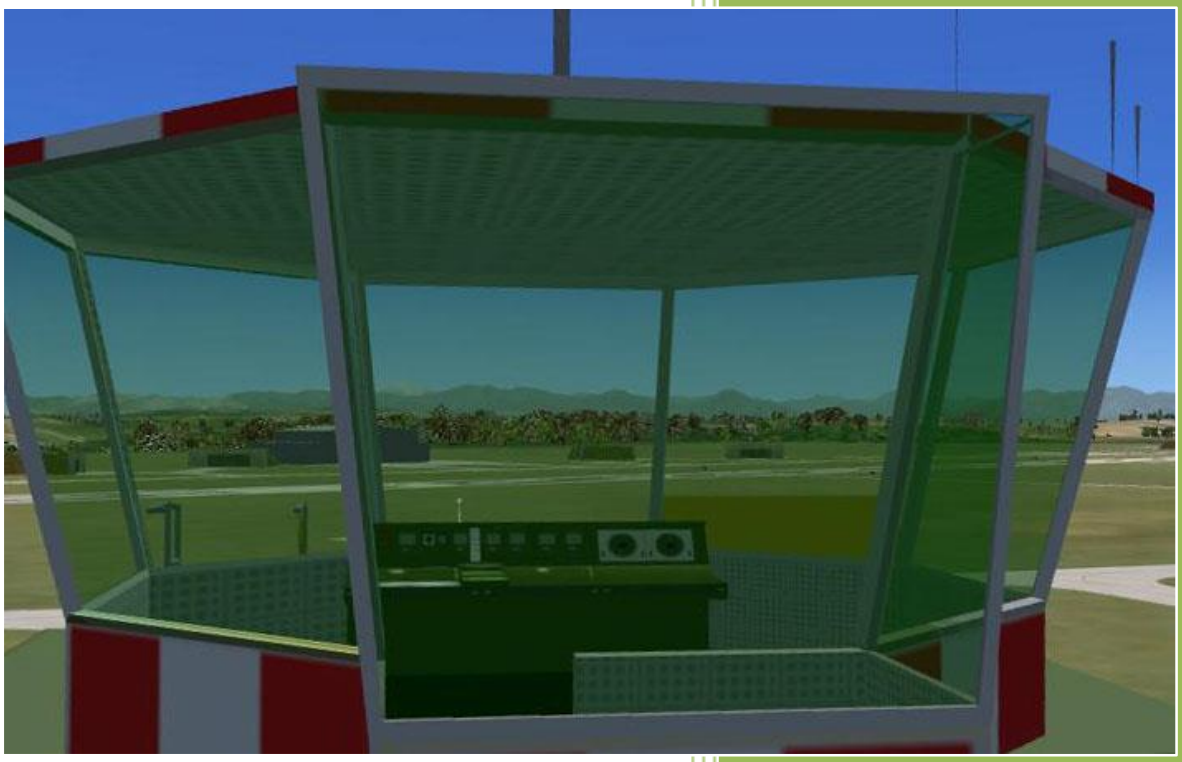
ARIES WINGS CONSULTING

2015

Aries Wings Radar Beta Version



Germany -- Version 1.976

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Aries Radar Beta version

Aries Radar consists actually on three applications:

Aries Radar Server

A centralized application for generating and delivering radar target data.

Aries GCI

A plan position indicator (PPI) radar. Displaying the map of the entire simulation area and all targets which can be detected by radar antennas.

Aries FPN67

A precision approach radar to guide an aircraft on final by a ground control unit.

The software is in a very early beta status. While the FPN67 is almost in its final version, the GCI radar misses still a lot of basic functions. Most of the startup values must be set manually. When ending a simulator session it can easily happen, that one of the applications will crash. The shutdown sequence is actually not finalized.

The layout of the different application may change during the beta phase. It is dependent of the experiences and the user reports.

Installation

To install Aries Radar on a computer, simply start setup.exe and follow the instructions given in the installation dialog.

Aries Radar requires the latest installation of Aries Radio.

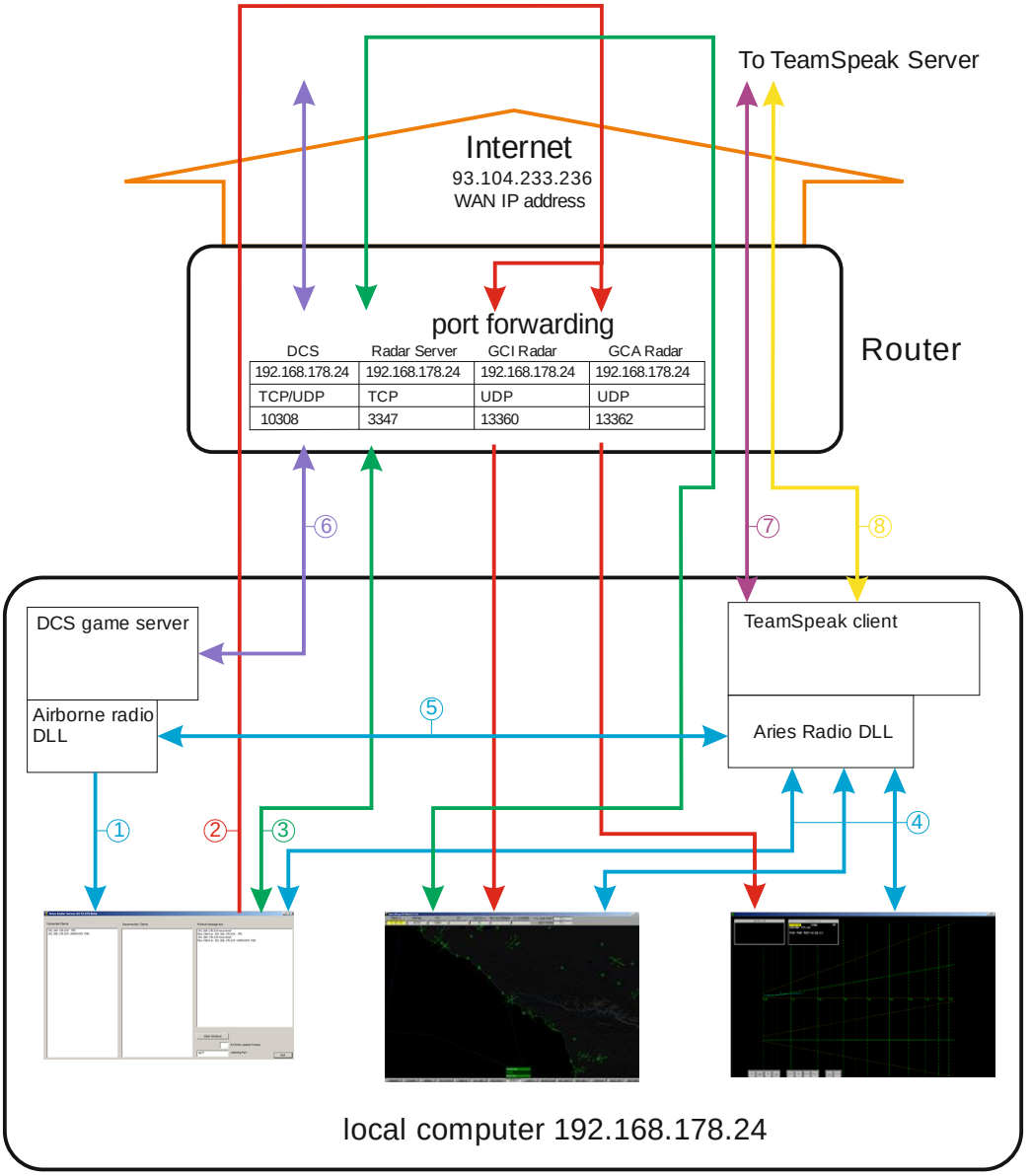
Starting Aries Radar

All radar applications require a running TeamSpeak client with an AriesRadio.dll on the same computer. Therefore the first step must be to start TeamSpeak (64 bit version).

The GCI radar and even the FPN67 require a running Radar Server anywhere in the network. The server can even be started on a computer anywhere in the internet. The only requirement is, that all involved computers are logged in on the same TeamSpeak server and all are in the same TeamSpeak channel.

Once the Radar server is up, the GCI radar and/or the FPN67 can be started. The applications automatically connect to the radar server wherever the server was started.

There are still some unsolved bugs in the system. Therefore, if you need to restart the radars, please restart TeamSpeak too.



Windows Local Messaging

Radar Internet TCP messages

Radar Internet UDP message

TeamSpeak Voice Packages

TeamSpeak Messaging

DCS Server Messaging

1. Target position updates DCS to Radar Server
2. Antenna UDP target updates Radar server to radars
3. Message exchange TCP between Radar Server and radars
4. Application sign in to be forwarded to all TeamSpeak clients
5. Radio frequency and channel control betewwen DCS and TeamSpeak
6. DCS data exchange between game server and game client
7. Teamspeak UDP voice data exchange between TeamSpeak server and TeamSpeak clients
8. TeamSpeak TCP messaging between TeamSpeak server ar TeamSpeak clients

Figure 1 Network Connections and Messaging

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Network Connections and Messaging

Figure 1 on the previous page shows all network connection necessary to run a mission with radar service. The most important information in the image is the necessary port forwarding to be set in the local router. All port numbers are the default settings, coming with the installed INI files. It is possible, but not recommended to change the port numbers. The changes have to be done in the router **and** in the INI files. The WAN IP address is set by your internet provider and changes probably daily. When you start the radar server for an internet mission, you need to find out you current WAN IP address first. The address has to be filled in the Server Net Addresses Dialog.

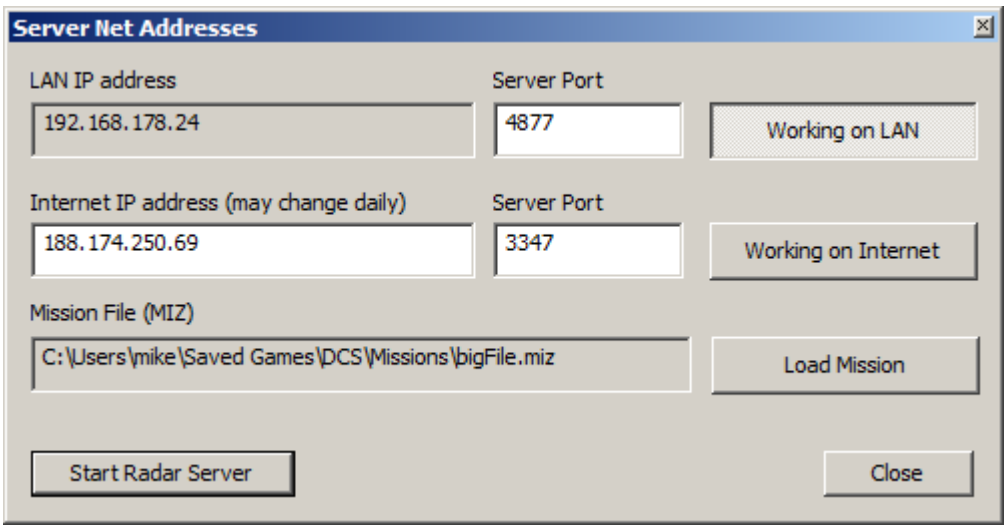


Figure 2 Server Net Addresses

The diagram assumes an installation of all applications:

- DCS World
- Aries Radio
- Aries Radar Server
- Aries GCI
- Aries GCA

on one and the same computer. The LAN address is assumed to be 192.168.178.24. For the port forwarding in the router, you have to insert the LAN IP of your local computer.

Starting the radar server

The radar server should be started on a computer on which DCS will later be started. If DCS and the radar server reside on the same computer, a lot of network traffic can be avoided. The radar server looks on the local computer if a DCS is running. If yes, the local DCS will be assigned to be the data generator. The entire position reports will then be exchanged via the local memory instead to be sent over the internet.

Prerequisites

Since all DCS and even all radar application can be dislocated anywhere in the internet, it is necessary, to prepare some data so that all client can contact the radar server over the internet. On the computer, on which the radar server will run, a so called port forwarding must be established in the local router. If the entire simulation shall run in a LAN, you may skip this step.

Server port forwarding in the local router (Server Listener port)

The default port, which shall be made accessible is 3347. To do this, follow the instructions for your local router. The port must be specified for TCP and be connected to the local computer on which the radar server shall run.

WAN IP address (important!)

All clients in the internet see only your public IP4 address, which unfortunately changes every day. Your current IP address can be read from your router or from the TeamSpeak dialog. In the latter case, do a right click on your client name in the left tree window of TeamSpeak. From the Menu select 'Client Connection Info'. You find your WAN IP address under 'Client address'.

When you start the radar server, you see the opening dialog, requesting your current WAN IP and the used server port. Fill in the current IP4 address and compare the port to that, which was specified in the router to be forwarded. If the ports do not match, simply fill in the port number from the router.

The default shown port value is taken from the server's INI file:

C:\Program Files\AriesWings\RSVR\ApplicationData\RSVR.ini

```
[GENERAL]
ServerListeningPortExtHBO=3347
```

If you want to have a different port for WAN operations, you may fill in your desired port. The value will be stored in the above INI section and appears as default with the next session.

Because of the port forwarding, the Radar Server is bound to the computer specified in the router for port forwarding. This applies for WAN operations only. If you start a session for LAN only operations, you are not bound to a specific computer in the LAN.

Attention!

If you change the displayed port number, you have to adjust your port forwarding in your router!

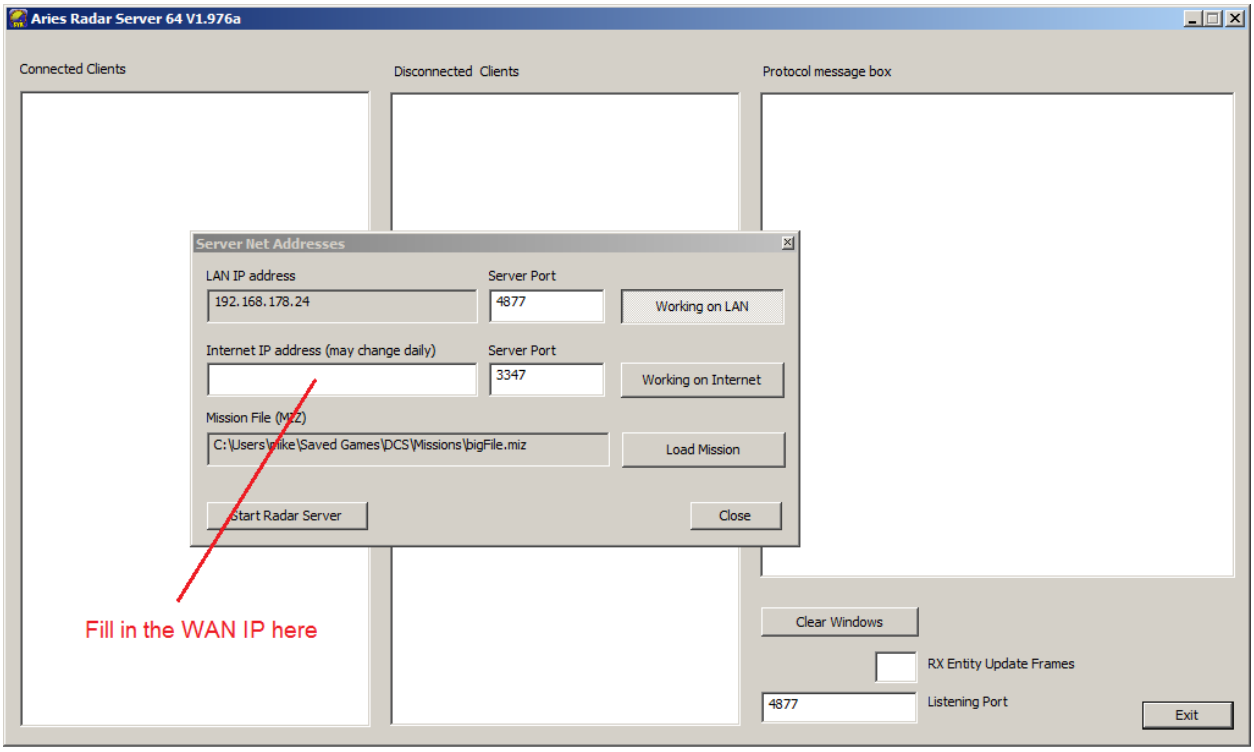


Figure 3 Startup dialog

LAN iP address

The LAN IP address is specified automatically. The port number for LAN operations can be any user defined port number. This port number **needs not** to be specified in the router. The default port number is taken from the server's INI file:

C:\Program Files\AriesWings\RSVR\ApplicationData\RSVR.ini

[GENERAL]
ServerListeningPortLclHBO=3347

If you want to have a different port for LAN operations, you may fill in your desired port. The value will be stored in the above INI section and appears as default with the next session.

Now you have the choice to prepare for LAN or internet operations. Use the buttons to the right to select 'Working on LAN' or 'Working on Internet'.

If the selections are complete, push 'Start Radar Server'

Load Mission

If this button is pushed, a file select dialog comes up. The MIZ file of the simulator Mission can be loaded into the memory. The MIZ file is evaluated and enables the PPI Radar to show the actual weather data and the flight tracks of the different airplanes.

Remote Start

It is planned for the later release version, to start the radar server remotely out of the TeamSpeak dialog. This enables the Game Supervisor to start the radar server on any connected client computer remotely.

Connected Clients

All clients, including all connected DCS, appear with its IP address in this list window. It is an indication for a positive connection of a radar or a DCS.

Disconnected Clients

Once a client has ended his application or he crashes, the connection to the radar server will be cut and the entry from 'Connected Clients' is moved to the 'Disconnected Clients' window.

Protocol Message Box

This list window receives important system messages during runtime. At the moment, the information are more or less important for the development rather than for the user.

Clear Windows

The button deletes all entries in the Protocol message box.

RX Entity Update Frames

This small edit field is a so called 'Kilroy'. It shows a turning line char as soon as position reports are received from a data generator DCS. If the Kilroy stops moving, then a severe error experienced to the connection to the data generator.

Listening Port

It shows as information the port used to connect to the radar server. It can be the port from the LAN connection or, in case of internet operations, the port forwarded in your router.

Starting the GCI radar.

Like the radar server, the GCI radar need even a port being defined in your router for forwarding.

Port forwarding for GCI radar (GCI receiver port)

The GCI radar needs a UDP port to receive position data from a Radar Server. The port number is

Specified in C:\Program Files\AriesWings\GCI\ApplicationData\GCI.ini

[RADAR]

localUDPport=13360

The port **13360** is the default and must be defined in your local router for UDP port forwarding and bound to the computer on which the GCI radar shall run. If you have already a GCA.ini, then the port number defined therein is valid. If you experience troubles with the port number, you may try any other number. But keep in mind, the port must be specified in your local router.

GCI start up

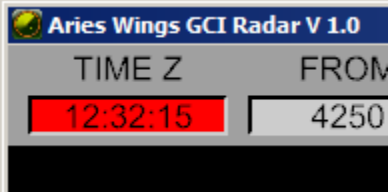
The startup of the GCI radar may take some seconds. It must establish a connection to the radar server and read and interpret the entire maps. This is done once at the begin and takes some time. On older Computers, it may take up to 2 minutes to load all resources. To indicate, that the software is not frozen, an analog clock is shown as long as the software is busy with loading all resources:

Figure 4 Busy Watch

If a radar server was found in the internet or in the LAN, the map window opens. If no radar server could be connected, a message box opens telling you, that no radar server is available. In any case you can inspect the GCI radar, but you will never see any target while disconnected from a radar server.

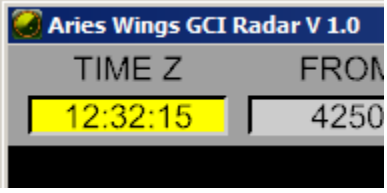
There are three situations while connecting the Radar Server. The first is to establish the TCP connection. You may observe the Clock Time in the upper left corner of the radar screen. It will change its background color according to the connection state:

No connection



No radar server was found or TeamSpeak does not run.

TCP connection established:



A radar server was found and connected.

UDP connection established:

The clock is running as indication, that the mission was started. The radar receives UDP position data over the network.

Starting the FPN67

The FPN67 has the same prerequisites as the GCI radar has.

Port forwarding for FPN67 (PAR receiver port)

The GCI radar needs a UDP port to receive position data from a Radar Server. The default port number is

13362

If you have already a GCA.ini, then the port number defined therein is valid.

The port 13362 must be defined in your local router for UDP port forwarding and bound to the computer on which the FPN67 PAR shall run. If you prefer another port number, you can change the value in:

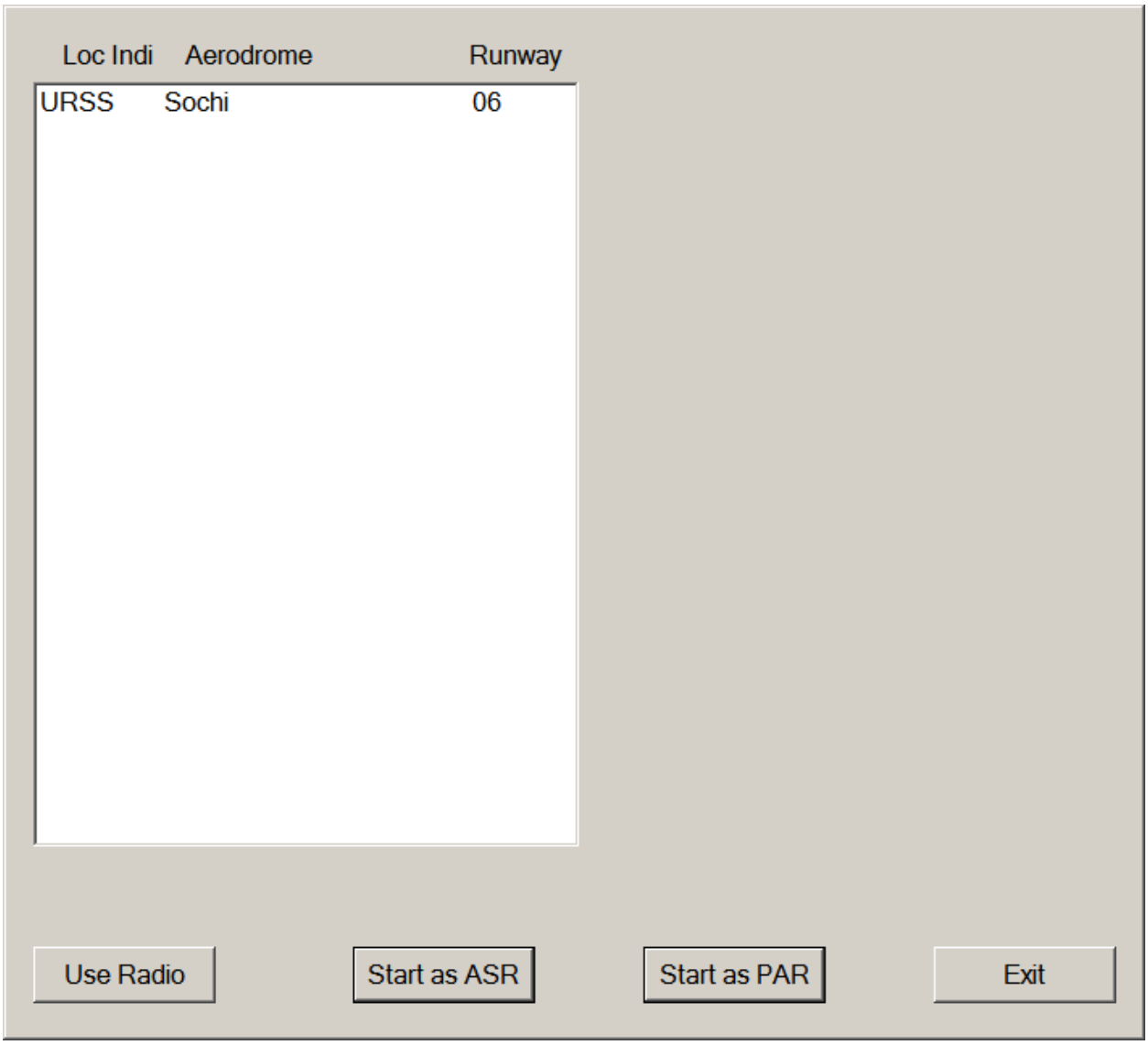
C:\Program Files\AriesWings\GCA\ApplicationData\GCA.ini

[RADAR]

localUDPport=13362

startup

The FPN67 It establishes contact to the radar server in the background and shows an opening Dialog:

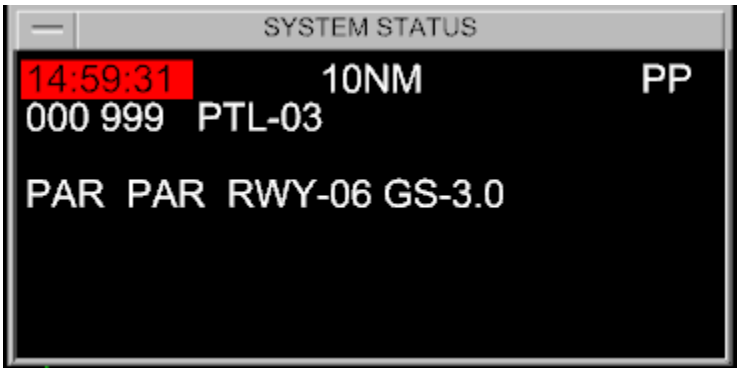


First click the line 'URSS Sochi 06'. It selects the PAR for Sochi Runway 06. It is the only PAR in this early beta version.

Do not push the buttons 'Use Radio' or 'Start as ASR. Only use 'Start as PAR'. This brings up the PAR screen and the system is ready for use.

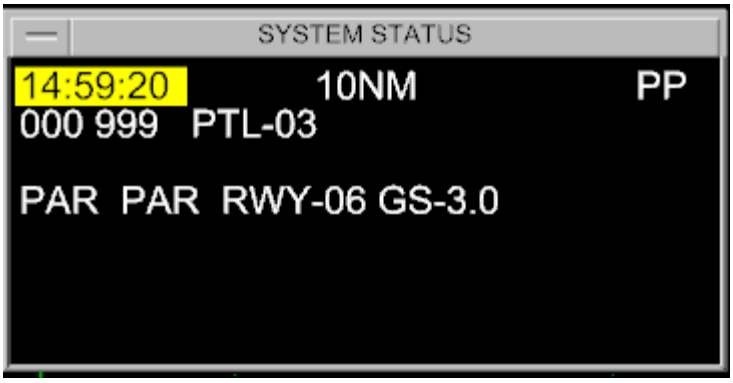
Even like the GCI, the PAR has a connection indication in the Clock Time:

No connection:



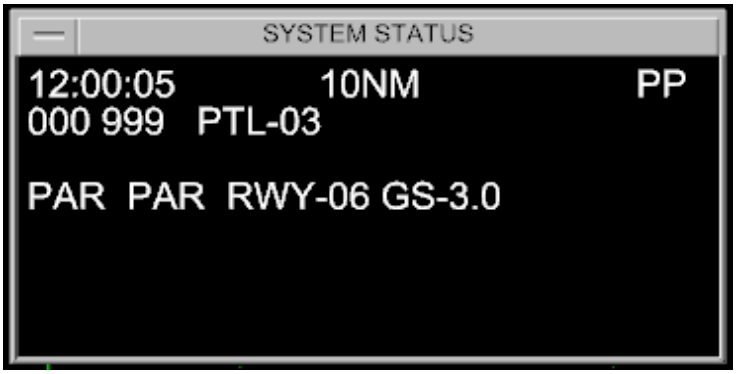
No radar server was found or TeamSpeak does not run.

TCP connection established:



A radar server was found and connected.

UDP connection established:



The clock is running as indication, that the mission was started. The PAR receives UDP position data over the network.

The GCI radar

The GCI radar comes up with the radar screen. The screen center and the scale is that from the last session. Even the position of the window is restored from the last session:

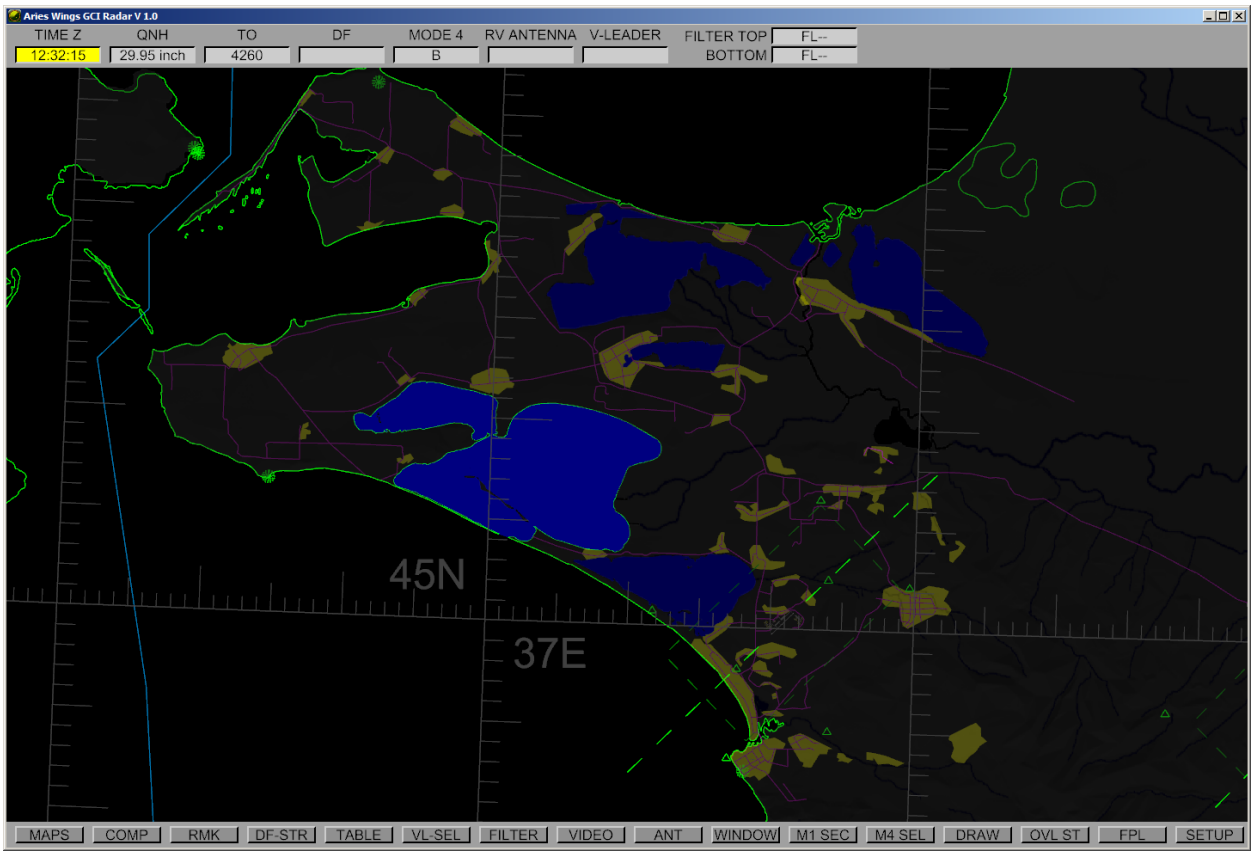


Figure 5 The GCI Radar

Radar Antennas

The GCI radar does not only display target position like simple simulations. To display targets, a set of antennas are simulated with defined range in distance, vertical beam and horizontal beam. Only if a target is in range and hit by the radar sweep, then a symbol will be displayed in the radar screen. In this version 12 antenna positions are available and can be switched on.

From the lower button row select 'ANT'. From the opening antenna menu, select the aerodrome from which the antenna shall be used. It is allowed to activate more than one antenna at a time. But keep in mind, that it uses a lot of computer resources, which could drag the performance down

Figure 6 Antenna selection

In the above example, the antenna of Sochi aerodrome was selected. If no antenna is active, no target can be displayed.

Switchable features

The lower button row offers some features which help to enhance the information display. Not all of the buttons are connected to a function up to now.

MAPS

Figure 7 Maps menu

This menu offers 15 map layers which can be activated to be displayed. The content of the maps is not finalized and reflects more or less the development and test requirements.

COMP

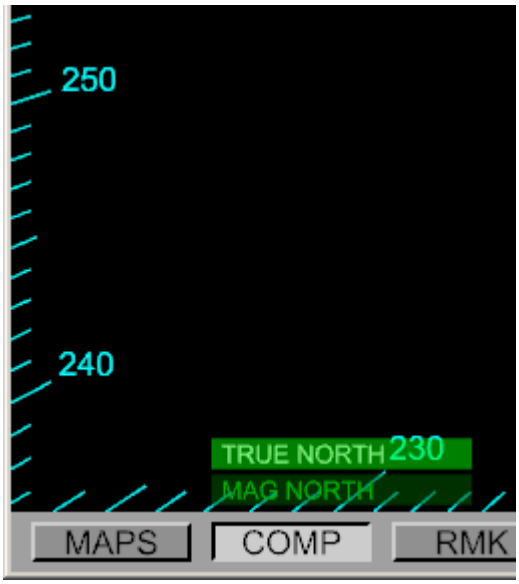


Figure 8 Compass display

COMP displays a compass scale around the radar screen. This is useful for the controller if he estimates directions on the screen. The map display is always grid north orientated. The compass scale can be set to magnetic North (green color) or to true North (light blue color). Because of the projection type, the true north orientation will change if the screen center is moved East – West over the map. This can be observed by the moving compass scale. Magnetic North depends on the closest aerodrome to the screen center. If the screen center is closed to Sochi, the magnetic variation of Sochi is used to show the magnetic compass scale.

RMK

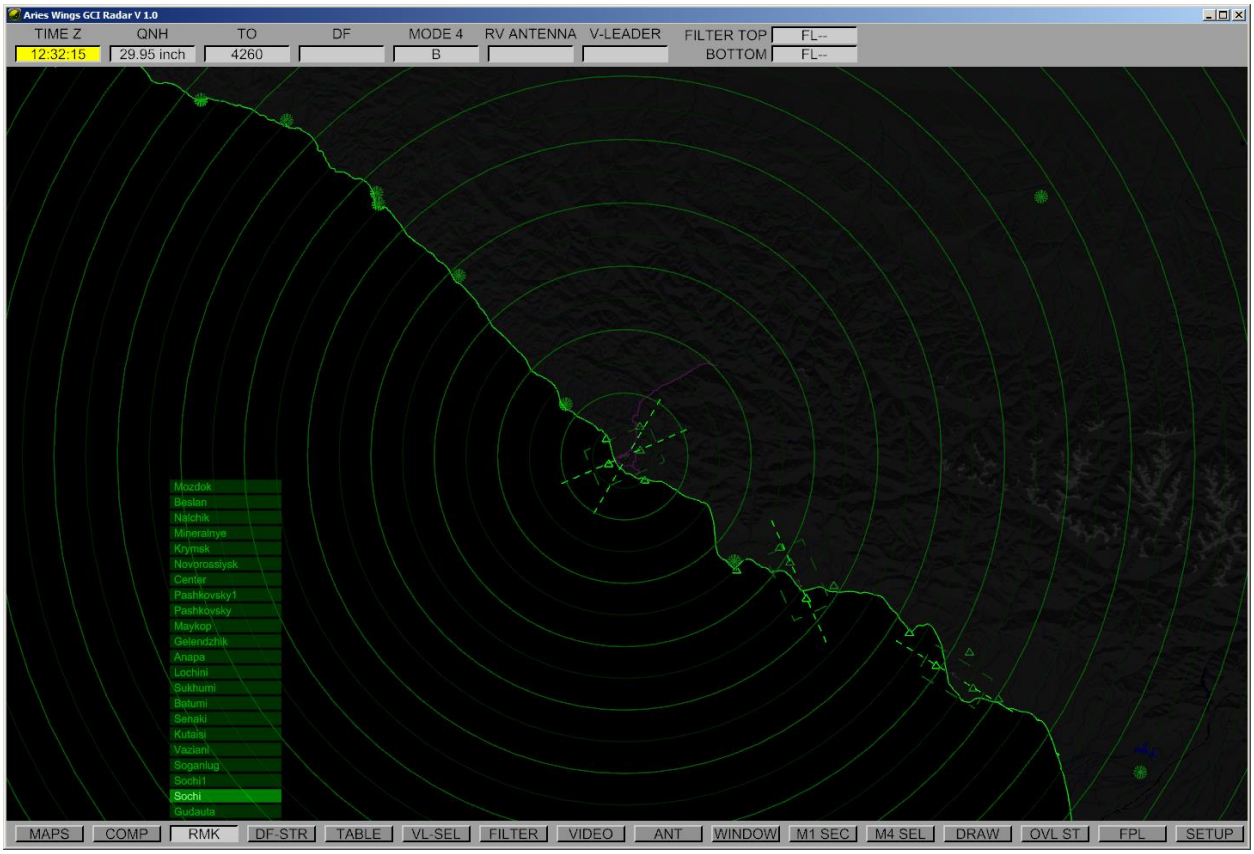


Figure 9 Range marks display

RMK activates the range marks display from which a controller can read distances from the active aerodrome. The Range marks can be centered around a selectable aerodrome or to any manual selected location.

Changing the range mark center

Center on aerodrome

Select an aerodrome from the RMK menu. The range mark center will be moved to the aerodrome reference point.

Manual selected center

The center of the range marks can be moved to any position on the map screen.
To move the center:

- Activate the range marks by pressing the 'RMK' button.
- Do a right mouse click on the pushed 'RMK' button. As feedback, you see the button text blink between black and red. This is the indication, that the next left click in the map screen determines the new range mark center.

- Do the left click in the map screen at the position where the range mark center shall be moved to.

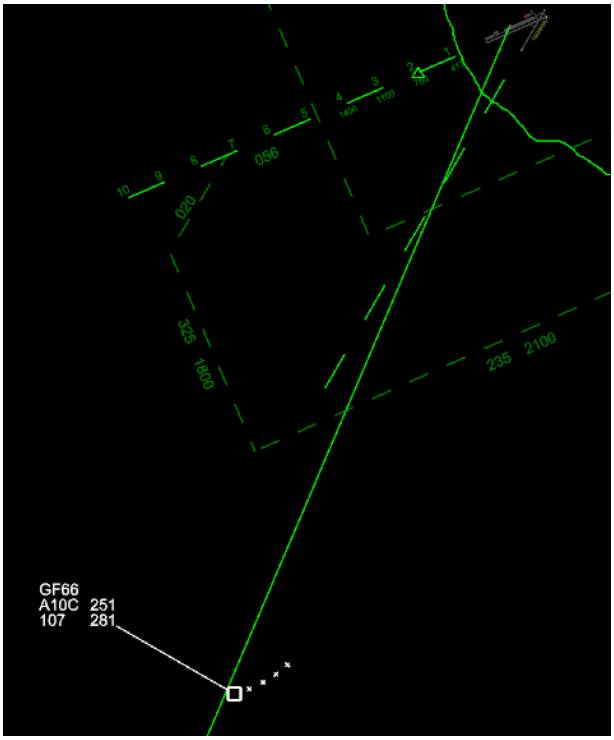
The new range mark center is stored in the INI file and will be retrieved with the next application start.

DF-STR

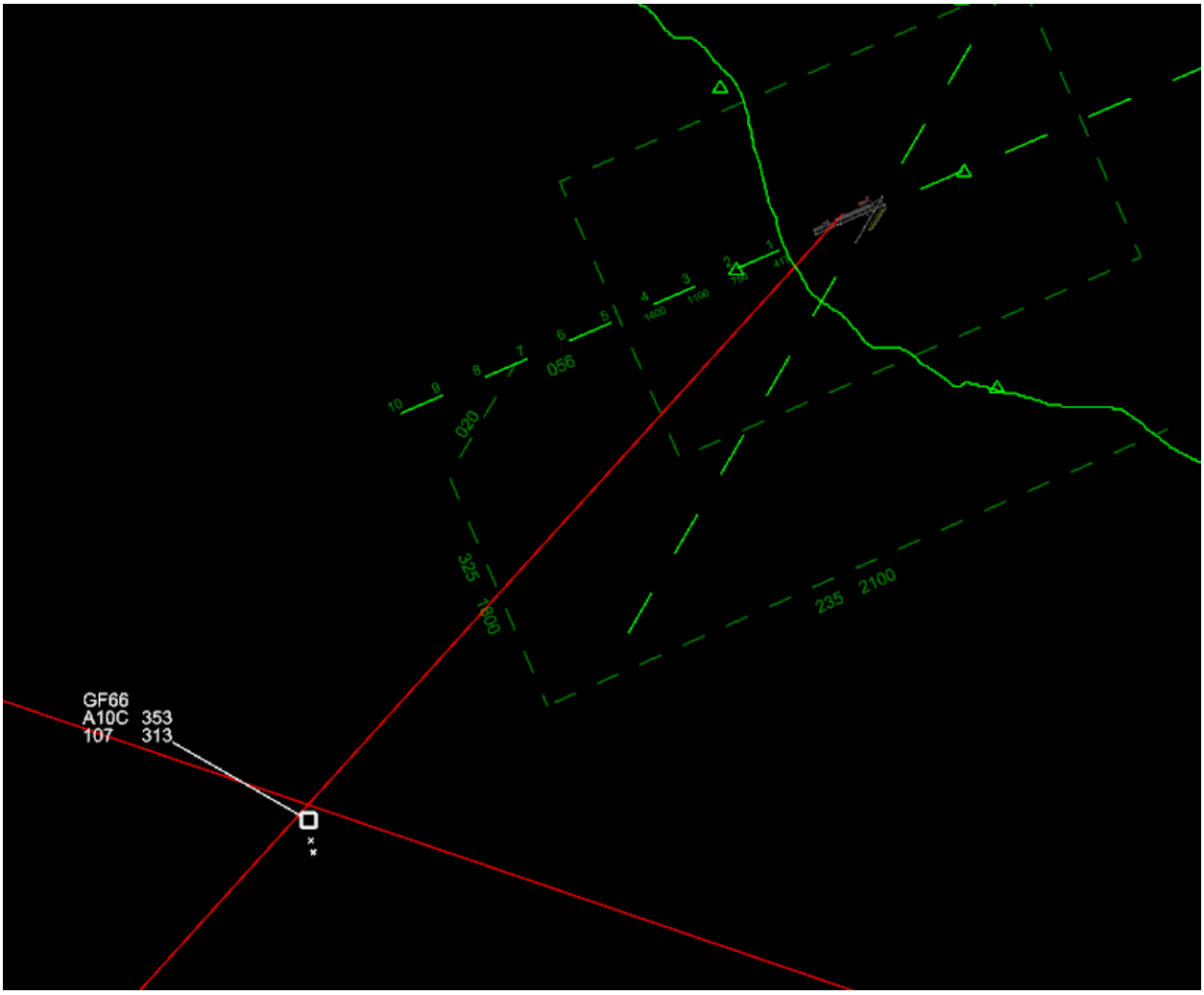
DF-STR activate the direction finder. As soon as radio energy is detected by this system, it shows a strobe from the DF ground station into the direction of the transmitter. If an aircraft is the transmitter, the line runs through the target symbol. This system supports the controller to notice who is speaking to him. In this beta version, the DF frequency watched is 251.000 MHz. The DF system is switched on permanently, regardless of the DF-STR button.

Up to 13 DF stations are selectable. The supported frequency is displayed in front of the station name.

The picture below shows a transmitting target. The DF station is located at Sochi.

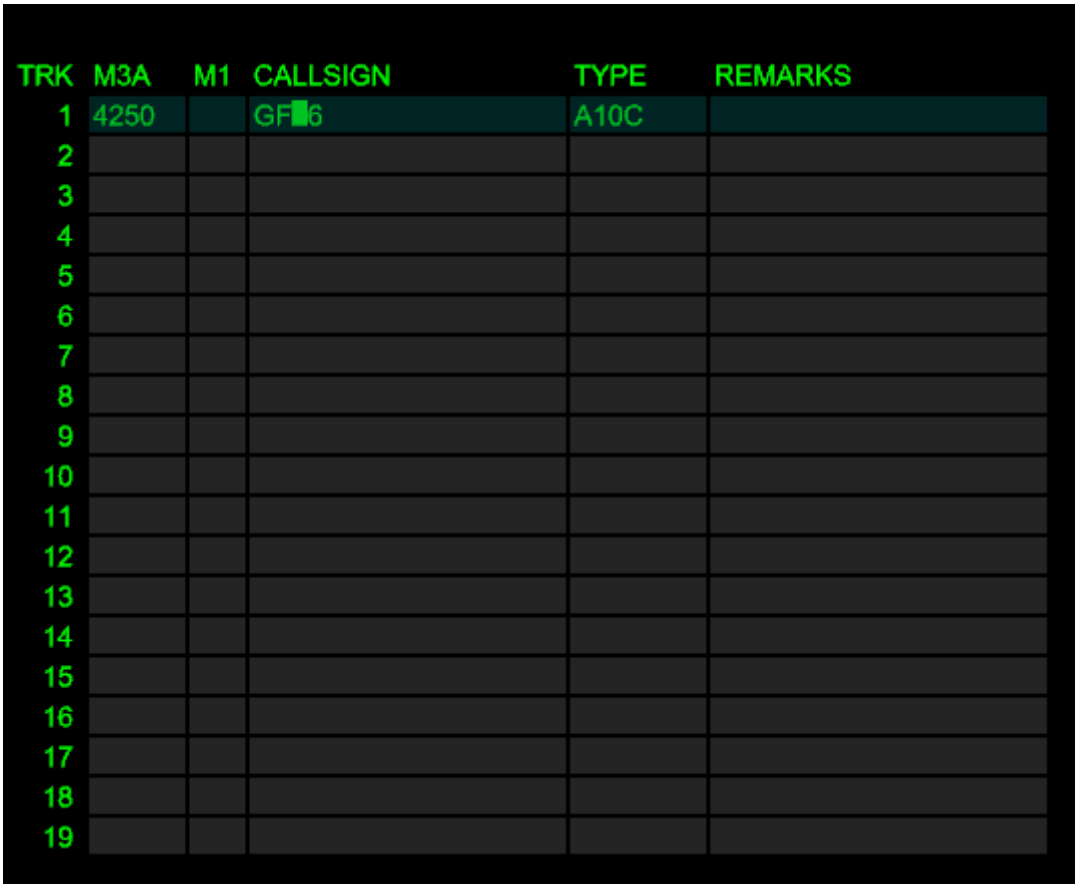


Since all DF stations watch the international guard frequencies 243.0 MHz and 121.5 MHz, transmitting on these frequencies create a cross bearing on the radar screen. Tis implies, that at least two DF stations are activated. If a guard frequency is used, the DF strobe is displayed in red:



TABLE

The correlation table shows up. This is one of the most important items for use during control. With the help of the table entries, some important target information can be bound to a specific radar target.

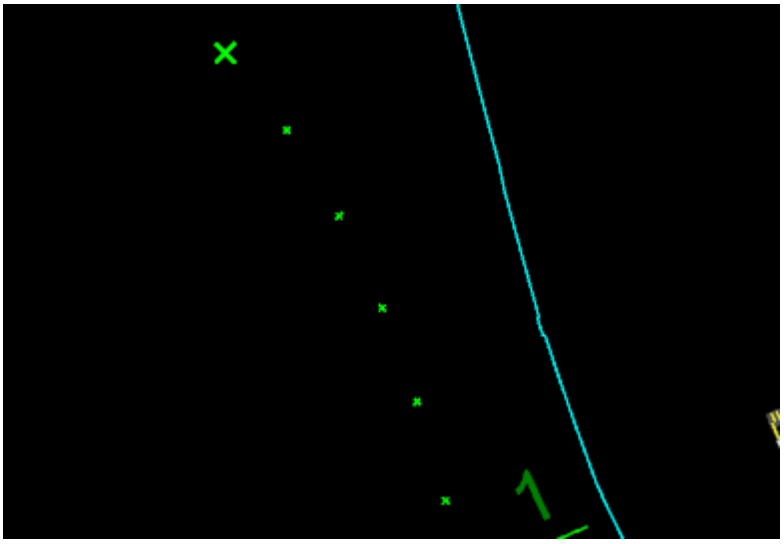


TRK	M3A	M1	CALLSIGN	TYPE	REMARKS
1	4250		GF[redacted]6	A10C	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					

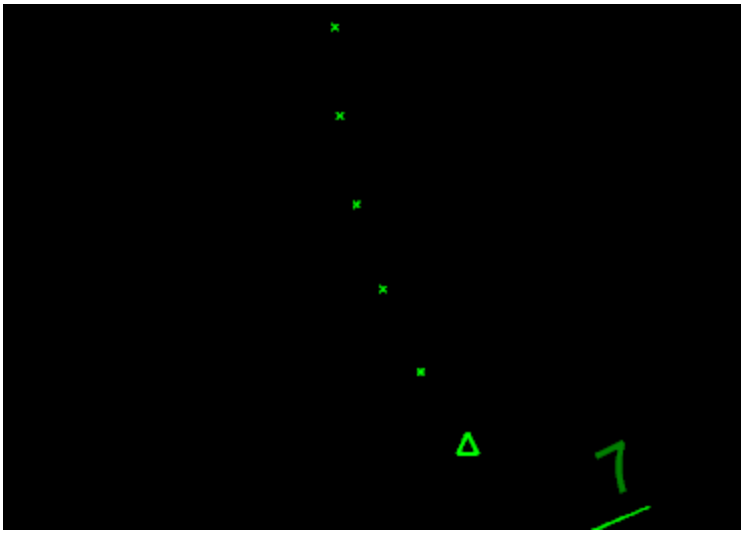
Figure 10 Correlation table

In the above example column M3A (mode 3 alpha) contains the code 4250. All aircraft which have code 4250 set, will show a label containing the above call sign and type. This is a real help for a controller to prevent mixing up call signs. In this beta version, only the A-10C can set IFF/SIF codes in the cockpit. Other types will follow in later versions.

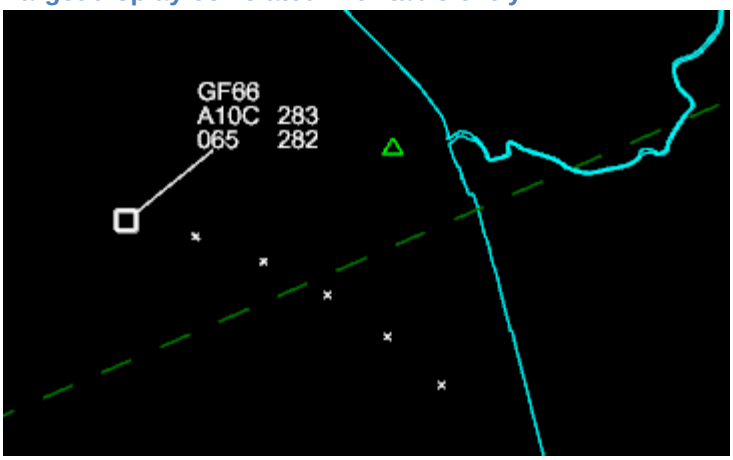
Target display with transponder off



Target display with transponder on

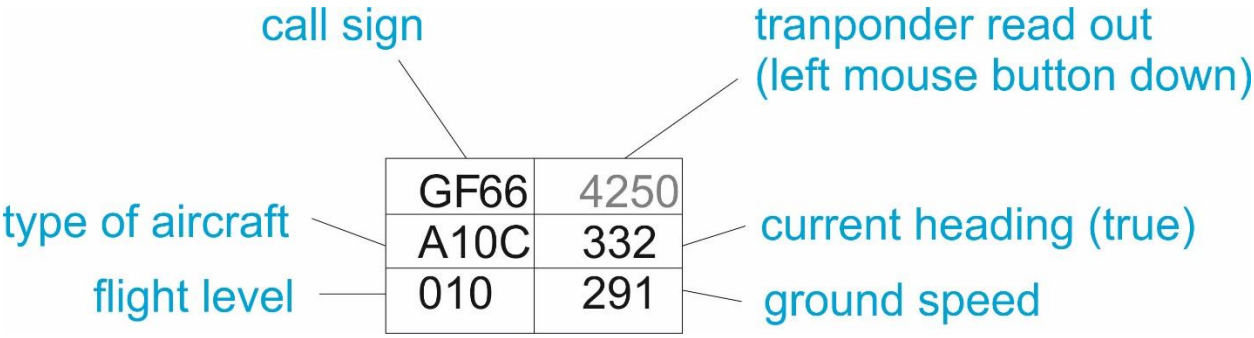


Target display correlated with table entry



Target label

The target label consists of 6 information fields. Most information come from the correlation table, while some values are calculated for each screen update:



Call sign

The call sign is taken from the correlation table and can be edited by the user.

Transponder readout

The Mode 3A code is visible only if the target was clicked with the left mouse button and the button is hold down. Even non correlated targets can be read out.

Type of aircraft

Even this field is taken from the correlation table and can be edited by the user.

Current heading

The heading is extracted from the past positions of the aircraft and reflects the true heading of the aircraft.

Flight level

The flight level is taken from the response data of the aircraft and shows the current mode C readout.

Ground speed

The ground speed is calculated by observing the past position and the time for a screen refresh.

VL-SEL

The menu offers the selection for velocity leaders (VL). The VL length is specified by time. Available values are 30 seconds to 5 minutes. If a VL is selected from the menu, the selection is shown in the upper button row:

A velocity leader shows the predicted horizontal flight path of correlated targets:

FILTER

Not connected up to now. It will later activate an altitude band (see FILTER TOP/BOTTOM in the upper button row). Aircraft outside the altitude band will be displayed in gray. This shall help to focus on targets under the responsibility of the controller.

VIDEO

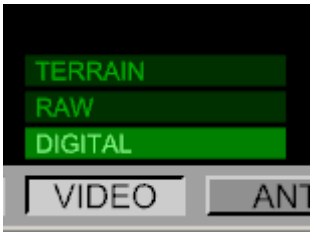
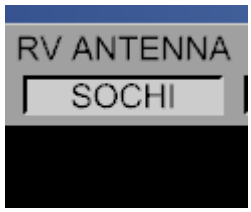


Figure 11 Video Menu

This enables the different display modes.

- DIGITAL enables the display of artificial target symbols like cross, triangle or square.
- RAW enables the raw video display like it is shown on an analog radar. This implies, that one of the antennas are selected as Raw Video Source. To select an antenna as Raw Video Source, open the “ANT” menu and do a Shift+Left Click on an activated antenna. As feedback, you will see the antenna name in the upper button row under ‘RV ANTENNA’:



The image below shows the Raw Video Display with Sochi Antenna.

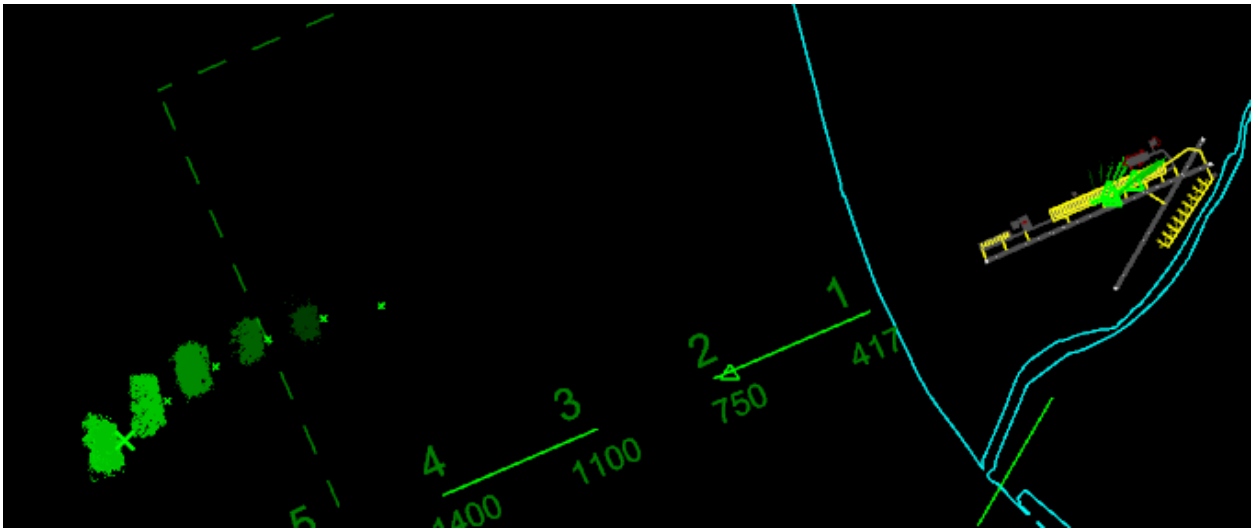


Figure 12 Raw Video Display

- TERRAIN shows a relief map in the radar screen. It can be used to recognize mountainous areas if necessary.

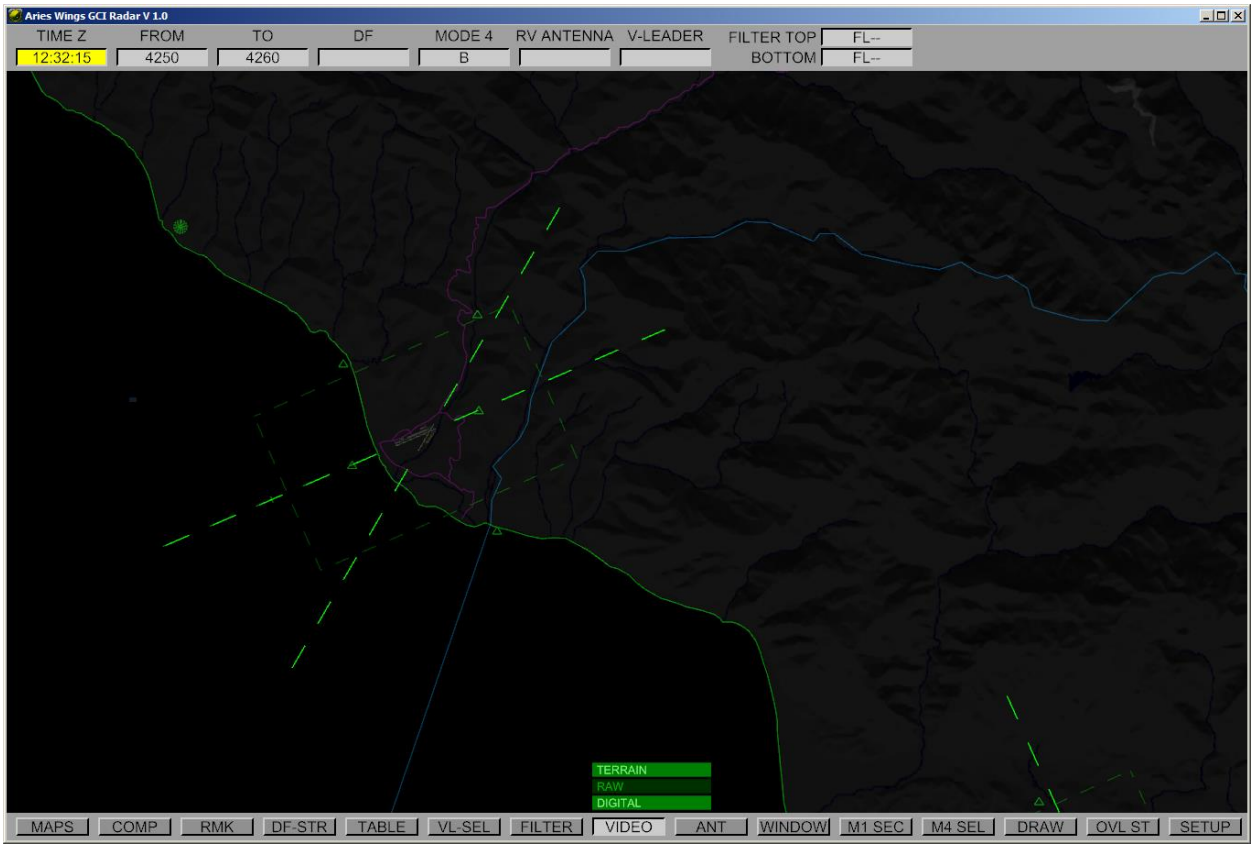


Figure 13 Relief map

WINDOW

Lets the controller open an additional window showing a selectable portion of the radar screen:

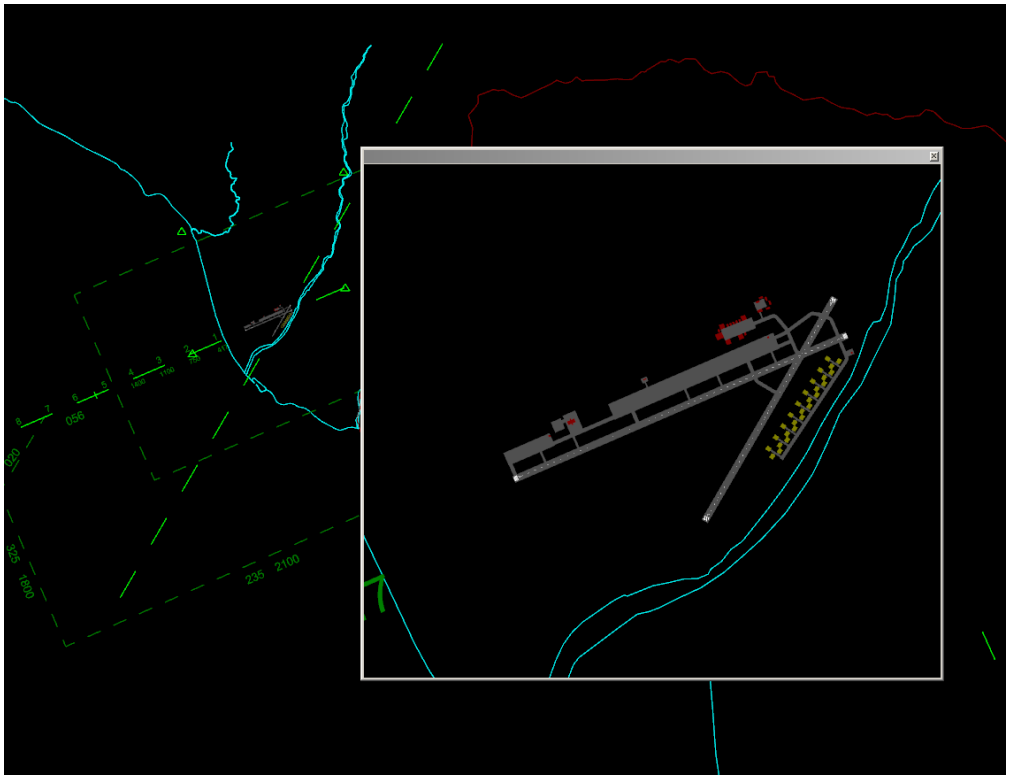


Figure 14 Window in window

M1 SEC

Not connected up to now. It will later offer the possibility to enter mode 1 codes for defined sectors in the radar map.

M4 SEL

Not connected up to now. It will later offer the possibility to switch between mode 4 encryption A and B for a specific antenna.

DRAW

Not connected up to now. Enables simple online drawing in the radar map.

OVL ST

OVL ST hold the 'PRINT' function only for the moment

Print the map

If the PRINT menu button is pushed, the standard Print dialog appears in the screen.

Select the Printer of your choice and select the orientation of the print area (Portrait or Landscape). Then push 'Print'. The printing does not start yet. Instead a dashed rectangle appears on the map:

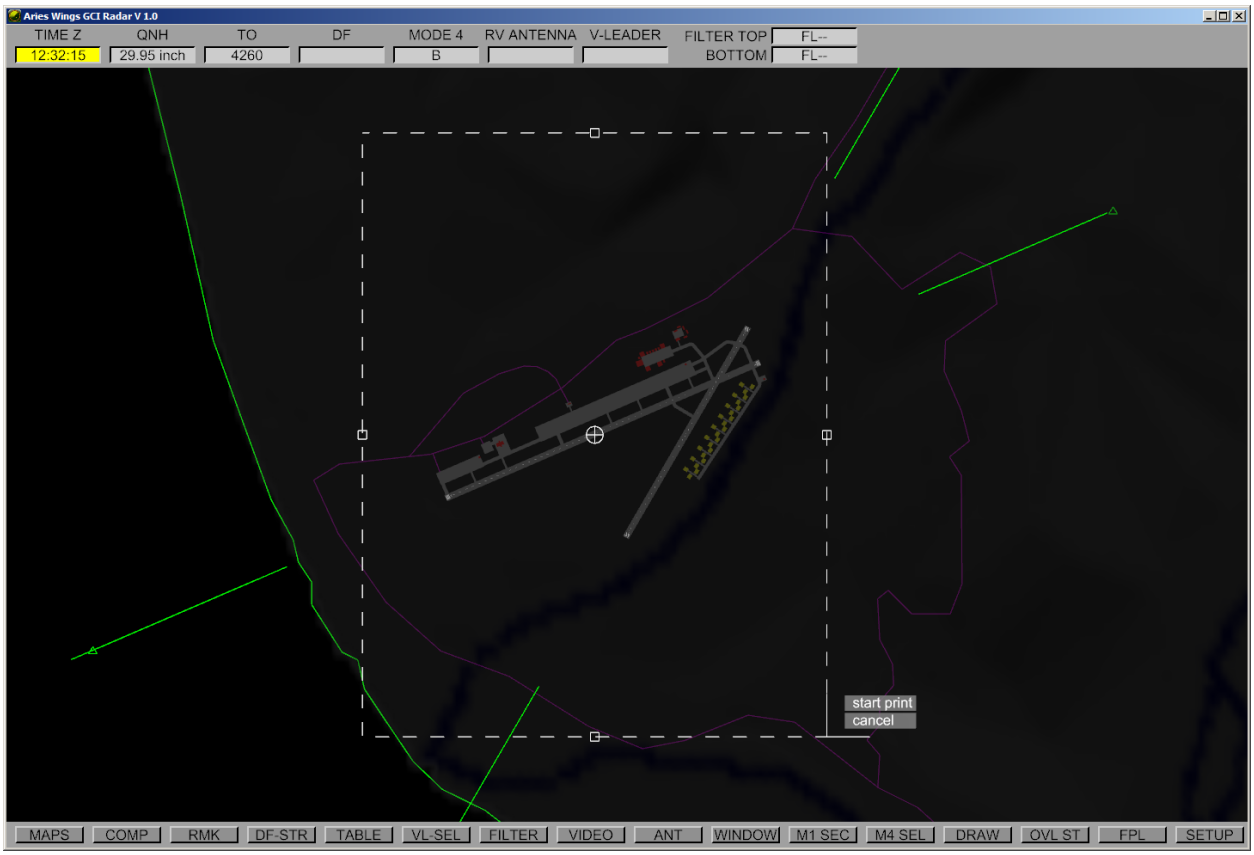


Figure 15 The print area

The rectangle shows the area which will be printed on the selected printer. The rectangle can be moved and resized so that it encloses the area of your selection. Finally, push 'start print' at the lower right corner of the area. The selected area is printed out on your printer.

SETUP

Not connected up to now. It will open a setup dialog to modify colors, label content…

Mouse Functions

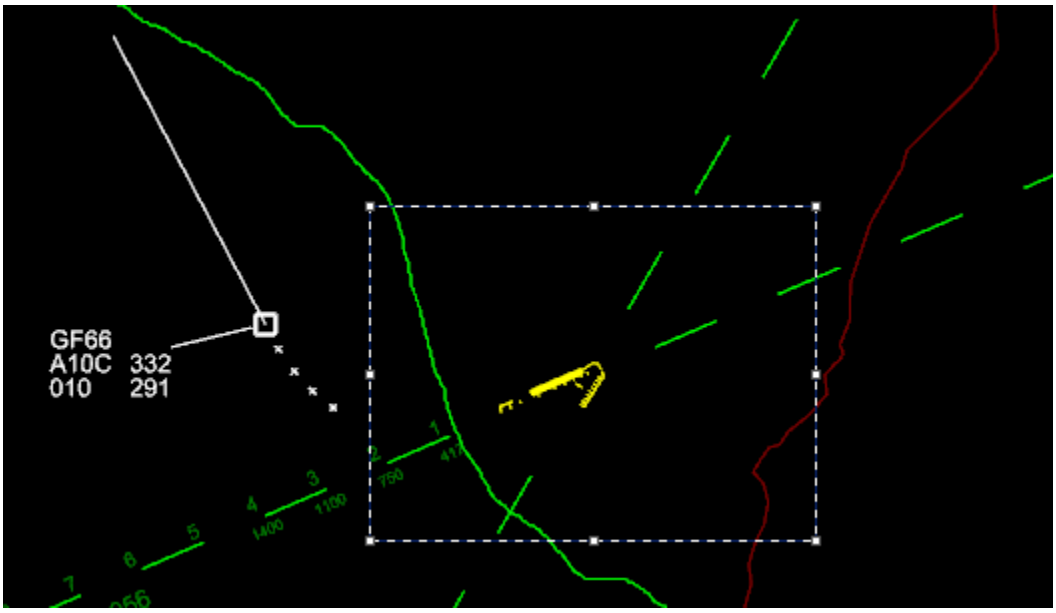
A set of useful functions can be initiated with the mouse buttons and the mouse scroll wheel.

Screen zoom

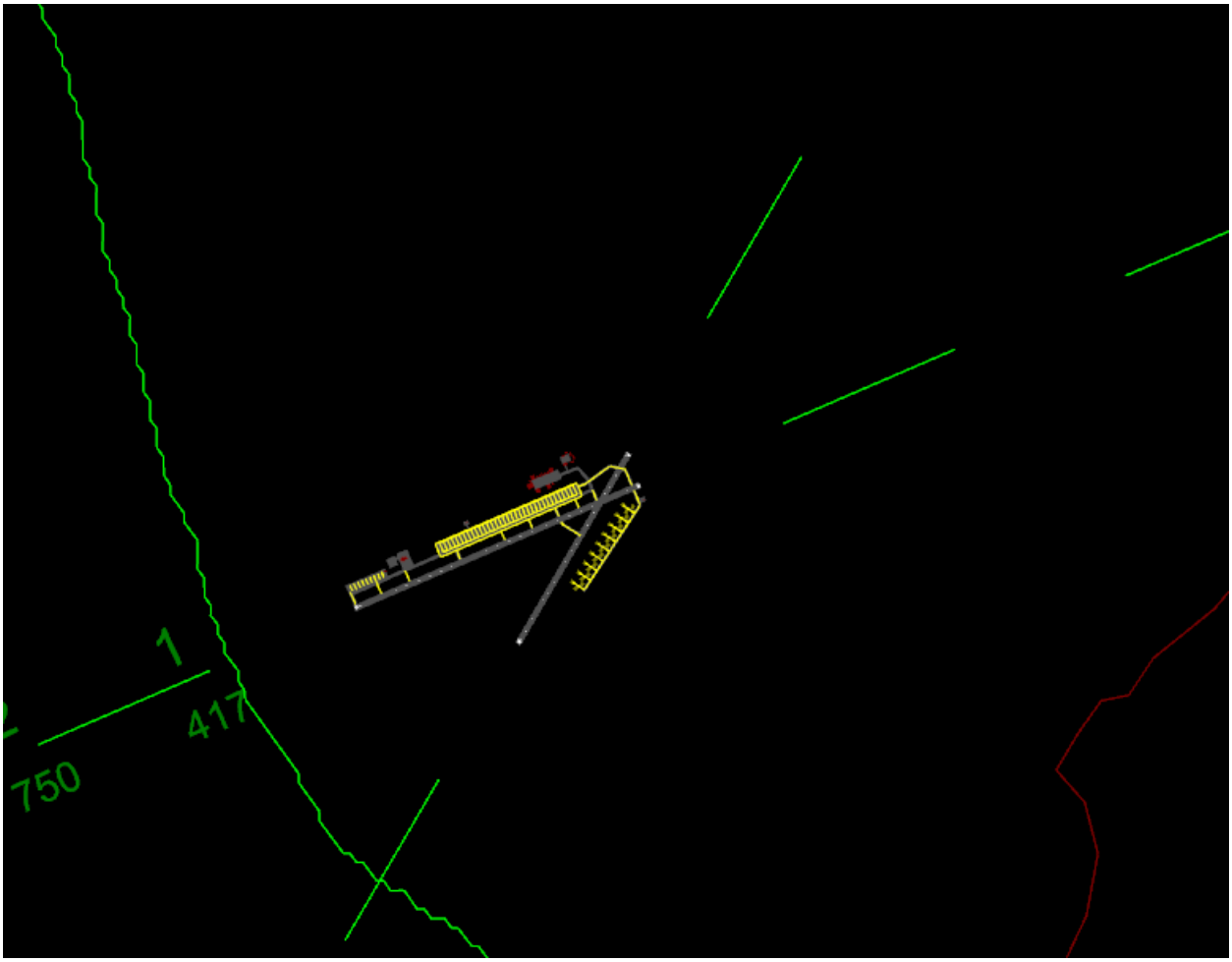
To change the map scale, move first the mouse cursor to the location which shall become the center of the screen. Then move the scroll wheel. You will notice, that the wheel forward movement causes a

‘zoom in’ and the ‘wheel backward’ causes a ‘zoom out’. The map is moved so that the location of the cursor jumps to the screen center.

Another method is to define a rectangle with Ctrl+left mouse button down.

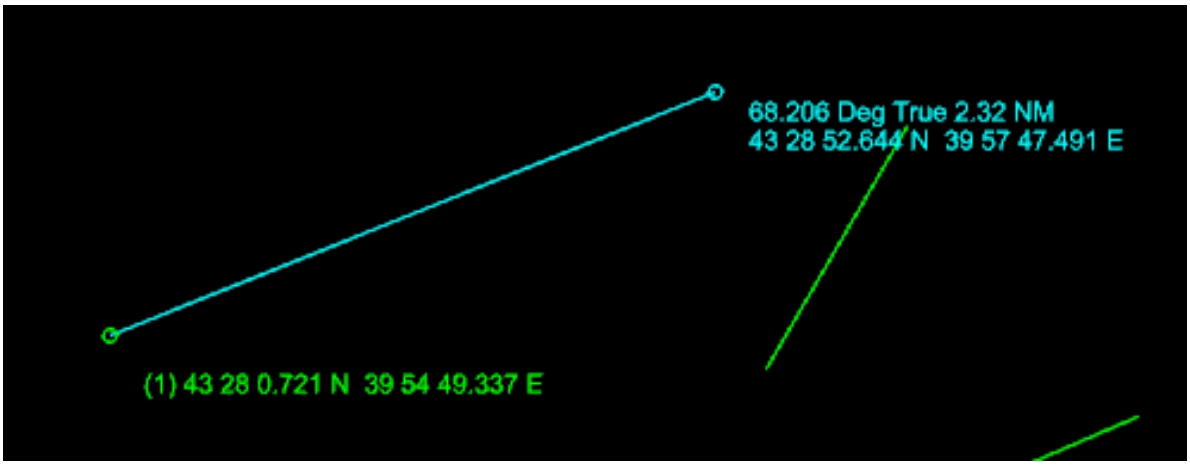


The resulting screen will then fit in the window's dimension:

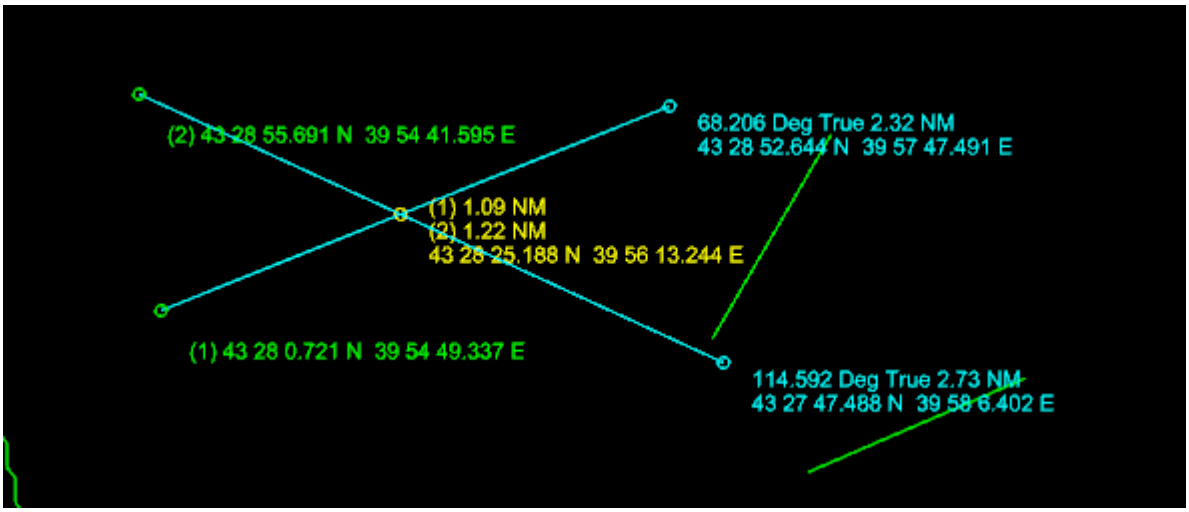


Distance line (ruler)

To measure distances and directions, a ruler is available. The ruler can be activated with Shift+left mouse button down. The first click sets the begin of the ruler and a second click with Shift+left mouse button down defines the end position of the ruler. A double click onto the ruler line deletes the ruler.



If two ruler line cross each other, the cross point is even labeled:



Up to 64 ruler can be handled at a time.

FPN67

The FPN67 is a fully digitized precision approach radar. It is a 1:1 simulation of the ATNAVICS FPN67 used by the US Air Force and Army. Most of the functions of the real PAR are supported. The details will be described in a separate manual.

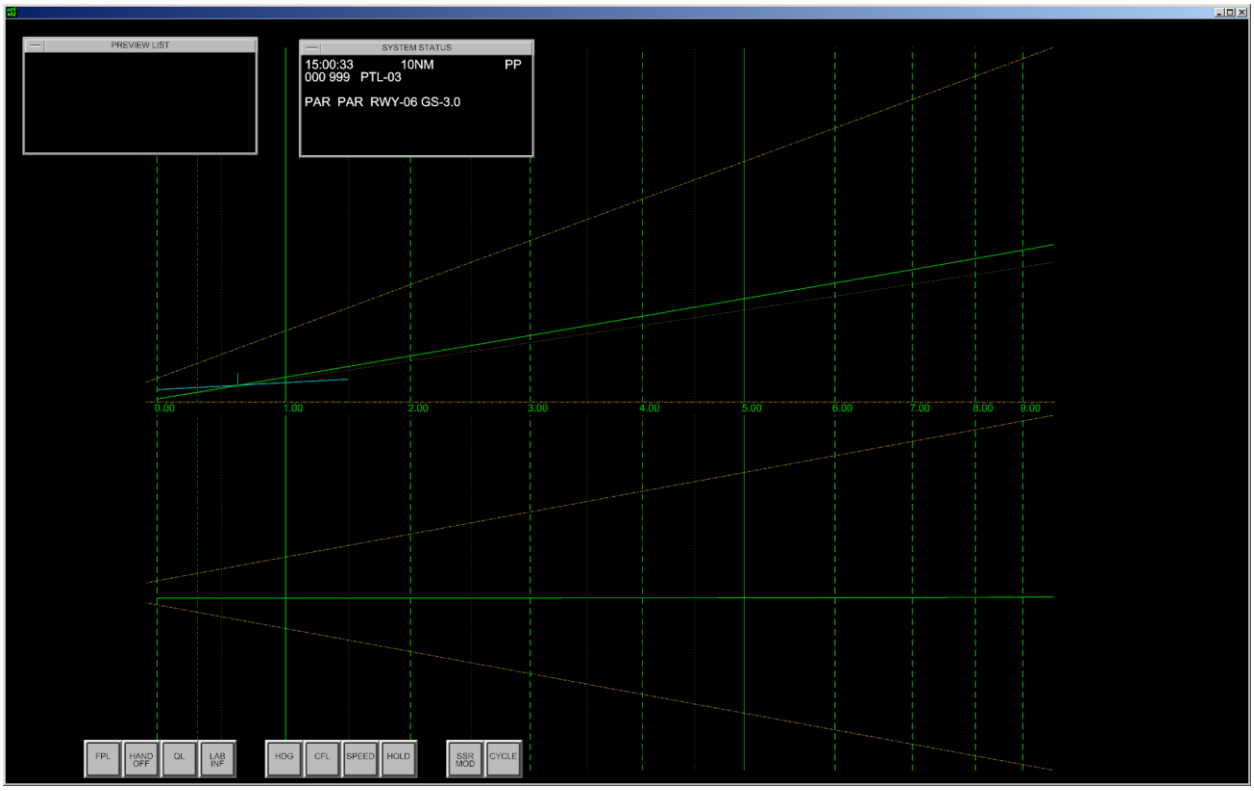


Figure 16 FPN67 screen

The image shows the glide path in the upper in the upper half and the final centerline in the lower half. For a basic use, nothing needs to be configured or adjusted.

To be continued…