

Identification

Unlike tower controllers, radar controllers cannot look out of the window to provide air traffic services. They have to rely on data collected by so-called surveillance systems. Examples of these systems are primary surveillance radar (PSR) and secondary surveillance radar (SSR).

Primary surveillance radar (PSR)

When radar was invented, it only existed as a primary radar. A primary radar emits electromagnetic waves in all directions and displays a dot on the screen for each reflection detected. However, there is no way to tell which dot on the screen belongs to which aircraft - this is where identification comes into play.

An aircraft is identified when we see its target on the radar screen and are sure which aircraft it belongs to.

But how can we know which target is which aircraft if it is not transmitting data?

When using PSR, there are several so-called **identification methods** [1]:

- **Position reports:** correlating a target with an aircraft reporting its position above or its distance and bearing from a significant point on the screen, and ensuring that the target's track matches the path/reported heading of the aircraft.
- **Departing aircraft:** Assignment of a target to a departing aircraft within 1 NM of the end of the runway.
- **"Turn" method:** Instruction to an aircraft to change course by 30 degrees or more and observation of this change.
- **Transfer of identification:** The identification for an aircraft can be transferred to you by another controller who has identified it.

Secondary surveillance radar (SSR)

Modern surveillance systems use a transmitter-receiver combination that interrogates transponders on board the aircraft, which then transmit data back to the ground station. This is the fundamental difference to PSR systems, where the ground station receives passive signals (reflections). There are different interrogation modes that transmit different data [2]:

Mode	Transported data
A	4-digit octal identification code, e.g. squawk

Mode	Transported data
C	Aircraft's pressure altitude
S	Callsign, unique 24-bit address, selected altitude, speed over ground, indicated airspeed, etc. [3]

Modes A and C are often combined into mode 3 A/C. When using SSR, there are additional methods of identification:

- Recognition of the aircraft identifier on the label,
- Recognition of an assigned discrete code whose setting has been confirmed by the pilot,
- Observation of the setting/change of an instructed individual code,
- Observation of compliance with a squawk IDENT instruction
- Transfer of identification: The identification for an aircraft can be transferred to you by another controller, who in turn has identified the aircraft.

The most common method of identifying an aircraft in our simulated environment is "recognizing the aircraft ID (call sign) in an SSR label". When you see a label with a callsign, that callsign is associated with a flight plan and the aircraft is correctly identified. If a pilot is unable to switch on their transponder, you can identify them using the methods listed for the primary radar.

This means that in the environment of Vatsim Germany (and with the standard ES packages) we can consider almost any aircraft as identified.

Before providing air traffic control services (any service provided directly using an ATS surveillance system, e.g. primary or secondary radar), the controller must identify the aircraft concerned and inform its pilot.

Reading and Deviation of Transponder Values

This topic is less relevant on VATSIM than in real life. In reality, there are various rules that define when a flight level is considered "reached," "maintained," or "left." For VATSIM, however, it is generally sufficient to assume a tolerance of 200 feet. It is important to note that this should not be exploited to justify breaches of separation. In any case, pilots should be addressed about deviations (and, for example, asked to correct their altimeter settings).

[1] ICAO Doc 4444, Procedures for air navigation services - Air traffic management, Sixteenth edition, 2016

[2] [Aviation transponder interrogation modes, Wikipedia](#)

[3] [Skybrary Mode S](#)