

CHALK RIVER GRAPHICS

# CrgSim Nav Display

---

## Installation and User's Guide

Nov 9, 2016

## Table of Contents

Installation.....	3
NAV Display - Captain's Side.....	3
NAV Display - First Officer's Side.....	3
Configuration.....	3
Example Nav Displays.....	8
NAV Display - First Officer's Side.....	18
Standby RMI Display (737 Style).....	18
Nav Display TCAS Notes.....	20
TCAS Aircraft Marker Display Notes:.....	21
Nav Touch Screen.....	22
Contact.....	24

# Installation

## NAV Display – Captain's Side

Copy the NAVLeft folder to the destination computer and start crgnavl.exe. A screen similar to that below (except with a different range and set of airports) will start up. How to modify the range and other display options will be covered in more detail below.

## NAV Display – First Officer's Side

Copy the NAVRight folder to the destination computer and start crgnavr.exe. A screen similar to that below (except with a different range and set of airports) will start up. How to modify the range and other display options will be covered in more detail below.

## Configuration

On startup **each instrument** reads a configuration file to determine size and location of the display as well as other optional parameters. Parameters are listed in the display configuration file (crgnavl.cfg or crgnavr.cfg) as parameter name/parameter value pairs. The parameter names are case insensitive.

Usually the configuration files will have to be opened and manually modified. The are saved from information on the setup screen.

To modify the instrument screen location and size select the instrument (click on it) and press F2. This will change the display and it will look like the image below.



Use the + and - keys to adjust the instrument size and the direction arrows to move the instrument to the desired location. Press F3 to save the new instrument size and location. You can also select to display or not display the bezel at this time. Pressing the "b" key toggles the bezel display. Be sure to press F3 to save your new bezel selection. Press F2 to go back to the normal instrument display.

The number of pixels the window is moved or re-sized with one keystroke can be changed by pressing a number key 1 through 9. For example: to move the window one pixel at a time press 1 before using the direction keys. Then each press of a direction key will move the instrument one pixel. To move the window 9 pixels at a time press 9 before using the direction keys. Each press of a direction key will then move the window 9 pixels.

The instruments were tested within a range of sizes centered around 700 pixels. You should be able to vary this size with the configuration file from 550 pixels to 950 pixels and still have a nice look and feel. Fonts on sizes below 550 pixels will not look as nice. This size range should provide a prototypical physical size when used with many (if not most) displays.

The instruments are expected to be relatively square when viewed on screen. Circles will appear out of round on a display that is not square. This is especially noticeable with the Nav Display. Minor adjustments to the window height and width parameters in the configuration file should allow for deviations of pixel width to pixel height for your specific display.

When F3 is pressed the configuration information is saved in a configuration file in the same directory as the instrument.

Common parameters are:

- **Winx** - the X location of the left side of the window.
- **Winy** - the Y location of the top of the instrument window.
- **Width** - the width of the instrument window
- **Height** - the height of the instrument window.
- **Bezel** - Include or exclude the bezel around the instrument (yes or no). If you integrate the instruments into your forward instrument panel behind your own physical bezel you may want to exclude the displayed bezel to give you more flexibility in integrating the instruments into your panel.
- **Ip** - override IP address (see communications)
- **Mask** - override IP mask (see communications)
- **navstby** - display the standby instrument associated with this display. See the section below titled **Standby RMI**

**Note:** The height and width of the Nav display must be the same to have a round compass. If they are not the same the compass circle will wobble as it rotates.

For example an instrument 10 pixels from the left on your screen, 10 pixels from the top of the screen with a height and width of 740 and 747 respectively would have the following parameters in the configuration file:

```
winx      10
winy      10
width     740
height    747
```

**Bezel** is an optional parameter, the default is to display the bezel. To exclude the bezel add the following line to the instrument configuration file:

```
bezel no
```

Comment lines may be used in the configuration file, they are started with the characters **//** **followed by a space** before the comment:

```
// This is a comment.
```

The lab computer with the instrument displays has two small 15 inch LCD screen connected to the computer with a VGA cables. The screen background is set to BLACK using the windows Control Panel, personalization function. The Nav Display occupies the right side of the one screen, the left side of the screen is occupied by the PFD display. The location parameters in the configuration file for our ND look like:

```
winx 1610
winy 13
width 740
height 740
bezel no
```

## Example Nav Displays



In the Nav Display above (expanded map mode) the aircraft has just reached the PYNON waypoint in the flight plan and is turning toward the waypoint HIPPE. HIPPE is located 32.6 NM away and should be reached at approximately 1624 zulu. Nav 1 is tuned to FCS which is 12.2 KM away, Nav 2 is tuned to PUB located 15.7 miles away.



The thicker arrow pointer around 138 degrees on the compass points to the PUB VOR. The thinner arrow tail at 136 degrees points to FCS 180 degrees away from the tail. True air speed is 277 knots and there is a 21 knot wind at 270 degrees at this location. The blue circles are airports. The next waypoint and flight path are magenta. In a real system all active waypoints on the flight path as well as the entire flight path are displayed in magenta.



The image above shows a number of waypoints in the Nav Display in the expanded range circle mode. The aircraft is enroute to PYNON. The display has 10 NM as the selected range.

At startup crgnavl.exe and crgnavr.exe begin a one time scan of the data base looking for objects within range of the aircraft. It may take 10 seconds or so at startup for the display to become fully populated.

After the initial scan, there is no delay on locating the displayable objects on the screen when the range and/or display content is changed.

Objects beyond 100 NM are not displayed even when the Nav display range is wider. Longer flight plans will, however, display on the wider ranges along with the names of each flight plan point.

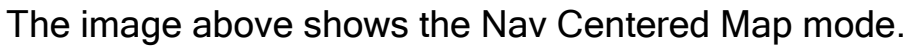
Many Nav displays are congested when showing waypoints. The waypoint names overlap one another. To help alleviate this problem the CrgSim Nav display will alternate the display of many of the names when they overlap. Not all overlapped names are eliminated but enough of them to dramatically improve the usability of the waypoint display. To turn on/off this feature select the Nav Display and press the “d” key. (It is on by default in the crgnavl.cfg)

You can change the Nav Display ranges, modes, OBS directions, ADF/VOR switch positions, and the type of objects displayed (airports, nav aids, or waypoints) by using the Nav Display window in the Utility Module. With the Utilities - Nav Display window each Nav Display can be separately configured for flight. If you have a GoFlight as part of your system these changes can be made on the GoFlight EFIS.



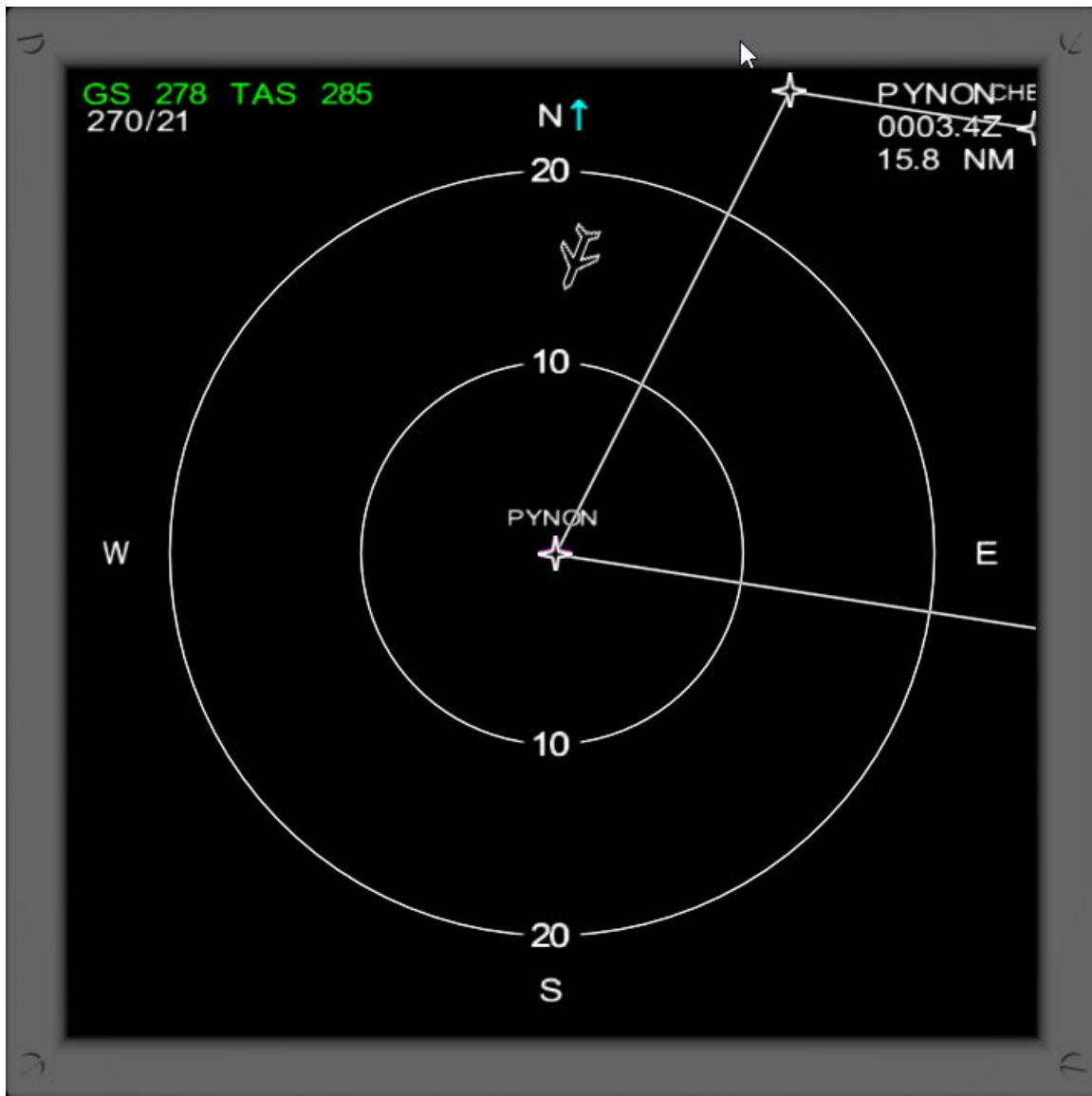
This is the Nav Display in the expanded VOR mode. Two VORs are being received by the radios. The pilot Nav display shows Nav1 in the upper right on the screen and the pilot selected radial to fly along with the deviation from the selected radial. The first officer's display is similar except that it shows OBS 2 and the VOR tuned by Nav 2 (if any) at the upper right.

There is a 4<sup>th</sup> mode that can be used when ILS signals are present that displays the localizer and glide slope information.





The image above shows the Nav centered VOR mode.



The Plan Mode is centered around the active flight plan point. If no flight plan is loaded or if no flight plan point is active this mode will display "NO ACTIVE FLIGHT PLAN". North is always up and if the aircraft is within the Nav Display range it's location will show as a small aircraft outline. In the display above the aircraft is about 15 NM north of the next waypoint (PYNON). The flight plan is called "circle" in the distribution. If LNAV and VNAV are activated and this flight plan is loaded the aircraft will fly around the flight plan path until fuel is exhausted. PYNON is the first and last point in the flight plan.



When a ground station transmitting VOR radials is within the Nav Display range and the signal is being received by the FSX/P3D system, the ground station will display as above showing radials and their reciprocals for the values on the MCP right and left OBS/Course entries. The ground station above is the Black Forest VOR/DME located about 10 miles North East of the Colorado Springs airport.





Above screen shows the Nav Display in expanded App mode with both radios tuned to IOUF at KDEN, about 8 NM out. When in the approach mode and neither radio has a signal with ILS content the test "NO ILS SIGNAL" is displayed on the screen.

## NAV Display – First Officer's Side

The First Officer's Nav Display (NAVRight) is set up similar to the captain's Nav Display.

To start up the First Officer's Nav copy the NAVRight folder to the destination computer and test as described above for the Captain's Nav Display.

## Standby RMI Display (737 Style)

Each Nav display (Captain and First Officer) has an optional RMI gauge that can be displayed.



To display the gauge add the following line to the Nav Display configuration file:

**navstby**                **yes**

Like the rest of the CrgSim instruments each RMI gauge has it's own configuration file.

Captain's RMI display                crgnavstbyl.config

First Officer's RMI                crgnavstbyr.config

The RMI gauge configuration file has the usual parameters:

winx	screen x location
winy	screen y location
height	number of pixels height
width	number of pixels width
bezel	display bezel yes or no

There is one additional RMI specific parameter:

showknobs	show the ADF/VOR knobs at the bottom of the gauge. If the gauge is displayed behind a cutout in the MIP then this will probably be NO.
-----------	--

## Nav Display TCAS Notes

The Traffic Collision Avoidance System (TCAS) warnings in CrgSim are different than in the real world system:

In the table below the horizontal legend is the altitude separation between the aircraft, the vertical legend is the horizontal distance separation between the aircraft. The table cells contain the TCAS symbol displayed in CrgSim TCAS.

		<3000	<2000	<1000
	>3000	>2000	>1000	
10 > Dist	Info	Info	Info	Info
6 >Dist<10	Info	Info	Info	Prox
4 >Dist < 6	Info	Prox	Prox	Alert
2 >Dist < 2	Prox	Prox	Alert	Alert
Dist < 2	Prox	Alert	Alarm	Alarm

- Info - a cyan diamond
- Prox - a filled magenta diamond
- Alert - an amber/yellow filled circle
- Alarm - a red filled box

## TCAS Aircraft Marker Display Notes:

- If an aircraft is greater than 5000 feet in altitude separation or greater than 10 NM distance from yours no altitude separation will be displayed above/below the aircraft marker.
- Aircraft less than 5000 feet above your aircraft will have the altitude separation displayed above the aircraft marker. For example: an aircraft 3330 feet above will have +33 displayed above the aircraft marker.
- Aircraft less than 5000 feet below your aircraft will have the altitude separation displayed below the aircraft marker. For example: an aircraft 2740 feet below will have -27 displayed below the aircraft marker.
- If an aircraft is climbing an up arrow will display to the right of the aircraft marker.
- If an aircraft is descending a down arrow will display to the right of the aircraft marker.
- If the highest traffic warning on the screen is ALARM the word "TRAFFIC" will be displayed in RED.
- If the highest traffic warning on the screen is ALERT the word "TRAFFIC" will be displayed in amber/yellow/
- TFC will be displayed in the lower left part of the Nav Display Screen indicating that TCAS on "ON".

## Nav Touch Screen

There is a set of virtual buttons that overlay the Nav Displays that allow you to select range, mode, and centering with a touch screen.

Imagine that the Nav Screen is divided into 9 areas:

1	2	3
4	5	6
7	8	9

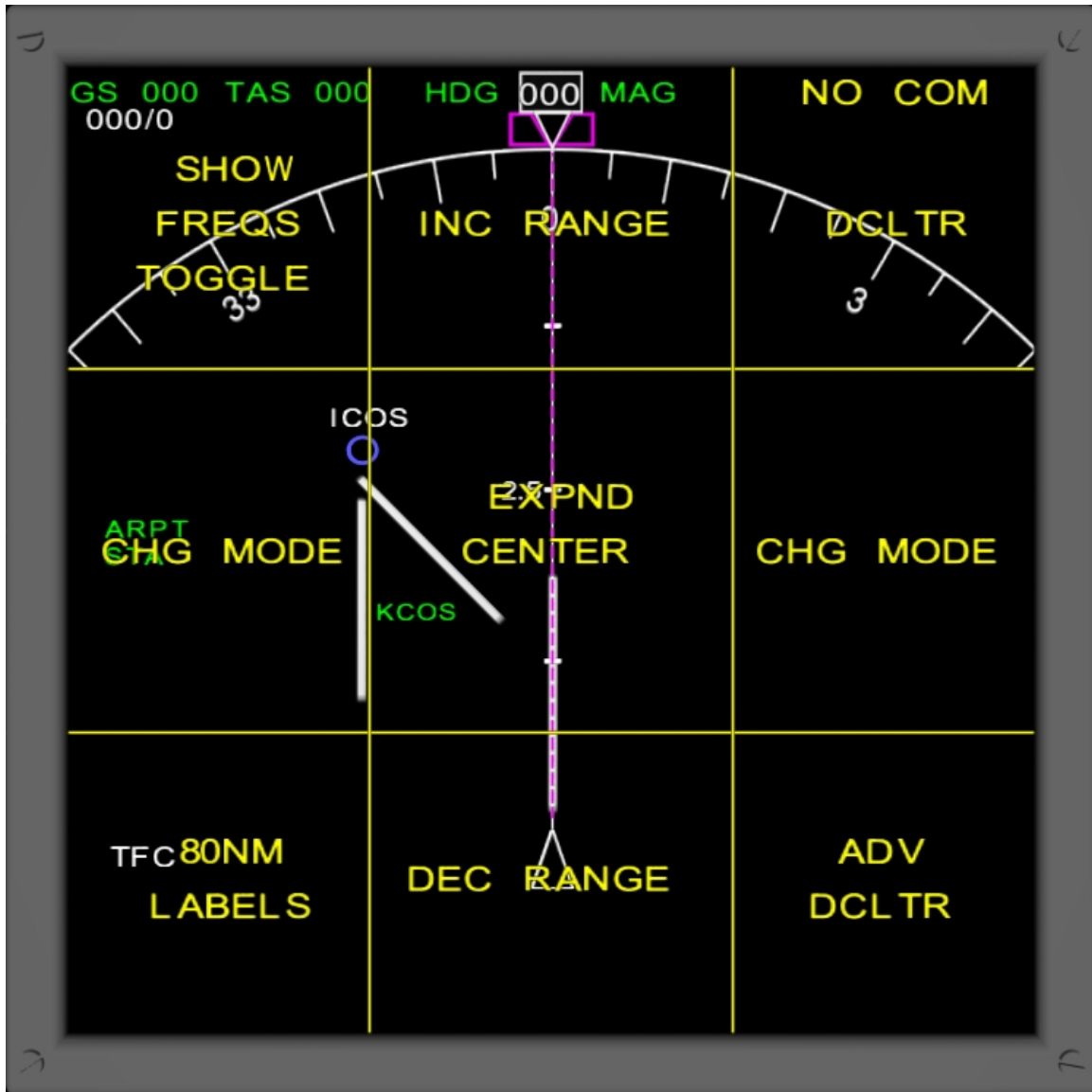
Consider each area a virtual button with the following assignments:

- 1 - Toggle display of station frequencies instead of names
- 2 - zoom out
- 3 - Toggle decluttering mode
- 4 - change Nav Display mode
- 5 - toggle centering mode
- 6 - change Nav Display mode
- 7 - toggle show labels at 80 km range
- 8 - zoom in
- 9 - toggle advanced decluttering mode

So to zoom out just touch the area on the screen labeled 2. To toggle centering mode touch the area labeled 5.

Of course a regular mouse click to a non-touch screen works as well.

When the Nav display is clicked on or touched (windows touch screen) an overlay grid is displayed to show the area and key function.



The first touch/click turns on the overlay but selects no option. The next touch/click(s) will select options. The overlay will disappear after 2 seconds of no activity.

The overlay feature can be turned off by adding the following line in the Nav configuration options file:

```
showgrid off
```

## Contact

You can contact us at [sim30@crgsim.com](mailto:sim30@crgsim.com). We are especially interested in your comments, any problems you might have with the programs, and things that you like (or don't like) about them.

After spending a large amount of time removing non-flight sim posts (drugs, counterfeit boots, ... for sale) we reluctantly had to convert the web site to read only.