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INSIGHT

Monitoring the Sovereign Skies

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In early 2023, a high-altitude balloon that originated in China transited through U.S. airspace before being shot down by military aircraft off the coast of South Carolina. Soon after, the U.S. military identified, tracked, and, under presidential orders, destroyed three additional unidentified flying objects in Alaska, Canada, and over Lake Huron. Little has been revealed about these incidents, but President Biden noted that the three objects may have been operated by private entities or research organizations and are not believed to have posed a national security threat. However, Biden Administration officials, including Secretary of Defense Lloyd Austin, expressed concern that the unpiloted flying objects that were shot down, besides being unauthorized, posed risks to civil aviation.

These events have raised questions about flight authorizations and tracking of manned and unmanned aircraft in U.S. airspace. Although Federal Aviation Administration (FAA) air traffic controllers actively monitor most piloted flights operating within U.S. airspace, not all aircraft are required to file flight plans, and many cannot be uniquely identified or tracked.

Sovereignty of Airspace

The United States asserts sovereignty of the airspace overlying the United States and its territories. Each country's sovereign right to control airspace, above its lands and territorial waters, up to the ill-defined boundary of space, is formally recognized by the International Civil Aviation Organization's (ICAO's) Convention on International Civil Aviation. Article 5 of the convention generally grants foreign-registered civil aircraft not engaged in scheduled air service access to airspace of a foreign country, whereas international air service must be formally agreed to and authorized. Foreign aircraft are generally permitted to transit through U.S. airspace and operate to and from U.S. airports but must follow specific national security procedures and airspace and customs regulations. Article 8 of the ICAO convention specifically states that aircraft without pilots on board flown over another country must obtain special permission from that country and must be "controlled as to obviate danger to civil aircraft."

Aircraft Identification and Tracking

During peak times, more than 5,000 aircraft are under active FAA air traffic control. Every day, more than 45,000 flights transit the 29 million square miles of airspace managed by FAA, including over 5 million square miles of domestic airspace overlying the contiguous United States and Alaska. FAA has

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technologies, regulations, and procedures for identifying and tracking these aircraft, including airships, balloons, and drones. Capabilities for tracking and identifying aircraft include

- primary radar returns, which are reflections of radar signals from ground-based radar antennas that "bounce back" off aircraft fuselages and other reflective surfaces;
- secondary radar, which relies on a transponder signal from equipped aircraft, emitted in reply to interrogation signals from ground-based radar beacons; and
- Automatic Dependent Surveillance – Broadcast (ADS-B), which continuously transmits identification and location signals from equipped aircraft.

FAA requires powered aircraft operating in certain areas—including all airspace above 18,000 feet, most airspace above 10,000 feet, and airspace around busy airports—to be equipped with ADS-B, which typically relies on the Global Positioning System (GPS) to provide aircraft location data. Similar regulations exist for powered aircraft to have radar transponders in these areas.

All flights operating under instrument flight rules (IFR) must file flight plans with FAA. For operations within the boundaries of U.S. airspace, most aircraft operating under visual flight rules (VFR) are not required to have flight plans but may voluntarily do so. IFR flights are assigned unique transponder codes for identification. VFR flights generally do not transmit unique transponder codes but must set transponders to a generic VFR code and activate ADS-B if so equipped. VFR flights must establish two-way radio communications with air traffic control and receive clearance to fly at or above 18,000 or near busy towered airports. Airspace above 60,000 feet is not controlled, but flights must obtain clearances or authorizations to transit through controlled airspace to reach these rarified heights.

Unmanned Balloons

Untethered, unmanned free balloons that exceed minimum size criteria cannot be launched unless the operator provides advance notice to the nearest FAA facility, monitors the balloon's position at least every two hours, and forwards tracking information to air traffic control upon request. Operators must also give notice prior to initiating descent, providing the balloon's position, altitude, and trajectory for the remainder of the flight. Unmanned balloons must have radar reflective devices or materials and, if operated at night, must have flashing lights visible for at least 5 miles. They are not required to have transponders or ADS-B.

Other Unmanned Aircraft

By September 16, 2023, drones that weigh under 55 pounds, whose operations are mostly restricted to airspace below 400 feet, will be required to be equipped with remote identification capabilities. Exceptions will be allowed in certain FAA-recognized identification areas, such as recreational airparks. Generally, aircraft subject to these regulations have relatively limited ranges, payloads, and altitude capabilities. Larger drones and unmanned vehicles operated at higher altitudes are not always tracked but do require specific FAA authorization.

Air Defense Identification Zones and Airspace Restrictions

The United States maintains Air Defense Identification Zones (ADIZs) extending beyond the sea borders of the contiguous states and around Alaska, Hawaii, and Guam. Canada also maintains an ADIZ extending from its shores and its arctic borders. Monitoring and enforcement of ADIZ procedures are the responsibility of the North American Aerospace Defense Command (NORAD), a binational U.S. and Canadian military organization. All powered aircraft must activate a flight plan and use transponders when operating in the ADIZ. Pilots must provide position reports prior to penetrating the ADIZ and when

operating within it. Inside U.S. airspace, FAA maintains a special flight rules area (SFRA) around Washington, DC, that requires authorization and special operating procedures. Additionally, various other airspace restrictions have been implemented, including around stadiums, Disney theme parks, security sensitive sites, military ranges, and in various locations on a temporary basis for presidential visits, natural disasters, emergency response, and other purposes.

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