilution of Precision (VDOP), and Course Over Ground (COG).

GPS LOCK: Indicates the type or level of GPS lock currently.

COG: Indicates the compass direction the vehicle is traveling. Note that this may or may not be the same as the "heading" which is the compass direction the vehicle is pointed. Wind may cause the COG to differ from the vehicle's actual heading.

CAUTION!

It is critical for Golden Eagle to be connected to a sufficient number of satellites to be able to triangulate the position of the vehicle. It is critical to have at least eight (8) but recommended that ten (10) satellites are indicated on the GPS icon prior to takeoff.

TELEMETRY RSSI ICON

This is currently under development.

RC RSSI ICON

This icon indicates the radio signal strength as is common on consumer cell phones.

Touch this icon to view the RSSI values for the TAC signal strength at the vehicle (MK1 RSSI), and the vehicle signal strength at the TAC (TAC RSSI).

BATTERY ICON

This icon conveniently shows the battery charge level of the drone (the TAC's battery charge level is checked by tapping the battery power button on the back of the TAC).

Touch this icon to view the vehicle battery's current voltage level and the accumulated amount of power consumed by the vehicle (in mAh) in this session.

CAUTION!

The drone will not arm when the battery pack charge level is 20% or less.

VEHICLE MESSAGES ICONS

This icon notifies the use of any operator messages. It is grayed-out until there is an operator message at which point it turns to blue, or changes to a warning icon in the case of a critical message. Touch the icon to view the messages.

Closing (X) this window turns the warning icon back into the gray horn icon.

Old messages can be reviewed by touching the gray icon. All messages will remain until the user permanently deletes them by touching the trash can symbol in the lower right-hand corner of this window.

CAUTION!

Messages cannot be individually deleted. All messages will be deleted if this function is selected.

FLY TOOLS OVERVIEW

The FLY TOOLS box is fixed vertically near the upper left-hand corner of the FLY SCREEN.

These functions found in the Fly Tools are the Pre-flight checklist, Takeoff, Land, and Return/Return to Launch (RTL).

The Pause function causes the drone to hover and can be used in most operations, to include takeoff, land, orbiting, etc.

The Action button offers additional options, to include changing the altitude, and starting and resuming a mission.

More detailed information can be found in the PRE-FLIGHT, IN-FLIGHT, LANDING, and TAC DETAILS sections, depending on the function.

CUSTOMIZING PERSONAL SETTINGS

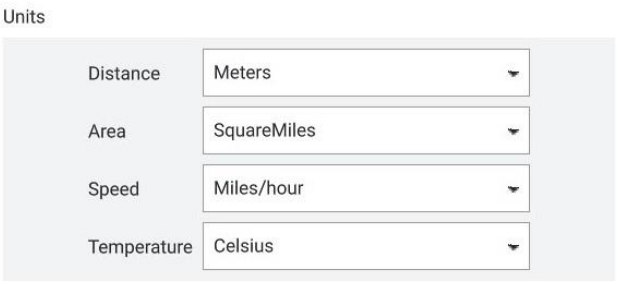
Use the GENERAL SETTINGS screen to customize user preferences. The most commonly used ones are referenced here. For a more complete list, please see the TEAL QGC APP section.

Touch the MENU icon in the top left of the screen.

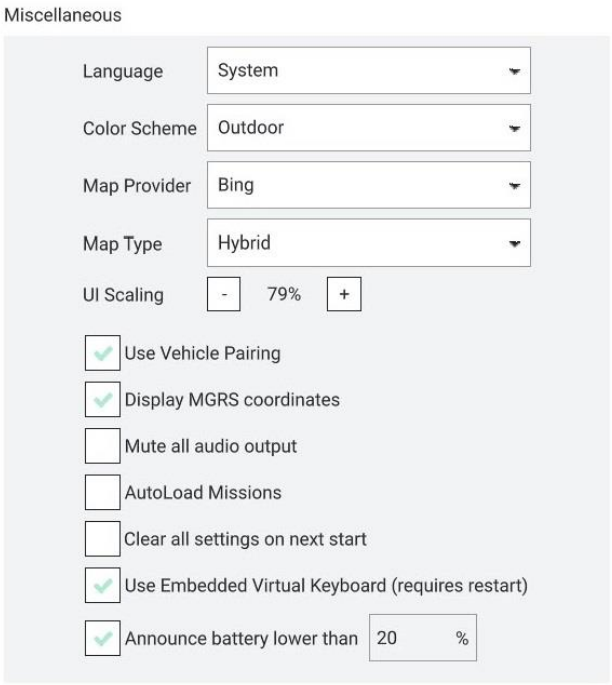
Select GENERAL.

A list of several settings will appear.

UNITS: Allows selection between feet and meters, imperial and metric, and Celsius and Fahrenheit.



MISCELLANEOUS: Select your language, dark/light mode, map provider and map type, etc.



NOTE: As of the publication of this manual, a software bug has made selecting a different language not an option at this time and is being investigated.

DATA PERSISTENCE: Disabling this option will result in telemetry logging and map tile caching to not be written to disk. This can be useful for security reasons but can also result in unintentional data loss.

TELEMETRY LOGS FROM VEHICLE: Saves telemetry logs in different formats to the vehicle which can later be downloaded to the TAC, to include logs in a CSV format for importing data into other programs for data analysis, such as spreadsheets.

FLY VIEW: These user preferences include using the pre-flight checklist, centering the map on vehicle, setting gimbal joystick and slider speeds.

PLAN VIEW: Entering the DEFAULT MISSION ALTITUDE value here sets the altitude in the Plan screen at which missions fly by default, unless otherwise specified.

VIDEO & VIDEO RECORDING: These preferences are still under development.

PICTURE SETTINGS: Configures full-resolution images whenever a snapshot is taken. **Check** the DOWNLOAD FULL RES IMAGE IN FLIGHT box.

CAUTION!

Enable all photo functions before flight or else they will not be stored locally on the TAC and will not be transferrable after the mission.

TEAL QGC SOFTWARE VERSION: The current version of the Teal QGC software version that has been downloaded onto the TAC is shown here. See the TEAL UPDATER APP section for instructions to update the software/firmware.

DOWNLOADING MAPS

Maps need to be downloaded for each area only once. We recommend you download maps before going into the field. This can be done while in the field as long as there is a wi-fi connection.

Follow along with our instructional video, **Downloading Offline Maps: Teal Golden Eagle Drone** on our website at: https://tealdrones.com/support/video/

NOTE: "Offline maps" is the name given to the maps on the TAC. There are no "online" maps. Different map areas are called "Tile Sets".

INSTRUCTIONS

Touch the TEAL SETTINGS icon to launch the app.

Change the Active network from DRONE to WIFI.

Login into the WIFI system with the appropriate login credentials.

Open/Enlarge the QGC app by sliding the SETTINGS screen all the way to the right.

Touch the MENU icon in the top left of the screen.

Select SETTINGS at the bottom left of the screen.

Select OFFLINE MAPS.

Select ADD NEW SET.

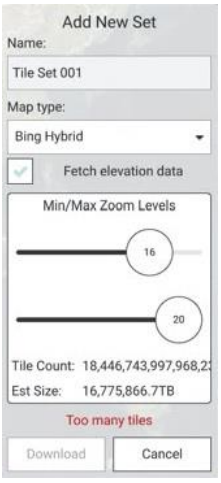
Set and zoom to the area that you would like to save.

Create a name for map set in the ADD NEW SET field.

Set the desired map type.

Check the FETCH ELEVATION DATA box to include elevation data with the tile set.

Select DOWNLOAD when finished.



NOTE: The TOO MANY TILES error appears and the download button is grayed out if the estimated memory usage is too large. Zoom out to reduce the tile size. We recommend keeping the tiles between 50-80 MB.

Touch the MENU icon in the top left of the screen.

Select the FLY button.

Reconnect to the drone by going back into the TEAL SETTINGS app and switching back to DRONE from WIFI.

Once the TAC acquires the GPS signal, the map screen will automatically load that tile set, **so long as the map provider in the general settings match your tile set**.

File sets are downloaded for planning and running missions in specific geographic areas. Depending on the mission type and location, cyber security best practice dictates that these prior tile sets should be deleted from the TAC.

MISSION PLANNING

This screen is used to plan autonomous missions and save or upload them to the drone during mission planning or while in the field. Here you can set takeoff and return to launch commands, waypoints, rally points, geofences, and survey patterns.

WAYPOINT: Program a location in 3D space to which a vehicle is programmed to fly during a mission. When a mission is defined in the PLAN SCREEN, these waypoints can be individually defined and edited, and parameters associated with them can be viewed.

RALLY POINT: Pre-program a secondary landing position, or a loiter/holding position. This can be added as a part of a survey mission or used when manually flying.

NOTE: When programming a rally point, be aware that the drone will either fly to the rally point or RTL point, whichever is closer to the drone when the RTL is initiated.

GEOFENCE: Create an optional inclusive or exclusive perimeter that can be embedded within a mission that will automatically cause the drone to RTL if breached.

NOTE: Additional Geofences can be separately configured as safety parameters and are created in the SAFETY SETTINGS under VEHICLE SETUP.

Once a mission is planned and uploaded to the drone, use the FLY SCREEN and Mission Flight Mode to fly the mission.

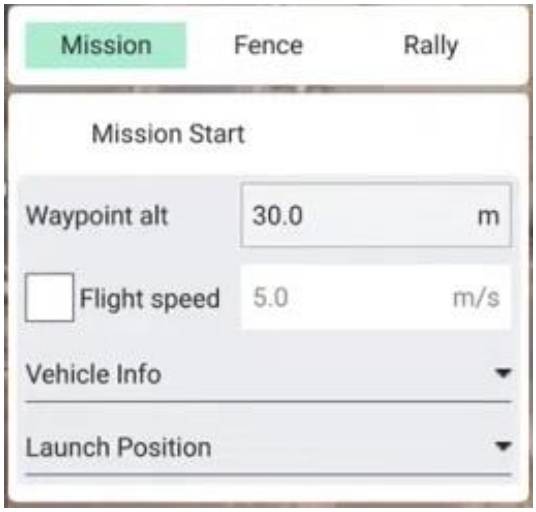
Follow along with our instructional video, **Planning a Time-Based Mission: Teal Golden Eagle Drone** on our website at: https://tealdrones.com/support/video/

PROGRAMMING A SURVEY MISSION

Touch the Teal logo menu icon in the Main Toolbar.

Select PLAN.

A MISSION PLAN window will appear.



- **Set** the map to the desired mission area.
- **Configure** the altitude and flight speed. 30 m AGL and 3 m/s is a good baseline.

Select TAKEOFF in the menu to the left.

- Add the take off point by touching the estimated location on the map.

NOTE: Once GPS is acquired in the field, the takeoff point will shift to where the drone is physically located. This can be mitigated by either having a set takeoff point, or by adjusting the takeoff point before flight.

Select WAYPOINT.

- Add a waypoint by touching the desired location on the map.
- Configure the gimbal position.

Select PATTERN then SURVEY to create a survey area and pattern.

- Adjust the survey size and location to your needs.
- Select DONE WITH POLYGON when finished.
- Select the camera that you would like to use from the drop-down menu.
- Adjust the percentage of overlap or ground resolution, if needed.

CAUTION!

Make sure to verify the altitude when adjusting the ground resolution settings.

- Go to the GRID window to adjust the angle of the survey to minimize turns, altitudes, and entry points to adjust the length of the flight.

Select WAYPOINT.

- Add one additional waypoint toward the exit point of the survey pattern.
- Set the gimbal to 0°.

Select RETURN.

- This will create the RTL point. This can be any location but is usually the same as the take-off point.

Select either UPLOAD REQUIRED to load the mission onto the drone or **select** FILE to save the mission and upload at a later time.

PROGRAMMING A GEOFENCE

Use this option to setup a Geofence within a mission. Note that a Geofence can also be programmed separately from a mission in the SAFETY SETTINGS page by following the instructions in the following VEHICLE SETUP section.

Select FENCE in the MISSION PLAN window.

Select the desired geofence perimeter shape and then select the area on the map, or **select** the free-form option and create the desired perimeter on the map.

Select DONE.

Select either UPLOAD REQUIRED to load the mission onto the drone or **select** FILE to save the mission and upload at a later time.

NOTE: Only one mission can be on the drone at a time. If you upload a new mission, it will overwrite the current mission.

PROGRAMMING A RALLY POINT

Touch the MENU icon.

Select PLAN.

A MISSION PLAN window will appear.

Select RALLY.

- Add the rally point by touching the location on the map or by entering the exact coordinates in the field provided.

Select either UPLOAD REQUIRED to load the mission onto the drone or **select** FILE to save the mission and upload at a later time.

NOTE: The drone will go to the RTL or rally point, whichever is closest to the drone.

VEHICLE SETUP

Use this screen to customize safety parameters, calibrate the drone, and to customize the joystick and buttons configurations on the TAC.

BUTTON & JOYSTICK SETUP

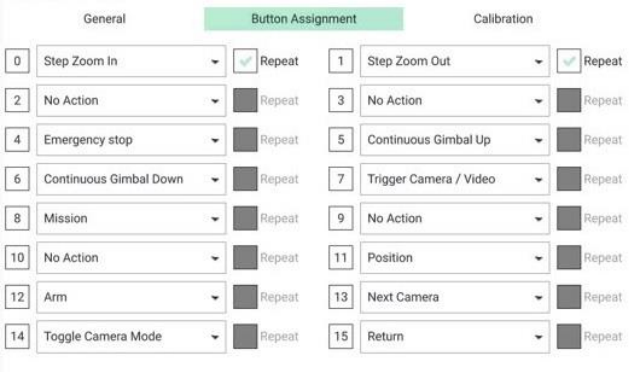
Connect the drone and the TAC.

Touch the MENU icon.

Select VEHICLE SETUP.

Select JOYSTICK.

Use the GENERAL, BUTTON ASSIGNMENT, and ADVANCED windows to customize the joystick and buttons, if so desired.



Select the SET TEAL DEFAULTS in the ADVANCED screen to reset all settings, if needed.

SAFETY SETTINGS SETUP

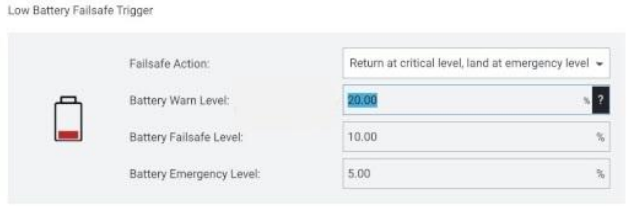
Connect the drone and the TAC.

Touch the MENU icon.

Select VEHICLE SETUP.

Select SAFETY.

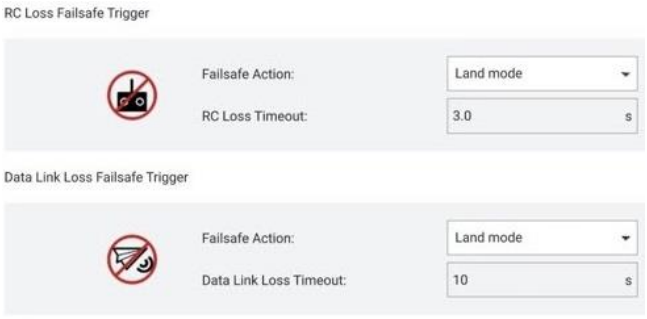
Here you can set a low battery failsafe trigger for when the battery pack reaches a certain percentage of charge. This includes setting the preferred failsafe action, i.e., return to launch, the battery warn level, the battery failsafe level, and the battery emergency level.



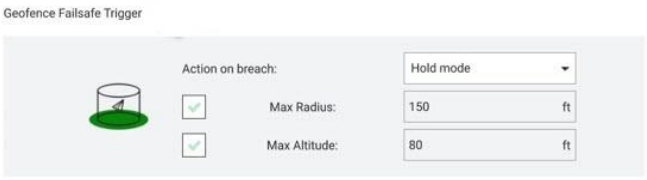
Recommendations:

- Low battery warning - set to at least 20%
- Critical battery level action - set to RTL at 10% or higher
- Emergency battery level action - set to land immediately at 5% or higher
- RTL height - set higher than any nearby obstacles to ensure the drone can clear them as it returns home

You can also establish an RC loss failsafe trigger and a data link loss failsafe trigger.



You can also establish a geofence that will confine the drone to the established parameters. This is helpful for those just starting out or for those who have definite boundaries that cannot be breached.



You can also establish the Return to Launch (RTL) settings, the landing settings, such as landing descent rate, and enable/disable the vehicle telemetry logging.

Other functions in the VEHICLE SETUP screen include sensor calibration. See instructions as to how in the GOLDEN EAGLE DETAILS section of this manual.

ENABLE PHOTO SETTINGS INSTRUCTIONS

All photo functions must be enabled before flight or else the media will not be stored locally on the TAC and will not be transferrable after the mission.

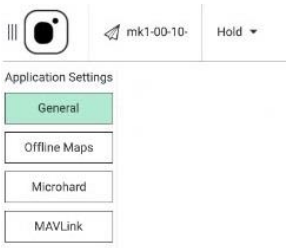
However, the tradeoff to having the media stored locally on the TAC during flight is a reduction of bandwidth which could degrade the quality of the media seen on the TAC fly screen during the mission.

If possible, we recommend storing media on the SD card, but realize some security protocols will not allow this.

Touch the MENU icon.

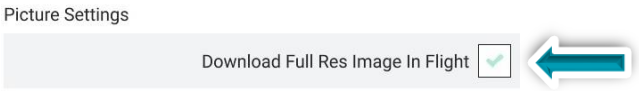
Select SETTINGS at the bottom of the screen.

Select GENERAL.



Scroll down to PICTURE SETTINGS.

Check the DOWNLOAD FULL RES IMAGE IN FLIGHT box.



PRE-FLIGHT

FLIGHT SAFETY

FLIGHT RESTRICTIONS & REGULATIONS

Complying with all FAA, federal, and local regulations ensures a safe and enjoyable experience for everyone. The FAA has great resources on their website to help you determine which rules and regulations apply to you depending on your experience level, certifications and licenses, or use of the drone at: https://www.faa.gov/uas/.

NEVER fly the drone over people and/or moving vehicles.

NEVER fly the drone beyond the visual line of sight of the Remote Pilot in Command (RPIC).

NEVER fly higher than the authorized 400 feet AGL restriction.

ALWAYS be aware of controlled airspaces and current flight restrictions.

BEST PRACTICES

ALWAYS exercise sound judgement and operate with due regard. As the Pilot in Command, you are solely responsible for the safe operation of your drone.

ALWAYS err on the side of safety. If you hear or see anything that does not seem right or looks dangerous, land immediately and log the situation!

ALWAYS thoroughly inspect your drone before each flight in accordance with the preflight checklist, especially for damage before each takeoff and after each landing.

ALWAYS follow maintenance schedules and storage requirements as outlined in the user manual, especially for battery packs and propulsion assemblies.

NEVER alter the Golden Eagle or TAC in any way that would cause damage, loss of control. Doing so would void all warranties.

Selecting the right location for your flight is critical. Find a space that is clear of tall trees, hills, or buildings that may impair the GPS reception and possibly control of the drone.

NEVER fly over an area that will pose a hazard for people or property beneath it. Damaging property or injuring people with your UAV can have significant legal and financial consequences.

IN-FLIGHT EMERGENCY PROCEDURES

ALWAYS ensure a controlled takeoff, flight, and landing by familiarizing yourself with system controls and the user manual.

However, **in the event of complete loss of control over the drone/emergency situation**, use the E-Stop button to shut off propulsion and immediately drop the drone from the sky. Be aware that this may result in:

- Partial or complete loss of the airframe, camera, gimbal, arms, motors, payloads and/or props.
- Partial or complete loss of data.
- Damage to property on the ground from vehicle impact.
- Significant injury or death of person(s) or damage to property struck by the falling drone.

SYSTEM CAPABILITIES / OPERATING LIMITATIONS

GOLDEN EAGLE	
Flight Time	Up to 25 minutes (22 minutes at hover to 0% full battery discharge)
Top Horizontal Speed	32.8 ft/s (10 m/s)
Maximum Vertical Speed	8.2 ft/s (2.5 m/s)
Maximum Servicing Ceiling	10,000 ft (3,048 m) MSL
Signal Range	1800 MHz line of sight: up to 2.17 miles (3.5 km)* 2400 MHz MIMO line of sight: up to 1.86 miles (3 km)*
Maximum Auxiliary Payload Weight	75 grams
Operating Frequencies	1800 MHz 2400 MHz
Encryption	AES 256
Protocol	MAVLink
EO Recording	4,000 x 3,000 @ 30 FPS
Video Format	H.264 Transport Stream and MP4
Gimbal Range	Pitch: -110° to +35° Roll: -25° to +25°
IR Sensor	FLIR Boson, 320 x 256 Pixels
IR Video Recording	G40 x 512 @ 30 FPS

*Range estimates represent maximum command and control (C2) link performance in optimum environmental conditions. To ensure safety of operations, the sUAS must be operated within the RPIC's line of sight at all times.

GETAC SYSTEM (GE, TAC, BATTERY PACKS)	
Operating Temperature Range	-32 °F to 110 °F (-35.6 °C to 43.3 °C) Note: In low temperatures (32 °F (0 °C) or below), pre-heating of the battery pack is required by placing it on the charger before flight.
Operating Humidity Range	10% to 90% RH, non-condensing
TAC SYSTEM	
Operating Frequencies	1800 MHz 2400 MHz
Tablet Display Resolution	WUXGA (1920 x 1200)
Tablet Display Brightness	550 nits (outdoor conditions only)
Tablet Interaction	Glove Mode
Wi-Fi	802.11 a/b/g/n/ac 2.4 G+5 GHz, VHT80
GPS	GLONASS
Security	Knox, Fingerprint Reader, and PIN

PRE-FLIGHT CHECKLIST

An automated pre-flight checklist in FLY TOOLS can be used to run through standard checks to ensure that the vehicle is configured correctly and is safe to fly. Enable the tool by navigating to APPLICATION SETTINGS > GENERAL > FLY VIEW and select the USE PREFLIGHT CHECKLIST checkbox. The tool will then be added to the Flight Tools box. Touch the checklist icon from the Fly screen to open the checklist.

OPERATIONS CHECKLIST

Check air space for restrictions and obtain authorization as required by the appropriate authorities having jurisdiction and follow all FAA, federal, and local rules and regulations. Verify the airframe and each payload, propulsion, and battery system is air-worthy and not damaged.

1-PRE-MISSON	
Air Space Restrictions	Checked, in compliance
Applicable Authorizations	Obtained
Weather	No limitations exceeded
Maps	Uploaded to TAC
Battery Packs	Charged
Mission Plans	Uploaded to TAC
Field Repair Kit	As required
GE/TAC Initial Pairing	Complete
TAC User Preferences	Set

2-PRE-FLIGHT	
Wind	Up to 18 mph/ 25 mph gusts
Temperature Range	0 °F to 110 °F (-17 °C to 43 °C)
Direct Sunlight	Limit until use
Launch Point	Clear of debris, 10 ft radius, unobstructed

3-PHYSICAL INSPECTION	
Arms	Intact at seam, secured into place
Propellers	No bending, warping, chips, or cracks found Clear of interference from accessories
Fasteners	No screws missing from airframe
Camera	Clear of debris, unblocked
Motors	Spin freely, no significant resistance, all springs present
Gimbal Protective Cover	Removed
Battery Packs	Fully charged
Antenna	Clear of interference from accessories
SD Card	Inserted (optional)

4-SYSTEM POWER / PAIRING	
Golden Eagle	Powered on
TAC	Powered on
Teal QGC App	Loaded, main screen displayed in TAC
GE/TAC Comms Link	Established
*GPS	Acquired (8 minimum, 10 recommended)
Calibration	If needed, complete
*Channel/ Frequency	Deconflicted

*** Denotes Impact of Safety of Flight**

5-SYSTEM CHECKS	
Button Assignments	Assigned (if not using default settings), calibrated, verified
*Safety Parameters	Set to user's site, mission, and environment
*RTL Height	Verified
*Compass	Stable, accurate
*Attitude	Verified
Gimbal	Functional
EO Camera Video Stream	Displays in TAC
IR Camera Video Stream	Displays in TAC
SD Card	Inserted (optional)
Picture Settings	Enabled
RSSI	Between -20 dBm and -50 dBm
Announcements	Cleared
Status Lights	Set as desired
Accessory Lights (optional)	Attached, functional
Offline Maps	Displays in TAC
Mission Plans	Uploaded, displays in TAC
*Flight Mode	Selected
*Arm/Disarm/ E-Stop	Functional

*** Denotes Impact of Safety of Flight**

Always perform a functions check before the first flight or mission of the day. It can be performed immediately before a mission or in advance, dependent upon time constraints and mission needs.

FUNCTION CHECK PROCEDURES:

1. Acquire GPS signal
2. While on the ground, safely test the arm and disarm functions:
    a. Press the ARM button
    b. Press the DISARM button
3. Arm the system
4. Takeoff
5. Climb approx. 5-10 ft (1-3 m), out of ground effect
6. Hold for approximately 10 seconds, checking for any uncommanded change in heading
7. Yaw right 360° and return to starting point
8. Yaw left 360° and return to starting point
9. Pitch forward and return to starting point
10. Pitch backward and return to starting point
11. Roll right and return to starting point
12. Roll left and return to starting point
13. Either continue on to performing a mission, or land and disarm to start the mission at a later time

IN-FLIGHT EMERGENCY ACTIONS	
Erratic Flight (Mission Mode)	1- Switch to Position Mode. 2-Manually land ASAP.
Erratic Flight (Position Mode)	1-Switch to Altitude Mode. 2-Manually land ASAP.
Loss of Pilot Control	1-Attempt manual landing. 2-E-Stop/Disarm if necessary.
No GPS/ Jammed Signal	The system will default to Altitude Mode. Manually fly/land the drone.
Loss of Link	1-Record last known position. 2-Adjust antenna to vertical position. 3-Execute recovery procedures if drone does not RTL.

6-POST-FLIGHT	
Micro SD Card	Removed
Media	Transferred
Golden Eagle	Powered off, inspected for damage and dirt, stowed
TAC	Powered off, stowed
Battery Packs	Removed, stowed
Mission Debrief	Complete, logged

*** Denotes Impact of Safety of Flight**

COLD WEATHER OPERATIONS

When operating in low temperatures (32 ºF (0 ºC) or lower), battery packs that have been exposed to low temperatures for more than one hour must be pre-heated on the charger before flight.

Failure to pre-heat the battery pack before flight could reduce overall battery performance and affecting overall flight time, up to 28%.

When the cold battery pack is placed on the charger, the 5-LED bar graph will indicate that the thermal blanket is activated by showing a green LED light pattern starting in the middle moving outwards. When this animation stops and the LED indicates the solid percentage of charge, it can be used for operations. The amount of time this takes will vary upon the starting temperature of the battery pack.

HOT WEATHER OPERATIONS

During extreme hot weather conditions, it is best to keep the system and all components out of direct sunlight prior to flight. Avoid storing battery packs in hot vehicles to not exceed the recommended temperature limit of 113 ºF (45 ºC). If overheated, lithium-ion batteries such as the Teal Performance Battery Pack may become unstable, overheat, damage cells, and potentially catch on fire.

ARMING & TAKEOFF

ARMING THE DRONE

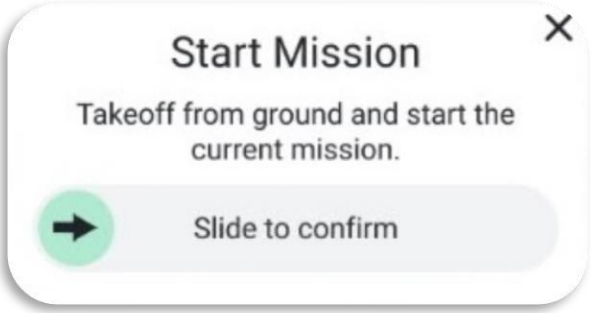
There are two (2) ways to arm the drone: either press the **left top button** on the TAC or **slide** the arrow in the slide confirmation window.

TAKEOFF

There are multiple ways to initiate takeoff:

Touch the TAKEOFF icon in the Fly Tools box or slide the arrow in the confirmation window.

In Mission Mode, slide the arrow to the right to takeoff and start the mission.



IN-FLIGHT

DEFAULT CONTROLS

Please refer to the TAC CONTROLS OVERVIEW screen for joystick/button locations.

THROTTLE UP / ASCEND
To ascend, move the left joystick straight up. The farther the joystick is moved from its centered position, the faster the drone ascends in its fixed vertical axis.

THROTTLE DOWN / DESCEND
To descend, move the left joystick straight down.

YAW LEFT / CCW
To rotate the drone counterclockwise (CCW) around its vertical axis, move the left joystick to the left.

YAW RIGHT / CW
To rotate the drone clockwise (CW) around its vertical axis, move the left joystick to the right.

PITCH FORWARD
To accelerate in a forward direction, move the right joystick up.

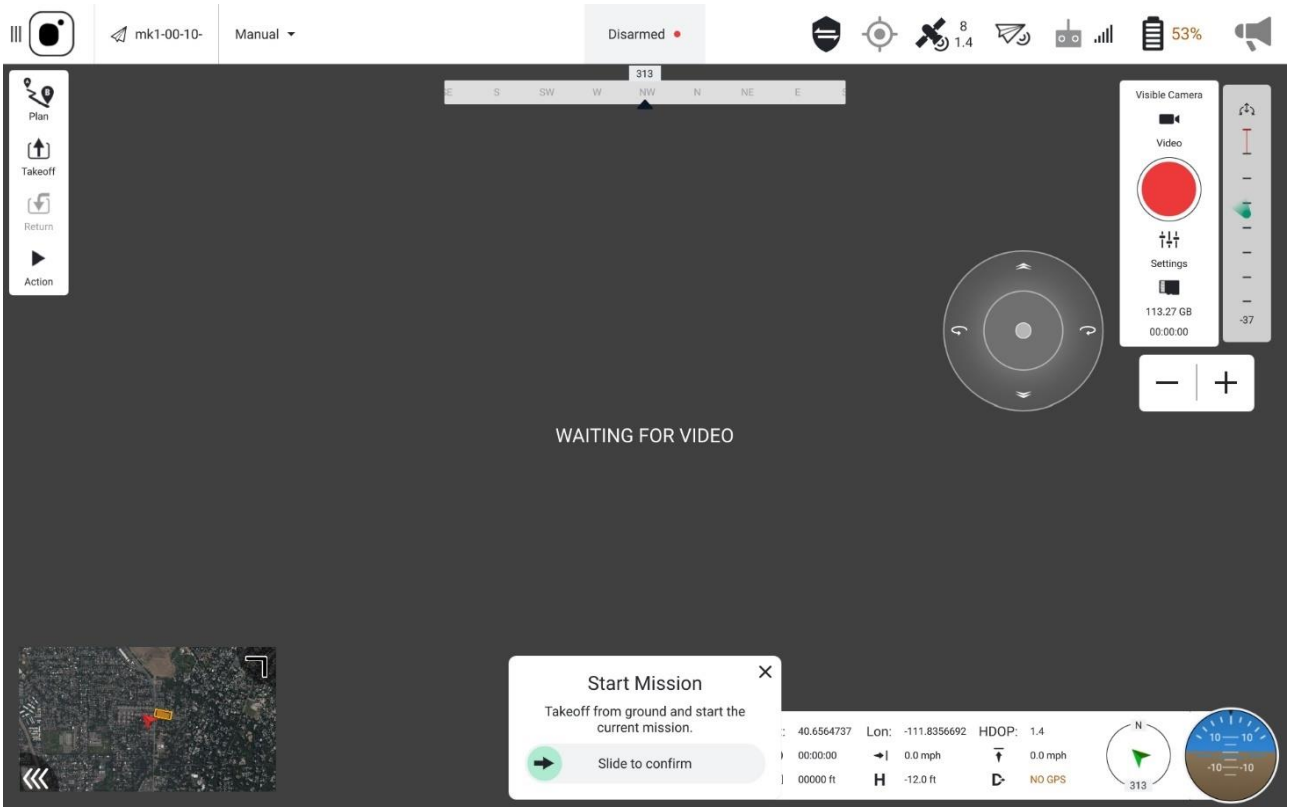
PITCH BACK
To accelerate in a reverse direction, move the right joystick down.

ROLL LEFT
To roll the vehicle toward the left, move the right joystick left.

ROLL RIGHT
To roll the vehicle toward the right, move the right joystick right.

FLY SCREEN DETAILS

SCREEN OVERVIEW



CONFIRMATION SLIDER

The Confirmation Slider box is fixed at the center-bottom of this and other screens. A context-sensitive slider appears when a critical action needs to be taken. For safety reasons, the action is intentionally made difficult to accidentally execute by forcing the user to slide (swipe right) to confirm the noted action. Press (X) to cancel the potential action which closes this box.

COMPASS HEADING

This compass heading indicator is centered just below the Main Toolbar but is only visible when video is selected to occupy the background. This indicator is not shown when the map view is selected. It indicates the heading of the drone in both the compass direction (N, S, E, W) and in the number of degrees from true north.

INSTRUMENT PANEL OVERVIEW

Lat: - Latitude

Lon: - Longitude

HDOP: - HDOP Values

00:00:00 Elapsed mission time in hrs:min:sec

0.0 Forward speed of the drone in meters/second

0.0 Altitude change in meters/second

00000 Odometer, indicating meters the drone has traveled during the mission

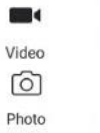
H 0.0 Indicates the current altitude of the drone in meters above ground (AGL)

NO GPS GPS status

Heading of the drone from true north (not magnetic)

Attitude indicator, also known as "artificial horizon," which shows the drone relative to the Earth's horizon

CAMERA CONTROL PANEL



Touch the VIDEO icon or the PHOTO icon to toggle back and forth from live video to taking photos.

Alternatively, **press** the **lower left button** on the **rear-panel** of the TAC to toggle between video and still photos. The icons will behave as described above to indicate which mode the system is in.

PHOTO MODE

Touch the black circular icon to snap a photo. A rotating circular icon appears briefly in the middle of the button while the photo is being processed. When the photo is processed, the black circle icon will reappear.

The amount of storage remaining is indicated below the SETTINGS icon, and the number of photos taken is also seen at the very bottom of the window.

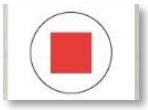
Alternatively, **press the front lower right button on the TAC** to take photos. The icons will behave as described above to indicate whether a photo is being processed.

Touch the SETTINGS icon to open the PHOTO SETTINGS window. Here you can select either the EO or IR (Boson) cameras, select gimbal controls, and turn on/off the screen grid and gimbal control graphics on the FLY SCREEN.

Alternatively, **press the upper left switch button** on the rear-panel of the TAC to toggle the active camera between EO and IR.

VIDEO MODE

Touch the red circular trigger to start video recording. The button will change to a red square inside the circle, indicating video is being recorded. **Touch** this red square to stop video recording. The red circle icon will reappear.



The amount of storage remaining is indicated below the SETTINGS icon, and the elapsed time of the current video is also seen at the very bottom of the window. When not recording, the elapsed time counter shows 00:00:00.

Alternatively, **press the front lower right button** on the TAC to also start and stop video recording. The icons will behave as described above to indicate whether video is being recorded.

Touch the SETTINGS icon to open the VIDEO SETTINGS window. Here you can select either the EO or IR cameras, select whether the video screen will fit screen height or stretch, and turn on/off screen grid on the FLY SCREEN.

Alternatively, **press the upper left switch button** on the rear-panel of the TAC to toggle the active camera between EO and IR.

GIMBAL CONTROL PANEL

The gimbal pitch scale is simply a vertical bar with 8 tick marks providing a quick visual indication for the current gimbal pitch position relative to its minimum and maximum limits.

The gimbal yaw/pitch angle indicator ( ) simultaneously provides a quick visual indication of the current gimbal pitch.

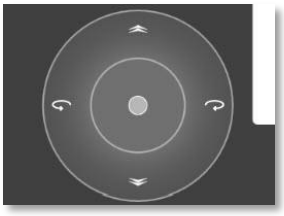
This indicator also roughly shows the gimbal pitch angle by its relative vertical position on the gimbal pitch scale. The indicator slides up and down the scale as the gimbal is pitched up and down, respectively.

Touch and slide the gimbal pitch scale to directly control the gimbal pitch angle.

Alternatively, you can use the GIMBAL CONTROL CIRCLE (see the next section) or the TAC rear-panel buttons to adjust the gimbal pitch angle.

At the bottom of the panel is a number indicating the gimbal pitch angle in degrees (represented by the number 2 in the example above). The Golden Eagle gimbal pitch angle ranges from about -110° to about +35° up, with 0° being the absolute forward camera direction.

GIMBAL CONTROL CIRCLE



The Gimbal Control Circle is only visible when the Video view is selected. It disappears in Map view. This control provides an alternate and more intuitive way to control the gimbal's pitch.

Touch the bullseye to change the pitch and yaw of the gimbal.

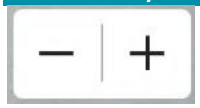
The up/down directions control the pitch.

Release to stop the movement of the gimbal at that current position.

Alternatively, **press or tap the upper right switch button** on the rear-panel of the TAC to continuously rotate the camera angle up until the button is released or until it reaches its maximum up position. Momentary taps of this button rotate the camera angle up by about 7-8º per tap.

Alternatively, **press or tap the lower right switch button** on the rear-panel of the TAC to rotate the camera angle until the button is released or until it reaches its maximum down position. Momentary taps of this button rotate the camera angle down by about 7-8º per tap.

ZOOM IN / ZOOM OUT CONTROLS



Below the camera and gimbal control panels are the zoom in and zoom out controls. The EO camera has 12 levels of digital zoom, the default being the fully zoomed-out level. The IR camera has 11 levels of digital zoom. Each "+" or "-" button press changes the zoom by one level.

Alternatively, **move the front right 4-position switch** on the TAC to the left to zoom in and to the right to zoom out.

PHOTOS SCREEN

ENABLE PHOTO SETTINGS INSTRUCTIONS

All photo functions must be enabled before flight or else the media will not be stored locally on the TAC and will not be transferrable after the mission.

However, the tradeoff to having the media stored locally on the TAC during flight is a reduction of bandwidth which could degrade the quality of the media seen on the TAC fly screen during the mission.

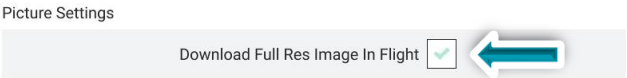
If possible, we recommend storing media on the SD card, but realize some security protocols will not allow this.

Touch the MENU icon.

Select SETTINGS at the bottom of the screen.

Select GENERAL.

Scroll down to PICTURE SETTINGS.

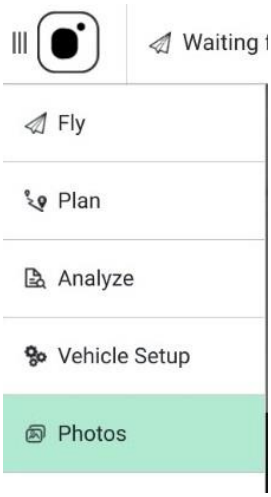


Check the DOWNLOAD FULL RES IMAGE IN FLIGHT box.

PHOTO SCREEN SETTINGS

Touch the MENU icon at the top of the TAC screen.

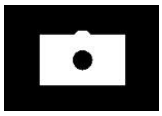
Select PHOTOS.



This opens the PHOTOS SCREEN from which you can customize the following functions:

- Take EO & IR snapshots and download them immediately in-flight to the TAC
- View thumbnails of downloaded EO & IR photos
- View a selected photo at full resolution
- View metadata of a photo
- Delete downloaded photos from the TAC

TAKING A PHOTO



A camera icon is fixed in the lower right-hand corner of the Photo screen. Touching this icon snaps a photo on the vehicle and downloads it immediately to the TAC.

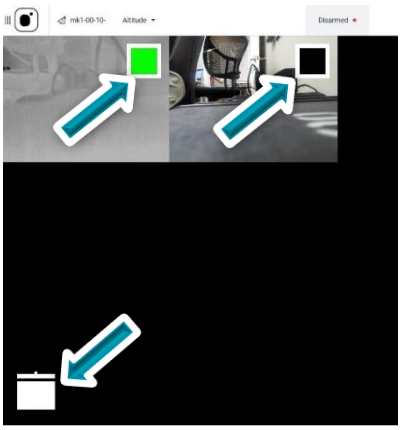
Pressing the front right momentary switch on the TAC will also either take a photo or start recording video.

A symbol appears when the camera icon is touched but download is not enabled. Ensure that the photo functions in the SETTINGS are enabled as instructed in the previous page.

The background of the Photos screen is largely a blank black screen, until it is populated with photos taken from the drone. Snapshots appear sequentially left-to-right and top-to-bottom on the Photos screen.

DELETING A PHOTO

Touch any photo in the photos screen to enable a selection box in the upper-right corner of each photo and the trash can icon in the lower-left corner. The box for that photo immediately turns green and indicates that it is selected for deletion. All others are black until selected.



Immediately touching that first photo again causes all the selection boxes to disappear. All selected photos can be deselected one at a time. As soon as the last selected photo is touched to deselect it, all the selection boxes disappear.

Once photos are selected for deletion, touch the trash can icon.

NOTE: Deleting photos from the TAC does not delete the original photo stored on the Golden Eagle.

VIEWING A PHOTO & METADATA

Select an individual photo for viewing by touching that photo. The selected photo will fill the entire Photo screen.

In the upper left of the individual photo view is a metadata icon. **Touch** this icon to display the timestamp of when the photo was taken. **Touch** the icon again to cause the metadata to disappear.

Above the metadata icon is the exit (X) icon. **Touch** this icon to exit the individual photo view and return to the main Photo screen that shows all the downloaded photos.

In the lower left of the individual photo view is a trash icon. **Touch and hold** this icon for about 1 second to delete the photo from the TAC photo screen.

LANDING & DISARMING

Please review the following functions to appropriately land and disarm the drone in both normal and emergency situations.

LAND

The land function is used under normal circumstances and brings the drone straight down from its immediate position in a controlled descent. The drone automatically disarms when on the ground for 3-4 seconds.

To land at the current position at any time, **touch the LAND button** in the FLY TOOLS box. **Confirm** landing by moving the confirmation slider to the right.

Alternatively, **hold the left joystick** that controls throttle in a continuous down position until the drone automatically disarms when on the ground for 3-4 seconds.

RETURN TO LAUNCH (RTL)

The return to launch (RTL) function is used under normal circumstances and initiates the pre-programmed landing sequence to a pre-determined takeoff / landing location.

The RTL settings can also be customized in the SAFETY SETTINGS screen for abnormal flight situations. These pre-determined fail-safes will automatically trigger a RTL.

The drone automatically disarms when on the ground for 3-4 seconds.

To initiate the RTL sequence via the TAC soft key. **Touch the Return button** in the FLY TOOLS box and move the confirmation slider to the right.

Alternatively, press the **front left momentary switch button**.

EMERGENCY STOP (E-STOP) / DISARM

The Emergency Stop (E-Stop) function is designed to immediately cut off power to the motors and cease all momentum of the drone. This causes the drone to fall exactly where the motors lose power, resulting in no control over where the drone lands.

This function is intended to be used in emergency situations only, and not for regular landing/disarming situations. The airframe will be unable to recover itself back into flight once the E-Stop has been activated and damage to the drone can be significant.

To disarm the drone via the E-stop button, **flip open the right top-panel guard door, and press the red button**.

WARNING!

The E-Stop will shut off propulsion and the vehicle will immediately fall from the sky. This may result in:

- Partial or complete loss of the airframe, camera, gimbal, arms, motors, payloads and/or props upon impact.
- Partial or complete loss of data.
- Damage to property on the ground upon impact.
- Significant injury or death of person(s) upon impact.

POST-FLIGHT

Be sure to inspect the Golden Eagle for any damage after landing. It is recommended to power off and remove the battery packs from both the drone and TAC before stowing the system.

However, be sure to extract the flight logs from the drone before powering it off. Flight logs can be extracted at a later time, until they are permanently deleted from the drone. Once the flight logs are transferred from the drone to local storage on the TAC, they can then be transferred to either a removeable USB-C device or to a PC via USB-C cable.

Photos can be easily transferred from the drone if the SD card was inserted and used during flight. Remove the SD card from the drone and insert it into the SD adapter, if necessary, and then be insert the adapter or card into a PC. If photos were enabled on the TAC, the photos will also be stored locally to the TAC and then can be transferred to either a removeable USB-C device or to a PC via USB-C cable.

FLIGHT LOGS

Some suggestions of what to document in your paper or digital flight log:

- Date & time
- Environmental conditions
- Golden Eagle serial number
- TAC serial number
- Software versions used
- Mission objective and operations performed
- The RPIC
- Damage sustained and/or maintenance needed

DOWNLOAD FLIGHT LOGS: GOLDEN EAGLE → TAC

To download flight logs over the drone wireless network to the TAC, ensure Teal QGC is launched on the TAC.

Touch the MENU icon at the top of the TAC screen.

Select ANALYZE.

- A LOG DOWNLOAD screen will appear.

Select REFRESH at the right of the screen to ensure all available files are displayed on the screen.

Select the file that you want to download by tapping on the screen on that file. Files are distinguished by time, date, and file size.

NOTE: Although the software will allow multiple files to be selected, it is recommended to download one file at a time to avoid any timeout errors.

Select DOWNLOAD at the right of the screen.

- A screen will pop up prompting you to save the file to a directory; this is not necessary and will disappear after selecting OK.

Select OK to continue.

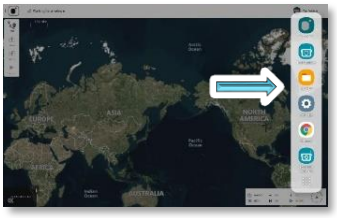
Once the file is finished downloading, the file's status on the screen will show as DOWNLOADED and will be available to transfer off of the TAC.

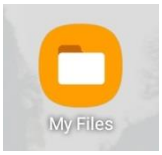
TRANSFER LOG FILES: TAC → REMOVEABLE USB-C DEVICE

Make sure that you have completed the previous DOWNLOAD FLIGHT LOG instructions.

Insert a USB-C removeable storage device into the port located at the top of the TAC.

Access the vertical side-bar menu.





Touch the MY FILES icon. Follow the path to the logs:

INTERNAL STORAGE > TEAL QGC > LOGS

Press and hold the file(s) you want to transfer until a checkmark next to the file(s) appears.

- You will be able to MOVE, SHARE, or COPY the files.

NOTE: Selecting SHARE will transfer the files to another TAC.

Select MOVE.

Select USB STORAGE (this may show whatever name is given to the storage device).

- You may need to scroll down or collapse the file path to see this option.

Select MOVE HERE at the bottom right corner of the TAC screen.

- A file with date, time, and orange "N" symbol will appear when the transfer is completed.

Remove the USB-C storage device when finished.

TRANSFER LOG FILES: TAC → PC

Make sure that you have completed the previous DOWNLOAD LOG instructions. The files can now be transferred from the TAC to a PC via USB-C cable. Transferring data this way requires switching the TAC out of and back into KIOSK MODE.

SYSTEM REQUIREMENTS:

- Windows 10 or Ubuntu Linux; Mac is NOT supported.
- Ensure the system has power and is paired and communicating prior to proceeding.
- Use a fully charged battery pack in both the drone and the TAC.
- Do not power off the drone or the TAC at any time during the process.

EXIT KIOSK MODE on the TAC

Press and hold the tablet power button (not the TAC battery pack) for 1-2 seconds until 3 system icons appear: POWER OFF, RESTART, and EXIT TEAL SECURE.

Select EXIT TEAL SECURE.

Enter the password **teamteal** (all lowercase, no spaces, no special characters) in the dialog box at the bottom of the screen.

- Although there will be no indication of this operation being successful, the TAC is now no longer in kiosk mode and you will be allowed to complete the transfer.

TRANSFER LOG FILES from the TAC to a PC

Plug in a USB-C cable into your computer.

Plug the other end of the USB-C cable into the port located at the top of the TAC.

- A prompt will appear at the bottom of the screen.
- **Select** ALLOW.

On your computer, open a file browser such as EXPLORER.

Find and follow the file path to the logs:

SAMSUNG ANDROID > TABLET > TEALQGC LOGS > LOGS

- The log files will have a **.ulg** file extension.

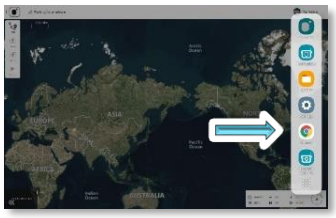
Move or copy the log files from the directory above to the desired location on the PC.

ENTER KIOSK MODE on the TAC

After transferring the files onto the PC, you will need to put the TAC back into kiosk mode. This is for both security and functional reasons while in the field.

Disconnect the USB cable from the TAC.

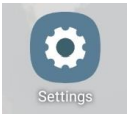
Access the vertical side-bar menu.



Touch the TEAL TAC SETTINGS icon.

Switch the ACTIVE NETWORK to WIFI.

Access the vertical side-bar menu once more.



Select the gray gear SETTINGS icon.

Scroll to the bottom of the menu.

Select ABOUT TABLET.

Select SOFTWARE INFORMATION.

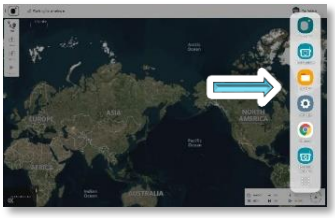
Select KNOX CONFIGURE.

Select APPLY LATEST PROFILE.

- You may see the screen rotate 90 degrees and go through a status update.
- This will take only a few seconds, and once completed, the TAC will be back in kiosk mode.

SWITCH ACTIVE NETWORK BACK TO DRONE

To resume flying missions, access the vertical side-bar menu.



Touch the TEAL TAC SETTINGS icon.

Switch the ACTIVE NETWORK to DRONE.

TRANSFER MEDIA: SD CARD DRONE → PC

If the SD card was inserted into the drone before flight, the photos and videos will be saved to the SD card. The files can be transferred directly to a PC.

Remove the SD card from the drone.

Insert the SD card into the SanDisk SD adapter that was provided in the spares kit, if needed.

- Any SD adapter will suffice.

Insert the SD adapter or SD card into the PC.

On your computer, open a file browser such as EXPLORER.

Find and follow the file path to the logs.

- The video will have a **.ts** file extension
- The photos will have a **.jpg** file extension and will be labeled IMG.
- Each photo and video file will be labeled with either EO or IR.

Move or copy the log files from the directory above to the desired location on the PC.

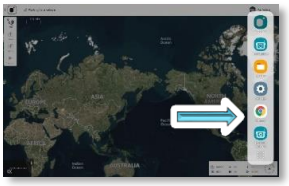
TRANSFER PHOTOS: TAC → REMOVEABLE USB-C DEVICE

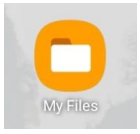
If the photo functions in the GENERAL SETTINGS files were enabled before flight, photos can now be transferred from the TAC to a USB-C removeable storage device.

NOTE: Videos currently can only be saved and transferred via SD card.

Insert a USB-C removeable storage device into the port located at the top of the TAC.

Access the vertical side-bar menu.





Touch the MY FILES icon. Follow the path to the logs:

INTERNAL STORAGE > TEAL QGC > PHOTO

Press and hold the file(s) you want to transfer until a checkmark next to the file(s) appears.

- You will be able to MOVE, SHARE, or COPY the files.

NOTE: Selecting SHARE will transfer the files to another TAC.

Select MOVE.

Select USB STORAGE (this may show whatever name is given to the storage device).

- You may need to scroll down or collapse the file path to see this option.

Select MOVE HERE at the bottom right corner of the TAC screen.

- A file with date, time, and orange "N" symbol will appear when the transfer is completed.

Remove the USB-C storage device when finished.

TRANSFER PHOTOS: TAC → PC

If the photo functions in the GENERAL SETTINGS files were enabled before flight, photos can now be transferred from the TAC to a PC via USB-C cable. Transferring data this way requires switching the TAC out of and back into KIOSK MODE.

NOTE: Videos currently can only be saved and transferred via SD card.

SYSTEM REQUIREMENTS:

- Windows 10 or Ubuntu Linux; Mac is NOT supported.

EXIT KIOSK MODE on the TAC

Press and hold the tablet power button (not the TAC battery pack) for 1-2 seconds until 3 system icons appear: POWER OFF, RESTART, and EXIT TEAL SECURE.

Select EXIT TEAL SECURE.

Enter the password **teamteal** (all lowercase, no spaces, no special characters) in the dialog box at the bottom of the screen.

- Although there will be no indication of this operation being successful, the TAC is now no longer in kiosk mode and you will be allowed to complete the transfer.

TRANSFER MEDIA from the TAC to a PC

Plug in a USB-C cable into your computer.

Plug the other end of the USB-C cable into the port located at the top of the TAC.

- A prompt will appear at the bottom of the screen.
- **Select** ALLOW.

On your computer, open a file browser such as EXPLORER.

Find and follow the file path to the media:

SAMSUNG ANDROID > TABLET > TEALQGC > PHOTO

- The photos will have a **.jpg** file extension and will be labeled IMG.

- Each photo file will be labeled with either EO or IR.

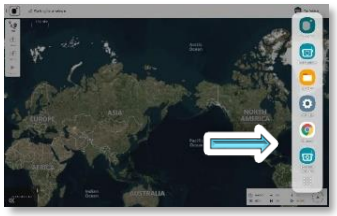
Move or copy the media files from the directory above to the desired location on the PC.

ENTER KIOSK MODE on the TAC

After transferring the files onto the PC, you will need to put the TAC back into kiosk mode. This is for both security and functional reasons while in the field.

Disconnect the USB cable from the TAC.

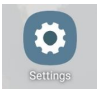
Access the vertical side-bar menu.



Touch the TEAL TAC SETTINGS icon.

Switch the ACTIVE NETWORK to WIFI.

Access the vertical side-bar menu once more.



Select the gray gear SETTINGS icon.

Scroll to the bottom of the menu.

Select ABOUT TABLET.

Select SOFTWARE INFORMATION.

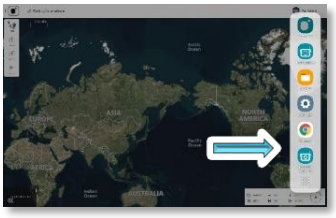
Select KNOX CONFIGURE.

Select APPLY LATEST PROFILE.

- You may see the screen rotate 90 degrees and go through a status update.
- This will take only a few seconds, and once completed, the TAC will be back in kiosk mode.

SWITCH ACTIVE NETWORK BACK TO DRONE

To resume flying missions, access the vertical side-bar menu.



Touch the TEAL TAC SETTINGS icon.

Switch the ACTIVE NETWORK to DRONE.

CLEARING MEDIA

We recommend clearing all media from the drone after each flight. After media has been successfully transferred:

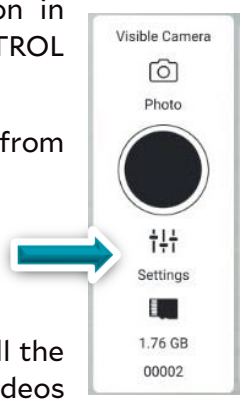
Power on and connect the TAC and Golden Eagle **WITHOUT** a media card inserted.

Select the SETTINGS icon in the CAMERA CONTROL PANEL in the FLY SCREEN.

Select VISIBLE CAMERA from the drop-down menu.

Scroll to the bottom.

Select FORMAT.



- This will delete all the EO photos and videos on the drone.

Select IR CAMERA from the drop-down menu.

Select FORMAT.

- This will delete all the IR photos and videos on the drone.

POST-INCIDENT REPORT PROCEDURES

IMMEDIATE POST-INCIDENT PROCEDURES

Document the following items after an event or failure resulting in a crash:

1. **Determine if the area is safe; if the situation is secure, then proceed.**
2. **Do NOT touch the drone yet!**
3. Document the date and time.
4. Take photos of the drone to include in the report.
5. Is the drone still powered on?
   - Do you need to hit the E-Stop and disarm?
   - Is the battery on (look at the light on the drone, but do not touch)?
   - Are the white LED lights on the side of the drone still on?
   - Is the fan on the drone running?
   - Is the gimbal still trying to stabilize?
6. Is the drone still connected to the TAC?
   - Is there still a video feed and telemetry being reported?
7. Does the drone appear safe to handle?
   - If yes, carefully pick up the drone and power off the battery if it is running.
8. Remove the battery pack.
   - If the battery does not shut off, remove the battery pack while it is still powered on:
     - Set in a safe place
     - Once some time has passed, check to see if the battery pack is still warm
9. Are the arms still locked?
10. Are the arms damaged?
11. Do the motors appear to be damaged?
12. Are the motors still freely moving or do they bind?
13. Is the gimbal/camera damaged?
    - Check the gimbal/camera wires and connectors.
14. Are there cracks or damage to the body of the airframe?
15. Is the battery connector on the bottom of the drone still attached?
16. Collect any loose parts and put them in a bag to keep together with the drone.

DOCUMENTING YOUR INCIDENT REPORT

Document these items that may be required in your incident report:

1. Document the TAC and Golden Eagle serial numbers.
2. What firmware version is on the drone?
3. What firmware version is the Teal QGC?
4. Describe the flight you were trying to perform:
   - Mission, Manual, Position, or Altitude flight mode, climbing, rolling, etc.
5. Describe your observations of how the flight performed.
6. Describe the environment (wind, snow, hot, cloudy, sunny, raining, crowded area, open fields, etc.).
7. Describe the incident:
   - How did it fall?
   - Was it making noise as it fell? Was it silent?
   - Did the drone tumble or was it a controlled crash?
   - Was the flight stable before this?
   - Were there any warnings or errors on the TAC?
   - What was the sequence of events? Include what you expected the drone to do and what the drone did.
8. If the Golden Eagle can still safely power on and connect to the TAC, are you able to download the logs from the drone onto the TAC?
   - If not, Teal Customer Support can extract the logs for you.
9. Send the flight logs to Teal Drones Customer Support at SUPPORT@TEALDRONES.COM and include them with incident report.

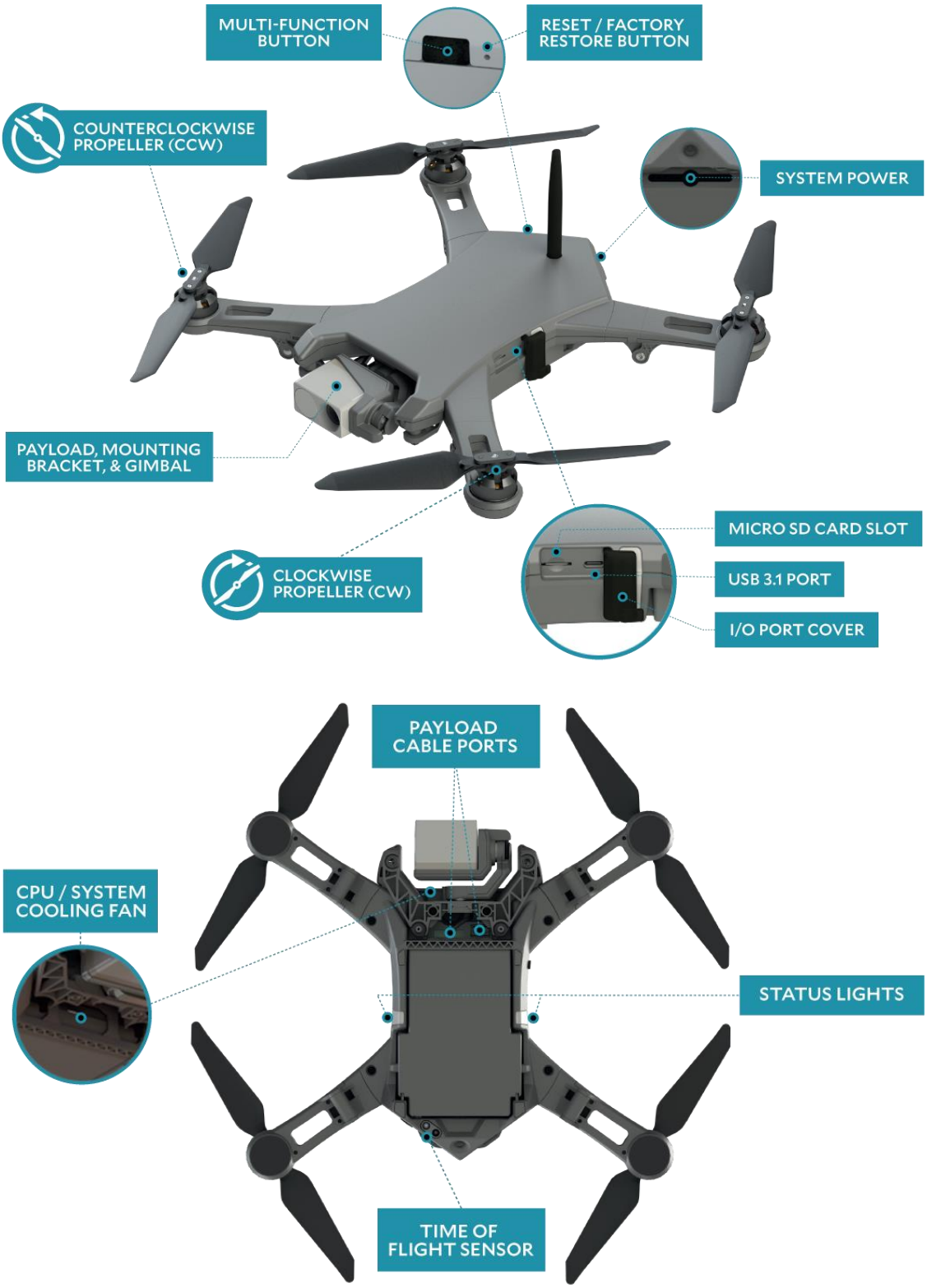
FILING YOUR ACCIDENT REPORT

For more information of the rules and regulations of accident reporting, and for up-to-date reporting procedures, please visit the FAA's **sUAS Pilot's Accident Reporting** page at:
http://suaspilots.org/knowledge-center/14-cfr-part-107-knowledge-center/accident-reporting/

GOLDEN EAGLE sUAS DETAILS

OVERVIEW

The following diagram illustrates the major components of the Golden Eagle:



ARCHITECTURE & RATIONALE

The Golden Eagle is designed to be vertically integrated and fully modular, ensuring that each payload, propulsion, and battery system can be quickly repaired, replaced, and upgraded. Each spares kit contains necessary parts and tools required to immediately make repairs while in the field.

For more information on repairing and replacing parts, please see the FIELD REPAIR & MAINTENANCE appendix at the end of this manual.

GOLDEN EAGLE SYSTEM POWER

The ON/OFF power switch for Golden Eagle is built into the battery pack. A 4-second press-and-hold of the battery power button turns the pack on or off. The battery pack must be removed from the Golden Eagle to be recharged. The battery pack is not serviceable in the field but is easily removed and replaced.

CAUTION!

The Golden Eagle does not support a battery pack hot-swap. Be sure to power down the battery pack before removing and replacing it.

ANTENNAS

The Golden Eagle antenna is highly flexible, providing for greater crash survivability. When placed in its tactical case, the case lid can be closed, bending the antenna(s) down to the top case. The antennas are permanently attached to the top cover and are not field-replaceable.

ROTOR ARMS

The Golden Eagle has foldable and replaceable rotor arms. The arms fold down and under the bottom of the Golden Eagle, even with the propellers attached. No latching or unlatching is necessary when folding the arms. When folding, the arms give at a torque of about 7 in-lbs. Locking the arms in the extended (flying) position requires a torque of about 3 in-lbs.

PROPELLER MOTORS

A custom brushless DC motor is mounted to each folding arms. These 3-phase motors spin at speeds up to 14,000 rpm. Optimized motor drive algorithms maximize the motors' power, efficiency, and audible signature. Note that individual motors cannot be replaced if damaged – only complete arm assemblies can be replaced.

PROPELLER ASSEMBLIES

Propeller assemblies are easily replaced in case of breakage with a simple no-tools push-and-twist method and are keyed so that a CCW one cannot be mounted to a CW hub and vice-versa. Replacement arms are prewired with the motor installed and are easily swappable in the field by removing a single T8 Torx screw.

MULTI-FUNCTION BUTTON

A multi-function button is used during the process of pairing Golden Eagle to the TAC, among other functions, including future functionality.

RESET/ FACTORY RESTORE BUTTON

The reset / factory restore button is recessed internally and is accessed through a pin hole to prevent accidental actuation. A paper clip or other small rigid pin can be used to actuate it. Pressing and holding this switch for at least 10 seconds before releasing initiates the following functions:

- Clears all media on either the SD.
- Clears all pairing information, causing a full radio settings re-program on the next pairing attempt (but does not clear the radio settings that are active on the radio).
- Sends a MAVLink message to PX4 to reset its parameters to default.
- Clears flight logs.

TIME OF FLIGHT SENSOR

An infrared ground-distance sensor on the bottom of the Golden Eagle works in conjunction with other on-board (GPS and barometric pressure) sensors to determine the distance to the ground to assist in landing.

The photo-diode emitter in this ground-distance sensor beams down infrared light, and a photo-diode receiver senses the reflections from that light to detect the distance to ground by measuring the "time of flight" of that light. It starts sensing the ground at about 12-15 meters high.

STOCK PAYLOAD

The stock payload on the Golden Eagle is a dual-axis (pitch and roll) gimballed FLIR Hadron 320 EO/IR camera module. The payload electrical interface to the Golden Eagle utilizes plug-in cables for ease of swapping the payload.

The gimbal's pitch angle ranges from +35° to -110°, and its roll angle ranges from +25° to - 25°. The roll function is automatic, so that it rolls in the opposite direction as the Golden Eagle, allowing for the camera to remain horizontal in roll and pitch up to 25°.

The electro-optical portion of the camera is a 12 Megapixel CMOS image sensor combined with an 80-degree horizontal field-of-view (HFOV) lens. The EO camera takes 4,000x3,000 video as well as 12 MP resolution still images in JPEG or TIFF format. Optical video from the camera is stored in the Golden Eagle's on-board flash memory or SD card.

The infrared portion of the camera has a 34-degree HFOV and captures video in a 320x256 format. The IR camera also has a built-in shutter for automating non-uniformity correction, which reduces image blurring and artificial ghosting. IR video is stored in on-board flash memory or SD card in 640x512 format.

The EO/IR camera module provides simultaneous EO and IR video streams to the Golden Eagle CPU, formatted as an H.264 elementary stream video within a MPEG2 Transport Stream. Either optical or IR video can be selected (on the TAC) to be transmitted over the radio link in a compressed format. Transmitted optical video is sent in a 720p (progressive scan) format. Video latency to the TAC has been minimized to ensure safe operation in confined areas.

MICRO SD CARD SLOT

The I/O port cover door swings open to expose the I/O ports. The port on the left is a Micro SD card slot. Teal's Field Repair Kit includes one 128 GB Micro SD card and one SD card adapter that can be used to store and transfer media files from the Golden Eagle.

Using the Micro SD card for storage is not a secure method of transferring confidential media files, but currently is one of the limited options for doing so. Be sure you understand the risks of losing the content of the SD card if the drone is lost or not recoverable.

AUXILIARY LIGHTING

The Golden Eagle includes an illumination panel on each right and left side of the airframe. These panels are designed to spread light vertically from the bottom to the top of the airframe to be visible from nearly all angles in flight. The stock Golden Eagle lights may not be bright enough or have appropriate directivity for some applications such as anti-collision, search and rescue, or line-of-sight navigation at a distance. For these situations, it is desirable to attach third-party auxiliary lighting to the airframe.

AUXILIARY LIGHTING PLACEMENT

The maximum weight of all auxiliary equipment that can be attached to airframe is 75 grams and must be securely attached to not cause any vibration.

Place the auxiliary light(s) toward the vehicle's natural CoG. This will result in the least amount of degradation to flight performance.

The Center of Gravity (CoG) of Golden Eagle is essentially dead center of the vehicle (the intersection point of the two (2) lines drawn between the centers of diagonally opposite props). The closer the weight distribution of the attached equipment maintains the original CoG, the better the aircraft will perform.

Care should be taken to avoid physical or electromagnetic interference. Do not place items containing metal near the magnetometer, located at the rear tip of the vehicle.

Spin the props to make sure that they do not come in contact with the desired location of the mounted light(s). Maintain at least 10mm clearance from tips of the prop blades to the light(s). Select the location of the light(s) while the gimbal protective cover is installed on the drone to ensure the added attachment does not interfere with the cover.

Verify that the gimbal operation, gimbal cover, battery pack, propeller assemblies, and rotor arms are not mechanically impeded by the attached lights.

GOLDEN EAGLE / TAC PAIRING

Each Golden Eagle and TAC are paired (authenticated and bound to one another) over a secure wireless network. Once complete, all communicated data is encrypted between the Golden Eagle and TAC over the AES-256 encrypted wireless network.

Only one wireless modem link is available between the TAC and the Golden Eagle. Both the Golden Eagle and the TAC use the Microhard Pico series pDDLxxxx-AES256 modem. The Microhard Pico modems support Advanced Encryption Standard with block lengths of 256 bits.

Radio encryption is managed through the TAC radio's user interface (UI). Access to the radio's configuration interface is secured through the QGroundControl application with a valid account name and password. Once logged into the TAC, the user selects a unique network ID to allow linking to and pairing with the Golden Eagle. Once joined to the same network, the wireless network forms a wireless encrypted closed network between the air and ground systems.

VIEWING CURRENT PAIRING STATUS

Touch the shield icon to open the VEHICLE PAIRING window that will list all currently connected Golden Eagle.

PAIRING INSTRUCTIONS

NOTE: The Golden Eagle and TAC only needs to be paired once. The system reestablishes the link upon the Teal QGC launch, as long as the system has not been unpaired or paired to a different TAC.

Follow along with our instructional video, **Linking Components: Teal Golden Eagle Drone** on our website at:
https://tealdrones.com/support/video/

Power on the Golden Eagle and the TAC.

Make sure that the active network is set to DRONE and not WIFI to pair the system in the Teal TAC Setting App.

Press and hold the black multi-function button on the Golden Eagle for 5 seconds, then release.

NOTE: Pressing this button will remove any previous connection or pairing to a TAC. This step is only necessary for pairing, not reconnecting.

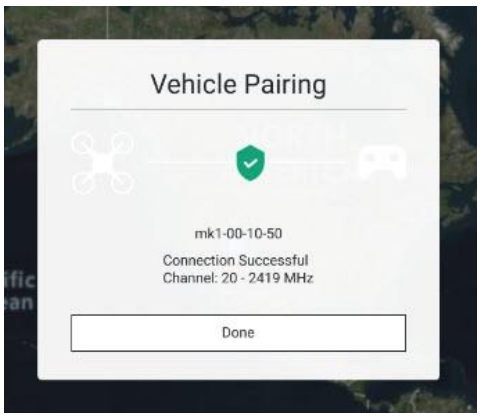
When the side panel lights stop flashing and stay on, the Golden Eagle is ready to pair with the TAC.

Touch the shield icon at the top-right corner of the FLY SCREEN to open the VEHICLE PAIRING window.

Once the Golden Eagle has been discovered the vehicle ID will appear in the window.

Touch the PAIR button to use the default communications channel.

When the pairing is successful, a CONNECTION SUCCESSFUL message will appear.



Select DONE to exit and return to the FLY SCREEN. The vehicle ID should now be visible at the top of the screen.

A red arrowhead will appear on the map representing the vehicle and its location.

Touch the gear icon to open a Pairing Configuration dialog box to change the pairing channel. A list of available channels is displayed.

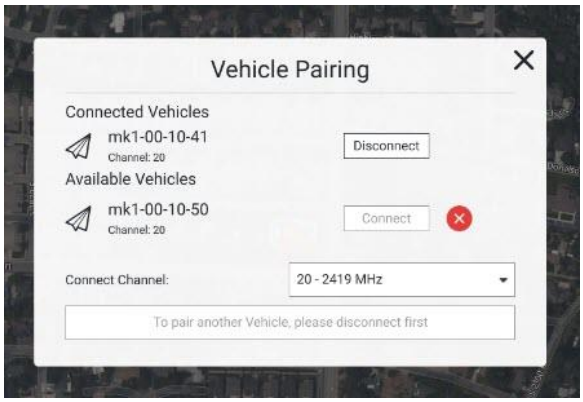
- The default or currently selected channel is highlighted in green.
- **Select** the desired channel. This closes the drop-down list and shows the newly selected frequency in the Pairing Configuration dialog box.
- **Select** APPLY to pair at that selected frequency.

DISCONNECTING FROM THE TAC

Disconnecting from the TAC is only temporary. See the UNPAIRING instructions below if permanent unpairing is needed.

NOTE: At this time, only one Golden Eagle may be connected to a TAC at a time. Disconnect the vehicle from the TAC before connecting a different one.

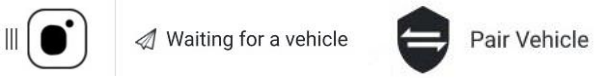
Touch the shield icon at the top-right corner of the FLY SCREEN to open the VEHICLE PAIRING window.



Select the DISCONNECT button for the vehicle ID.

Select the CONFIRM button.

The WAITING FOR A VEHICLE and PAIR VEHICLE icons reappear at the top of the screen indicating that the disconnection was successful.



RECONNECTING TO THE TAC

This is needed when the Golden Eagle has already been paired with the TAC, but has been disconnected, such as in the case of a loss of power.

Touch the shield icon to open the VEHICLE PAIRING window.

Select CONNECT.

Select CANCEL if necessary to terminate the process.

Select DONE after the connection is successful to exit and return to the FLY SCREEN. The vehicle ID should now be visible.

UNPAIRING THE SYSTEM

Unpairing the Golden Eagle from the TAC drops the secure pairing relationship, and the pairing process will need to be re-accomplished.

NOTE: The system must be disconnected before it can be unpaired.

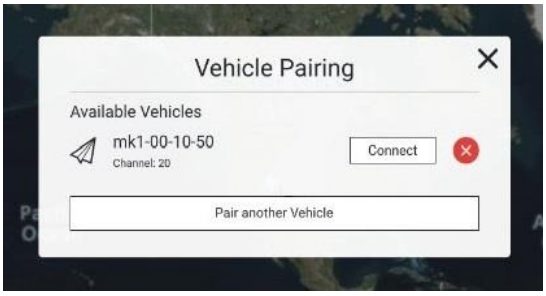
Touch the shield icon to open the VEHICLE PAIRING window.

Touch the red (x) icon.

Select CONFIRM to un-pair.

PAIRING ADDITIONAL GOLDEN EAGLES

Touch the shield icon to open the VEHICLE PAIRING window.



Select PAIR ANOTHER VEHICLE.

Press and hold the pairing button on the drone for 5 seconds when directed.

Select PAIR when the Golden Eagle is discovered.

Select DONE to exit and return to the FLY SCREEN. The vehicle ID should now be visible.

NOTE: Power off inactive drones to avoid RF interference.

CALIBRATING THE DRONE

The Golden Eagle will arrive already calibrated, and needs to only be calibrated when:

- You have traveled over 50 miles (80 km) or to a new geographical location.
- You have seen significant flight instability, such as “toilet-bowling” or horizontal position wandering greater than 10 ft (3 m).
- The system has prompted you to perform a calibration.

Follow along with our instructional video, **Calibrating Drone Sensors: Teal Golden Eagle Drone** on our website at: https://tealdrones.com/support/video/

CALIBRATING THE COMPASS

Connect the drone and the TAC.

Touch the MENU icon.

Select VEHICLE SETUP.

Select SENSORS.

Select COMPASS to calibrate the magnetometer.

Be ready to pick up and rotate the drone.

Click OK in the top right of the screen to begin.

The first tone from the Golden Eagle will alert you to begin.

Follow the instructions on the TAC screen.

The second tone will prompt you to hold the drone steady for the next orientation.

Select REBOOT VEHICLE when finished.

NOTE: Due to known errata, it is recommended to perform a power cycle (turn the drone battery pack off and on again.

Reestablish connection between the TAC and the drone.

CALIBRATING THE GYROSCOPE

Connect the drone and the TAC.

Touch the MENU icon.

Select VEHICLE SETUP.

Select SENSORS.

Place the drone on a flat, level surface.

Select GYROSCOPE.

Click OK in the top right of the screen to begin.

This should only take a few seconds to complete.

CALIBRATING THE ACCELEROMETER

Connect the drone and the TAC.

Touch the MENU icon.

Select VEHICLE SETUP.

Select SENSORS.

Place the drone on a flat, level surface.

Select ACCELEROMETER.

Click OK in the top right of the screen to begin.

Follow the instructions on the TAC screen. As each orientation completes, move the drone into the next position as prompted on the TAC screen. When all six (6) positions are complete, you may exit to the fly screen.

TEAL AIR CONTROL (TAC) DETAILS

ARCHITECTURE & RATIONALE

The TAC is a critical system serving as the UI, AV manager, system network manager, media manager, mission program manager, and storage device. As the primary UI, the TAC provides physical controls for the air vehicle to be flown manually with first-person view (FPV) over a low-latency video stream. Using the built-in tablet's touch screen, the user can program autonomous missions and manage other more complex functions through an intuitive custom UI.

As a stand-alone system, all high-resolution mission media and mission telemetry data are securely retrieved from the air vehicle, stored, and replayed by the TAC.

SERVICEABILITY

The TAC's mechanical design is straightforward, having only four (4) major chassis components: a clamshell chassis front and rear, an internal tray to secure the Samsung tablet, and a small externally accessed door removable with two Torx screws to access the radio modem for repair.

RF COMMUNICATION / RADIO MODEM

The TAC contains the same Microhard modem used in the Golden Eagle., either: a single 1800 MHz antenna connected internally to a Microhard pDDL1800-AES256 modem, or a dual 2.4 GHz ISM Band multiple-input and multiple-output (MIMO) option connected internally to a Microhard pMDDL2450-AES256 modem. Radio encryption is initiated and managed through the TAC UI. Once a Golden Eagle is paired to a TAC, an encrypted Closed Network between the air and ground systems is automatically formed.

LAN / DRONE

The user can select to either connect the TAC to the drone or wi-fi.

I / O

The TAC includes a high-speed USB-C 3.1 port; future functionality and features may be developed.

SAMSUNG TABLET

The TAC system uses a Samsung Galaxy Tab Active Pro tablet, which is MIL-STD-810G certified and IP68-rated. It features a large, WUXGA (1920x 1200) resolution, 10.1" touchscreen and is super-bright and sunlight-visible with a 550-nit rating. The audio vents comply with the IP53 rating.

TAC SYSTEM POWER

The main ON/OFF system power switch for the TAC is built into the battery pack. A 4-second press-and-hold of the battery power button turns the pack on or off. The battery pack must be removed from the TAC to be recharged. The battery pack is not serviceable in the field but is easily removed and replaced.

CAUTION!

The TAC does not support a battery pack hot-swap.

Power down both the tablet and the battery pack before removing and replacing the battery pack from the TAC.

TABLET POWER

After powering on the TAC main system power via the battery button with a 4-second press-and-hold, the tablet must then be powered on via its tablet power button with a 2-second press-and-hold.

When the tablet power is on, a quick tap on the tablet power button puts the tablet to sleep. When asleep, a quick tap on the tablet power button, or a double-tap on the screen, wakes it up.

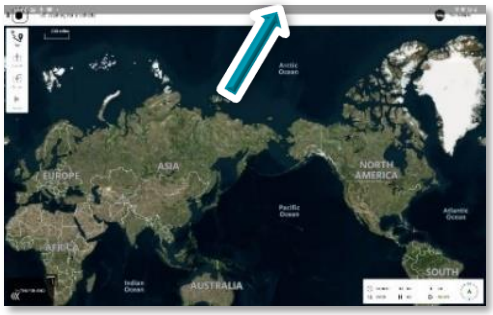
SYSTEM SOFTWARE DETAILS

ACCESSING THE APPS

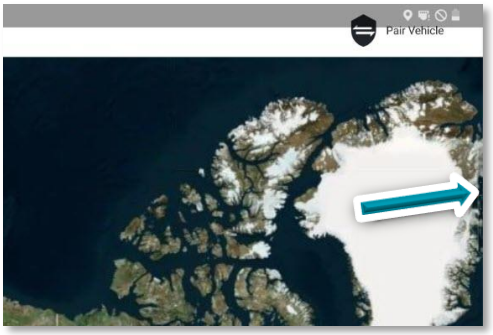
The TAC is built around a Samsung Galaxy Tab Active Pro tablet running the Android operating system. A number of Android applications are installed on the TAC.

The Teal QGroundControl (Teal QGC) app is launched upon system bootup.

Touch anywhere along the top edge of the screen and swipe downward.

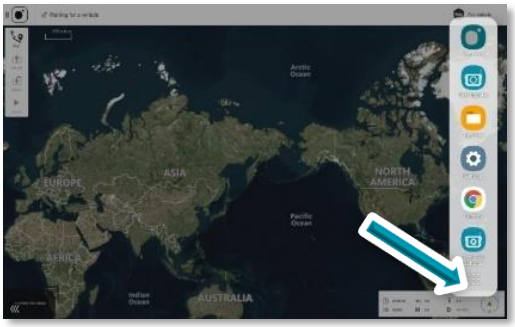


Four (4) small dots appear the right edge of the screen.



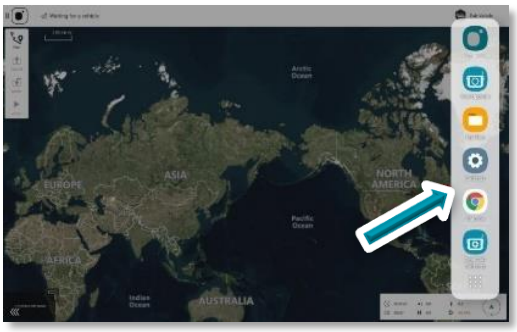
Touch and slide these dots to the left. This opens a vertical sidebar menu.

Touch the 9-dot icon to expand the sidebar to show all the available apps.



Touch the right-pointing arrow at the lower-right-hand corner of the tray to collapse the window back to the compact sidebar menu.

Touch the icon to launch the desired app.



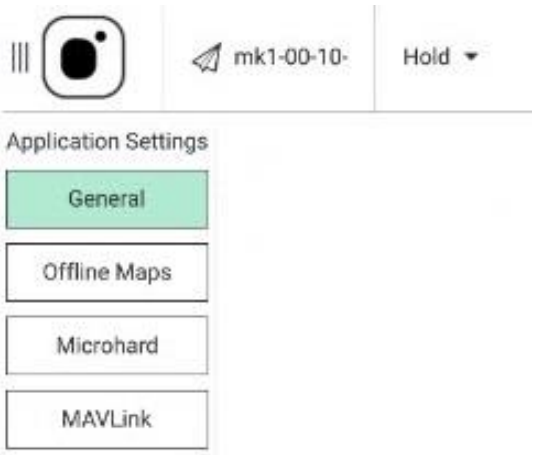
TEAL QGC APP

Teal QGC is the ground control application software running in Android on the TAC. It is the primary user application for flying the Golden Eagle. Teal QGC launches by default when the TAC is powered on.

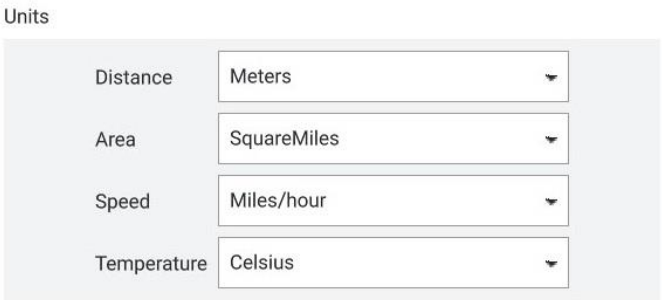
Teal QGC is Teal's customized version of Auterion's open-source QGroundControl (https://auterion.com/) with customizations and enhancements added to optimize robustness and usability.

GENERAL SETTINGS

The general settings screen is used to view and manage a variety of Teal QGC software application settings:

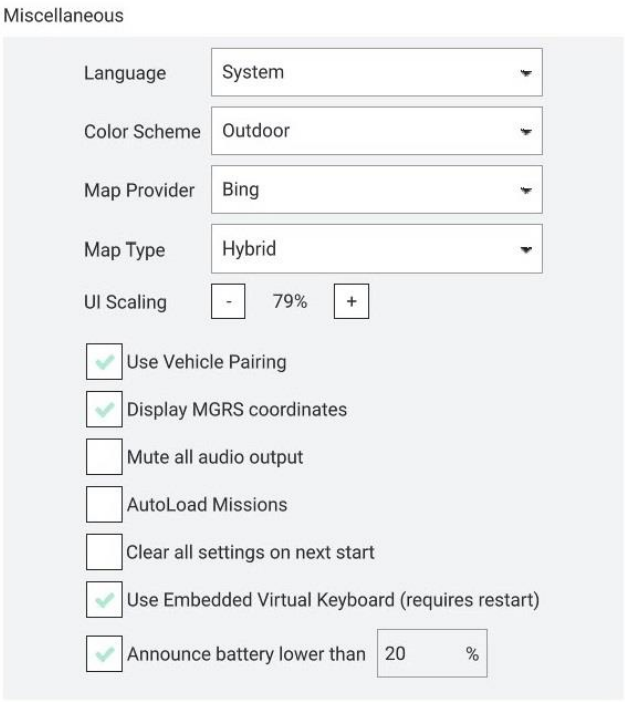


UNITS: Set units of measurement for distance, area, speed, and temperature. Choose between feet and meters, imperial and metric, and Celsius and Fahrenheit.



MISCELLANEOUS: Customize or enable/disable the following features:

- Language
- Outdoor/indoor read modes (light/dark screen modes)
- Map provider
- Map type
- UI scaling
- Display MGRS coordinates
- Mute all audio output
- Autoload missions
- Clear all settings on next start
- Turn on/off the embedded virtual keyboard
- Announce low battery charge levels



DATA PERSISTENCE: Disabling this option will result in telemetry logging and map tile caching to not be written to disk. This can be useful for security reasons but can also result in unintentional data loss.

TELEMETRY LOGS FROM VEHICLE:

- Saves telemetry logs to the vehicle which can later be downloaded to the TAC.
- Saves telemetry logs to the vehicle even if the vehicle was never armed which can later be downloaded to the TAC and can be useful for troubleshooting or other purposes.
- Saves telemetry logs in a CSV format for importing data into other programs for data analysis, such as spreadsheets.

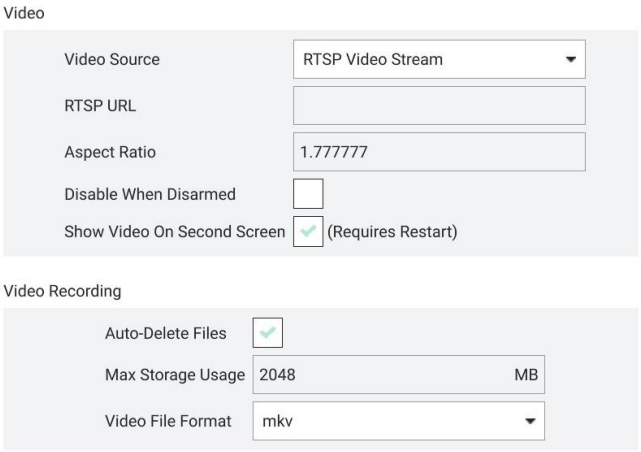
FLY VIEW: Customize or enable/disable the following features:

- Use preflight checklist
- Keep map centered on the vehicle
- Show telemetry log replay status bat
- Use vertical instrument panel
- Show additional heading indicators on compass
- Set GO TO location max distance
- Enable new gimbal controls
- Turn on/off gimbal joystick speed factor
- Set gimbal slide speed factor

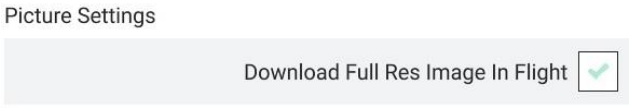
PLAN VIEW: Entering the DEFAULT MISSION ALTITUDE value here sets the altitude in the PLAN SCREEN at which missions fly by default, unless otherwise specified.

CURSOR ON TARGET (COT): This is currently still under development at the time of this publication.

VIDEO & VIDEO RECORDING: These settings are automatic and are not customizable at the time of this publication.



PICTURE SETTINGS: Configures full-resolution images whenever a snapshot is taken.

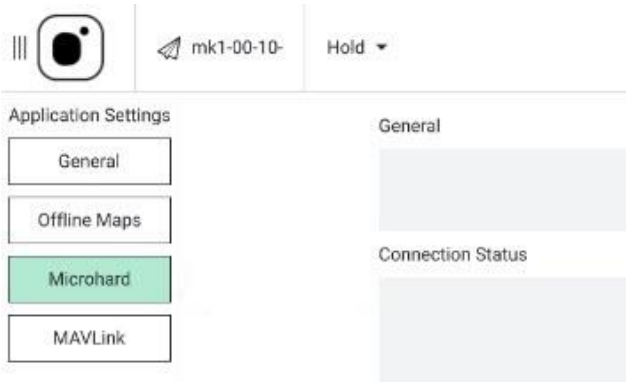


CAUTION!

This function must be enabled before flight or else photos will not be stored locally on the TAC and will not be transferrable after the mission.

TEAL QGC SOFTWARE VERSION: The current version of the Teal QGC software version that has been downloaded onto the TAC. TAC updates are automatic.

MICROHARD SETTINGS



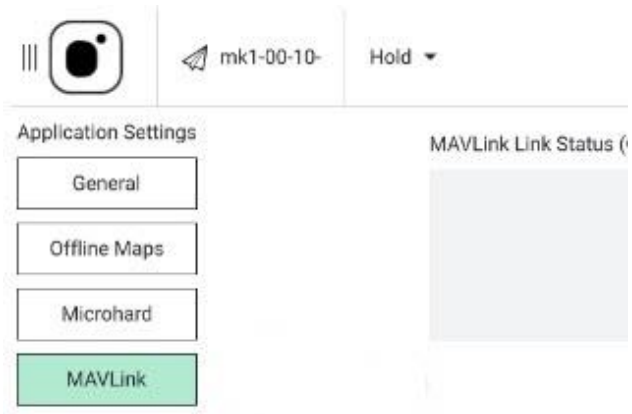
The Microhard settings screen is where to enable/disable the TAC's Microhard radio and to view the signal strength of the TAC and the Golden Eagle.

GENERAL: When the Enable Microhard box is checked, the Connection Status sub-group appears below it. Otherwise, Connection Status disappears when the Microhard radio is disabled.

CONNECTION STATUS: When a vehicle is connected to the TAC, a CONNECTED message is displayed and the real-time RSSI value for both the Golden Eagle ("MK1") vehicle and the TAC are displayed.

When the Microhard is enabled, but no vehicle is connected to the TAC, a NOT CONNECTED message is displayed.

MAVLINK SETTINGS



MAVLink (Micro Air Vehicle Link) is used for communication between a Ground Control Station (GCS) and unmanned vehicles, and in the inter-communication of the subsystem of the vehicle. It can be used to transmit the orientation of the vehicle, its GPS location, and speed.

MAVLINK LINK STATUS: When the TAC is connected to a vehicle, this box displays link statistics consisting of the cumulative number of MAVLink messages sent, the number of messages received, the number of messages lost, and the loss rate expressed as a percentage.

When the TAC is not connected to a vehicle, there are no link statistics to display, and messages indicate that the TAC is not connected.

TEAL TAC SETTINGS APP

Teal TAC Settings is the application software running in Android on the TAC for changing a few important TAC settings and functions. The Teal TAC Settings app manages which network that TAC is using, screen brightness, relaunch of Teal QGC when needed, and indicates the TAC's current software version.

Launch the app to open the TAC SETTINGS screen.

TEAL DOCUMENTATION APP

Teal Documentation is the application software running in Android on the TAC that enables electronic viewing of Teal documentation. The user can access and view electronic versions of the system documentation, such as the Operator Manual, in the field right from the TAC, eliminating the need to carry a hard copy or another electronic device.

TEAL UPDATER APP

Teal Updater is the application software running in Android on the TAC. Teal Updater manages the details of the otherwise-complex software and firmware update process.

If an update is needed, the Teal Updater app will guide you through the process via an automated "wizard".

UPDATING SOFTWARE/FIRMWARE

SYSTEM REQUIREMENTS:

- You will need to have access to a wireless network (2.4GHz or 5GHz) with access to the internet.
- Ensure the system is paired and communicating prior to proceeding.
- Use a fully charged battery pack in both the drone and in the TAC.
- Do not power off the drone or the TAC at any time during the update process.

ESTIMATED TIME: 15-25 Minutes

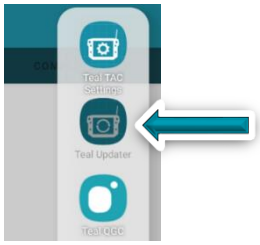
Follow along with our instructional video, **Firmware Updates: Teal Golden Eagle Drone**, on our website at: https://tealdrones.com/support/video/

Touch the TEAL SETTINGS icon to launch the app.

Change the Active network from DRONE to WIFI.

Login into the WIFI system with the appropriate login credentials.

Touch the TEAL UPDATER icon to launch the app.



Select the CHECK CLOUD FOR NEW VERSION button.

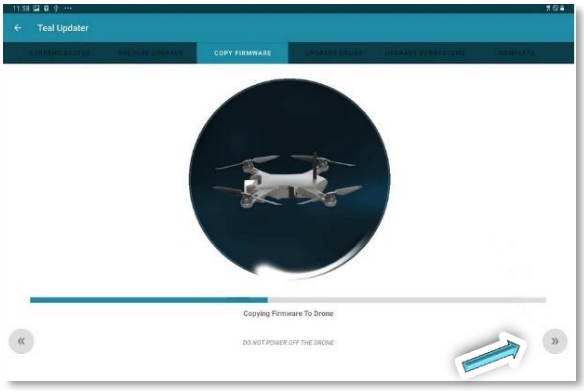
- You will see the latest version available.

Select DOWNLOAD FROM CLOUD.

- You will see a DOWNLOAD COMPLETE notification when finished.
- You can now reconnect the drone and begin the installation process.

Connect to the drone by going back into the TEAL SETTINGS app and switching back from WIFI to DRONE.

- You will see a CONNECTED message at the bottom of the screen of the TEAL UPDATER app.



Select NEXT to update the Golden Eagle and all its subsystems.

- The system will first prepare the Golden Eagle. This should take less than a minute.

Select NEXT to continue.

- The system will then copy the firmware on the TAC to the Golden Eagle. This may take 5 minutes or more.

Select NEXT to continue.

- The system will then update all subsystems and will take about 5 minutes.

Select NEXT to continue.

- The system will then update all the ESCs, and chirping sounds and small movements from the drone are normal.

- Once all subsystems are updated, you will see a confirmation screen.

Select NEXT to continue.

- The system will then reboot the drone. Once the reboot is complete, the update process is complete.

Select either the EXIT button to return to the Teal QGC, or, **select** NEXT to go back to the beginning of the upgrade wizard to verify the new firmware version on the drone.

Known errata: the firmware update process may take several reboot cycles to be successful. Please be sure to verify that the new firmware version is on the drone.

BATTERY PACK & CHARGER DETAILS

ARCHITECTURE & RATIONALE

Teal purposefully designed the power source for the Golden Eagle and the TAC to use the exact same Teal Performance Battery Pack and Teal Battery Charger for both systems.

The battery charge level is visibly indicated by a 5-segment LED directly on the battery pack with a single tap of the power button. Batteries charge from 10% to 80% in 36 minutes and to 100% in 65 minutes.

When battery packs that have been exposed to low temperatures (32 ºF (0 ºC) or lower) for more than one hour, they must be pre-heated on the charger before flight.

Failure to pre-heat the battery pack before flight could reduce overall battery performance and affect overall flight time, up to 28%.

When the cold battery pack is placed on the charger, the 5-LED bar graph will indicate that the thermal blanket is activated by showing a green LED light pattern starting in the middle moving outwards. When this animation stops and the LED indicates the solid percentage of charge, it can be used for operations.

The amount of time this takes will vary upon the starting temperature of the battery pack.

The Teal Performance Battery Pack consists of six (6) Sony VTC6 18650 lithium-ion cells wired in series to produce a total nominal voltage of 22.2 volts (3.7 VDC per cell). The output voltage ranges from 21.6 VDC (3.6 VDC per cell) to a maximum of 25.2 VDC (4.2 VDC per cell). The cells have a capacity of 3 Ah (amp-hours), producing a total nominal energy of 66.6 Wh (watt-hours).

This results in approximately 60 usable Wh from the pack, which equates to flight time of up to 25 minutes for the Golden Eagle and up to 8 hours of operation on the TAC.

CAUTION!

The Golden Eagle and the TAC do not support a battery pack hot-swap. Be sure to power down the battery pack before removing and replacing it.

Per regulation, battery packs are shipped at not more than 30% state of charge and must be fully charged before using. The battery pack is configured by the factory to be in a very low power state called shipping mode in which only 15 uA is consumed. This results in a shelf life of several years.

When the user removes the battery pack from shipping mode, the lowest power state that the battery pack can enter is sleep mode. The battery pack will automatically go into sleep mode upon 72 hours of inactivity. The current consumption in this sleep mode is approximately 675 uA.

If a user removes the battery pack from shipping mode without further charging, the shelf life is 34 days from 30% to a 10% state of charge, and 52 days (7.4 weeks) to 0% state of charge. If a user removes the battery pack from shipping mode and fully charges the battery pack, the shelf life in sleep mode is 163 days (23 weeks) from 100% to a 10% state of charge, and 182 days (26 weeks) to 0% state of charge.

Pack dimensions are: 5.03” L x 2.86” W x 0.96” H (127.68 mm L x 72.67 mm W x 24.5 mm H).

Each pack weighs approximately 0.84 lbs (380 g).

BATTERY POWER / STATUS BUTTON

Quickly push-and-release (tap) the button to briefly indicate the pack's state-of-charge. Press-and-hold for four (4) seconds to power off and on. The middle LED in the charge level meter stays lit when the pack is powered on.

BATTERY LED INDICATORS

The battery pack has a 5-LED bar graph to indicate state-of-charge and power status indicated in 20% increments.

Current voltage can be found in the FLY TOOLS screen by touching the BATTERY icon.

This table summarizes user actions, the various resulting battery states, and LED indication of those states.

User Action	LED Action	Mode
Tap Power Button	1 - 5 LEDs turn on, then off	**Charge Level** indication for 2 seconds
Tap Power Button	2nd & 4th LEDs flash 3 times	In low-power **Shipping Mode!** Charge to exit!
Press & Hold for 4 seconds	Sequential turn-on	**Toggles** battery Power to **ON**
Release after 4-sec hold	Middle LED stays on	Battery **Power** is **ON**
Press & Hold for 4 seconds	Sequential turn-off	**Toggles** battery Power to **OFF**
Release after 4-sec hold	All LEDs off	Battery **Power** is **OFF**

TEAL BATTERY CHARGER

The Performance Battery Charger is a Teal-proprietary smart charger system built for charging Teal Performance Battery Packs. The charger converts the power supply's DC output and regulates its voltage and current output to optimally charge the battery.

The Smart Charge Adapter has an internal cooling fan that automatically turns on when power is applied to keep the smart charger electronics operating safely across the specified operating temperature range.

The battery pack is simply inserted onto the charger via mating slots in the battery pack, and the side latches on the battery pack securely lock it into place.

Charger dimensions are: 3.65" L x 3.52" W x 1.80" H (92.7 mm L x 89.4 mm W x 45.7 mm H). Each charger weighs 0.35 lbs (158 g).

CHARGER EXTERNAL POWER SUPPLY

The power supply for the Teal Battery Charger is an external cord-to-cord "brick" style switching power supply with a universal voltage input. It has a captive DC power cable and a removeable USA NEMA 5-15P to IEC 320 C13 AC power cable.

The power supply may be operated from AC voltages ranging from 100-240 VAC. The removeable AC cord can be replaced with an appropriate cord for that particular region.

The supply power unit is a fully sealed enclosure complying with IP32 environmental rating and operates in temperatures ranging from 32 °F to 140 °F (0 °C to 60 °C). It is approved to international medical and IT safety standards. The output power is 120 W, the output voltage is 25.2 V, and output current is 5.0 A (±5%).

CAUTION!

Always power down the Golden Eagle and the TAC before removing and replacing their battery packs.

Charge within the limits of 32 ºF to 113 ºF (0 ºC to 45 ºC). Do not operate charger in direct sunlight to avoid exceeding temperature limits.

Remove the battery pack from the charger once it is fully charged to prevent unnecessary prolonged heating.

Unplug the charger power supply when not in use to prevent unnecessary heating and wear on electrical components.

Charge battery packs at least once every three (3) months to prevent over-discharge and possible permanent damage.

Properly dispose of depleted or damaged battery packs in accordance with applicable federal, state, and local regulations.

WARNING!

If improperly stored, lithium-ion batteries such as the Teal Performance Battery Pack may become unstable, overheat, damage cells, and potentially catch on fire.

Store batteries between -4 ºF to 113 ºF (-20 ºC to 45 ºC). Do not keep batteries in hot vehicles!

Store battery packs in an isolated area, away from flammable and combustible materials. If possible, store in metal storage cabinets.

Never stack heavy objects on top of boxes containing battery packs to prevent crushing or puncturing the cell case, leading to possible short circuits or fire.

MISCELLANEOUS

PACKAGING, SHIPPING & LABELING SPECIFICATIONS

PACKAGING & SHIPPING

All items are packaged in compliance with Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) and International Civil Aviation Organization (IATA) regulations for both ground and air transport. Batteries are shipped at not more than 30% state of charge. All required documentation is provided to the shipper.

Battery pack packaging and transport meet safety, environmental, mechanical, and electrical requirements for lithium cells detailed in section 38.3 of the UN Manual of Tests and Criteria (UN Transportation Testing) and the UN/DOT 38.3 to prevent short-circuiting, collapse by dropping or stacking, exposure to moisture and protection from damage by dropping.

LABELING

All packages are marked and labeled according to Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA), and International Civil Aviation Organization (IATA) regulations for both ground and air transport. Packages that contain lithium batteries are clearly labeled with the UN3481 placard visible on the outside of the package, to include the overpack. Packages that only contain lithium batteries are clearly labeled with the UN3480 placard visible on the outside of the package.

PATENTS & TRADEMARKS

Teal is a wholly owned subsidiary of Red Cat. The Teal GE/TAC system is manufactured under the following U.S. patents: 9,915,955; 9,926,077; 10,671,072; 10,683,089; 10,836,486.

All patents are held by UAV patent corp.

Teal Drones™, Teal Golden Eagle™, and Teal Air Control™ are registered trademarks of Teal Drones, Inc.

ELECTRONIC VERSION

An electronic version of this manual and all accompanying training videos can be found on our website at:
https://tealdrones.com/support/documents/

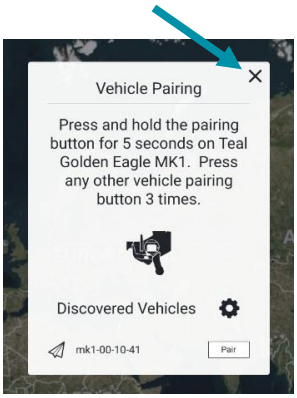
or can be quickly accessed by scanning this QR code:

APPENDICES

APPENDIX A: TROUBLESHOOTING GUIDE
APPENDIX B: FIELD MAINTENANCE & SCHEDULE

TROUBLESHOOTING

This troubleshooting guide highlights the most commonly known issues and is not intended to be an exhaustive list. We encourage you to contact our Teal Drone Customer Support team at any time at **(385) 281-8415** or at **SUPPORT@TEALDRONES.COM.**

ISSUE	SOLUTION
THE SYSTEM WILL NOT PAIR/CONNECT The Vehicle Pairing box opens and displays the message "Discovering…" with a gear icon and rotating arrows indicating that discovery is in process but never actually connects.	1. Make sure that the Active Network is set to DRONE and not to WIFI: **Touch** the cancel (X) button in the discovery window.  **Touch** the TEAL TAC SETTINGS icon. **Change** the Active Network to DRONE. **Touch** the shield icon to initiate the pairing/connection process again.
	2. Move further away from the drone. Radios can over-saturate at close range.
	3. Make sure that the USE VEHICLE PAIRING box is checked in the GENERAL SETTINGS screen: **Launch** the Teal QGC app on the TAC. **Touch** the MENU icon. **Select** GENERAL. **Scroll** to the MISCELLANEOUS section. **Ensure** the USE VEHICLE PAIRING box is checked.

ISSUE	SOLUTION
CAMERA DOES NOT HOLD STEADY The camera payload on the Golden Eagle "flops" and will not hold stable.	1. If in the air, wait 30 seconds. The gimbal will automatically try to stabilize itself. 2. Restart the Golden Eagle by powering it off and then on again. 3. Make sure that there are no obstructions or debris in the gimbal payload.
ISSUE	**SOLUTION**
A BATTERY PACK SHUTS OFF AFTER AN ATTEMPT TO POWER ON	
A battery pack that is NOT connected to a Golden Eagle or TAC immediately shuts off after an attempt to power it on.	This is normal behavior. The battery pack will remain powered on once connected to a Golden Eagle or TAC.
A battery pack that is connected to a Golden Eagle or TAC will not power on or immediately shuts off after an attempt to power it on.	1. Attempt to charge the battery pack: **Tap** the power button once. **Insert** the DC power cable into the charger and plug the AC power cord into an AC outlet. **Insert** the battery pack onto the charger. **Verify** that the green LEDs on the battery pack are illuminated to indicate the battery pack is charging. 2. If the attempt to charge is unsuccessful, please contact Teal Drone Customer Support: **(385) 281-8415** **SUPPORT@TEALDRONES.COM**
ISSUE	**SOLUTION**
THE GOLDEN EAGLE WILL NOT ARM The Golden Eagle will not arm using either the arm button or soft key commands.	1. Make sure that the battery pack is powered on and is fully charged. The drone will not arm when the battery pack charge level is 20% or less. 2. If in Position Flight Mode, you may not be connected to a sufficient number of satellites to be able to triangulate the position of the vehicle. It is critical to have at least eight (8) but recommended that ten (10) satellites are indicated on the GPS icon prior to takeoff.

ISSUE	SOLUTION
BUTTONS/JOYSTICKS DO NOT RESPOND The buttons or joysticks on the TAC are not responding and are not commanding the drone.	1. Perform the joystick setup once more: **Connect** the drone and the TAC. **Touch** the MENU icon. **Select** VEHICLE SETUP. **Select** JOYSTICK. **Use** the GENERAL, BUTTON ASSIGNMENT, and ADVANCED windows to customize the joystick and buttons as desired. 2. Contact Teal Drone Customer Support: **(385) 281-8415** **SUPPORT@TEALDRONES.COM**

ISSUE	SOLUTION
AN ERROR SYMBOL APPEARS WHEN ATTEMPTING TO SNAP A PHOTO When attempting to snap a photo, an error symbol appears indicating that the attempt was unsuccessful.	Make sure that the photo functions in the GENERAL SETTINGS are enabled: **Touch** the MENU icon. **Select** SETTINGS at the bottom of the screen. **Select** GENERAL. **Scroll** down to PICTURE SETTINGS. **Check** the DOWNLOAD FULL RES IMAGE IN FLIGHT box.

ISSUE	SOLUTION
UNCOMMANDED FLIGHT IN A CIRCULAR MOTION aka "TOILET BOWLING" The drone will be stuck flying in a circular motion uncommanded.	1. Try to fly a figure-8 pattern in the air to regain control. 2. Land and perform a compass/ magnetometer calibration: **Connect** the drone and the TAC. **Touch** the MENU icon. **Select** VEHICLE SETUP. **Select** SENSORS. **Select** COMPASS to calibrate the magnetometer. Be ready to pick up and rotate the drone. **Click** OK in the top right of the screen to begin. The first tone from the Golden Eagle will alert you to begin. Follow the instructions on the TAC screen. The second tone will prompt you to hold the drone steady for the next orientation. **Select** REBOOT VEHICLE when finished. Due to known errata, it is recommended to perform a power cycle (turn the drone battery pack off and on again). **Reestablish** connection between the TAC and the drone. 3. Contact Teal Drone Customer Support: **(385) 281-8415** **SUPPORT@TEALDRONES.COM**

ISSUE	SOLUTION
THE COMPASS INDICATOR SPINS/DOES NOT HOLD STEADY The compass or heading indicator on the TAC fly screen will spin or drift instead of holding steady.	Perform a compass/magnetometer calibration: **Connect** the drone and the TAC. **Touch** the MENU icon. **Select** VEHICLE SETUP. **Select** SENSORS. **Select** COMPASS to calibrate the magnetometer. Be ready to pick up and rotate the drone. **Click** OK in the top right of the screen to begin. The first tone from the Golden Eagle will alert you to begin. Follow the instructions on the TAC screen. The second tone will prompt you to hold the drone steady for the next orientation. **Select** REBOOT VEHICLE when finished. Due to known errata, it is recommended to perform a power cycle (turn the drone battery pack off and on again). **Establish** connection between the TAC and the drone.

ISSUE	SOLUTION
MAPS DO NOT CACHE/SAVE Maps are not saved/imported on the TAC.	1. Make sure that the active network has WIFI selected (not DRONE). 2. Make sure that proper procedure was followed in the OFFLINE MAPS screen: **Touch** the TEAL TAC SETTINGS icon. **Change** the Active network from DRONE to WIFI. **Login** into the WIFI system with the appropriate login credentials. **Slide** the SETTINGS screen all the way to the right to open/enlarge the QGC app. **Touch** the MENU icon in the top left of the screen. **Select** SETTINGS at the bottom left of the screen. **Select** OFFLINE MAPS. **Select** ADD NEW SET. **Set and zoom** to the area that you would like to save. • **Create** a name for map set in the ADD NEW SET field. • **Set** the map type. • **Check** the FETCH ELEVATION DATA box to include elevation data with the tile set. • **Select** DOWNLOAD when finished. **Touch** the MENU icon in the top left of the screen. **Select** the FLY button. **Touch** the TEAL TAC SETTINGS icon. **Change** the Active network to DRONE from WIFI. Once the TAC acquires the GPS signal, the map screen will automatically load that tile set.

TEAL™

GOLDEN EAGLE SYSTEM

FIELD MAINTENANCE & SCHEDULE

FIELD REPLACEABLE ITEMS

Field-replaceable items are parts that can easily be replaced in the field without requiring special expertise or tools other than those provided in the Field Spares Kit. Repairs, upgrades, or software updates that cannot be performed in the field are beyond the scope of this manual, and doing so may void conditions and terms of the warranty.

MAINTENANCE SCHEDULE

AFTER 10 FLIGHT HOURS (OR AS NEEDED)

1. Clear and format SD Card media
2. Clean all sensors and the vehicle with a damp cloth and a can of air
3. Fully discharge all batteries and charge back to full capacity
4. Verify that the gimbal and camera connectors and securely seated
5. Update the Golden Eagle and the TAC software
6. Delete and re-download offline maps to ensure the latest versions
7. Clear flight logs from the Golden Eagle

AFTER 150 FLIGHTS (OR AS NEEDED)

1. Replace propeller assemblies
2. Replace rotor arm assemblies
3. Retire battery pack after 150 charge/discharge cycles

ROTOR ARM REPLACEMENT

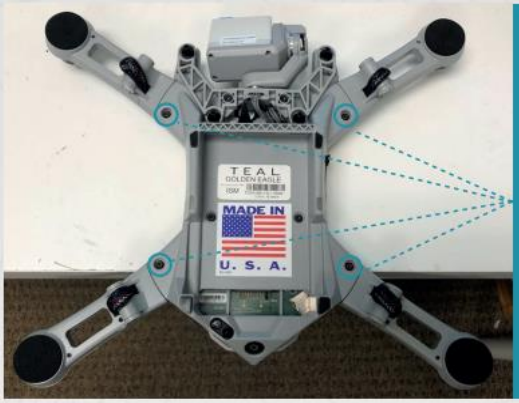
Damaged or worn rotor arms require the entire assembly to be replaced but can easily be done so in the field. The arms are prewired with the motor installed, and only need to be locked into place and secured with a single Torx T8 screw per arm. The Torx T8 screwdriver is included in the Field Repair Kit.

Arms are keyed to the appropriate sockets on the airframe so that CW and CCW arms cannot be inadvertently interchanged.

REPLACEMENT INSTRUCTIONS

1. Place the drone on its back on a table or workspace where the antenna can hang off the edge to prevent being damaged.
2. Remove the single T8 Torx screw on the motor arm using a T8 Torx screwdriver.

REPLACEMENT INSTRUCTIONS (CONTINUED)



Tools Needed:
One (1) T8 Torx Screwdriver

Removal:
One (1) T8 Torx Screw Per Rotor Arm

3. Set the screw aside for re-use.
4. Carefully pull the arm straight out from its socket in the drone.
5. Insert the new arm into the airframe. Push firmly until you feel the connectors “click”.

> **NOTE: If you feel any resistance and the arm will not easily click into place, ensure that you are not attempting to insert a CW arm into a CCW position, and vice-versa.**

6. Use a Torx T8 screwdriver to tighten the screw to 0.6N*m (0.44 ft-lbs) and secure the arm into place.
7. Make sure that the motor functions properly before the next flight.

CAMERA & GIMBAL PAYLOAD REPLACEMENT

Both the FLIR Hadron EO/IR camera and gimbal can be replaced in the field. Use the specific tools to ensure that no components are damaged in the process. Use the following instructions to replace both parts.

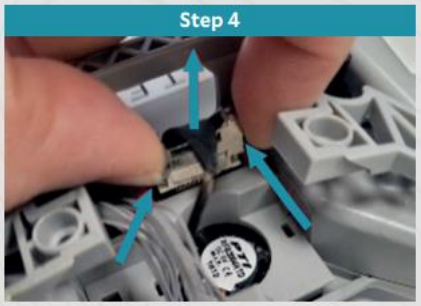
REPLACEMENT INSTRUCTIONS

1. Place the drone on its back on a table or workspace where the antenna can hang off the edge to prevent being damaged.
2. Remove the two (2) M3 x 8mm screws on the gimbal brackets using a T8 Torx screwdriver.

Tools Needed:
One (1) T8 Torx Screwdriver

Removal:
Two (2) M3 x 8mm Screws

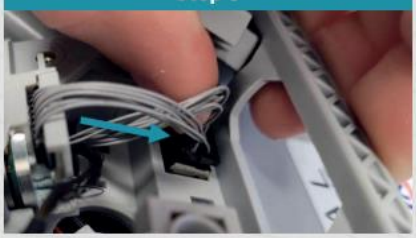
3. Set the screws aside for re-use.
4. Squeeze the side latches of the camera data cable connector to release the connector (as shown in the image to the right).
5. Carefully pull the connector straight up to disconnect it from its socket in the drone.



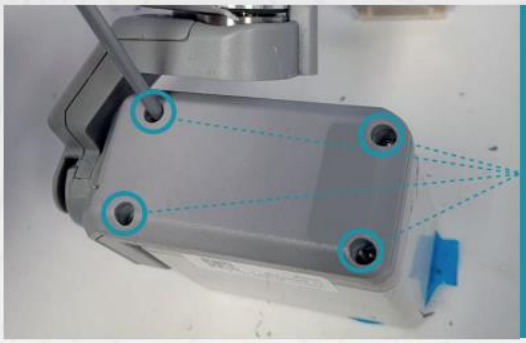
REPLACEMENT INSTRUCTIONS (CONTINUED)

6. Use your fingernail or a flathead screwdriver to press on the tab on the motor control cable connector (as shown in the image to the right).

Step 6



7. Carefully pull the connector up to disconnect it from its socket in the drone.
8. Use a T5 Torx screwdriver to remove the four (4) M1.6 x 4mm screws from the back of the Hadron camera.



Tools Needed:
One (1) T5 Torx Screwdriver

Removal:
Four (4) M1.6 x 4mm Screws

9. Set the screws aside for re-use.
10. Disconnect the Hadron camera from the gimbal by carefully pulling it away from the gimbal (as shown in the image to the right).

Step 10

CAUTION: The exposed PCB is ESD sensitive and static discharge can damage the electronics. Minimize handling of the exposed PCB.

11. Check that the gasket around the PCB on the Hadron camera is properly aligned and adjust if needed.

Step 14

12. Push the Hadron camera onto the gimbal. Press firmly until you feel the connector "click" into place.
13. Use a T5 Torx screwdriver to secure the four (4) M1.6 x 4mm screws in the back of the Hadron camera.
14. Connect the camera data cable connector to the mating socket in the drone so that the side of the cable as shown in the image to the right is facing towards the front of the drone.

Step 15

15. Connect the gimbal motor cable connector to the mating socket in the drone so that the tab on the connector is facing toward the front of the drone (as shown in the image to the right).
16. Align the threaded inserts on the gimbal under the holes on the gimbal brackets.
17. Place the two (2) M3 x 8mm screws into the holes on the gimbal brackets.
18. Align the gaps (as shown in the image to the right).

Step 18

19. Use a Torx T8 screwdriver to tighten the screws to 0.6 N*m (0.44 ft-lbs).

SYSTEM CHECKOUT

- ✓ Manually move the gimbal pitch and roll axis and check for binding or obstructions.
- ✓ Ensure that no wires are pinched.
- ✓ Power on the system and confirm the gimbal properly functions and is properly oriented.

PAYLOAD MOUNTING BRACKET REPLACEMENT

The gimbal brackets can be easily replaced in the field; however, the black silicone gimbal dampers cannot. If the dampers need to be replaced or serviced, please contact Teal Drone Customer Support or an authorized service center.

REPLACEMENT INSTRUCTIONS

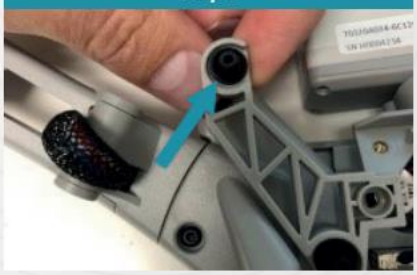
1. Place the drone on its back on a table or workspace where the antenna can hang off the edge to prevent being damaged.
2. Make sure that the camera data cable and gimbal motor cable are not strained in any way.
3. Remove the two (2) M3 x 8mm screws on the gimbal brackets using a T8 Torx screwdriver.

Tools Needed:
One (1) T8 Torx Screwdriver

Removal:
Two (2) M3 x 8mm Screws

4. Set the screws aside for re-use.
5. Use your fingers or plastic pliers that will not damage the silicone damper to hold the body of one of the front dampers in place (as shown in the image to the right).

Step 5



6. Firmly, but slowly, pull the bracket away from the damper body until the end of the damper pulls through the hole.
7. Follow the same directions to remove the rear damper (as shown in the image to the right).

Step 7

8. Remove the remaining dampers.
9. Set the new bracket so that the recesses for the screw head and dampers are visible and away from the body of the drone (as shown in the image to the right).

Step 9

REPLACEMENT INSTRUCTIONS (CONTINUED)

10. Hold the bracket in place and pull the end of the silicone damper through the hole in the bracket (as shown in the image to the right).
11. Make sure that the damper is properly seated in the bracket.
12. Repeat this procedure for the remaining dampers.
13. Align the threaded inserts on the gimbal under the holes on the gimbal brackets.
14. Place the two (2) M3 x 8mm screws into the holes on the gimbal brackets.
15. Align the gaps (as shown in the image to the right).
16. Use a Torx T8 screwdriver to tighten the screws to 0.6 N*m (0.44 ft-lbs).

SYSTEM CHECKOUT

- ✓ Manually move the gimbal pitch and roll axis and check for binding or obstructions.
- ✓ Ensure that no wires are pinched.
- ✓ Power on the system and confirm the gimbal properly functions and is properly oriented.

PROPELLER REPLACEMENT

Individual damaged or worn propellers require the entire 2-prop assembly to be replaced, but are easily installed, removed, or replaced with a simple push-and-twist method that requires no tools or hardware.

The propeller assemblies are keyed so that CCW and CW props cannot be inadvertently mounted to the wrong hub.

The two CW prop assemblies have black rivets that secure their blades, and the two CW propeller motors have a black ring below the spring.

The two CCW prop assemblies have silver rivets that secure their blades, and the two CCW propeller motors have a silver ring below the spring.

NOTE: CW prop assemblies lock into place by turning it in a CCW direction, and CCW prop assemblies lock into place by turning it in a CW direction.

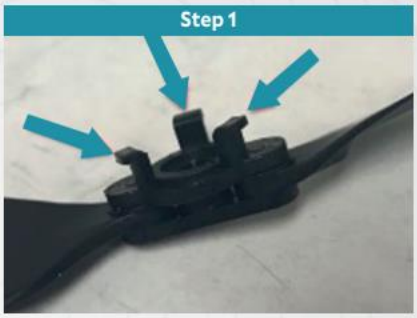
PROPELLER REMOVAL & INSTALLATION

PROPELLER REMOVAL

1. To remove a prop assembly, push down and rotate it a quarter turn until it hits its mechanical limit. Allow the spring to push the hub up, then pull the assembly off the shaft.

PROPELLER INSTALLATION

1. To attach a prop assembly to a motor, line up and insert the three (3) bent legs on the underside of the prop assembly into the three (3) slots on the motor (as shown in the image to the right).



2. Push down to compress the spring on the shaft, then rotate a quarter turn until it hits its mechanical limit. Allow the spring to push the hub up into its locked position.

3. Verify that the newly installed propellers spin feely.

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