TABLE OF CONTENTS

1.0 General

1.1 Unfolding The Arms 7
1.2 Mounting The Camera 7
1.3 SD Card Selection 8

2.0 Overview

2.1 Limitations 9
2.2 Aircraft Servicing And Maintenance 12

3.0 Normal Procedures

3.1 Site Scan Firmware Update 18
3.2 Calibrations 19
3.3 Pairing With Aircraft 22
3.4 Aircraft Lights And Sounds 23
3.5 Charging 26
3.6 Flight Operations 26

4.0 Emergency Procedures

4.1 Return Home/Return To Launch (RTL) 31
4.2 Battery Failsafe 31
4.3 Emergency Shutdown 31
4.4 Five Motor Mode 31
4.5 Exit Autonomous Flight 31
4.6 RC/Data Link Loss Failsafe 31

5.0 Troubleshooting

5.1 Battery Recommendations 32
5.2 Aircraft Calibrations 32
5.3 Return Home/Return To Launch (RTL) 32
5.4 Pairing Troubleshooting 33
1.0 GENERAL

Thank you for purchasing the 3DR H520-G Commercial Series Unmanned Aircraft. This guide provides information on setup, usage of, and safety parameters for the 3DR H520-G.

The 3DR H520-G has advanced features to assist with government, commercial and other aerial operations. The sUAS comes equipped with the ST10C controller, which is a simple and intuitive remote controller incorporating manual flight control sticks and controls for primary and emergency systems.

For mission planning, fleet management and automated flight modes, 3DR Site Scan is the recommended platform. To get started, visit the iOS App Store and search and download Site Scan - LE.

What is in the box? (standard package)

- H520-G Hexacopter
- E90 Camera
- Car Charger
- SD Card
- DY5 Dual Smart Charger
- ST10C Controller
- Propellers
- SC400-4H Balancing Smart Charger with Power Supply
- Pelican Case
- 4 Batteries
- iPad Mini Holder

*Different packages may include different accessories.*
1.1 UNFOLDING THE ARMS

Remove the H520-G from the storage/transport case and gently lift the arms until you hear a click. Test the locks by gently lifting up and pressing down on the arms several times. To unlock the arms, press the Press button on the base of the arms. On new systems, it may be necessary to release the arms while lifting up on the bottom of the motor with one hand and pressing the Press button with the other. Doing so relieves some of the pressure on the locking system.

Note: Do not depress the Press button on the arms while unfolding and locking them into place; doing so may cause the arms to not engage the locking system.

1.2 MOUNTING THE CAMERA

1.2.1 E90

The E90 camera is a wide-angle, high-resolution, gimbal stabilized imaging system perfectly suited for use in applications that require high-quality photos and videos. The E90 utilizes a 20MP 1-inch sensor and the H2 high speed image processing chip.

1.2.2 INSTALLING THE CAMERA GIMBAL

Insert a supported micro SD card (see 1.3 SD Card Selection) in the rear of the E90 camera and mount the camera on the H-Mount. Using the arrow on top of the camera gimbal pointed towards the H520-G, slide the camera gimbal (arrow towards the airframe) until the front latch clicks. Gently pull the camera gimbal away from the aircraft to check that it is properly installed. If the gimbal comes off the rail, or is not solid and secure, remove and reinstall the gimbal.
1.2.3 CHANGING THE CAMERA GIMBAL

Power down the H520-G using the power button on the top of the airframe, press the camera latch on the front of the camera mount and slide the camera gimbal off the mount. Select the preferred camera gimbal for use. Using the arrows on top of the camera gimbal, slide the camera onto the mount until the camera stops. Test the gimbal to ensure the camera is installed. Power on the H520-G using the power button on top of the airframe. Occasionally lubricating these slides with graphite will keep them sliding smoothly.

1.3 SD CARD SELECTION

3DR requires an SDXC Class 10 UHS-3 micro SD card for capturing high-resolution images and recording 4K video. Using the UHS-3 card allows the camera buffer to record to the micro SD card faster, resulting in less buffer overrun and allowing for over-the-air firmware updates.
2.0 OVERVIEW

2.1 LIMITATIONS

• Do not fly in precipitation is prohibited
• Continued flight in precipitation is not recommended; land as soon as possible
• Flight in visible moisture is not recommended
• Flight in Known Icing (FIKI) conditions may result in vehicle failure
• Takeoff, landing and flight in dust or sand not recommended
• Flight beyond visual line of sight is not recommended
• Maximum Wind Speed: 11 m/s (25 mph, 21.7 kts, 40 kph)

2.1.1 AIRCRAFT — 3DR H520-G

• Flight time: up to 28 minutes (depending on payload weight)
• Size: 520x457x310 mm
• Airframe weight: 1645g (3.6 lbs)
• Maximum gross takeoff weight: 2633 g (5.8 lbs)
• Battery: LiPo
• Battery capacity & voltage: 5250mAh 4S/15.2V (79.8Wh)
• Charger: SC4000-4H
• Transmitter: ST10C Ground Station
• Maximum flying height (relative altitude): 500m
• Maximum rotation rate: 120 deg/s
• Maximum roll angle: 35 deg
• Maximum climbing speed: 4m/s
• Maximum horizontal speed (Manual mode): 17m/s (38mph)
• Maximum horizontal speed (Angle mode): 13.5m/s (30mph)
• Maximum descending speed: 2.5m/s
2.1.2 GROUND STATION: ST10C CONTROLLER

- Compatible with iPad running iOS 10.0+ using an Apple USB cable
- Video, telemetry and RC transmitter links: 5.8 GHz WiFi and 2.4 GHz WiFi
- Control transmission distance (optimal conditions): Up to 1.6km/1 mile
- Live feed video output: HDMI

2.1.3 INCLUDED CAMERA: E90

- Weight: 350g
- Focal length: 23mm
- Color sensitivity: RGB
- Compression bit rate: 100Mbps
- Compression type: AVC/HEVC
- Digital noise reduction: 2D filter
- Effective pixels: 20 megapixels
- Elements: 7G2P
- View field: DFOV 91
- Frame rate: 24/25/30/48/50/60/120
- FSTOP range: F2.8
- Gimbal axes: 3
- Angular vibration range: ± 0.02°
- Maximum control range: TILT: -90° - 15° / PAN: 360° limitless
- Maximum control speed: TILT: 30°/s / PAN: 120°/s
- ISO range: 100 - 6400
- Video resolution: 4K 60FPS
- MTF: 104lp/mm / CENTER: 0.6 / CORNER: 0.4
- Sensor size: 1 inch
- CMOS shutter speed: 1/8000s - 4s
- Shutter type: Rolling
- SD card class: 10 u3 min. 90 Mbit/s SNR ISO100, SNR 36db
- Storage temperature: -10°C - +50°C
- Operating temperature: -10°C - +40°C

2.1.4 PERFORMANCE CHARACTERISTICS

- Maximum altitude: 4500 m (14,763 ft) maximum density altitude
- Maximum and cruise airspeeds: 17 m/s (38 mph) maximum, 9 m/s (20 mph) cruise
- Maximum endurance: 25 minutes with standard E90 Camera payload
- Maximum range: 13.5 km (8.4 SM)
- Rate of climb: 4 m/s (780 ft/min)
- Rate of descent: 3 m/s (600 ft/min)
- Maximum glide slope: N/A
2.1.5 WEIGHT AND BALANCE

- Airframe Weight: 1645g
- Maximum gross takeoff weight: 2633 g (5.8 lbs)

The center of gravity should be located within a 2.5 cm radius (1") of the center of the aircraft as shown:
2.2 AIRCRAFT SERVICING AND MAINTENANCE

There are two categories of maintenance: preventive and directed. Preventive maintenance is user-managed and user-performed at manufacturer’s recommendation. Directed maintenance is a required maintenance/replacement following 3DR guidelines and must be performed at scheduled times.

This maintenance may occur at a 3DR Authorized Service Facility or performed by user (except where noted in this manual.)

2.2.1 HARDWARE FOR BASIC MAINTENANCE

We recommend a tool kit consisting of:

- #00 size Phillips screwdriver
- #0 size Phillips screwdriver
- #1 size Phillips screwdriver
- 1.5mm Hex Driver
- 2.0mm Hex Driver
- 2.5mm Hex Driver
- Small pair of hemostats bottle of bearing lubricant (Tri-Flow with needle applicator recommended)
- Magnifying glass
- Microfiber cleaning cloth
- Lens cleaning cloth
- Can of compressed air
- Tube of extra-fine graphite lubricant (dry)
- Small vacuum and bristle brush

2.2.2 FIRMWARE

We recommend always installing the latest firmware/software for all 3DR aircraft and all related components. Failure to update aircraft, Ground Control Station and camera system, may result in flight error for which 3DR cannot be held responsible. Verify you are using the latest firmware using the Site Scan iOS application (see 3.1 Site Scan Firmware Update.)

2.2.3 INSPECTIONS OF AIRCRAFT

This guide provides the basics of inspections. However, it’s important to remember that the aircraft inspection is only a single component of flight safety. Always remember to check local weather, airspace, flight restrictions and the area in which the aircraft will be flying. Ensure there are no persons, property or ground hazards/objects in the determined flight areas that may be impacted during flight operations. Logging maintenance is an industry best-practice, and in some regions, required for regulatory compliance.

Always abide by local flight regulations.
2.2.4 ROUTINE MAINTENANCE

PREFLIGHT/EACH FLIGHT:

**Aircraft**
- Check motors for smooth rotation
- Batteries fully charged
- Battery fully seated and locked to airframe
- Check propellers for lock on motor
- Check propellers for nicks, cuts or other damage (replace if necessary)
- Check propellers for symmetry (replace if necessary)
- Landing gear for matched angle
- Gimbal properly attached to pin rails
- Gimbal vibration dampers properly seated, pinned for safety
- Check camera for full motion

**ST10C Controller**
- Fully charged
- Antenna(s) firmly seated
- Vents not blocked
- Always hover UAS at a height of approximately 10’ (to avoid being at eye level)
- Perform a controllability check prior to a mission (pitch, roll and yaw)

25 FLIGHTS MAINTENANCE (approx. 15 hours per cycle):

**Aircraft**
- Clean gimbal vibration dampers of debris and dust
- Check arm locks for positive operation
- Check the motor wire sleeves leading into the airframe for wear
- Clean motors of debris and dust using compressed air can
- Manually spin to assure there is no grit inside, and all propellers spin freely
- Clean leg actuators of debris and dust and check for leg tightness
- Inspect camera rails for wear
- Inspect camera filter threads for thread integrity
- Verify all screws are secure and hand tighten if necessary
- Listen to cooling fan for consistency/no unusual noise
- Wipe arms/legs of dust clean sonar ports, removing debris and dust
- Calibrate the compass, accelerometer and gimbal

**ST10C Controller**
- Verify all screws are secure and hand tighten if necessary
- Check vents for debris and dust and vacuum if necessary
- 3DR does not recommend blowing compressed air into these vents
- Check switch retainer rings for tightness
100 FLIGHTS MAINTENANCE (approx. 45 hours per cycle):

Aircraft

- Inspect play of motors by lifting each motor and adding some pressure to the side; replacing any motor showing signs of play
- Inspect motor wire sleeves leading into the airframe for wear
- Check the propellers for any cracking, stress marks or pitting
- Check cooling fan for smooth spin and replace if necessary
- Check venting areas for debris and dust
- Check arm locking mechanism and adjust if necessary
- Brush, blow or vacuum dirt from actuators, motors and cooling fan
- Replace gimbal vibration dampers
- Replace gimbal vibration damper locks
- Check gimbal rail for any wear or stress marks; replace if necessary
- Check gimbal rail screws for tightness
- Apply a small amount of graphite lubricant to a tissue and brush lengthwise on the gimbal rails
- Check gimbal arms for smooth rotation
- Inspect camera quick contact pins for wear and clean if necessary
- Electronic cleaning solution applied to a paper towel or cleaning cloth is recommended
- Inspect camera lens threads for thread integrity
- Check propeller locks for integrity, wear and operation
- If wear is noticed, replace the propeller lock and springs
- Clean motors of debris and dust
- Manually spin to assure no grit, imbalanced grind and free spinning propellers
- Remove landing gear actuators, checking for contact wear and add a very small amount of graphite lubricant if necessary
- Remove the antennas from their sleeves and check for any wear or frayed wires
- Clean leg actuators of debris and dust and check for leg tightness
- Check leg locks for integrity
- Check landing gear feet for wear and replace if necessary
- Check all screws and hand-tighten if necessary

ST10C Controller

- Clean air vents/fans using computer vacuum or hand blower (do not use compressed air)
- Clean joystick pivot points with small brush
- Check gimbal control for tightness and adjust if necessary
- Check throttle control for tightness and adjust if necessary
2.2.5 ANNUAL FLIGHT MAINTENANCE (Recommended to be done at an Authorized 3DR repair facility):

Aircraft

Perform all actions of 100 flight maintenance recommendations

- Open shell, gently clean debris and dust
- Check shell for cracks or breaks
- Check motherboard for cracks or breaks
- Inspect all legs and connectors for cracks and any loose connections
- Check all connections for integrity
- Clear debris and dust from GPS module
- Check all solder joints for integrity
- Replace battery connection board
- Replace landing pads on legs
- Replace gimbal vibration dampers and safety pins
- Lubricate gimbal attachment points
- Thread lock any metal to metal screw points
- Replace gimbal rails
- Open camera housing
- Clear lens board of debris and dust
- Clean antennas of grime, debris and dust
- Check antenna connection for integrity
- Check antenna lobes for uniformity
- Check attachment points for integrity
- Replace arm locks and springs
- Clean motors of debris and dust
- Inspect motor bearings for lubrication and wear
- Clean leg actuators of debris and dust and check for leg tightness
- Check all moving parts for strength and integrity of function
- Remove and retighten all hex screws
- Remove and retighten all other fasteners
- Verify all sensors are optimized and functioning properly
- Update firmware
- Calibrate compass, GPS, accelerometer and gimbal

ST10C Controller

- Update firmware
- Update all software applications
- Clean air vents/fans using computer vacuum or hand blower (do not use compressed air)
- Clean joystick connection points with contact cleaning spray
- Remove and clean throttle control potentiometer with contact cleaning spray
- Reinstall and throttle control potentiometers
- Check throttle control for tightness
- Clear electronic components of debris and dust
- Check stand/handle screws
- Check all connectors for integrity
- Check toggle mount threads for tightness
### 2.2.6 MANUFACTURER RECOMMENDED PART REPLACEMENT

<table>
<thead>
<tr>
<th>PART</th>
<th>INTERVALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propellers</td>
<td>20 Flights</td>
</tr>
<tr>
<td>Landing Pads/Feet</td>
<td>100 Flights</td>
</tr>
<tr>
<td>Batteries</td>
<td>200 - 250 Cycles*</td>
</tr>
<tr>
<td>Motors</td>
<td>400 Flights</td>
</tr>
<tr>
<td>Landing Gear</td>
<td>400 Flights</td>
</tr>
<tr>
<td>Motor Arm Lock/Catch</td>
<td>400 Flights</td>
</tr>
<tr>
<td>Internal Cooling Motor</td>
<td>400 Flights</td>
</tr>
<tr>
<td>ST10C Controller Fan</td>
<td>400 Flights</td>
</tr>
<tr>
<td>ST10C Controller Battery</td>
<td>400 Flights</td>
</tr>
<tr>
<td>Time Between Overhaul</td>
<td>500 Hours**</td>
</tr>
</tbody>
</table>

*Batteries

Batteries may fail due to overheating, being dropped or any number of other causes. Any battery that is bulged or distorted in the casing should be immediately disposed of to avoid impending failure that may lead to mid-air power loss or explosion. Self-contained batteries may not be repaired.

Dispose of batteries by placing the battery in a salt water bath for 24 hours. Deliver to a recycling center or dispose of them safely.

**Time Between Overhaul (TBO)

See 2.2.5 Annual Flight Maintenance that is recommended to be done at an Authorized 3DR repair facility.

Users may choose to set a more conservative TBO.
2.2.7 INSPECTION CHECKLIST

Owner:
Date:
Unit Tested:
Serial Number:

☐ Firmware updated to current version
☐ Checked ST10C nuts and toggle mounts
☐ Motor shafts and propellers in good shape
☐ Battery slides in properly and locks in place
☐ Landing gear in good condition and properly extending/retracting
☐ Camera installed and in good condition
☐ Camera rails in good condition
☐ Frame inspected for structural damage
☐ Full transmitter system check
☐ Battery cells balance normal (if included)
☐ LED Indicators checked
☐ Telemetry data accurate and functioning
☐ Startup sequence normal
☐ Accelerometer test complete
☐ Compass calibration checked
☐ GPS signal locked and acquired sufficient satellites
☐ Stationary hover test completed
☐ Range tested and within specs
☐ Max altitude tested and within specs
☐ Picture tested at altitude
☐ Camera tested for functionality and quality
☐ Tested manual/no GPS flight response
☐ Tested waypoint/survey functions
☐ Tested RTL and auto-landing
☐ GPS locked throughout flight
☐ Motors and battery tested for normal temperature
☐ Video/picture examined for any discrepancies
☐ Product cleaned

Maintenance by:
Date:
3.0 NORMAL PROCEDURES

3.1 SITE SCAN FIRMWARE UPDATE

An internet connection is required for the Site Scan Field app to download the update. We recommend doing it via WiFi:

1. Power up the Controller, connect it to the iPad via Lightning cable and turn the aircraft on
2. Open the Site Scan App and select the H520-G aircraft
3. Click the gear icon on the top-right corner to open the Global settings menu
4. Go to Aircraft Settings ➔ Firmware Manager

5. Select Update Firmware
6. Download and install the update(s), wait for the aircraft to finish the update(s) and restart the aircraft
7. Ensure the firmware on the aircraft versions for Autopilot, Camera, Gimbal and Remote Controller match the Latest Firmware versions
3.2 CALIBRATIONS

3.2.1 COMPASS CALIBRATION

1. With the aircraft powered on, open the Site Scan App and select the H520-G aircraft
2. On the Global settings menu, go to Aircraft Settings → Calibration → Compass
3. A six box graphical grid will display indicating what is required to calibrate the compass
4. Pick up the H520-G by the two arms with green dots, as close to the arm joints as possible
5. Rotate the H520-G in the direction indicated in the box highlighted in yellow
6. Using the arrow in the box to point towards the front of the H520-G (the front has the two sonar eyes) rotate the H520-G until it beeps
7. Continue doing the same for the next box highlighted in yellow
8. Upon successful completion of the compass calibration, you will return to the calibration menu and a green dot will be displayed next to Compass
9. A failed calibration will be indicated by all six arm lights on the H520-G blinking red
10. If calibration fails, try again after moving the aircraft away from any metallic objects
3.2.2 ACCELEROMETER CALIBRATION

1. With the aircraft powered on, open the Site Scan App and select the H520-G aircraft
2. On the Global settings menu, go to Aircraft Settings → Calibration → Accelerometer
3. A six-box graphical grid will appear with the H520-G in different positions

4. Place the H520-G on the ground as shown in the highlighted box
5. After each position, the H520-G will give an audible tone and the highlighted box will change to the next position
6. A successful completion of accelerometer calibration shows a green dot next to Accelerometer
7. A failed calibration will be indicated by all six arm lights blinking red
8. If a calibration fails, try again making sure not to move the aircraft
3.2.3 GYRO CALIBRATION

1. With the aircraft powered on, open the Site Scan App and select the H520-G aircraft
2. On the Global settings menu, go to **Aircraft Settings → Calibration → Gyro**
3. A graphical box will be displayed, indicating what is required to calibrate the gyro

4. Position the aircraft as shown in the diagram until marked as completed
5. Upon successful completion of the gyro calibration, you will return to the calibration menu and a green dot will be displayed next to **Gyro**
6. A failed calibration will be indicated by all six arm lights on the H520-G blinking red
7. If calibration fails, position the aircraft on a flat, leveled surface and try the calibration again without moving the aircraft during calibration
3.3 PAIRING

3.3.1 Pair RC with Aircraft

1. Power up the ST10C controller and connect it to the iPad via Lightning cable
2. Power up the H520-G aircraft
3. Open up the Site Scan App, login and select any Project
4. Select the H520-G aircraft in the Site Scan App. Telemetry status will show “Connecting”
5. Access the pairing menu go to: Global Settings → Aircraft Settings → Remote Controller Pairing
6. Tap Pair with Aircraft
7. Follow the instructions on the screen to pair the vehicle, camera pairing should begin after a successful vehicle pairing
8. If pairing process is successful, the blue light on the front of the controller will stop blinking after a few seconds and become solid blue

3.3.2 Pair RC with Camera

1. Power up the ST10C controller and connect it to the iPad via Lightning cable
2. Power up the H520-G aircraft
3. Open up the Site Scan App, login and select any Project
4. Select the H520-G aircraft in the Site Scan App. Telemetry status will show “Connecting”
5. Access the pairing menu go to: Global Settings → Aircraft Settings → Remote Controller Pairing
6. Tap Pair with Camera
7. Select the WiFi network being transmitted by the aircraft camera (the MAC address is marked on the camera mount “MAC:xxxxxxxxxxxx”) and connect to it by entering the password. The default password will automatically be typed in: 1234567890. To test if the aircraft is paired, try to pitch the camera. If it moves, it means that the aircraft is connected
8. If pairing process is successful, the blue light on the front of the controller will stop blinking after a few seconds and become solid blue, the light on the camera will be solid green
3.4 AIRCRAFT LIGHTS AND SOUNDS

3.4.1 LIGHTS

Normal LED colors

LED 1: White
LED 2: Red
LED 3: Status
LED 4: Status
LED 5: Green
LED 6: White

<table>
<thead>
<tr>
<th>STATUS LEDs (3 + 4)</th>
<th>LIGHT BEHAVIOR</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Continuous On</td>
<td>Manual (Altitude)</td>
</tr>
<tr>
<td>Purple</td>
<td>Continuous On</td>
<td>Angle</td>
</tr>
<tr>
<td>Green</td>
<td>Continuous On</td>
<td>Mission</td>
</tr>
<tr>
<td>Yellow</td>
<td>Continuous On</td>
<td>RTL</td>
</tr>
<tr>
<td>Red</td>
<td>Flash (2 short flashes and then off)</td>
<td>1st LV BAT WARNING</td>
</tr>
<tr>
<td>Red</td>
<td>Flash Fast</td>
<td>2nd LV BAT WARNING</td>
</tr>
<tr>
<td>Color of the actual mode</td>
<td>Flash Normal</td>
<td>No GPS</td>
</tr>
</tbody>
</table>

ALL LEDs

Red                | Flash Fast    | Initialization failed |
Green              | 2 Flashes     | Pairing completed     |
### 3.4.2 SOUNDS

#### ST10C SOUNDS

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>BEEP</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power-on</td>
<td>3 short beeps</td>
<td>The remote control has booted up successfully</td>
</tr>
<tr>
<td>Pressing any key</td>
<td>1 short beep</td>
<td>A key has been pressed</td>
</tr>
<tr>
<td>Return-to-launch</td>
<td>Interval 2S</td>
<td>The aircraft is in RTL mode</td>
</tr>
<tr>
<td>Low battery 15%</td>
<td>Interval 1S</td>
<td>The battery of the aircraft is low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The beeping stops after 10 seconds</td>
</tr>
<tr>
<td>Critical low battery 10%</td>
<td>Interval 0.5S</td>
<td>The battery of the aircraft is critical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The beeping stops after 20 seconds</td>
</tr>
<tr>
<td>Power-off due to inactivity</td>
<td>Interval 0.5S</td>
<td>The remote control will power-off in 10 seconds due to inactivity (not bound, no data exchange or no key pressed for longer than 5 minutes)</td>
</tr>
</tbody>
</table>

#### H520-G SOUNDS

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>ANSI MUSIC CODE*</th>
<th>SIMPLIFIED MUSICAL NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startup</td>
<td>MNT255L32O2&lt;CDEFGAB &gt;CDEFGAB &gt;CD</td>
<td>octave 1: CDEFGAB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>octave 2: CDEFGAB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>octave 3: CD</td>
</tr>
<tr>
<td>Error</td>
<td>MBT200a8a8a8a8 P aaa P</td>
<td>short: A A A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pause</td>
</tr>
<tr>
<td></td>
<td></td>
<td>long: A A A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pause</td>
</tr>
<tr>
<td>Notification Positive</td>
<td>MFT200e8a8a P 8a</td>
<td>short: E A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>long: A</td>
</tr>
<tr>
<td>Notification Neutral</td>
<td>MFT200e8e8e8c8e8c88c8</td>
<td>short: E C E C E C</td>
</tr>
<tr>
<td>Arming Warning</td>
<td>MNT75L1O2G</td>
<td>octave 2, short: G</td>
</tr>
<tr>
<td>Battery Warning Slow</td>
<td>MBT150L16O5C L8O3B P16P16P16 L16O5C L8O3B L1PPP</td>
<td>octave 5: C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>octave 3: B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pause</td>
</tr>
<tr>
<td></td>
<td></td>
<td>octave 5: C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>octave 3: B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>long pause</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td><strong>GPS Warning</strong></td>
<td>MFT255L4AAAL1F#</td>
<td>A A A F#</td>
</tr>
<tr>
<td><strong>Arming Failure</strong></td>
<td>MFT255L4&lt;&lt;&lt;BA P</td>
<td>B A pause</td>
</tr>
<tr>
<td><strong>EKF Warning</strong></td>
<td>MFT255L8ddd#d#eeff</td>
<td>D D D# D# E E F F</td>
</tr>
<tr>
<td><strong>Baro Warning</strong></td>
<td>MFT255L4gf#fed#d</td>
<td>G F# F E D# D</td>
</tr>
<tr>
<td><strong>Home Location Set</strong></td>
<td>MFT100L4&gt;G#6A#6B#4</td>
<td>octave 2: G# A# B#</td>
</tr>
</tbody>
</table>

*ANSI MUSIC CODES*

- M[N=Normal, L=Legato, S=Staccato, F=Foreground or B=Background]: Select pause between notes
- T[number]: change tempo
- L[number]: select note length
- <: decrease octave
- >: increase octave
- O[number]: select octave
- A ... G[number]: play a note, the following number is the length of the note
- P[number]: pause
3.5 CHARGING

3.5.1 H520-G

Power the desktop charger from a 100-240V AC outlet using the AC adapter/power supply or from a 12V-16.8V DC accessory socket/cigarette lighter receptacle in an automobile using the included adapter. Plug the aircraft battery into the charger port as illustrated.

A green blinking LED indicates the charger is powered on and ready to charge. A red blinking LED indicates the battery is charging. It takes approximately 2.5 hours to charge a fully discharged battery. A solid green LED indicates the battery is fully charged. Alternating red and green LED lights indicate balanced charging (this ensures the individual cells inside the battery are charged to similar amounts.)

Warnings: Never completely drain an H520-G battery. Never attempt to charge an over-discharged battery. Batteries should be stored at 30-50% charge and never stored at full charge.

3.5.2 ST10C CONTROLLER

Charge the ST10C battery by using the supplied USB cable and inserting it into the USB port on the charger. It will take approximately five hours to charge a fully discharged battery.

3.6 FLIGHT OPERATIONS

3.6.1 POWERING ON THE H520-G

Power on the H520-G first by gently inserting a battery into the rear of the H520-G while lifting the rear lever on the back of the battery pack. Push the battery all the way in and release the lever. Give one final push on the rear of the battery to ensure the battery is fully seated. A click will be heard as the lock engages. Ensure the battery is fully seated and latched before proceeding. Press and hold the power button (approximately two seconds) on the top of the airframe near the nose. Wait for the rising tone and arm lights to turn on and release the button. During start up the camera will rotate to the front of the airframe and several tones will announce the aircraft’s readiness.
3.6.2 INSTALLING THE PROPELLERS

- Each arm of the H520-G has a letter A or letter B labeled on it. “A” arms have black center buttons; “B” arms have white center buttons.
- Each propeller has an A or B label etched into the blade. “A” propellers cannot be attached to “B” motors, nor can “B” motors be mounted to an “A” motor.
- Match the A propellers with the A arms (black center button) and the B propellers with the B arms (white center button). Place the prop on the motor, lightly press down while holding the motor and turn the prop a quarter turn. A click will be heard and the center button will slightly pop up. Hold the motor and test propeller security to assure a locked propeller.

3.6.3 MOTOR START AND LAUNCH

3DR recommends launching/landing on clean, level surfaces. Dust, dirt, sand, leaves and other lightweight matter may reduce operational time and may cause mid-air failures from foreign object damage (FOD). Launch and land from a clean surface such as clean concrete, wood, plastic or dry fabric. The launch pad should be made of a heavy material and secured without the sides lifting from the rotor wash. Ensure the pad is large enough to accommodate the landing gear and downforce from the propellers. Never launch directly from sand, soft soil or dirty concrete.

Prior to motor start, position the H520-G with the nose pointing away and the battery latch facing rearward towards the pilot. Before you start the motors, ensure the launch area is clear of people and equipment. To turn on the RC, press and hold the Power Button (in the middle of the ST10C) for two seconds.

Press and hold the Arming Button for one second and the propellers will start to spin. Check for any irregularities in prop speeds, noise or vibrations.

Once the visual and auditory check has been performed, move the left stick upward, away from the pilot. Do not hesitate to add maximum throttle input. The H520-G will lift off the ground. When the H520-G is approximately 15-20 feet in altitude, release the left stick, the stick will center itself and the aircraft will hold its altitude.
This is a good time to check the flight control systems. 3DR recommends checking pitch, yaw, roll and altitude before each flight.

To check **pitch**, push the right stick upward and the H520-G will move away from the pilot. Pull the right stick downward and the H520-G will move towards the pilot.

To check **roll**, move the right stick right and left. The H520-G will slide respectively to the right and left.

To check **yaw**, move the left stick right and left. The H520-G will rotate respectively in a counter-clockwise and clockwise spin.

Once the surface controls have been checked, the H520-G is ready for flight. Push the **Landing Gear Control** button on the top right of the ST10C and the gear will retract. Pushing the position again will lower/extend the landing gear.
3.6.4 LANDING AND MOTOR SHUTDOWN

When ready to land, fly the H520-G towards the launch/landing area. At an altitude of 12 ft/3.5M or higher, lower the landing gear using the button on the top right of the ST10C. Use the left altitude stick to slowly bring the H520-G down towards the landing point (turning the H520-G nose away from the pilot makes landing more intuitive on the right stick controls.) After the H520-G touches down, continue to hold the throttle stick down until the motors stop.

3.6.5 RETURN HOME SETTINGS

Using the **Return Home Altitude** settings menu, the pilot can set the altitude of the H520-G upon executing a Return Home/Return to Launch (RTL). This setting is useful for avoiding any trees or obstacles on the return path to the takeoff location. Ensure this setting is checked at any new area being surveyed/flown.

3.6.6 AUTONOMOUS MISSIONS

Please refer to Site Scan documentation at https://flying.3dr.com.
3.6.7 PAUSING A MISSION

The pilot may want to pause a mission to avoid obstacles or regain bearings. To pause an autonomous mission, tap on the Pause button in the Site Scan App or ST10C (Hover Button). This will cause the H520-G to hover and maintain its position. Moving any stick on the ST10C during an automated mission will also pause/hover the aircraft.

3.6.8 RESUMING A MISSION

To resume an interrupted mission, tap the Resume button on the bottom right of the Site Scan App. The aircraft must acquire a GPS lock before it can resume a mission.

3.6.9 BATTERY CHANGES DURING MISSION

If a battery change is required during a planned mission, the H520-G will automatically RTL and land. Once the H520-G has landed, remove the discharged battery and replace with a charged battery. Wait for the H520-G to establish a connection with the ST10C and GPS lock. The aircraft may take up to two minutes to reconnect.

Once both signals have been locked, the Continue Mission screen will appear on the Site Scan App. Tap Continue to confirm resuming the mission.

3.6.10 ENDING A MISSION

A pop-up window will appear on Site Scan App once the H520-G has landed and completed the mission. Tap End Mission.

3.6.11 REFLY A MISSION

After completing a mission, if the mission requires re-flight, go to Flight Plans in the main menu of Site Scan App and then tap Refly.

3.6.12 GEAR SWITCH

In mission mode, the landing gear will automatically retract after reaching takeoff altitude (around 10 ft. altitude). After the mission is complete and an RTL is triggered, the landing gear will continue to stay up until it reaches the home position. The landing gear will come down once it descends to a safe altitude (around 20 ft.) during the landing process from the RTL altitude. To deploy the landing gear after exiting Mission mode by pausing the mission, the pilot may need to cycle (flip up and down) the landing gear switch to activate the switch.
4.0 EMERGENCY PROCEDURES

4.1 RETURN HOME/RETURN TO LAUNCH (RTL)

At any time during a flight, if the Return Home button is pushed on the ST10C, the aircraft will ascend to the altitude set in the mission for RTL and then return to the launch location.

4.2 BATTERY FAILSAFE

During low battery flight mode, the H520-G will attempt to RTL. In some cases, the H520-G might be too far from the launch site to return. During low battery flight mode, the pilot has limited lateral control and no vertical control of the H520-G. Low battery flight mode is indicated by flashing red LEDs on the two rear motor arms.

<table>
<thead>
<tr>
<th>BATTERY LEVEL</th>
<th>FLIGHT MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>Warning</td>
</tr>
<tr>
<td>20%</td>
<td>Failsafe</td>
</tr>
<tr>
<td>8%</td>
<td>Emergency</td>
</tr>
</tbody>
</table>

4.3 EMERGENCY SHUTDOWN

In the event of a flyaway or other emergencies, hold the left stick down and tap the Arming button 4 times.

4.4 5-MOTOR MODE

If one of the motors of the H520-G stops working, the aircraft will enter 5-motor mode. The aircraft will continue to fly with decreased yaw authority. Yaw instability is expected. If the aircraft enters 5-motor mode it should be landed as soon as possible.

4.5 EXIT AUTONOMOUS FLIGHT

There are a few ways to exit an autonomous flight:

- Manually take-over while the aircraft is automatically following a predetermined flight plan
- Cancel the mission from the Site Scan iOS App which will force the aircraft to RTL
- Push the RTL button on the ST10C

4.6 RC/DATA LINK LOSS FAILSAFE

<table>
<thead>
<tr>
<th>RC/DATA LINK LOSS</th>
<th>FLIGHT MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 10 secs</td>
<td>RTL</td>
</tr>
<tr>
<td>0 - 10 secs</td>
<td>Return to Previous Flight Mode</td>
</tr>
</tbody>
</table>
5.0 TROUBLESHOOTING

5.1 BATTERY RECOMMENDATIONS

- Be certain to never completely drain an H520-G battery. Batteries should be stored at 30-50% charge, and never stored at full charge.
- The DY5 multi-charger for the H520-G battery is capable of discharging batteries, preparing them for storage.
- Flight time is estimated to be approximately 25 minutes per battery (E90 camera).

5.2 AIRCRAFT CALIBRATIONS

Compass, Accelerometer and Gyro calibrations are required prior to launching the H520-G for the first time. This is for safety and proper operation of the aircraft. See 3.2 Calibrations section for more information.

It is also highly recommended that the aircraft always be recalibrated after each software/firmware update.

5.3 RETURN HOME/RETURN TO LAUNCH (RTL)

During RTL Mode the pilot may maneuver the H520-G to assist in automatic landings.

As the H520-G nears the ground, the pilot should refrain from adjusting the controls as the H520-G may tip over when being maneuvered as the legs touch down.

Return Home Mode will cause an automatic landing; the pilot should be prepared to use the throttle stick to shut down the motors (keeping it all the way down) although the aircraft is expected to disarm/shut down motors on its own.

**Note:** *Using the landing gear switch, lower the gear before attempting to land, landing gear will NOT be automatically deployed when manually landing the aircraft.*

5.4 PAIRING TROUBLESHOOTING

1. Power up the ST10C controller and connect it to the iPad via Lightning cable
2. Power up the aircraft
3. Open up the Site Scan App, login and select any Project
4. Select the H520-G aircraft in the Site Scan App. Telemetry status will show “Connecting”
5. Access the pairing menu go to: **Global Settings → Aircraft Settings → Remote Controller Pairing**
6. Tap **Pair with [PAYLOAD*]**
7. **[PAYLOAD*]** pairing should begin after a successful aircraft pairing; the default password will automatically be typed in: 1234567890
8. If pairing process is successful, the blue light on the front of the controller will stop blinking after a few seconds and become solid blue

*PAYLOAD defined in app depending on camera model or other payload