Document Objectives / Requirements

This document is intended to:

- Explain what transponders are.
- Provide an understanding of what Squawk Codes are and why they are used.
- Explain correct usage of a transponder.

The Transponder

(short for ***Transmitter-responder*** and sometimes abbreviated to XPDR or XPNDR)

An aviation transponder is a piece of Radio equipment that transmits information from the aircraft to receiving stations (usually an Air Traffic Control unit or another aircraft's TCAS.)

There are 3 main different types of transponder that all transmit different information;

- *Mode A* – Position & Squawk Code only
- *Mode C* – Position, Squawk Code & Altitude Information
- *Mode S* – Position, Squawk Code, Altitude & Digital Information

The Mode A transponder will display on the radar a small target with only the 4 letter Squawk code for the controller to identify you with. Mode C will add altitude information to this target. Lastly the Mode S transponder can be used to draw varying information on a controller's radar display. This can include digital data to do with the aircraft, altitude, speed & callsign. Mode S is the most common system across modern airspace such as Europe & North America.

All mode transponders have the ability to "Ident." This is a small button that will cause the target on the radar screen to flash & display more overtly than other targets - the exact display varies from unit to unit but usually involves flashing and/or colours & words. When instructed to "Squawk Ident" by ATC you should press the ident button so that the controller associates the flashing target with your callsign.

Squawk Codes

Squawk codes are 4 digit octal numbers (the digits can be set at 0-7 inclusive, only.) Thus the lowest possible Squawk is 0000 and the highest is 7777. A Squawk of 7618, for example, is not valid because no number can be more than 7.

The code is a unique code assigned by Air Traffic Control Units. They are, usually, used to identify a callsign on the frequency with a target on the radar screen. This identification proccess is essential.

Many ATC units have "ranges" of Squawk Codes that they assign depending on type & destination of flight. These are, however, not particuarly important for pilots - the main thing is that you are able to use the assigned code when requested.

Transponder Usage

The phraseology for being assigned a Squawk code is simple:

ATC: *Skyways 123 Squawk 0472*
Pilot: *Roger, Squawk 0472 Skyways 123.*
**(Phraseology in FAA & other countries may vary.)*

When ATC is online, a Squawk code will always be issued with the IFR clearance.

On the ground, the transponder should be left on Stby (Standby) mode until lining up on the runway. On IVAO & VATSIM it is required practise to turn the transponder on (to mode TX, C or S) as you enter the runway. Similarily you should turn the transponder back off again (to mode Stby) when vacating the runway. This ensures it does not clutter the controller's radar screen.

When assigned a Squawk code in the air coming from outside controller airsapce, the pilot should change the Squawk code in the Radio Panel & ensure it is set to transmit without delay.