

# TI-84 Plus CE Python Tello Drone Getting Started



## Overview of the TI 84 Plus CE and Tello Drone

The Tello Original, Tello EDU, and Tello TT are all supported by the TI-84 Plus CE tello module. Some tello module methods are not supported on the Tello Original, and some of the more sophisticated features of the Tello TT are not supported in the module. The Tello EDU is the recommended drone.

Watch the companion [Getting Started Videos](#) with this QR code:



Tello



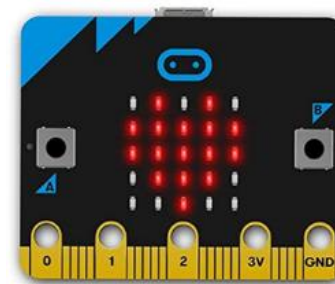
Tello EDU



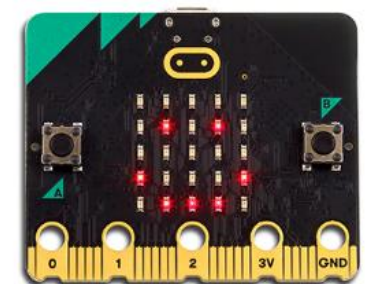
Tello TT

Determine if your micro:bit card is version 1 or version 2. The version 2 card has scallops on the board's gold connector edge and a speaker on the back.

*Note: The `ti_runtime.hex` will not load on a version 1 card. A version 2 micro:bit is required for the Tello drone module to communicate with the calculator and drone.*



version 1



version 2

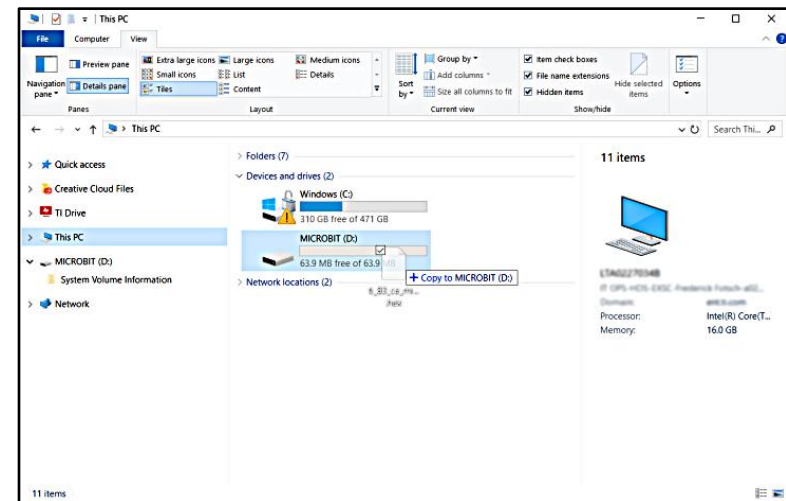
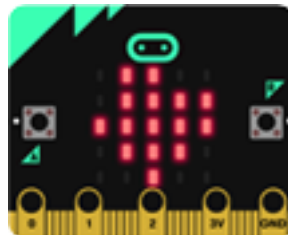
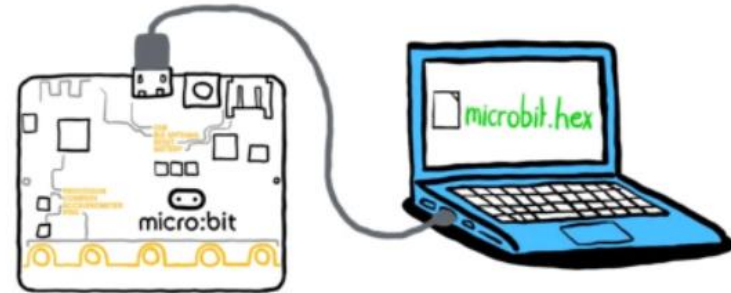
# TI-84 Plus CE Python Tello Drone Getting Started



## Part 1 - Loading the Software ([video](#))

### A. Load the ti\_runtime.hex on the micro:bit:

- Download and unzip the Tello .zip file to a convenient location on your computer, such as your desktop. Locate the ti\_runtime.hex file.
- Connect the micro:bit to your computer using a micro USB cable. The micro:bit will appear as a flash drive icon on the computer.
- Drag and drop the ti\_runtime.hex file to the micro:bit icon. Alternatively, left-click on the file and use the 'Send to' command to copy from the Tello folder to the micro:bit card.
- After the ti\_runtime.hex is successfully flashed on the card, the Texas logo will appear.



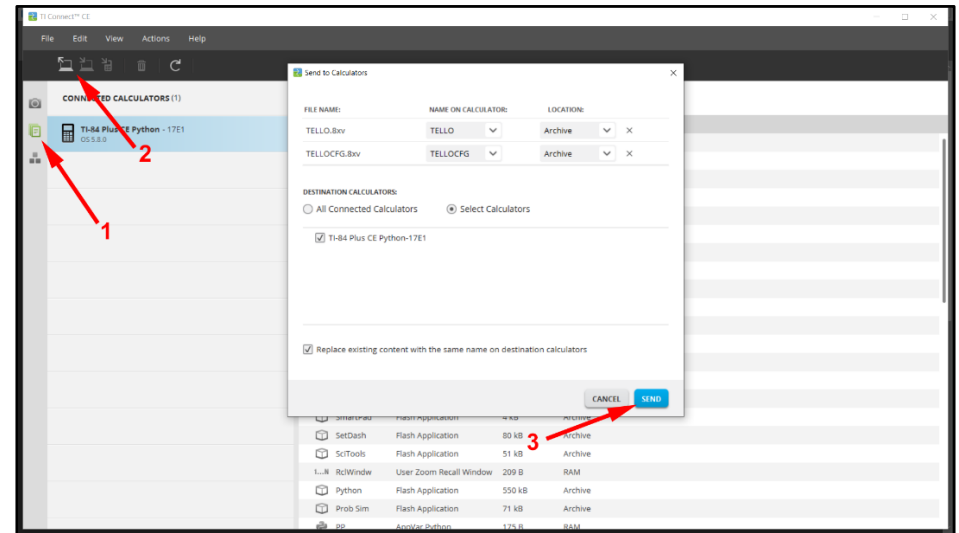
*Note – The ti\_runtime.hex provides functionality between the calculator and the micro:bit card. The ti\_runtime.hex installation is a one-time process. If the micro:bit is programmed from a computer in a different editor, e.g., The micro:bit Python editor, or MakeCode editor, the ti\_runtime.hex will be replaced and must be installed again.*

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## B. Transfer the Tello modules to the calculator:

- Locate the TELLO.8xv and TELLOCFG.8xv files in the Tello folder. Use TI Connect CE to transfer the files from your computer to the calculator. The modules will install automatically into the archive memory.
- Select the Calculator Explorer (1) icon on the left of the window.
- Select the Add Content icon (2) from the top menu bar.
- From the Open box, navigate to the Tello module folder.
- Select **TELLO.8xv** and **TELLOCFG.8xv**, then select the Open button at the bottom of the window.
- The window on the right will appear. Select SEND (3) to complete the transfer.



*Note: Get the PC and Mac: TI-Connect CE Software (free):*

<https://education.ti.com/en/products/computer-software/ti-connect-ce-sw>

*Note: Ensure your TI-84 Plus CE PYTHON is updated to the latest OS/app bundle, version 5.8.0 or later, prior to transferring the tello modules. Visit:*

<https://education.ti.com/en/product-resources/whats-new-84-ce>.

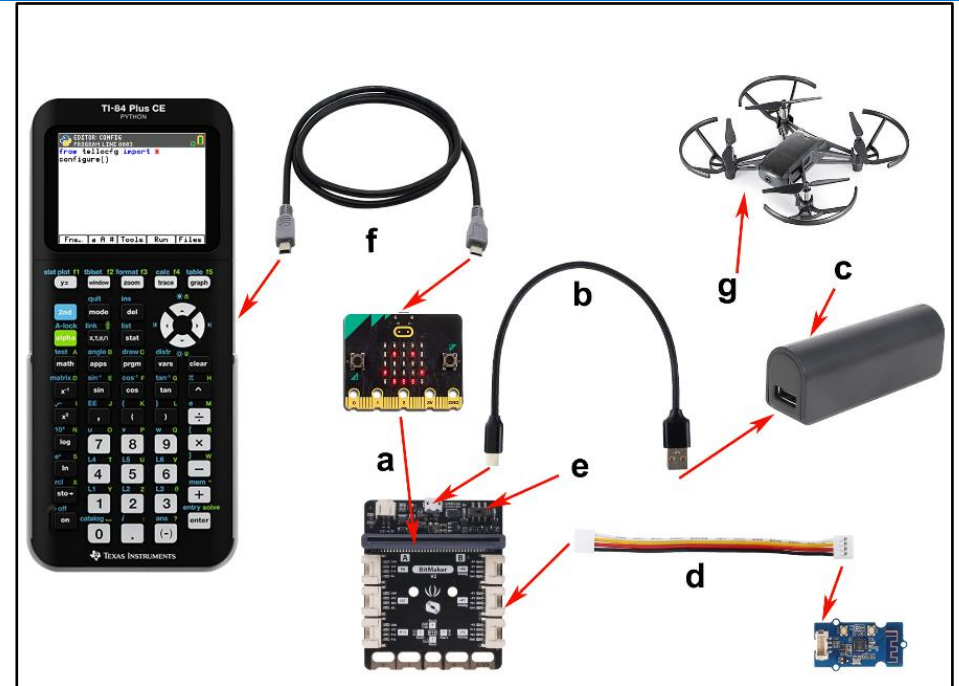
# TI-84 Plus CE Python Tello Drone Getting Started



## Part 2 - Putting the Pieces Together [\(video\)](#)

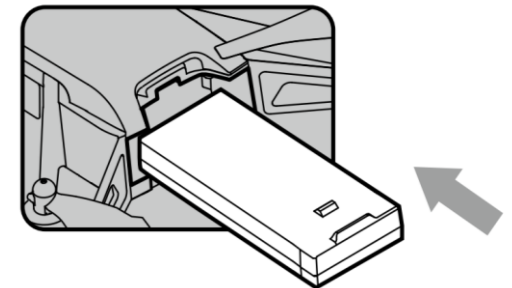
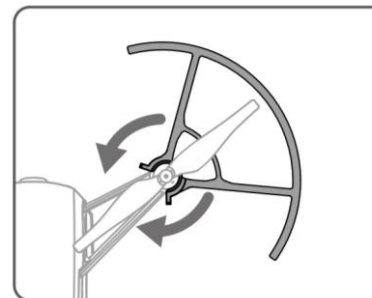
### A. Prepare the micro:bit communication system:

- Insert the micro:bit ver 2 card into the BitMaker ver 2 expansion board (a). Be sure the 5x5 LED display faces forward.
- Connect the USB power cable (b) micro-end to the Bitmaker's external battery port and the A-end to the rechargeable battery (c).
- Connect the Grove cable(d) to the BitMaker ~P1 port and the other end to the Grove WiFi module.
- Slide the BitMaker board switch (e) to ON (ver 1) or 3.3V (ver 2).
- Connect the unit-to-micro:bit cable (f) to the micro:bit card's USB port (micro-end) and then to the TI-84 Plus CE calculator (mini-end).
- Ensure the external battery (c) is fully charged and turned ON.
- Note – When the rechargeable battery is powered ON, the LEDs on the micro:bit, BitMaker board, and the WiFi Module will illuminate.
- Ensure the drone has a fully charged battery. The drone (g) will be activated and updated in Part 3.



### B. Prepare the drone:

- Check that the propellers do not have nicks, and gently but firmly press each propeller onto the motor's shaft.
- Confirm the propellers rotate freely and do not hit the safety guards.
- Inspect the airframe for cracks or other damage.
- Securely insert a fully charged battery into the drone. Be sure to slide the battery in with the correct orientation. Never force the battery!



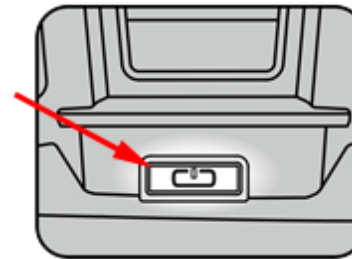
# TI-84 Plus CE Python Tello Drone Getting Started



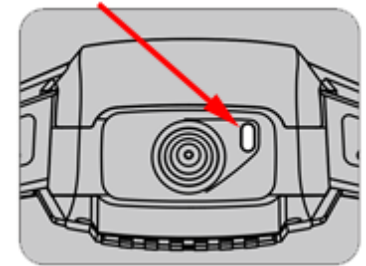
## Part 3 – Activating the Drone ([video](#))

### A. Activate the Tello drone:

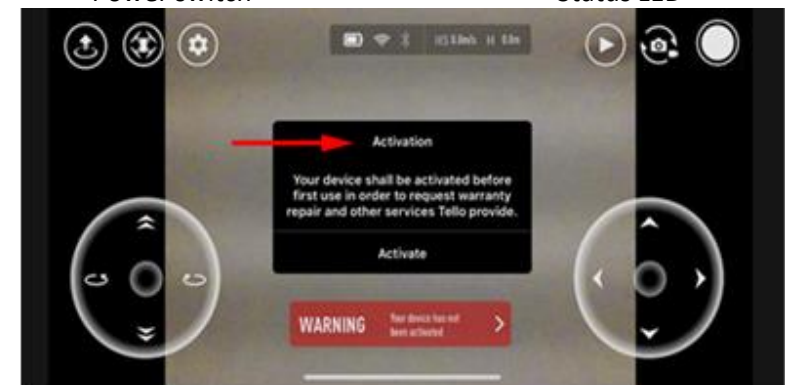
- This step is required for a drone that has never flown, or the firmware needs updating. If the drone is up to date and has previously been flown on any platform, skip to Part 4.
- Download the Tello flight app to your phone. You will need the app to register your new drone once.
- Turn on the Tello drone and wait for the status LED to blink constantly.
- Open the Tello application on your phone, and you will be prompted to connect the drone to the phone's WiFi.
- Switch to the phone's settings to search for available WiFi connections. An example of a drone SSID is TELLO-9EF498.
- Connect to your Tello drone.
- The Tello app will prompt you to activate the new drone.



Power switch

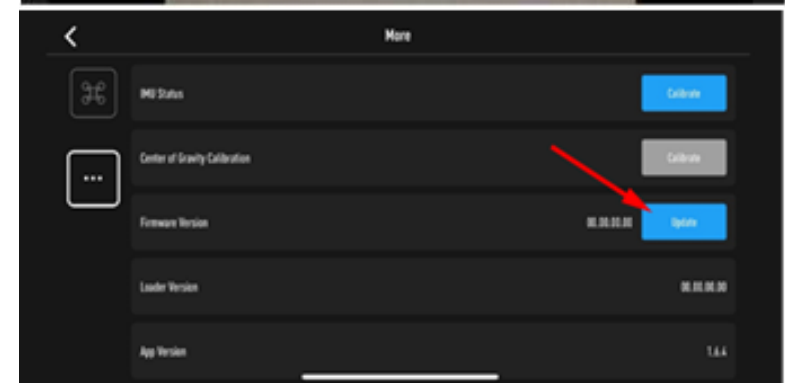


Status LED



### B. Update Tello's firmware:

- Click on the app's update button to check the firmware version of your drone. If it is out of date, you should update the latest firmware version. Out of date firmware may prevent the drone from performing some tello module methods.
- Once activated and updated, disconnect the WiFi from the Tello drone. You will no longer need this app or phone to program the drone with the TI-84 calculator.
- Be sure to disconnect and forget the Tello Drone's SSID on your phone. If your phone automatically connects to the drone, the micro:bit will not.





# TI-84 Plus CE Python Tello Drone Getting Started



## Part 4 – Pairing the micro:bit to the Tello Drone ([video](#))

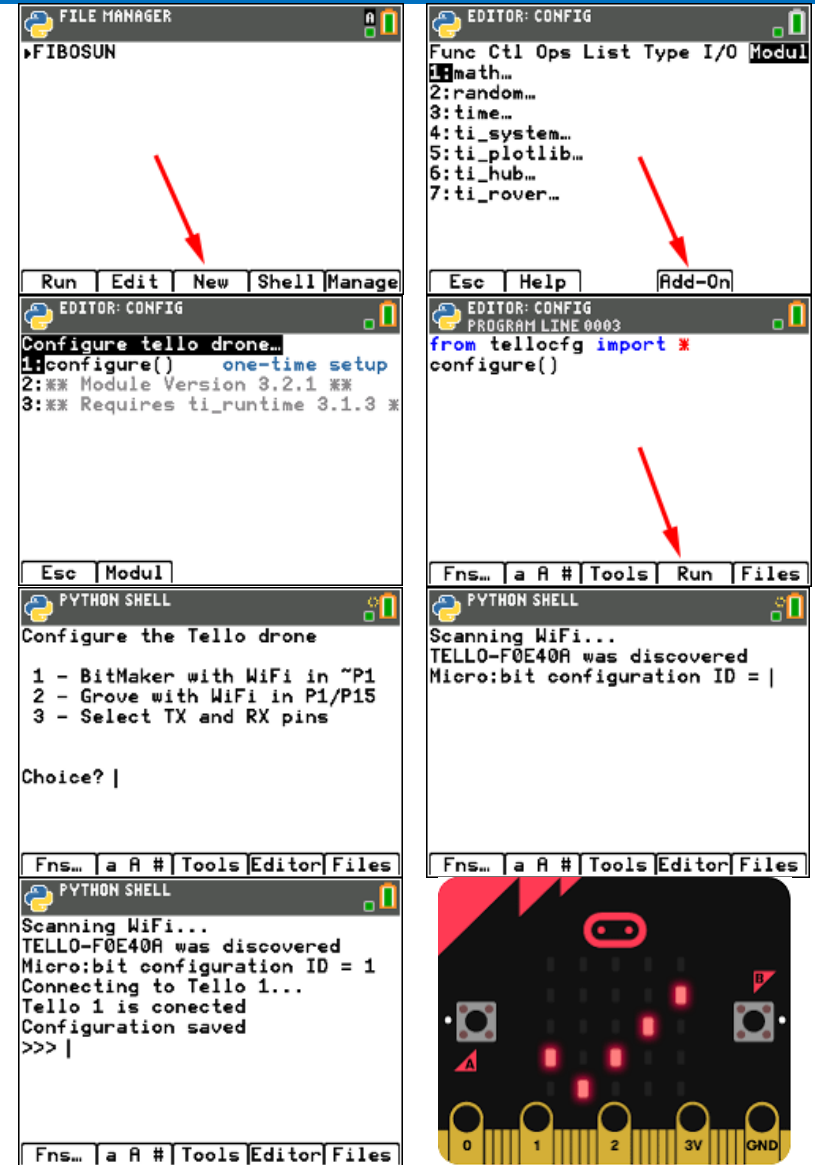
### A. Create the pairing configuration program:

- Select **[New]** to create a program named "CONFIG."
- Select **[OK]**. There will be a blank Python editor screen on your calculator.
- Select the **[Fns...]** → **[Modul]** → **[Add-On]**.
- Select **from tellocfg import \*** the import statement will paste at the program's top.
- Select the **[Fns...]** → **[Modul]** → **configure tello drone**.
- Select configure() from the menus



### B. Run the pairing configuration program:

- Plug in the micro:bit communication system into the calculator and ensure the external battery is turned on.
- Power on the Tello and wait until Tello's status LED is blinking constantly.
- Select the **[Run]** tab to pair the micro:bit to the drone.
- Select the micro:bit expansion board used, BitMaker (1), or Grove (2), and ensure the WiFi module is inserted into the ~P1 port.
- Select TX and RX pins (3) only if you use an expansion board not listed or choose to attach the WiFi module to a port other than ~P1.
- The micro:bit will scan for a Tello SSID and connect if available. It is best only to have one Tello turned on and ensure the Tello is not connected to a phone or other WiFi device.
- Enter a single character micro:bit configuration ID, 0-9 or A-Z, to identify the Tello/micro:bit pair.
- When you see a checkmark on the micro:bit and the **"Configuration saved"** message on the calculator, the Tello is paired and ready to fly!



The screenshots show the TI-84 Plus CE Python interface during the pairing process. The top row shows the **FILE MANAGER** and **EDITOR: CONFIG** screens. The **FILE MANAGER** screen shows a list of files with a red arrow pointing to the **New** button. The **EDITOR: CONFIG** screen shows the configuration menu with a red arrow pointing to the **Add-On** button. The bottom row shows the **PYTHON SHELL** screen. The left **PYTHON SHELL** screen shows the configuration options: **Configure the Tello drone**, **1 - BitMaker with WiFi in ~P1**, **2 - Grove with WiFi in P1/P15**, and **3 - Select TX and RX pins**. The right **PYTHON SHELL** screen shows the execution of the program, displaying the message: **Scanning WiFi...**, **TELLO-F0E40A was discovered**, **Micro:bit configuration ID = |**, and **Configuration saved**. A red arrow points to the **Run** button in the bottom menu.

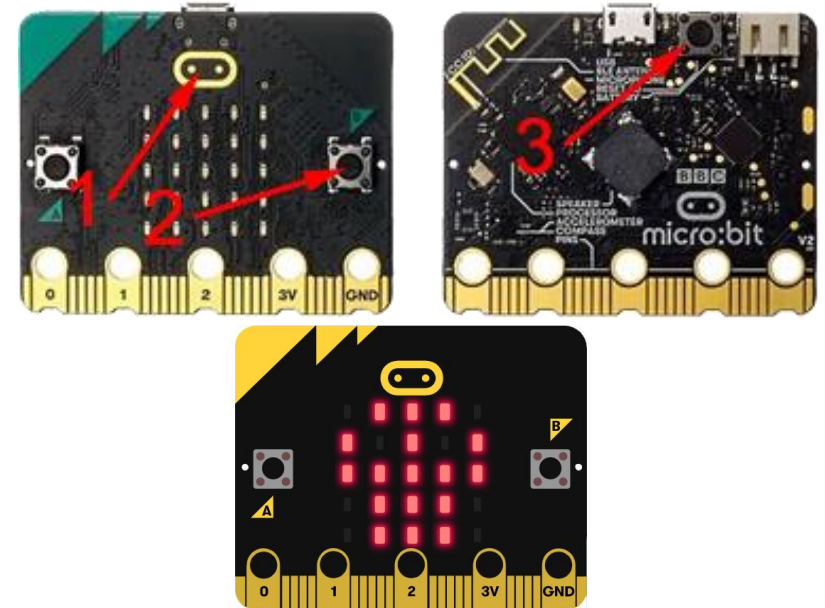
# TI-84 Plus CE Python Tello Drone Getting Started



Note – the micro:bit configuration is paired to a particular drone and will not work with a different one; it is helpful to label the drone with the character used during pairing. After pairing, the micro:bit will automatically connect to only this Tello.

- C. Resetting the micro:bit configuration - should you need to pair the micro:bit to a different drone, you will need to delete the pairing configuration stored on the micro:bit by doing the following:
- Touch the gold pin\_logo touchpad (1)
  - Press button B (2)
  - Press the reset button on the back of the card (3).
  - While holding down button B and touching the pin\_logo, release the reset button.
  - If successful, a skull will display on the micro:bit. The next time you want to run a Tello program, you will need to do the pairing process again.

*Note: Any time a new ti\_runtime.hex is transferred onto the micro:bit card, the pairing steps A and B must be performed.*



# TI-84 Plus CE Python Tello Drone Getting Started



## Part 5 – Learning to Fly ([video](#))

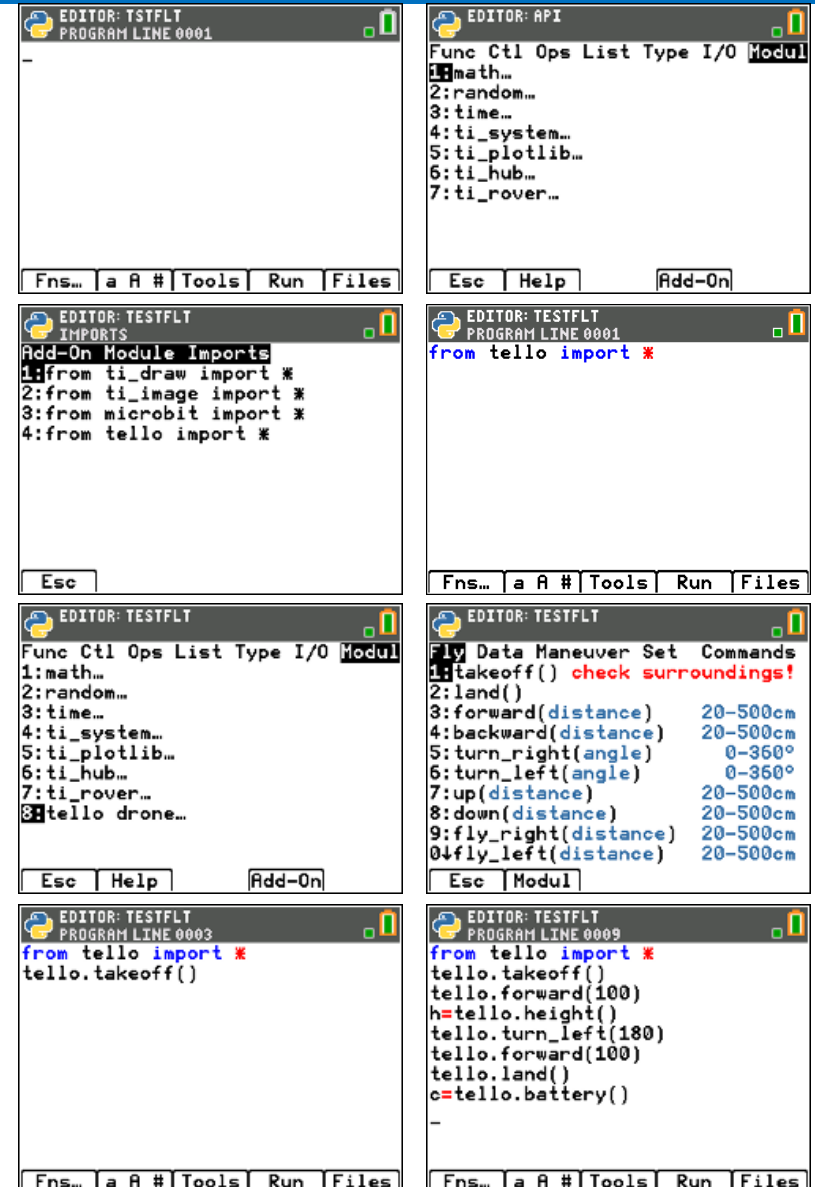
### A. Write a flight program:

- Select [**New**] to create a program named “TESTFLT.”
- Select [**OK**]. There will be a blank Python editor screen on your calculator.
- Import the tello module into your program.
- Select the [**Fns...**] tab and select the [**Modul**] tab.
- Select the [**Add-On**] tab and select **from tello import \*** the import statement will paste at the program's top. This action will import the tello module into the editor and add the tello menu to the bottom of the modules list.
- Next, select [**Fns...**] and arrow to the [**Modul**] tab, then cursor arrow down to tello drone and press [**enter**]. The menus will display all of the tello drone methods.
- Select **.takeoff()** always as the first statement in all flight programs.
- Explore the tello module menus and enter the rest of the TESTFLT program.



### B. Run the program:

- Place your drone in a well-lighted area free of obstructions. The drone has a positioning camera on the underside, which works best over a patterned rug or other non-uniform visual surfaces.
- Ensure everything is powered up and [**Run**] the program.
- Modify your program by adding a flip at the end of the square. The drone must have at least 50% battery charge to perform a flip.



The following screenshots illustrate the steps to create and run a flight program on the TI-84 Plus CE Python calculator:

- EDITOR: TESTFLT** (PROGRAM LINE 0001): A blank editor screen with tabs for Fns..., a A #, Tools, Run, and Files.
- EDITOR: API**: A list of modules including math, random, time, ti\_system, ti\_plotlib, ti\_hub, and ti\_rover.
- EDITOR: TESTFLT** (PROGRAM LINE 0001): The **Add-On Module Imports** menu is open, showing options like ti\_draw, ti\_image, microbit, and tello.
- EDITOR: TESTFLT** (PROGRAM LINE 0001): The **from tello import \*** statement is pasted at the top of the program.
- EDITOR: TESTFLT** (PROGRAM LINE 0001): The **Modul** tab is selected, showing a list of modules including tello drone.
- EDITOR: TESTFLT** (PROGRAM LINE 0001): The **takeoff()** method is selected from the tello drone menu.
- EDITOR: TESTFLT** (PROGRAM LINE 0003): The program now includes the **from tello import \*** statement and the **tello.takeoff()** command.
- EDITOR: TESTFLT** (PROGRAM LINE 0009): The program is completed with the following code:
 

```
from tello import *
tello.takeoff()
tello.forward(100)
h=tello.height()
tello.turn_left(180)
tello.forward(100)
tello.land()
c=tello.battery()
```



# TI-84 Plus CE Python

## Tello Drone Getting Started



Trouble Shooting	
Problem	Solution
I don't see the tello module menus.	Transfer and install the Tello module to the calculator. See Part 1 – Loading the Software.
I don't see the Texas logo on my micro:bit.	Transfer the ti_runtime.hex file to the micro:bit card. See Part 1 – Loading the Software.
The calculator will not connect to the Tello drone.	<ul style="list-style-type: none"> <li>• Check that your hardware configuration is assembled correctly. See Part 2 – Putting the Pieces Together.</li> <li>• Ensure the drone is activated. See Part 3 – Activating the Drone.</li> <li>• Ensure the drone has been paired to the micro:bit. See Part 4 – Pairing the micro:bit to the Tello Drone.</li> <li>• Unplug/replug the micro:bit, power-cycle the drone, and press the reset button on the micro:bit.</li> <li>• Ensure the Tello Drone is not connecting to a phone's WiFi.</li> </ul>
Command status reports "COMPLETED," but Tello's flight is erratic.	Tello uses flight vision for positioning. A well-lighted space and patterned floor are required, and typical glossy-white school flooring may cause erratic flight. Try moving to an area with a different floor appearance with lots of light.
Tello crashes and flies oddly.	Bent propellers and interference with propeller guards may be the problem. Replace propellers (notice markings on props and placement order). If the problem continues, calibrate the inertial motion unit (IMU) using the Tello phone app. See the Tello owner's manual.
The Tello drone will not take off, and the status light is blinking red.	Charge or replace the drone battery.
Tello will not perform flips.	The battery charge must be greater than 50%. Check battery charge with <code>tello.battery()</code> method.
The calculator does not connect to Tello, and the micro:bit displays a sad face.	<ul style="list-style-type: none"> <li>• Check that the WiFi module is in the correct port.</li> <li>• Check that the expansion board's power switch is ON (BitMaker V1 expansion board only).</li> <li>• Check that all batteries are fully charged.</li> <li>• Check the external battery connected to the expansion board is turned on.</li> <li>• Disconnect, reconnect the calculator and external battery, and try the program again.</li> </ul>
For more information on the Tello drone	<ul style="list-style-type: none"> <li>• Check the Tello drone user manual</li> </ul>

# TI-84 Plus CE Python

## Tello Drone Getting Started



**Tello Drone**

During pairing WiFi does not discover a TELLO- SSIS and micro:bits displays a “?”

- Turn on the Tello until the LED steadily blinks. Hold Tello power button down for ~10 sec until the WiFi resets and the Tello powers down.
- Hold the RST button down on the Grove WiFi module to reset the device configuration.
- Reset the micro:bit Tello configuration, see section 4:C in this document.