



VIRGINIA FLIGHT SCHOOL SAFETY ARTICLES – NO 02/08/07

NOTES ON TRANSPONDER CODES

INTRODUCTION

The following notes are a very basic outline on transponders and the three principle modes or codes. It is intended as an introduction to new student pilots. It also outlines the basic operation of the new Mode S which might come into operation in South Africa sometime during 2008.

TRANSPONDER?

In high air traffic density areas, radar is used to identify different aircraft thereby enabling the controller to control all the aircraft in that particular airspace safely and effectively. A ground based radar, called a Secondary Surveillance Radar (SSR) sends out “interrogation signals which are responded to by an electronic device in the aircraft called a transponder. The type of information sent back to the SSR depends on the type of interrogation signal received by the transponder by the SSR.



TRANSPONDER CODES

A transponder responds in three ways, or sends three categories of information back to the SSR, according to the interrogation by the SSR. These are known as “Modes”.

Mode A. Prior to flying into controlled airspace where SSR is active, the pilot will receive a four digit “code” from the controller which he dials into the transponder in a similar way to selecting a frequency on the radio. This code is specific to a particular aircraft and no two aircraft will have the same code. When an interrogation signal is received by the transponder from the SSR, the transponder sends back the predesignated code, also known as “Squawk” to the SSR thereby enabling identification. This will be displayed as a “blip” on the controller’s radar screen but only indicates the horizontal position of the specific aircraft relative to other aircraft i.e. it is two dimensional.

Mode C. Mode C couples pressure information (altitude) about the aircraft to the mode A response. The controller now knows what pressure altitude the aircraft is at and he/she has a horizontal as well as a vertical location of the aircraft i.e. three dimensional. The controller can now control all the aircraft in the airspace to keep a minimum safe horizontal as well as a minimum safe vertical separation from each other.

Mode S. Mode S is a new mode that has recently been introduced and is mandatory in many countries when flying into SSR controlled airspace such as the European Union. Mode S has amongst others two notable functions :

- For the Controller. The permanent, unique identity of the aircraft is displayed on the controller’s screen thus it is virtually impossible for the controller to get “mixed up” between all the different blips on the radar screen.
- For the Pilot. A mode S transponder receives information from the SSR about proximate traffic which can be displayed on devices such as a GPS moving map display or a multi function display in the aircraft. The pilot then also has a “radar” picture of other traffic in the airspace in which he/she is flying.

FUTURE OF MODE S

There are currently three stations in South Africa which are inactive. It is envisaged to have Mode S mandatory in major controlled airspace areas in South Africa such as Johannesburg sometime in 2008.

REMARKS

A system is currently under development in the US whereby an aircraft will continuously transmit detailed information from it’s GPS to a ground station which will be displayed to the controller. It is possible that Mode S may become obsolete before it becomes universally mandatory!

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