



# Radar Contact Center 1.1

User Manual

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## I GENERAL

Radar Contact Center is an ATC (Air Traffic Control) Simulator that lets you take the position of an air traffic controller in an area control center (ACC). Your job is to safely and efficiently guide aircraft from one boundary of your airspace (the entry point) to another one (exit point). To achieve this you can assign altitudes, headings and speeds.

Furthermore you can send aircraft to certain waypoints that are part of their route. Every approaching aircraft will fly initially along the route filed in its flightplan (along a so-called airway) but you can assign shortcuts anytime to speed up traffic if it is safe to do so. For every airplane you will have to coordinate its entry altitude (flightlevel) and its exit altitude. Furthermore they all have a requested flightlevel (altitude at which they would prefer to fly) and you should try to get them there as close as possible while they are in your sector. Additionally, there are airplanes that will start their descent to their destination in your sector and some that climb into your sector.

Your main job is to safely separate them at all times - additionally you should try to create and establish an efficient traffic flow. The difficulty is controlled by setting the rate of new aircraft in a 10 minutes period. However, at the beginning of the game four aircraft will always be present instantly.

Your success is measured by a score that mainly depends on the number of aircraft that leave your sector - the closer they are to their requested altitude and to their coordinated exit point at that time, the higher the score.

This application is more a simulation than an arcade game and aims at replicating a real radar screen as well as possible. Without any advance air traffic control knowledge, it takes some time to be able to handle it efficiently. However, every effort is made to explain everything required in this document.

## II MAIN MENU

In the main menu you can select the airspace you want to "work" at and the aircraft arrival rate (expressed in aircraft number per 10 minutes). At the beginning of the game four approaching aircraft will be present instantly. The rates can be modified during a session by touching the field "RT/DST" on menu bar page 2. You can also enter your name if desired. This name is only saved locally and will be displayed as a default the next time you start the game. At the bottom of the screen you find a button to open the instructions as well as general information (version number etc.).

**Note:** Not all sectors can be selected from the beginning. Starting from the second sector (Hemswell), you need a specific total score to unlock them. The total score is the sum of all your session scores achieved so far. To unlock Hemswell sector 50 points are needed and you need a total score of

300 for Reydon. More sectors will be included in further updates of the game. The total score will also determine your rank as an air traffic controller. You start as an Air Traffic Controller in Training after 40 points and then move on to Junior Air Traffic Controller, Air Traffic Controller, Senior Air Traffic Controller, Supervisor, Examiner and finally Senior Examiner (total score needed: 1200).

In the main menu, the sound setting (text only, sound and text or sound only) can be selected. See the section “Sound” in this document for further information. There is also a simulation of thunderstorms that can be switched off or set to a light or moderate level. For further information, see the section “Weather Simulation” in this document.

To exit the game from the main menu, press the back button on your device as usual.

### III THE RADAR SCREEN

After selecting “Start New” in the main menu, you are presented with the radar screen and the first approaching aircraft (“target”) will be visible at some position near the edges of the screen (for more about targets, see the “Target Symbols” section). The next aircraft will appear according to the rate you have selected in the main menu. However, at the beginning of the game four aircraft will be present instantly.

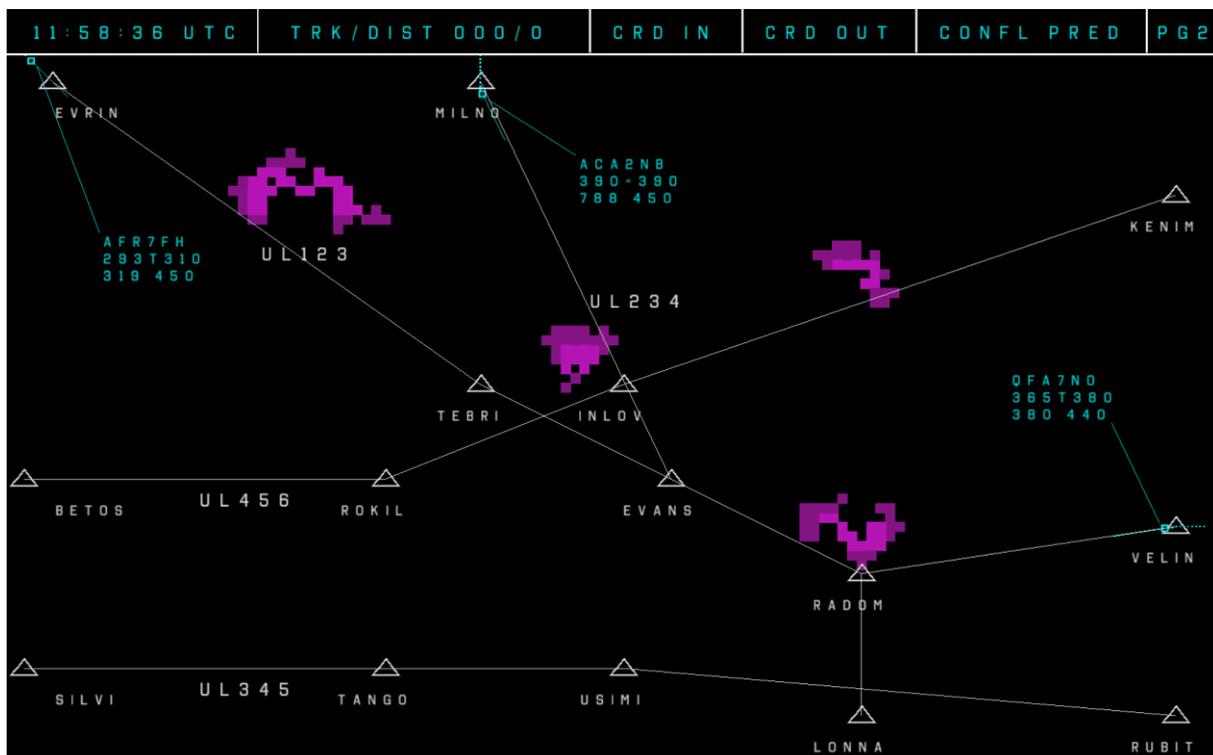


Fig.1 – The Radar Screen

The screen has a black background and consists of several routes (airways), labelled with their name. The name always starts with “U” for upper airspace and is then a combination of numbers and letters. These names are

used to refer to a route, which is a sequence of waypoints. Every aircraft entering your sector will be cleared along one of the routes from the entry to the exit point. You can assign shortcuts to specific waypoints along their route and for an efficient traffic flow, you should send airplanes to their exit point as directly as possible. However, you can use the airways also for separation (for example, assign a shortcut to one airplane and have the other one stay on the planned route). The screen width always corresponds to 120 miles and the height to 75 nautical miles.

If an aircraft leaves the boundaries of the radar screen at a point completely away from its exit point (more than 30 miles), it will disappear and the controller of the adjacent sector will have to handle it (5 points will be deducted of your score).

The radar screen is updated only every 3 seconds because the radar antenna has to complete a full rotation before providing new data. The screen can be zoomed to some extent by moving two fingers apart or together as usual on your Android device.

At the top of the screen the menu bar is shown. It consists of the following fields and buttons:

- **TIME:** The current time in UTC (Universal Time Coordinated) is shown.
- **TRK/DIST:** The track and distance from a target to any position on the screen is shown. See section “Controlling Traffic” for details.
- **CRD IN:** This field shows if there are aircraft whose entry level has not yet been coordinated. See section “Sector Coordination” for details. Tapping this field will open the sector coordination menu.
- **CRD OUT:** This field shows if there are aircraft whose exit level has not yet been coordinated. See section “Sector Coordination” for details. Tapping this field will open the sector coordination menu.
- **CONFL PRED:** Shows a 3D-view of your airspace and points out possible conflicts. See section “Conflict Prediction Display” for details.
- **PG2/PG1:** Switches between page 1 and page 2 of the options bar.



Fig. 2 - Menu Bar Page 1

Items on page 2 are explained in the following:

- **TIME:** Also displayed on page 2.
- **UP WIND:** Shows the current average upper wind. Will influence the targets’ tracks above ground.
- **RT/DST:** Opens a dialog where the traffic rate can be modified and the vertical speed and turn direction assignment switched off and on.
- **SETUP:** Opens the setup menu. See section „Setup Menu“ for details.
- **SCORE:** Shows the session score.



Fig. 3 - Menu Bar Page 2

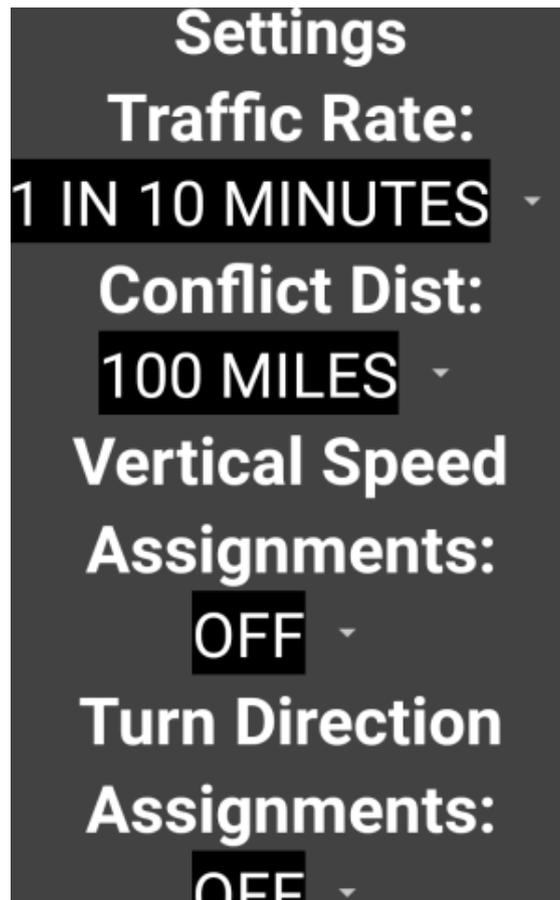


Fig. 4 - Traffic and vertical rates menu (TFC/RTS)

In the RT/DST menu, you can modify the traffic density by specifying how many aircraft should appear in a 10 minute period. Furthermore, the vertical speed assignment dialog can be switched on and off. If this feature is on, you will be asked for a vertical speed assignment after each altitude clearance. You can then either specify a climb/descent rate between 500 and 3000 feet per minute or have the airplane choose its own rate by selecting “free”. It can happen that an aircraft cannot accept a rate due to performance. It will then inform you accordingly.

In this menu you can also adjust the “conflict distance” - this is the range in nautical miles that the conflict prediction function (activated if you press and hold an aircraft’s label) will look for conflicts. A farther range will show more possible conflicts, but maybe also some uncritical ones and a smaller distance will avoid more false warnings but will leave less time to react for real ones.

There is also an option to switch on turn direction assignments. If on, you will be asked for the desired turn direction. If this feature is switched off, aircraft will always turn in the direction giving the smaller required heading change.

## IV SETUP MENU

The setup menu can be opened by touching the respective button on page 2 of the top menu bar. Here you can pause the simulation (the game is stopped except for the UTC time that continues to run), end your shift and close your sector. Pressing the pause button will stop the simulation at once, without clicking the “Done“ button. To resume the simulation, the pause button has to be pressed again. The button “End Shift“ ends the session and takes you back to the main menu. Closing the sector can be useful when traffic gets too much to handle. It causes the controllers of adjacent sectors to prevent aircraft from entering your airspace which gives you some time to handle the traffic you already have. However, the sector may only be closed for 10 minutes of every hour. In the setup menu, you can also select the colour in which targets are shown. You can choose between cyan (default), white and orange. Furthermore, the datatag display can be switched between full and reduced mode and the track line display may be turned on or off.

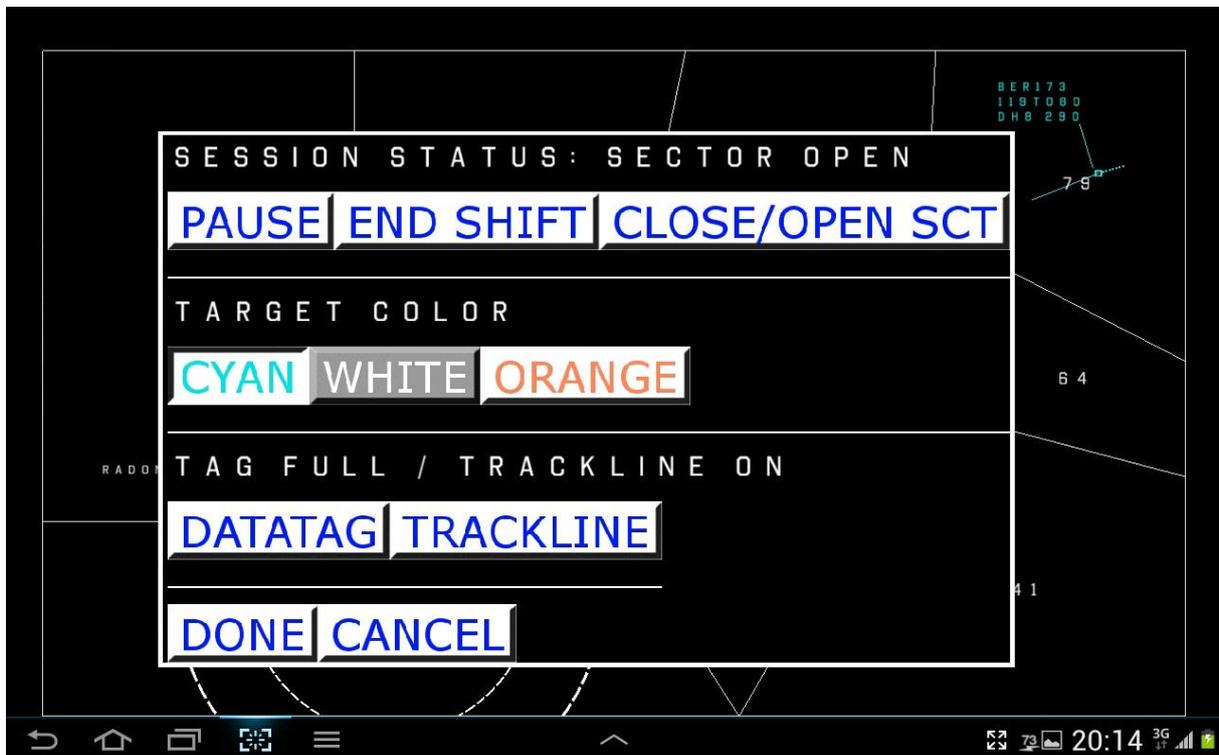


Fig. 5 - The Options Menu

## V TARGET SYMBOLS

A target (aircraft) is represented by a small square with a text of block of information about it (datatag) and a line connecting both. A full and a reduced datatag mode are available and either can be selected in the options menu. The full datatag shows the following information:

First line: Callsign  
Second line: Current Altitude =/T Cleared Altitude  
Third line: Type Groundspeed (alternates with target waypoint for departures)

For example, the following datatag:

```
AUA123  
348T380  
320 250
```

shows an Austrian Airlines Airbus A320, currently at 34800 feet with a cleared altitude of 38000 feet and a groundspeed of 250 knots. The two altitude values are separated by a "T" if the aircraft is climbing/descending, by a "=" if it maintains its altitude and by a "R" if it maintains its requested flightlevel. From the small aircraft symbol (square), a line is extending showing the target's track. It's length corresponds to 5 miles. Additionally, a "trail" showing the target's last 10 positions is shown behind the aircraft symbol.

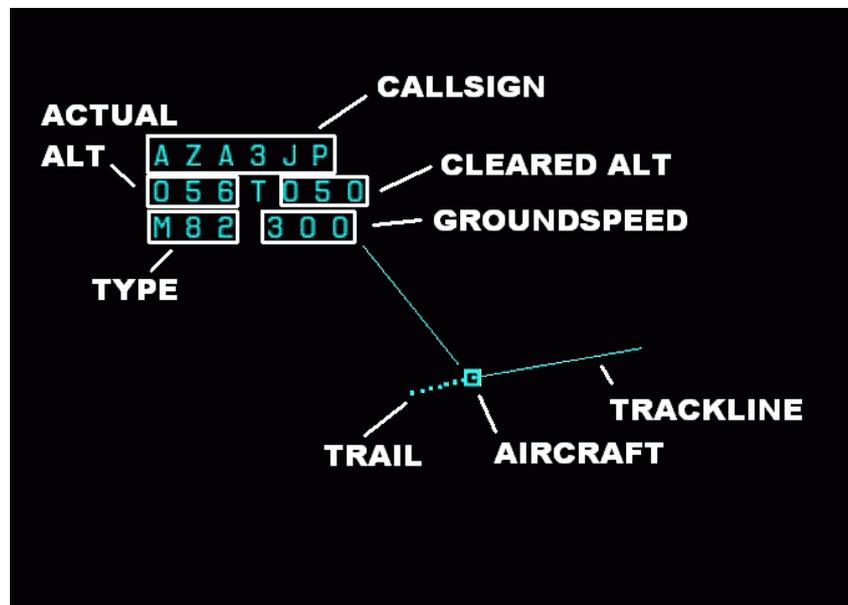


Fig. 6 - Full Datatag

The reduced datatag shows the following information:

First line: Callsign  
Second line: =/C/D/R Current Altitude\*Groundspeed

For example, the following datatag:

AUA123 D251\*280

shows an aircraft currently at 25100 feet, descending, and a groundspeed of 280 knots. A “D” before the altitude shows the aircraft is descending, and a “C” that it is climbing. The letter “R” indicates it is maintaining its requested flightlevel.

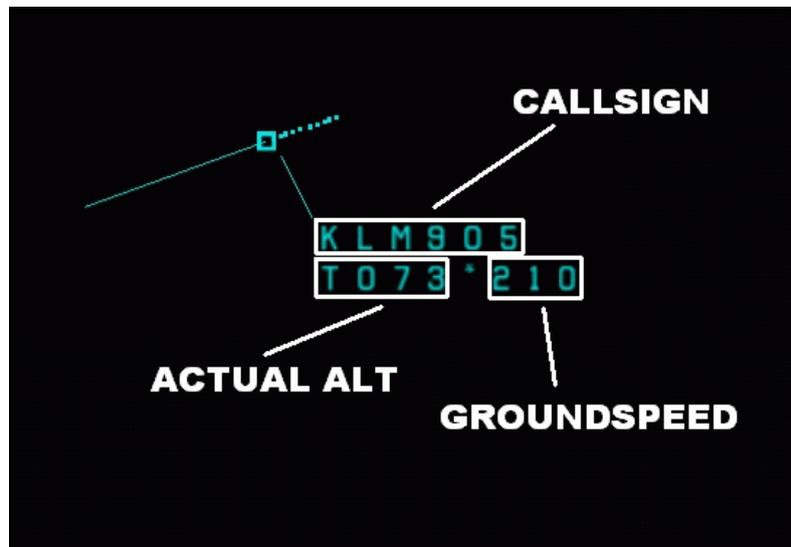


Fig. 7 - Reduced Datatag

Here is a list of airline and aircraft codes with the radio telephony callsign in parentheses:

**Airlines:**

- DLH Lufthansa (Lufthansa)
- AUA Austrian Airlines (Austrian)
- BAW British Airways (Speedbird)
- AFR Air France (Air France)
- IBE Iberia (Iberia)
- BEL Brussels Airlines (Beeline)
- KLM KLM (KLM)
- UAE Emirates (Emirates)
- RYR Ryanair (Ryanair)
- TCX Thomas Cook (Kestrel)
- AZA Alitalia (Alitalia)
- SWR Swiss Airlines (Swiss)
- ISK Intersky (Intersky)
- AEE Aegean (Aegean)
- BER Air Berlin (Air Berlin)
- COA Continental Airlines (Continental)
- AAL American Airlines (American)
- FDX Fedex (Fedex)
- AFL Aeroflot (Aeroflot)
- NLY FlyNiki (Niki)
- THY Turkish Airlines (Turkish)
- QFA Qantas (Qantas)

SAS Scandinavian Airlines (Scandinavian)  
JAI Jet Airways (Jet Airways)  
FIN Finnair (Finnair)  
BMA British Midland (Midland)  
TOM Tomson (Tomson)  
CLX Cargolux (Cargolux)  
TRA Transavia (Transavia)  
EZY Easyjet (Easy)  
EIN Aer Lingus (Shamrock)  
ETD Etihad Airways (Etihad)  
ADR Adria Airways (Adria)  
MSR Egyptair (Egyptair)  
CTN Croatia Airlines (Croatia)  
MAH Malev Hungarian Airlines (Malev)  
BEE Flybe (Jersey)  
LOT LOT Polish Airlines (LOT)  
ANA All Nippon Airways (All Nippon)  
JAL Japan Airlines (Japan Air)  
OAL Olympic Air (Olympic)  
ACA Air Canada (Air Canada)

**Aircraft** (if not labelled Heavy, wake turbulence class is Medium):

736 Boeing 737-600  
737 Boeing 737-700  
738 Boeing 737-800  
753 Boeing 757-300 (Heavy)  
744 Boeing 747-400 (Heavy)  
748 Boeing 747-800 (Heavy)  
763 Boeing 767-300 (Heavy)  
773 Boeing 777-300 (Heavy)  
318,319,320,321 Airbus A318,A319,A320,A321  
332 Airbus A330-200 (Heavy)  
333 Airbus A330-300 (Heavy)  
343 Airbus A340-300 (Heavy)  
344 Airbus A340-400 (Heavy)  
380 Airbus A380 (Super)  
DH8 Dash 8  
M82 MD-82  
E19 Embraer 190

The datatag can be positioned at any convenient position by drag and drop. Just tap on the datatag, hold it and drag it to the desired position. Just tapping the datatag briefly will open the aircraft control menu (see section “Controlling Aircraft“ for details). Tapping and holding the target’s datatag will highlight its route and exit point. Furthermore, all other aircraft for which a possible conflict is predicted will be highlighted in red. If the aircraft is on a heading or direct-to, a line will point from the target in the respective direction. The following datatag and target symbol colours exist: Normal (cyan, white or orange depending on your settings), yellow (aircraft not yet accepted or ready to be handed over to next sector) and red (conflict alert or emergency).

## VI CONTROLLING AIRCRAFT

Aircraft can be controlled by assigning altitude, speed, heading or by clearing them to proceed to a waypoint. This section explains how this is done in detail.



Fig. 8 - The Aircraft Control Menu

Tapping a datatag will open the respective aircraft's control menu. In the first line (labelled „CALLSIGN EXIT POINT XXXXX“ or “CALLSIGN EXIT FL290” and showing the respective exit point from the sector), basic trajectory items can be selected - altitude, heading and speed.

Note: if the aircraft is to leave your sector descending, the second status line shows not the requested flightlevel, but “DESCENT COORDINATION”.

**ALTITUDE:** After tapping this button, you can select altitudes between flightlevel (FL) 290 and 430 (corresponding to 29000 feet to 43000 feet on a standard altimeter setting).

After selecting an altitude, it is selected for the new clearance. However, this clearance is not issued yet because you may enter additional clearance items (a specific speed, for example).

If the assignment of climb/descent rates is activated in the RT/DST menu (page 2 of the menu bar), you can also assign a vertical rate of 500 to 3000 feet per minute in 500-foot steps. The airplane will then climb or descent at the given rate, but will reduce the rate a bit shortly before reaching the target altitude. However, if you also assign a very low speed together with a high descent rate, the aircraft may be unable to keep that speed and will inform you accordingly. You must then either reduce the assigned rate or increase the assigned speed. The same is applicable for climbs, when it may happen (if the aircraft is very heavy) that an instructed climb rate is too high for the airplane's performance and will

therefore also be refused by the pilots. If you do not want to assign vertical rates at all, switch this feature off in the rates menu on menu bar page 2. This will prevent the vertical speed assignment dialog from appearing and will make altitude assignments quicker.

**HEADING:** After selecting this function, you can enter all 3 digits of the heading successively. Headings can be assigned in steps of 5 degrees. (Heading 345 is possible, but not heading 342). For example, to assign heading 340, you press 3, then 4, then 0. Headings must be entered with leading zeros if applicable, e.g. heading 005.

Simplified, a heading is the magnetic direction (1-360 degrees, e.g. 090 is east, 270 is west) an aircraft's nose points to. If there is wind, this is not the same as the direction the aircraft travels in relation the ground.

For example, if the aircraft's nose points exactly to the west but there is strong wind from the south, the track above ground will approximately be west-northwest. Wind is simulated as there is random upper wind generated for each session that influences all aircraft tracks. Its direction and speed can be seen on menu bar page 2.

Aircraft will always turn in the direction giving the smaller required heading change unless turn direction assignments are switched on in the RT/DST menu.

**DIRECT:** After pressing this button, you will be presented with a selection of waypoints. Only waypoints on the airplane's cleared airway will be available and selecting a waypoint will have the aircraft proceed to it. To quickly send the airplane to its exit point, press the button EXIT PT.

**SPEED:** You may select Mach numbers from 0.74 to 0.83. The Mach number is the fraction of the speed of sound and at high altitudes, airplanes are assigned Mach numbers as speed restrictions. For example, Mach 0.80 means the aircraft is flying at 80% of the speed of sound. Aircraft entering your sector will have a random speed. The Mach number is not the aircraft's actual speed in relation to the ground. This speed is called ground speed and is the actual speed of the aircraft in relation to the ground - it is displayed in the datatag. Therefore, if you assign Mach number to a target, this is not what will be displayed in the datatag (because there groundspeed in knots is shown). As a controller, you have to take the different groundspeeds of aircraft with same Mach number, but different altitudes and wind conditions into account. An aircraft may refuse a speed clearance if you have instructed a high descent rate before and it is unable to fly the requested speed at the given rate. You then have to either increase the cleared speed or assign a lower descent rate.

In the second button line of the control menu (labelled "REQUESTED FL XXX", indicating the requested altitude - "DESCENT COORDINATION" will be indicated here if the aircraft will leave your sector vertically descending), the following functions can be found:

**EXIT PT:** Directly selects the aircraft's exit point as the direct-to waypoint.

**TXFER:** When an aircraft reaches the boundary of the screen or approaches FL290 for airplanes leaving your sector descending you can instruct the aircraft to contact the next sector. It will then not be controllable anymore. If you fail to hand the aircraft off in time it will be transferred anyway but 1 point will be deducted from your score.

**ACCEPT:** When a new aircraft arrives, its datatag will be yellow indicating that the controller of the adjacent sector requests a handoff. By selecting „Accept“, the target will get under your control. You can then immediately issue a clearance.

**TRK/DIST:** After tapping this button, you can tap anywhere on the screen and the track and distance of the respective target to this point will be displayed in the upper menu bar.

Below the first two button lines you will find three text lines showing the target's actual data (altitude, magnetic track and groundspeed), its previous clearance and the now selected clearance. The new clearance will be transmitted by tapping the button "Transmit". Selecting "Disregard" will cancel the transmission. The aircraft will continue according to its previous clearance.

Only after tapping the "Transmit" button, the clearance will be sent (except for "ACCEPT", which will be immediate). The respective aircraft then sends back its readback, which can be heard when sound is on and which is additionally shown as a text field for a few seconds near the bottom of the screen, if selected in the main menu.

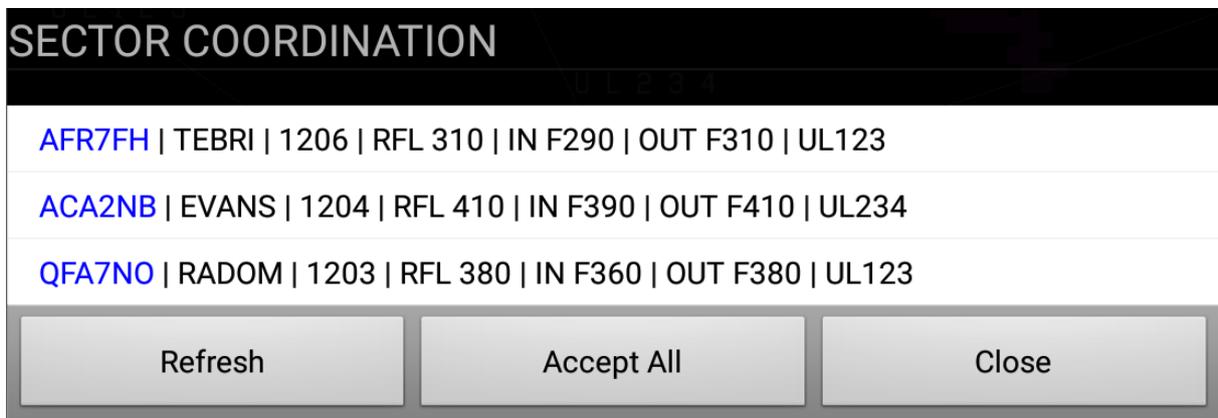
**IMPORTANT NOTE:** During an aircraft's audio transmission, you cannot use the "Transmit" button on the control menu of any target, except for accepting a handoff. You cannot issue any instructions as long as speech can be heard, but you can prepare them. The transmit button will also be unavailable during the first seconds after a transmission was heard. This simulates the time it would take in real life to speak the instruction you prepared in the control menu.

## VII SECTOR COORDINATION

As an ACC controller, you accept aircraft into your sector from adjacent sectors, control them and then finally transfer them to another sector. This entry and exit has to be coordinated with the controllers of neighbouring sectors to agree on the flightlevels airplanes are handed over. For example, another sector may suggest to transfer an aircraft to you in FL 360 at a specific entry point but you see that this could cause a conflict with other traffic. In this case, you can coordinate the entry level of the respective traffic for example as FL 350, avoiding a conflict. On the other hand, you have to offer aircraft leaving your sector at some flightlevel to the next sector, which can also accept or decline that suggestion. In this simulation however, for simplicity, the next controller will always accept the outbound level you offer. Whatever it is, every aircraft should leave your sector at the coordinated level.

Vertical coordination is also simulated in the game, meaning aircraft can also enter/leave your sector from the sector below (which is below FL290). Those will be airplanes that have just departed or are descending to land. For descending traffic, the out level will always be FL 290.

Inbound and outbound traffic can be coordinated in the game in the “Sector Coordination Menu”. It can be opened by tapping either the “COORD IN” or the “COORD OUT” field in the menu bar. After doing so, you will be presented with a list of aircraft that are either already under your control or waiting to be coordinated. So in this list you will also see aircraft that are not present on your screen yet but may be still minutes away. This pre-planning gives you the chance to coordinate entry levels in time. Different colours indicate the acceptance and coordination status of each traffic.



**Fig. 9 - The Sector Coordination Menu**

A red callsign means the aircraft has not been accepted yet (handover not performed), it will turn blue as soon as you accept it using the airplane control menu. The colour codes for the coordination altitudes (for in and out coordination equally) are as follows: red for uncoordinated, magenta for coordination pending (request has been made but not yet accepted by other sector) and black for coordinated. You can tap the “Refresh” button to update the status. An “Accept All” button is also provided to quickly accept all suggested in and out levels of all displayed aircraft. This should only be used in light traffic or when being sure there will be no conflicts created by this action. In many cases it is possible to control traffic without giving much attention to coordination, but it will make short-term conflict avoidance much harder, especially with dense traffic.

In each line there is additional information about each airplane. The format is as follows:

CALLSIGN | ENTRY/EXIT POINT | ESTIMATED TIME OVER POINT | REQUESTED FL | INBOUND COORDINATION LEVEL | OUTBOUND COORDINATION LEVEL | AIRWAY

The entry point will be shown for traffic yet to enter your sector, the exit point for traffic that has already entered. The time is the estimate for the airplane reaching the mentioned point.

You can tap on any airplane’s line to enter its own coordination menu, called the “Airplane Coordination Menu”. Its title line will show the callsign and requested flightlevel. Below there are lots of possible entry and exit altitudes. Select the one you wish and then tap “OK”. Coordination with the other sector will then start and after a while you see the status change accordingly in the sector coordination menu. In the rightmost column you can see all other aircraft with which your choice could cause a conflict. This conflict prediction is only based on the other airplanes’ in and out levels and not on their routes, actual level etc. So it is only a very rough guide as to which the selected altitudes could create separation problems.

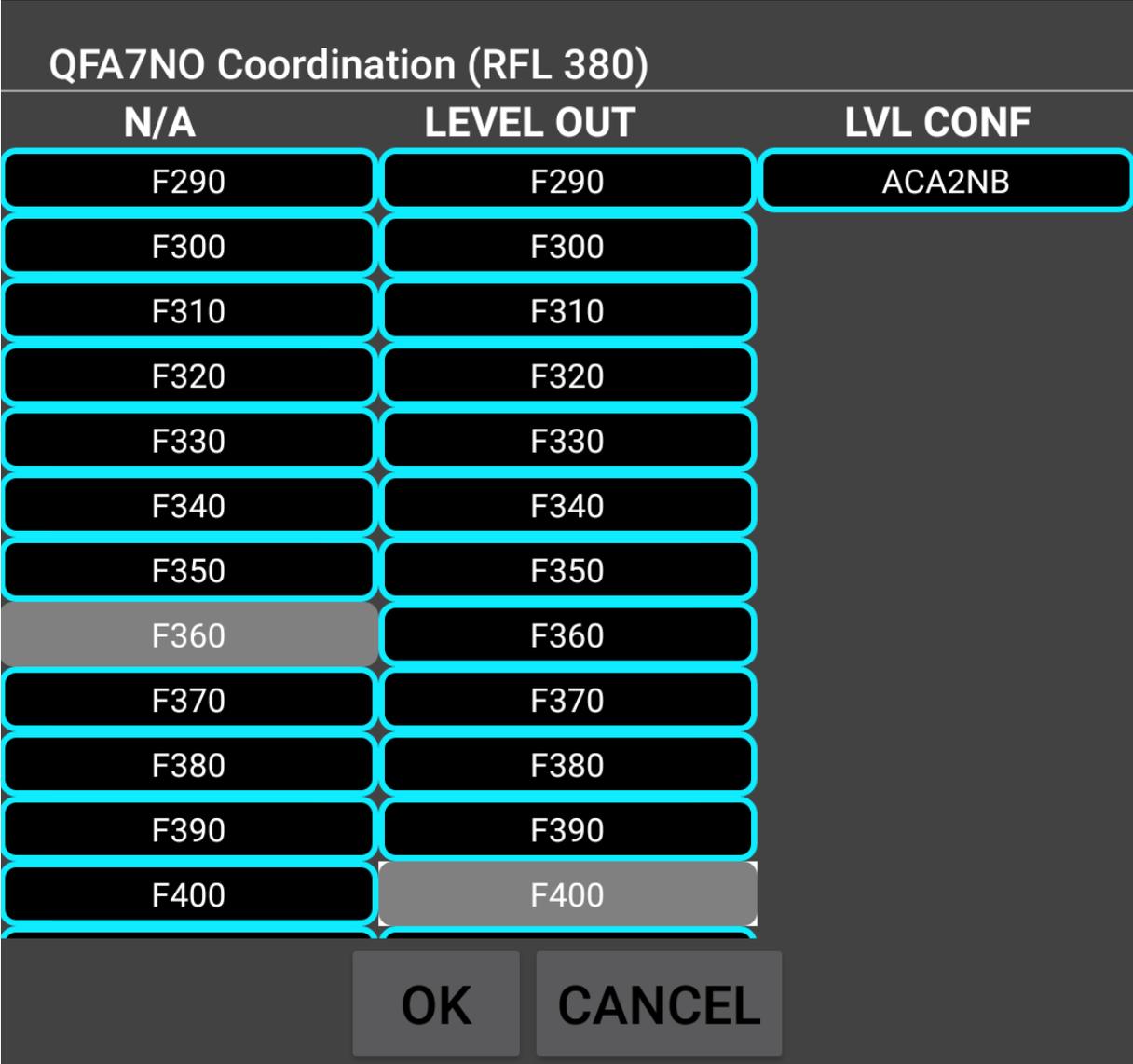


Fig. 10 - The Aircraft Coordination Menu

If an inbound level cannot be selected (the respective column will be labelled “N/A”) this is either because the airplane is already too close to the sector to re-coordinate a new level or it is an aircraft that will climb into your sector (so the inbound level is fixed at FL290). If an outbound level cannot be selected this is because the respective airplane will leave the sector descending (out level is always FL290).

## VIII SOUND

When starting the app for the first time, you might be asked by the operating system which text-to-speech engine you would like to use. If this is the case, select "Android Text-To-Speech". If you have already chosen any other option, saved it and are unable to hear any sound, re-install the app and proceed as stated before. Sound effects featured are a reminder beep when coordination is required or a system message is shown, an alarm when there is a conflict alert, and audio readback of all aircraft using voice synthesis. Voice readback will only work if you have Android voice synthesis installed, which should be the case by default on most devices. In the main menu, you can choose between no sound, sound together with text readbacks and audio readback only.

**IMPORTANT NOTE:** During an aircraft's audio transmission, you cannot use the TRANSMIT button on the control menu of any target, except for accepting a handoff. You cannot issue any instructions as long as speech can be heard, but you can prepare them. The transmit button will also be unavailable during the first seconds after a transmission was heard. This simulates the time it would take in real life to speak the instruction you prepared in the control menu.

**ALSO IMPORTANT:** If the speech output of "non-native-english" airlines like Lufthansa, Alitalia etc. sounds strange, please make sure you have all needed languages (French, German, Italian) installed: Settings -> Language & Input -> Text-to-Speech Output -> Settings -> Install voice data

## IX AIRCRAFT SEPARATION

Aircraft have to be separated from all other aircraft at all times. The minimum separation is 5 miles horizontally or 1000 feet vertically. Aircraft with a horizontal or vertical distance below the minimum will change their colour to red and a red conflict alert warning will be displayed in the upper menu bar. If sound is on, an alarm tone will also be heard. You can then take action to avoid a closer approximation.

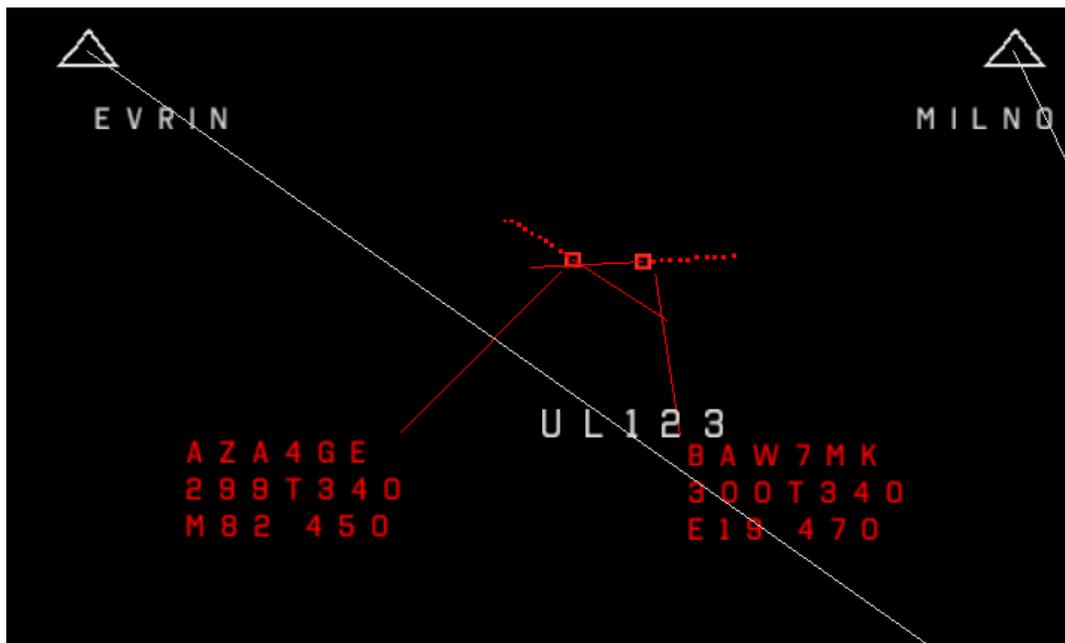


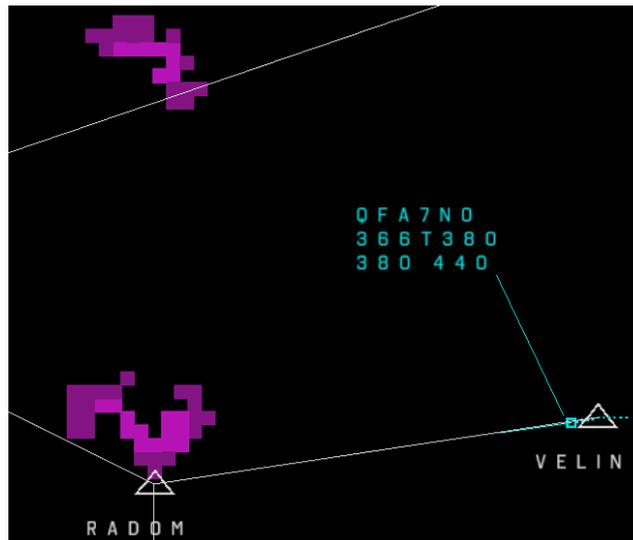
Fig. 10 - Conflict Alert

If one aircraft's distance to another target gets less than 3 miles and the altitude difference less than 600 feet, the session is over and 10 points will be deducted.

## X WEATHER SIMULATION

A weather simulation, which generates thunderstorm cells, can be switched on in the main menu. There are two levels - light and medium - that determine the number of cells that will be generated. The radar detects cells with precipitation and depicts them on the screen in two colours. Dark magenta means light and light magenta heavy precipitation. Generally, aircraft should not get into contact with the storm clouds. It is your job to guide them around the cells, making traffic control more challenging as some parts of the airspace cannot be used.

Pilots will also take measures to avoid thunderstorms. If they are on a heading directing them into a cell they will, if you do not issue a heading in time, fly their own avoidance heading. You will be informed about the heading and as long as the aircraft considers the heading as necessary you will not be able to issue any new heading. Therefore it is strongly advisable to vector targets away from clouds early enough. Otherwise, a target may take an avoidance heading putting it into conflict with another aircraft. Targets on their own avoidance heading will inform you when clear of weather (you can then assign a heading again).



**Fig. 11 - Precipitation Areas**

If a target is close to a cell and you issue a heading or direct-to that would take it into the thunderstorm, the pilots will not accept it and continue on their present heading. All storm cells move very slowly across the screen according to the wind direction. When they reach the screen boundary they disappear. After all clouds have disappeared, no more will be generated so after a long session the significant weather will have dissipated.

One point will be deducted from your score for each radar update a target is inside a cell.

## XI SCORE SYSTEM

Your success as an air traffic controller is measured with a score system. For every single session a session score is determined and additionally a total score, which is the sum of all previous session scores, is stored. After each session, the session score is compared to your highscore and you will be informed when you have achieved a new highscore. Additionally, after each session you may compare your score to global highscores. The best 200 scores for each airport are stored on a remote server to enable comparison to other players, if desired. If you choose to compare your score, it will be transmitted to the server, where your global rank is determined. No personal data is transmitted to the server but only date/time and your score. A Wi-Fi connection is recommended.

**IMPORTANT NOTE:** Your total score will only be updated after ending a shift without saving. If you save a game, it is expected that you continue it at a later time and therefore your total score will not be updated right away. If you exit the game directly (without visiting the main menu) and do not save, your total score, rank and the available sectors will be updated and shown in the main menu the next time you start the app. However, you will not get any information dialog about your achievements (like in the main menu) before exiting.

The total score influences which sectors are available and which rank as an air traffic controller you have.

At a total score of 50 points the second sector (Hemswell), and at 300 points the third airport (Reydon) will be unlocked. Further sectors may be included in later updates of the game. Furthermore, from time to time you will receive promotion to a new rank from Air Traffic Controller Trainee in the beginning to Senior Examiner in the end.

Here is an overview of all actions influencing your score:

- Aircraft leaving sector at requested level: +1 point
- Aircraft leaving sector at coordinated out level: +1 point
- Aircraft leaving sector near exit waypoint: +1 point
- Aircraft leaving sector > 20 miles from exit waypoint: -1 point
- Aircraft leaving sector > 30 miles from exit waypoint: -5 points
- Aircraft leaving sector was not coordinated in/out: -1 point
- Aircraft was not transferred to next sector: -1 point
- Descent coordination aircraft leaves sector bottom: +1 point
- Same aircraft also leaves screen boundaries: -1 point
- Emergency descent aircraft leaves sector bottom: +10 points
- 2 aircraft closer than < 1000ft and 5 miles: -1 point per radar sweep

## XII EMERGENCIES

From time to time, an aircraft will declare emergency, which is always a rapid descent due to pressurisation problems in this game. The target will change its colour to red. Your job then is to help it descend to FL 100, while it will not accept any different altitude clearances. This may mean moving other traffic out of the way. If you are successful, you will receive 10 points when the traffic leaves your sector.

## XVI CONFLICT PREDICTION DISPLAY

By touching the label "CONFL PRED" on menu bar page 2, a three-dimensional display of all traffic is opened. On the left side, a legend shows the different altitudes in feet. Aircraft are shown as small blue rectangles. Lines extend from them to indicate various data. In the upper left corner, the display can be customized. By selecting ALTITUDE, a blue line is drawn from all aircraft symbols to the altitude grid in front to show their present altitude. Touching POSITION shows a green line extending from the aircraft symbol to the ground, indicating the 2-dimensional position in relation to the radar screen.

This display can be used for medium term conflict prediction.

This prediction has two modes, actual and preview. In actual mode, the actual and cleared flightlevels of all targets are used and in preview mode the coordinated in and out levels are used. If a possible conflict is

detected, the respective target symbols turn red and show the callsigns of the conflicting traffic together with the smallest distance of closest approach. Additionally, altitude target lines turn red, too. The prediction algorithm takes also position and track into account in a limited way. It will not show a conflict for airplanes at the same altitude, but flying in trail 100 miles apart, for example. However, it will always be conservative and some indicated possible conflicts may not be critical.

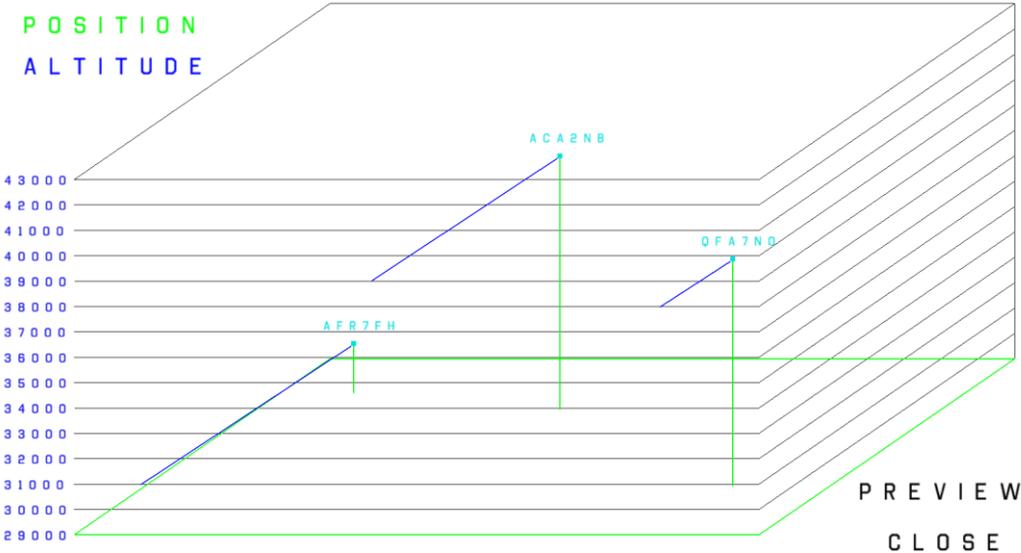


Fig. 14 - Conflict Prediction Display

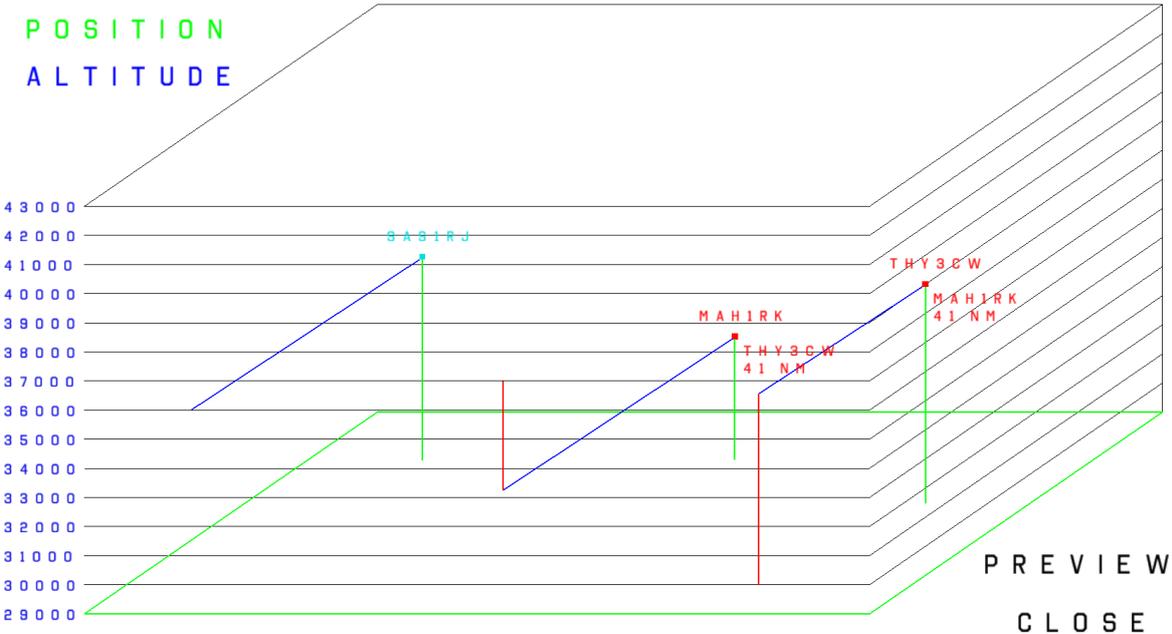


Fig. 15 - CPD with conflict detected

## XVII SAVE & LOAD GAMES

Sessions can be saved and continued at a later time, even after app shutdown. At the moment, only one game can be stored. After returning to the main menu or when directly exiting the game, a dialog will appear asking you whether the game should be saved. If you choose yes, all present session data is stored. You can continue this game from the main menu by choosing "Resume" at the bottom of the screen. The last saved game will be opened. All settings from the main menu (traffic rates, weather etc.) will be ignored except for sound and loaded from the saved game. Sound settings will always be taken from the main menu.

If the session is terminated due to a game-over situation (loss of separation) it cannot be saved.

**IMPORTANT NOTE:** Your total score will only be updated after ending a shift without saving. If you save a game, it is expected that you continue it at a later time and therefore your total score will not be updated right away, but only when you really end the session (exit without saving).

When a previously saved game is loaded, continued and then ended without saving, it cannot be loaded anymore to prevent the score from the same session being awarded multiple times.