RFM2 Customer Documentation Checklist

Version: 1.0

This is a list of things to capture for customer documentation.

Assemble Hardware

Task	Check
Prepare and mount the RANGER-UAV FLEX R6 Camera and all cables must be removed from FLEX. Position **RANGER-UAV FLEX** onto zero-point mount on **Dual Base Plate**. Ensure no cables or objects are blocking the zero-point mount and it is in the “open” position before inserting Flex studs into the mount. Make sure there is no gap between zero-point base and RANGER-UAV FLEX bottom plate before tightening the zero-point mount. Using supplied torque wrench and 6mm hex driver, torque to 25ft. Lbs in **clockwise direction until “click”** is heard and felt. Make sure the torque wrench is set to the right direction. **Only mount the UAV FLEX Scanner to the zero-point mount when the dual LiDAR platform is detached from the roof rack and placed securely on a workbench.**	
Connect internal **Dual Head cables** to Flex. DC IN, Ethernet, Sensor, IMU (optional), and Camera, GPS 1, GPS 2 (do not swap!), and Wifi. Route cables to avoid straining cables. Confirm 2nd Scanner has Sensor cable plugged into it as well, connecting the two scanners.	
Ensure Ladybug is running firmware 1.21.3.0 and LadybugCapPro is 1.20.0.79	
Insert SD Card (formatted with exFAT) into **Flex Pack, ensure write protection switch is off**	
Inspect enclosure for overstrained cables, debris, loose or frayed wires, bad connectors etc.	
Clean lenses on Scanners and Ladybug	
Install cover over the sensors and close latches.	
Inspect Roof Rack Mount for loose or missing hardware. Also check for dirt and debris that might prevent installation of the dual scanner or Ladybug camera mast. Mount the Roof Rack to the vehicle (needs visuals)	
Install dual head accessory onto the rack by sliding it into the hinge mechanism. **Before installing and transporting the dual head accessory, make sure the handle is fully locked to the LiDAR base plate via the 2 plunger pins.** Fully tighten the 2 knobs (hand-tight) on the hinge point (towards vehicle front). Unlock the 2 plunger pins that secure the handle. Then tilt up the dual LiDAR platform and align the handle into the side rails. Once the handle is in position, fully tighten (hand-tight) the 2 knobs towards the vehicle rear to lock the handle in place.	
DOUBLE CHECK CAMERA MAST CLEARANCE. MOVE VEHICLE OUTSIDE IF CLEARANCE IS GOING TO BE AN ISSUE.	
Install wheel sensor onto wheel. Clean car body for the suction cups and activate the	

cups on the car body. Route the wheel sensor wires and secure them. Secure the wheel sensor leash, taking up excess slack in the line.	
Route wheel sensor cables to the dual head unit. Do not connect them yet. Ensure there is slack in the cable for suspension travel.	
Install LadyBug Mast (if available) Check that zero-point mount for the LadyBug mast is in the open position. Position the mast over the mounting studs on the roof rack and make sure there is no gap between zero-point mount on the mast and the roof rack base plate before tightening the mount. Using supplied torque wrench and 6mm hex driver, torque to 25ft. Lbs in **clockwise direction until "click"** is heard and felt. **Ensure to operate the zero-point mount of the mast only from the passenger side of the vehicle (connector side of the mast).**	
Install Single GPS Antenna Pole (if available - LadyBug Mast not used) Mount the single GPS antenna pole to the roof rack base plate (between the zero-point studs)	
Now **connect all exterior cables** to their plugs and receptacle using the labels on the cables as reference. The Wheel Sensor port is accessible by opening the small door on the side of the dual head cover. The door can be closed again once the cable plug is connected. Secure the umbilical cord on the roof rack frame using the attached clips (use cable ties where needed). Install Wifi antenna if ethernet connection cannot be used.	
Vehicle Interior Tasks	**Check**
Check battery voltage for Sensor, install battery alarm	
Mount Drive Monitor to windshield using suction cup mount, connect to USB-Hub using only USB-C cable	
Connect Ethernet from sensor and USB-A from ladybug to USB-Hub	
Connect USB C from USB-Hub to laptop.	
Connect USB-Hub to Power supply	
Remove all LiDAR protective caps	
Connect 6S Lipo battery to power cable from sensor.	
System is now ready to power on and connect to SE8.	

Disassemble Hardware

Task	Check
Disconnect Cables Make sure the system is fully powered down (CPU Button LED off, all LEDs on the RANGER-UAV FLEX off (visible by opening the small door on the side of the cover). Then fully disconnect the power source to the entire system. Unplug all external cables from the dual head accessory and the LadyBug mast (DC IN, Ethernet, Camera, USB, GPS)	
Remove the Dual Head Unit Make sure all cables are disconnected from the unit. Fully loosen the 2 knobs securing the handle to the roof rack. Make sure the 2 plungers for the handle fixation are in the locked position. Lift up the dual head unit by pushing up against the bottom surface and release the handle from the roof rack rails. While still holding up the dual head unit, ensure the handle is fully locked via the plunger pins. Then, slowly and carefully drop the dual head unit until it rests flat on the roof rack. Now fully loosen the 2 knobs towards the vehicle front. Remove the dual head unit from the roof rack and store it inside the pelican case for protection.	
Remove the LadyBug Mast (if available) Make sure all cables are disconnected from the mast. Set the direction of the torque wrench to the “release” direction (counter-clockwise). Release the zero-point mount using the torque wrench in counter-clockwise direction until the black rubber grommet on the golden piece is visible. Do not release the mount any further. Now lift the mast from the roof rack and store it in the pelican case for protection.	
Remove the Single GPS Antenna Pole Unscrew the antenna pole from the roof rack and store it in a safe place.	
Remove the Wheel Sensor from the car	
Remove the Roof Rack from the car if needed	
Remove the RANGER-UAV FLEX from the dual head unit Make sure the dual head unit is fully removed from the roof rack and placed securely on a workbench. Remove the cover from the dual head unit by opening all latches. Unplug all connections to the RANGER-UAV FLEX (DC IN, Ethernet, Sensor, IMU (optional), Camera, GPS1, GPS2, WiFi). Set the direction of the torque wrench to the “release” direction (counter-clockwise). Release the zero-point mount using the torque wrench in counter-clockwise direction until a resistance is noticed. Do not release the mount any further after the resistance is felt. Now lift and release the RANGER-UAV FLEX from the dual head base plate and store it in a safe location or inside the pelican case. Reattach the cover of the dual head unit and store the entire dual head unit in the pelican case.	

Notes (Hardware)

Software Setup

Test	Check
Connect to rover via SpatialExplorer	
Verify navigation system is receiving satellites, IMU, and wheel sensor packets	
Wait until finesteering time status is achieved	
Check the messages window in SE for any concerning messages?	
Start ladybug Cap Pro - select “connect to camera” mode	
Verify camera hardware trigger settings are correct	
Verify recorded imagery settings are correct (12-bit GIS, urban drive)	
Start GPS time sync	
Start file stream - pick directory on notebook to save imagery to	
Start sensors (VUX0, VUX1, Hesai, ladybug) and ensure all capture data (ladybug may not if configured to capture by distance	
Begin moving to take off location - stay **below 15 mph** until ready for kinematic alignment	
Begin kinematic alignments and figure, then proceed to the mission (using MG)	
Ensure that **ladybugcappro displays GPS: 1, PPS: 1, Quality: 1**	

Mission Guidance

Test	Check
Load a KML as a flightplans, check it visualizes correctly on OpenStreetMap layer	
Adjust altitude of flight plan (240 m for Austin)	
Split at 45 degree angles (per default setting)	
Shorten flight lines (20 m, per default setting)	
Open MG window when system still static, make **sure the view is sane and calm**	
Schedule a flightline, start driving, verify behavior is right	

Notes (Software)