

GA Radio Stack

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INTRODUCTION

WHAT IS GA RADIO STACK?

G.A. Radio Stack is an application representing typical radio devices found in general and commercial aviation, intended for use in flying schools or flight simulation.

It can be used on the same pc as your flightsim ('FS' from now) software or on a networked *client* computer. The panel communicates with your flightsim via Pete Dowson's FSUIPC system: if you intend to use it on a networked pc, a registered copy of WideFS is required. (FSUIPC: <http://www.schiratti.com/dowson.html>)

To run using WideFS, simply install onto your client pc and ensure that WideFS is running prior to starting the program.

This first version has seven emulated devices, each modelled on Bendix-King designs. Although *Peix Software* has no link with the brand, they have been chosen just for their ease of use.

Devices currently included in the radio stack are:

- KM 24 - Audio panel
- KFC 225 - Autopilot – modified to include auto-throttle/airspeed hold & TOGA*
- KX 155 - (x2) Communications and navigation (COM / NAV)
- KN 62A - DME
- KR 87 - ADF
- KT 76C - Transponder

*n/b speed and throttle modifications are only operative if supported by FS in the aircraft being used.

The devices are designed to be as realistic as possible with all buttons being operative subject to the limitations of FS. Unsupported FS buttons are internally simulated, such as Timers or SBY Freq on ADF.

An *instructor mode* is included allowing its use without connection to FS that may be useful for training purposes.

Frequencies can be changed using a keyboard or mouse in a variety of ways. All values and states are saved in a file, and reloaded when application starts. The program does not use graphical specific acceleration, so it should work on low-spec computers.

Running the program automatically connects to the currently loaded aircraft with data being sent in both directions. Changing settings in the aircraft panel instruments will be detected by the radio stack and the display updated, and vice-versa. Should connection be lost while using WideFS, it will automatically attempt to reconnect every half-second.

The radio stack has a "panel" appearance and cannot be resized although it can be hidden. The basic design cannot be changed and as such the devices range from the audio panel at the top to the transponder (XPDR) at the bottom. As a result, if your screen resolution is lower than 1024 pixels vertically the lower section may be lost. A minimum resolution of 1280x1024 is therefore recommended. However, should the base of the unit be "lost" due to insufficient resolution, pressing "H" on the keyboard will toggle a shift in the panel moving it upwards so the bottom can be seen. Hitting "H" again, returns it to its original position. Also, units can be excluded from the stack via the Options Screen: un-checking a device will remove it from the stack while checking the box next to a device, will return it to the stack.

The entire panel can also be moved using "Ctrl" + Drag with mouse – see below.

DEVICE DESCRIPTION

The order in which the devices appear, if activated, is fixed: see diagram.

	<p>Audio Panel & Markers</p>
	<p>Autopilot</p>
	<p>Communication & Navigation 1</p>
	<p>Communication & Navigation 2</p>
	<p>Distance Measurement Eq. (DME 1 & 2)</p>
	<p>Automatic Direction Finder (ADF)</p>
	<p>Transponder (XPDR)</p>

Note:

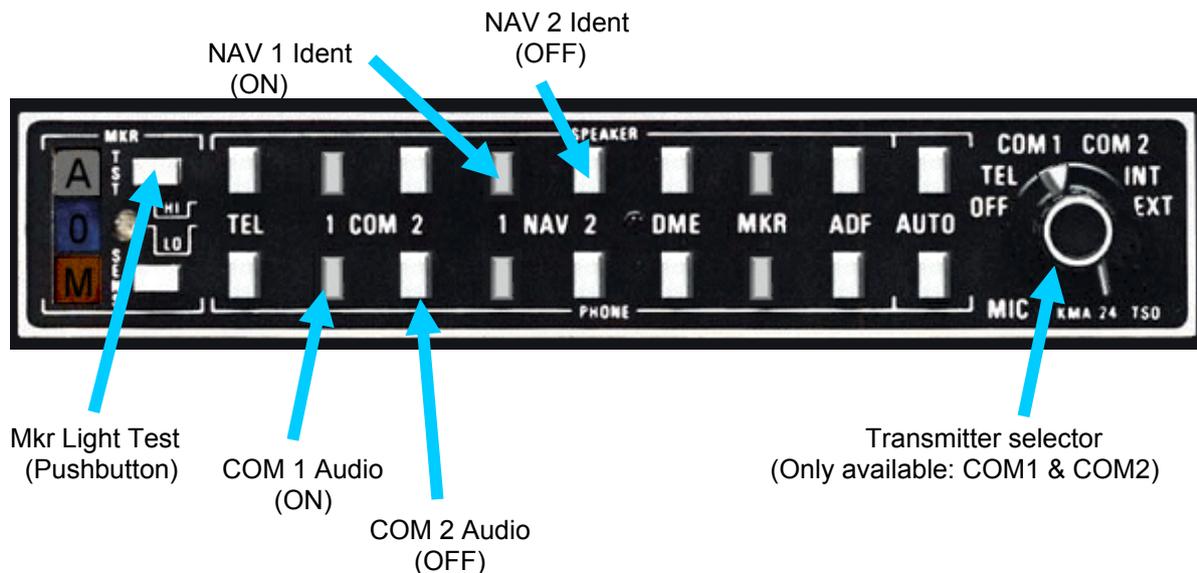
If the stack disappears try pressing "H" on your keyboard: this should maximize the window. The Options screen allows you to choose which devices are included along with the font and color of the text used.

Audio Panel and Markers

The user can select which audio channel to receive and transmit; it also includes an approach radiobeacon (marker) lights.

“Active” buttons are shown smaller and darker, to simulate the fact that they have been pressed. Speaker and Phone buttons are linked and will always be de/activated together, regardless of which is pressed first.

The picture shows some buttons pressed (ON) and some depressed (OFF)



TRANSMITTERS

The NAV1, NAV2, DME, MRK and ADF buttons are used to listen and identify the Morse code associated with the currently tuned station.

Important: To activate NAV1 or NAV2, it is mandatory that the "Ident" knobs in respective COM/NAV radios are pulled, otherwise it won't be activated. To make it easier, the Options screen allows for a "Linked" option that will automatically press the corresponding button in the audio panel when the Ident knobs on the radios are pulled.

OBLIGATORY SELECTION OF COM1 OR COM2

The transmitter channel (COM1 or COM2) is selected automatically as the received audio channel and cannot be deactivated (it is a FS restriction).

DUAL RECEPTION

It is permitted to activate both COM1 and COM2 audio, simultaneously.

NOTE: Not all the buttons work; inoperative buttons are: MKR Sens, TEL and AUTO. MIC switch only works with COM1 and COM2.

Autopilot (AP) 'Peix 225' type

This modified version shows (and allows modification of) values from the simulator's autopilot. It also provides information about active and armed modes as well as allowing control of the auto-throttle and speed. Some buttons only work with supporting aircraft - i.e: auto-throttle, YD and FD only works with planes that have it installed natively.

NOTE: The autopilot does nothing by itself; it merely sends to and receives from FS, the appropriate data, while FS handles the operation. As a result, GA Radio Stack may exhibit limited functionality with certain third-party addon aircraft depending on how complex the autopilot systems are and how much they deviate from the generic FS systems.

Therefore, although the default aircraft and most addon GA aircraft can be used successfully with the stack, more complex addon aircraft may not work at all or demonstrate limited functionality.



BUTTON DEFINITION:

1. - Yaw Damper: Switch it ON or OFF (If installed in aircraft being used).
2. - TOGA: Take Off/Go Around power set. Only works if auto-throttle is available.
3. - A/T: Auto-throttle, switches ON or OFF (if installed) and makes it active (not armed). Refer to SPD (15) button to select the speed before engaging the A/T. A boxed AT caption is lit on the annunciation panel (20) when engaged. It is independent of the AP Master Switch.
4. - AP Master Switch: Engage/Disengage the autopilot.
Boxed AP lit on annunciation panel (20) when ON.
5. - FD: Flight Director. switch ON or OFF (If installed).
6. - HDG: Heading mode. This follows the Directional Gyro's or HSI's "heading bug".
7. - GPS-NAV source switch. This changes between using nav data from GPS or NAV1.
8. - NAV: Navigation mode (VOR 1)
Arms the NAV mode to intercept and follow the selected radial on NAV1.
9. - APR: Approach mode (LOC or ILS)
This arms the APR mode, to intercept the Localizer and the Glide Slope (if available and the NAV radio is tuned to the ILS frequency).
Note: if HDG mode is active it will be replaced by APR mode when Localizer is captured and if ALT mode is active it will be replaced by the Glideslope.
10. - REV: Back course mode (Rev LOC).
It arms the reverse localizer capture to perform an outbound procedure turn to ILS.

11. - WLVL: Wing Leveler: Maintain the wings leveled
ROL is shown on active roll display (19).

12/13 - UP & DN: It is used to change the Vertical Speed (VS) or the Airplane Speed.

- If VS is visible [if not press VS button (17)] then UP & DN increases or decreases 100 ft respectively on every click. The mouse's button can be held to increase or decrease

- If SPD is visible [if not press SPD button(15)] then UP & DN increases or decreases the speed depending on which speed mode is selected (IAS or MACH). To change the selected speed mode push SPD again.

When IAS is active the change is 1 Kt per click, if MACH is active the change is 0.01 per click.

Note: the speed at which values change while holding a button down using left mouse, can be changed in the Options Screen.

14. - ALT Knob: Used to change the selected altitude. The mouse's cursor will change its form depending on which knob (inner or outer) is being adjusted. The outer knob changes the altitude in increments of 1000 ft (or 500 meters if metric mode) and the inner knob in increments of 100 ft (or 50 meters).

15. - SPD: Speed Selector: Changes from VS mode to SPD mode, and between IAS and MACH while in SPD mode. The visible selection (IAS or MCH) will be the active speed when A/T being engaged.

To change the speed values use the UP & DN buttons (12 & 13).

16. - ALT: Altitude Hold. This arms the altitude mode. If AP is engaged the plane will climb or descend to the desired altitude (shown on alt display (24)) at the selected vertical speed. If VS is not shown you can press VS button to show it. Vertical speed can be changed while Alt is engaged by pressing UP or DN buttons.

17. - VS: Vertical Speed: Shows the selected vertical speed. VS and FPM (or MPM) appears on VS display. The rate can be changed using UP or DN buttons.

DISPLAY:

18. - **Roll Armed Mode:** These can be NAV, APR, REV and GS (although it is Pitch mode). Armed modes also show a vertical ARM caption at its right position.

19. - **Roll Active Mode:** These can be ROL, HDG, NAV, APR and REV.

- o ROL = Wing Leveler active.
- o HDG= Heading mode active.
- o NAV = NAV1 Radial intercepted and following it.
- o APR = ILS Localizer captured.
- o REV = ILS localizer Back Course captured.

20. - **Annunciator:** This has two columns, left for AP options and right for A/T options.

- Left column can show the next options (usually boxed):

AP: Master AP switch is engaged.

YD: Yaw Damper is On.

FD: Flight Director is On.

- Right column can show (all boxed):

AT: Autothrottle is On.

TOGA: TOGA is On.

21. - **Pitch Active Mode:** this can be PIT, VS, ALT and GS.
 - PIT: Pitch is maintained (occurs when engage AP without any other mode)
 - VS: Altitude is armed but not yet attained; it is using VS to reach it.
 - ALT: Altitude is reached and hold.
 - GS: ILS Glide Slope is captured.
22. - **Pitch Armed Mode:** This can be ALT.
Armed modes also show a vertical ARM caption to the right.
23. - **Alert annunciator:** This label appears when the aircraft altitude is between 1000 ft and 200 ft of the desired altitude. It always occurs, even when AP is off or altitude hold is not active.
24. - **Altitude selected:** This is the desired altitude. It can be changed using the rotary knobs (14).
25. - **Vertical Speed and Aircraft Speed:** This display can show the Vertical Speed (a label with the word VS appears preceding the rate, and also FPM (or MPM) units), or the selected speed for auto-throttle: SPD appears preceding the speed. Units can be IAS or MCH - to swap press SPD button twice.

AUTOPILOT BUTTON ILLUMINATION



COLOR CODING:

1. - Light Yellow: Active. The current option is active.
2. - Light Gray: Inactive: The default value when the button is not pressed.
3. - Light Orange: Armed: The mode is armed, waiting to reach the objective. Once the armed mode is engaged it will change to Active color, and can deactivate other selection (i.e. HDG -> APR)

Armed modes can be: NAV, APR, REV and ALT.

The active modes that can be replaced are HDG and VS. Examples:

- HDG is active, APR is armed, ALT is active. When plane is approaching the ILS Localiser, the HDG light will extinguish, the APR will continue to be armed for a few seconds, and will then activate as the LOC is captured. ALT is active until the ILS Glideslope is captured, then ALT switches off as the GS is activated.

- ALT is active but not yet attained. While altitude is not yet reached, the active mode is automatically set to VS while ALT is only armed. It will change to active when the desired altitude is reached.

Step by step example (capturing an ILS with Cessna 182):



The plane is following the heading selected on the instrument's heading bug, APR is armed waiting to capture the ILS localizer, and ALT is armed because the plane is descending (and it follows the Vertical Speed). Alert appears due to current alt (2500ft) and selected alt (2000 ft) is less than 1000 ft to reach.



ILS Localizer is captured and altitude is reached (ALT is active); HDG has disappeared and APR is now in active mode, awaiting interception of the Glideslope.



ILS Glideslope is now captured. ALT mode is extinguished.



The same performed with Boeing 737 (or any aircraft with an Auto-throttle). With Auto-throttle and Flight director on and showing the selected approach speed. Remember, without an auto-throttle, as PiC you are responsible for managing the throttle to ensure efficient capture of the glideslope !

Autopilot (AP) *Generic model*

This is an easy to use generic version of auto pilot which more closely represents the default Learjet/Airliners. It has all the necessary buttons and knobs to control a flight. The only difference from the default FS system is that the IAS and MACH buttons are automatically engaged when A/T button is active and that it displays "armed" values only - the color of the buttons indicate whether a particular mode is active or not.



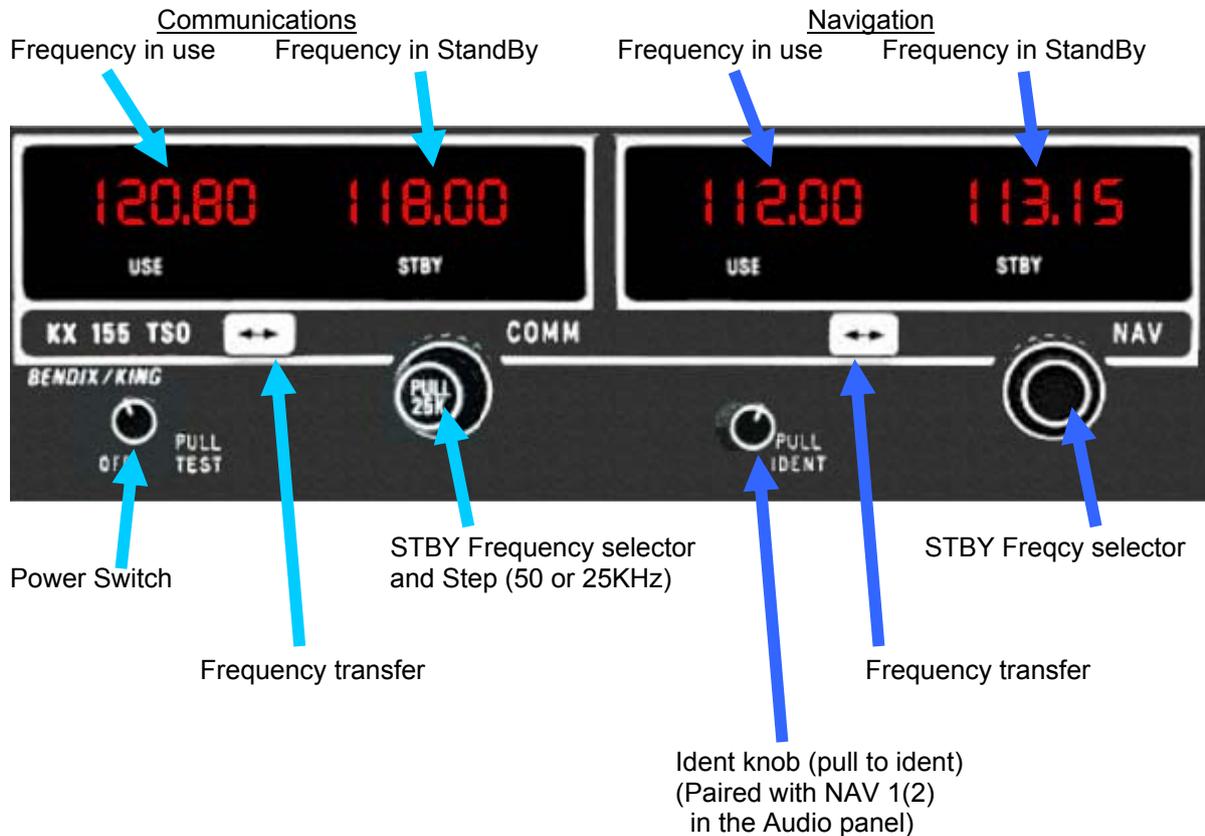
The illumination of the buttons is explained above (previous pages). Essentially there are three types of illumination: Off, Armed and Active - Active = yellow; Armed = orange.

To change the displayed values hover the mouse over the knobs; it will change to a curved arrow showing the direction of rotation: mid left to decrease and mid right to increase. Altitude selector has two knobs: the inner knob increases and decreases in steps of 100 ft (or 50m if meters is selected) and the outer knob changes in steps of 1000 ft (or 500m).

You can keep pressure on the mouse button depressed to auto-increase or decrease the setting. (The automatic change step for Spd, Hdg and Crs can be modified by user in the options screen)

Communications and Navigation

COM & NAV equipment is integrated in the one device and is 100% functional except "Pull Test". When entering values with the keyboard, a dash appears in the digit that waits to be changed.



CHANGING FREQUENCIES WITH MOUSE



There are hidden areas (here shown colored) that respond to mouse actions to change frequencies. The mouse cursor changes its form to curved arrows or a hand when it is over the click-spot.

The left zone decreases and the right increases the value. The red marked zone change the frequencies in steps of 1 MHz, and the green in steps of 50KHz or 25KHz, depending on the state of the pullable knob "Pull 25K". To Pull or Push the knob just click on the magenta area, a hand appears and it switches between Pull and Push on every click.

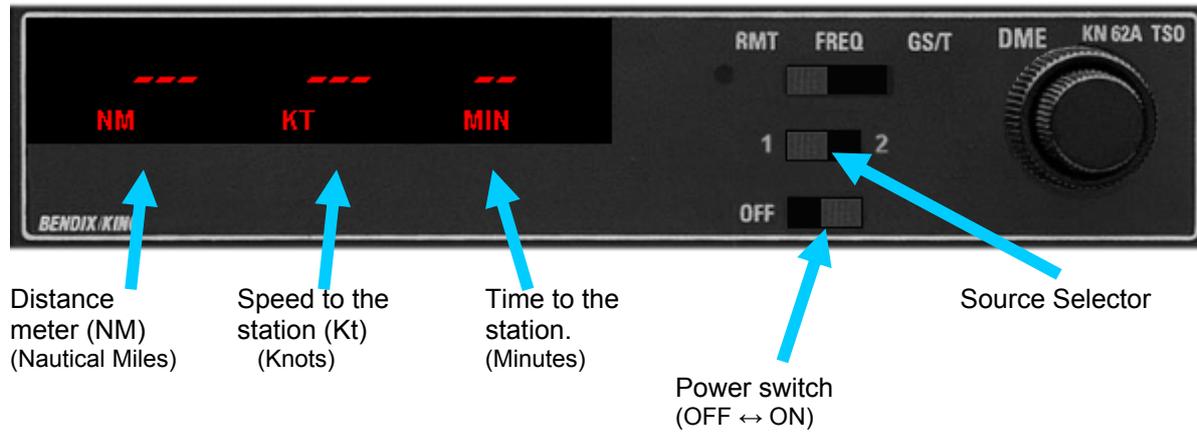
Quick change: If mouse is pressed and held, changes of frequency is made quickly. The rate of change can be adjusted in the options screen.

When the frequency reaches the max value it returns to the initial min value and vice-versa.

Distance Metering Equipment (DME)

This is a modified version to allow the user to choose between DME 1 or 2. Due to FS limitations, it always works in remote mode (RMT); that is, it always works paired with NAV 1 or 2 respectively. It will not work with an independent frequency.

If no signal from DME is received dashes appears on the screen.



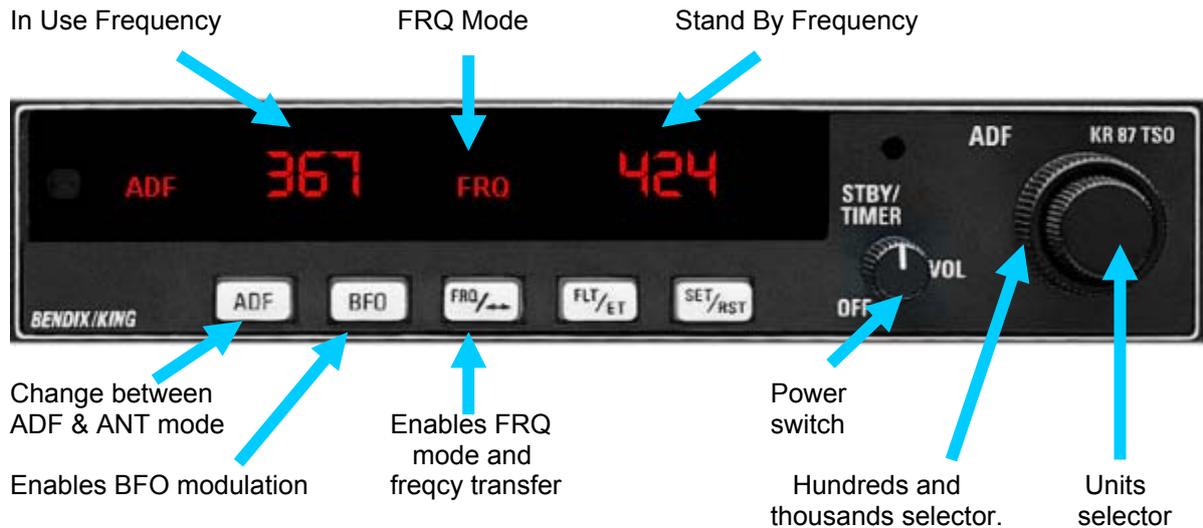
Automatic Direction Finder (ADF)

This is 100% functional; the ADF and BFO buttons are working but perform no actions. (FS does not allow the user to move the needle to 90° as would be usual in ANT mode ©).

Note: NO dash appears when frequency is changed in this device.

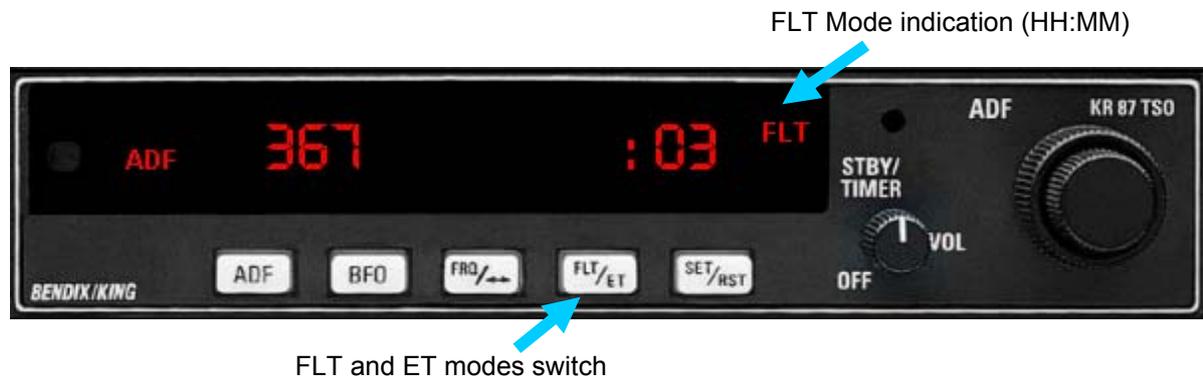
FREQUENCY MODE (FRQ)

In its main mode, it shows two frequencies: Used and Standby.



FLIGHT TIME MODE (FLT)

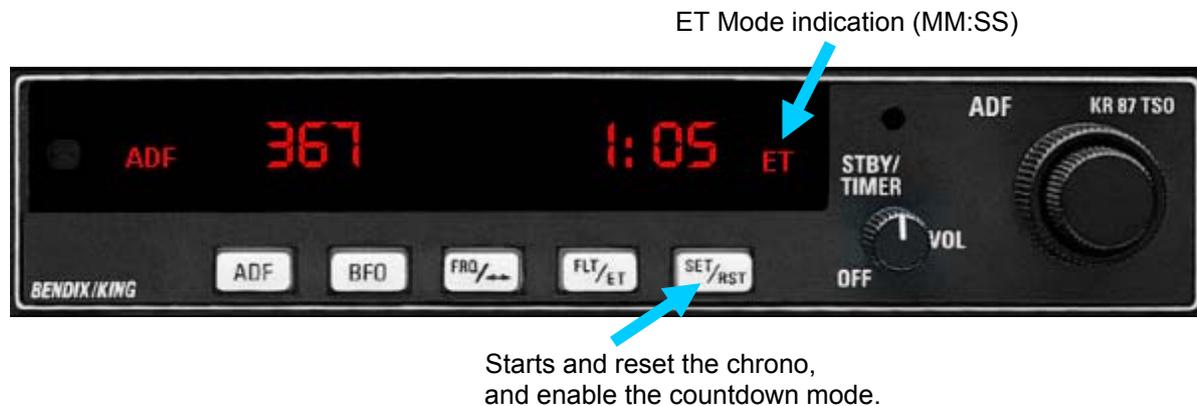
An internal chrono is started when the device is activated, and it counts both Hours and Minutes. It always works (in any mode) while the device is On.



(The picture shows 3 minutes in FLT mode)

CHRONO MODE - Elapsed Time (ET)

The ET mode allows a chrono with Minutes and Seconds (until 59:59). The chrono begins to count when you press SET/RST push button (also when other mode is selected) and returns to start every time SET/RST is pressed. Can not be stopped, always is reset to 0 and begins to count automatically.

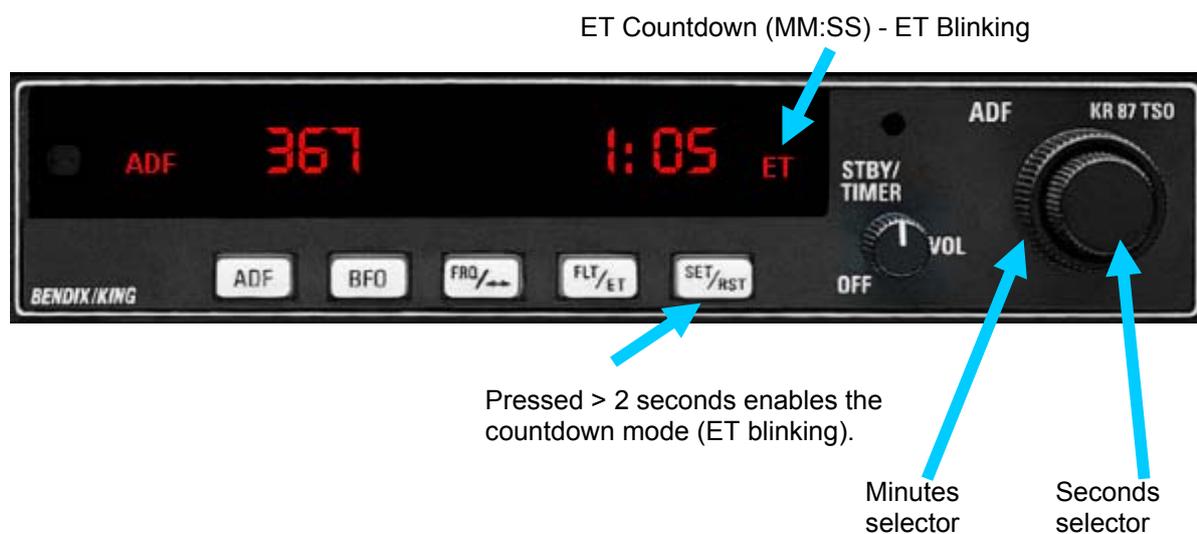


COUNTDOWN MODE (ET blinking).

A countdown of a maximum of 59 minutes, 59 seconds is allowed. To enter countdown mode, the SET/RST pushbutton must be pressed and maintained (with the mouse) for 2 seconds or longer, or until ET starts to blink.

Subsequently, you should select the initial time with the rotatory knobs, the big one to select the minutes and the small for the seconds, and press the SET/RST pushbutton to start the countdown.

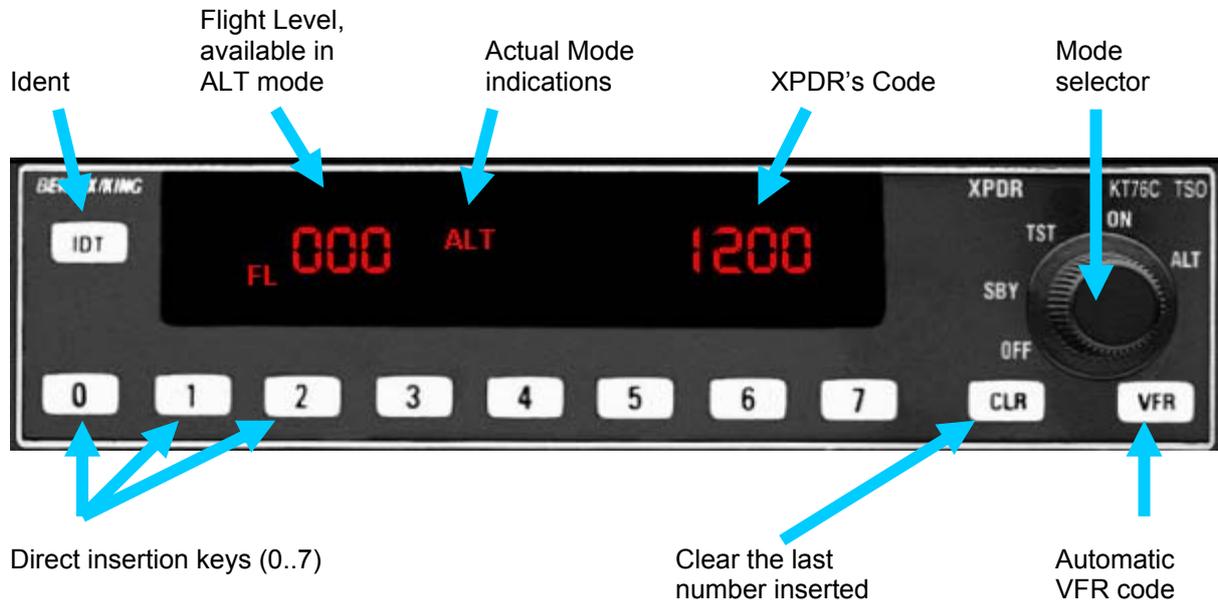
When the time reaches 0 the mode reverts to normal ET Mode and begins to count up, but to advise you of the time blinks for 15 seconds.



Transponder (XPDR)

100% functional including the flight level in ALT mode.

When inputting values with the keyboard, a dash appears in the digit that waits to be changed.



Mode selector:

This can be changed by pressing the caption (OFF, SBY, TST, ON, ALT) or with the rotatory knob. The mouse's cursor changes to a hand or an arrow depending its position near the knob. The selected mode appears lit on the screen (except OFF). The TST mode lights all indicators.

IDT: Simulated action showing the "R" caption for 18 seconds.

0 a 7: Direct entry of XPDR's code. Code is inserted sequentially; if the code is not completed in a reasonable time (more than 4 seconds from the last insertion) the code reverts to the last used code.

CLR: Clears the last digit inserted, waiting for a new entry, if it is pressed several times it going back until arriving at the beginning.

VFR: Puts automatically the VFR code predefined in the options screen.

Note: The SBY mode is only for instruction purposes as FS treats it as always-on.

WINDOW SCROLLING

To move the stack to another screen position, you must press and hold the CTRL key and then drag the stack to the desired place. The mouse's cursor will be change to four arrows to indicate the scrolling mode. The last position will be saved in the config file.



CTRL + Drag

KEYBOARD

A quick method to change the values is using the keyboard. To use this method, first you should select the device to change, and subsequently insert the numbers.

Devices selection keys:

KEY	device	KEY	device
C	COM 1	D	DME
V	COM 2	A	ADF
N	NAV 1	X	XPDR
M	NAV 2		

Other Keys:

KEY	ACTION
ESC, RETURN	Exits the manual input mode.
ESPACIO	Transfer the frequencies [<->] of the last selected device. *
P	Switch ON or OFF the last selected device.*
I	Enable/Disable the Instructor mode (Show an asterisc between the frequencies on com/nav devices when enabled).
H	Show/Hide the Audio Panel.
F	Transfer then frequencies of the device COM 1 [<->]
G	Transfer then frequencies of the device NAV 1 [<->]
J	Transfer then frequencies of the device COM2 [<->]
K	Transfer then frequencies of the device NAV 2 [<->]
Y	Push/Pull the NAV 1 ident knob.
U	Push/Pull the NAV 2 ident knob.
S	ADF's SET/RST Pushbutton (Only to start/reset the chrono, NOT to activate the countdown mode).
E	ADF's FLT/ET Pushbutton (Switch between FLT and ET mode).
Z	Engage/Disengage the Autopilot master switch.
+	Increase the STBY freq of the last selected device. *
-	Decrease the STBY freq of the last selected device. *
0 .. 9	Insert the values sequentially on the last selected device. *
Q	Show the options screen.

*** NOTE:** When changes are made with the mouse, that device remains active and will respond to keyboard inputs until another device is highlighted.

MANUAL INPUT: SEQUENCING

When a device is selected by keyboard, the digits change color to show that it is in manual input mode. Values are entered sequentially, except the COM/NAV devices where the first digit expected is the second one (assuming that the first digit is always 1). It shows a dash to help the user.

It is preferable to always enter the full frequency even if the numbers coincide.

COM/NAV:

The picture shows the acceptance order on COM/NAV device.



Example: To insert the freq 123.45 in STBY of COM 1, press: **C2345**
To increase COM1 STBY frq's by keyboard press: **C+++ (etc) Return**
This is valid for COM2, NAV1 & NAV2, with their corresponding initial KEY

ADF:

The order depends of the first digit inserted: if it is 1, it assumes that the frequency will have four digits, in other cases it assumes only three digits.

Examples: To insert the STBY frequency 367 in the ADF press: **A367**
To insert the STBY frequency 1234 in the ADF press: **A1234**
To increase one by one the ADF's STBY freq press: **A+++ (etc) Return**

XPDR:

The order is always from first to last.
It only allow numbers from 0 to 7.

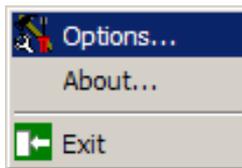
Example: To insert the code 1200 press: **X1200**

DME:

Only the source can be selected.

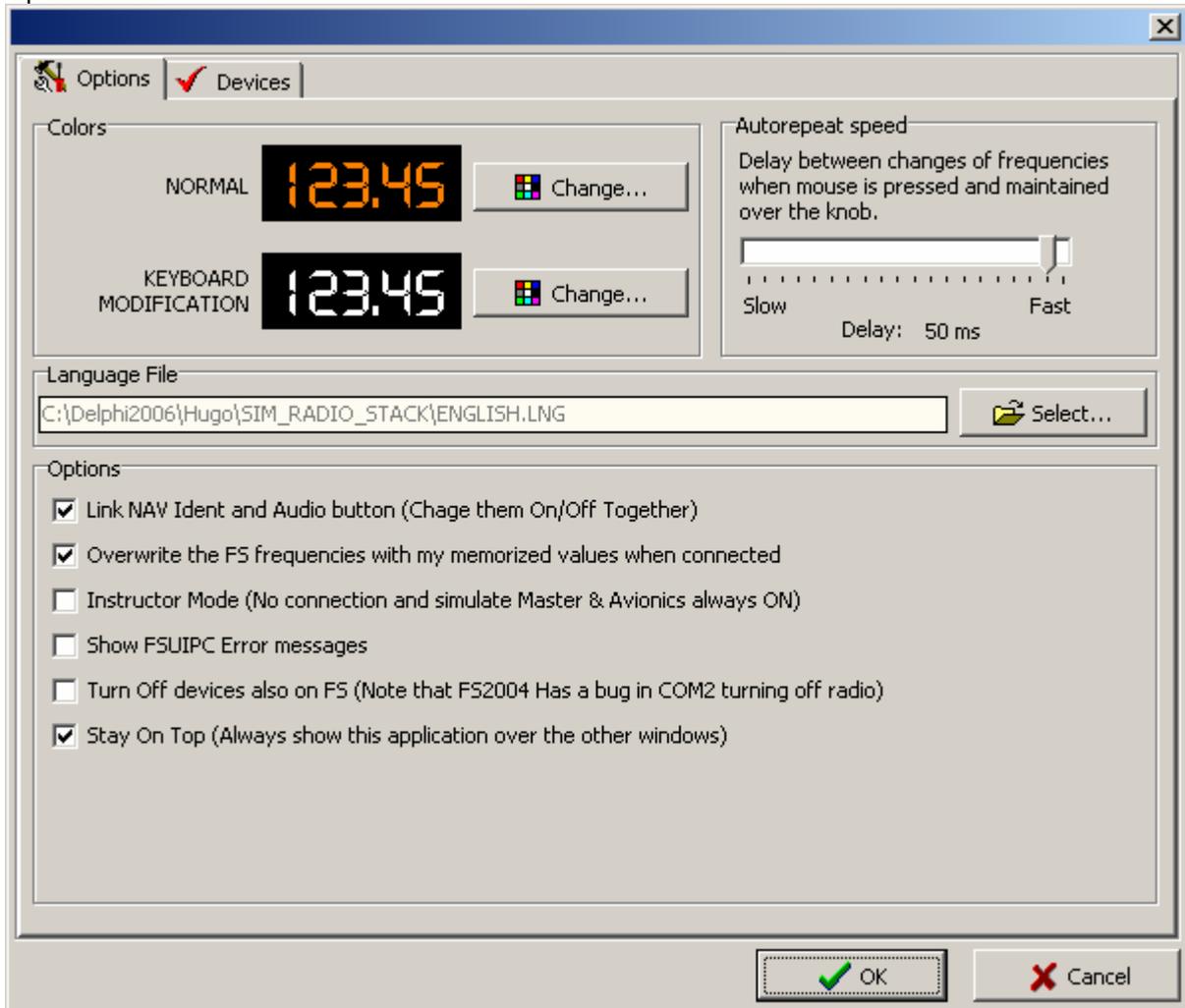
Examples: To select DME1 as source, press: **D1** o **D-**
To select DME2 as source, press: **D2** o **D+**

OPTIONS SCREEN



To show the options screen press the **O** key or use the secondary mouse button and select [Options...] when the context menu appears.

Options Tab:



COLORS

Allows you to change the colors of the screen displays.

To select another color press the button [Change...] and a color palette will appear.

NORMAL: Default color.

KEYBOARD MODIFICATION: This shows the color that appears when a device is selected by keyboard, and is ready to accept new values.

AUTO-REPEAT SPEED

This allows the time interval between automatic increments or decrements of frequencies, to be adjusted. This is done when the mouse button is pressed and held over any rotatory knob (valid for COM, NAV and ADF).

OPTIONS

■ **Link NAV Ident and Audio button:**

Link the "Pull Ident" knob of NAV devices with their corresponding buttons on Audio Panel, so when the knob is pulled automatically the NAV Audio is pressed and vice-versa.

If this option is unchecked the two buttons must be activated individually, which is realistic.

■ **Overwrite the FS frequencies with last-used values when connected**

This forces the last used frequencies to be transferred to FS overwriting those set in the aircraft. If unchecked, the program will be updated with the frequencies read directly from FS.

■ **Instructor Mode:**

Allows use of the radio stack without connection to FS. This option is useful to teach/learn the use of the radios. If a connection was established it will be disconnected and will work in stand alone operation. An asterix (*) will appear between frequencies on COM/NAV devices to indicate that this mode is active.

■ **Show FSUIPC Error messages:**

Shows at the bottom of the COM1 device a label with the connection errors sent by fsuipc or wideclient; if no errors occurred, the label is in any case hidden. If unchecked no error messages are shown.

■ **Turn Off devices also on FS:**

If checked, when a device is turned off also is turned off in FS. The FS2004 (at least in the Spanish version) has a bug with this option: when you turn off the COM1, FS also turns off the COM2, but when you turn off only the COM2, nothing happens. GA Radio Stack can not solve this issue.

■ **Stay On Top:**

Show the application always on top of other windows, even if inactive.

LANGUAGE FILE

It shows the path and the language file loaded. To change the file press the button [Select...], an Open Dialog will be appear to let you choose another file. The captions will be changed immediatly. As language files are editable, in case of erroneus data, the captions affected will be shown in English.

The language files are user editable (files with .LNG extension). You can create your own language file copying and editing an existing one. You should only change the phrases next to the equal sign = xxx.

Example:

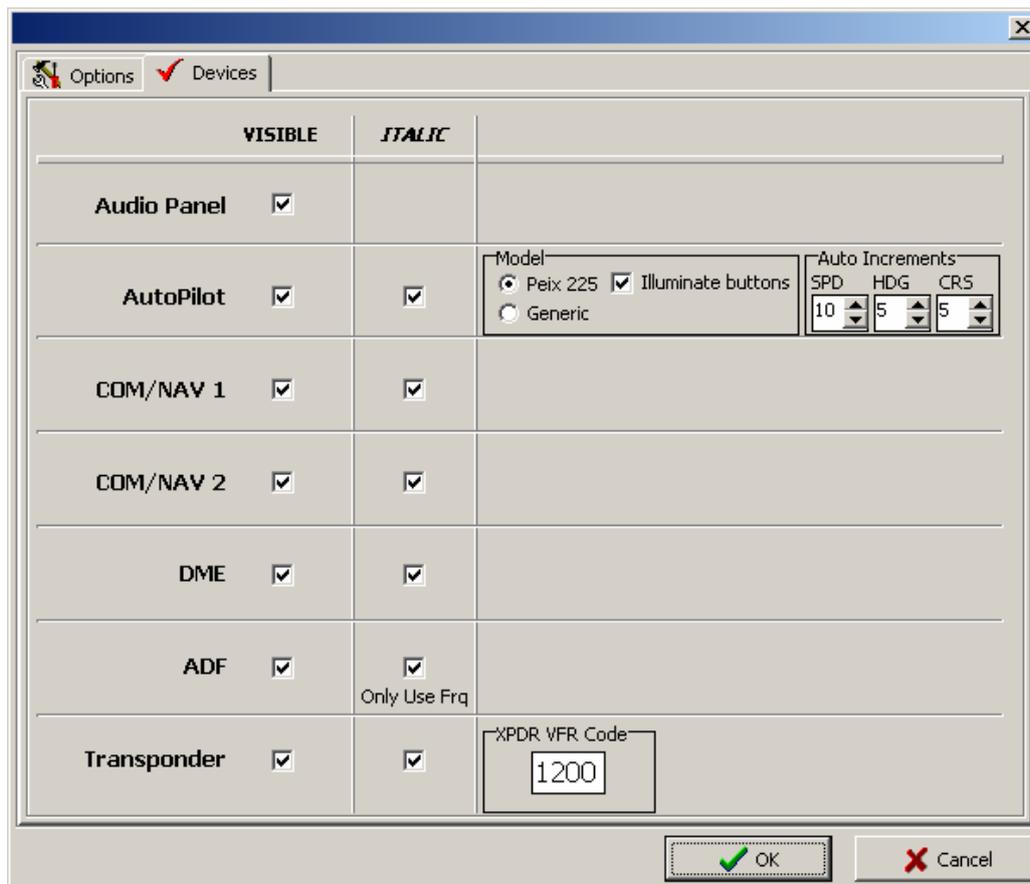
Original file:

[Menu]
Exit = Exit

New translation:

[Menu]
Exit = Salir

Devices Tab:



VISIBLE column

The checkboxes allow devices to be shown or hidden individually. It is useful if the screen resolution is not high enough to show all of the stack. In this case, the audio panel for example, can be hidden to let it show the transponder at the bottom of the screen.

Note: The devices are still working even being hidden.

ITALIC column

The checkboxes allows changing of the style of the display's font, showing them in normal or *italic* style. Note that ADF only changes the Use Freq; Standby freq cannot be in italic. The Peix 225 autopilot differs in terms of the additional modes offered: normal text = armed modes; italics = active modes.

Autopilot Model

Allows selection of 2 types of autopilot. The checkbox "illuminate buttons" allow illumination of buttons in Peix 225 model (redundant info) while the Generic AP always has illuminated buttons.

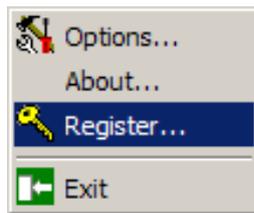
Auto Increments

Values are the automatically changed incrementally when mouse button is pressed and held over Spd, Hdg and Course knobs respectively.

XPDR VFR CODE

This code is entered into the transponder when VFR button is depressed.

REGISTER

A registration dialog box with a blue title bar and a close button. It contains a button labeled 'Click to buy at DIRECT - Paypal' with a globe icon. Below this is a section header: 'If you have already bought it insert the codes here:'. There are three input fields: 'Name' with the placeholder 'Your Full Name', 'E-Mail' with the placeholder 'youremail@here', and 'Registry Code' with the placeholder '1234567890'. At the bottom are two buttons: 'Register' with a green checkmark icon and 'Cancel' with a red X icon.

To register the program the registration code should be purchased. It can be obtained using Paypal redirected from the Peix Software web page, which opens in your web browser automatically when pressing the button [Click to buy at DIRECT - PayPal].

Once obtained , return to the registration screen and enter all the registration data as per the purchase details: Full name, e-mail address and the registration code. Press 'Register'.

The program will close and restart and the option "Register..." will have disappeared. If it continues appearing the option of registering it means that some of the data is incorrect.

SUGGESTION and COMMENTS

Please feel free to send your comments, suggestions or translations to improve the following versions to: ganel@terra.es

Thank you very much for your co-operation.