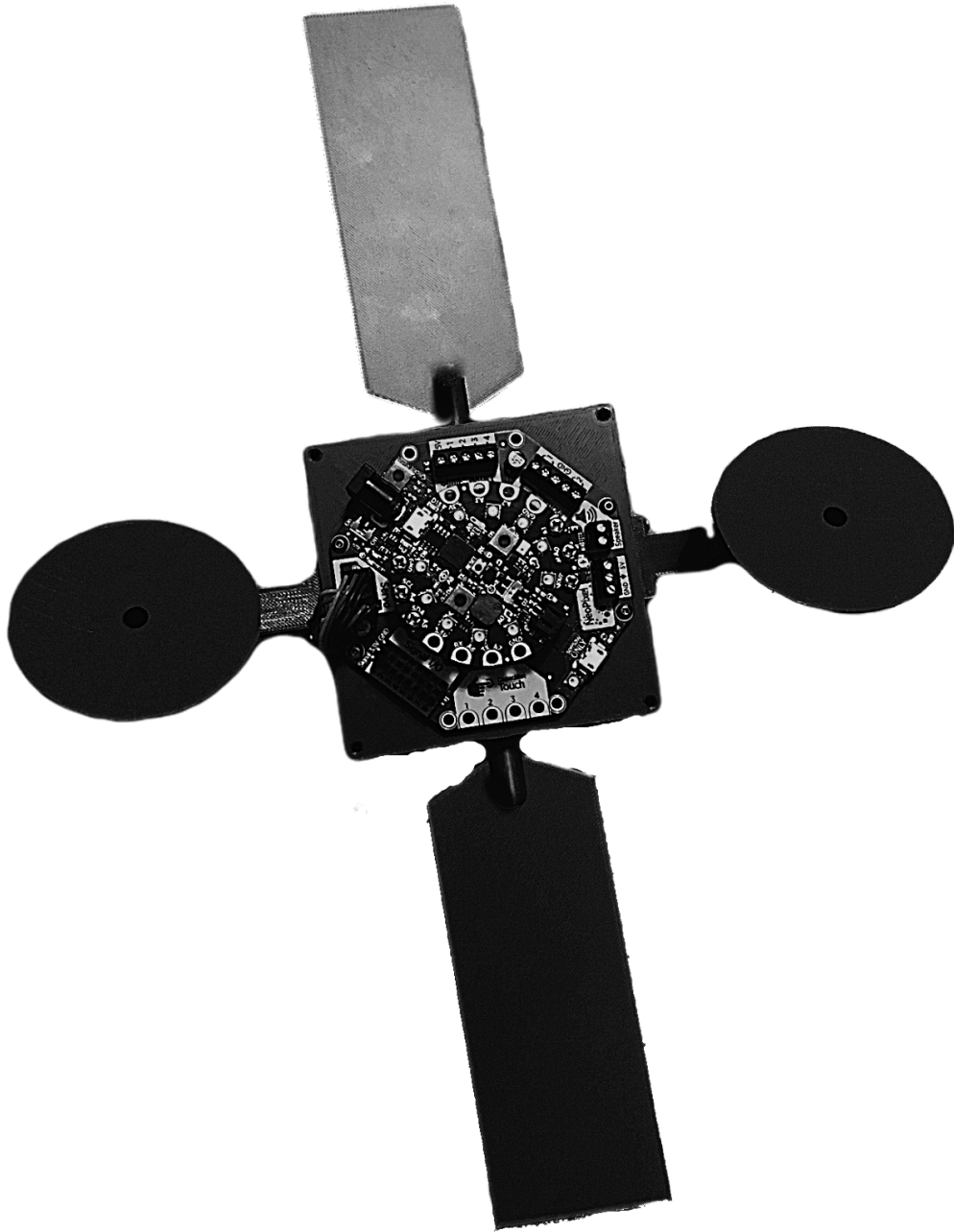


# CPX SimpleSat

## Interface Control Document

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SpaceDotCom - A Otter Mispac creation

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# Introduction

Thank you for your purchase of the CPX SimpleSat Earth Observing System (EOS). The following document contains a brief overview of the SimpleSat environment and control interface via SpaceDotCom's custom ground station environment and Otterbot User Companion (patent pending).

## System Overview

The SimpleSat environment consists of one CPX satellite to be launched into low Earth orbit (LEO) on the date listed in the given contract. The satellite's expected lifetime is roughly 15 years from the date of launch. On board the satellite will be a custom designed gyrostabilizer and temperature management system unique to SpaceDotCom. Additionally the satellite will have two control antennas to provide double redundancy incase of a fault.

The SimpleSat environment also consists of one CPX ground station for both communications and maintenance of your satellite. This system will talk to the satellite over a frequency hopping differential quadrature phase shift keying (DQPSK) at a blazing fast 125 kbps, and encrypted with Manchester encoding for additional security.

## Interface Overview

Interfacing with the ground station is done either physically over a serial data link, or remotely via the Otterbot User Companion (patent pending). Through either link, the user simply logs in with the given username and password assigned to them when they purchased the system. Note it is strongly recommended that users change their default password of "password" to something more secure, like "p455w0rd".

Using their login credentials, users will be able to view and check the health and status of all the different systems running on their CPX satellite. Should they see something wrong, like an antenna misalignment or a charging malfunction, they can contact SpaceDotCom, where one of our helpful administrators will login remotely using our secure internal company password. Once logged in they will be able to diagnose and remotely repair your satellite back to its optimal working state.

## Interface Definition

The following is a list of commands available to the users and maintainers of your CPX SimpleSat system. Each command is broken down into the associated subcommands and any other useful information.

Note that the SpaceDotCom team does have several additional commands enabled during development and testing to validate the functionality of servo and led controls, but those are always disabled before launch.

## Login:

This is the command used to log into the ground station system. When performed at the user level it will allow you to check the health and status of your satellite. The command format is simply "login [username] [password]".

For commercial users your username is simply the name you use when talking to otterbot. All user accounts are given the default password of "password" at account generation, but you are strongly advised to change it.

For SpaceDotCom remote administrators, log in using the company wide administrator account only after gaining direct permission from the satellite owner. Should you forget the corporate password for any reason, remember the helpful password hint: "Wh0 p4y5 y0u?"

## Ant:

This command focuses on the primary and secondary control antennas.

## Status

Returns the current status of the primary or secondary antenna. Note if a weak signal is detected, please contact a SpaceDotCom administrator to log into your system and reset the control antenna to your current region.

## Calc

Calculates the new zone a ground station is in should you have decided to move your ground station to a new location. Note, please inform SpaceDotCom HQ ahead of your move or else the HQ ground station may overwrite any realignment requests on the primary control antenna.

## Set

Sets either the primary or secondary control antenna to target a new zone. Note this command should only be used by an administrator.

## Bat:

This command deals with the battery and solar charging system. Note that in the CPX satellite the battery will act as a backup temperature management system as long as the battery is in a charging state.

## Status

Return the status of the battery system: it's current charging state, how long till drained/charged, the state of each solar panel, and if the battery is acting as a temperature backup.

## Enable / Disable

Enables or disables either the primary or secondary solar panel. Note this is to only be used by an administrator to help diagnose or correct an error within the battery system.

## Temp:

This command focuses on the temperature management system onboard the CPX satellite. Note the internal flight control system of SimpleSat requires a minimal operating temperature of at least 0C, and a maximum temperature no greater than 40C. Client payloads may be even more restrictive, so please ensure to inform SpaceDotCom of any additional restrictions before the satellite is launched.

## Status

Gets the status of the temperature management system.

## Set

Updates the minimum and maximum temperatures for the temperature management system. Warning: this command can only be used by an administrator, and should not be used without ensuring that the new temperature range will disable or deactivate any key components.



## Orbit:

This command focuses on the orbital state of the satellite. Should a catastrophic failure occur, a SpaceDotCom administrator can use this command to reset the targeted orbit of the satellite. Note that doing so will greatly reduce the lifetime of the satellite.

## Status

The current status of the satellites orbital management system. This will report the health of the flight control systems, the current target orbit, and expected fuel lifetime left.

## Mode

Allows an administrator to set the current flight mode of the system between automatic and manual. Note: due to the requirements of the United States Space Command, the system may only be put in manual flight mode if the onboard system has detected a critical flight failure and does not believe it can maintain its current orbit.

## Set

Allows an administrator to set a new orbit for the satellite to target. These parameters will be passed onto the thruster control system. Warning: using thrusters to change orbital parameters will greatly reduce the lifetime of the satellite.

## Ignite

Allows an administrator to manually activate thrusters once a new orbit has been set. Were this some sort of game, it feels like this would be the winning command.

## Errors / Troubleshooting

While the CPX SimpleSat has had a robust and highly successful launch history of 1 successful test flights, it is possible that you may encounter errors or unusual states during your satellites lifetime. Below are a list of tips and tricks from our engineers for common questions we have received from other users:

- Help, I've forgotten my username and password. How do I log in?
  - It's literally your username and password
    - Let's be honest, no one changes the default password in 1999
- I recently moved my ground station to a new location but am suffering from bad reception. What do I do?
  - An admin will need to update your command antennas to point to your new zone.
    - To calculate this zone, the administrator will need your ground stations latitude, longitude and altitude.
- A payload on my satellite now requires a very specific temperature range due to thermal degradation. Will this negatively affect the rest of the satellite?
  - No, as long as that range does not cause it to exceed the temperature limits of the flight control system (0C to 40C), everything will be fine.
- I received a status message saying that the temperature control unit was malfunctioning, have I lost my satellite? Can I get a refund?
  - Sometimes the temperature management system will get into a bad state, thankfully the onboard battery system will act as an automatic backup as long as at least one of the panels is providing enough power to charge the battery.
    - This should allow plenty of time for a SpaceDotCom admin to connect to your system and figure out a solution.
  - All SpaceDotCom sales are final, and all systems are sold as is.