



INNOFLIGHT

Galaxy Aircraft Flight Checklist



Warning

The Galaxy 950 and 1080HL have many moving and rotating parts. Keep all loose clothing, long hair, and hands clear of any moving parts to prevent personal injury or damage to parts. When the Galaxy is powered on extra caution is to be taken. It is the sole responsibility of operator/ Pilot In Charge (PIC) to assemble the aircraft correctly and conduct correct flight checks before each instance of operation.

Caution

Ensure both flight batteries are at the same state of charge before operating to prevent battery damage or loss of power to the Galaxy in flight.

Check the Galaxy autopilot RTL lost link and Navigation lost link settings are suitable for your flight plans.

Always operate the Galaxy aircraft with strict adherence to any and all unmanned aviation laws relevant to the country of operation.

Notes

The purpose of this checklist is to prevent action items critical to the successful mission preparation and execution of the Galaxy 950/ 1080HL unmanned aircraft. It **IS NOT** meant to replace the Galaxy operating manual.

The Galaxy 950/1080HL is commonly used to carry expensive and heavy payloads, Innoflight International Pty Ltd recommends that all operations of the Galaxy aircraft are conducted as a two-person team to ensure safe operations and flight monitoring at all times.

For further information on the Galaxy aircraft or Innoflight systems please visit our website www.innoflighttechnology.com

Full operating manuals and associated software related to the Galaxy 950 and Galaxy 1080HL can be found here:

https://drive.google.com/drive/folders/1YuaVV8yqhx1vUbudSB5T4JqatF_VYArP?usp=sharing

Preflight

Assembly

- **Landing Gear**
 - Both landing gear side legs are fully inserted and clamped/ screwed securely
 - Both Landing gear sensors are connected firmly to Galaxy body
- **Tail Boom**
 - Galaxy Tail boom is inserted fully into Galaxy body boom clamps
 - Alignment guide correctly mated to the body with correct alignment
 - Boom clamping bolt firmly fastened
 - Check boom cannot rotate or slide out of the body
 - Lemo connectors x2 connected firmly to flush mount body plugs
 - Parachute shock cord connected to the Galaxy body with metal attachment clips
- **DRS Parachute Installation**
 - DRS deployment plate pushed into the locked and armed position
 - Check deployment plate is correctly locked in place
 - Parachute silk/canopy inserted to the carbon tube with cardboard sleeve
 - Parachute canopy shock cord attached to the rear boom metal attachment clip
 - Any shock cord slack/extra length taken up in velcro strap to prevent contact with tail rotor in flight
- **Rotor Blades**
 - Main rotor blades installed and all set to the correct tension and even across all blades
 - Tail blade spins freely and coloured torque marker not cracked
 - All rotor blades are free of defect or damage
- **Payload**
 - All payloads are the responsibility of the end user and must be operated to their relative specifications
 - Dual payload attachment bolts secured to Galaxy mounts
 - All loose wiring or batteries are securely attached
- **Galaxy Flight Batteries**
 - Both batteries are installed and no wires able to rub sharp edges
 - Both Galaxy battery straps tightly secured to batteries and Galaxy battery plate

Mechanical Checks

- **Rotor Head**
 - No signs of torque marker paint cracking or signs of movement
 - Rotor head parts free of defect
 - Plastic linkages show no sign of stress or cracking
 - Rotor shaft free of rust
 - Swash plate moves freely up and down rotor shaft without restriction
 - Main rotor spins freely clockwise without restriction or foreign objects in the main gear mesh
- **Tail Rotor**
 - Rotor blade spins freely

- Coloured torque marker on all bolts free from cracking or signs or movement
- No loose cables or objects able to contact rotor
- Parachute DRS systems attached to tail mount correctly
- Tail prop hub and locking nut tight and no movement between hub and motor shaft

Before powering on the Galaxy

- **Laptop/ Tablet** – Turned on and of adequate charge to conduct flights
- **Ground Control Station** – Aerial and battery connected
- **Ground Control Station** – Powered on and of adequate voltage

Power Galaxy

- Connect main batteries to both Galaxy XT90 plugs firmly
- Turn on redundant battery silver switch (push in)
- Wait approximately 20 seconds for the Galaxy autopilot to initialize (do not move during this time)
- Wait for GPS LED to change from blue to solid green
- **Check DRS parachute activation**
 - Before flying, the DRS parachute system must be checked for correct deployment
 - With the deployment plate in the armed and locked position and a heavy object (400g or more) inside the parachute tube, activate the parachute manually via GCS
 - Note the deployment plate releases followed by a red LED and audible sound
 - In place of having a heavy weight your observer could hold an object inside the parachute tube against the deployment plate to soften the powerful plate releasing.
 - Re-power the Galaxy once the parachute system has been checked. Make sure redundant power is turned off to fully de-power the Galaxy

Never activate the parachute without a weighted object or device to take the deployment impact. Always re-power the Galaxy after activation to clear the autopilot mode.

Control Check

- **Main Rotor Control**
 - Move the GCS altitude control up and down checking the Galaxy swash plate moves evenly and smoothly at all 3 control points
 - Move joystick to check forward and back control of swash plate
 - Move joystick to check left and right control of swash plate bank
 - Manually lift tail up to tilt Galaxy approximately 20 degrees forward checking that the autopilot gyro sensors control the swashplate to remain level
- **Autopilot Checks**
 - GPS puck LED remains solid Green to indicated GPS fix
 - Attitude mode enables correctly by pressing the momentary “GPS Off” switch on the GCS. Confirmation of attitude mode is indicated by the GPS Green LED flashing 1 blink per second while the GCS switch in the pressed position
 - Landing sensors both working, lift Galaxy tail to raise landing sensors above 50mm distance from the ground. Landing sensor Orange LED changes to off to indicate distance over 50mm and on to indicated distance below 50mm.

Connect to Flight Planner software I-GCS

- Confirm connection between flight planner and Galaxy
- Correct Com port must be selected to match paired Bluetooth GCS port
- 100% connection is displayed for connection strength top right corner of I-GCS
- **Check all telemetry values are correct**
 - Heading - confirm red heading line is within 10 degrees of known heading direction
 - Altitude - showing near 0m for AGL height
 - Ground Speed - near 0m/s
 - Voltage is near or above 50v depending on battery technology used (normal voltage or high voltage lithium polymer)
 - GPS Sat count above 10
 - Current draw below 3amps

Flight Planning

- **Pre-planned or on sight flight plan**
 - Flight Plan altitude is at correct height for **ALL** waypoints
 - Overlap is consistent with sensor requirements
 - Flight Plan speed is lower than 12m/s max speed
 - Home point is set to safe emergency landing zone free of obstructions
 - Flight path does not fly over populated areas or people
 - Camera shutter settings within selected camera requirements
 - Full line of sight can be maintained for the full duration of the flight
 - Ground Control Station and Galaxy have unobstructed link/view at all times
 - Consider smaller flight plans needed to maintain aviation laws for unmanned aircraft
- **Galaxy Autopilot settings for mission**
 - Lost link protocols are set to safely conduct mission in event of emergency override landing
 - Navigation mode set to correct lost link protocols
 - Will the Galaxy climb to a safe height in RTL mode, will the Galaxy return to take off point or mission home point in the event of a communications break between galaxy and GCS?
- **Upload Flight Path to Galaxy**
 - Write waypoints to Galaxy confirming waypoint writing process completes correctly
 - Reconfirm waypoints are in the correct position and flying heights
 - Close Waypoint create page
 - Check all telemetry values again

Take Off

- **Confirm surroundings**
 - Take off area is free from obstructions and people, maintaining a safety radius of 30m or more from the Galaxy
 - Wind speed is within safe operating limits allowing for extra wind speed at higher altitudes during flight
 - Sun is at an angle that does not restrict sight of Galaxy during flight
 - Galaxy nose as close to pointed into wind as possible (not critical, tail may change heading during take-off in strong winds to adjust for side force)
- **Manual Take off (Recommended)**
 - Final telemetry check
 - Surrounding check
 - Heading check
 - Commence spool up process (Hold altitude down – press start button – hold altitude above 60% to start rotors)
 - Hold altitude above 60% until galaxy takes off (approximately 20 seconds from arming)
 - Climb to an altitude of 5m (+/- 1m)
 - Control check, pitch bank, yaw and altitude
 - Confirm telemetry values are normal
 - Enable Nav mode to begin mission
 - PIC to maintain sight of Galaxy at all times
 - Observer to monitor telemetry values at all times
- **Autonomous Take off**
 - Final telemetry check
 - Surrounding check
 - Heading check
 - Commence spool up process (Hold altitude down – press start button – hold altitude above 60%)
 - Enable NAV switch to enable auto take off
 - Once the Galaxy has taken off to approximately 5m (+/- 1m) turn off NAV mode to take over manual control
 - Control check, pitch bank, yaw and altitude
 - Re-enable NAV switch to continue mission flight

Emergency Procedures

- **Galaxy Begins automatic return to home**
 - Check Telemetry data link is connected
 - Press “GPS OFF” switch on the GCS for 1 second to take over control
 - Confirm control is regained (Galaxy will stop flying home and hover)
 - Confirm full control by raising altitude control from GCS and observing Galaxy height raising visually or via telemetry altitude data.
 - **Galaxy flying out of normal control**
 - Press and **HOLD DOWN** “GPS OFF” switch on GCS to disable heading and GPS fix
 - Confirm whether control of the Galaxy is regained
- Yes**
- Maintain pressing GPS OFF switch using second person if possible

- Land the Galaxy using normal practices taking extra caution that there is not a GPS fix while holding the “GPS Off” button down (Attitude mode)
- DO NOT fly again until contacting your distributor or Innoflight directly

No

- Alert anyone nearby to evacuate the area immediately
- Attempt a climb to a height of more than 60m AGL and manually deploy the parachute
- At all times the priority is to avoid any people or property. It is at the sole responsibility of the PIC to ensure the Galaxy is operated away from people and property at all times
- **Emergency Landing Shutdown – Galaxy does not shut down rotor when landing**
 - During landing the Galaxy contacts the ground but does not shutdown straight away
 - Hold Altitude control down at all times while on the ground to avoid blade strikes
 - Press the “Start/Arm” button of the GCS while holding the altitude control down to manually disarm the Galaxy

While on the ground always hold the altitude control down until the main rotor speed has decreased and confirmation of the disarm process is made visually or via I-GCS telemetry
- **Lost telemetry**
 - Telemetry link lost during flight can occur if the GCS moves over 10m from the laptop/tablet due to the Bluetooth link range between the GCS and PC.
 - Reconnect I-GCS checking the correct Com port is selected
 - Confirm the link is obtained and all telemetry data is correctly updating
 - If the link cannot be established enable RTL mode from the GCS and land the Galaxy as soon as possible
- **Manual RTL mode**
 - During flight it is possible to enter a manual RTL (Return to Launch) mode
 - Preferably let the Galaxy slow to a speed under 4m/s (usually at waypoint turns) before enabling manual RTL mode. This avoids sudden stooping of speed while in fast forward flight
 - To take over control, wait until the Galaxy is within a safe distance from home/ starting the descent stage of landing, turn off the RTL switch.
 - Once the RTL switch is off, confirm control by increasing altitude and observing the galaxy rise altitude visually or via I-GCS telemetry
 - Continue with standard landing procedures to land the Galaxy safely
- **Manual Parachute Activation**

The parachute system is the last line of safety and should only be used in emergency situations.

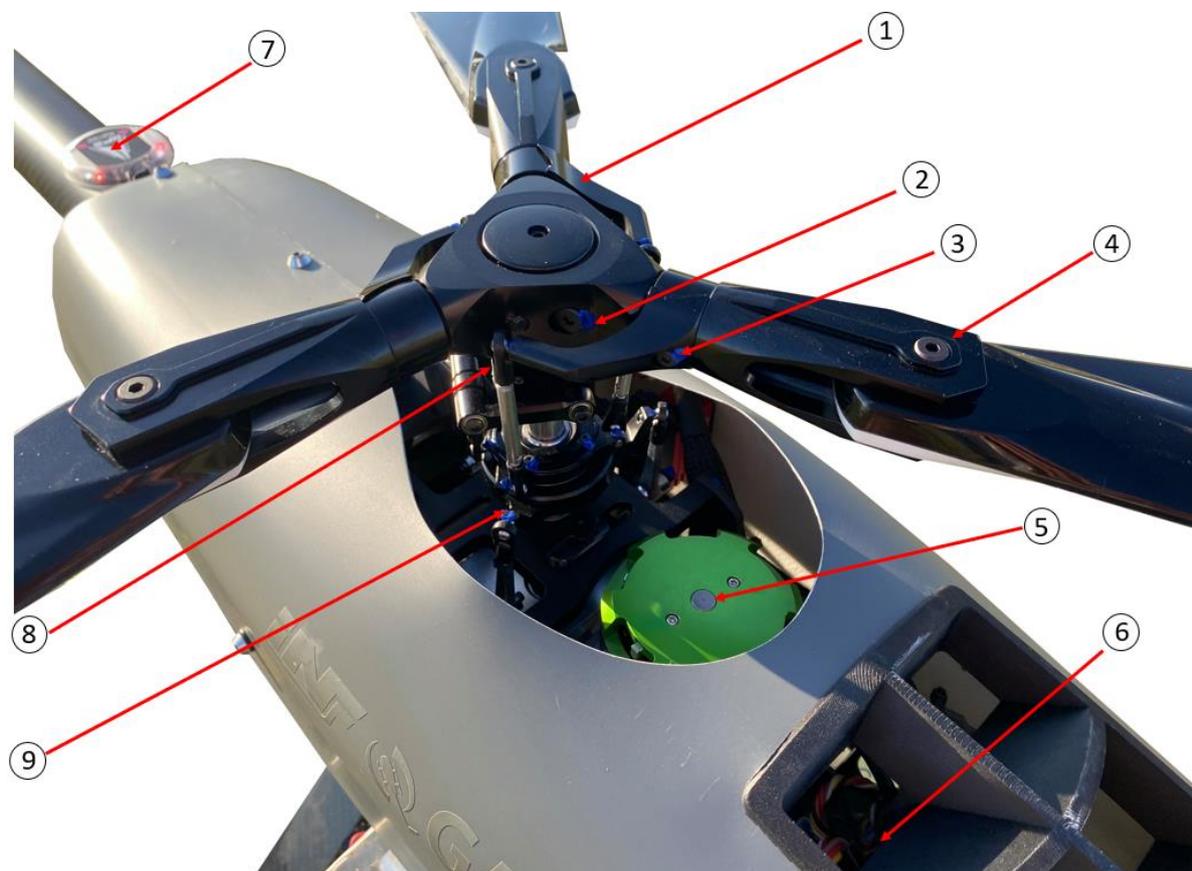
- The Parachute will automatically activate if the flight parameters are met as explained in the Galaxy operating manual
- To manually deploy hold the “Parachute” and “Arm” buttons simultaneously on the GCS until the parachute activates

Landing – End of operations

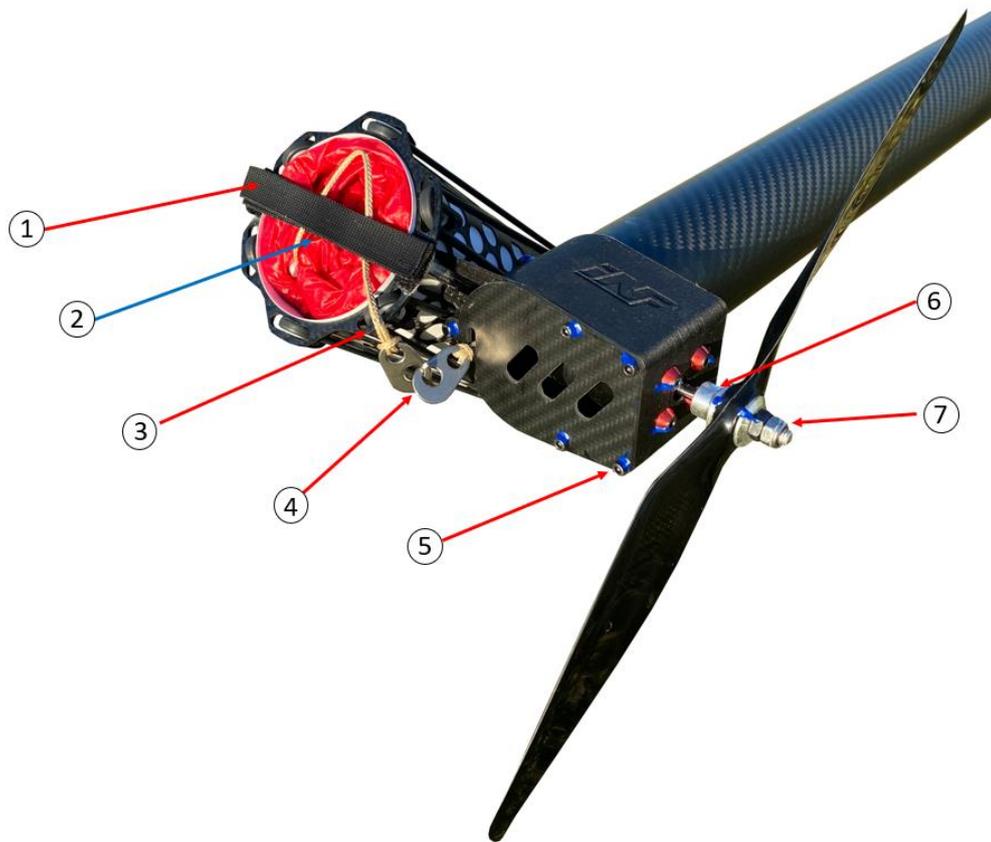
- **Standard Landing Process**
 - Check telemetry data
 - Check Landing area is free from people and objects
 - Lower altitude to 5m and conduct final control check
 - Lower altitude slowing the descent just before touch down
 - Hold altitude control down firmly until main rotor slows down as soon as the Galaxy contacts the ground
 - If the rotor does not slow down within 3 seconds follow emergency shutdown process as aforementioned
- **Remove batteries**
 - Disconnect the main batteries
 - Check that the Galaxy remains powered before turning off the back up battery
 - If the Galaxy does not remain powered with the main batteries removed and the redundant power switch in the on position contact Innoflight or your distributor before continuing operations
- **Check Motor and Electronic Speed Controller (ESC) temperatures**
 - Using an IR heat gun, check the main motor temperature is below 65°C / 150°F
 - Using an IR heat gun check the ESC is below 40°C/ 100°F (the cooling fan must be off to test this)
- **Conduct a mechanical inspection as per pre flight inspection**
 - Check all mechanical parts related to the main rotor and tail rotor system after landing
 - Check parachute system
- **Remove Parachute**
 - Remove the DRS parachute silk/ canopy from the parachute tube carefully
 - Keeping the parachute silk wrapped in the cardboard outer tight at all times
 - Place a rubber band around the parachute to hold the tube shape during transport and storage
 - Keep the parachute in a storage box or bag to prevent damage or unfolding
 - Using something that fits inside the parachute tube release the parachute deployment plate locking latch to relieve the rubber band tensions for storage
 - NEVER release the deployment plate without a heavy object inserted into the parachute tube or slowly release the plate with an object
 - *Releasing the deployment plate with no weight or object to slowly extend the deployment plate WILL result in the carbon structure being damaged*

Mechanical Inspection Points

The below areas are to be inspected before every flight. Conducting flights without preflight inspections is not permitted. It is the sole responsibility of the PIC/ Operator to ensure all systems, parts and relevant items are in correct operating condition before flight.



- 1- Blade Grip Arm – Check the linkage arm to blade grip has **zero movement** and the torque marker is intact
- 2- Feathering Shaft Bolt- Check bolt torque marker has no signs of movement
- 3- Blade Grip Arm Bolt – Check no signs of movement
- 4- Main Blade Bolts – Adequately tensioned and the other 2 bolt (950)/ 3 bolts (1080HL) are of comparable tension. Ie no one bolt is more or less tensioned than the other(s). The main blade tension must be set correctly as per the operating manual to avoid excess vibrations
- 5- Main motor temperature – Measure the temperature on the steel main motor shaft, motor temperatures should be less than 65°C/ 150°F. Allow to cool between flights in hot conditions
- 6- ESC temperature – With the Galaxy powered off (ESC cooling fan off) check the temperature of the ESC is below 40°C/ 100°F
- 7- GPS Puck- LED indicates status. Green solid = GPS lock, Green LED flashing = Attitude mode, All LED = Initializing/ RF link to GCS error, Red = System Error
- 8- Plastic Ball linkages – Check no signs of stress, cracking or excess movement
- 9- Metal ball linkages – Check ball linkages show no signs of movement



- 1- Velcro parachute strap – Must be attached during flight with the slack of the parachute cord taken up by the Velcro to avoid tangling in tail rotor or parachute coming up unintentionally during flight
- 2- Parachute silk – Factory packed parachute installed during ALL flights
- 3- Parachute shock cord – Attach to Galaxy boom parachute metal clip before flight, cable can come loose **if not** attached to boom clip and contact tail rotor
- 4- Boom parachute attachment – ensure Parachute silk/ canopy shock cord and boom clips are attached together at all times for flights
- 5- Tail motor mount bolts – check all bolts torque marker shows no signs of movement
- 6- Tail prop hub – check that the prop hub is tightly attached to the tail motor shaft and has no movement
- 7- Tail prop attachment nut- check tail prop hub has dual locking nut and blue torque marker shows night signs of movement

This pre flight checklist does not replace the Galaxy Operating manual, it has been created to assist operators to follow correct procedures and operate the Galaxy in a safe manner. Failing to follow these steps carefully can result in damage to the Galaxy aircraft and any attached payloads. Never operate the Galaxy if any of the above points are of concern and consult your nearest distributor as soon as possible.

Always operate the Galaxy 950/ 1080HL with strict adherence to any unmanned aviation laws within the country of operation.

Galaxy Operating Manual:

<https://drive.google.com/drive/folders/111-0y7kEBE6YU1Jmh4elFiE9NOFz8Ugz?usp=sharing>