

Seagull #MAP-X - Manual



General information

Please read this manual thoroughly before connecting and configuring Seagull #MAP-X

CAUTION: Never power #MAP-X without the GPS antenna connected – this could damage the GPS module and void your warranty !

Seagull #MAP-X is designed to connect and control your UAV mounted camera, and log GPS coordinates during an autonomous flight, used for geotagging the photos captured for high precision orthophoto generation to use within land mapping, agriculture analysis, 3D modelling and more.

#MAP-X gives you precise GPS coordinates of photos captured and only tags the location, if the photo has been successfully captured. Furthermore #MAP-X logs GPS coordinates of failed photos - giving you data to quickly redo a survey and capture the missing photos.

Seagull #MAP-X features 5 modes:

AC-T (shutter release with user defined focus time)

TL-T (shutter release with user defined time interval)

SS-T (GPS logging based on hot shoe feedback alone)

Camera On/Off (switch camera on/off – only with Sony "Multi" cameras!)

Mission Start/End (starts and ends the tagging process of a mission flight)



Other specifications

#MAP-X is a precision SYNC camera trigger - meaning that photos and GPS coordinates will have a 1:1 relation !

Say goodbye to mismatches between photos and GPS logs. Featuring twice the update rate of commonly used solutions on the market – meaning reduced drift and higher precision on your GPS location data.

The unit features onboard data logging and multiple log file generation such as MAP.kml for easy post-flight overview with an overlay in Google Earth of failed and confirmed photos captured, as well as a flight summary (LOG.txt) with information in regards to failed photo GPS coordinates and the number count of the missed photo. All this to ensure an easy re-flight of missing waypoints and photos by making a new flight – with the missing waypoints alone !

On top of that #MAP-X can be expanded with the telemetry ground station add-on - Seagull #TRX (*optional*), that offers live feedback from #MAP-X including current camera triggering count of confirmed and failed photos and more !

#MAP-X in more detail:

- uBlox NEO M8 GPS receiver module
- Fast sampling concurrent GNSS
- 10Hz GPS refresh rate
- Compact multi GNSS antenna
- Micro SD card for onboard data logging
- SYNC feedback from camera hot shoe
- Multiple log file generation with critical mission data
- Photo number count indication for failed photos incl. coordinates for easy re-flight and mission overview !
- Optional Seagull #TRX ground station offering live feedback from #MAP-X with camera photo count and more..

Connecting to your Receiver / Flight Controller

Connect the servo cables by following the polarity markings on Seagull #MAP-X and connect the other ends of servo cables to your Receiver / Flight Controller, with the correct polarity.

Please refer to the manual of your specific R/C radio system or Flight Controller to find out more about how to connect accessories and what ports to utilize.



NOTE: #MAP-X needs to be powered through one of its input channels (1, 2 or both) For Pixhawk users, #MAP-X can be powered by Pixhawk's power rail ranging from 4.5V to 10.5V !

#MAP-X can be powered externally as well by a power source ranging from 4.5V to 16V ! (In case you are using an external power source make sure that there is common grounding between the RC or Flight controller unit, when connecting the signal wires !)



Configuring your Transmitter

Setting up Seagull #MAP-X is straight forward !

Simply select the channel that the device is plugged into and trim the LOW/HIGH values for that channel, until the desired modes are met – refer to the table below:

Channel	State / Mode	Value	Range
1, 2	Neutral	1500 μ S	1400 \leftrightarrow 1600 μ S
1	SS-T	1100 μ S	1000 \leftrightarrow 1200 μ S
1	TL-T	1300 μ S	1200 \leftrightarrow 1400 μ S
1	AC-T	1800 μ S	1600 \leftrightarrow 2000 μ S
2	Camera On/Off *	1200 μ S	1000 \leftrightarrow 1400 μ S
2	Mission Start/End	1800 μ S	1600 \leftrightarrow 2000 μ S
1 & 2	No signal **	n/a	0 \leftrightarrow 1000 μ S / 2000 \leftrightarrow ∞ μ S

* On/Off - only with Sony "Multi" cameras !

** Signal out of scope or no input signal !
No signal state will occur when signal is out of the standard R/C PWM signal range or if no signal is received.

Example with Seagull #MAP-X configured to CH7 on a Taranis X9D transmitter:

```

SERVOS 1500us 7 / 13
CH1 RAil 0.0 - 100.0 - 100.0  $\rightarrow$  --- 1500 $\Delta$ 
CH2 Ele 0.0 - 100.0 - 100.0  $\rightarrow$  --- 1500 $\Delta$ 
CH3 Thr 0.0 - 100.0 - 100.0  $\rightarrow$  --- 1500 $\Delta$ 
CH4 Rud 0.0 - 100.0 - 100.0  $\rightarrow$  --- 1500 $\Delta$ 
CH5 LAil 0.0 - 100.0 - 100.0  $\rightarrow$  --- 1500 $\Delta$ 
CH6 0.0 - 100.0 - 100.0  $\rightarrow$  --- 1500 $\Delta$ 
CH7 Seagull MAP-X 0.0 - 60.5 - 60.5  $\rightarrow$  --- 1500 $\Delta$ 
    
```

Setting up Mission Planner / Ground Control / Camera Trigger

If you wish to trigger Seagull #MAP-X from a Flight Controller, setting it up in Mission Planner is also straight forward. Start Mission Planner and follow the steps below.

1. Click on **INITIAL SETUP** >> **OPTIONAL HARDWARE** >> **CAMERA GIMBAL**
2. **"SHUTTER"** - in the drop down list, chose the channel that Seagull #MAP-X is connected to.
3. **"PUSHED"** - Set the "Value" for the AC-T trigger mode

State / Mode	Value	Range
Neutral	1500 μ S	1400 \leftrightarrow 1600 μ S
AC-T	1800 μ S	1600 \leftrightarrow 2000 μ S

4. **"NOT PUSHED"** – Set the value "1500" (Neutral state – see table above)
5. **"DURATION"** – Set the value "1" for AC-T mode.
(Value may vary depending on the cameras speed to lock focus, make sure that you have correct settings on the camera side and if running camera with slow focusing lenses, increase the camera focus time in the CONFIG.txt on the micro SD card)

Example from Mission Planner:

The screenshot shows the Mission Planner software interface. The 'INITIAL SETUP' tab is selected, and the 'Camera Gimbal' option is highlighted in the left sidebar. The main window displays settings for Tilt, Roll, and Pan servos, each with 'Servo Limits' (Min: 1000, Max: 2000) and 'Angle Limits' (Min: 1000, Max: 2000). The 'Shutter' section is highlighted with a purple box and contains the following settings:

- Shutter: CH 7 (with a note: <- Select channel that Seagull #MAP-X is connected to. ex. CH 7)
- Servo Limits: Min: 1000, Max: 2000
- Shutter: Pushed: 1800 (with a note: <- Set value for AC-T mode)
- Shutter: Not Pushed: 1500 (with a note: <- Set value "1500" - Neutral state)
- Duration (1/10th sec): 1 (with a note: <- Set value "1" for AC-T mode)

NOTE: "Servo Limits" needs to be set to Min: 1000 and Max: 2000 for Pixhawk to react to the entered values !

Camera On / Off

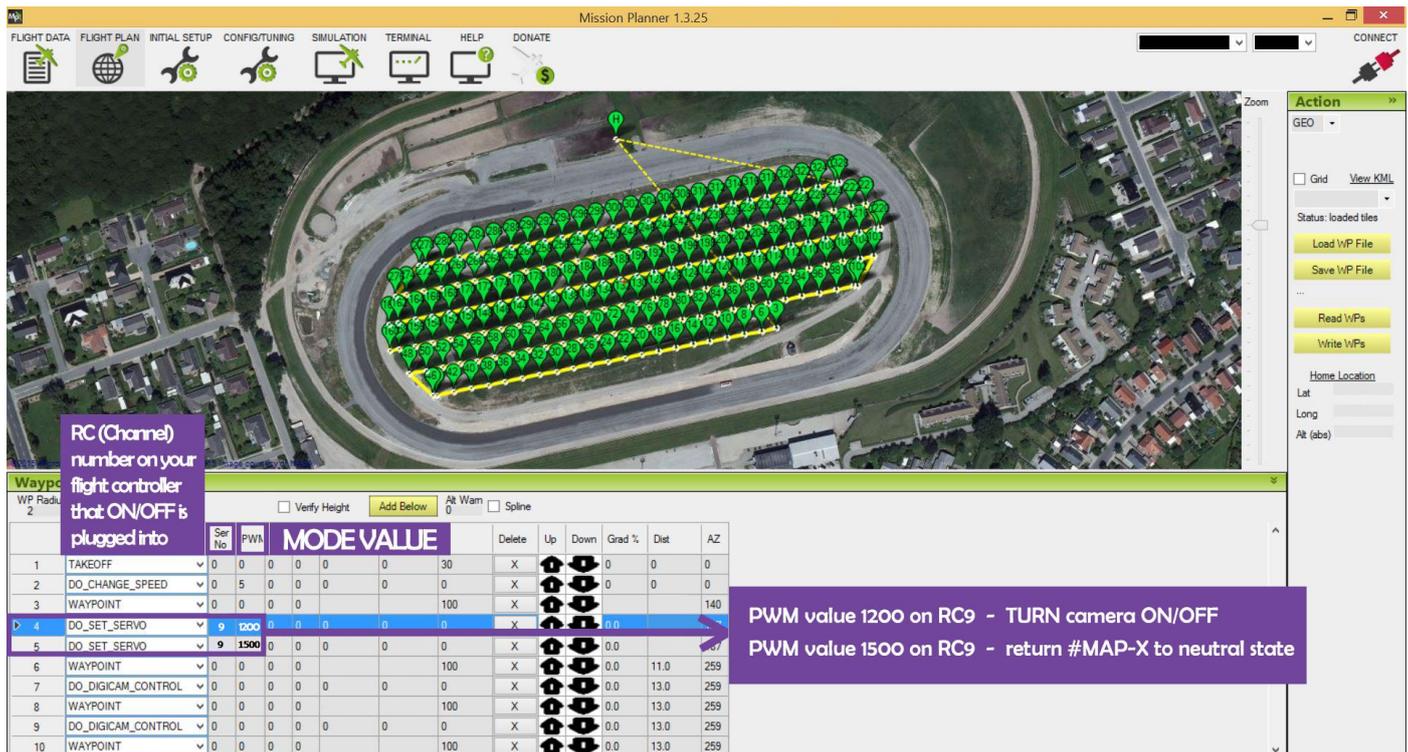
This feature only works with Sony MULTI cameras, it helps to prevent dust getting into the lens on compact cameras and to retract the lens before landing with fixed wing platforms to protect the lens mechanism.

This feature is very helpful on fixed wing platforms as well as multirotor platforms in order to prevent dust entering the lens mechanism on motorized lenses.

*Camera On / Off feature can be controlled via RC transmitter or Flight controller.

If you wish to integrate camera ON / OFF into your Survey/Mission plan via the use of Ground Control or Mission Planner software, simply follow the steps below.

In this scenario we want to turn on the camera after the take-off.



RC (Channel) number on your flight controller that ON/OFF is plugged into

Waypoint	WP Radius	Ser No	PWM	MODE VALUE	Delete	Up	Down	Grad %	Dist	AZ
1		0	0	0	0	0	30	X	0	0
2		0	5	0	0	0	0	X	0	0
3		0	0	0	0	100	X			140
4		9	1200	0	0	0	0	X	0	0
5		9	1500	0	0	0	0	X	0	0
6		0	0	0	0	100	X	0	11.0	259
7		0	0	0	0	0	X	0	13.0	259
8		0	0	0	0	100	X	0	13.0	259
9		0	0	0	0	0	X	0	13.0	259
10		0	0	0	0	100	X	0	13.0	259

PWM value 1200 on RC9 - TURN camera ON/OFF
PWM value 1500 on RC9 - return #MAP-X to neutral state

To turn the camera OFF just before landing simply execute the following before the last waypoint / RTL / LANDING, in order to retract and protect the lens mechanism.

NOTE: Make sure to let the signal be on for some period of time in the mission plan when doing DO_SET_SERVO command, in order for #MAP-X to read it correctly.

*When setting up the CHANNEL 2 of #MAP-X to be controlled by Pixhawk or other flight controller platforms, this will disable control from the RC transmitter and vice versa scenario.

SS-T mode

Is a mode that listens to input from your cameras hot shoe, and only logs GPS coordinates when shutter action occurs and feedback from hot shoe is sensed !

It is great if you are triggering the camera manually or have another method to trigger the camera - and need precise GPS coordinate logging.

The mode is simply activated by keeping the value (1100 μ S) for the mode. To exit the mode, simply return the channel back to "Neutral" (1500 μ S) and wait for a 10sec timeout before the mode exits.

NOTE: It's possible to "break out" of the 10sec timeout by triggering a photo shortly after returning to "Neutral" as well. "Neutral".

Mission STARTED / ENDED

Mission STARTED has to be triggered in order to start logging GPS coordinates to the SD card during a flight !

*The "Mission STARTED / ENDED" feature can be controlled either from R/C transmitter or Flight controller.

If you wish to integrate Mission STARTED / ENDED feature to be automated in the in your Survey/Mission plan via the use of Ground Control Station or Mission Planner software - simply follow the steps below.

In this scenario we will enable "Mission STARTED" after Mission takeoff.

RC(Channel) number on your flight controller that Mission START/END is plugged into

	Ser No	PWM	MODE VALUE							Delete	Up	Down	Grad %	Dist	AZ
1	TAKEOFF	0	0	0	0	0	0	0	30	X	0	0	0	0	
2	DO_CHANGE_SPEED	0	5	0	0	0	0	0	0	X	0	0	0	0	
3	WAYPOINT	0	0	0	0	0	0	0	100	X	0	0	140	0	
4	DO_SET_SERVO	9	1800	0	0	0	0	0	0	X	0.0	0.0	0	0	
5	DO SET_SERVO	9	1500	0	0	0	0	0	0	X	0.0	0.0	0	0	
6	WAYPOINT	0	0	0	0	0	0	0	100	X	0.0	0.0	11.0	259	
7	DO_DIGICAM_CONTROL	0	0	0	0	0	0	0	0	X	0.0	0.0	13.0	259	
8	WAYPOINT	0	0	0	0	0	0	0	100	X	0.0	0.0	13.0	259	
9	DO_DIGICAM_CONTROL	0	0	0	0	0	0	0	0	X	0.0	0.0	13.0	259	
10	WAYPOINT	0	0	0	0	0	0	0	100	X	0.0	0.0	13.0	259	

PWM value 1800 on RC9 - Mission START / END
 PWM value 1500 on RC9 - return #MAP-X to neutral state

For ending the Mission simply repeat the same step as above at the end of you flight plan, at the point where there is no more photos being triggered or just before RTL or LANDING. If executed correctly it will do "Mission ENDED" and generate log files and finalizing the flight.

In a case that you have forgotten to end the mission - do not worry, since there will still be available GPS log data for during geotagging, apart from not being able to use .kml file or have a complete summary of trigger signals received, photos confirmed, photos failed and lost GPS lock count.

NOTE: If Mission STARTED is not active, no GPS coordinate data will be logged to the Micro SD card !!

Make sure to let the signal be on for some period in the mission plan when doing DO_SET_SERVO command, in order for #MAP-X to read it correctly. Repeat the sequence at the end of the mission in order to indicate the END of mission and generate the log files in the SD card. When setting up the CHANNEL 2 of #MAP-X to be controlled by Pixhawk or any other flight controller platform, will disable control over RC transmitter and vice versa scenario.

Micro SD Card

Seagull #MAP-X features a micro SD card for storing flight and GPS coordinate data for geotagging your photos. The micro SD card has to be formatted in either FAT-16 or FAT-32 format in order for #MAP-X to be able to recognize it.

The micro SD card will contain folder(s) named "FlightXX".

A new "FlightXX" folder is generated every time the "MISSION STARTED" command is executed from #MAP-X.

The maximum "FlightXX" folder count is 99, meaning that there can be 99 Flights in total starting with the folder "Flight1" and ending with folder "Flight99".

Every "FlightXX" folder will contain the following 3 files:

- **GPS.txt** – containing the NMEA GPS data, which is used for geotagging your photos.
- **MAP.kml** – Google Earth's .kml file extension with an overview of confirmed and failed photos with icons showing the result for the completed flight.
- **LOG.txt** – is a flight summary log which will contain failed photo coordinates (if any) with expected photo number count. This file also contains data such as total trigger counts received, photos confirmed count, photos failed count and lost GPS lock count.

NOTE: In the very root of micro SD card is "CONFIG.txt" which contains configuration settings for #MAP-X and telemetry (the optional add-on, Seagull #TRX)

CAUTION: Always perform a "Safe Eject" of the micro SD card from your PC/Mac to avoid data corruption on the card !

CONFIG.txt file

The CONFIG.txt file is automatically generated when #MAP-X is powered on with a correct formatted micro SD card.

If the file is present on the micro SD card when #MAP-X is powered, the parameters will simply be read from the file, and #MAP-X configured on that behalf.

The parameters listed in the file, is referred to as:

AC-T pre-AF – time in seconds to define the pre-AF for the camera. If a lens or camera is too slow to focus, then the photo will not be captured. For mapping purposes leave the AF to 0 for as fast as possible shutter action, if the camera is set up correctly. If your camera is not reacting when triggered, then try to increase the AC-T pre-AF value in 0.1 increments before you get a repeatable result.

TL-T interval – time interval in seconds for timelapse action. Can be entered down to 2 decimals (ex. "1.54")

Edit the following if #TRX is connected to #MAP-X otherwise the following can be ignored.

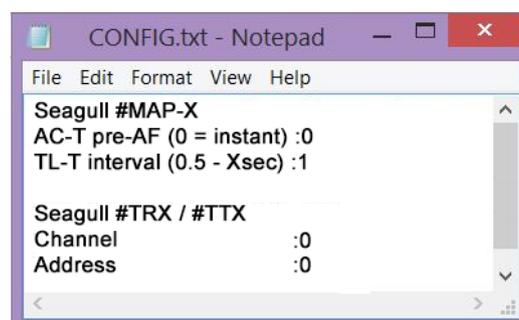
Channel – Telemetry channel adjustable frequency from 410MHz to 441MHz / 900MHz to 925.5 MHz.

Please refer to the Seagull #TRX Manual for further instructions – default when CONFIG.txt is generated is set to "0" !

Address – Telemetry address in case you have multiple #TRX units or other telemetry modules running at 433MHz / 915MHz.

Please refer to the Seagull #TRX Manual for further instructions. – default when CONFIG.txt is generated is set to "0" !

Example of default generated CONFIG.txt file:



```
CONFIG.txt - Notepad
File Edit Format View Help
Seagull #MAP-X
AC-T pre-AF (0 = instant) :0
TL-T interval (0.5 - Xsec) :1

Seagull #TRX / #TTX
Channel :0
Address :0
```

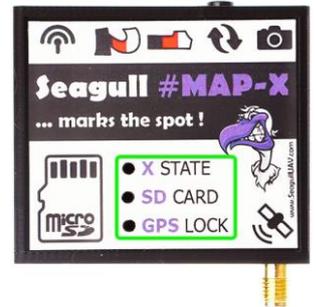
If CONFIG.txt file becomes corrupt or you accidentally delete it, don't worry - #MAP-X will generate the file with default values. Please be aware that if the file was deleted and generated automatically by #MAP-X the telemetry setting values will be reset back to default values which are 410MHz for the 433MHz kit and 900MHz for the 915MHz unit. Please refer to the #TRX manual for a full list of values regarding channel frequency configuration !

NOTE: If CONFIG.txt is re-generated with default Channel and Address values, and you are using the #TRX unit, you will have to bind #MAP-X and #TRX again, this is done by resetting it back to default values - refer to Seagull #TRX Manual on how to perform this operation.

Troubleshooting

To determine what Seagull #MAP-X is currently doing - simply read the output of the "X STATE" LED and match it with the "Action" in the table below.

The following tables show the readout for the different states / modes for X STATE LED, SD CARD LED and GPS LOCK LED.



X STATE	Action
Blinking	No Signal – check connections and mode values
Fading	Ready – waiting for next command
Solid on	Active in one of the 4 modes – return to "Neutral" before next command
Fade >> Solid on	AC-T mode activated – return to "Neutral" before next command
Fade >> Solid on	SS-T mode activated – return to "Neutral" mode will exit after default timeout 10seconds or trigger one more time when "Neutral" is active to exit before timeout
Fade >> Solid on (repeat)	TL-T mode activated – return to "Neutral" to exit the mode
Fade >> Solid on	Camera ON/OFF activated (Only Sony "Multi" cameras) – return to "Neutral" before next command

SD CARD	Action
Blinking	Micro SD card - is not present
Flashing rapidly	Micro SD card initialization error – please check format!
Solid on	Micro SD card – successfully initialized and ready

X + SD CARD	Action
1x blink >> Solid on	Mission START – return to "Neutral" before next command
2x blink >> Solid on	Mission END – return to "Neutral" before next command

GPS LOCK	Action
OFF	There is no GPS lock!
Solid on	GPS position locked!

Technical specifications

- Dimensions: 52 x 45 x 12 mm
- Weight: 24 g (standalone – no cables, connectors, antenna etc.)
- Voltage: 4.5 – 15 volts (5 volts recommended – do **NOT** exceed 15 volts !!)
- Input signal: Standard R/C PWM between 1000 – 2000µS