



Avionics Basics



Aim



To gain an understanding of the basic avionics functions featured in the C172 and other aircraft with similar avionic fit outs

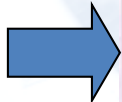


VHF Radios

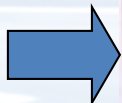


Many modern aircraft feature Dual VHF radio's, this allows the pilot to plan ahead minimising work load as well as increasing situational awareness. The left side of the Radio stack is the Communications side, the Right Side is the navigation side. During this presentation we will only be concentrating on the left side of the radio stack.

Comm 1



Comm 2

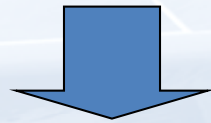




Function of the VHF Radio



Each radio has an active Radio frequency indicated by the word COMM



And a standby Frequency indicated by the word STBY



Function of the VHF Radio



Having a standby and active Frequency allows the pilot to tune a new frequency and have it ready without effecting the active frequency



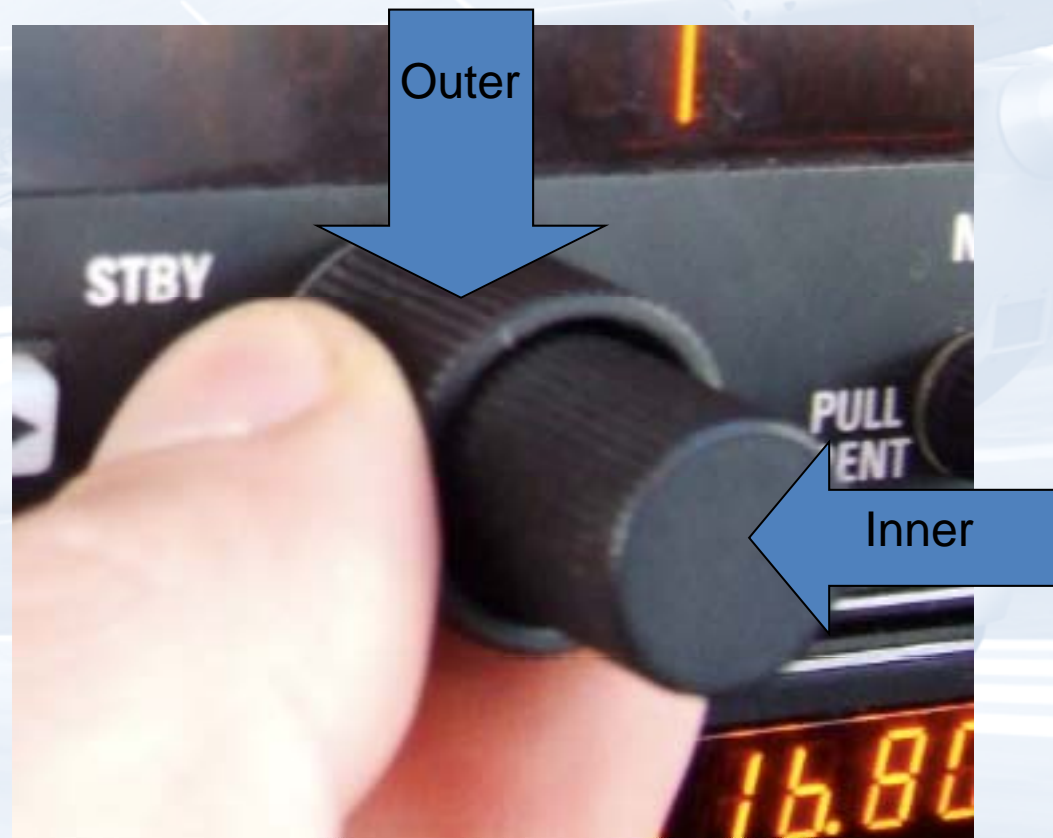
In order to swap the standby frequency over to the active frequency you push the toggle button above



Tuning a New Frequency



The standby frequency can be changed at any time by utilizing the inner and outer knobs





Tuning a New Frequency



The outer knob changes the number before the decimal place





Tuning a New Frequency



The inner knob changes the numbers after the decimal place





Tuning a New Frequency



When transmitting the radio will indicate TX





Tuning a New Frequency



When you are receiving a transmission RX will illuminate





Changing Volume



To increase the volume the pilot turns the volume knob clockwise, to decrease volume turn the knob anti clockwise. To test the selected volume gently pull the knob outwards and you will get a static noise at the selected volume.



Audio Selector



The audio panel controls what the pilot transmits and listens to

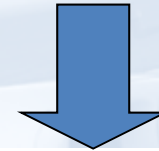




Audio Selector



The transmit function is controlled by the dial below, currently Comm 1 is selected





Audio Selector



When transmitting the Green transmit light will illuminate. This will indicate the transmit button is functioning correctly and can also alert you of a faulty button that is continually transmitting.



Audio Selector



The pilot can control what radio he is listening to by pushing the listen selection buttons below, once selected the button will illuminate to show which radio is being listened too.





Audio Selector



The Listen function will default to the radio that is selected on the transmit dial and cannot be turned off





Audio Selector



When comm 1 is selected the pilot has the ability to also listen to comm 2 by pushing the button above. This can be very useful allowing the pilot to check the ATIS for example and still be able to monitor tower or ground



Audio Selector



The pilot can also use the audio selector to identify navigation aids by pushing the relevant listen function. The graphic below shows us listening to comm 1 as well as also listening to the ADF.





ADF

The ADF short for 'Automatic Direction Finder' is a simple navigation aid that if used correctly can allow a pilot to track towards the tuned station it is the air component of the NDB





Tuning The ADF



The ADF will default to a FLT mode which times the flight time.





Tuning The ADF



To change to dual frequency mode push the FRQ button



Tuning The ADF



To view your flight time at any point push the FLT button



Tuning The ADF



In FRQ mode the ADF has a active frequency





Tuning The ADF



Like the Radio the ADF has a active frequency





Tuning The ADF



And a standby frequency





Tuning The ADF



You can change between the active and standby buttons by using the toggle button



Tuning The ADF



To change the Frequency much like the radio the operator uses the inner and out knobs. The outer knob changes the first number, the inner knob changes the 2nd, to change the third the inner knob must be gently pulled out before being rotated.





Tune, Identify and Test



Once the desired frequency has been tuned and toggled over to the active frequency it must be then identified and tested.





Tune, Identify and Test



Identifying means confirming that we have tuned the correct aid. On the chart where you found the Radio frequency it will also have Morse code which is a series of short or long beeps represented on the chart as small or long lines.





Tune, Identify and Test



By selecting ADF on the audio Selector you can listen to the audio being transmitted on the NDB frequency and then confirm you have tuned the correct Frequency by hearing the ATIS or by comparing it to the Morse code on the chart.





Tune, Identify and Test



In order to test the ADF, the indicated button must be depressed to get an ANT indication on the display. The needle in the 172's will then point towards the right wing. Once you have confirmed the needle moved the unit can be switched back to ADF mode.





Interpreting the ADF



The ground based component of the ADF is the NDB or non-directional beacon. If the ADF is tuned correctly the Needle will point towards the aerial, when taxiing the pilot should check the needle is operating in the normal sense. In the case below the aircrafts nose is pointing towards the station.





Interpreting the ADF



In this case the station is 60 degrees to the left of the nose of the aircraft

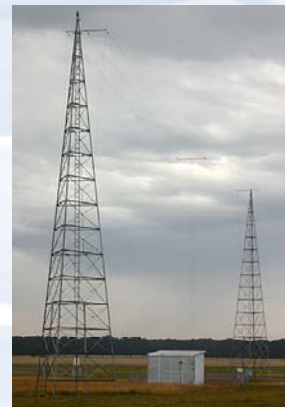




Interpreting the ADF



In this case the station is 15 degrees to the right of the tail of the aircraft





Simple ADF Homing



The simplest way to use an ADF is simple homing. If you maintain a heading that keeps the needle pointing towards the nose the aircraft may not fly a perfectly straight path however due to wind but it will eventually pass over the station





Transponder



A transponder is a device that returns a signal to a ground based radar system making the aircraft visible to the controller. As well as a basic return the transponder is capable of broadcasting altitude and a code.





Transponder Modes



The transponder can operate in several modes selected by the knob below.





Transponder Modes



The transponder is not functional when the knob is selected to off





Transponder Modes



Standby (SBY) powers the unit up and allows the operator to change the code without transmitting a return. The unit should always be put in this mode whenever the code is being changed to avoid accidentally transmitting an unintentional code.





Transponder Modes



TST or test mode lights up all possible parts of the display to allow the user to see if part of the display is unserviceable





Transponder Modes



The On mode transmits the aircrafts position and selected code but not the altitude





Transponder Modes



The Altitude (ALT) mode transmits the aircraft's position, code and altitude. The transponder should be set to altitude mode before the aircraft enters the runway unless instructed otherwise by ATC.





Transponder Code Operation



To make individual aircraft easier to identify when entering controlled airspace the controller will instruct you to 'Squawk' a code. When changing code the transponder must be put in 'SBY' mode. The operator then pushes the numbered keys on the lower portion of the unit to change the 'Squawk' code. Once the code is selected the transponder should be put back into ALT mode





Transponder Code Operation



When VFR aircraft are operating outside controlled airspace they are expected to Squawk 1200. If changing from another code to 1200, pushing the VFR button will automatically select code 1200. Because there is no possibility of selecting another code while the numbers are being changed the transponder can be left on ALT mode.





Transponder Ident Function



If a controller requests that you Squawk 'Ident' the pilot should push the ident (IDT) button. This highlights the aircraft to the controller without having to enter a specific code. If asked to Squawk a code YOU SHOULD NOT PUSH THE IDENT BUTTON.





Transponder Functions



If an error is made while entering a code the Clear button can be used to reset the code.





This on-line guide is for personal reference only and is not in any way designed or intended to be a substitute for individual manufacturers operating handbooks.

All efforts have been made to present information in an up to date and concise manner.

Any questions regarding the operation of your aircraft's radio's and navigational aids should be referred to your instructor.