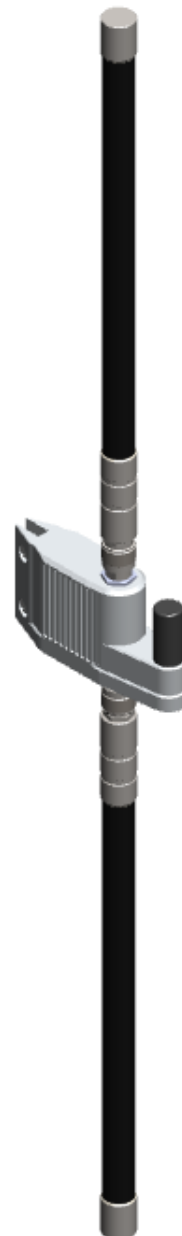
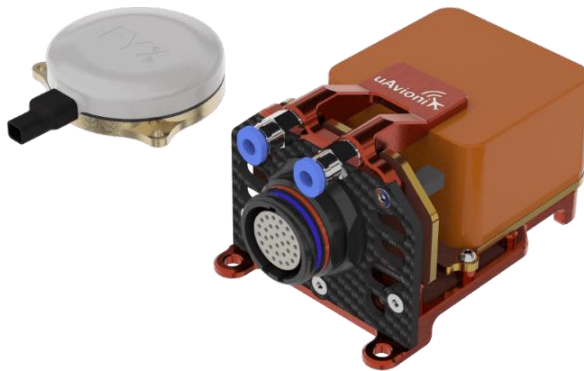


# uAvioni

## George G2i User Guide



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## 1 Revision History

Revision	Date	Comments
A	6/9/2021	Initial release
B	8/29/2021	G2 updates
C	9/5/2021	SS2 and Compass Updates
D	10/19/2021	Update parameters
E	7/7/2022	Update for RC Input

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## 2 Limited Warranty

uAvionix products are warranted to be free from defects in material and workmanship for one year from purchase. For the duration of the warranty period, uAvionix, at its sole option, will repair or replace any product which fails under normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost.

This warranty does not apply to cosmetic damage, consumable parts, damage caused by accident, abuse, misuse, water, fire or flood, damage caused by unauthorized servicing, or product that has been modified or altered.

IN NO EVENT, SHALL UAVIONIX BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

### Warranty Service

Warranty repair service shall be provided directly by uAvionix.

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## 4 Specification

### 4.1 George Autopilot Technology

George combines the flexibility and over a decade's worth of open-source innovation in UAS autopilots with the robustness of a certifiable DAL-C hardware and a DAL-C safety and sensor processor. George has the aircraft.

- Lightweight and low power consumption
- Skyline Cloud-Based C2 Compatible
- TSO-C145e Global Positioning System (GPS) Coordinated Universal Time (UTC)
- Detect and Avoid Ready
- Environmental RTCA/DO-160G and MIL-STD-810H
- Software RTCA/DO-178C Level C
- Complex Hardware RTCA/DO-254 Level C
- FCC 47 CFR Part 15.247 ID 2AFFTC2XISM

Specification	Value
Input Voltage/Power	2S-12S 2.5W
Size	44x40x63mm
Weight	63 grams
Operating Temp	-10° to 55° C
Internal Peripherals	
Core	cubeOrange
C2	uAvionix microLink
ADS-B	uAvionix pingRXpro
Compass	3 axis RM3100
Airspeed	SDP33
External Interfaces	
Servo/ESC Outputs	9
GPS Input	truFYX NMEA +PPS
RS232 Serial IO	2
UAVCAN IO	2
ADC Inputs	2
RC PPM/SBUS Input	1
Top Level Assembly	
George G2	UAV-1005692-001
Options	
truFYXmicro TSO-C145e GPS Sensor	UAV-1005511-001
skyStation2	UAV-1005507-001
ADS-B antenna	UAV-1004675-002
microLink antenna	UAV-1004675-001
XT90 SERIES Adapter	UAV-1005476-001

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## 4.2 Regulatory Statements

### 4.2.1 FCC Statement

FCC ID: 2AFFTC2XISM

This device meets the FCC requirements for RF exposure in public or uncontrolled environments.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### 4.2.2 Industry Canada Statement

IC ID: 25261-C2XISM

In order to comply with FCC / ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps.

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

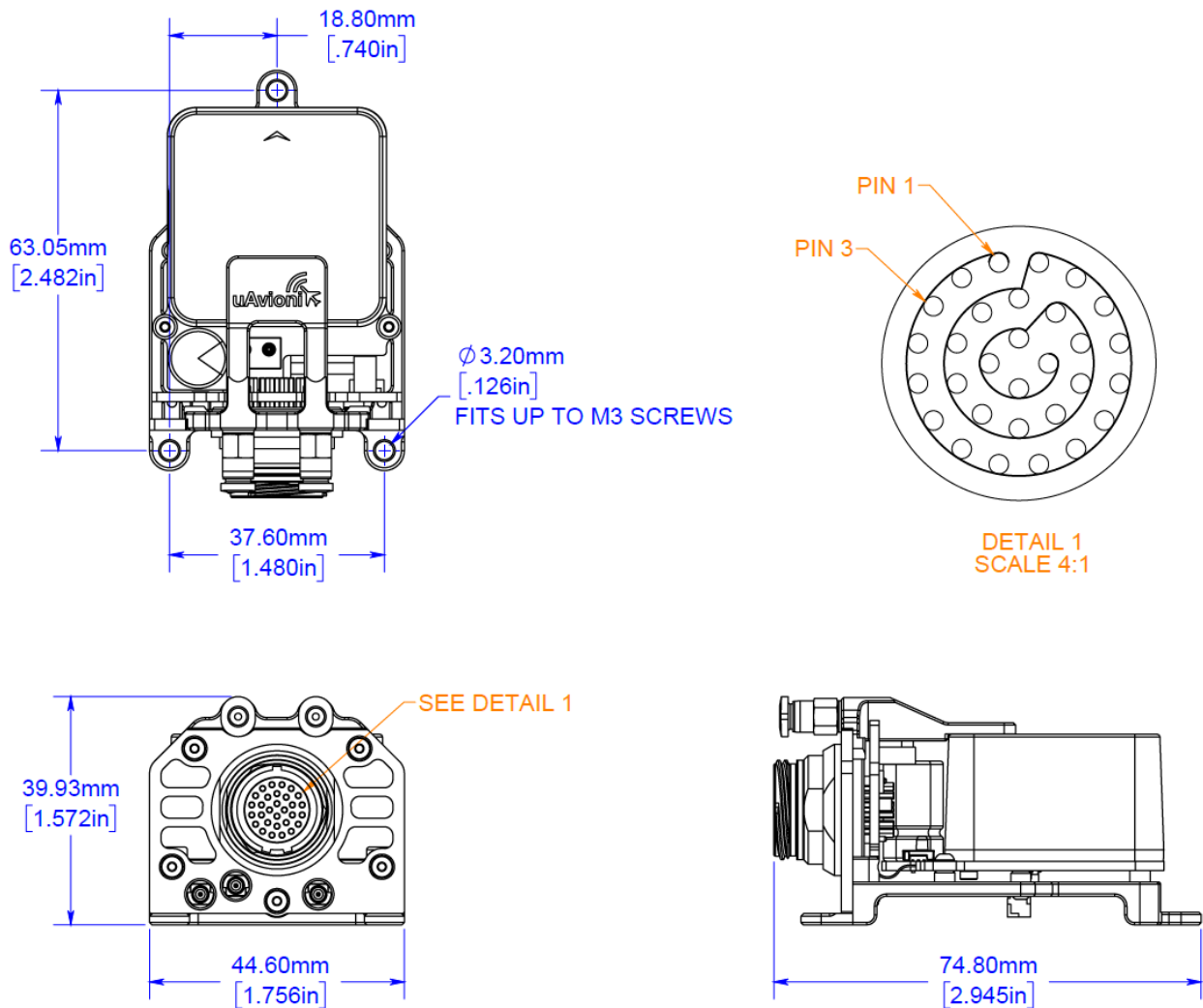
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) l'appareil ne doit pas produire de brouillage;



2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.”

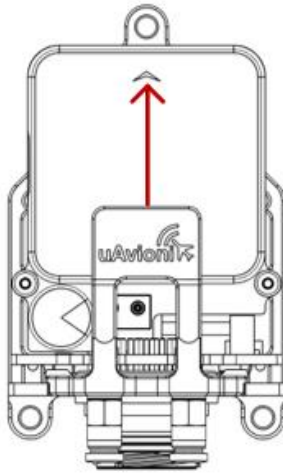
### 4.3 Mechanical Specifications



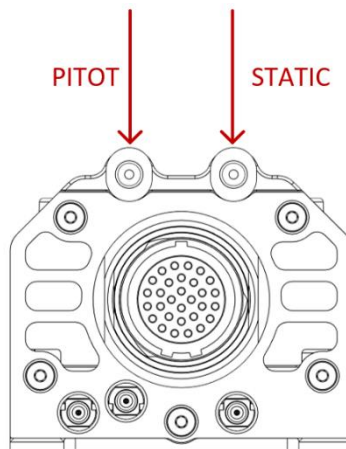
## 5 Installation

### 5.1 George Mechanical Installation

Mount the George AutoPilot on a flat solid surface near the Center of Gravity (CG) of the aircraft. Mount the George AutoPilot so that the arrow on top of the AutoPilot is pointed towards the nose of the aircraft. Use three M3 or #5 size screws to secure the George AutoPilot to the airframe at the three mounting locations.

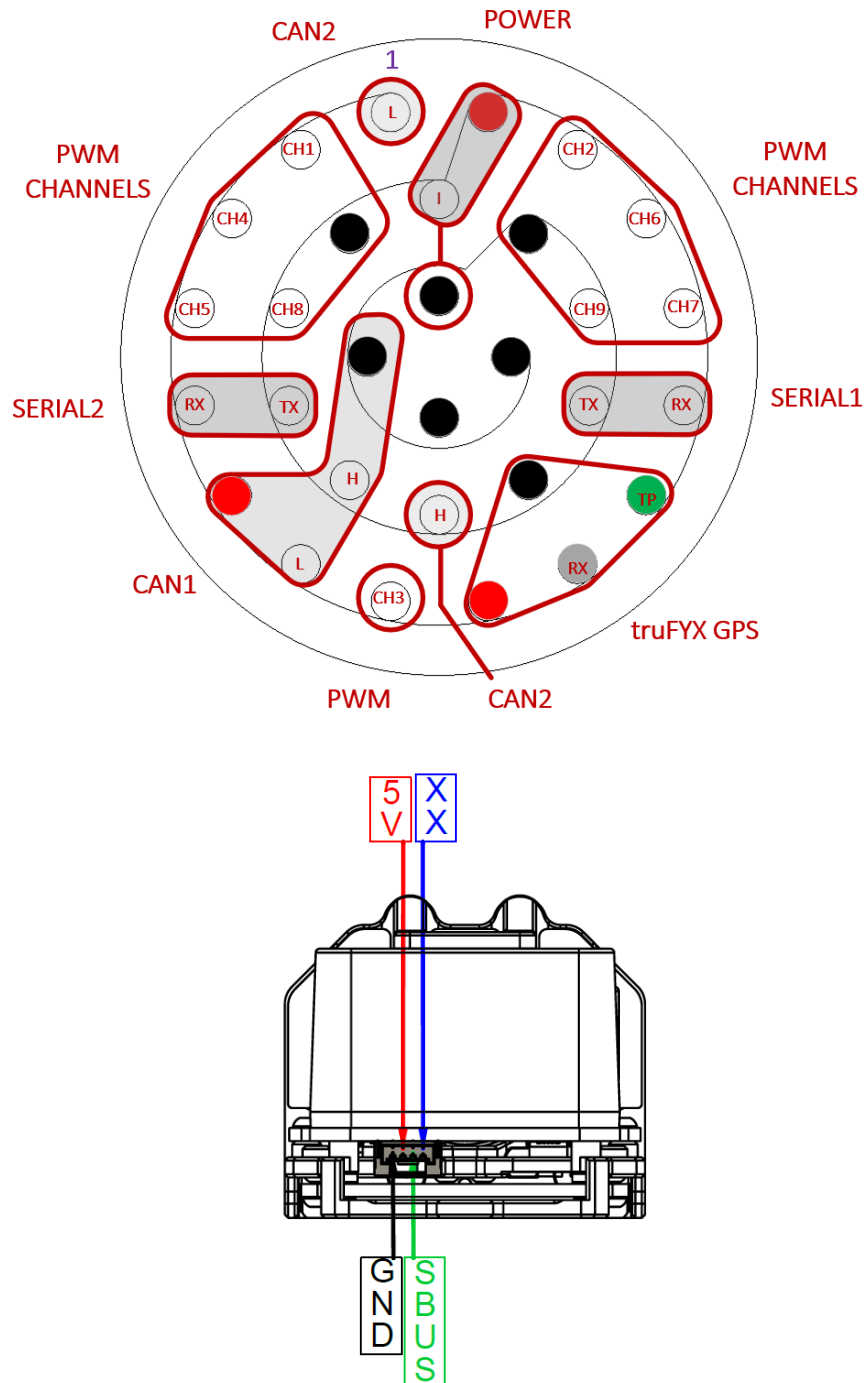


Connect aircraft pitot and static pressure lines to either of the 3mm push fit connectors on the backside of the AutoPilot.



## 5.2 George Electrical Installation

Integrate the George AutoPilot to your platform. George offers 9 PWM channels, 2 external serial connections, 2 CanBus connections, 1 RC SBUS input and a power module capable of supporting up to two 6s LiPo batteries.



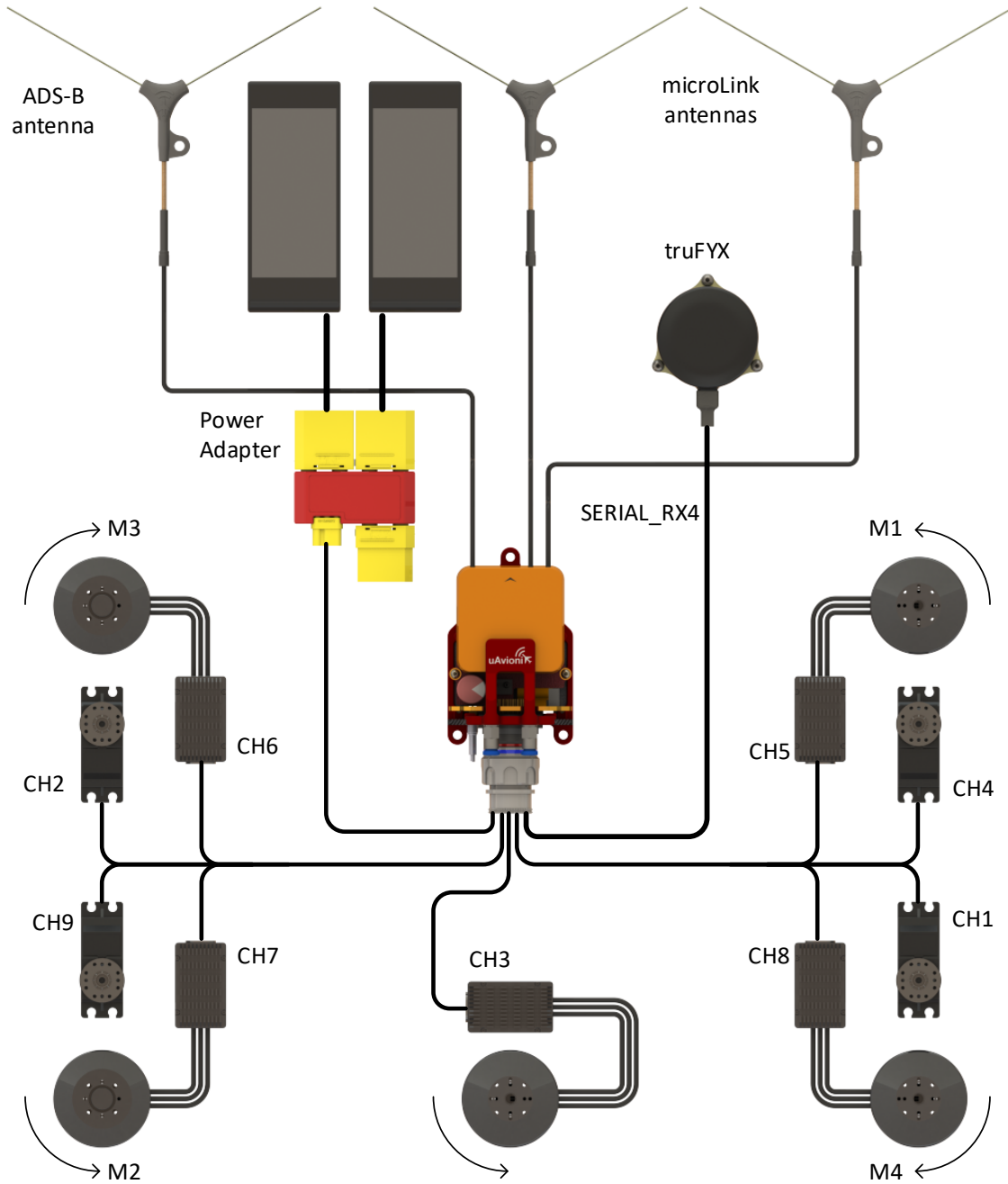
EXTERNAL CONNECTIONS LEMO 30-PIN	Lemo Pin	Name	Description	Resource	IO	Level	
	1	CAN2_L	CanBus2			IO	3.3V
	2	IO_CH1	PWM_CH1	Servo/ESC		Output	3.3V
	3	IO_CH4	PWM_CH4	Servo/ESC		Output	3.3V
	4	IO_CH5	PWM_CH5	Servo/ESC		Output	3.3V
	5	SERIAL2_RX	TELEM2 Rx	Ping200X/ZPX-B		Input	EIA/TIA-232
	6	5V_CAN1	5V Output			Power	5V
	7	CAN1_L	CanBus1			UI	3.3V
	8	IO_CH3	PWM_CH3	Servo/ESC		Output	3.3V
	9	5V_SERIAL4	5V Output			Power	5V
	10	SERIAL4_RX	GPS PVT Data	truFYX GPS		Input	3.3V
	11	FYX_PPS	GPS PPS			Input	3.3V
	12	SERIAL1_RX	TELEM 1 Rx	SkyLink C-Band C2		Input	EIA/TIA-232
	13	IO_CH7	PWM_CH7	Servo/ESC		Output	3.3V
	14	IO_ch6	PWM_CH6	Servo/ESC		Output	3.3V
	15	IO_CH2	PWM_CH2	Servo/ESC		Output	3.3V
	16	V_BUS	Aircraft Power			Power	2S-12S
	17	CURRENT				Input	3.3V
	18	1ND	Aircraft Ground			Power	
	19	IO_CH8	PWM_CH8	Servo/ESC		Output	3.3V
	20	SERIAL2_TX	TELEM 2 Tx	Ping200X/ZPX-B		Output	EIA/TIA-232
	21	CAN1_H	CanBus1			IO	3.3V
	22	CAN2_H	CanBus2			IO	3.3V
	23	GND	Aircraft Ground			Power	
	24	SERIAL1_TX	TELEM1 Tx	SkyLink C-Band C2		Output	EIA/TIA-232
	25	FMU_CH1	PWM_CH9	Servo/ESC		Output	3.3V
	26	GND	Aircraft Ground			Power	
	27	GND	Aircraft Ground			Power	
	28	GND	Aircraft Ground			Power	
	29	GND	Aircraft Ground			Power	
30	GND	Aircraft Ground			Power		

INTERNAL CONNECTIONS	Description	Resource	IO	Level
	SERIAL3_RX	MicroLink C2 Radio	Input	3.3V
	SERIAL3_TX		Output	3.3V
	SERIAL5_RX	pingRXpro ADS-B	Input	3.3V
	I2C1_SCL	RM3100 Compass	IO	3.3V
	I2C1_SDA		IO	3.3V
	I2C2_SCL	SDP33 Airspeed Sensor	IO	3.3V
	I2C2_SDA		IO	3.3V
	VOLTAGE		Power	3.3V

RC INPUT JST-GH 4-PIN	JST-GH Pin	Name	Description	IO	Level
	1	NP			
	2	RC_Rx	PPM/SBUS RC Rx	Input	3.3V
	3	5V_RC	5V Output	Power	5V
	4	GND	Aircraft Ground	Power	

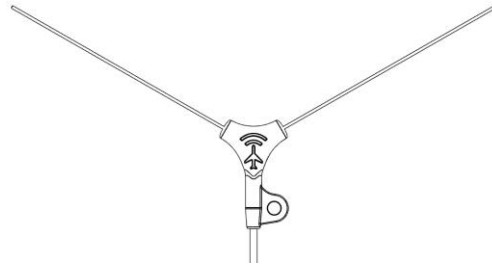
## 5.2.1 Example Electrical Connection for eVTOL

eVTOL				
Parameters	Resource	Description	Parameter	Value
	PWM_CH1	Starboard Elevon Servo	FUNCTION	80:VTailRight
	PWM_CH2	Port Aileron Servo	FUNCTION	4:Aileron
	PWM_CH3	Pusher Motor	FUNCTION	70:Throttle
	PWM_CH4	Starboard Aileron Servo	FUNCTION	4:Aileron
	PWM_CH5	Starboard Forward Motor 1	FUNCTION	33:Motor1
	PWM_CH6	Port Forward Motor 3	FUNCTION	35:Motor3
	PWM_CH7	Port Aft Motor 2	FUNCTION	34:Motor2
	PWM_CH8	Starboard Aft Motor 4	FUNCTION	36:Motor4
	PWM_CH9	Port Elevon Servo	FUNCTION	79:VTailLeft
	SERIAL_4	GPS Data	BAUD	115:115200
			PROTOCOL	5:GPS
	SERIAL_3	TELEMETRY	BAUD	57:57600
			PROTOCOL	1:MAVlink1
	SERIAL_5	ADS-B	BAUD	57:57600
			PROTOCOL	1:MAVlink1
	CURRENT	Current ADC input	BATT_CURRENT_PIN	15:CubeOrange
	VOLTAGE	Voltage ADC Input	BATT_VOLT_PIN	14:CubeOrange
	I2C1	RM3100 Compass		
	I2C2	SDP33 Airspeed		

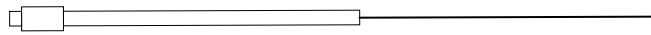


### 5.2.2 George RF Connections

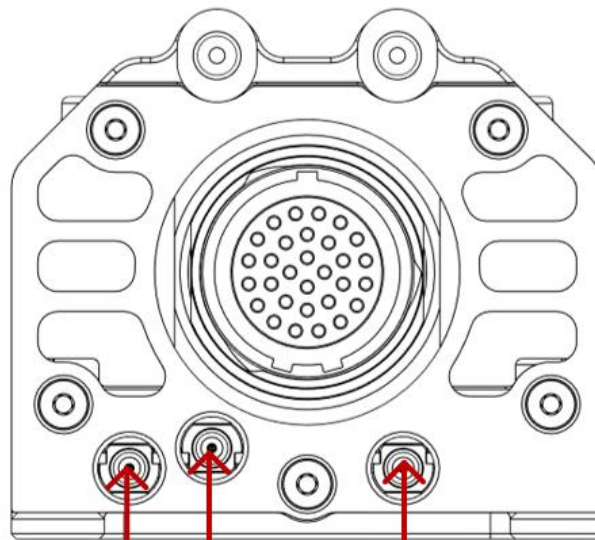
Three antennas are included with the George Autopilot, two 915 MHz dipole antennas for the C2 radio, and one feeder ADS-B antenna. The 915 MHz Dipole antennas should be mounted in a vertical orientation.



C2 Antenna



ADS-B Antenna



C2  
Antennas

ADS-B  
Antenna

---

## 5.3 skyStation Mechanical Installation

### 5.3.1 Tripod Installation

Mount the skyStation to a conventional tripod using a standard ¼"-20 screw. Mounting location is on the bottom of the skyStation as shown below.



Place the skyStation at a vantage point to achieve adequate coverage and optimal line-of-sight to the autopilot.

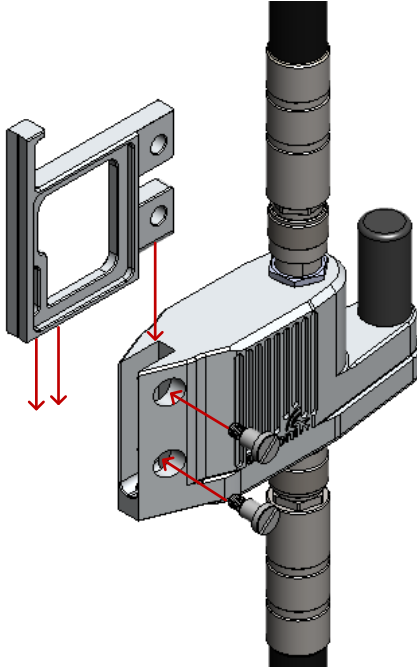
#### **Note!**

skyStation and George AutoPilot must be at least 20 feet apart to acquire a link.

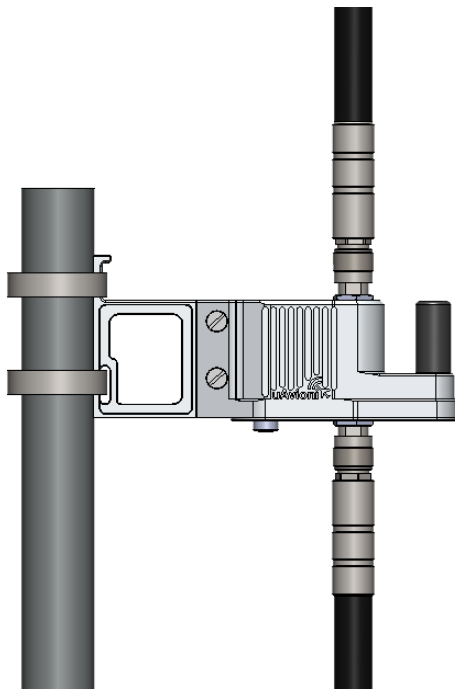


### 5.3.2 Pole Installation

Attach the pole mounting bracket to the skyStation and secure using the two supplied M5 shoulder screws.



Use the supplied hose clamps to secure the skyStation to the mounting pole. Antenna orientation should be vertical.



## 5.4 skyStation Electrical

The skyStation connects to a network via POE using an M12 connector.

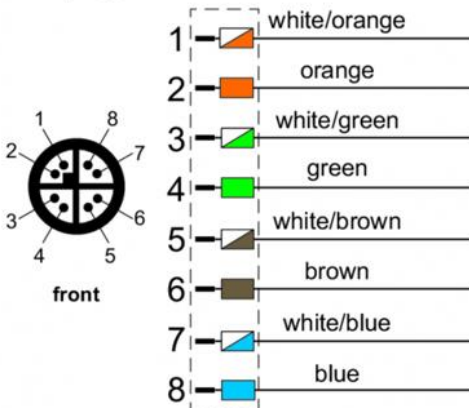
Suggested cable part #: 142M2X15050

Suggested accessory: RJ45 Coupler

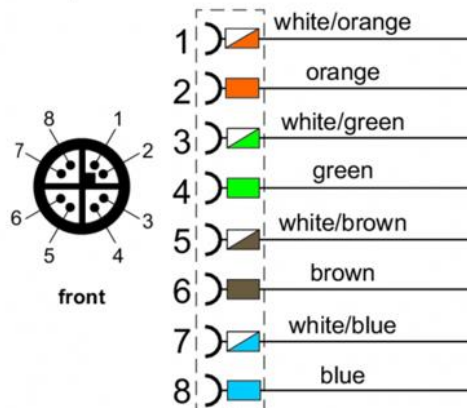
POE Specifications:

Parameter	Value
Standard	803.3af (802.3at Type1)
Maximum power	15.4W
Voltage Range	37 – 57V
Maximum Current	350mA
Maximum Cable Resistance	20Ω
Supported Cabling	Shielded Cat 3 and Shielded Cat 5
Supported Modes	Mode A (endspan), Mode B (midspan)
Power Management	Power Class 0
Maximum Cable Length	100 meters

M12 plug



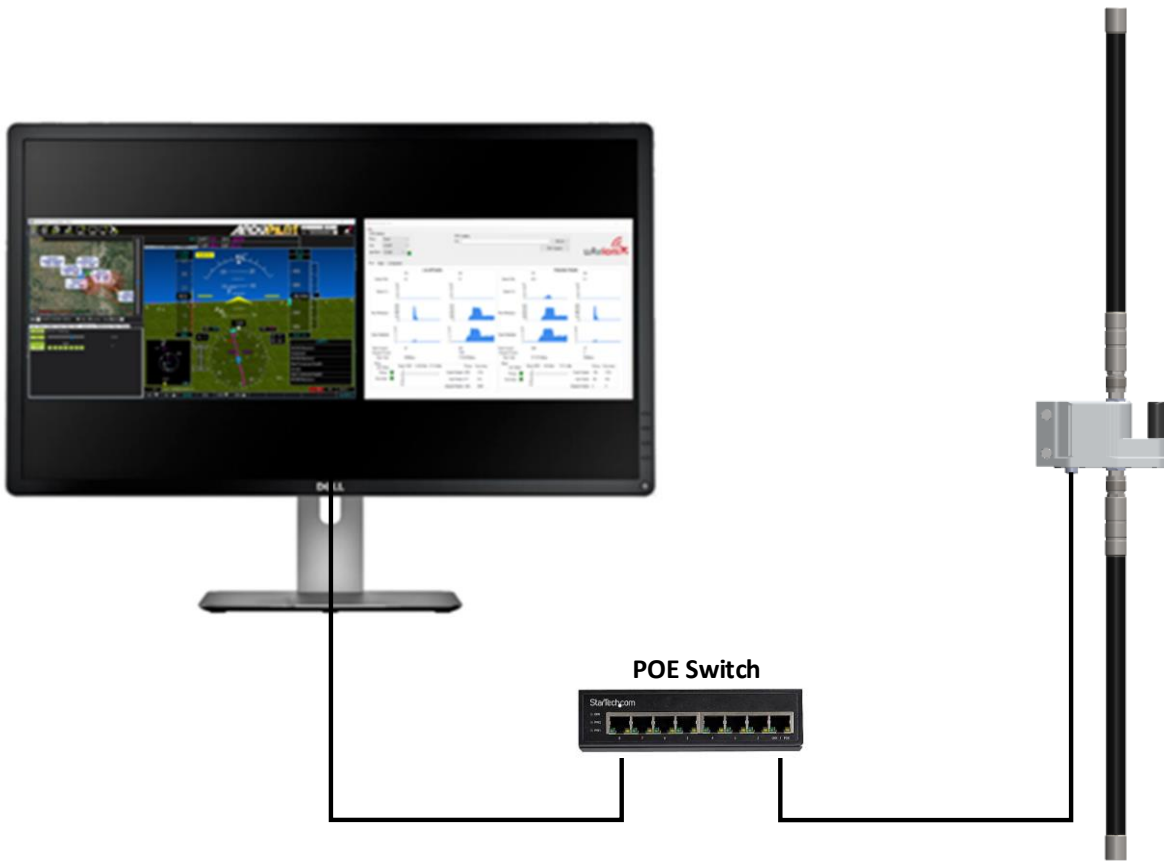
M12 jack



### Caution!



Absolute maximum DC voltage +57 V. A higher DC voltage value will permanently damage the equipment!



---

## 6 Configuration

### 6.1 George Start-up and Connection

Power on the George AutoPilot by connecting to the aircraft power system. Once George acquires a GPS lock, a C2 link can be made.

A C2 link can only be made when a skyStation is powered on within proximity. Link cannot be achieved unless both the skyStation and George Autopilot have a GPS lock.

**Note!**

skyStation and George AutoPilot must be at least 20 feet apart to acquire a link.

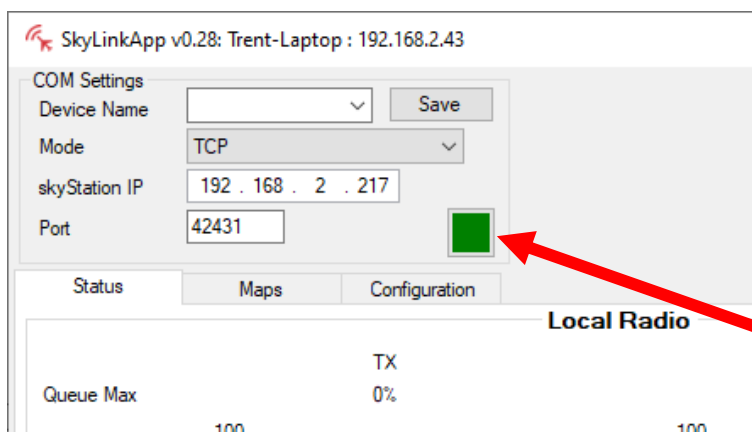
## 6.2 skyStation Start-up and Connection

Connect the skyStation to a POE capable network switch. At power-up an IP address will be assigned to the skyStation by the local DHCP server. By default, the skyStation will accept TCP connections for User channel information on TCP port 42430 and the Control channel information on port 42431. An IP Scan can be used to find the IP address of the skyStation. MAC addresses are printed on the skyStation label.

See section 6.5.3 for configuring the network settings on skyStation.

### 6.2.1 Run skyLinkApp.exe

In the skyLinkApp.exe, configure the Mode Settings to TCP, enter the IP address of the skyStation, and enter the default Control port 42431. The Status box in the upper left-hand corner will turn green indicating a successful connection to the skyStation.



**NOTE:** If you are not able to connect to the skyStation it is likely your firewall is blocking access on port 42431. Please setup your firewall to allow skyLinkApp.exe TCP access on port 42431.

Please see section 6.5.3 to change or view the network configuration settings on the skyStation. See section 6.4 for more details on the skyLinkApp.

## 6.2.2 Configure Hop Table

Once connected via the SkyLinkApp, go to the Configuration tab.

At first power up the user may need to configure the Hop Table to link with the George G2. On the label on the George G2 is a radio ID.



- Enter the radio ID into the “DeviceID Input” field on the SkyLinkApp.
- Press the “Generate DeviceID Hop Table” button
- Press “Save Hop Table To Device”

SkyLinkApp v0.28: Trent-Laptop: 192.168.2.43

COM Settings: Device Name, Mode (TCP), skyStation IP (192.168.2.217), Port (42431)

Logging: File, KML, CSV, Start Logging

Radio FW Update

uAvioni logo

Idx	Freq (MHz)	Sync Word
0	905.75	0x35E09C3
1	926.00	0x6263EAF
2	923.50	0x2DB1873A
3	915.25	0x0C48A9D8
4	904.00	0x79C64EBF
5	924.75	0x7DC56864
6	917.00	0x5FD0ED01
7	925.25	0x387AD41D
8	908.00	0x0E0FCB17
9	921.50	0x5651973A
10	906.25	0x4CDBBCDE
11	918.75	0x2B94FF5E
12	916.25	0x35E09C3
13	914.75	0x45BFBC79
14	924.00	0x2DB1873A
15	907.00	0x1339F3C1
16	919.50	0x0BA72484
17	921.75	0x642C5252
18	920.25	0x54813227
19	916.75	0x5C815ECD
20	916.50	0x51290DB4
21	925.50	0x214436A9
22	907.50	0x773F7E0A
23	918.00	0x7D1280E6
24	912.25	0x5FD0ED01
25	906.50	0x7DC56864
26	914.00	0x773F7E0A
27	923.25	0x4F6F758E

Device Configuration: Station Type (Ground), User Port Baud Rate (115200), GPS Port Baud Rate (115200), Control Port Baud Rate (115200), Frame when State (Frame on Uart Idle), Framers MTU (240), Tx Off on Powerup

Buttons: Generate DeviceID Hop Table, DeviceID Input, Save Hop Table To Device

Device Configuration: Get Config from Device, Save Config to Device, Load Config from File, Save Config to File, Get Versions

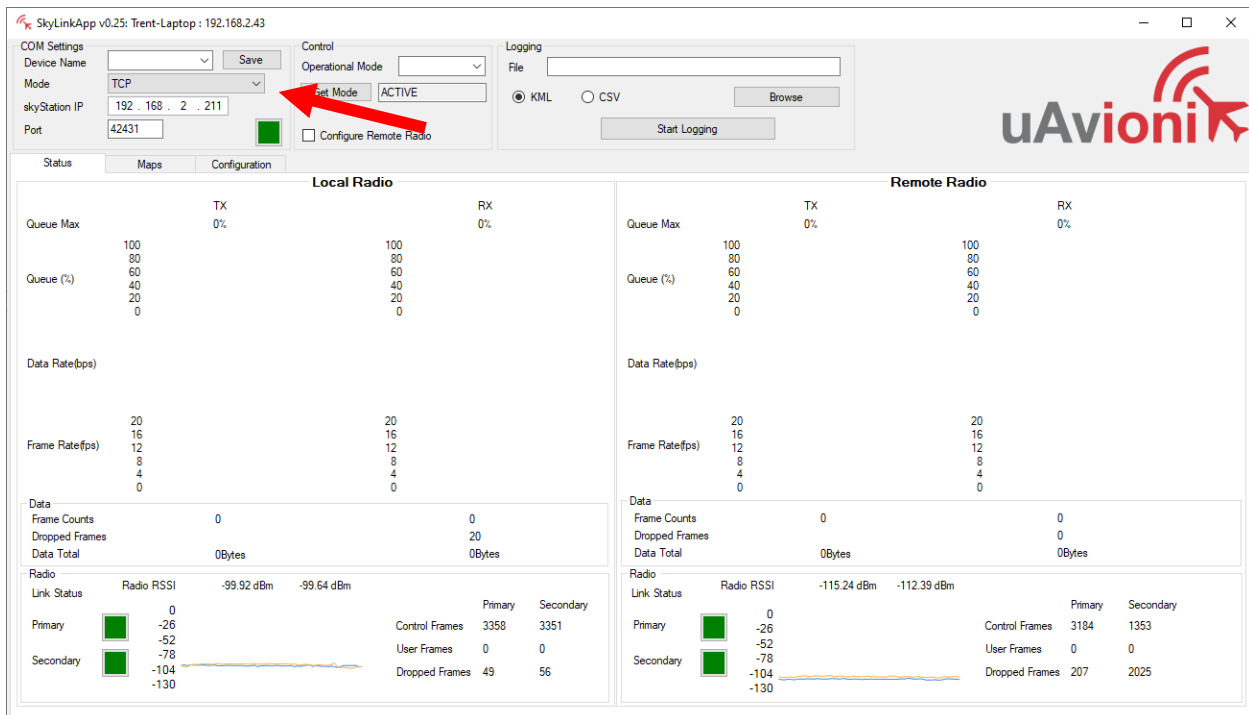
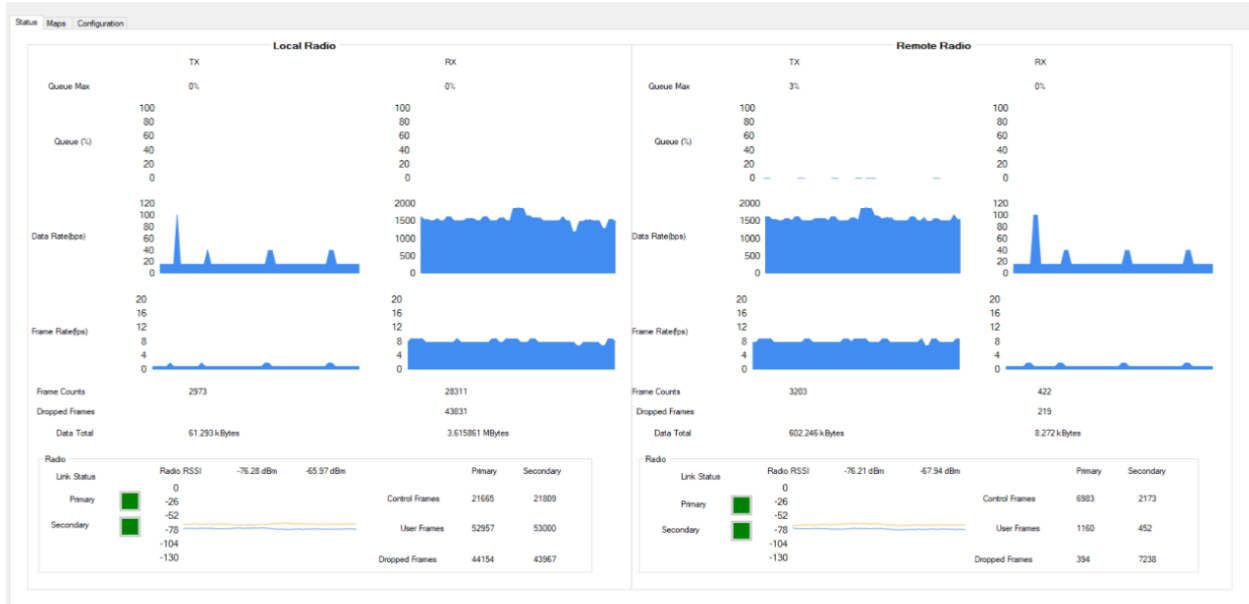
Local microLink: Firmware Version, Firmware CRC, Hardware ID, Device ID (0x0021CDD855)

Remote microLink: Firmware Version, Firmware CRC, Hardware ID, Device ID (0x0000000000)

The skyStation and George G2 now share the same unique Hop Table.

### 6.2.3 Verify Link

To verify link go to the Status Tab of the skyLinkApp. When the data arrives, skyLinkApp will begin graphing the radio link statistics.



## 6.3 Connecting George to Mission Planner

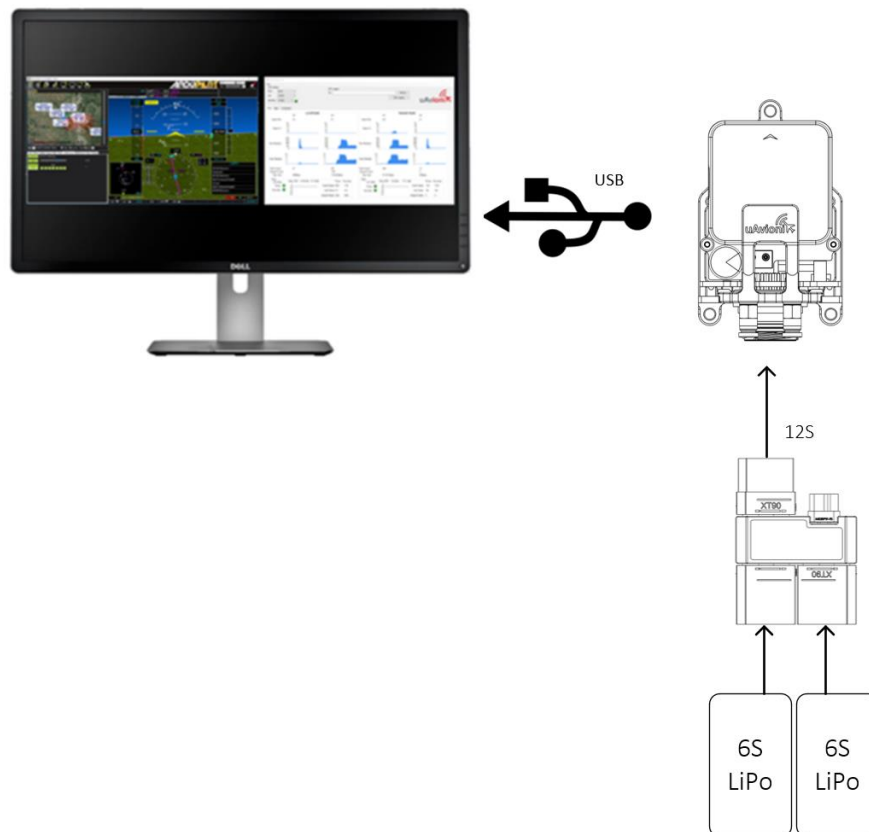
Download and install Mission Planner from:

<http://firmware.ardupilot.org/Tools/MissionPlanner/>

<http://ardupilot.org/planner/docs/mission-planner-installation.html>

### 6.3.1 George Direct Connect

Connect the George AutoPilot directly to a PC using a micro-USB cable. The connection point on the George AutoPilot is on the side of the Cube Orange. External power must be supplied to the George AutoPilot.

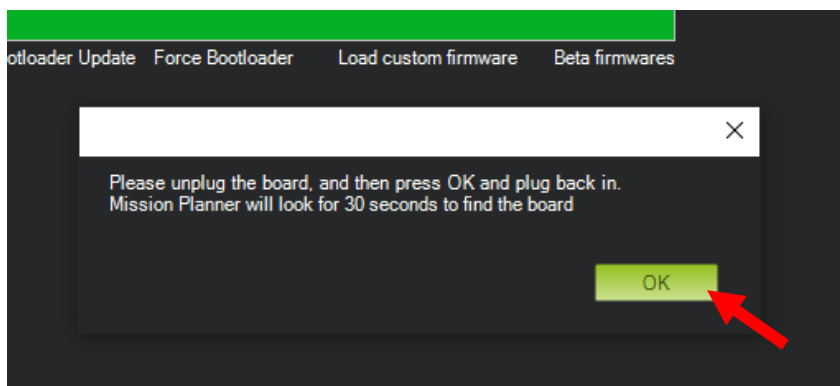
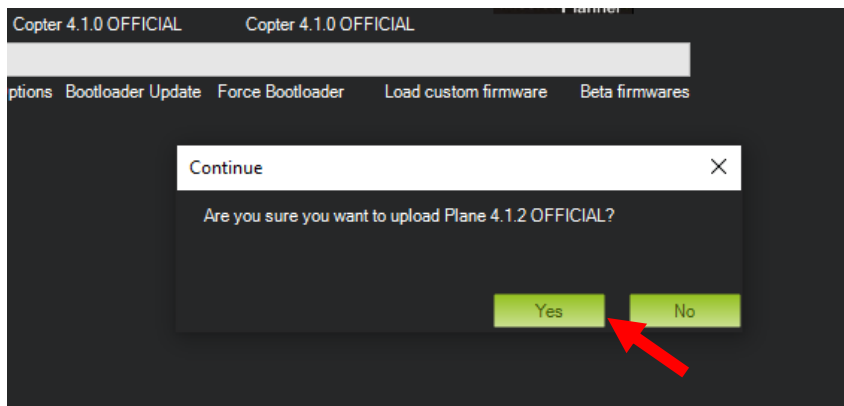
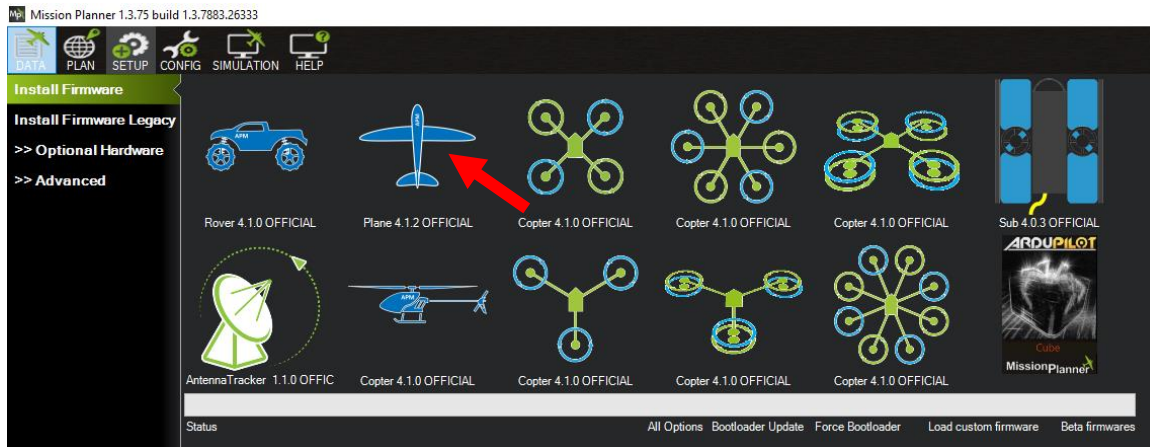


Open Mission Planner and in the upper right-hand corner select the corresponding MAVLINK COM port for the George Autopilot and hit CONNECT.





**Note:** On first power up, it may be required to setup the AutoPilot with Mission Planner. To do this, keep Mission Planner disconnected from the George AutoPilot. Go to the SETUP tab and the Install Firmware section. George AutoPilot comes default with an Airplane 4.2.2 configuration. Select your platform style and follow the instructions on Mission Planner to setup the AutoPilot.



### 6.3.2 George Parameters

Once connected to the George AutoPilot through Mission Planner, change the following parameters in Mission Planner. (CONFIG>Full Parameter List)

Function	Parameter	Value	Description
<b>GPS</b>	GPS_AUTO_CONFIG	0	Disable GPS Auto Config
	GPS_AUTO_SWITCH	0	Use Primary GPS
	GPS_SAVE_CONFIG	0	Disable GPS Save Config
	GPS_TYPE	5	GPS = NMEA
	SERIAL4_BAUD	115	Baud Rate = 115200
	SERIAL4_PROTOCOL	5	Serial 4 = GPS
	BRD_SAFETYENABLE	0	Disable Safety Switch
<b>Airspeed</b>	ARSPD_TYPE	6	Airspeed Sensor = i2C – SDP3X
	ARSPD_USE	1	Enables Airspeed Sensor
	ARSPD_BUS	0	Internal i2C bus
	ARSPD_PIN	0	Disable Analog Airspeed Pin
	ARSPD_PRIMARY	0*	Enable First Sensor
	ARSPD_AUTOCAL	0*	Disable In-Flight Autocal
	ARSPD_TUBE_ORDER	2*	Either port can be used for Static/Pitot
	ARSPD_RATIO	2.0 *	Pitot tube Pressure/Velocity
	ARSPD_PSI_RANGE	1*	PSI Range for sensor
	ARSPD_SKIP_CAL	1	Startup offset calibration disable
<b>C2</b>	SERIAL3_BAUD	57	Baud Rate = 57600
	SERIAL3_PROTOCOL	1	MavLink 1 Protocol
<b>**ADS-B</b>	SERIAL5_BAUD	57*	Baud Rate = 57600
	SERIAL5_PROTOCOL	1*	MavLink 1 Protocol
	SERIAL5_OPTIONS	1024	Don't forward mavlink to/from
	***ADSB_TYPE	1	Enable uAvionix ADSB
	ADSB_EMIT_TYPE	14*	Emitter Category = UAV
	ADSB_RF_CAPABLE	3	RX UAT and 1090ES
	ADSB_RF_SELECT	1*	RX Only
<b>Battery</b>	BATT_MONITOR	4	Analog Voltage and Current
	BATT_AMP_PERVLT	27.7347	Current Sensing Calibration
	BATT_CURR_PIN	15	Current Pin for Cube Orange
	BATT_VOLT_MULT	19.54	Voltage Sensing Calibration
	BATT_VOLT_PIN	14	Voltage Pin for Cube Orange

\*Default Ardupilot value

\*\*Other ADS-B Parameters may not be visible unless ADSB\_Type is configured to 1 and a “Refresh Params” is initiated.

\*\*\*In Plane and Copter versions predating 4.1.0, ADSB\_Type is replaced with ADSB\_Enable.

Click "Write Params" when finished and cycle the power.

The screenshot shows the Mission Planner interface with the 'Full Parameter List' tab selected. The parameters are listed in a table with columns for Command, Value, Units, Options, Desc, and a checkbox. The 'ADSB\_ENABLE' parameter is highlighted in green. On the right side of the interface, there are several buttons: 'Load from file', 'Save to file', 'Write Params', 'Refresh Params', and 'Compare Params'. A red arrow points to the 'Write Params' button.

Command	Value	Units	Options	Desc	Flag
ADSB_LOCKING	0		0 Disabled 1 Enabled	Enable attitude locking when sticks are released	<input type="checkbox"/>
ADSB_PITCH_RATE	180	deg/s	10 500	The maximum pitch rate at full stick deflection in ACRO mode	<input type="checkbox"/>
ADSB_ROLL_RATE	180	deg/s	10 500	The maximum roll rate at full stick deflection in ACRO mode	<input type="checkbox"/>
ADSB_EMIT_TYPE	14		0 Noisy 1 Light 2 Small 3 Large 4 High Voltage 5 Heavy 6 High Voltage 7 2500mah 8 RESERVED 9 Older 10 Light/c 11 Parameter 12 Reserved 13 RESERVED 14 UAV 15 Source 16 RESERVED 17 Emergency/Surface 18 Sense/Surface 19 Port/Obstacle	ADSB classification for the type of vehicle emitting the transponder signal. Default value is 14 (UAV)	<input type="checkbox"/>
ADSB_ENABLE	1		0 Disabled 1 Enabled	Enable ADS-B	<input type="checkbox"/>
ADSB_ICAO_ID	0		-1 16777215	ICAO ID or plane vehicle identification number of this aircraft. This is a integer limited to 24bits. If set to 0 then one will be randomly generated. If set to -1 then static information is not sent, transceiver is assumed pre-programmed.	<input type="checkbox"/>
ADSB_ICAO_SPECID	0			ICAO ID of special vehicle that ignores ADSB_LIST_RADIUS and ADSB_LIST_ALT. The vehicle is always tracked. Use 0 to disable.	<input type="checkbox"/>
ADSB_LEN_WIDTH	1		0: NO_DATA 1:11M/23 2:125W/28PS 3:125W/34 4:125W/35 5:300W/8 6:145W/39PS 7:145W/49 8:125W/35 9:155W/52 10:125W/39PS 11:125W/67 12:125W/70PS 13:125W/80 14:125W/80 15:125W/82	Aircraft length and width dimension options in Length and Width in meters. In most cases, use a value of 1 for smallest size.	<input type="checkbox"/>
ADSB_LIST_ALT	0	m	0 32767	ADSB vehicle list altitude filter. Vehicles detected above this altitude will be completely ignored. They will not show up in the SRx_ADSB stream to the GCS and will not be considered in any avoidance calculations. A value of 0 will disable the filter.	<input type="checkbox"/>
ADSB_LIST_MAX	25		1 100	ADSB list size of nearest vehicles. Longer lists take longer to refresh with lower SRx_ADSB values.	<input type="checkbox"/>
ADSB_LIST_RADIUS	1000	m	0 100000	ADSB vehicle list radius filter. Vehicles detected outside this radius will be completely ignored. They will not show up in the SRx_ADSB stream to the GCS and will not be considered in any avoidance calculations. A value of 0 will disable the filter.	<input type="checkbox"/>
ADSB_LOG	1		0 no logging 1 log only special ID 2 log all		<input type="checkbox"/>
ADSB_OFFSET_LAT	4		0 NoData 1 Lat2m 2 Lat4m 3 Lat6m 4 Center 5 Right2m 6 Right4m 7 Right6m	GPS antenna lateral offset. This describes the physical location offset from center of the GPS antenna on the aircraft.	<input type="checkbox"/>
ADSB_OFFSET_LON	1		0 NO_DATA 1 AppliedBySensor	GPS antenna longitudinal offset. This is usually set to 1. Applied By Sensor	<input type="checkbox"/>
ADSB_RF_CAPABLE	3		0 Unknown 1 Rx Only 2 Tx Only 3 Rx and Tx Enabled	Describes your hardware RF In/Out capabilities	<input type="checkbox"/>
ADSB_RF_SELECT	1		0 Disabled 1 Rx Only 2 Tx Only 3 Rx and Tx Enabled	Transceiver RF selection for Rx enable and/or Tx enable. This only affects devices that can Tx and Rx. Rx only devices override this to always be Rx only.	<input type="checkbox"/>
ADSB_SQUAWK	1200	octal	0 7777	VFR squawk (Mode 3/A) code is pre-programmed. default 0000 when the pilot is flying VFR and not in contact with ATIS. In the USA, the VFR squawk code is octal 1200 (hex 3c20), decimal 640) and in most parts of Europe the VFR squawk code is octal 7000. If an invalid octal number is set then it will be reset to 1200.	<input type="checkbox"/>
AFS_ENABLE	0			This enables the advanced failsafe system. If this is set to zero (disabled) then all the other AFS options have no effect.	<input type="checkbox"/>
AHRS_COMP_BETA	0.1		0.001 0.5	This controls the time constant for the cross-over frequency used to fuse AHRS (speed and heading) and GPS data to estimate ground velocity. Time constant is 0.1 beta. A larger time constant will use GPS data less and a small time constant will use ar data less.	<input type="checkbox"/>
AHRS_CUSTOM_PIT	0	deg	-180 180	Autopilot mounting position pitch offset. Positive values = pitch up, negative values = pitch down. This parameter is only used when AHRS_ORIENTATION is set to CUSTOM.	<input type="checkbox"/>
AHRS_CUSTOM_ROLL	0	deg	-180 180	Autopilot mounting position roll offset. Positive values = roll right, negative values = roll left. This parameter is only used when AHRS_ORIENTATION is set to CUSTOM.	<input type="checkbox"/>
AHRS_CUSTOM_YAW	0	deg	-180 180	Autopilot mounting position yaw offset. Positive values = yaw right, negative values = yaw left. This parameter is only used when AHRS_ORIENTATION is set to CUSTOM.	<input type="checkbox"/>
AHRS_EXF_TYPE	2		0 Disabled 2 Enable EXF2 3 Enable EXF3	This controls which NeoDXF Kalman filter version is used for attitude and position estimation.	<input type="checkbox"/>
AHRS_GPS_GAIN	1		0 0.1 0	This controls how much to use the GPS to correct the attitude. This should never be set to zero for a plane as it would result in the plane being control in turn. For a plane please use the default value of 1.0.	<input type="checkbox"/>
AHRS_GPS_MINSAT5	6		0 10	Minimum number of satellites visible to use GPS for velocity based corrections attitude correction. This defaults to 6, which is about the point at which the velocity numbers from a GPS become too unreliable for accurate correction of the accelerometers.	<input type="checkbox"/>
AHRS_GPS_USE	1		0 Disabled 1 Enabled	This controls whether to use dead-reckoning or GPS based navigation. If set to 0 then the GPS won't be used for navigation, and only dead-reckoning will be used. A value of zero should never be used for normal flight. Currently this affects only the DCM-based AHRS. The EXF uses GPS whenever it is available.	<input type="checkbox"/>

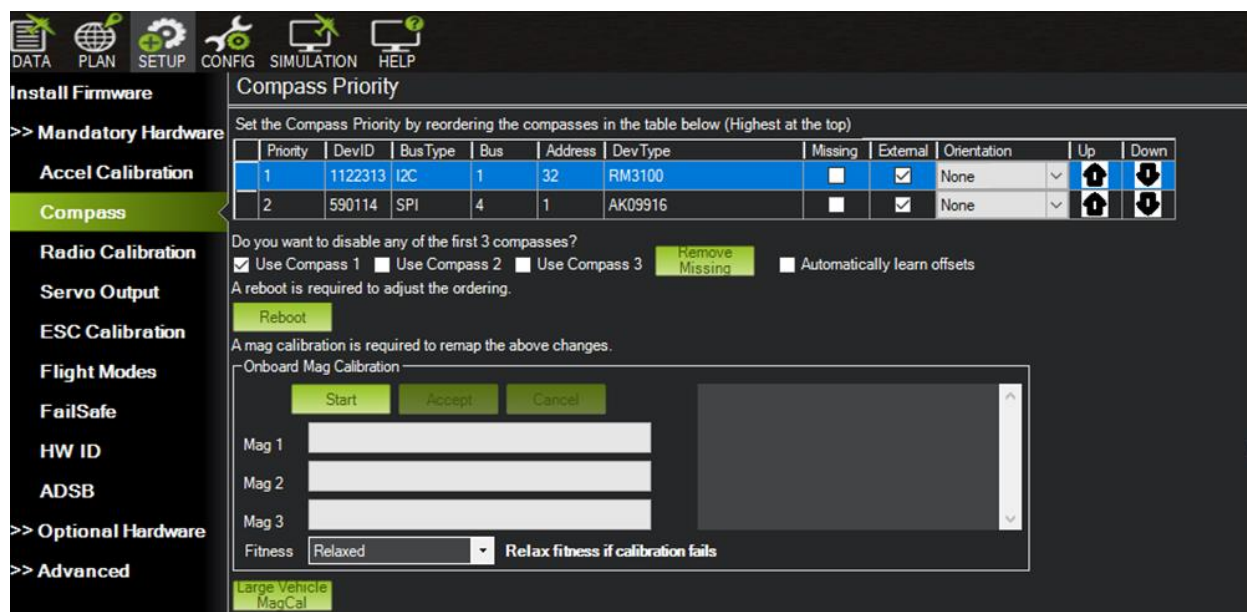
### 6.3.3 Compass Configuration

George contains an internal RM3100 compass for heading reference. The RM3100 delivers improved accuracy over the Cube integrated compass and is connected via the internal i2C bus. George will automatically detect the RM3100 and assign a DevID, no parameter changes are necessary for the RM3100 to be properly identified.

Configure the RM3100 as primary prior to calibration.

- a. Under the “SETUP” tab in Mission Planner navigate to the “Compass” window.
- b. Move the RM3100 to compass priority one position.
- c. Uncheck the boxes for “Use Compass 2” and “Use Compass 3” located midway down the Compass dialog.
- d. Reboot George via the “Reboot” button.

Compass orientation will be automatically set by default after calibration. Use the appropriate orientation for your George installation. In a standard installation the orientation would be set to None.



The RM3100 is now ready for calibration. Follow the Mission Planner compass calibration instructions via the link below.

<https://ardupilot.org/copter/docs/common-compass-calibration-in-mission-planner.html>

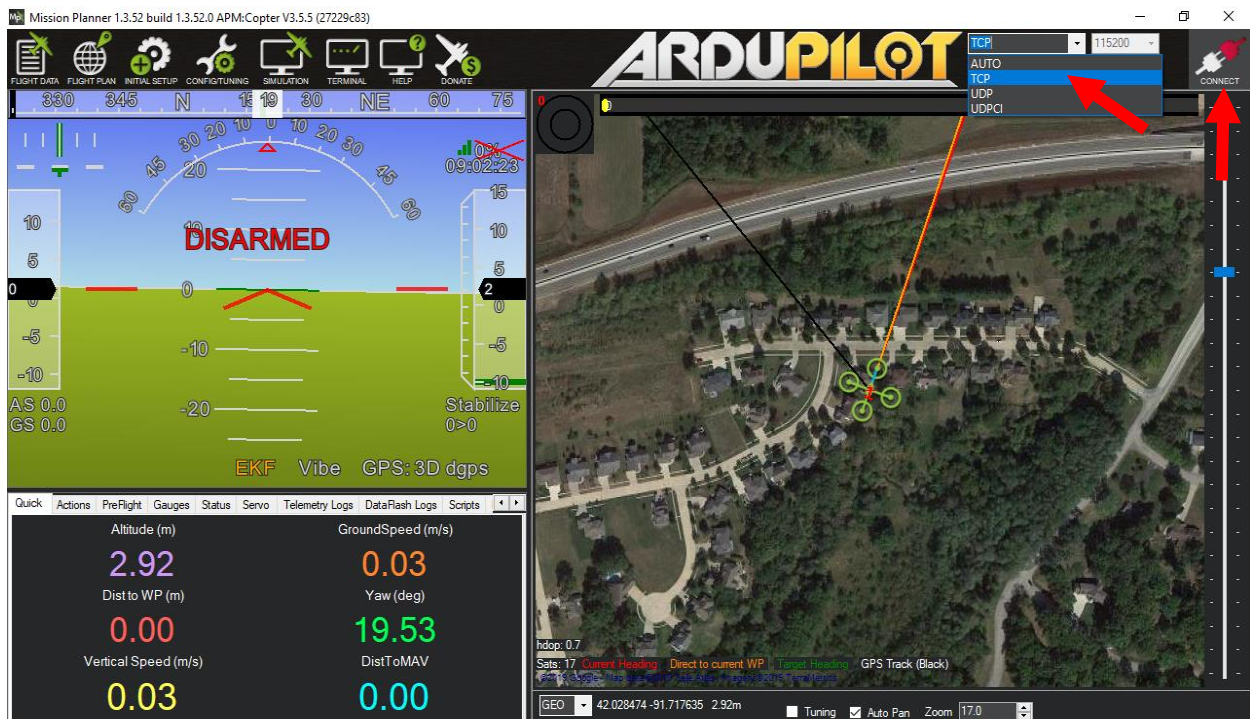
### 6.3.4 Remote Connection to George

The George AutoPilot must be preconfigured to establish a remote connection. Follow procedures in sections 6.3.1 and 6.3.2 to configure the AutoPilot.

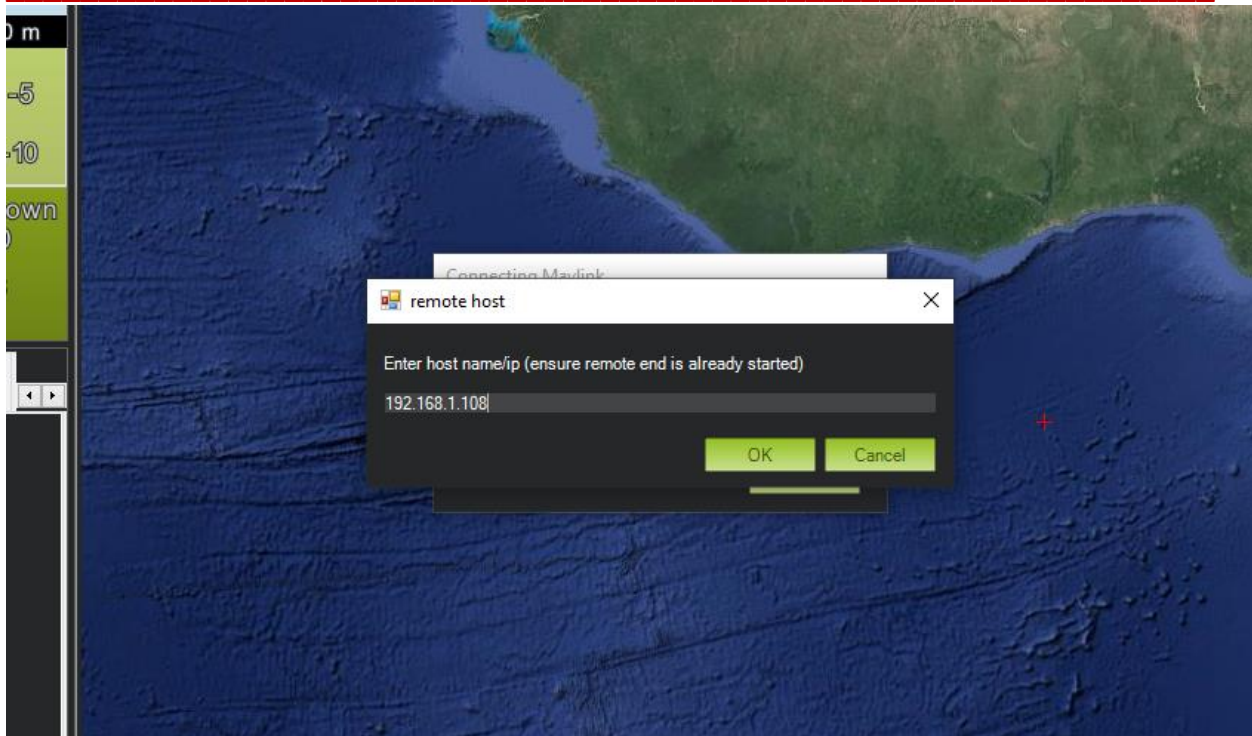
Verify that the George AutoPilot and skyStation are powered, linked, and that skyLinkApp.exe is receiving data. Run Mission Planner and select the communications drop down menu.



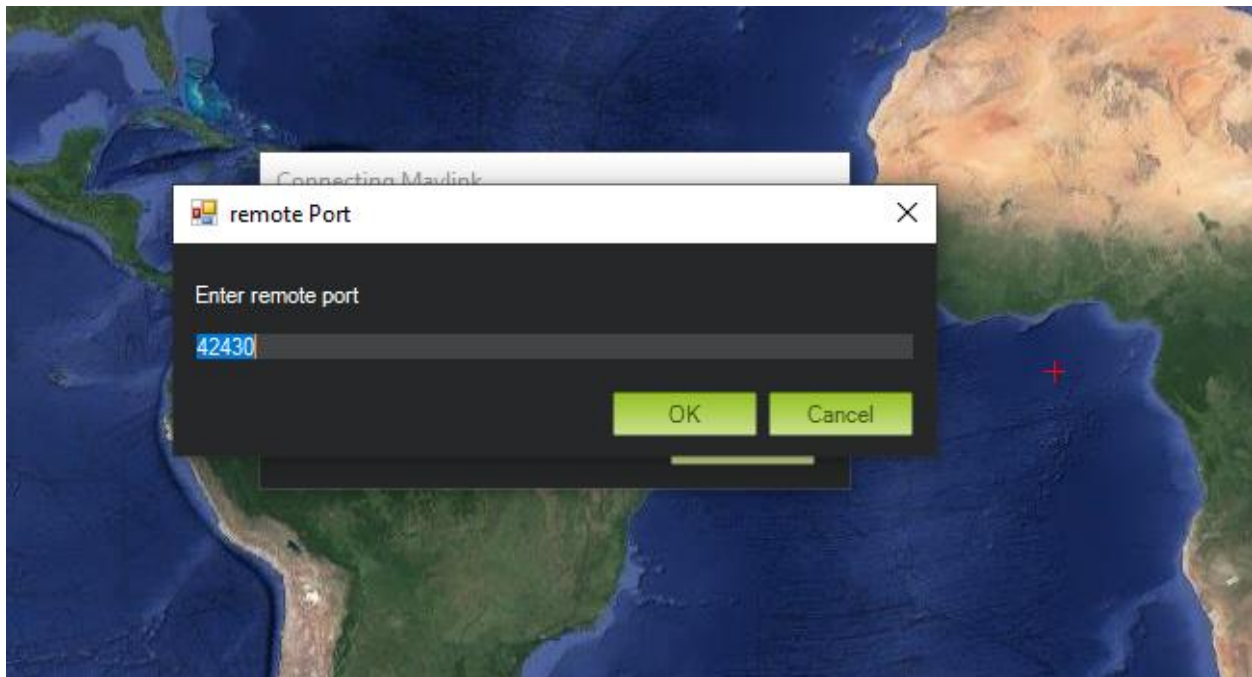
Select TCP as the communication mode and hit the Connect button on the upper right-hand corner.



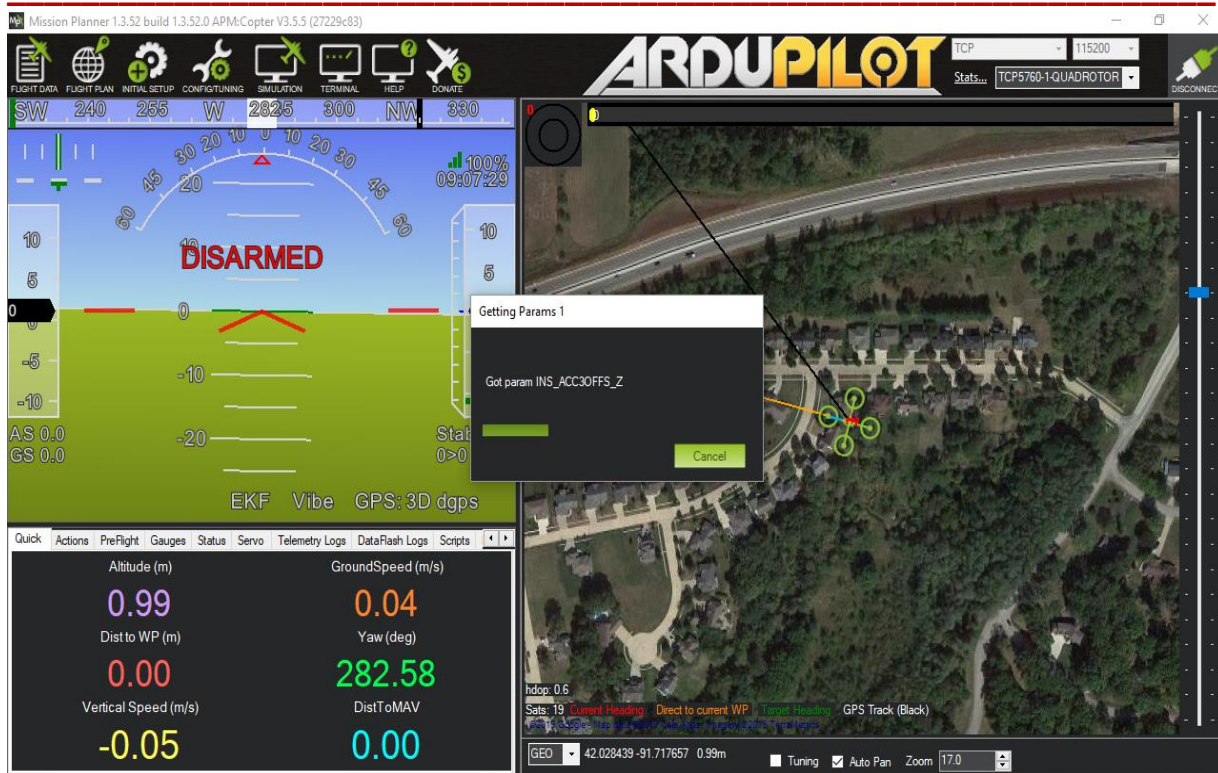
Enter the skyStation IP address and click OK.



Enter the User TCP port number as shown on the skyStation configuration page (see section 6.4.3) and click OK. The default port number is 42430.



Mission Planner will begin retrieving parameters when a successful TCP connection has been made.



The user now has full remote access to the George AutoPilot.

### 6.3.5 RC Connection to George

The George G2i offers users to connect an external RC receiver via PPM or SBUS through the 4 pin JST connector. RC transmitter and receiver binding procedures are done independently of the George setup. Follow the manufacturer's specified instructions for binding.

Once transmitter and receiver are bound, power up the George G2 and proceed with the aircraft configuration.

**\*\*ENSURE THE AIRCRAFT IS DISARMED AND ALL PROPS HAVE BEEN REMOVED WHILE CONFIGURING\*\***

From the Setup tab in Mission Planner, go to the Radio Calibration screen under Mandatory Hardware. Here you can calibrate the RC Transmitter, set PWM limits, and verify radio channel inputs.

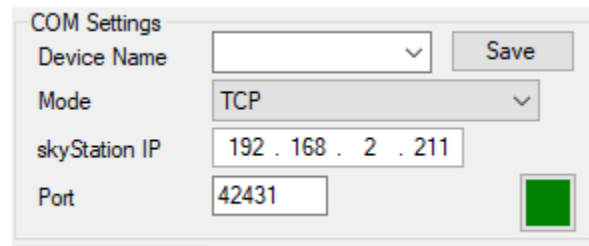




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## 6.4 skyLinkApp.exe

skyLinkApp.exe is the uAvionix Control channel monitoring application used for showing Status, Maps, and Configuration information. It can be connected to the skyStation in TCP mode and the ports are configurable for network flexibility. The mode and port selection must match the skyStation Configuration page setup and the IP address is always the IP address of the skyStation. See section 6.4.3.



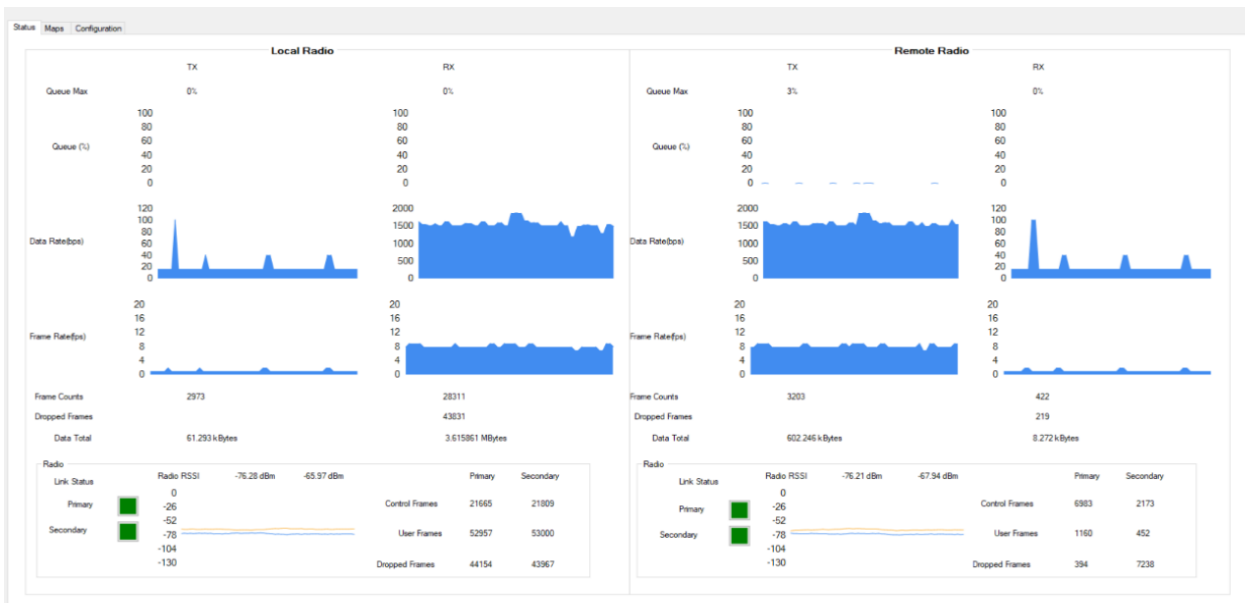
The screenshot shows a 'COM Settings' dialog box with the following fields and values:

Field	Value
Device Name	[Empty]
Mode	TCP
skyStation IP	192 . 168 . 2 . 211
Port	42431

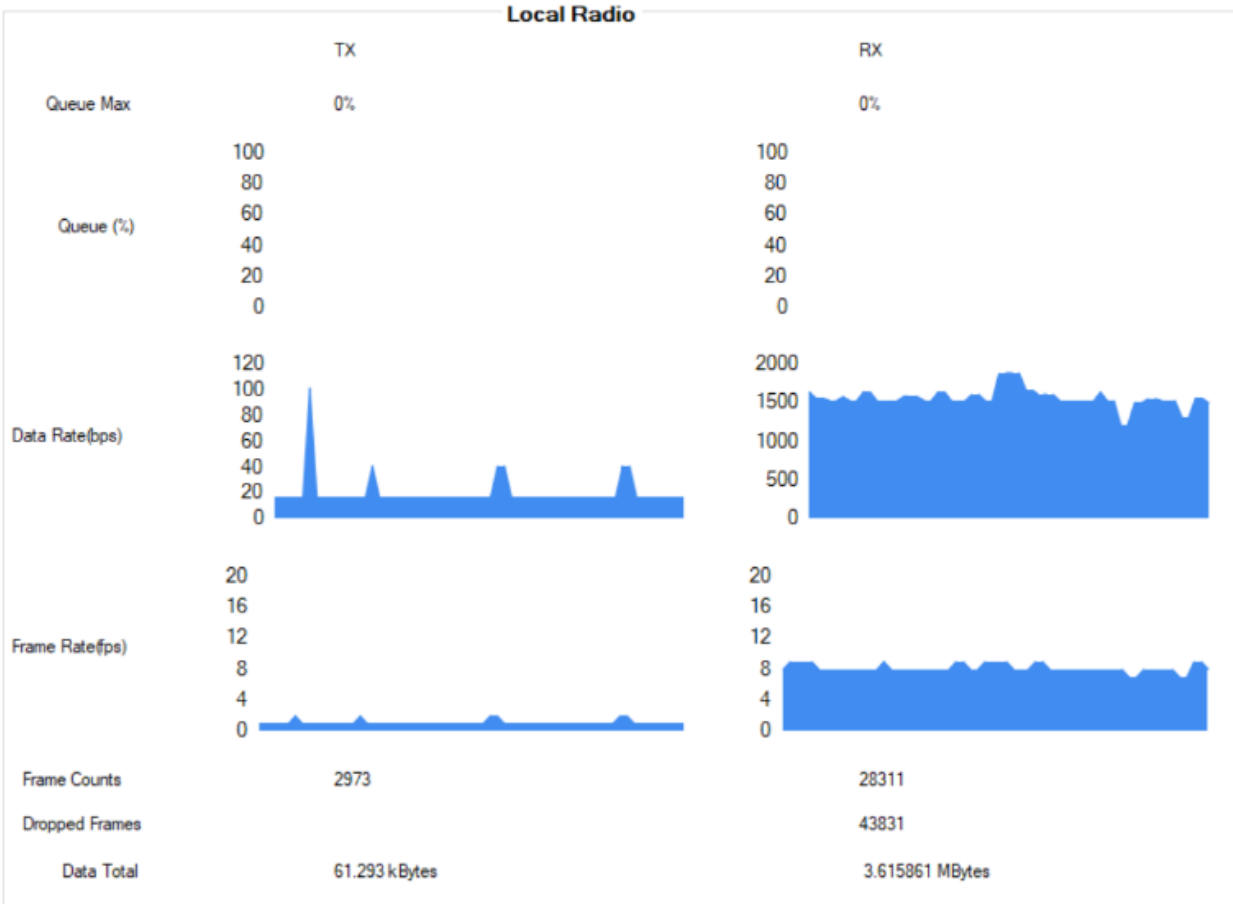
A 'Save' button is located to the right of the Device Name field. A green square button is located to the right of the Port field.

### 6.4.1 Status Tab

The status data is shown for both the local and the remote radios. It contains both transmit and receive information for the local and remote radios. This information includes memory queue depth information, transmit and receive data rates, frame rates, dropped frames and data totals. It also shows the RSSI's on the primary and secondary radios for both the local and remote radios giving the user comprehensive information on the state of the system.



Radio throughput and statistics detail shown below.

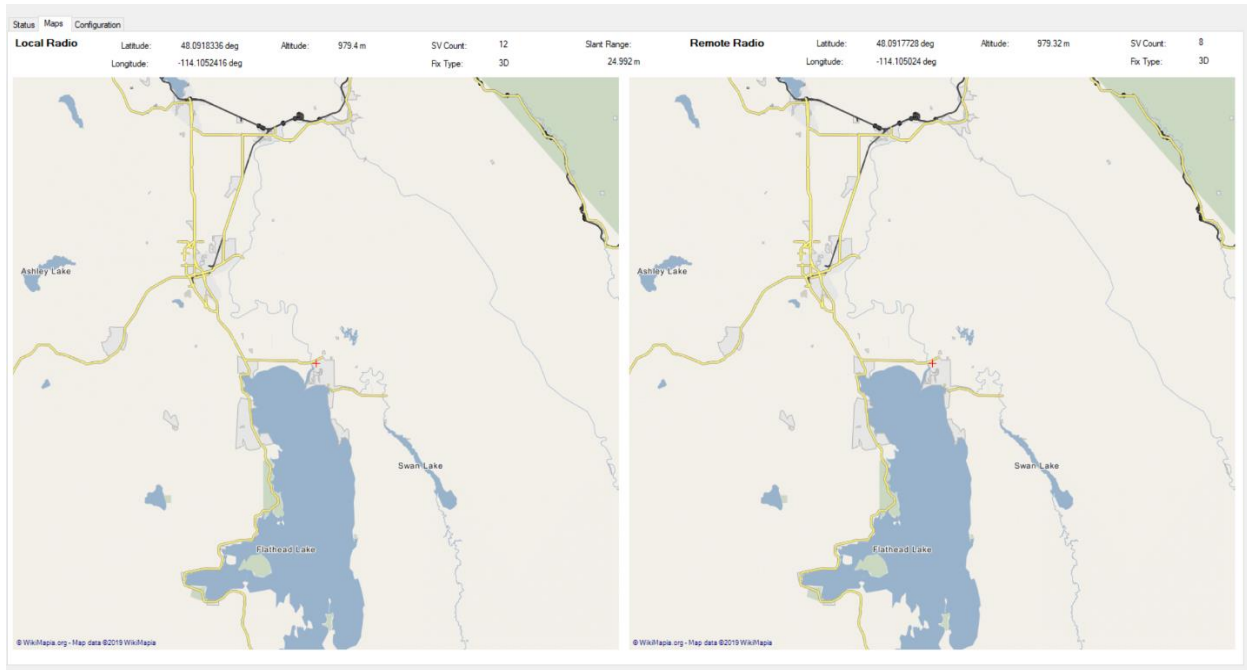


RSSI detail shown below.



### 6.4.2 Maps Tab

skyLinkApp.exe has a mapping tab for mapping the local radio skyStation radio as well as the remote aircraft radio. It includes latitude, longitude, altitude, GPS fix type, Slant Range and SV count.



### 6.4.3 Configuration Tab

skyLinkApp.exe also contains a Configuration page. This page is used for device settings and setup as well as selecting the hop table scheme for the system.

The screenshot shows the 'Configuration' tab of the SkyLinkApp. The 'Hop Table' section contains the following data:

Idx	Freq (MHz)	Sync Word
0	905.75	0x35EB09C3
1	926.00	0x6263EAFF
2	923.50	0x2DB1873A
3	915.25	0x0C48A9D8
4	904.00	0x79C64EBF
5	924.75	0x7DC56864
6	917.00	0x5FD0ED01
7	925.25	0x387AD41D
8	908.00	0x0E0FCB17
9	921.50	0x5651973A
10	906.25	0x4CDBBCDE
11	918.75	0x2B94FF5E
12	916.25	0x35EB09C3
13	914.75	0x45BFBC79
14	924.00	0x2DB1873A
15	907.00	0x1339F3C1
16	919.50	0x0BA72484
17	921.75	0x642C5252
18	920.25	0x54813227
19	916.75	0x5C815ECD
20	916.50	0x5129DDB4
21	925.50	0x214436A9
22	907.50	0x773F7E0A
23	918.00	0x7D12B0E6
24	912.25	0x5FD0ED01
25	906.50	0x7DC56864
26	914.00	0x773F7E0A
27	923.25	0x4F6F758E

The 'Device Configuration' section includes settings for Station Type (Ground), Station Mode (Frame when State), User Port Baud Rate (57600), GPS Port Baud Rate (115200), Control Port Baud Rate (115200), and UTC Pulse Polarity (Positive). It also features buttons for 'Get Config from Device', 'Save Config to Device', 'Load Config from File', and 'Save Config to File'. The 'Versions' section shows local and remote microLink details such as Firmware Version (1.0.12), Firmware CRC (0x78C363F9), Hardware ID (0x38), and Device ID (0x0021CDD855).

Hop Table

Idx	Freq (MHz)	Sync Word
0	905.75	0x35EB09C3
1	926.00	0x6263EAFB
2	923.50	0x2DB1873A
3	915.25	0x0C48A9D8
4	904.00	0x79C64EBF
5	924.75	0x7DC56864
6	917.00	0x5FD0ED01
7	925.25	0x387AD41D
8	908.00	0x0E0FCB17
9	921.50	0x5651973A
10	906.25	0x4CDBBCDE
11	918.75	0x2B94FF5E
12	916.25	0x35EB09C3
13	914.75	0x45BFBC79
14	924.00	0x2DB1873A
15	907.00	0x1339F3C1
16	919.50	0x0BA72484
17	921.75	0x642C5252
18	920.25	0x54813227
19	916.75	0x5C815ECD
20	916.50	0x5129DDB4
21	925.50	0x214436A9
22	907.50	0x773F7E0A
23	918.00	0x7D12B0E6
24	912.25	0x5FD0ED01
25	906.50	0x7DC56864
26	914.00	0x773F7E0A
27	923.25	0x4F6F758E

Tx Off on Powerup

Generate DeviceID Hop Table

DeviceID Input

Save Hop Table To Device

	Generates the Hop Table per the DeviceID input
DeviceID Input <input type="text" value="0021CEBF15"/>	DeviceID input allows the user to enter the airborne radio ID to match Hop Tables.
	Saves the Hop Table currently displayed in the Hop Table window to the device.

Device Configuration

Station Type:

User Port Baud Rate:

Control Port Baud Rate:

Frame when Stale:  Frame when Stale

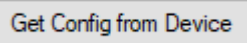
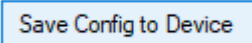
Frame on Uart Idle:  Frame on Uart Idle

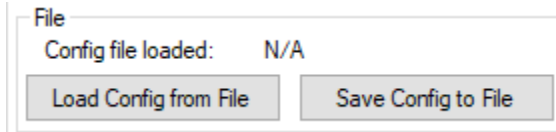
Framer MTU:

GPS Port Baud Rate:

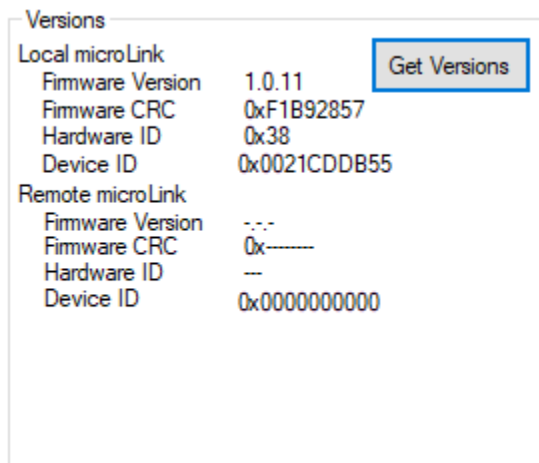
UTC Pulse Polarity:

Get Config from Device  Save Config to Device

Shows current device configuration. Clicking the  button will pull the configuration parameters currently stored on the device and display them in the window. Clicking the  button will push any new configuration parameters to the device.



The File window allows the user to save or load all the Configuration parameters to a PC.



The Versions window shows the microLink radio information for both the Local radio, and the Remote radio when a Link has been made.skyStation

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## 6.5 Configuration and Health Webpage

The skyStation IP address can be determined by accessing the local DHCP server and reviewing the connected devices or by using industry accepted network scanning tools. Directions for each DHCP server, router, or network scanning tool differ. Refer to the instruction manual for these devices or tools to help determine the IP address assigned to the skyStation. The MAC address for each skyStation can be found on the device housing.

The following pages can be viewed in your web browser.

Note nnn.nnn.nnn.nnn is the IP address of the skyStation.

- skyStation base URL:

<http://nnn.nnn.nnn.nnn/>

Displays Health statistics, position and version information. Use to program the target UDP address and Port number.

- skyStation status URL:

<http://nnn.nnn.nnn.nnn/stats>

Displays the status json sentence.

- skyStation update URL:

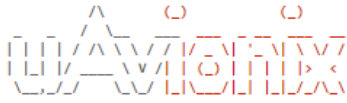
<http://nnn.nnn.nnn.nnn/update>

Provides ability to update skyStation firmware.

The base URL displays configuration items as well as dynamic skyStation health statistics. The defaults for the User and Control channel connections is shown. All parameters can also be modified to fit your network needs.



← → ↻ ⚠ Not secure | 192.168.2.217



## Firmware Information

SkyStation Version: V 0. 0.10 [Update](#)  
Radio Version: V1.0.11  
Node ID: 0x21CDD855

## Settings

### Skyline Information

Websocket URL:

### Datamux Information

IP Address: (0.0.0.0 for listen)

User Port:

Control Port:

[Network Configuration](#)

## Status Information

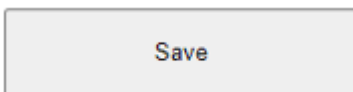
Name	Value
Up Time	7h:33m:28s
GPS Fix	3
Num GPS Sats	9
Latitude	48.0914496
Longitude	-114.1049344
GPS Altitude	2956
PPS Detected	true
SkyLine Up Time	0s
User Skt Up Time	0s
Ctrl Skt Up Time	37m:8s
Mission Timeout	0

### 6.5.1 Firmware Information

The skyStation firmware version, microLink radio version and the microLink radio ID associated are displayed here. The user can update the skyStation through the webpage by clicking the “update” link and the microLink Radio through the SkyLinkApp. see section 0 and 0.

### 6.5.2 Configuration Items

Configuration Item	Description
Websocket URL	When using Skyline or a websocket to manage missions, the mission data will be forwarded through to the URL address entered in this field.
Data Mux IP Address	When this parameter is 0.0.0.0, the skyStation will act as a TCP server and listen for incoming connections. Alternatively, if this address is a valid IP address, the skyStation will act as a TCP client and will attempt to connect to a TCP server listening on [User TCP IP Address : User TCP Port ]. 0.0.0.0 is the default setting for this parameter.
Data Mux User Port	This is the port number used for the User connection. Typically, the ground control software uses the User connection to communicate with the aircraft. The skyStation listens on this port and forwards any received TCP datagrams from ethernet to the aircraft. Any User connection data coming from the aircraft will be sent as an ethernet TCP datagram to [User TCP IP Address : User TCP Port].
Data Mux Control Port	This is the port number used for the Control connection. The Control connection is used for device configuration and device monitoring. The skyStation will forward all internal data metrics through this port.



When you modify any configuration item, press the Save button to store the changes. These fields are non-volatile and persist through power cycles.

The Status Information section shows real time statistics updated once every second. It will show skyStation Up Time, GPS and PPS metrics. It will also show SkyLine metrics when connected through to the websocket.

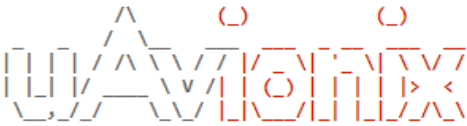
## Status Information

Name	Value
Up Time	7h:43m:57s
GPS Fix	3
Num GPS Sats	10
Latitude	48.0914496
Longitude	-114.1049344
GPS Altitude	2957
PPS Detected	true
SkyLine Up Time	0s
User Skt Up Time	0s
Ctrl Skt Up Time	47m:37s
Mission Timeout	0

### 6.5.3 Network Configuration

Clicking the Network Configuration link on the main landing page will forward you to the Network Configuration page where the user can adjust the network connectivity settings used by the skyStation when a DHCP server is not available.

← → ↻ ⚠ Not secure | 192.168.2.219/networkConfig



## Network Configuration

IP Address:

Subnet Mask:

Gateway Address:

DNS Server Address:

[Main Page](#)

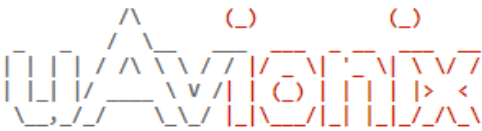
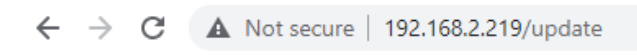
Configuration Item	Description
IP Address	This is the IP address number of the skyStation which will be used when a DHCP server is not available. The network administrator should assign this number.
Subnet Mask	Mask used with the skyStation IP address to differentiate between local and remote subnet destinations.
Gateway IP Address	Address used to send packets out of the local network.
DNS Address	IP address of the Domain Name Service.

When you modify any configuration item, press the Save button to store the changes. These fields are non-volatile and persist through power cycles.

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### 6.5.4 skyStation Update

The firmware on the skyStation can be updated through the skyStation Configuration Webpage by clicking the Update link next to the version number.



## Firmware Update

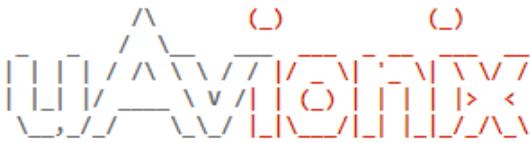
SkyStationF7\_V0.0.5.uav

[Main Page](#)

Choose the appropriate file to upload and click Start Update.

DO NOT power off the skyStation or close the web browser until the update is complete.

← → ↻ ⚠ Not secure | 192.168.2.219/update



## Firmware Update

Update file transfer complete. Rebooting...

SkyStationF7\_V0.0.5.uav

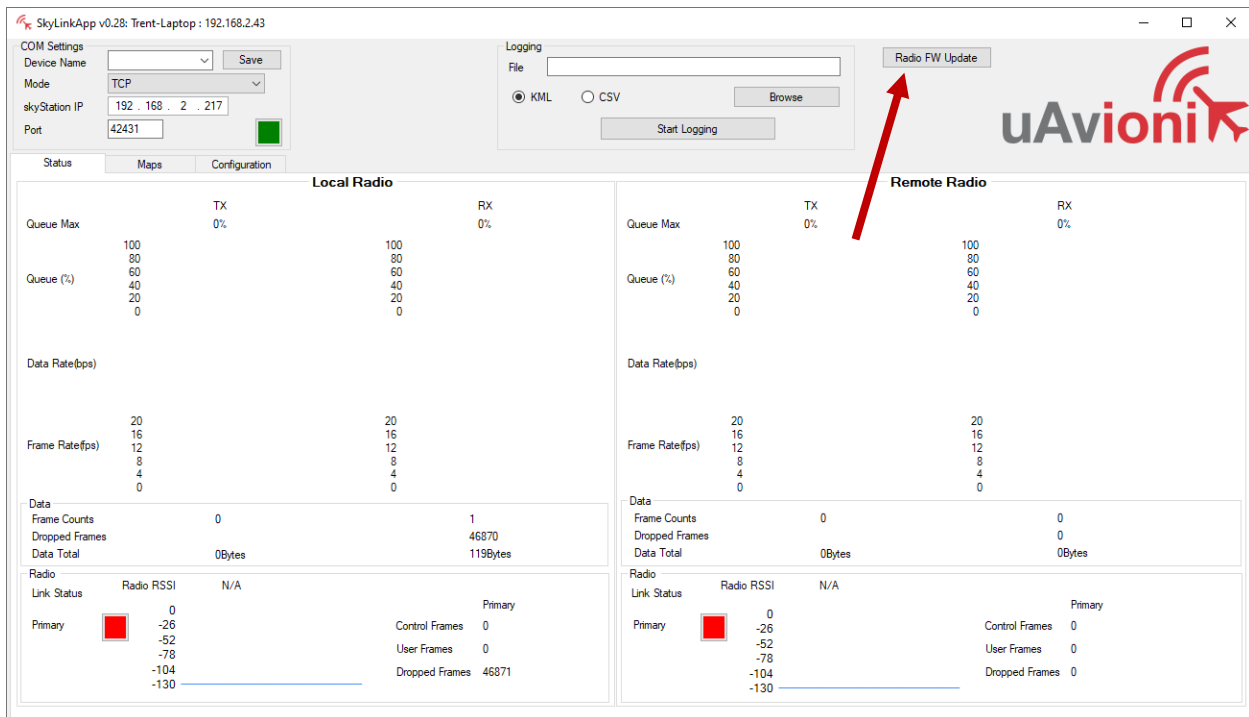
[Main Page](#)

When the file transfer is complete, click the Main Page link to return to the skyStation Configuration Webpage. The version number on the Configuration Webpage should reflect the firmware version uploaded.

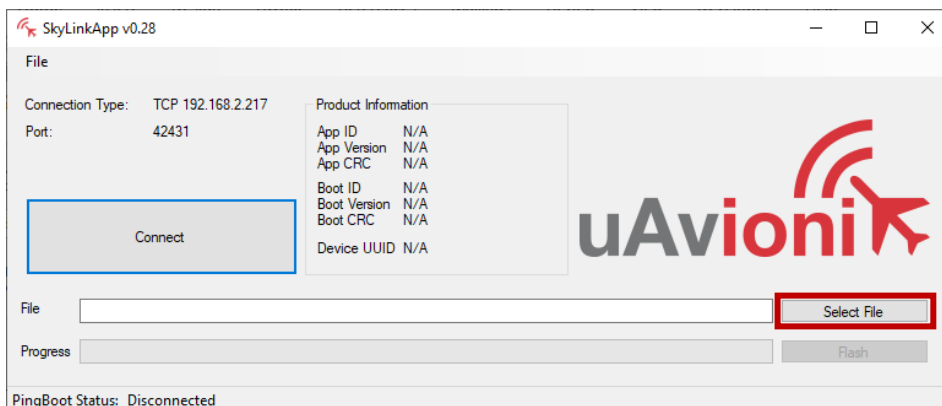
### 6.5.5 microLink Update

The microLink Radio on the skyStation can be updated using the SkyLinkApp. First connect the SkyLinkApp to the skyStation following the steps in section 6.2.

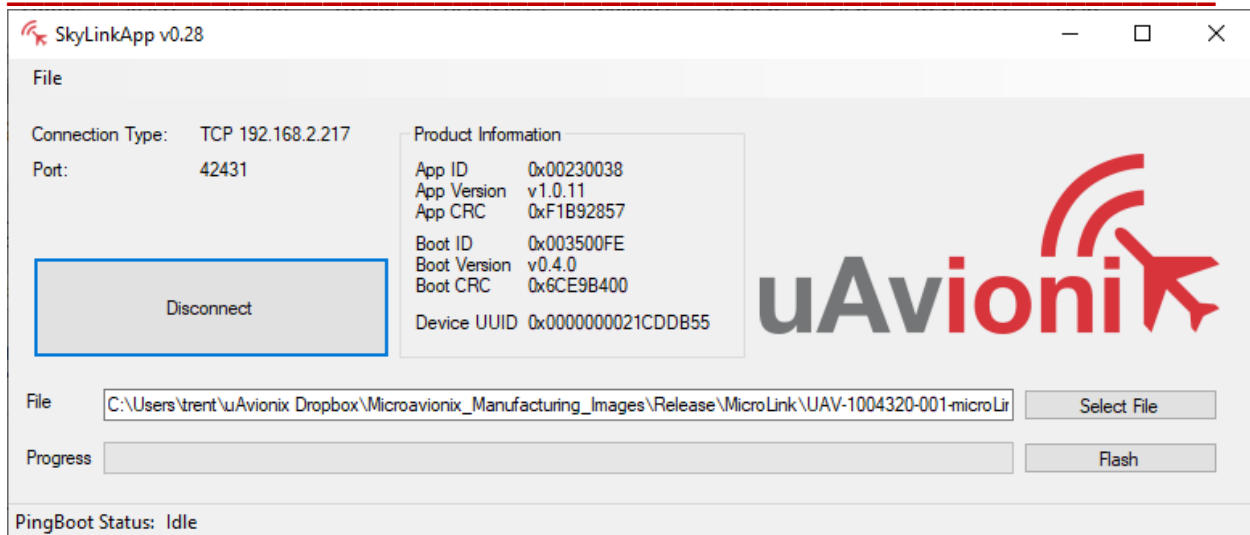
In the upper right hand corner click the “Radio FW Update” button.



A new window will open. First click “Select File” and select the correct firmware file to upload.



Then click the “Connect” button. The Product Information window will populate with radio information when a connection is made, and the PingBoot Status in the bottom left will change to “Idle”



Click “Flash” DO NOT power off or disconnect the device until the flash is complete.

