

Security Analysis of Mod. S Transponder Technology and Attack Examples

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Abstract : All class A Airplanes have to be equipped with Mod. S transponder for ATC surveillance purposes. This technology was designed to provide a robust and dependable solution to localize, identify and exchange data with the airplane. The purpose of this paper is to analyze potential hazards that are a result of lack of any security or encryption on a design level. Secondary Surveillance Radars rely on an active response from an airplane. SSR radar installation is broadcasting a directional interrogation signal to the planes in range on 1030MHz frequency with DPSK modulation. If the interrogation is correctly received by the transponder located on the plane, a proper answer is sent on 1090MHz with PPM modulation containing plane's SQUAWK, barometric altitude, GPS coordinates and 24bit unique address code. This technology does not use any kind of encryption. All of the specifications from the previous chapter can be found easily on the internet. Since there is no encryption or security measure to ensure the credibility of the sender and message, it is highly hazardous to use such technology to ensure the safety of the air traffic. The only thing that identifies the airplane is the 24-bit unique address. Most of the planes have been sniffed by aviation enthusiasts and cataloged in web databases. In the moment of writing this article, The PoFung Technologies has announced that they are planning to release all band SDR transceiver - this device would be more than enough to build your own Mod. S Transponder. With fake transponder, a potential terrorist can identify as a different airplane. By replacing the transponder in a poorly controlled airspace, hijackers can enter another airspace identifying themselves as another plane and land in the desired area.

Keywords : flight safety, hijack, mod S transponder, security analysis

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