

# EUROCONTROL guidance notes for pilots

## 11. Getting the Most out of your Transponder



### AIRSPACE INFRINGEMENT

Controlled and restricted airspace is established to protect all aviators, not only those who are entitled to be inside it. Aircraft which stray into such airspace without complying with the requirements can cause serious disruption and possible danger. Such infringements are unfortunately common in the busiest areas of European airspace and require prompt action by ATC to avoid possible mid-air collisions.

under his control. This is much easier if aircraft are equipped with transponders and the equipment is correctly set. A correctly set transponder will also allow an aircraft equipped with TCAS (Traffic Alert and Collision Avoidance System) equipment to see an intruder and use it to avoid a collision.

Most aircraft are already equipped with transponders, for their own safety as well as that of others, so ***if your aircraft does***

enemy ones; military transponders are still used for this. The Mode A code, which can identify the aircraft to the radar controller, depends on settings made by the pilot, but information in other modes is transmitted automatically. Special transponder codes can also be used to draw the controller's attention to an emergency or abnormal situation.

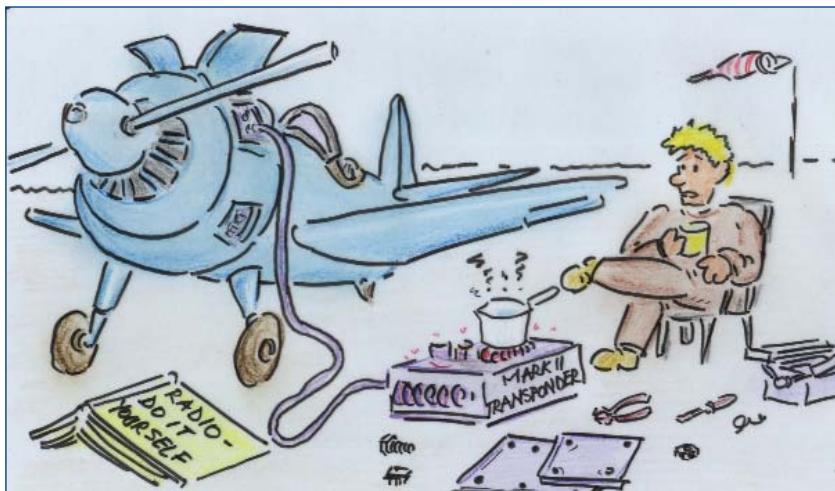
The transponder system is often referred to as Secondary Surveillance Radar (SSR). The secondary (transmitted by the transponder) signal is much stronger than the 'primary' signal reflected from the aircraft. SSR returns therefore show up more clearly on the radar screen, as well as allowing information to be transmitted in the code.

### TRANSPOUNDER MODES AND CODES

Transponders operate in various 'modes'. Some military modes are not available on commercial transponders. There are 3 modes used in civilian equipment:

**Mode A** is the basic mode which transmits whatever 4-digit code (squawk) the pilot selects. ATC will normally allocate a code to the aircraft either before takeoff or in flight.

**Mode C**, when selected, transmits an automatic signal equating to the aircraft's pressure altitude or Flight Level which the radar set or the controller can convert to altitude if necessary. The signal is independent of the aircraft's altimeter setting.



This is one of a series of Guidance Notes (GN) intended to help you keep out of trouble. The others are listed at the foot of the next page.

When an airspace infringement does occur, a controller may be able to prevent a dangerous situation from developing by passing avoiding action to the aircraft

***not have one - get one now, preferably of the latest type.***

### WHAT IS A TRANSPOUNDER?

A Transponder is an electronic component which transmits a coded signal when it receives an "interrogating" radar signal. Transponders were developed during war-time to identify friendly aircraft from

**Mode S** transmits 'selectively' only when the interrogating radar asks it to but can transmit a considerable amount of information about the aircraft. Mode S is mandatory equipment for IFR traffic, and for VFR traffic in designated airspace. That 'designated airspace' is published in an individual State's AIP (see GN 3).

**Ident** can be selected by the pilot (by pressing momentary a button) to send a doubled Mode A signal for a short time to aid positive identification when the controller requests it.

Controllers try to allocate different Mode A codes to different aircraft, although sometimes that is not possible and several aircraft will be allocated the same one. Certain codes are allocated for specific purposes and must only be used when these conditions apply. 7500 indicates hijack, 7600 loss of communication, and 7700 emergency.

Other codes are used for specific purposes in different geographical areas. In Europe, 2000 is generally used by aircraft which have not been assigned another specific code by ATC. The code 7000 shall be used by all aircraft not receiving ATS service. Therefore, **a VFR pilot flying outside controlled airspace should set 7000 on the transponder**. Again, refer to the AIP (see GN 3).

### TRANSPOUNDER OPERATION

Figure 1 illustrates a typical transponder in which codes are set by turning knobs; thumb wheels are used in some other equipment. The IDENT button can be

seen, and the main switch can select SBY (Standby - not transmitting), ON (transmitting the displayed code on Mode A only), ALT (Mode A and Mode C), or TST (Test, checking the internal circuits). To avoid transmitting an emergency code while changing selections, always switch temporarily to SBY until the new code has been set in the display.



Figure 1 - a typical transponder

Modern equipment such as the mode S transponder in figure 2 uses push-buttons. This design reduces the chance of accidentally transmitting an emergency code while making a routine change. The assigned code is simply typed in by pressing the relevant buttons.



Figure 2 - a modern transponder

The transponder should always be switched on, to ALT if fitted, with an appropriate code, even when it is not intended to contact a radar service. This provides information to controllers who are providing a service to other aircraft, and more importantly may guide TCAS equipped aircraft to take avoiding action should they appear to be on collision course.

### COMMUNICATIONS

The term "Squawk" is used to indicate the code to be selected, e.g.

"Cessna ABC, Control, Squawk 1250".

The pilot must read back all transponder codes, e.g.

"Squawk 1250, Cessna ABC".

The controller may also use expressions such as "Squawk Ident" or "Squawk Charlie" to instruct the pilot to select the "Ident" or "ALT" facility respectively; again, the pilot must confirm receipt of the message.

### HAVE A SAFE FLIGHT

We hope you have found this useful. If you have any suggestions for improvement, please let us know.

### OTHER GUIDANCE NOTES

1. Rules for VFR Flight
2. Flight preparation
3. Getting Aeronautical Information Before Flight
4. Getting Meteorological Information Before Flight
5. Using Meteorological Information for Planning
6. Visual Navigation
7. VOR / DME / ADF Navigation
8. GPS Navigation
9. Getting Aeronautical & Met Information In Flight
10. Entering Controlled Airspace
11. Getting the Most out of your Transponder

To get more copies, just send an email to: [alexander.krastev@eurocontrol.int](mailto:alexander.krastev@eurocontrol.int)

## WEBSITE **info** [www.eurocontrol.int/safety](http://www.eurocontrol.int/safety)

© European Organisation for the Safety of Air Navigation (EUROCONTROL) March 2009

This document is published by EUROCONTROL in the interests of exchange of information. It may be copied in whole or in part, providing that the copyright notice and disclaimer is included. The information contained in this document may not be modified without prior written permission from EUROCONTROL. EUROCONTROL makes no warranty, either implied or expressed, for the information contained in this document, neither does it assume any legal liability or responsibility for the accuracy, completeness or usefulness of this information.

Published by:

**EUROCONTROL Headquarters**

General Secretariat Directorate  
96, rue de la Fusée  
B - 1130 Brussels, Belgium