

TCAS II

for
Microsoft Flight Simulator X SP2 or SP1



Version 1.0

Created by: Dietmar Loleit
E-Mail: dlleit@t-online.de
May 2011

Table of Contents

I	Introduction
II	General TCAS Functionality
III	Functional Description of Buttons and Displays
IV	Operational Information
V	Installation
VI	How to get started with your new TCASII

I **Introduction**

This gauge has been developed for the FSX Flight Simulator SP2 or SP1. It should also work with Acceleration but this is not guaranteed by the author. The functionality for this gauge is based on the Honeywell C81A system. The gauge will provide resolution advisories (TA or RA) to the pilots via recorded voice announcements once the aircraft is in danger of a collision with an intruder. The gauge is a generic gauge, and can be added to any aircraft as a stand alone pop up window. This particular gauge is available in 3 color options for the display body and the control panel. They are gray, light gray and beige.

COPYRIGHTS AND DISCLAIMER

This gauge is distributed as a free-ware. All rights are reserved and no part of this package may be duplicated or distributed without the expressed and written consent of the author. The author is not in any way affiliated with the Honeywell Corporation or it's affiliates. All images remains the property of the respective owner. Use this gauge at your own risk. The author cannot be held responsible for any damages, directly or indirectly, caused by the use of this free-ware.

Credit goes out to: Kaj O. Hallstrom and Jesper Hebel for their outstanding support on documentation, pre beta and beta testing and improvement recommendations for the gauge and control panel.
Doug Dawson for his sound generating dsd-XML interface.

II General TCAS Functionality

The Traffic Alert and Collision Avoidance System (TCAS) alerts the pilot in case of potential conflicts with other aircrafts in the vicinity. TCAS tracks these other aircrafts, if equipped with an Air Traffic Control Radar, or a Beacon System. TCAS II

TCAS provides two types of collision avoidance alerts. They are:

- Traffic advisory (TA)
- Resolution advisory (RA)

TCAS I

TCAS I is the system intended for use on small commuter or general aviation aircrafts. TCAS I supplies proximity traffic advisories (TA's), but does not produce resolution advisories (RA's).

TCAS II

TCAS II is the system installed on all modern aircrafts. It supplies both visual and audible advisories to the pilot. Both TA's and RA's are generated by this system. All commercial airlines and some general aviation aircrafts are equipped with this system.

This gauge development for FSX provides the functionality as defined for TCAS II. A potential collision will warn the pilot with an audible voice recording.

TCAS II issues the following advisories:

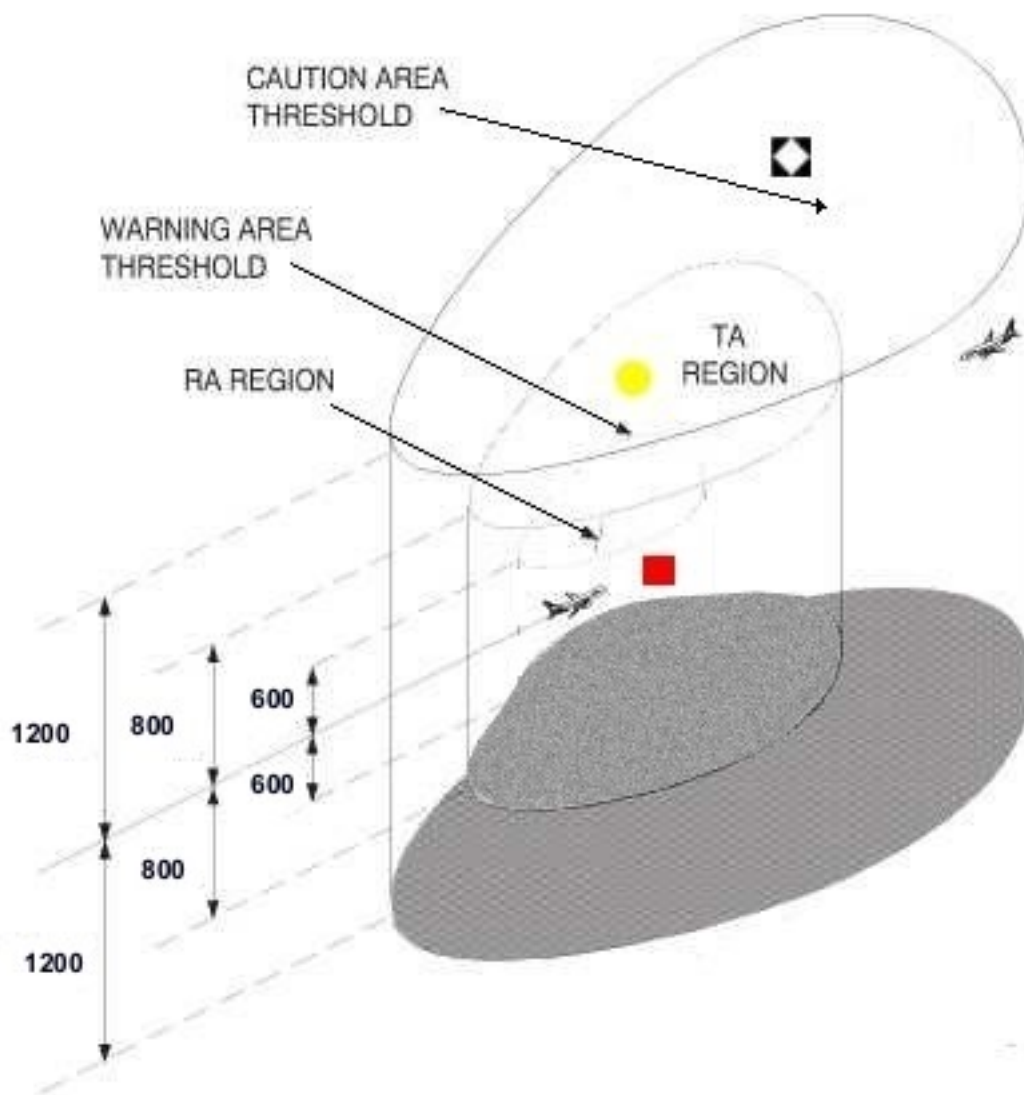
TA Traffic advisory

RA Resolution advisory

Clear of conflict

III Functional Description of Buttons, Modes and Displays

The drawing below show the altitude threshold settings for the TCAS gauge. The distance rings are in range 0-5nm (red), (yellow), and 6 nm (white-filled diamond).



As long as your aircraft is outside the corridor of the defined distance and altitude in relation to the AI aircraft, you will see the white open diamond.

If the aircraft is on ground, or below 1500 feet radio altimeter height, all TCAS informations are displayed only. No audibles are generated.

TCAS Displays

Non-Threat Displays

An open white diamond indicates that an intruder's relative altitude is greater than ± 1200 feet, or its distance is beyond 6 nm range. It is not yet considered a threat.

Proximate Traffic

A white filled diamond indicates that the intruding aircraft is within ± 1200 feet and within 6 nm range, but this is still not considered a threat.

Traffic Advisory (TA) Traffic

A symbol that converts into a filled yellow circle indicates that the intruding aircraft is considered to be a potential hazard. The intruder is 800 ft below/800 ft above your own altitude. The TCAS II will now generate this audible : "TRAFFIC, TRAFFIC."

Resolution Advisory (RA) Traffic

A solid red square indicates that the intruding aircraft is considered to be a collision threat. The intruder is 600 ft below/600 ft above of your own altitude TCAS II will now generate this audible :

"CLIMB, CLIMB, " or " DESCEND DESCEND ".

CLEAR OF CONFLICT

In connection with a TA situation only. If the intruder (AI) distance is close to 1 nm to your own position TCAS II will generate this audible:

"CLEAR OF CONFLICT ".

Vertical Motion Arrow

An arrow pointing up or down in the same color as the traffic symbol, is placed on the right side of the symbol to show if the AI aircraft is either climbing or descending at a rate greater than 500 f/m.

The logic behind the advisories is :

RA CLIMB : If the AI altitude relative to your AC is equal or below .

RA DESCEND: If the AI altitude relative to your AC is above.

If the AI is in climb mode the RA will always be : DESCEND regardless whether the altitude is above or below.

If the AI is in DESCEND mode the RA will always be : CLIMB regardless whether the altitude is above or below.

The altitude indication is a two digit number and is on top of the symbol if the altitude is above, and is below the symbol if the altitude is below. If the value is below, a minus sign is associated with the number. If the value is above, a plus sign is associated with the number.

If the altitude below/above exceeds 1,200 ft, no numbers are displayed along with the symbol.

TCAS Display Unit



The distance display is divided into 5, 10, 20 and 40 nautical mile ranges. You may select your range by clicking the buttons on the display unit. The green bar indicates the range selected.

AUTO Mode Push Button: Will turn TCAS function OFF. In case of a conflict situation the TCAS will be turned ON automatically. (The pop up window will be displayed also automatically if not open already).

BRT Knob: Increases/decreases brightness.

TCAS Control Panel



Mode selector Switch

TCAS Mode Selector Knob.

The actual selected mode will be displayed on the main panel. Turn the selector knob to select your preferred mode.

Mode TA/RA : TA or RA audible advisories will be issued in case of a conflict situation.

Mode TA : TA audible advisories will be issued only in case of a conflict situation. (It is the basic TCAS I functionality).

Mode ALTON : Inoperative. **AUTO cannot be turned ON**

Mode ALTOFF: Inoperative. **AUTO cannot be turned ON**

Mode STBY : Turns OFF all TA/RA sounds but displays are still functioning. **AUTO cannot be turned ON**

Mode TEST:

Turns the TCAS test on. After about 10 seconds an audible "TCAS SYSTEM TEST OK " or "TCAS SYSTEM TEST FAIL" will be generated.

TEST OK : If AI traffic is active with a minimum of one AI aircraft

TEST FAIL : If no AI traffic is detected. This condition will occur if your traffic slider in FSX is set to zero (the slider knob is all the way to the left). In addition to the audible, a text message " NO TRAFFIC ? " will be displayed in orange color on the screen. **AUTO cannot be turned ON**

Display Window: Displays the Transponder code. The code can be adjusted by the 2 knobs seen in the picture marked with a **red 1**.

ATC Ident: Turns on the ATC Ident display on the main screen. The Info will be displayed on the right side of the traffic symbol for all AI's on the screen. It is the ATC ID defined in the aircraft.cfg.

FL Push Button: Turns on the real flight level (in hundreds of feet) display of the AI on the main screen. The Info. will be displayed on the right side of the traffic symbol for all AI's on the screen, and will stay on for 25 seconds.

ATC FAIL Light: Inoperative

IV

Operational Information

- > Please notice that TCAS TA/RA_audibles are only active when you are above the 1500 ft radio altimeter height.(AGL)
- > You must follow the command CLIMB or DESCEND in order to solve the conflict situation. Be aware that the audible will be generated only once.
- > Make sure that your traffic slider is **NOT** set to zero(see page 8/mode test) Before your flight turn your TCAS knob to TEST in order to check status.
- > The CLEAR OF CONFLICT audible will be generated if the AI is below 800 ft (yellow) or above at 600ft, 1nm distance and decreasing.(Your aircraft will not be able to descend or climb fast enough to create a collision threat within 1nm)
- > The initial operational TCAS mode is STANDBY.

TCAS ON/OFF.

The TCAS main display will be turned on by clicking the TCAS icon.



To turn on the TCAS control panel, click on the center of the main display.

Important: The TCAS pop up window does NOT have to be open for TCAS to be functioning. The TCAS display will open automatically if the AUTO function is activated, and a conflict (TA/RA) situation occurs. The audibles will be played as well.

You will not be able to close (turn off) the TCAS window as long as the conflict situation is active.

V Installation

I recommend to delete all your other TCAS files, if you have installed my gauges: TCAS and Traffic Display_V1 or TCAS and Traffic Display_V2

YOU SHOULD ALWAYS BACKUP YOUR **ORIGINAL** PANEL.CFG

Rename original panel.cfg as "OLDpanel.cfg or similar and leave in folder.

- 1: Copy the TCASII\$.cab file into the panel folder of your aircraft.
- 2: Copy the TCASII\$ folder into the main gauge folder of FSX.
- 3: Insert the entries for 2 new Windows into your panel.cfg (e.g. B737 default FSX):

In the [Window Titles] section insert:

```
window10=TCASII$  
window11=TCASII$ Panel
```

And the following .cfg entries for the 2 new windows:

```
//----- TCAS II Window -----
```

```
[Window10]  
Background_color=0,0,0  
size_mm=512,400  
window_size_ratio=1  
position=0  
visible=0  
Ident=10022  
//window_size= 0.303,0.303  
window_size= 0.412,0.412  
window_pos= 0.050, 0.060  
  
gauge00=TCASII$!TCASII$_81,  
//gauge00=TCASII$!TCASII$_81G,  
//gauge00=TCASII$!TCASII$_81B,  
  
0,0,0,0 // Don't change this !!  
0,0,0,0 //small  
0,0,0,0 //large  
  
0,0,0,0 // standard color light gray  
0,0,0,0 // color gray  
0,0,0,0 // color beige
```

```
//----- TCAS II Panel -----
[Window11]
Background_color=0,0,0
size_mm=260,105
window_size_ratio=1
position=0
visible=0
Ident=10021 //Don't change this !!
//window_size= 0.224,0.096 //small
window_size= 0.303,0.130 //large
window_pos= 0.0500, 0.475

gauge00=TCASII$!TCASII$_81_Panel, 0,0,0,0 // standard color light gray
//gauge00=TCASII$!TCASII$_81_Panel_G, 0,0,0,0 // color gray
//gauge00=TCASII$!TCASII$_81_Panel_B, 0,0,0,0 // color beige
//gauge00=TCASII$!TCASII$_81_Panel_DVA, 0,0,0,0 // light gray with DVA logo
//gauge00=TCASII$!TCASII$_81_Panel_DVA_G, 0,0,0,0 // gray with DVA logo
//gauge00=TCASII$!TCASII$_81_Panel_DVA_B, 0,0,0,0 // beige with DVA logo
```

Make sure that the numbers in the entries are not in conflict with your existing numbers in your panel.cfg (e.g. [Window09], [Window08] etc.).
Remove the // from the entry you want to select. Only one selection is allowed !!

4: Insert the following entries into your for main window [Window00] :

```
gauge37=TCASII$!TCASII$_Sound_Control, 0,0,0,0
gauge38=TCASII$!TCASII$_Switch, 585,465,25,25 (for B737)
gauge39=TCASII$!TrafficInfo$, 0,0,0,0
gauge40=TCASII$/Sound3!dsd_xml_sound3, 0,0,20,,./gauges/TCASII$/Sound.ini
```

Double check the correct gauge numbering. !!!! VERY IMPORTANT DETAIL when you install TCAS II on different aircrafts. Keep in mind the numbering shown here is for the default FSX B737.

Again, double check the gauge sequence numbers so that they are not in conflict with existing numbers in your panel.cfg of the particular aircraft selected for the installation.

When you open the TCAS window you can move it and change the size to fit your needs. If you right-click on it and check “unlock window” you can move it and your control panel to a secondary monitor if you have one available and it's supported by your video card.

If you see this FSX warning message (it's in German, because I have the German Windows):



Click Accept/OK. This provides the sound.dll from Doug Dawson.

Finally copy the PDF documentation into a folder of your choice.

That's it.

VI How to get started with your new TCAS II

Just to see whether your TCAS works do this:

- 1: Start FSX
- 2: Set your traffic slider to 100 % just to generate a lot of traffic.
- 3: Select a busy airport with time and date accordingly.
- 4: Start "FLY NOW!"
- 5: You will now be spawning on your selected runway (RWY)
- 6: Go into Slew Mode.
- 7: Slew your aircraft off the RWY and position it so you have a good view of the RWY. You should stay on the ground. (See page 5 why)
- 8: Open your TCAS window.
- 9: Select the 40 nm Display Mode and you should see a lot of traffic.
- 10: You can now speed up the simulation by selecting 4X (**not more !!**)
- 11: Watch the AI until you see an AI take off.
- 12: Return the sim speed back to normal, and watch the AI that takes off.
- 13: Select TCAS Mode 5 nm
- 14: As soon as the AI is in the air, you should see the red square visible and the TCAS display with the climb arrow and the altitude information. You will hear **NO** sound, because you are on ground and below 1500ft radio altimeter height.
- 15: Go in Slew Mode and move your aircraft off the ground, move up over 1500 ft, and make sure to stay on the RED situation and you now should hear a voice instructing you to "DESCEND DESCEND". This is because your AI is in CLIMB mode and TCAS will order you to descend regardless of the above/below altitude indication. As soon as the AI is 800 feet over the relative altitude to your AC the yellow symbol shows up and you will hear the "TRAFFIC TRAFFIC" voice alert. Stay in slew mode, and follow the AI by controlling your distance and flight level according to the specs of the TCAS gauge. This way you can easily generate the TA/RA situation and any other displays/advice, according to the setting of the mode selector switch.

Please follow all installation instructions and read the users manual carefully. This TCAS should add great flying realism for all FSX users. We had fun creating it. We hope you all have fun using it.

Dietmar Loleit , Author.

The Beta Team are both DVA (Delta Virtual Airlines) members:

Kaj O. Hallstrom, 10000+ MS FS hours

Jesper Hebel , B737NG type rated