TP-302-001

IG42-SB-T GPS Autonomous GPS Robot

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SAFETY GUIDE

Thank you for purchasing this product!

WARNING - Before using, read this guide to ensure correct usage and operation. After reading, store in a safe place for future reference. Incorrect handling of this robot could result in personal injury or physical damage. The manufacturer assumes no responsibility for any damage caused by mishandling that is beyond normal usage defined in these manuals of this product.

NOTE - The information in this manual is subject to change without notice.
- The manufacturer assumes no responsibility for any errors that may appear in this manual.
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This symbol indicates an additional warning (including caution).

This symbol indicates a prohibited action. The content will be clearly indicated in an illustration or nearby.

Safety Precautions

Do not operate the robot if it isn't working properly.

If you notice something unusual when operating the robot, immediately stop and turn the unit off. Contact our technicians at **info@sdrobots.com** and explain the issue. This includes smoke, strange odor, damage to the chassis or components etc.

Be careful when operating around children and animals

Children and animals may not understand that the robot has moving parts. Exercise caution when operating the robot and remain aware of your surroundings.

Do not expose interior to liquid or insert foreign objects

1. Do not place the robot near water while interior is exposed (ex. flooded area, bathroom etc.).
2. Do not insert any foreign objects into the robot.
3. Avoid placing the robot into a container/bag/case that contains objects besides it's own components.

Be careful when interacting with internal components of the robot.

The robot contains moving and electric components. Modification and/or disassembly of the robot could result in personal injury. **ALWAYS** disconnect the power before working on the robot.

Do not drop, throw, or otherwise cause an impact to the robot

The robot contains moving components, wiring, and electrical systems. If the robot is dropped or otherwise receives an impact, internal components could be damaged. If the robot is dropped or otherwise falls and is damaged, turn it off immediately.

Pinching hazard

The drive systems have very powerful motors. There are many pinch points! If fingers or hands are inside the drive section while on, injury may occur.

LEGAL INFORMATION

Accurate content is of important to the authors of this document. If you find an error or an item that needs clarification report it to www.superdroidrobots.com

1. SuperDroid Robots, Inc is not responsible for special incidental, or consequential damages resulting from any warranty or under any legal theory, including, but not limited to lost profits, downtime, goodwill, damage to, or replacement equipment or property, or any cost of recovering, reprogramming, or reproducing any data stored. **ANY LIABILITY SHALL BE LIMITED TO REPLACEMENT OF DEFECTIVE PARTS**. SuperDroid Robots, Inc. is further not responsible for any personal damages, including, but not limited to bodily and health damages resulting from any use of our products.
2. SuperDroid Robots, Inc. makes no representations as to the fitness of its products for specific uses. **ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS HEREBY EXCLUDED**.
3. Agreements shall be construed in accordance with the laws of the State of North Carolina, and the rights and obligations created hereby shall be governed by the laws of North Carolina.
4. In the event a dispute or controversy arises, such dispute or controversy (including claims of default) shall be brought in the courts of Wake County, North Carolina and the plaintiff hereby agrees to this choice of venue.

The following section contains a list of non-warrantable items. Any procedure covered in this section will void the coverage warranty of the robot, or robots, you have purchased.

1. *Removal of the lid, or access to the interior of the robot is considered abuse and neglect and as such will void warranty; Unless otherwise instructed by SuperDroid Robots.*
2. *Using the robot for purposes that it is not intended, or in any situation that could cause damage outside of the normal wear and tear of the robot, will not be covered under warranty and be seen as neglect of the robot system.*
3. *Improper maintenance and overall disregard to the upkeep of the robot can harm, and/or cause severe damage to the robot, leading to malfunctions and/or destruction of the functionality of the robot.*
4. *Located throughout the entirety of this document are other warranty voidable perimeters displayed by RED text Any of which will again cause an immediate void of the warranty and disqualify repairs of the robot.*

NOTE

Ensure all ordered items are in package. While performing first-time setup place robot in a clear space.

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SuperDroid Robots also does business as Team Half-Life
SuperDroid Robots is a registered trademark of Team Half-Life.
Prior to purchasing review our Terms (https://www.superdroidrobots.com/terms.htm)

Unpacking and Activation

Your robot may come in a crate or carry case. As you unpack your robot, take note of how everything fits so you may safely store your system for future use.

1. Check that all your ordered items are included in the package.
2. Place the robot on a level surface or on blocks so that the tracks/wheels can rotate freely.
3. Power on the FlySky controller using the Power switch (*Fig 1A*). The FlySky controllers are labeled as 1 & 2 for easy reference.
4. Power on the robot and allow it time to connect to the controller. This may take up to 30 seconds. (*Fig 1B*).
5. To arm the GPS module, press and hold down the blinking red button. Do this until the button's light turns solid red. (*Fig 1C*).

Figure 1A

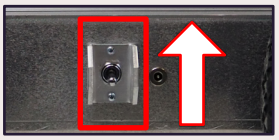
Figure 1B

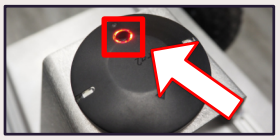
Figure 1C

SECTION 2- OPERATION

Camera and Movement Controls

TOP RIGHT JOYSTICK - Robot Drive: This joystick drives the robot forwards/backwards and turn left/right. Only active during **Manual** mode.

TOP RIGHT SWITCH - Toggle between **Manual**/**Autonomous** modes. **Switch Up** places the robot in **Manual** mode. **Switch Down** places the robot in **Autonomous** mode, where it travels between GPS waypoints.

Autonomous Operation

During autonomous mode, the robot will drive autonomously between GPS waypoints. Use the following instructions to connect to the robot and set a series of GPS waypoints. These instructions are written for use with a **Windows PC**.

1. Download and install the Mission Planner software: **https://ardupilot.org/planner/docs/mission-planner-installation.html**
2. Turn on and arm the robot by following the steps in the **Setup** section of this manual.
3. Plug the provided Xbee remote board + USB-TTL cable into your computer's USB port. The bottom sides of the boards are labeled *REM1* and *REM2*. These correspond to Robot 1 & 2. The correct remote board **MUST** be used with each robot. The remote board will show up in **Device Manager/Ports** (*COM & LPT*) as a **USB Serial Port** (*COMXX*), where XX is a 1 or 2 digit number.

NOTE **In some cases, Windows may identify the board as a Serial Ballpoint Mouse. If this happens, your mouse pointer might move and right-click randomly.**

To fix this error, first turn off the robot to stop any data streams. Go to Device Manager/Mice and other pointing devices. Right click Microsoft Serial Ballpoint and click Disable. Turn the robot back on afterwards and confirm the issue is resolved.

4. Open Mission Planner. In the top right corner select the *COM* port of the XBee remote board. Change the baud rate to **57600**. Click connect at the top right. If the connection is successful, Mission Planner will start downloading parameters from the robot and the red Connect button will change to a green Disconnect button.

NOTE **If you are having trouble connecting, check the selected COM port and baud rate.**

Verify that there is a connection between the XBee remote board and the XBee robot board by checking the LEDs on the remote board. If there is a connection, there will be green LEDs lit and blinking. Otherwise only the red Power LED will be on. If there is no connection, unplug and replug the remote board and restart the robot. Make sure the antennas are connected. Finally, if you continue to experience issues with the XBee boards you can connect directly to the onboard computer by plugging a Micro USB cable into the side of the Cube.

5. Switch to the **PLAN** tab. You can build a set of waypoints to follow by clicking on the GPS map. Click/Drag to move the waypoints. The waypoints are listed at the bottom of the screen and can be rearranged or deleted. When ready, click **WRITE** to send your GPS waypoints to the robot. Note that waypoints can be Saved or Loaded from a file. Click the **READ** button to view the currently loaded waypoints on the robot. Additional info on Mission Planner can be found at **https://ardupilot.org/planner/index.html**

SECTION 2 - OPERATION Continued

6. Take the robot outside and drive around using the FlySky controller a bit until the display on the DATA tab seems to approximate the robot's actual position and orientation. It is normal for there to be some amount of error since GPS is inexact. On the controller, flip the top right switch (SWD) down to begin autonomous operation. The robot will pivot turn to align with the first waypoint and begin driving to it.

NOTE **If you're having trouble getting the DATA tab display to match the robots actual position and orientation, try moving the robot to an area with a stronger GPS signal. Restart the robot and check the display to see if positioning has improved. The robot should be turned on in situations where it has a clear view of the sky with few obstructions/obstacles.**

7. Monitor the robot and switch back into Manual mode (SWD up) if it looks like it may collide with something. **These robots have no obstacle detection**. Note that the robot relies heavily on GPS coordinates, which are subject to error up to several meters. If switched into Manual mode, the robot will pick up where it left off when returned to Auto mode.
8. The robot will stop when it reaches the last waypoint. To run the route again, switch into Manual mode, then return to Auto mode.

On subsequent uses the robot will remember the set of waypoints loaded into it, meaning you don't need to re-upload waypoints to the robot every time it is turned on. Whenever turning the robot on, try to make sure it boots up in an area with good GPS signal. You will need to drive it around manually (mostly in straight lines) for at least 10-20 seconds to help it initialize its position estimate. If the position estimate is not yet stable, the robot will not begin navigating to waypoints when the Mode switch is flipped to Auto. If this happens, just switch back to Manual mode and drive the robot around more before trying again.

Documentation for the onboard Cube Orange computer can be found at the link below.

https://docs.cubepilot.org/user-guides/autopilot/the-cube-module-overview

SECTION 3 - CHARGING & MAINTENANCE

NOTE
Never charge batteries unattended. Regularly charge batteries to prevent levels from dropping below point of recovery.

http://www.superdroidrobots.com/terms_batteries.html

The robot comes with a standard barrel port charger. Plug the provided charger into a wall outlet, then into the robot. The light on the charger will turn **RED** while charging and **GREEN** when it is fully charged. (*Fig 2A*)

The FlySky remote is powered by standard AA batteries.

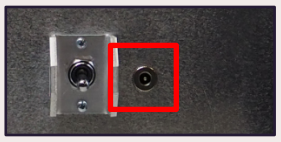

Figure 2A

TROUBLESHOOTING & SUPPORT

- **Equipment fails to power up** - Check the batteries charge. Remember to cycle charging throughout storage period when the robot is not in use.
- **Broken or Missing Parts** - If you notice any parts are missing or broken, shut down the robot. Check to see if the parts are required to continue operating. Certain parts are critical to the functions of the robot, or cause further damage if not repaired. Please contact our engineers by telephone or email for further assistance.

NOTE **The smooth & successful operation of your robot requires time and training. Take care of your new robot and it will take care of you. Treat it the same way you would treat any other important piece of equipment.**

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