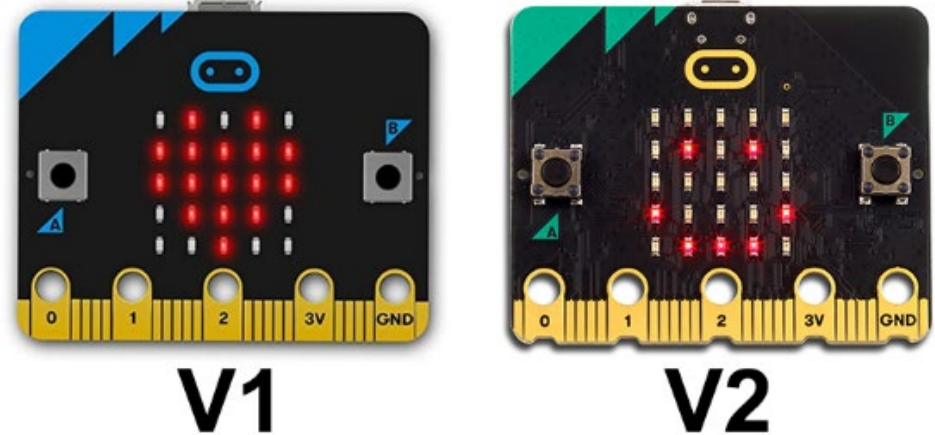
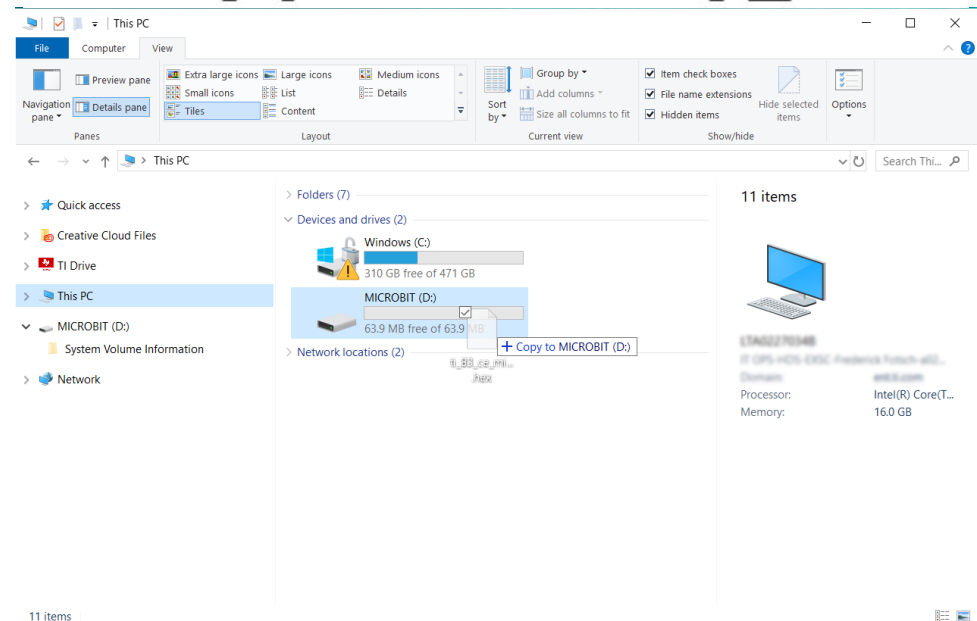


Installation of ti_runtime and 84 Plus CE Tello modules

1. Determine if your micro:bit card is a V1 or V2. The V2 card has scallops on the board's gold edge, while the V1 is straight. **The Tello Drone only works on a V2 board.** Download and unzip the Tello .zip file to a convenient location on your computer, such as your desktop. Locate the 2.x.x ti-runtime.hex file.

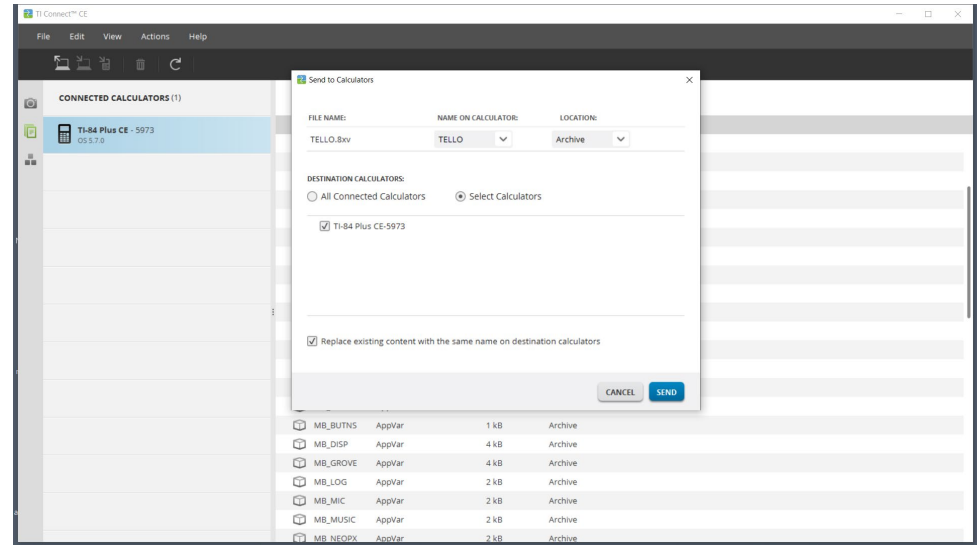


2. [Click here to watch a video](#) on how to configure your Tello drone.
3. Connect the micro:bit to your computer using a micro USB cable. The micro:bit will appear as a flash drive icon on the computer. Drag and drop the 2.x.x ti-runtime.hex file to the micro:bit icon. Alternatively, left-click on the file and use the 'Send to' command to copy from the Tello folder to the micro:bit card. This file provides functionality between the TI-84 Plus CE Python and the micro:bit card. The ti_runtime installation is a one-time process. If the micro:bit is connected back to the PC and programmed in a different language other than Python, such as MakeCode, the ti_runtime.hex will need to be installed again. See additional information at the end of the document.

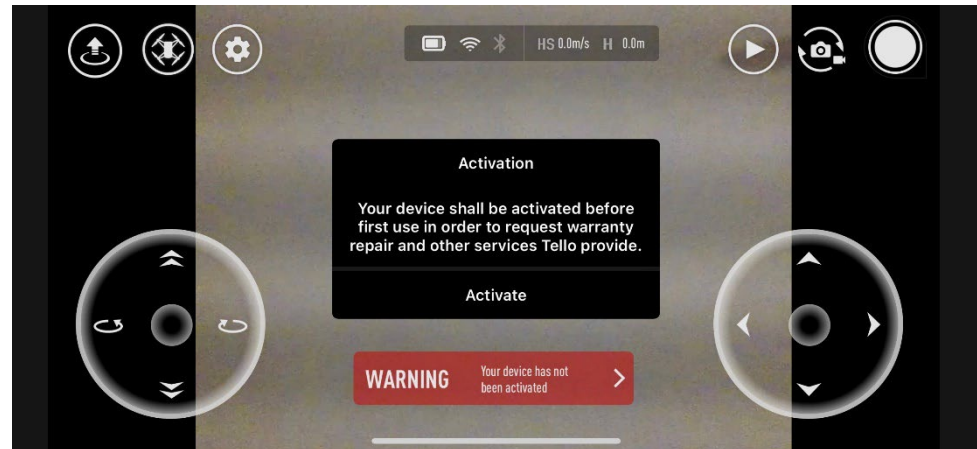


4. Locate the TELLO.8xv file in the Tello folder. Use TI-Connect to transfer the TELLO.8xv module from your computer to the calculator. The module will install automatically into the archive memory.
 - a. Select Actions from the menu.
 - b. Select Add Files from Computer...
 - c. Navigate to the module folder.
 - d. Select in the **TELLO.8xv** and select Open.
 - e. The menu on the right will appear. Select SEND 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)
<https://education.ti.com/en/products/computer-software/ti-connect-ce-sw>



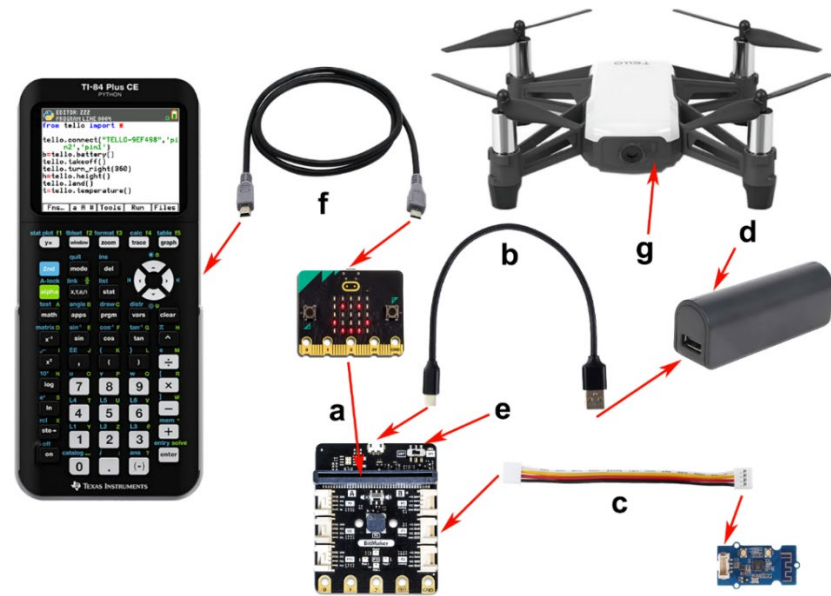
5. Register your Tello Drone.
 - a. Download the Tello flight app to your phone. You will need the app to do a one-time registration of your new drone.
 - b. Turn on the Tello drone.
 - c. Use a phone to search for available WiFi hotspots.
 - d. Connect to your Tello drone. An example of a Tello drone SSID is TELLO-9EF498.
 - e. Open the application, and you will be prompted to register your drone. Once registered, you do not need the phone or Tello application.
 - f. Disconnect your phone from the Tello drone and quit the Tello app. You will no longer need this app to program on the TI-84 Plus CE PYTHON. **Ensure the Tello does not reconnect to the phone again; this will cause a problem when the calculator attempts to connect to the drone.**



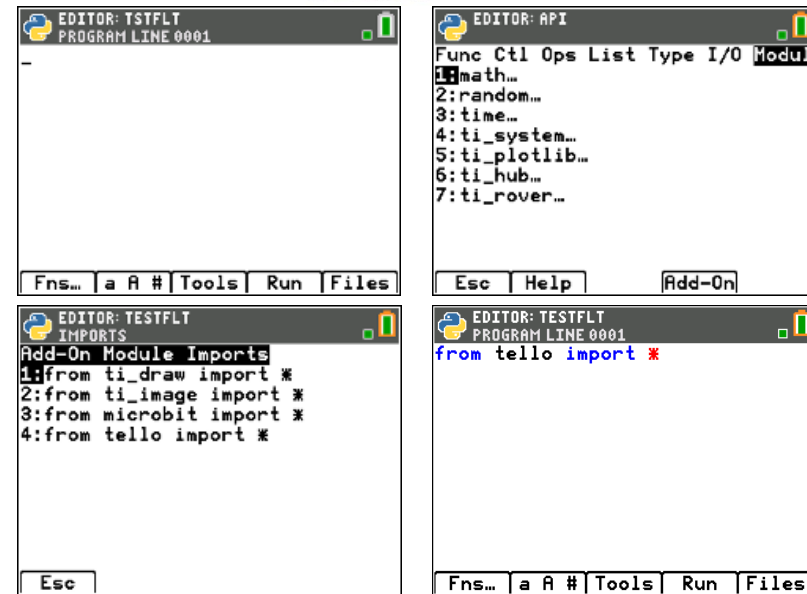
TI-84 Plus CE Python – Tello Drone Getting Started



6. Connect the Tello Drone system.
 - a. Insert the micro:bit V2 card into the BitMaker expansion board. Be sure the 5x5 LED display faces the correct direction.
 - b. Connect the external battery to the BitMaker power port.
 - c. Connect the Grove WiFi module to the BitMaker ~P1 port.
 - d. Ensure the external battery is fully charged and turned ON.
 - e. Turn ON the BitMaker board. The LEDs on the micro:bit, BitMaker board, and the WiFi Module will illuminate.
 - f. Connect the unit-to-micro:bit cable to the micro:bit card's USB port (micro-end) and then to the TI-84 Plus CE Python calculator (mini-end). Then turn ON the calculator.
 - g. Ensure the Tello drone is fully charged and turn it ON. It will blink several colors and settle on flashing yellow when it is ready.



7. Configure the Tello Drone system.
 - a. Select [New] to create a program with the name 'TESTFLT'
 - b. Select [OK]. There will be a blank Python editor screen on your calculator.
 - c. Import the tello module into your program. Select the [Fns...] tab and select [Modul] tab.
 - d. Select the [Add-On] tab and select **from tello import * the** import statement will paste at the program's top.
 - e. **Ensure the Tello is quickly blinking yellow; run the program.**
 - f. Select the [Run] tab. Drone configuration will begin.





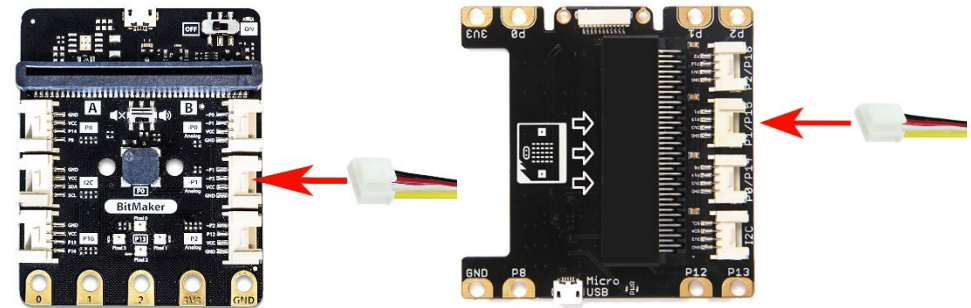
- g. Select the micro:bit expansion board, Grove or BitMaker, and ensure the WiFi module is inserted into the ~P1 port.
- h. Select Advanced only if you are using a different expansion board or port other than P1.
- i. The system will scan for a Tello SSID and connect if available. It is best only to have one Tello turned on and ensure the Tello is not connected to a phone or other WiFi device.
- j. Enter a single character ID, 0-9 or A-Z, to identify the Tello/micro:bit pair. It is best to mark this ID on the Tello. After pairing, the micro:bit will automatically connect to only this Tello.
- k. Unplug the cable from the calculator and then plug it back into the calculator to reset the system.
- l. Your Tello is now ready to fly!

```

PYTHON SHELL
CONFIGURE TELLO DRONE
SELECT YOUR HARDWARE:
1 - BITMAKER WITH WIFI IN P1
2 - GROVE WITH WIFI IN P1
3 - ADVANCED SETUP
CHOICE? 1
    
```

```

PYTHON SHELL
SCANNING WIFI FOR TELLO...
TELLO-F038A8 DISCOVERED
ENTER A SINGLE CHARACTER
MICRO:BIT CONFIGURATION ID = 4
    
```



Creating Your First Python Tello Program

2. Select [New] to create a program named 'TESTFLT' or edit the same program from the previous steps.
3. Select [Ok]. There will be a blank Python editor screen on your calculator.
4. Import the tello module into your program. Select the [Fns...] tab and select [Modul] tab.
5. 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 module list.
6. Next, select [Fns...] and arrow over to the **Modul** tab, then arrow down to tello drone and press [enter]. The menus will display all of the tello drone methods.

```

EDITOR: TESTFLT
PROGRAM LINE 0001
    
```

```

EDITOR: API
Func Ctl Ops List Type I/O Modul
1:math...
2:random...
3:time...
4:ti_system...
5:ti_plotlib...
6:ti_hub...
7:ti_rover...
    
```

```

EDITOR: TESTFLT
IMPORTS
Add-On Module Imports
1:from ti_draw import *
2:from ti_image import *
3:from microbit import *
4:from tello import *
    
```

```

EDITOR: TESTFLT
PROGRAM LINE 0001
from tello import *
    
```

TI-84 Plus CE Python – Tello Drone Getting Started



7. Select `.takeoff()` always as the first statement in all flight programs.
8. Explore the Python programming menus and the tello module menus and enter the remainder of the TESTFLT program.
9. Place your drone in a well-lighted area free of obstructions. The drone has a positioning camera on the underside, and it works best when the drone flies over a nonuniform floor, e.g., a patterned rug. Ensure everything is powered up and Run the program.
10. 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 charge**

```

EDITOR: TSTFLT
Fly Data Maneuver EDU Settings
1: .takeoff()
2: .land()
3: .forward(distance) 20-500cm
4: .backward(distance) 20-500cm
5: .turn_right(angle) 0-360°
6: .turn_left(angle) 0-360°
7: .up(distance) 20-500cm
8: .down(distance) 20-500cm
9: .fly_right(distance) 20-500cm
0: .fly_left(distance) 20-500cm
Esc Modul
  
```

```

EDITOR: TSTFLT
PROGRAM LINE 0007
from tello import *
tello.takeoff()
tello.forward(50)
d=tello.altitude()
tello.turn_left(180)
tello.forward(50)
tello.land()
Fns... a A # Tools Run Files
  
```



Trouble Shooting	
Problem	Solution
I don't see the tello module menus.	Use TI-Connect to transfer the module to the calculator. The menus only appear in the editor after the <code>from tello import *</code> line.
I don't see the Texas logo on my micro:bit.	Transfer the TI_runtime file to the microbit card.
The calculator will not connect to the Tello drone.	Quit the program. Unplug the cable from the calculator and press the reset button on the back of the microbit card and the RST button Grove WiFi module. Reconnect the cable to the calculator and try again. The default TX and RX pins for the BitMaker expansion board are P2 and P1. If using a different expansion board other than the MakerBit, you must configure different TX and RX pins unique to that board's port. For example, if using the Grove Shield, plug the Grove WiFi into the P1/P15 port and enter
Command status reports "COMPLETED", but Tello flight is erratic.	Tello uses flight vision for positioning. A well-lighted space is required. Additionally, the floor should not be uniform or glossy in appearance. 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). There is also a IMU calibration that can be done using the phone software. See the owner's manual.
Tello drone will not take off, and the status light is blinking red.	Charge the drone battery.
Tello will not perform flips.	The battery charge must be greater than 50%.
The calculator does not connect to Tello, and microbit displays an unhappy face	<ul style="list-style-type: none"> • Check that the WiFi module is in the correct port. • Check that the expansion board's power switch is ON if present. • Check that all batteries are fully charged. • Check the external battery connected to the expansion board is turned on. • Disconnect and reconnect the calculator and the external battery and try the program again.
For more information on the Tello drone	<ul style="list-style-type: none"> • Tello drone user manual