MAESTRO plugin for EuroScope

- version 1.1 -

Developer Guide

EuroScope | power of control

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1 Installation

1) In EuroScope, open the “OTHER SET” menu, then click on the “Plug-ins…” item

2) Check if the “MAESTRO plugin” is already loaded
   -> If not, click on “Load” and select the plugin file (MAESTRO.dll)

3) Select the MAESTRO plugin in the list and check if “Standard ES radar screen” is listed in the “Allowed to draw on types”
   -> If not, move it there

4) Close the Plug-ins Dialog with “Close”

5) If the plugin wasn’t already loaded or you needed to give the drawing permission, save the profile to avoid having to do all this again the next time: Open the “OTHER SET” menu and click on “Save profile”. This will automatically load the plugin with the profile when it’s used the next time. You can also select “Save profile as” if you want to create a different profile for this plugin for some reason.

2 Plugin data files

This chapter gives guidance on developing the data files used by the plugin for various features. Even though the plugin does its best to check the data for errors, some errors may get through and cause all kinds of issues, possibly leading to ES crashing, so it's important to be careful to provide correctly formed data when creating the files. Errors in these files discovered by the plugin are reported in a "MAESTROplugin" chat tab when the files are loaded.

2.1 MAESTROsettings.txt & MAESTROsettingsLocal.txt

These files are used for adjusting the plugin settings. Each setting in the file must be on its own line, and the syntax is *SettingName=Value*, for example *System_Wind_Sfc_Auto=0* to disable the automatic wind setting. The available settings, default values, short descriptions and the acceptable values are listed below.

The settings in MAESTROsettings.txt (meant to contain common settings and airport setups) are read first, followed by the ones in MAESTROsettingsLocal.txt (meant to contain personal settings). If a setting is found more than once, the last value will be used.

To use certain settings as airport-specific, enter a setting line *[ICAO]* where ICAO is the desired airport ID. Any settings below that line up to the next *[ICAO]* line are used only at that airport. All settings to be used at all airports (or when no airport is selected) must be at the beginning of the file before any *[ICAO]* lines.

Setting name	Default value	Description
System_Version	0	Selects the modelled GUI version, old(0)/new(1)
System_AutoHideCOTSwindow	0	Hide(1)/show(0) COTS Window when MAESTRO Window is open
System_UpdateNotificationDelay	30	Do not show update notification until this amount of days (0-90) have passed since a new release version is available
System_GUI_Scale	1.0	Scale factor for all graphics (0.2-10.0)
System_Timeline_PixPerMin	10.0	Timeline scale in pixels per minute (1.0-100.0)
System_TrueColorMode	1	Windows shown during move&resize(1)/only outline shown(0)
System_WTC_Type	0	Wake turbulence classification to use 0 ICAO wake turbulence category 1 RECAT-ICAO 2 RECAT-EU
System_RateTime	30	Past landing rate calculation range (10-120min)
System_RateDisplayType	0	Displayed rate type, seconds(0)/ops per hour(1)
System_DisplayWinds	1	Show(1)/hide(0) Winds tab
System_DisplayRates	1	Show(1)/hide(0) Actual Rates tab
System_DisplayTracks	0	Show(1)/hide(0) Tracks tab
System_LandingSpeed	140	Average airspeed on final approach (50-200kts)
System_Default_Feeder_Time	15	Default time from feeder to threshold (1-600min)
System_Default_Rate	150	Default rate value between arrivals (1-600sec)
System_Default_Final_Length	10.0	Default length of final for vectoring path calculations (1.0-100.0nm)
System_Default_Slot	2	Default length of a new slot (1-999min)
System_Minimum_EET	10	Minimum time to destination (0-999min) forced for new flights
System_Max_Final_Length	15	For frozen flights on final, sequence forced on order within this distance (0-999nm)

System_Lost_Time	15	Track age (1-9999sec) to use lost track color
System_Remove_Time	600	Track age (1-9999sec) to automatically remove from sequence
System_Delay_Time_0	1	Delay (1-9999min) to use Delay 0 color
System_Delay_Time_1	2	Delay (1-9999min) to use Delay 1 color
System_Delay_Time_2	5	Delay (1-9999min) to use Delay 2 color
System_Delay_Time_3	10	Delay (1-9999min) to use Delay 3 color
System_Time_Frozen	5.0	Time to destination (0.0-999.9min) to enter "Frozen" state
System_Time_SuperStable	6.0	Time to feeder fix (0.0-999.9min) to enter "SuperStable" state
System_Time_SuperStable_Buffer	5.0	Keep flights in "SuperStable" state unless time to feeder fix becomes greater than the above parameter plus this amount (0.0-999.9min)
System_Time_Stable	15.0	Time to feeder fix (0.0-999.9min) to enter "Stable" state
System_Time_Stable_Buffer	5.0	Keep flights in "Stable" state unless time to feeder fix becomes greater than the above parameter plus this amount (0.0-999.9min)
System_Time_Unstable	1.0	Minimum time for new tracks (0.0-999.9min) to use "Unstable" color
System_Vectoring_Mode	0	Use shortest possible vectoring path as basis for calculations for flights with an assigned heading set 0 Never 1 For SuperStable flights that have passed the feeder fix 2 For all SuperStable flights
System_Wind_Sfc_Auto	1	Set(1)/Don't set(0) surface wind automatically from METAR
System_Web_Path_DL		Path (without filename) to web server for downloading data
System_Web_Path_UL		Path (without filename) to web server for uploading data
System_Web_User_DL		Username to download web server
System_Web_User_UL		Username to upload web server
System_Web_Password_DL		Password to download web server
System_Web_Password_UL		Password to upload web server
System_Web_Auth_DL	0	Authentication required(1)/not required(0) to download data
System_Web_Auth_UL	1	Authentication required(1)/not required(0) to upload data
System_LoadInterval_Local	15	Interval (5-600sec) to load local data in slave mode
System_LoadInterval_Web	60	Interval (30-600sec) to load web data in slave mode
System_LoadType	0	Source of sequence data when in slave mode: 0 Load sequence from received window messages 1 Load sequence from file
System_SaveInterval_Local	15	Interval (5-600sec) to save local data in master mode
System_SaveInterval_Web	30	Interval (30-600sec) to save web data in master mode
System_SaveType	0	Sequence sharing type when in master mode: 0 Send as window message 1 Save to file 2 Both
Window_COTS_Pos	100,100,1	COTS window top left corner x,y -position and "startup only flag"
Window_MAESTRO_Pos	100,100,1	MAESTRO window top left corner x,y -position and "startup only flag"
Window_MAESTRO_Size	300,200,1	MAESTRO window width,height and "startup only flag"

When set to "1", the "startup only flag" causes the setting to be applied only on plugin startup. In this case the setting must not be in an airport-specific section of the settings file as those sections are not read at

plugin startup. Setting the flag to “0” or leaving it out will cause the setting to be applied every time the settings are reloaded (whenever the “Ok” button is clicked on the Setup window).

Label_Highlight_Type	0	0 No box around label 1 Box around ASEL aircraft label 2 Box around aircraft showing detailed tag (*

*) this also needs the plugin’s “Dummy item – correlated detailed tag” item to be present in all of the used tag family’s correlated detailed tags.

Label_DelayItem_ColorType	1	0 No specific coloring 1 Sector state coloring as in the TopSky plugin 2 Delay coloring as in the MAESTRO/AMAN Window
Label_DelayItem_ShowGain	1	Show(1)/hide(0) delay item when there is no delay
Label_DelayItem_Unsel_Uncon	0	Show(1)/hide(0) delay item for unconcerned unselected tracks
Label_DelayItem_Uncon	1	Show(1)/hide(0) delay item for unconcerned selected tracks
Label_HideZeroDelay	0	Show(1)/hide(0) zero value delays in timeline flight labels

The following settings define the flight labels’ coloring and default item visibility. A positive value will show the item, a negative value will hide it by default (the callsign item is mandatory to be displayed, so only positive values are accepted for it). The available color values are as follows:

- 1 Custom label color 1
- 2 Custom label color 2
- 3 Custom label color 3
- 4 Custom label color 4
- 5 Custom label color 5
- 6 Custom label color 6
- 7 Flight state color (unstable, stable, etc.)
- 8 Runway specific color
- 9 Feeder specific color
- 10 Current delay color
- 11 Total delay color
- 12 Arrival airport specific color

Label_Rwy_FeederTime	7	Feeder time in Runway mode label
Label_Rwy_Callsign	7	Callsign in Runway mode label
Label_Rwy_ATYP	-7	ATYP in Runway mode label
Label_Rwy_WTC	-7	WTC in Runway mode label
Label_Rwy_Feeder	-7	Feeder ID in Runway mode label
Label_Rwy_Delay_Total	-11	Total delay in Runway mode label
Label_Rwy_Delay_Now	10	Remaining delay in Runway mode label
Label_Feeder_FeederTime	7	Feeder time in Feeder mode label
Label_Feeder_Rwy	-7	Runway in Feeder mode label
Label_Feeder_Callsign	7	Callsign in Feeder mode label

Label_Feeder_ATYP	-7	ATYP in Feeder mode label
Label_Feeder_WTC	-7	WTC in Feeder mode label
Label_Feeder_Delay_Total	-11	Total delay in Feeder mode label
Label_Feeder_Delay_Now	10	Remaining delay in Feeder mode label

When the System_Version setting is set to “1”, some of the default color values are different, and are shown in the below list with square brackets.

Color_ActiveText	255,255,255	RGB value for Active text color	[0,0,0]
Color_Button	120,120,120	RGB value for Button color	[192,192,192]
Color_Button_Active	120,120,120	RGB value for Active Button color	[96,160,224]
Color_CurrentTime	192,0,0	RGB value for the line marking the current time	
Color_Highlight	236,228,108	RGB value for Highlight color	[255,255,255]
Color_InactiveText	168,168,168	RGB value for Inactive Text color	
Color_MenuBackground	120,120,120	RGB value for Menu Background color	[0,128,255]
Color_MenuBorder	50,50,50	RGB value for Menu Border color	[255,255,255]
Color_MenuText	0,0,0	RGB value for Menu Text color	[255,255,255]
Color_Selected	64,64,64	RGB value for Selected items color	
Color_SliderBackground	96,96,96	RGB value for Slider Background color	
Color_Slot	192,0,0	RGB value for Slot color	
Color_WindowBackground	120,120,120	RGB value for Window Background color	
Color_WindowBackground_Past	none	RGB value for timeline area in the past	
Color_WindowText	255,255,255	RGB value for Window Text color	
Color_Delay_Negative	0,224,0	RGB value for Delay Negative color	
Color_Delay_0	255,255,255	RGB value for Delay 0 color	
Color_Delay_1	0,0,224	RGB value for Delay 1 color	
Color_Delay_2	224,224,0	RGB value for Delay 2 color	
Color_Delay_3	255,128,0	RGB value for Delay 3 color	
Color_Delay_4	192,0,0	RGB value for Delay 4 color	
Color_Unstable	80,220,100	RGB value for Unstable color	[128,255,128]
Color_Stable	255,128,0	RGB value for Stable color	[192,255,128]
Color_SuperStable	255,255,255	RGB value for SuperStable color	
Color_Frozen	0,255,255	RGB value for Frozen color	[128,255,255]
Color_Landed	0,0,224	RGB value for Landed color	[255,128,255]
Color_Lost	96,96,96	RGB value for Lost color	
Color_Label_Custom_1…6	255,255,255	RGB value for custom label colors 1 to 6	
Color_ADES_Default	255,255,255	RGB value for the default airport label color	
Color_Feeder_Default	255,255,255	RGB value for the default feeder label color	
Color_Runway_Default	255,255,255	RGB value for the default runway label color	

The following color settings are used for the same purpose as the corresponding ones in the TopSky plugin, and should be set to the same values for a uniform graphical appearance. The default values are the same ones as in the “non-COOPANS” version of the TopSky plugin. To set the values according to the “COOPANS” version, a setting “Color_COOPANS=1” may be used.

	Default	Color_COOPANS=1
Color_Arm	97,97,97	97,97,97
Color_Background	162,163,156	73,80,85
Color_Concerned	124,1,124	111,153,110
Color_Foreground	0,1,0	200,200,200

Color_WM_Active_Fg	230,230,231	255,254,254
Color_WM_Bg	147,147,145	100,100,105
Color_WM_Border	50,50,50	88,95,99
Color_WM_Fg	1,1,1	180,184,181
Color_WM_Frame	1,1,0	88,95,98

There are three specific format setting lines to set up airport-related things. These must appear after an *[ICAO]* line to link them to the correct airport, and may only be used in MAESTROsettings.txt, not in MAESTROsettingsLocal.txt.

AIRPORT:Icao
AIRPORT:Icao:Color

The AIRPORT line is used to define additional airports whose traffic is also to be sequenced. Airport-specific colors for labels can also be set here. The main airport (defined with the *[ICAO]* line) does not need to be defined using an *Airport* line unless a color is wanted for it as well.

- Icao Airport ICAO code
- Color Optional color value to use as an airport-specific color (format: R,G,B)

FEEDER:FeederName:FeederID:Icao:FixList
FEEDER:FeederName:FeederID:Icao:FixList:Color

The FEEDER line is used to set up a feeder fix. Any number of feeder fixes may be defined. An aircraft is connected to a specific feeder fix when its flightplan includes any of the defined waypoints and the destination matches the defined one.

- FeederName Feeder name
- FeederID String to display in flight labels (an abbreviation perhaps)
- Icao Airport ICAO code (or "*" for any airport)
- FixList Comma-separated list of waypoints associated with the feeder fix
- Color Optional color value to use as a feeder-specific color (format: R,G,B)

For aircraft not routing via any of the defined feeder fixes, a "floating" feeder point is used to trigger the state changes. The setting System_Default_Feeder_Time controls its position in time from the landing threshold.

RUNWAY:Icao:RunwayID:Rate:Color:FinalLength

The RUNWAY line is used to define a runway-specific default landing rate, a specific color to use for this runway in the flight labels and a length of final approach to use in shortest vectoring path calculations. To set only some of these, enter "*****" for the others to use the respective default values.

- Icao Airport ICAO code
- RunwayID Runway ID
- Rate Default landing rate (seconds between landings, 1-600)
- Color Runway-specific color (format: R,G,B)
- FinalLength Length of final (nm, 1.0-100.0)

2.2 MAESTRO_sequence_data.json

This file contains the sequence data when the Master or Slave mode is used. It does not contain any other data so it can be safely deleted after the session if necessary.

Warning: Do not store any data in a file with this name in the same folder as the plugin. The plugin will overwrite the file without any warning!

The JSON file contains the following objects:

- data
  - icao — string — ICAO code of main airport in the data
  - source — string — VATSIM callsign of data source
  - timestamp — number — Unix timestamp
- wind
  - 10k_deg — number — 10000ft wind direction (-1=no data, 0=variable)
  - 10k_kts — number — 10000ft wind speed (-1=no data)
  - sfc_deg — number — Surface wind direction (-1=no data, 0=variable)
  - sfc_kts — number — Surface wind speed (-1=no data)
  - sfc_auto — boolean — Surface wind in automatic mode?
- runways (array of runway objects as specified below)
  - icao — string — Airport ICAO code
  - id — string — Runway identifier
  - active — boolean — Runway active for arrivals?
  - rate — number — Runway landing rate in seconds between arrivals
  - color — number — Runway-specific color (COLORREF value)
  - slots (array of slot objects as specified below)
    - begin — number — Unix timestamp
    - end — number — Unix timestamp
- feeders (array of feeder objects as specified below)
  - icao — string — Airport ICAO code
  - name — string — Feeder group name
  - id — string — Feeder group short id
  - color — number — Feeder group -specific color (COLORREF value)
  - fixes — array of strings — Fixes associated with the feeder group
- sequence (array of aircraft objects as specified below)
  - callsign — string — Callsign
  - atyp — string — ICAO aircraft type designator
  - wtc — string — Wake turbulence category or group
  - adep — string — Departure ICAO code
  - ades — string — Destination ICAO code
  - initial_eta — number — Unix timestamp for initial destination ETA
  - rwy — string — Arrival runway identifier
  - rwy_seq — number — Sequence number for the arrival runway
  - feeder_group — string — Feeder group name
  - ff — string — Feeder fix name

○	sta_ff	number	Unix timestamp for scheduled time at feeder fix
○	ttlttg_ff	number	Time to lose(+)/gain(-) at feeder fix (seconds)
○	eet_ff	number	Time to feeder fix (minutes) (<0=fix already passed)
○	eet_rwy	number	Time to scheduled time at the runway (seconds)
○	eet_ff_to_rwy	number	Time from feeder fix to runway (seconds)
○	eet_ades	number	Time to runway without delay (seconds)
○	state	number	0=unstable, 1=stable, 2=superstable, 3=frozen, 4=landed
○	delay_total	number	Total delay (seconds)
○	lost	boolean	Aircraft currently not seen by data source?
○	slot_before	number	Slot before aircraft (minutes)
○	slot_after	number	Slot after aircraft (minutes)

2.3 ICAO_Aircraft.json

This file contains more detailed information on the aircraft types. It is a JSON file containing an array of objects with the following keys:

	Key	Data type	Description
-	ICAO	string	Type designator (mandatory item)
-	Description	string	Three-character description ▪ First character – description: A (Amphibian), G (Gyrocopter), H (Helicopter), L (Landplane), S (Seaplane) or T (Tiltrotor) ▪ Second character – engine count: 1-8 or C (Two engines coupled to drive a single propeller system) ▪ Third character – engine type: E (Electric), J (Jet), P (Piston), R (Rocket) or T (Turboprop/turboshaft)
-	WTC	string	Wake turbulence category ▪ L, M, H or J
-	WTG	string	ICAO wake turbulence group ▪ A, B, C, D, E, F or G
-	RECAT-EU	string	RECAT-EU wake turbulence group ▪ A, B, C, D, E or F
-	Wingspan	number	Wingspan in meters
-	Length	number	Length in meters
-	Height	number	Height in meters
-	MTOW	number	Maximum take-off weight in kilograms
-	Use	string	Typical use(s) for the aircraft ▪ One or more of the following: A (Airliner/commuter), B (Business/corporate), C (Cargo), H (Helicopter, other than military), I (Military helicopter), M (Military, other than helicopter), P (Private), T (Military tanker/transport)
-	IATA	string	IATA designator
-	IATA_cargo	string	IATA designator when used as cargo aircraft
-	Manufacturer	string	Manufacturer name
-	Model	string	Aircraft model name(s) for this type designator

The “ICAO” key is the only mandatory one. Keys that are irrelevant or whose values are not known can be left out.

3 Using the sequence data in other applications

The easiest way to use the sequence data is to put the plugin into local master mode and set it up to save the sequence data into a local file which can then be read by any other application. For the file format, see above.

While it is technically possible to use other software to create the sequence file and have the plugin read it in slave mode, such use is not supported and may lead to unexpected results or crashes if the provided data is not exactly what the plugin expects.

Another option for direct access only to the delay values is to use the .lib and .h files in the Developer folder. They are untested and provided “as-is”, with no support.