

How to Add Color To AVDS Entities

Background

When playing back multiple entities in AVDS, color and transparency can be used to differentiate one entity from another. For example, in order to examine the operation of different navigation systems on an aircraft, one can save the flight data from both sensors and play the data back in AVDS using one solid vehicle and one semitransparent vehicle. For simulations that contain multiple vehicles one can add different color offsets to each vehicle to be able to tell them apart. Colors can also be set for flight path markers and wing-tip ribbons.

There are three methods for changing colors and transparency of entities in AVDS, they are: defining static colors in **craft geometry files**, adding colors to **playback data files**, and setting static colors in the **playback configuration dialog**. The choice of method depends on the situation. The craft geometry files can be used to provide specific colors to an entity that will not change during playback. The color offset definition, for an entity, in playback data is added to the craft file colors and can change during the playback. The Playback configuration dialog window makes it possible to choose static color and transparency offsets that are added to the craft file and data playback colors.

Colors in the Craft Geometry Files

Craft geometry files, see AVDS Manual Appendix A, contain many directives for manipulating the colors of the vehicles, flight path markers and wing-tip ribbons. These directives can be used to set the color for groups of polygons as well as the flight path marker and wing-tip ribbons, see Figure 1. The following are the color directives and their definitions:

co – Sets the color of all of the polygons that follow this directive until a new color directive is given. The format is `:co#` followed by three floating-point numbers between 0.0 and 1.0 that represent the amount of red, blue and green colors that are blended into the final color. For example the following directive produces **orange** polygons:

```
:co# 1.0 0.5 0.25:\
```

ct – Sets the color of the polygons and makes the polygons transparent. For example the following directive produces transparent **yellow** polygons:

```
:ct# 1.0 1.0 0.0:\
```

EC – Sets the color of the flight path marker. For example the following directive produces a **red** flight-path marker:

```
:EC# 1.0 0.0 0.0:\
```

NOTE: For the flight-path marker to be visible its position must be set with the *ep* directive, e.g.:

```
:ep# 0.00 -7.50 0.00:\
```

SC – Sets the color of the starboard wing-tip ribbon. For example the following directive produces a **green** starboard wing-tip ribbon:

```
:SC# 0.0 1.0 0.0:\
```

NOTE: For the starboard wing-tip ribbon to be visible its position must be set with the *SW* directive, e.g.:

```
Sw# 14.0 -5.0 0.0:\
```

PC – Sets the color of the port wing-tip ribbon. For example the following directive produces a **blue** port wing-tip ribbon:

```
:PC# 0.0 0.0 1.0:\
```

NOTE: For the port wing-tip ribbon to be visible its position must be set with the *PW* directive, e.g.:

```
:Pw# -14.0 -5.0 0.0:\
```

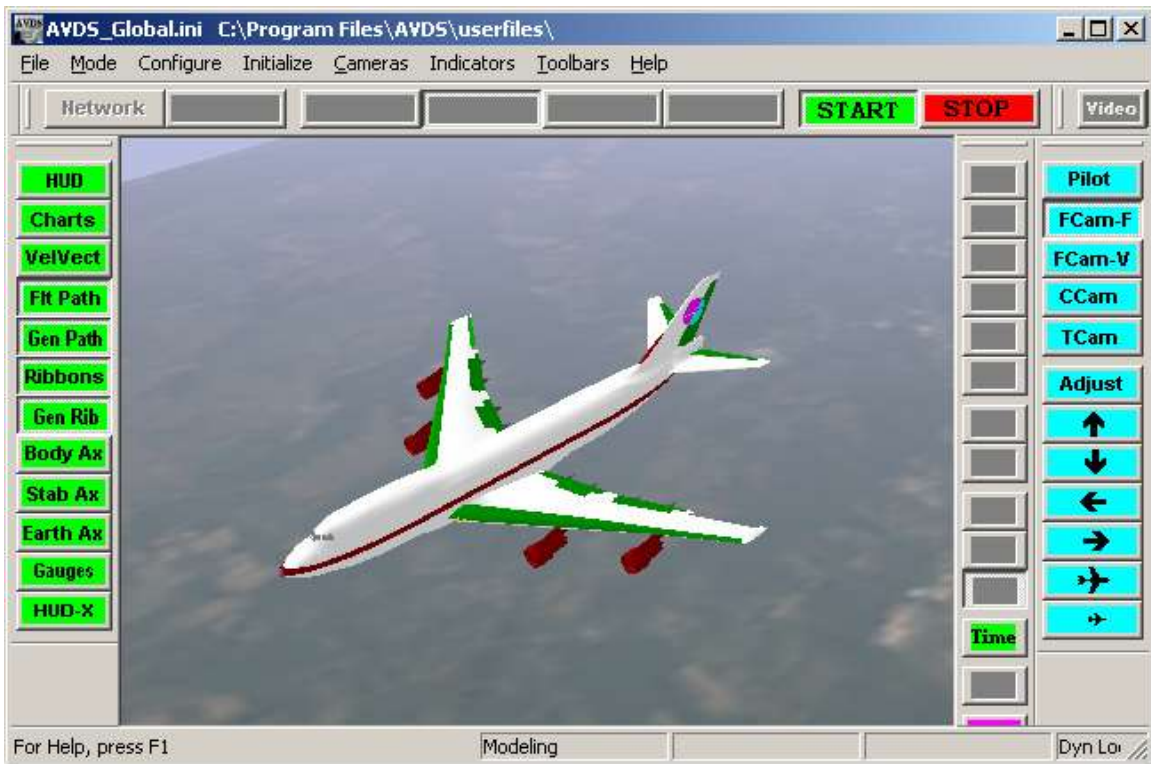


Figure 1 These colors on the 747 were entered in the craft geometry file.

Colors in Data Playback

Playback data files can be used to dynamically define color offsets to the entities, and colors for the flight path, and wing-tip ribbons. The colors are defined for each time step in the data. This makes it possible to change the colors during playback. As shown in Figures 2 and 7, the playback entities for color are `ColorOffsetVehicle`, `ColorFlightPath`, `ColorRibbonPort`, and `ColorRibbonStarboard`. Colors are defined using the following formula:

$$\text{ColorSignal} = \text{Transparency} * (2^{24}) + \text{Blue} * (2^{16}) + \text{Green} * (2^8) + \text{Red}$$

Where: *Transparency*, *Blue*, *Green* and *Red* are values that range between 0 and 255.

NOTE: The color definition is based on 32-bit storage. In hexadecimal the color definitions are: $0xTTBBGGRR$, where *TT* is the transparency component, *BB* is the blue component, *GG* is the green component and *RR* is the red component. For example, if one wishes to use the color **orange**, the values for red, green, and blue are: 255, 128, and 64. For opaque entities the transparency value is set to 255. To calculate the color value the numbers are entered into the equation:

$$\text{ColorValue} = 255 * (2^{24}) + 64 * (2^{16}) + 128 * (2^8) + 255 = 4282417407$$

The hexadecimal value for this color is: $0xFF4080FF$

For the following fragment of a playback data file, the entries in column #8 can be used to add **orange** to the vehicle.

```
% LAT 37.793625
% LONG -122.32856
0.04 2.49 0 -5000 0 0 0.01 4282417407
0.08 37.34 0 -5000 0 0 0.01 4282417407
0.12 49.79 0 -5000 0 0 0.01 4282417407
0.16 74.68 0 -5000 0 0 0.01 4282417407
0.2 92.1 0 -5000 0 0 0.01 4282417407
0.25 119.49 0 -5000 0 0 0.01 4282417407
0.28 129.44 0 -5000 0 0 0.01 4282417407
```

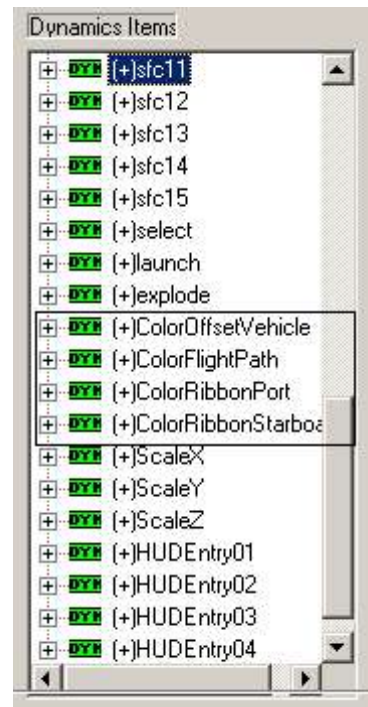


Figure 2 Playback Configuration dialog window, color entries.

Color Settings in the Playback Configuration Dialog Window

Colors can be set for each entity in AVDS using settings in the Playback Configuration dialog window. Settings are available for adding color offsets to each entity, and setting colors for the entities flight path and wingtip ribbons. To set a color, select the check box above the color, see Figure 3, and the left-click on the colored square. This will enable the color and bring up a color selection dialog window. Choose a new color, click OK and the new color will be set for that entity.



Figure 3 Color selection controls.

To set the transparency value for the entity move the Transparency slider control, see Figure 4.



Figure 4 Transparency selection

To turn on/off the different components, check/uncheck the boxes in the area labeled Visible Components, see Figure 5.



Figure 5 Component state

Figure 6 is an example of adding an orange offset to AVDS' Black F-117, changing the transparency, and changing the color of the flight makers and the wing-tip ribbons.

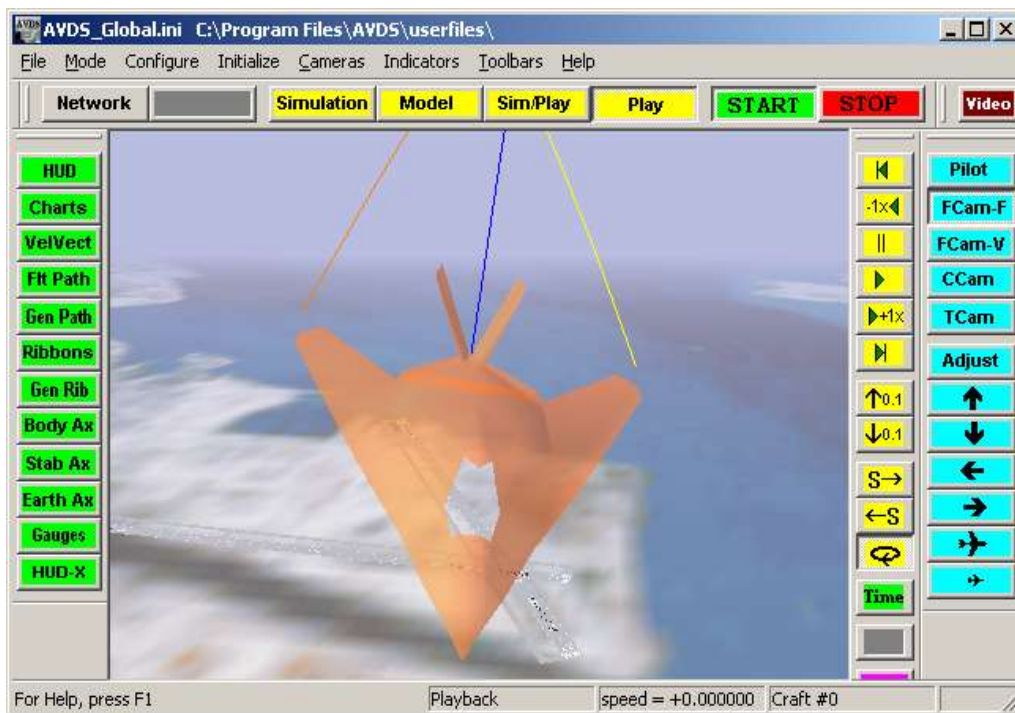


Figure 6 Black F117 with orange color added.

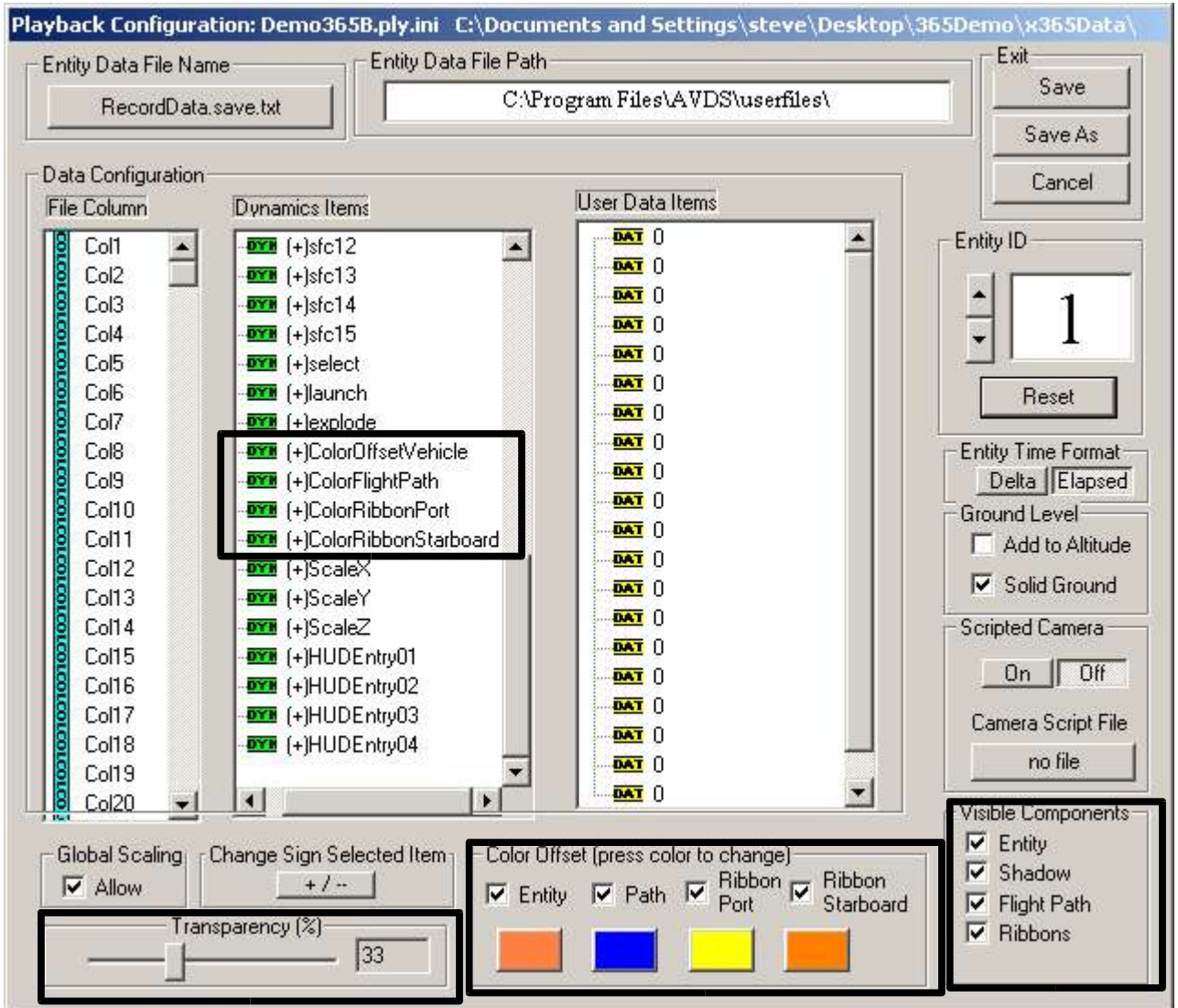


Figure 7 Playback Configuration dialog window (Configure->playback).