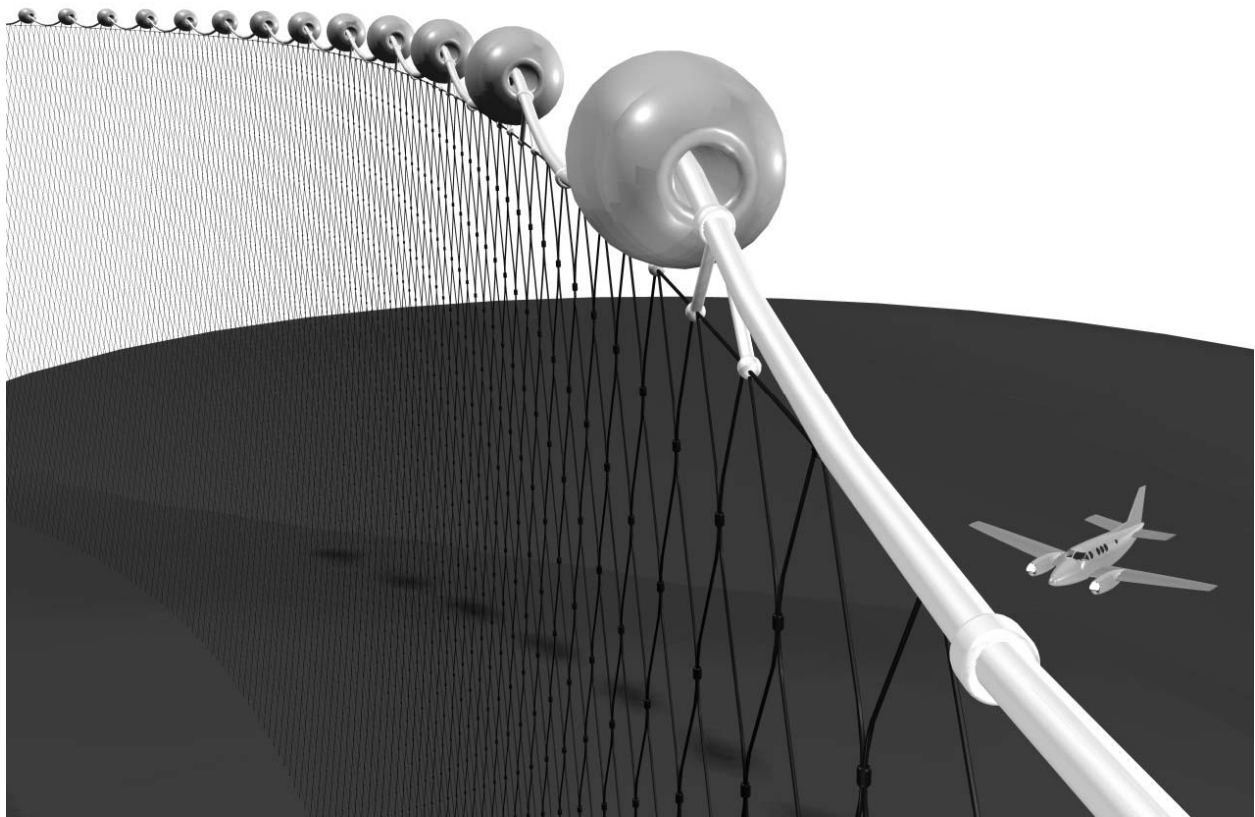# Violations of Temporary Flight Restrictions and Air Defense Identification Zones: An Analysis of Airspace Violations and Pilot Report Data

*Michael Zuschlag*
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**September 2005**

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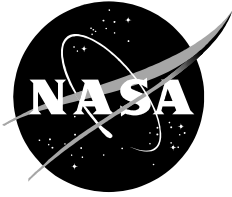- CONFERENCE PUBLICATION. Collected papers from scientific and technical conferences, symposia, seminars, or other meetings sponsored or co-sponsored by NASA.

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# Violations of Temporary Flight Restrictions and Air Defense Identification Zones: An Analysis of Airspace Violations and Pilot Report Data

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## Executive Summary

The purpose of this study is to determine the apparent factors and causes of violations of restricted airspace, particularly temporary flight restrictions (TFRs) and air defense identification zones (ADIZs). After the terrorist attacks on 9/11/2001, the Federal Aviation Administration (FAA) has greatly expanded the use of TFRs and ADIZs to more securely control the airspace around potential terrorist targets. Since then, there have been a substantial number of accidental violations of restricted airspace with over 2900 violations in the two years between June 2002 and June 2004 alone. This frequency of violations incurs security and safety risks plus economic costs. By illuminating the reasons for these violations, this study aims to take the first step towards reducing them.

To provide an initial assessment of the basic characteristics of restricted airspace violations, the records for all 2910 violations from a two-year period were obtained from the FAA Flight Service Operations Support Center (FSOSC). These data indicated that most violations of restricted airspace are associated with relatively static or re-occurring restricted airspace, with half of all violations concerning just the ADIZ around Washington DC or restricted airspaces within it. This implies that most violations are not due a TFR "popping up" in unpredictable locations.

While the FSOSC data indicated the locations of violations of restricted airspace, it provided limited insight into the reasons. Why are most violations at places where airspace restrictions ought to be predicable? To address this, the study next examined the narratives of 203 records from NASA's Aviation Safety Reporting System (ASRS) in order to determine the probable causes and factors contributing to violations of restricted airspace.

Based on a systematic categorization of the narratives in the ASRS data, the probable cause of most violations was the pilot having incorrect or a lack of detailed information about the airspace. Most violations were not due to the pilot being simply unaware of the airspace at the time of violation. In most violations, pilots *are* aware of the presence of the airspace but have incorrect information about it, namely, its exact boundaries or procedures for authorized penetration. Apparent violations of the DC ADIZ are especially likely to be due to such incorrect detailed information, and quite rarely due to the airspace being outright not known or recalled. With its relatively complex penetration procedures, the DC ADIZ frequently had the violations due to misunderstanding these procedures.

The narratives frequently related cases where pilots tried to get information about a TFR or ADIZ, but ultimately developed misconceptions about the airspace. A substantial number of narratives explicitly reported that the pilots got the Notices to Airmen (NOTAMs) relevant to the flight or a preflight briefing, where NOTAMs and briefings are the chief means today of disseminating TFR and ADIZ information to pilots. Nonetheless these pilots allegedly violated a TFR or ADIZ. Indeed, about half of all the narratives explicitly cite communication problems concerning the airspace as a factor contributing to violating the airspace. This may be a miscommunication with an official Flight Service Station briefer or a communication failure concerning the NOTAMs themselves. The lack of depiction of TFRs and the DC ADIZ on standard aviation navigation charts has also been identified as a contributing factor in many narratives (the DC ADIZ and certain recurrent TFRs began appearing on charts in February 2004, after the period comprising the ASRS records analyzed for this study).

These results imply that the best means to reduce violations of restricted airspace is to improve the effectiveness of informing pilots of *the details about* the restricted airspace. Better pilot

awareness of the *existence* of TFRs and ADIZs should prevent some violations but cannot eliminate most of them. While the FAA has made graphic representations of TFRs available to pilots, this practice does not appear to have effectively conveyed the boundaries of restricted airspace. Furthermore, knowing the boundaries of the airspace is only part of the problem. For ADIZs and ADIZ-like TFRs, where penetration is allowed, the detailed procedures to be followed while in the airspace do not appear to be making it to pilots in an effective manner.

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# 1. Background

In the wake of the use of civil aircraft to carry out terrorist attacks on 9/11/2001, the Federal Aviation Administration (FAA) sought to combat future attacks of this kind by restricting or better controlling the airspace around potential targets. The FAA used two existing mechanisms for this: temporary flight restrictions (TFRs) and air defense identification zones (ADIZs).

## 1.1. TFRs

Historically, the FAA imposes TFRs over an area for a specific event whenever anticipated air traffic is deemed to be dangerous or threatening either to people or property on the surface or to the pilots and aircraft themselves. This includes events such as forest fires and other natural disasters (where sightseeing flights may interfere with disaster mitigation and rescue efforts), shuttle launches and air shows (to reduce the chances of mid-air collisions), and visits by the President or other VIPs (FAA, 2004d). TFRs may prohibit all air traffic in an airspace or may place other restrictions on aircraft that operate in the airspace.

After 9/11, the FAA greatly increased the number TFRs imposed for security reasons (Government Accountability Office, 2004). In addition to visiting VIPs, TFRs have been imposed around military installations, large public gatherings and attractions, nuclear power stations, and, occasionally, entire cities. TFRs are regularly imposed as an "expansion" of an existing fixed Prohibited Area (e.g., about Camp David) as events within the area warrant (e.g., the actual presence of the President). The size of these new TFRs also may be quite large. Where a rescue TFR typically has a 3 nautical mile (nm) radius and extends up to an altitude of 2000 feet (Jeppesen Sanderson, 1998), security TFRs may be as much as 30 nm in radius and up to 18000 feet (FAA, 2005a). Some of these "temporary" flight restricts have been in place for over a year and are expected to remain in force indefinitely. By the shear number, size, and duration of present TFRs, the raw opportunity to violate one has greatly increased since 9/11.

## 1.2. ADIZ

The ADIZ is a boundary surrounding the United States airspace originally intended to provide security from attacking foreign aircraft. All aircraft that cross the ADIZ are required to have a flight plan filed with air traffic control (ATC), to transmit or "squawk" an ATC-assigned discrete transponder code, and to maintain two-way radio communications with ATC. Following these procedures allows authorities to recognize such aircraft as non-hostile (Jeppesen, 1998). As the attacks of 9/11 illustrated that a hostile aircraft can come from within domestic airspace, a new ADIZ was established around the Baltimore and Washington DC region, extending over 40 nm from the Capitol in places. For a time there was also an ADIZ around greater New York City. Analogous to the original US ADIZ, aircraft entering or operating within the DC ADIZ must have a flight plan, a transponder code, and two-way communication. The aircraft must be transmitting the transponder code and be explicitly cleared into the ADIZ before entering. Aircraft that takeoff from airports within the ADIZ must be cleared by ATC and transmitting the code before they are airborne. Within the DC ADIZ, the FAA has erected a Flight Restricted Zone (FRZ). General Aviation flight is banned from this approximately 13 nm radius circle centered on the Capitol, except for specially vetted or approved cases (FAA, 2003a).

While flights that cross the US ADIZ are relatively rare for most pilots, the Baltimore-Washington region is a heavily populated area, with abundant aircraft activity, including aircraft that normally operate under Visual Flight Rules (VFR), where a flight plan and ATC

communication are not required. As with the latest security TFRs, the establishment of the DC ADIZ provides much greater opportunity for restricted airspace violations than before 9/11 by simply having far more aircraft within the vicinity of restricted airspace.

## 1.3.    Avoiding of Violations

Legally, pilots are solely responsible for gathering the necessary information to comply with TFRs and the ADIZ. Failure to comply with the requirements of a TFR or ADIZ can result in disciplinary action by the FAA (e.g., license suspension). Pilots can learn of the existence and details of a TFR through Notices to Airmen (NOTAMs) (Jeppesen, 1998). NOTAMs may be obtained from a Flight Service Station (FSS), typically as part of a standard preflight briefing, and from various government and commercial electronic sources. Details for complying with the requirements of the DC ADIZ were also published in a series of NOTAMs (FAA 2003a, b, c, 2004a, b, c, 2005).

To avoid a violation of restricted airspace, a pilot must gather information from the NOTAMs and operate the aircraft such that the pilot:

- Is aware that the restricted airspace exists.

- Understands the horizontal and vertical boundaries of the airspace.

- Knows the effective dates and times in the case of a TFR.

- Understands the procedures for legal penetration of the airspace, if they exist.

- Navigates correctly so that one knows when the airspace is proximal.

- Correctly carries out the necessary control settings or inputs to the aircraft to comply with the requirements of the airspace.

A failure by the pilot to complete any of the above steps can result in a violation.

## 1.4.    Handling of Violations

Violations are typically detected by air traffic controllers by monitoring their radar displays. If an unauthorized aircraft is detected within the restricted airspace, the controller may attempt to contact the pilot by radio and inform him or her directly of the violation. However, VFR traffic is not always required to be in radio contact with ATC, and this may not be successful. Also, VFR traffic typically is not required to transmit a discrete transponder code that distinguishes one aircraft from another, so the violator may be unidentified as well. In most such cases, the controller tracks the violating aircraft until it disappears near an airport. The aircraft is assumed to have landed there and the controller calls the airport to give the pilot a message. In any case, once on the ground, the pilot contacts ATC by phone where particulars are collected to file the violation. The typical disciplinary action is a one or two month suspension of the pilot's license. The pilot may also be interrogated in person by law enforcement.

In certain cases, if the aircraft appears especially threatening, a military aircraft will be sent to intercept it. The interceptor and aircraft may communicate using emergency radio frequencies such as 121.5 megahertz (MHz). They may also communicate without radio though a set of standard aircraft maneuvers (FAA 2004d). In this way, the interceptor can order the aircraft to land at a specific airport, where law enforcement can conduct an interrogation.

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If the aircraft fails to comply with the orders of the intercepting aircraft, contingency procedures exist that ultimately may result in the aircraft being shot down if the threat is sufficient.

## 2.    Purpose

Since 9/11, there has been a great increase in the number of violations of restricted airspace. The total number of violations for 1999 and 2000 was 71, while the total for 2002 and 2003 was 1655, a more than 20-fold increase (Government Accountability Office, 2004). Possibly, this number of violations is purely the result of the greater opportunities for violations presented by contemporary TFRs and the DC ADIZ. Nonetheless, this frequency of violations is unacceptable as it represents a risk to safety and security and an economic cost far beyond that witnessed for restricted airspace violations in previous years.

- The handling of violations may distract air traffic controllers from their primary task of ensuring safe separation of aircraft.

- All violations since 9/11 have been false alarms rather than actual terrorist attacks. A high frequency of false alarms breeds complacency that may result in a delayed or incomplete response in the event of an actual attack.

- Every time an interceptor is scrambled, there is a chance that through some sequence of errors a pilot with innocent intentions may be shot down. Reducing the number of false alarms, and thus the number of scrambles, reduces the chance of this.

- With violations occurring almost every day, there is a chance that an interceptor scrambled for a false alarm will not be available for an actual contemporaneous attack

- Each false alarm scramble also carries an economic cost to the government for flying, maintaining, and ultimately replacing the interceptor.

It is in the interests of air traffic controllers, defense and security agencies, pilots, and the general public to reduce the number of violations. However, there does not appear to be any solid understanding of why such violations occur. Some government officials have expressed frustration over the limited effectiveness of their efforts to educate pilots on the presence and procedures for the new restricted airspaces (Grady, 2004). Some agencies have even sought to criminalize such violations (Niles, 2003), implying that the violations are primarily due to careless pilots. Pilots, for their part have expressed frustration and anxiety over what they regard as the government's slowness to make compliance with TFRs and the ADIZ less burdensome (Charles, 2002, 2004).

Missing from the debate is any data on why the violations occur. Any attempt to reduce violations must address the reasons for the violations. The purpose of this study is to determine apparent factors and causes of the violations of restricted airspace. To accomplish this, data provided by the FAA Flight Service Operations Support Center (FSOSC) regarding all restricted airspace violations over a two year period was analyzed to determine the basic characteristics of violations –where they occur, when they occur, and by what type of aircraft. To determine why violations occur, the study next determined the probable causes of violations as described in over 200 narratives within NASA's Aviation Safety Reporting System (ASRS) records. For the purpose of this study, "restricted airspace" is defined as airspace associated with an ADIZ or a TFR, along with associated Restricted Areas and Prohibited Areas. Because of the databases and selection methods used, the vast majority of cases underlying the statistics involve ADIZs or TFRs.

# 3. Basic Characteristics of Violations

To provide an initial assessment of the basic characteristics of restricted airspace violations, the records for all violations over a two-year period were obtained from the FAA Flight Service Operations Support Center (FSOSC). All records from June 2002 to June 2004 were obtained with the exception of records for 7/10 to 9/28 2002, which were missing. The 2910 FSOSC records include such attributes as the time, place, and aircraft type.[1] The statistics on these dimensions are presented in Table 1 through Table 3, and Figure 1 through Figure 3.

**Table 1. Airspace related to violation.**

| Airspace | Violations |
|---|---|
| DC ADIZ | 49.0% |
| Presidential | 22.0% |
| NY ADIZ | 8.0% |
| Crawford / P-49 | 6.4% |
| Camp David / Thurmont / P-40 | 3.9% |
| Newport Chemical Depot | 2.2% |
| Disney (either) | 1.8% |
| US ADIZ | 1.0% |
| Other | 6.8% |

Over 97% of all violations were for restricted airspace imposed for security reasons including VIP protection, with the remaining portion including TFRs imposed for rescue efforts, sporting events and air shows, hazards, and space operations.[2] About half of all violations are associated with the DC ADIZ (see Table 1). Violations of Presidential TFRs are the second most common, actually representing multiple locations spread across 39 states. This figure excludes violations of TFRs around the presidential residences in Washington, Camp David, Crawford, TX, and Kenebunkport, ME. The NY ADIZ, which was only in effect for 29 days, is also associated with a substantial number of violations. Its number of violations per month is comparable to the DC ADIZ for the same period. Specific locations comprising the largest portions of the Other category include violations of TFRs for space operations (0.7%), Blue Grass Chemical facility (Richmond, KY, 0.7%), and Kenebunkport (0.7%). As such, nearly three-quarters of all violations are associated with only 11 specific geographic locations. With the notable exception of Presidential TFR violations, nearly all violations involved restricted airspace that is relatively static or recurrent for a particular location.

Most of the aircraft associated with violations of restricted airspace are small general-aviation (GA) airplanes (see Table 2). This is consistent with flights by GA aircraft constituting the bulk of the aircraft-hours for a given period of time (FAA 1994). Probably even more significantly, the

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[1] The number of violations for this time period as indicated by the FSOSC data is different than reported by the Government Accountability Office (2004) due to the use of different databases. The FSOSC database tracked number of detected violations, while the Government Accountability Office apparently used the FAA's database of violation enforcements.

[2] There were no space shuttle flights for about two-thirds of the sampled period due to the grounding of the shuttle fleet following the destruction of the Columbia on February 1, 2003. However, there were numerous unmanned rocket launches in the US through out the entire sampled period (National Aeronautics and Space Administration, 2004).

use of VFR is very rare among transport aircraft while being common for GA. Transports almost always operate under Instrument Flight Rules (IFR), where they rely on electronic means of navigation and are positively controlled by an air traffic controller, typically following explicit vectors by ATC when at low altitudes where restricted airspace is present. With two independent parties (aircrew and ATC) monitoring the aircraft's position electronically, these aircraft are apparently relatively unlikely violate restricted airspace. ATC may monitor a VFR flight, especially if requested by the pilot, and alert him or her if the flight strays towards restricted airspace, but ATC is not required to do so, and the workload associated with controlling IFR flights may prohibit such service. An additional possible benefit of IFR flight is that compliance with IFR flight is nearly synonymous with compliance with ADIZ penetration: the pilot has filed and activated a flight plan, is transmitting a discrete transponder code, and is in radio contact with ATC. For pilots such as those of air transports that habitually fly IFR, the ADIZ represents a smaller adjustment. Familiarity with and use of IFR may effectively prevent ADIZ violations as well. Not all private pilots are certified or even equipped to fly IFR, however.

**Table 2. Aircraft classification involved in violation.**

| Aircraft | Violations |
|---|---|
| GA Airplane, Single Piston | 72.7% |
| GA Airplane, Multi Piston | 9.5% |
| GA Airplane, Turboprop | 2.8% |
| GA Airplane, Jet | 1.1% |
| Civil Rotorcraft | 5.8% |
| Experimental | 1.7% |
| Civil Transport | 1.2% |
| Military | 5.2% |

The FSOSC data did not include pilot name or identity. However it did include the tail number of the aircraft. With the caveat that a single aircraft may be rented or shared among multiple pilots, tail number can be used to crudely estimate the frequency that a pilot repeatedly violates restricted airspace. Examining the 2043 FSOSC records that included tail numbers, only six percent of all tail numbers are associated with two or more violations. Without an estimate of the number of aircraft "exposed" to restricted airspace, it is not possible to determine if this 6% indicates that certain pilots are characteristically prone to violations (i.e., that a repeat violation is not merely a chance event). Indeed, depending on the actual number of exposed aircraft, this 6% may indicate that previous violators are *less* likely to violate again than those who have never violated. In any case, the 6% statistic is not consistent with a hypothesis that a few incorrigible pilots are responsible for a large portion of the violations. Ninety-three percent of all violations involve a single appearance of a tail number.

**Table 3. Percent of violations involving an interception.**

| Intercepted | Violations |
|---|---|
| Yes | 14.6% |
| No | 85.4% |

Approximately 1 in 6 or 7 of all violations are associated with an interception (see Table 3). The probability of interception is not significantly related to aircraft classification.

Most violations occur during daytime hours, in particular, the afternoon, although there appears to be a small dip around lunch time (see Figure 1), and there is a tendency for more violations around the weekend (see Figure 2). This might be expected given most violations are associated with small GA airplanes.
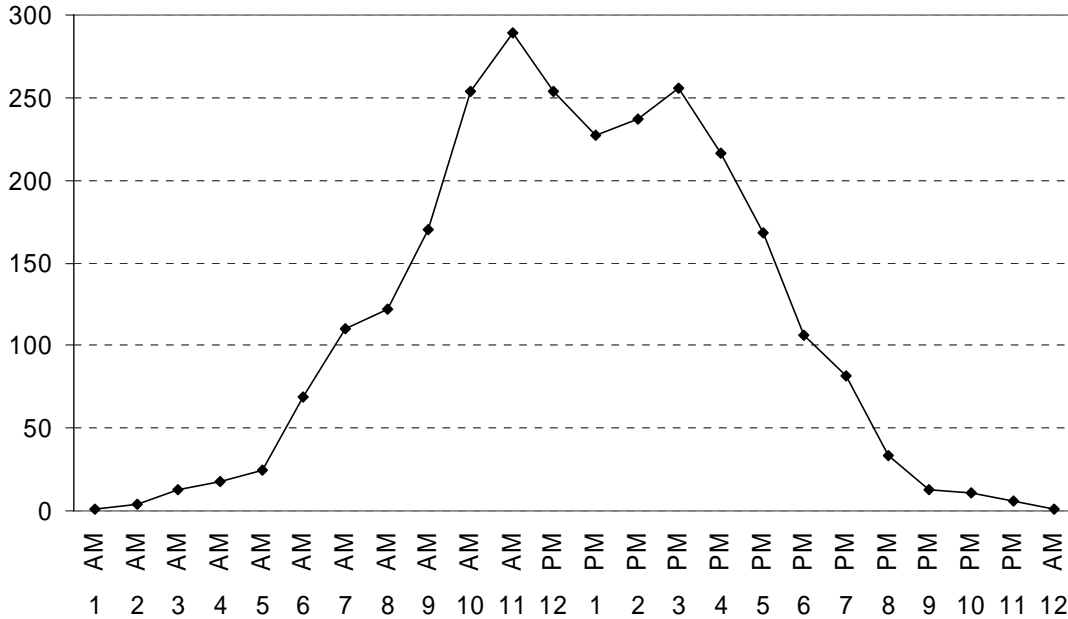


**Figure 1. Number of violations for each hour of local time of day.**
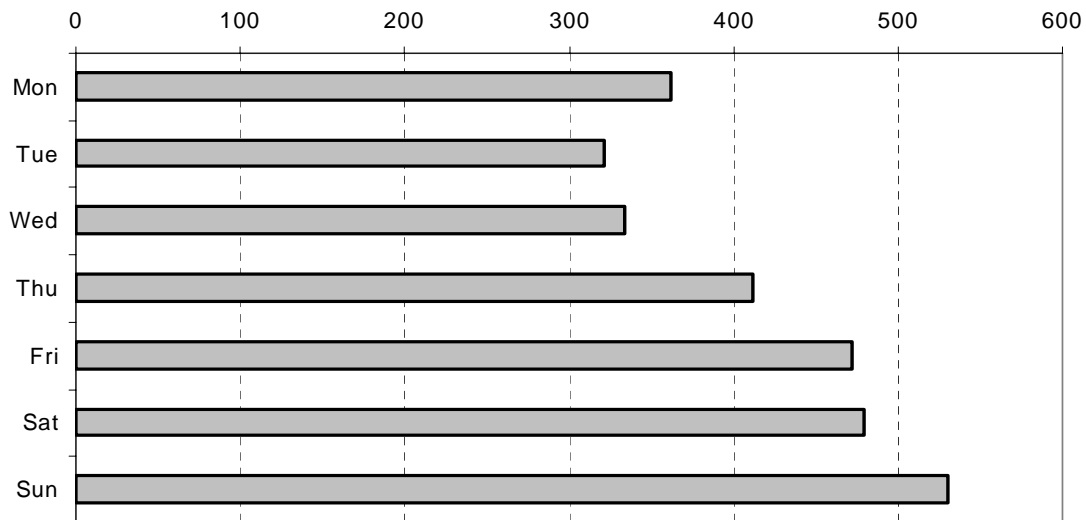


**Figure 2. Number of violations for each day of week.**

Only two years were included in the FSOSC sample so any relationship of violations to month of year can be only tenuously asserted. Nonetheless, there may be an increase in violations in the spring months (see Figure 3), perhaps associated with a general increase in GA activity for those months. However, it should be noted that March 2003 corresponds to the US invasion of Iraq

with its heightened level of alert at home, which resulted in more TFRs and thus more violations. The New York ADIZ, which only existed from 3/18/2003 to 4/17/2003[3], is alone responsible for 232 of the 818 violations for March and April of both 2003 and 2004. On the other hand, the DC ADIZ was imposed in the beginning of February 2003, yet a sharp increase in violations does not occur until March, consistent with a general spring increase in GA activity bringing more pilots into conflict with the ADIZ. Furthermore, March of 2004 witnessed a doubling of violations compared to February 2004. While not as dramatic as the change from February 2003 to March 2003 (a six-fold increase), this still represents a substantial increase that is not associated with any heightened level of alert. Indeed, February 2004 marks the beginning of depicting the DC ADIZ and certain recurring TFRs on aeronautical charts, so one might have predicted a decrease in violations as these charts are obtained and used by pilots.
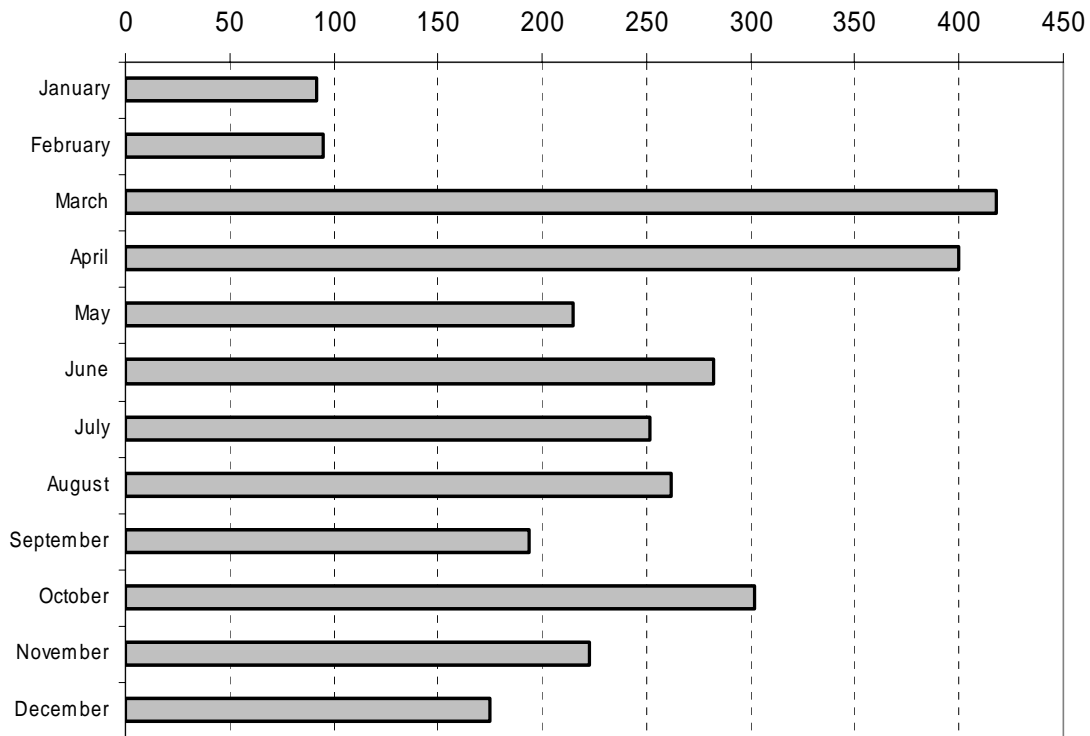


**Figure 3. Number of violations for each month of the year.**

While the FSOSC data indicated when, where, and what sort of aircraft were violating restricted airspace, it provided limited insight into why. Why are most violations for restricted airspace, such as the DC ADIZ, that would be predicted to be well known? To answer this, one needs much greater detail about the sequence of events leading up to each violation. This can be found in the narratives in the records of NASA's Aviation Safety Reporting System (ASRS). These records provide sufficient detail to reliably determine the probable cause and factors contributing to violations of restricted airspace.

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[3] The NY ADIZ was imposed a couple days before the invasion of Iraq on March 20, 2003 and rescinded on April 17 after major hostilities in Iraq ceased and the National Threat Advisory Level returned to Yellow (Aircraft Owners and Pilots Association, 2003a, 2003b);

# 4.      Method

## 4.1.      Source of Data

The Aviation Safety Reporting System (ASRS) was established in 1975 by NASA with the cooperation of the FAA in order to collect voluntarily submitted aviation safety incident reports with the goal to lessen the likelihood of aviation accidents. Reports are solicited from pilots, air traffic controllers, cabin crew, flight dispatchers, mechanics, and other airport personnel, although over 90% of the reports are from pilots (Aviation Safety Reporting System, 1996). In addition to recording the conditions of the incident (e.g., visibility, aircraft type, pilot experience), the reporter provides a narrative of the incident where she or he describes what happened, why it happened, and what can be done to reduce the chance of a re-occurrence[4]. These narratives are the primary item of interest for this study as they provide the details necessary to categorize the probable cause of a violation of restricted airspace, as well as the reporter's perspective of the factors that led to the violation.

## 4.2.      Biases within ASRS Records

To encourage reporters to record an honest assessment of the incident, all submissions are confidential and the records are void of potentially identifying details (e.g., aircraft tail number, discrete transponder codes used, exact time and date of the incident). Furthermore, the FAA is prohibited by law from using any ASRS records for disciplinary actions.

The contents of an ASRS record thus cannot be used for or against a pilot who is charged with violation. However, as an incentive for pilots to make ASRS reports, such pilots gain certain advantages with regard to FAA disciplinary actions (ASRS provides a reporter with a means to prove she/he submitted a report without revealing its contents). In the case of violation of restricted airspace, pilots whose licenses are suspended are not required to physically mail the license to the FAA.[5] It also appears, based on the narrative of the ASRS reports themselves, that during the phone interviews to collect the particulars of an alleged violation of restricted airspace, air traffic controllers are encouraging pilots to file ASRS reports. The result of these incentives and encouragement is a substantial and broad corpus of cases of restricted airspace violations in ASRS even though it was originally instituted for compiling safety issues.

While the ASRS process is designed to encourage reporters to make reports and to make the reports honestly, ASRS records are still open to certain biases. As a voluntary reporting system, the records within ASRS do not constitute a random sample of incidents. As a result, the proportion of incidents of one class among ASRS records may not be the same as the proportion of incidents of that class within the National Airspace as a whole. For example, pilots who are most likely to enter restricted airspace for one particular reason may be disproportionately likely to file an ASRS report simply because they are the type of pilot who is familiar with ASRS. While this study reports the proportion of restricted airspace violations attributable to various causes, the proportions should be considered only rough approximations of the actual proportion. A high proportion of an incident class in ASRS records is a relatively reliable indicator that the class is important, but the true proportion might be different.

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[4] The ASRS reporting forms are available at http://asrs.arc.nasa.gov/forms_nf.htm.
[5] For other violations, filing an ASRS report would result in no suspension or other civil penalty at all, assuming certain criteria are met (e.g., violation did not result in an accident) (FAA, 1987).

The records submitted to ASRS are a single person's perspective of an incident at the time it is reported. Even if the person is reporting honestly, the report may be distorted by lack of knowledge about, misunderstandings of, or failure to accurately recall the actual events that led to the incident. The vast majority of the reporters of the ASRS records used in this study were pilots whose flight was somehow related to a violation of restricted airspace. As such, the results of this study should be regarded as the violations from the pilots' point of view.

## 4.3. Record Selection

The investigator was supplied with a total of 784 ASRS records from October 2001 to December 2003, selected because they referenced "temporary flight restriction" or "TFR." From this total, records were selected to create a sample that meets two criteria:

- The sample represents the more recent incidents. This was done so that the sample reflected the latest efforts by the FAA and other organizations to minimize the frequency of violations For example, in June 2003, the FAA made graphical TFR notices available to pilots. This sampling was also done to reflect violations of the most recent kinds of restricted airspace. For example, the DC ADIZ did not exist prior to February, 2003.

- The sample matches proportions on various dimensions found in the FSOSC records. Specifically, the ASRS sample should match the FSOSC data for each time of day and day of week of the apparent violation, airspace associated with the violation, aircraft classification, and inclusion of an interception. This was done to minimize potential bias due to the ASRS records being voluntary submissions. For example, if pilots of air transports are especially likely to file an ASRS report, then the observed distribution of probable causes would be skewed to the degree that pilots of air transports tend to violate restricted airspace for different reasons than pilots of general aviation aircraft. This concern of bias is eliminated by matching the ASRS sample proportions to FSOSC proportions, which are the true statistics for nearly all restricted airspace violations over a two-year period.

In practice, the proportions found in an exhaustive selection of all of the most recent ASRS records (from June 2003 on) were not significantly different than the proportions in the FSOSC data, with the following exceptions:

- The ASRS data over-represented violations of the DC ADIZ, accounting for 65% of the records versus 49% for FSOSC. Also, violations in the NY ADIZ were not represented in most recent ASRS data, as it was rescinded in before June 2003.

- Rotorcraft appear to be somewhat over-represented in ASRS data (10% of the records versus 6% for FSOSC), while military aircraft are under-represented (less than 2% of the records versus 5% for FSOSC).

With the most recent ASRS proportions nearly matching the FSOSC proportions, the two criteria were met by taking all the most recent records and then selecting a smaller number of somewhat less recent records to achieve the second criterion. Two hundred and nineteen records were selected from April 2002 to December 2003, with the majority (81%) being nearly all records from June 2003 to December 2003[6], leaving 19% specifically selected to adjust the proportions in the sample to not differ significantly from the FSOSC proportions. For example, the NY ADIZ

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[6] There were a total of 1484 violations for the same time period according to the FSOSC data. Note that an incident reported in ASRS does not necessary appear in FSOSC; the ASRS data include incidents that are not associated with an actual accusation of violation of restricted airspace.

only existed for a few weeks in March and April 2003, so records concerning the NY ADIZ from that time were selected in order for the sample's proportion of records related to the NY ADIZ to match that found in the FSOSC data.

Because the ASRS records only represent one reporter's perspective of an incident at a given point in time, it is not possible to strictly determine if a violation of restricted airspace actually occurred or not. The best that can be determined is that the reported incident involves *concern about the violation of restricted airspace.* That is, according to the narrative, a party (not necessarily the reporter) is concerned about a past or future violation of restricted airspace. This includes incidents where:

- All parties in the narrative apparently agree that the pilot violated restricted airspace.

- An air traffic controller has cited the pilot for violating restricted airspace, but the pilot suspects this is an error.

- The pilot has not been accused of any violation but the pilot nonetheless believes she or he may have violated restricted airspace.

- No party in the narrative believes a violation occurred, but the reporter believes certain factors may make violations likely in the future and (apparently) felt it was worth reporting this to ASRS.

Some of the selected records do not include a concern about a violation of restricted airspace. A TFR may have played a role in the incident, but the report may have been submitted to document a different concern for safety or security, such as an uncleared entry into Class B airspace, failure to hold an assigned altitude, or near mid-air collision. On examining the narratives, sixteen of the 219 records were found to not concern a violation of restricted airspace, based on the classification system documented in the appendix. These records were excluded from this study, leaving 203 selected records.

## 4.4.    Record Categorization

For this study, the key contribution of the ASRS data is the narrative included with each record, in which the reporter describes the event, the causes of the event, and efforts that may reduce the chance of future similar events. Being a free-form text description, a systematic means of categorizing the narratives based on their content is required to extract statistics from these narratives.  Based on the contents of its narrative, each ASRS record was categorized on the dimensions given in Table 4. Documentation and rules for classifying ASRS records on all these dimensions is provided in the appendix, but key details of each dimension are provided in the following sections.

### 4.4.1.    Got NOTAMs/Briefing

The Got NOTAMs/Briefing dimension was used to get a rough estimate of the presence of pilot preparation for encountering restricted airspace. For the this dimension, a "Yes" means the narrative explicitly says the pilot got at least some NOTAMs or a partial preflight briefing. It does not necessarily mean the pilot got the NOTAMs or briefing specifically regarding the airspace associated with the violation of concern. A "No" means the narrative explicitly says the pilot did not get any briefing or NOTAMs. A narrative may also be categorized as "Unknown," indicating that the narrative did not explicitly and unambiguously state that the pilot received or failed to receive any NOTAMs or briefing.

**Table 4. Dimensions for categorizing ASRS records.**

| Dimension | Meaning |
|---|---|
| Got NOTAMs/ Briefing | Whether the pilot got any NOTAMs or a preflight briefing for the flight. |
| Violation of concern | The specific action required for the airspace that the pilot may not have followed. |
| Probable Cause | The most likely cause based on the information provided in the narrative. |
| Reporter-identified Factors | Factors the reporter indicated contributed to (or may contribute to) the violation of concern. |
| Airspace | The airspace associated with the violation of concern. |
| Accusation | Whether the narrative indicates that the pilot was accused of violating restricted airspace by a federal authority. |
| Interception | Whether the narrative indicates that an interceptor was dispatched for the apparently violating aircraft. |

### 4.4.2. *Violation of Concern*

The dimension Violation of Concern has the categories of actions given in Table 5.

**Table 5. Categories of Violation of Concern.**

| Category | Meaning |
|---|---|
| Entry into Restricted Airspace | Narrative concerns an aircraft entering airspace when entry is not allowed. |
| Activation or Clearance | Narrative concerns failure to get proper authorization prior to entering restricted airspace, including activating a flight plan, getting a clearance, and getting a discrete transponder code. |
| Transponder Use | Narrative concerns failure to correctly use the transponder as required for the airspace. |
| ATC Communications | Narrative concerns failure to establish or maintain communication radio communications with the appropriate air traffic controller after entry into the restricted airspace. |
| Flight Path or Procedure | Narrative or synopsis concern a prohibited flight path or procedure for the restricted airspace that otherwise allows flight. |
| No Violation of Concern | No party in the narrative is concerned that a violation of restricted airspace occurred or might occur in the future. |

As described in 3.3, records classified to have No Violation of Concern are not included in the statistics given by this report.

### 4.4.3. *Probable Cause*

The categories for probable cause are derived from the model for avoiding a violation of restricted airspace as described in 1.3 and illustrated in Figure 4. For the purpose of assigning probable cause to a record, *it is assumed that the violation of concern actually occurred as described,* even though the narrative may not necessarily relate an actual violation. Because the records for this study were selected if they included any *concern about* a violation of restricted

airspace, the events in a particular narrative may not be an actual violation. Instead, they may represent a near-violation, the potential for a future violation, or merely the belief by one party in the narrative (sometimes the pilot) that a violation occurred when apparently no violation actually occurred.

**Violation Probable**

| | | |
|---|---|---|
| Aware Restricted Airspace Exists | *No* → | Presence of Airspace not Known or Recalled |
| ↓ *Yes* | | |
| Know Spatial Position Relative to Airspace | *No* → | Incorrect Understanding of Distance to Airspace |
| ↓ *Yes* | | |
| Know Time Airspace is in Effect | *No* → | Time or Date of Effect not Correctly Known |
| ↓ *Yes* | | |
| Understand Procedures for Penetration | *No* → | Procedures for Penetration not Understood |
| ↓ *Yes* | | |
| Complete Necessary Control Settings | *No* → | Control Setting Error |
| ↓ *Yes* | | |

Incorrect or Lack of Detailed Information

**No Violation**

**Figure 4. Model for assigning probable cause.**

The category for Incorrect Understanding of Distance to Airspace includes both errors in navigation and errors in understanding the boundaries of the restricted airspace. It is often unclear from the narratives which error occurred. All a pilot can report is that she or he apparently entered restricted airspace when she or he thought it was farther away. As a result, these two errors are combined into one probable cause for this study.

A category of Indeterminate / Multiple / Other was also included for records that could not be categorized on any of the causes given in Figure 4.

Navigation charts were referred to for some records in order to reconstruct the flights in order to assign the probable cause.

### 4.4.4.    *Reporter-identified Factors*

Reporter-identified Factors are items the reporter explicitly identifies as contributing to a potential violation. They are also derived from reported elements of the chain of events leading to a violation. In addition, they are established from statements on reporter-suggested remedial actions that may prevent future violations (implying that the lack of such actions is a factor in current violations). Reporter-identified Factors are in contrast to Probable Cause, in that while

Probable cause follows the investigator's model for avoiding violations of restricted airspace, Reporter-identified Factors are the reporters' perspectives on the cause of the violations. As such, they provide a separate viewpoint or cross-check of the results concerning Probable Cause.

Based on an initial sample of ASRS records, eight Report-identified Factors were derived and each record was categorized as to whether it included each factor or not. The factors are detailed in Table 6.

**Table 6. Reporter-identified Factors.**

| Factor | Description |
|---|---|
| Airspace Communication | Problem in communicating restricted airspace information (e.g., through FSS or NOTAMs) and recommendations to improve its communication. |
| ATC/Clearance Problem | Problem in required communication with ATC. Does not include technical problems with the aircraft radio. |
| Underuse of Optional ATC | Lack of use of ATC services such as flight following or recommendations to use them in the future. |
| Pilotage Limitations | Imprecision in navigation due to reliance on pilotage (i.e., navigation by visual reference without electronic aids). |
| General Human Factors Antecedents | Miscellaneous human factors not specific to restricted airspace (e.g., fatigue, distraction). |
| Equipment Failure | Failure of aircraft or on-board equipment leading directly to possible violation. |
| Violation Handling Error | Apparent error in procedure or execution of the handling of an alleged violation of restricted airspace, including disputes about the existence of the violation. |
| Overly Restrictive Rules | Rules regarding airspace restrictions are regarded as unnecessarily strict or extreme. |

### 4.4.5. *Other Categorization Dimensions*

The categories for Airspace were derived from the most frequently reported airspaces in the FSOSC data.

A narrative was categorized as "Yes" for Accusation and Interception if it indicated the presence of an accusation or interception respectively, and "No" otherwise. There was no provision for categorizing narratives as "Unknown" on these dimensions.

## 4.5. Inter-rater Reliability

Because categorizing the ASRS reports on these dimensions requires a human rater, all categorization dimensions documented in the appendix were subjected to tests for inter-rater reliability. Twenty records were coded independently by two raters, and the categorizations compared. The results of the comparisons are presented in Table 7, where the percent agreement between the two raters is a measure of the inter-rater reliability. The reliability of binary dimensions, such as the Reporter-identified Factors, can also be indicated by the product-moment correlation ($\varphi$) of the ratings of the two judges, for which a value of 1.00 represents perfect agreement, and 0.00 represents no agreement.

**Table 7. Reliability of categorization dimensions.**

| Dimension | Agreement % | Correlation $\varphi$ | $\chi^2$ | df | p |
|---|---|---|---|---|---|
| | | | Significance | | |
| Violation of concern | 85% | -- | 40.30 | 12 | < 0.001 |
| Airspace violated | 95% | -- | 8.84 | 1 | < 0.005 |
| Got NOTAMs/ Briefing | 80% | -- | 18.50 | 4 | < 0.001 |
| Accusation | 100% | 1.00 | 12.93 | 1 | < 0.001 |
| Interception | 100% | 1.00 | 10.43 | 1 | < 0.005 |
| Probable Cause | | | | | |
| Grouped together Incorrect or Lack of Detailed Information | 85% | -- | 32.67 | 9 | < 0.001 |
| Subdivided Incorrect or Lack of Detailed Information | 75% | -- | 61.03 | 20 | < 0.001 |
| Reporter-Identified Factors | | | | | |
| Airspace Communication | 75% | 0.60 | 4.84 | 1 | < 0.05 |
| ATC/Clearance Problem | 70% | 0.36 | 1.06 | 1 | > 0.1 |
| Underuse of Optional ATC | 95% | 0.84 | 8.45 | 1 | < 0.005 |
| Pilotage Limitations | 85% | 0.49 | 1.98 | 1 | > 0.1 |
| General Human Factors Antecedents | 90% | 0.80 | 9.53 | 1 | < 0.005 |
| Equipment Failure | 100% | 1.00 | 4.49 | 1 | < 0.05 |
| Violation Handling Error | 80% | 0.54 | 3.59 | 1 | < 0.10 |
| Overly Restrictive Rules | 95% | 0.69 | 1.87 | 1 | > 0.1 |

The chi-square ($\chi^2$) tests of independence were used to determine the statistical significance of the inter-rater agreement for each dimension (at a bare minimum, the apparent agreement between the two raters must not be attributable to chance). The resulting *p*-values are shown, with the associated chi-square values and degrees of freedom (*df*). Cells with zero expected values were deleted from the analysis and the degrees of freedom adjusted accordingly. Yates correction was used when the degrees of freedom were 1.

Reliability was consistently sufficient for all dimensions except for certain Reporter-identified Factors. Inter-rater reliability was calculated for Probable Cause both as a four-category dimension, with all subcategories of Incorrect or Lack of Detailed Information grouped together, and as a seven-category dimension, with each subcategory treated individually. The reliability is fairly low when the subcategories are treated separately, comparable to the reliability of the Airspace Communication Reporter-identified Factor. The impact of such levels of reliability is greater uncertainty regarding the observed proportions among the categories. The actual proportions for the entire population of cases may be substantially different.[7]

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[7] Statistically, one impact of low reliability is that relationships among dimensions becomes diluted by the "noise" that low reliability brings. However, it will be seen later that there is a significant relationship

Among the Reporter-identified Factors, ATC/Clearance Problem, Pilotage Limitations, and Overly Restrictive Rules (shaded gray in Table 7) all had inter-rater reliabilities that approached chance ($p > 0.1$), and Violation Handling Error has marginally acceptable inter-rater reliability. For Pilotage Limitations and Overly Restrictive Rules, the intuitively odd combination of high percentage agreement and nearing-chance performance is due to the very low frequency of these factors. For example, according to one rater, only one narrative out of 20 was classified as including Overly Restrictive Rules as a factor. Probabilistically, two unrelated but low frequency events are likely to fail to occur together (i.e., to apparently "agree") simply because they are unlikely to occur at all. The *p*-values for these factors reflect this. Due to their low reliability, ATC/Clearance Problem, Pilotage Limitations, and Overly Restrictive Rules are not statistically analyzed in this study, although Pilotage Limitations and Overly Restrictive Rules are discussed qualitatively.

## 5.    Analysis

### 5.1.    Violation Type

Of all the ASRS reports selected for this study, 15% of the respective narratives did not explicitly indicate that the pilot was actually accused by a federal authority of any violation, but the reporter was nonetheless concerned about a potential violation. This necessarily includes both cases where there was no accusation and cases where the reporter simply neglected to mention there was an accusation. The specific violations of concern are given in Table 8. As the DC ADIZ constitutes airspace quite different from the others in this study while accounting for nearly half of the cases, the statistics for violation of concern and other dimensions are broken down for the DC ADIZ versus other airspace.

**Table 8. Violation of concern.**

| Category | DC ADIZ | Other Airspace | Total |
|---|---|---|---|
| Entry into Restricted Airspace | 57.0% | 90.3% | 73.9% |
| Activation or Clearance | 21.0% | 5.8% | 13.3% |
| Transponder Use | 18.0% | 3.9% | 10.8% |
| ATC Communications | 1.0% | 0.0% | 0.5% |
| Flight Path or Procedure | 3.0% | 0.0% | 1.5% |

Category of violation of concern varied depending on the airspace. Unauthorized entry into restricted airspace accounted for the vast majority of cases involving airspace other than the DC ADIZ. For the DC ADIZ, about half of the cases involved violations other than simple unauthorized entry ($\chi^2(4) = 29.84$, $p < 0.001$). This is probably simply due to the other violation categories concerning proper penetration of airspace (e.g., activating a flight plan and getting a clearance from ATC). While pilots are generally allowed into DC ADIZ, many if not most TFRs effectively do not allow any penetration –there is no procedure for pilots to become confused about. These TFRs afford no opportunity to make any violation other than simple entry into restricted airspace.

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between Airspace Communication and Airspace Violated, implying that the observed reliability is adequate for the purposes of this study.

## 5.2. Pilot Preparation for Airspace

Most of the narratives (53%) did not indicate if the pilot did or did not get any NOTAMs or a briefing prior to flight, while 39% explicitly said the pilot got at least some NOTAMs or a partial briefing, and 7% explicitly said the pilot did not get any briefing or NOTAMs. Compared to narratives involving other airspace, narratives involving the DC ADIZ are somewhat less likely to mention getting or nor getting NOTAMs or a briefing (62% versus 46%, $\chi^2(2) = 6.82$, $p < 0.05$). In any case, there is a substantial proportion of pilots in these reports who made at least some effort to be aware of the airspace they would be transiting but nonetheless became concerned about a violation. The following narrative from the ASRS reports is a case where the pilot apparently received both an electronic and personal briefing on the airspace, yet still incurred an apparent violation.

> *I was told I entered a TFR that was placed over Chicago on [a day in June 2003]. This was due to a visit from government official. I was aware of the TFR from reading the notice on internet weather service, when I checked my weather and TFRs. Internet weather service I thought has about the best format for checking a pilot's preflight weather and en route conditions. I understood that there was a 30 mi restriction from ORD (O'Hare). I was told by the agency I talked with that it was 30 mi from the center of downtown Chicago. Then another person said from the center of Midway Airport. My route is outside the 30 mi Mode C ring south of Chicago's Class B airspace. I assumed I was well clear of the TFR. Later I downloaded my track from my GPS [(Global Positioning System] to DeLorme Topo [software]. It showed me between 36-39 mi south of O'Hare, 28 mi south of downtown, 24-26 mi south of Midway. As our company check pilot I stress checking TFRs on a daily, flight bases. The government employee that I had to speak with made the comment that this TFR was confusing to him also.* [ACN 584256][8]

## 5.3. Probable Cause

Statistics for the probable cause of the violation of concern are given in Table 9. Overall, the probable cause of most violations was incorrect or a lack of detailed information about the airspace. Most violations were not due to the pilot being simply unaware of the airspace at the time of violation. Probable cause varied significantly with airspace ($\chi^2(3) = 11.41$, $p < 0.01$), with apparent violations of the DC ADIZ being more likely to be due to incorrect or lack of detailed information, and less likely to be due to the airspace being outright not known or recalled. While the establishment of the ADIZ was relatively well publicized, airspace other than the DC ADIZ includes Presidential and other TFRs that may be imposed with little notification, making it relatively more likely to escape a pilot's awareness.

**Table 9. Probable cause of violation of concern.**

| Category | DC ADIZ | Other Airspace | Total |
|---|---|---|---|
| Airspace not known or recalled | 12.0% | 30.1% | 21.2% |
| Incorrect or lack of detailed information | 74.0% | 59.2% | 66.5% |
| Control setting error | 3.0% | 1.0% | 2.5% |

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[8] ACN (Ascension Number) is the uniquely identifying ASRS report number. All ASRS narratives quoted in this report were converted from all capitals in the original to sentence case. Abbreviations in the originals have been spelled out. The original ASRS records may be accessed through their ascension numbers at the National Aviation Safety Data Analysis Center website (www.nasdac.faa.gov).

| Category | DC ADIZ | Other Airspace | Total |
|---|---|---|---|
| Indeterminate / Multiple / Other | 10.0% | 9.7% | 9.9% |

The following narrative from the analyzed ASRS records is an example of such a case where the pilot appears to have been completely unaware of a TFR.

> *Called Altoona, PA, FSS (1-800-WX-BRIEF). Told controller I was flying to Sarasota/ Bradenton International Airport [FL] at 8500 ft MSL [(mean sea level)], VFR. He said it was low clouds around North Carolina, but I should be fine. I should have asked for any NOTAMs…. [While reporter was flying over Florida, an] FA-18 [interceptor] told me to turn [to] heading of 270 degrees. Complied, told to call control tower upon reaching Sarasota. Asked to spell name, was told to fly back to Jacksonville International Airport. Security put us under arrest. Bomb dogs sniffed airplane. Jacksonville security very apologetic and professional. Four hours later interviewed by secret service. After 10 minutes he let my wife and I go. Told us we got too close to temporary restricted flight zone. Took us back to airplane and said good-bye. 1) I failed to ask FSS for NOTAMs. 2) [unrelated mechanical problem]. 3) Should have done flight following. 4) 27 years of United States military service, should prepare better….* [ACN 593733]

### 5.3.1.     *Incorrect or Lack of Detailed Information.*

For most cases, however, pilots are aware of the restricted airspace, but lack certain correct information that would have prevented the violation. The specific correct information that pilots were lacking is shown in Table 10. Compared to apparent violations of other restricted airspace, apparent violations of the DC ADIZ are significantly more likely to involve lack of correct knowledge for the procedures for allowed penetration, and less likely to involve lack of correct knowledge of the date when the airspace is restricted ($\chi^2(3) = 17.11$, $p < 0.001$).

**Table 10. Breakdown of incorrect or lack of information. Percentages are of all cases.**

| Category | DC ADIZ | Other Airspace | Total |
|---|---|---|---|
| Distance to airspace | 40.0% | 41.8% | 40.9% |
| Time or date of effect | 0.0% | 5.8% | 3.0% |
| Procedures for allowed penetration | 31.0% | 8.7% | 19.7% |
| Unspecific | 3.0% | 2.9% | 3.0% |
| **Total** | 74.0% | 59.2% | 66.5% |

This stands to reason as most TFRs effectively do not have procedures for allowed penetration, but often have effective dates and times. Even for TFRs, however, incorrect knowledge about the time or date of the TFR is not associated with a large proportion of the violations.

As shown in Table 10, for both the ADIZ and other airspace, the most common lack of detailed information is that the pilot does not correctly know his or her distance to the restricted airspace. This may be a result of either incorrect understanding of the boundaries of the airspace (e.g., it being larger or extending further in one direction than expected), or it may be due to a navigation error. For some cases, the distinction cannot be determined from the ASRS record, as in this case which may have involved imprecise knowledge of the reporter's own position or of the southern boundary of the DC ADIZ, or a little of both.

*I filed an ADIZ flight plan with Leesburg FSS. Flight plan for VFR flight from Manassas Regional Airport [VA] to Cambridge-Dorchester Airport, for [a morning] departure and return [six hours later]. I received an ADIZ clearance from Manassas tower, a squawk and departure frequency. Departed from runway 16R and proceeded southwest to Casanova VOR [ground-based radio navigation aid]. Called Potomac Approach. Controller was busy due to high traffic on weekend VFR day. No acknowledgement of radar contact. After heading to Casanova for approximately 7 minutes, requested a turn to Brooke VOR. Was given a standby. A few minutes later, controller called and said, 'clear of ADIZ, squawk 1200 proceed on course.' I turned to heading of 090 degrees to Brooke. I continued 'on course' via Brooke to Cumberland [MD] VOR. In doing so, I entered the edge of the southern limit of the ADIZ. I continued flight as planned to Cambridge. At Cambridge, I was requested to call Potomac TRACON [(Terminal Radar Approach Control)]. I was advised that I had flown through the ADIZ without a discrete code. Suggestions: I should have queried the controller as to route of flight since it was questionable as to the procedure for a flight through the ADIZ. I should have requested flight following which would have required a discrete code. On the return trip, I contacted Patuxent Approach and requested flight following and activation of my flight plan. The return flight was essentially the same route with several handoffs. I will use this experience to assist other pilots in the use and procedures of the TFR/ADIZ.* [ACN 597741]

It appears that misunderstanding of the vertical dimensions of the airspace rarely causes problems. More commonly, pilots are unclear on the lateral dimensions of the airspace, and may attempt to use existing well-known or well-mapped boundaries as a guide.

*I had not flown my Piper Cherokee for over a month. I was at the service center with my company's Gulfstream IV and Gulfstream V. Upon my return to the Washington, DC area, opportunity was presented to fly my Cherokee. I departed Shannon Airport, Fredericksburg, VA approximately [10 minutes pass the hour] with the intention of flying a local VFR flight…. I was aware of the 30 mile Washington ADIZ, but thought that the ADIZ did not extend far enough south that it would conflict with the GPS Runway 24 approach [I use for practice]. Additionally, I mistakenly assumed that the ADIZ would conform to the 30 mile Class B outer ring of Dulles/Washington. Furthermore, I never contacted flight service, which is normally my practice, in order to discuss the area NOTAMs. The basis for not contacting flight service was that my primary mission intention was to fly within the immediate airport area, get the oil temp up on the engine and boil off the moisture and land. However, as the flight progressed, I decided to do a little training. I attempted to contact Potomac and Quantico Approach without success on both my #1 and #2 receiver. In my experience this is not unusual. Generally it is more effective to fly to the Richmond area and attempt to get into the [ATC] system. [Conducted various training maneuvers around Fredericksburg]. Approximately 3 miles from [a fix for an approach to Shannon], I was intercepted by a customs helicopter and ordered to land. After landing, I was informed that I had violated, by a mile or more the Washington ADIZ. It could probably be argued whether or not I actually penetrated the ADIZ. It doesn't matter, I was too close. Pilots don't like to make mistakes. I've been flying for forty-five years, all over the world, and never had an incident or violation. I got complacent, I assumed, when you should assume nothing in this business.* [ACN 575606]

At the time of the above incident, the DC ADIZ was not depicted on charts. While in most places the DC ADIZ does in fact coincide with the Class B outer ring (which *is* shown on charts), this is

not so along the southern edge of the ADIZ (see Figure 5). Several pilots in the analyzed ASRS reports missed this detail.
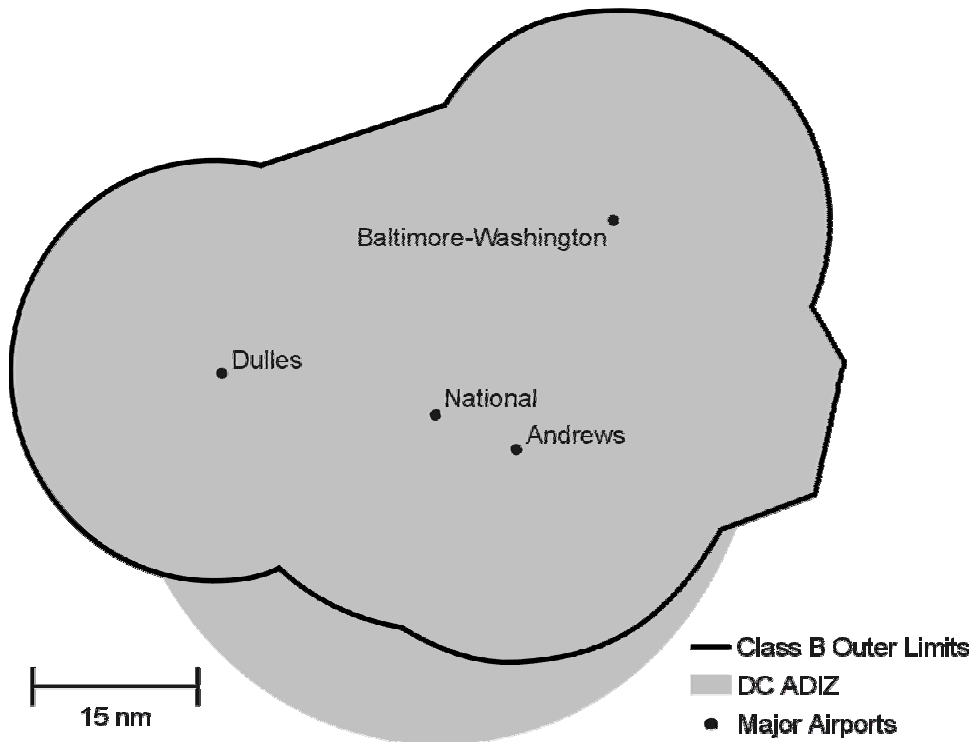


**Figure 5. DC ADIZ and Class B outer limit correspondence.** Note that while most of the ADIZ coincides with Class B, the ADIZ extends beyond it in the south. Several violations are associated with pilots not being aware of this detail.

Even having the latest most sophisticated navigation equipment is no guarantee, as the information on restricted airspace in the databases of such equipment can only be as good as that available through official sources. Pilots appear to be finding such information confusing in certain cases.

> *The event(s) involved the possibility of infringement in the expanded P-40 airspace surrounding Camp David. The problem arose as I have had recent cause to question the course that I have taken around the airspace. I regularly obtain a flight briefing prior to flying. I have been aware of the frequent NOTAMs involving the expansion of the airspace since inception. I fly the area weekly and usually file ADIZ transition, or file IFR through the Class B airspace. I also fly VFR without radar coverage for local flights. I... have an IFR certified approach and en route GPS. I have a current commercial database supplier database that I subscribe to and receive monthly updates. I have used the GPS for guidance assuming that the special airspace for P-40 is depicted accurately. P-40 is depicted with 2 concentric circles surrounding it. I assumed that the inner circle was 4 nm and the outer circle was 10 nm from the P-40 site. This would allow the pilot-in-command to navigate with reference to these delineations. The pilot could thus navigate around the larger circle when the expanded airspace is in effect. After contacting commercial database supplier, I discovered that the circles on the map were not 4 nm and 10 nm as I surmised, but 3 nm and 5 nm. There are no size labels on the map to indicate this. This ambiguity may mislead the user. Commercial database supplier offered no reason as to why the markings were at 3*

*and 5 nm as the reference made no particular sense to the present airspace situation….*
[ACN 595198]

While the reporter above suspects an error in the database, the depiction is actually consistent with the official government navigation charts. The inner circle is P-40 itself; the outer circle is not the 10 nm TFR expansion of P-40, but a 5 nm ring whose meaning is not apparent. The symbology does not correspond to any established airspace representation and its definition is not given in the map legend (FAA, 2004).[9]

Alternatively, the pilot understands the boundaries of the restricted airspace but, due to a navigation problem, the pilot does not know his or her own precise position.

> *Incursion into Newport, in TFR ([NOTAM #] FDC 1/0661). I was on a VFR flight at 4500 ft MSL en route from Monroe County Airport, Bloomington, IN to Terre Haute VORTAC [ground-based radio navigation aid], directly to Rantoul Airport, IL. The beginning of the Newport TFR was no less than 5 nm from my intended route of flight. Weather conditions were VFR, but grey and moderately hazy due to extensive cloud cover at 7000-8000 ft. Visibility was 6+ nm. I had received a weather briefing and relevant NOTAMs from St. Louis FSS and through DUAT [electronic briefing service] prior to my initial flight from Rantoul to Bloomington earlier. I flew from Bloomington toward the Terre Haute VORTAC without incident. Upon departing the Terre Haute VOR checkpoint toward Rantoul, I believed I was on the proper route, however, I apparently ended up off-course and traversed the Newport, IN, TFR at 4500 ft MSL or about 1000 ft to 1100 ft below the TFR's AGL [(above ground level)] altitude limit of 5000 ft. I believe that I was off course because of stronger than anticipated westerly winds…. I simply became disoriented as a new pilot in an unfamiliar area and did not reorient to multiple VORTACs fast enough. As this was my first flight in the vicinity of a TFR, I believe corrective actions would include the following: 1) If lost or off-course in the vicinity of a TFR, seek advisory services or vectoring from ATC/FSS immediately to avoid such an incursion. 2) Plan VFR flight routes well enough away from any TFR. 3) plan flight altitudes substantially in excess of TFR minimums (in this case, ceilings were lower than preferred and may have compromised safety).* [ACN 599483]

As shown in Table 10, the second most common lack of correct information was for the procedures that allow penetration of the restricted airspace, which, as mentioned above, is particularly common for the DC ADIZ. Specifically, pilots appear to often have difficulty with the procedure to get clearance into the DC ADIZ, which involves activating a flight plan, establishing contact with ATC, and getting a discrete transponder code. One common error is to attempt to get a clearance and transponder code after takeoff from an airport within an ADIZ. While it is common practice for a pilot to takeoff in VMC then initiate IFR flight or use other ATC services in this manner, it is a violation for the ADIZ; pilots must be cleared and squawking before the wheels leave the ground.

> *I called Leesburg flight service to file an ADIZ flight plan from Leesburg Executive [inside the DC ADIZ] to Chester Company Airport. After the flight plan was filed, I asked the briefer for my transponder code. The briefer informed me that after takeoff, Potomac Approach will give me a squawk code. I contacted Potomac Approach as soon as possible after takeoff. Potomac Approach informed me that flight service should*

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[9] The 5 nm ring could be an attempt to represent a static TFR placed around Camp David in April 2002 as described by NOTAM 2/3251 (Aircraft Owners and Pilots Association, 2002). This NOTAM was apparently canceled some time later, being replaced by a recurrent 10 nm TFR.

*have given me a code. I then turned back and landed at Leesburg executive to contact the office. The person I spoke with at Potomac Approach listened to the event and contacted Leesburg flight service. He said he was sorry about the mix-up, but he had to file the report, because the squawk code is necessary for takeoff.* [ACN 595615]

In addition to misunderstandings concerning getting a clearance into restricted airspace, many violations can be traced to misunderstandings concerning the use of the transponder while flying in restricted airspace. This can be seen in this following example concerning the New York ADIZ, a restricted airspace that was only in effect for a few weeks, allowing pilots and ATC alike little time for education and adjustment.

*We are now approaching the north New Jersey shoreline well inside the ADIZ and we are told "radar service terminated, squawk 1200 and frequency change approved, unable to make a hand off New York".... I questioned them about maintaining contact with ATC and asked for a frequency for New York. She gave us one to try and I made immediate contact with them. They identified us and the flight up the corridor was uneventful. Just before we were transferred to Newark Tower as we progressed up the river, we were told to call New York approach by telephone when we got on the ground.... I called the New York TRACON when I got on the ground. I was informed that I had penetrated the NY ADIZ on a 1200 code.... ATC needs to be better trained in the procedures involving the TFRs for national security. I did everything as the procedure stated. I briefed myself that morning on the procedures as well. I called FSS, filed a flight plan, called McGuire Approach to activate it, and stayed in radio contact. Yet I am still being told I had a violation. I believe ATC, McGuire Approach made an error when they terminated us without a frequency change. The only [thing] I am not 100 percent sure of is if they told us to change to 1200 code. My copilot and passenger both said they did....* [ACN 579443]

Outside restricted airspace, it is common to switch the transponder to 1200, the standard VFR code, when radar services are terminated. However, when in ADIZ-like restricted airspace, 1200 must never be squawked, even briefly. Especially when new restricted airspace is imposed, it is easy to imagine local pilots and even controllers missing differences from the usual procedures.

Other violations were concerned with misunderstandings about radio communications and allowed flight paths. Operating within the DC ADIZ is particularly complicated, where individual airports vary on the procedure for getting a clearance and transponder code, for contacting ATC, and allowed and prohibit paths or procedures (Aircraft Owners and Pilots Association, 2004). For example, for a time at some airports just inside the ADIZ, pilots were *not* required to get a discrete transponder code if they are leaving the ADIZ by a "direct" route.

*New procedures were implemented for Washington ADIZ for special airports [inside the ADIZ] including Martin State, which includes the following: pilots shall fly the most direct route out of the ADIZ. Our training flight departed Martin following the prescribed procedures. As the NOTAM says, we flew directly to Westminster VOR [to the northwest outside the ADIZ]. Upon reaching our destination of Carroll County airport, we were informed by ground personnel to contact Potomac [Approach]. We were told by Potomac that we're in violation for not flying the quickest route out of the ADIZ, meaning to fly directly north of Martin state, or directly southeast. However, as a pilot, the definition of direct is to fly the shortest distance between 2 points, without deviating from that course, so as interpreted by many pilots, we flew the most direct route to Westminster. Problems with the current sys include: 1) The ambiguity of the wording 'most direct.' 2) No statements are made on what is the most direct route out of*

*the ADIZ. 3) The same route was completed the night before, and was never told that a deviation had occurred. 4) We monitored the appropriate Potomac frequency, but was never advised that we were deviating from the intent of the NOTAM. To conclude, I feel that future violations can be minimized if the wording of the NOTAM is changed, so that there leaves no room for interpretation. I understand that these current procedures are a test, and as a pilot operating from within the ADIZ, I want them to be successful. I hope my statement shows that NOTAMS of this magnitude should be worded very clear, so that mistakes will not be made.* [ACN 599020]

By January 2005, the NOTAM associated with these procedures were changed to instruct pilots to take "the shortest route" out of the ADIZ (FAA, 2005b).

### 5.3.2. Control Setting Error and Other Causes

Errors in setting controls appears to relatively rarely cause violations of restricted airspace. For some cases of this class, the pilot by habit made an input that normally would be correct, but resulted in a violation when done within restricted airspace. For example, as described earlier, after radar services are terminated or IFR flight is canceled, pilots are supposed to change their transponders to 1200 --*unless* they are operating in the DC ADIZ for which they must continue to squawk the assigned discrete code until either they leave the ADIZ or land. However, the habit to switch to 1200 can be so strong that pilots may do it without even thinking.

*I was on an IFR flight plan landing at Leesburg Executive Airport [inside the ADIZ]. Controller told me to switch to UNICOM [airport communication] frequency when I canceled IFR flight plan but to remain on discrete IFR squawk. Because of distraction with other aircraft in landing pattern and because of training, I inadvertently squawked '1200' which I know was incorrect. Homeland security spoke with me about the incident.* [ACN 601541]

The Indeterminate / Multiple / Other category of probable cause mostly contains cases where a single cause cannot be determined, often due to insufficient information. In the following narrative, it is not clear what may have caused the violation, if, in fact, there was a violation.

*While on an air medical helicopter flight from [one location to a] hospital, I learned that a TFR was in effect for the area while inbound northeast of [a] city. I contacted approach control west of [another] city, and requested clearance to [the] hospital. I was told to hold my position and to squawk an assigned code. I was also advised of traffic which was at my altitude and not talking to approach. I was also advised that the aircraft was on the edge of the TFR and would be intercepted. I was then given clearance to [the] hospital and given a phone number to call when on the ground. I called and talked to a supervisor who asked for my name, address, phone number, and pilot certificate number. I asked if I had violated the TFR airspace and was told that he knew nothing about it and that he was just taking my information. I don't believe I was in the TFR airspace.* [ACN 593019]

This probable cause category also includes causes that cannot be linked to human error, such as an apparent equipment malfunction.

*…Certified flight instructor (pilot-flying) receiving instruction for initial multi-engine rating from certified flight instructor/ pilot-in-command (pilot-not-flying). Filed two ADIZ VFR plans with Leesburg FSS to depart ADIZ Leesburg Executive Airport (Leesburg, VA) direct to Winchester Regional Airport (Winchester, VA) and return.*

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*Departed Leesburg. Contacted Potomac Departure, direct Winchester. Exited ADIZ, squawked 1200. Airwork performed as prebriefed. Gear extended several times during lesson. Upon retraction, gear exhibited in transit light and low voltage bus warning light flashed on/off several times…. Contacted ATC on 125.05. Received [transponder] code [number] and pilot-in-command entered code with read back to ATC. Pilot-in-command (pilot-not-flying) and student (also certified flight instructor) visually verified [discrete code] Mode C displayed on transponder. Aircraft entered ADIZ [five minutes after that]. Approximately 5 minutes later, ATC requested our position and heading. Pilot-in-command (pilot-not-flying) advised location and heading. ATC requested squawk identification, pilot-in-command complied. ATC advised transponder transmitting code 1200 and advised 'squawk [discrete code] quickly.' Pilot-in-command verbally confirmed transponder set to [discrete code] and recycled as precaution…. Next day, Potomac Approach quality assurance advised ATC tapes showed aircraft entered ADIZ at [a certain time], displaying code 1200, despite cockpit display of [the discrete code].* [ACN 602516]

Very rarely, there is an apparently deliberate violation of the restricted airspace.

*Our Homeland Security Act has established new aviation rules and regulations. Apparently there are abundant funds to investigate unintentional infractions, but no funds available for an updated communication systems to assist general aviation pilots. A telephone system which puts general aviation pilots in line 'to be answered by the next available operator' similar to the preflight weather briefing system and more available [radio] frequencies to contact Potomac Approach would be viable solutions to alleviate unfortunate and unintentional incidents such as the one I find myself faced with. On a routine, round trip, 20 nm flight from Glenair Airport [inside DC ADIZ] to Carroll County Regional Airport [outside ADIZ], 2 ADIZ flight plans were filed. We contacted Potomac Approach by cell phone, received our clearance and departed. An hour later, in preparation for the return flight, while trying to contact TRACON, we received only busy signals for in excess of 10 minutes. Unfortunately, Saturday afternoon became a very busy time and we were not able to make contact. The boys with the big transmitters continuously overpowered us for the entire 10-min flight to the ADIZ. We penetrated the ADIZ at 1600 ft MSL for 2 1/2 minutes -- the time it took to traverse the outer limits and land at Glenair….* [ACN 600552]

While the reporter quoted above describes the violation as "unintentional," she or he obviously knew Glenair was in the ADIZ, and therefore surely would have understood that proceeding to and landing there would constitute breaching the ADIZ boundaries.

## 5.4.    Relationship between Probable Cause and Violation

Probable cause is strongly related to the violation of concern ($\chi^2(24) = 130.24$, $p < 0.001$). This relationship is shown Table 11. Entry into Restricted Airspace is usually due to either the pilot not being aware of the restricted airspace (or forgetting about it), or due to the pilot having incorrect information about the aircraft's distance to the restricted airspace. In contrast, all other violations are evidently most often due to the pilot having incorrect information about the procedures for allowed penetration of the airspace. This is consistent as the other violations all involve the procedures for allowed penetration (i.e., getting a clearance, maintaining radio communications, and squawking the correct transponder code). In contrast, when the pilot is concerned with simply staying out of the airspace altogether, the key information to understand is the presence of that airspace and the relative position of its boundaries.

**Table 11. Percent of each violation of concern associated with each probable cause.**

| Probable Cause | Violation of Concern | | | | |
|---|---|---|---|---|---|
| | Entry into Restricted Airspace | Activation or Clearance | Transponder Use | ATC Communi-cations | Flight Path or Procedure |
| Airspace not known or recalled | 28.0% | 3.7% | 0.0% | 0.0% | 0.0% |
| Incorrect or lack of detailed information (unspecific) | 4.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Distance to airspace | 50.0% | 25.9% | 0.0% | 0.0% | 33.3% |
| Time or date of effect | 4.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| Procedures for allowed penetration | 2.7% | 63.0% | 72.7% | 100.0% | 66.7% |
| Control setting error | 1.3% | 0.0% | 13.6% | 0.0% | 0.0% |
| Indeterminate / Multiple / Other | 10.0% | 7.4% | 13.6% | 0.0% | 0.0% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Control setting errors appear to be most closely associated with transponder use violations, suggesting that slips in the use of the transponder is the most common control setting error associated with violations of restricted airspace.

## 5.5. Reporter-Identified Factors

For each reporter-identified factor (omitting the unreliable ones), Table 12 shows the percent of cases that had that factor. There was no significant differences between the DC ADIZ and other airspace on the factors, except that reporters were more likely to point to Airspace Communication for other airspace (59.2%) than for the DC ADIZ (42.0%, $\chi^2(1) = 5.35$, $p < 0.025$).

**Table 12. Percent of cases including each Report-identified Factor.**

| Factor | Total |
|---|---|
| Airspace Communication | 50.7% |
| Underuse of Optional ATC | 16.7% |
| General Human Factors Antecedents | 27.1% |
| Equipment Failure | 6.4% |
| Violation Handling Error | 16.3% |

### 5.5.1. Airspace Communication

Consistent with the finding that a lack of correct detailed information frequently is the probable cause of violations of restricted airspace, reporters often point to communication problems concerning the airspace as a factor contributing to violating the airspace. While the relatively low inter-rater reliability of this factor lends some uncertainty to the actual frequency in the population, it is clearly the most common contributing factor identified. Such communication errors can involve any source of airspace information, including "official" sources such as FSS briefers.

> *Called flight service station [in the morning], was told of temporary restriction area (TFR). As I understood, it was a 30 mi radius from the Ventura [CA] VOR. I took off from Long Beach at [an hour and half later], turned west through the Los Angeles Special Flight Rules airspace [a separate ADIZ-like airspace] to Santa Monica, then north. I had assumed that this would keep me well east of the TFR. While transitioning through the Special Flight Rules area I was squawking [a discrete transponder code] and monitoring 128.55 as directed by the Los Angeles terminal chart. At approximately 7 miles south of the Van Nuys Airport, I called Southern California Approach for advisories to my destination at Mammoth Lakes, CA (MMH). I was told to turn east to clear me from the TFR and call an 800 number at Los Angeles Center Control. What I think I did wrong was to assume that all TFRs were to be a fixed distance from an established radio navigation aid, i.e., a VOR. When I heard the FAA weather briefer mention a fix from the Ventura VOR of a 037 degrees and 5.7 miles, I took this to mean that the TFR was to protect something from that location, not that the 30 mile radius was to originate from that position. This of course extended the restricted area more easterly than I had thought. Conclusion, I should have stopped the fast talking briefer to ask specific questions and not assume anything....* [ACN 590613]

While the above narrative apparently involved a misunderstanding, in some cases, pilots claim the briefer gave them flat-out incorrect information. In the following example, it appears the briefer was unaware that the P-49 prohibited area over Crawford, TX, was expanded.

> *I got an in-person briefing at the Casper [WY] FSS.... One hour later, left Casper Airport for West Houston Airport [TX], making a fuel stop at Liberal Municipal Airport, KS. Then about one hour later, proceeded direct for West Houston Airport, making deviations for several thunderstorms and for Military Operations Areas in the vicinity of Wichita Falls Municipal Airport, TX. Northeast of Waco, TX, at 9500 ft [over 15 mi from Crawford], I was intercepted by two F-16's and when I contacted Waco Approach, was instructed to land at Waco Regional Airport. I did get a complete briefing at the Casper FSS for weather, NOTAMs, and the like. I had asked about restricted areas along the route of flight. I was told that a restricted area existed at Colorado Springs, but that I would be well to the east. I specifically asked about the Waco-Crawford area and was told that the area around Crawford was a 3 mi radius. I asked if I'd be okay to the east of Waco and I was told that I should be okay. My Waco chart (current issue) shows no restricted zone at all --though I thought one existed. At the time of the incident, I thought I was clear. I was listening to 122.8 on one radio and to 122.0 on the other and squawking 1200. I was at 9500 ft on a direct heading for west Houston Airport, and was VFR. In retrospect, had I been on a VFR flight plan, the en route controller would probably have kept me further to the east of Waco, TX.* [ACN 582776]

Pilots have also pointed to the omission of information as a factor, although it may be difficult for a FSS briefer to anticipate what information is necessary for a particular case.

*I planned an instrument training flight with a student, from Essex Skypark (Essey, MD), to Eastern WV Regional Airport (Martinsburg, WV). The student filed an instrument flight plan and asked the briefer what frequency to pick up the IFR clearance on. The briefer told my student 119.0. We departed Essex with a [a transponder code for local pattern work] and contacted Potomac Approach around 800 ft AGL. After a minute or two, Potomac gave us our IFR clearance. We were then given an 800 number to call. I had wrongly assumed that, because Essex lies within MTN (Martin State [Airport], Baltimore, MD) Class D airspace, that we could depart Essex on a [pattern-work] squawk and contact approach for our IFR clearance once airborne. At the time, it was not clear to me how to pick up an IFR clearance from Essex (other than on the ground), since the ADIZ was surrounding the Baltimore and Washington area. When the student asked the briefer for the frequency to pick up an IFR flight plan, the briefer said 119.0, but did not mention that you first have to at least get a squawk on the ground to enter the ADIZ, (which both the student and I should have realized). This further led to our confusion. According to my student (who got the briefing), the briefer did ask if he was familiar with the ADIZ, which he said he was....* [ACN 602933]

Another potential source of confusion is the written NOTAMs. For some, the large number of NOTAMs to peruse before flight, plus their low readability, can make determining the relevant NOTAM difficult.

*Overflying the Los Angeles International Airport Class B [airspace] at 13500 ft, I noticed a fighter jet fly by.... Shortly before my departure I printed out a full DUATS [electronic] briefing and flight plan (35 pages) for the direct route to Montgomery Field Airport [San Diego, CA]. Eleven of those pages were NOTAMs. I later found the Los Angeles TFR on the sixth NOTAM page, (the fifth FDC NOTAM) but I missed seeing it during my preflight reading....  There are a few things I think DUATS could do better which might help prevent similar incursions. First, government TFRs, because of their high profile should be listed first before all other NOTAMs (if it was even listed first among the FDC NOTAMs, I think I would have noticed it.) The regular NOTAMs are listed cleanly in upper and lower case with their headings in bold face type so it is easy to scan them to pick out any relevant items. However, the FDC NOTAMs are shown in all capital letters with no headings causing ones eyes to glaze over after a while.... Now if DUATS was as smart as an FSS briefer, it might even have noticed that my proposed route and altitude went smack through the middle of an active government TFR. If so it could display this fact right before or after the flight plan printout. While this would be impractical to do for all NOTAMs, I think it would be justified for popup TFRs. Certainly I was responsible for looking through all the NOTAMs to determine which ones were relevant, but with such a large number of NOTAMs, the chance of human error grows....* [ACN 585771]

While all other restricted airspace (e.g., Prohibited Areas) appears on standard navigation charts, TFRs usually do not and, until February 2004, neither did the DC ADIZ. Many pilots see the lack of such an integrated graphic representation of restricted airspace to be a factor.

*...I received an in-flight briefing from Dayton FSS after departing from my first fuel stop. The specialist gave me 5 separate areas to be cautious of for the flight. 1) R-4501, 2) Crane TFR off of Hoosier VOR, 3) an air show north of Indianapolis, 4) one on the Pine Bluff VOR and one off of the Terra Haute VOR [(over the town of Montezuma)]. I*

*did not know I flew through the TFR over Montezuma, IN, until I was briefed by TRACON supervisor. Mitigating circumstances: I received the proper information on the TFRs from the Dayton FSS, but I wrote it down incorrectly, which is partly to blame because I was flying, trying to write down the info at the same time…. I wrote down that the TFR for the Terra Haute VOR was on the 223 degree radial, when it was actually on the 335 degree radial. It was actually the Hoosier VOR that was using the 223 degree radial…. Contributing factors: 1) Pilot in a hurry to fly as far west as possible. 2) Should have gotten briefing on the ground, not in the air. 3) Weather was very good, so I didn't bother with a full briefing, and only asked for TFR info. 4) This TFR has been in existence for a 1 1/2 years, why can't it be made into a restricted area and put on the chart?* [ACN 588615]

Maps of TFRs have become available from a FAA web site, which represents a substantial improvement, but, as implemented, these are not always adequate to prevent violations.

*I was on a flight to check out my new Mode S transponder, a test flight. After flying up towards Danbury [CT] area I headed south, down Route 7 and Norwalk River which is where I thought the [NY] ADIZ was west of. I mistook the Mode C/ADIZ as west of the Norwalk River/Route 7 instead of west of the Westport River. I was told upon my entrance into Sikorsky Memorial Airport airspace [Bridgeport, CT] to squawk on 1200 VFR, and then told by ground control after landing to call NY TRACON. I called as soon as I got to my house. I inadvertently entered the ADIZ by mistake. Better charting on the internet would have helped me in my preflight planning in this instance.* [ACN 579571]

Pilot also suggested other media for transmitting TFR and ADIZ information, such as the airport's electronic information systems (e.g., ATIS, the Automatic Terminal Information Service, or AWOS, Automated Weather Observing System), postings within the airport, and notes in the Airport Facilities Directory.

### 5.5.2. *Underuse of Optional ATC*

Many reporters suggested that the violation could have been avoided if the pilot had made better use of ATC services, such as flight following or even filing IFR for all flights. As discussed previously, IFR flights rarely experience airspace violations probably due to having two parties (pilot and ATC) monitoring the aircraft position relative to restricted airspace. A similar effect can be achieved for VFR pilots by securing "flight following" services from ATC. However, it appears that sometimes this is not possible, as ATC is unable to provide this service.

*I departed, VFR, from Capital City Airport [Harrisburg, PA] to Hagerstown Regional Airport [about 13 nm west of P-40's center], in a Piper Navajo. Shortly after departure the local controller informed me I was leaving the Class B airspace. I asked that controller for the frequency to obtain flight following, I was given a frequency for DC Center Control. I called and stated my position and requested flight following to Hagerstown, the controller replied that he was unable to provide assistance. (I made this request knowing that P-40 was expanded, and hoped for assistance to remain outside of its boundaries.) When I had a visual on Hagerstown, I was northeast of the field between Chambersburg and Green Castle [PA]. I called tower over Green Castle and reported my position. I was given entry and landing instructions. Upon landing I was instructed to contact approach control. It was at this time that I was informed that I had entered the 'expanded P-40 restricted area. Upon examination of my VFR chart I determined that I misread the dimensions of the P-40 airspace. I noticed the circular*

*restriction area R-4009, followed by a space, then a dashed circular area marked in green on the accompanying chart. I assumed that the dashed line was the 10 mi, 'expanded area' when in fact it was not. [It's 5 nm.] I did measure a 10-mi circle from the center of P-40. I now know the parameters of the 'expanded P-40 airspace.' I assure you that this incursion was entirely unintentional, and that I will not violate this airspace again.* [ACN 597714]

The presence of an ADIZ or TFR represents a significant increase in workload for controllers. They must monitor the airspace and route traffic around it. They must detect and report violations, sometimes tracking violating aircraft for hours. In the case of an ADIZ, they must now give clearances and maintain radio communications not only with the normal IFR traffic but also with all VFR traffic now on ADIZ flight plans (or traffic that is normally VFR but filing IFR to reduce the chance of a violation). This inevitably includes some inexperienced pilots who do not use the radio or ATC services in the most standard or efficient manner. In the following narrative, the controller appears to express some frustration with the repeated request for help from a VFR pilot. Under flight following, ATC provides advisories and vectors to an aircraft only as the controller's time allows.

*On [a Friday afternoon in October], I received a transponder code for transition to the ADIZ at Intersection GOLDA on a flight from Summit Airport [Middletown, DL] to Montgomery County Airpark [Gaithersburg, MD, within the DC ADIZ]. I continued flying until I came to the Bay Bridge [Airport] and turned toward Tipton Airport [Fort Meade]. I was at 1200 ft. There was a wind 10 to 15 knots from southwest. I must have drifted toward the little piece of the Class B airspace. The controller reminded me to keep out of Class B airspace and told me to turn to 260 degrees. I complied and asked how many miles to fly this direction because I didn't want to get into the Washington [FRZ]. I was told to turn back to 330 degrees and I complied. He reminded me how much trouble I would be in if I entered the [FRZ]. By this time I am really concerned and asked him which direction would keep me out of trouble and on my way to Gaithersburg. He said he didn't have time to fool with me, advised me to submit a NASA [ASRS] form. He then told me he was turning me over to a trainee who would help me. I thanked him very much, but I felt like he was toying with me somewhat.* [ACN 596899]

A proportion of cases cannot be determine (due to unreliability of the categorization scheme for the ATC Communication factor), but there appear to be cases of clearances into the DC ADIZ being delayed due to ATC workload. Some pilots end up violating the ADIZ as they loiter outside waiting for clearance to enter.

*…We departed Sky Manor [Pittstown, NJ, west of the NY ADIZ] en route to Linden Airport [inside the ADIZ]…. We filed an ADIZ flight plan, and attempted to contact NY TRACON on 127.6. The controller asked us to call back in two minutes. We then began to circle over Spruce Run reservoir. We made contact again, and asked for clearance into the NY ADIZ. The controller said we were unreadable. We were now circling for 15 minutes. We called the controller again on the same radio he then told us we were on the wrong frequency, and to try 132.8. We made contact with the controller on 132.8 and he cleared us into the airspace with a [transponder] beacon code. We completed our circle to an on course heading of 95 degrees and then the controller told us we needed to call him when we got on the ground. He said we penetrated the ADIZ with out a beacon code…. Human performance consideration: we turned inbound as soon as we made contact, and when we did not receive a clearance we started circling again. This happened twice, and when we finally received a beacon code we were right on top*

*of the NY ADIZ. We should have made contact with a less congested approach control such as Lehigh Valley International….* [ACN 579274]

An overworked controller is more likely to make mistakes, which may possibly account for pilot-reported erroneous accusations of violations of restricted airspace (see 5.5.3).

### 5.5.3.  Violation Handling Error

A small but not inconsiderable portion of pilots suspect an error in the handling of a violation, often suggesting that they are being incorrectly accused. Given that ATC often cannot positively identify a violating aircraft from the radar display, the potential exists for one aircraft to be confused with another.

> *I called flight service filed an ADIZ flight plan and proceeded to call my TRACON for discrete [transponder] beacon code. Upon takeoff I circled the airport [outside the DC ADIZ] until I was in communication with ATC. At this point I informed the controller that I was airborne and squawking the appropriate code. It was an extremely busy day for ATC. The controller replied that he acknowledged my presence and that there would be no [flight following] radar services at that time. He also informed me to stay clear of Class B airspace…. [Transiting through the ADIZ,] I remained clear of the Class B at all times and monitored the ATC frequency. I did not hear my numbers called. When I arrived at my destination the ground controller said I was told to call TRACON. I phoned TRACON and was scolded by the man on the other end. I explained to him the chain of events and said I felt that I did not do anything wrong. At that point he said he would reprimand the controller….* [ACN 579606]

However, it should be noted that these narratives almost always represent only the pilot's perspective, and the pilot's suspicions may merely be the result of an inability to determine his or her own error.

> *Obtained weather briefing from Millville FSS, standard VFR briefing [(includes NOTAMs)] from Sussex Airport [NJ] to Orange County Airport [VA]. Asked about Washington area TFRs. Departed Sussex. Route of flight was direct, overflying [Frederick VOR?], then under the western outer Class B ring of Dulles at 3000 ft MSL direct Orange County. I squawked 1200 entire route, and did not contact ATC, because I was under Dulles Class B airspace on the west side. Aircraft is IFR GPS certified. My flight plan was well planned using web site to avoid P-40, R-4009 and ADIZ. My route was verified by the GPS and pilotage. I am IFR rated, but chose to fly VFR. My route was 20-24 nm west of the Washington ADIZ. Upon landing at Orange County, line personnel gave me a phone number to call. I called and spoke to the supervisor at Potomac TRACON. He informed me that I had flown through the Washington ADIZ…. A Cessna 172 landed just prior to me at Orange County. I do not know where his flight originated. Perhaps the line person was supposed to give the Cessna the phone number to call. I cannot see how TRACON had me in the ADIZ when I was at least 20-24 nm west of it. I would never purposely fly into an ADIZ without first obtaining a clearance.* [ACN 600267]

Despite the reporter's certainty of not violating the ADIZ, the narrative happens to provide enough details to determine the error. The pilot says the aircraft passed under the western portion of the outer Class B ring of Dulles. This is most definitely within the ADIZ. The position is 20-24 nm west of the *FRZ*. It would seem this pilot confused the FRZ boundary with the ADIZ

boundary. The very fact that pilots can be directly told that they violated the airspace but they cannot understand it is an indication of the confusion TFRs and ADIZs have fostered.

Many narratives that suggested problems with the handling of a violation included concern about things other than an allegedly incorrect accusation. In particular, there are reports of communication problems between interceptors and the pilot. Intercepted pilots have complained of interceptors failing to respond on the standard emergency frequency of 121.5 MHz, which pilots expect from their training.

> *...Prior to this flight, on this day I had checked the weather and flight information…. For MSP [(Minneapolis-St Paul International Airport)] one of the NOTAMs [according to Meteorologix, an electronic briefing system] was as follows: 'MSP 06/078 MSP see FDC 3/4756 ZMP 91.141 WEF 0306191655-0306191945.' I looked under the flight data center page for a description of the above mentioned FDC [NOTAM] but found nothing. My destination on both flights [of that day] was not MSP or around, so I didn't do further research…. At about 5 miles west-northwest of Lake Elmo Airport (21D) an F-16 aircraft initiated a right turn just in front of me. First I thought the pilot was just avoiding me. I realized on a second passage that I was being intercepted for an unknown reason. I started to turn eastbound then I followed him on his third passage and acknowledged by rocking my wings. Immediately I tried to contact him on 121.5 MHz at least 5 times. I received no answer. Lake Elmo Airport was in front of me therefore I decided to land there. To my surprise, people on the ground informed me about the existence of the TFR for the government official…. Conclusion: Whilst not attempting to absolve myself of the responsibility of contacting FSS for additional info [about the missing FDC NOTAM], had the Meteorologix system, which I used as a legal source to obtain flight information, provided me all the information I needed, I would have avoided the situation of flying into the TFR altogether.* [ACN 584989]

On the other side, there are reports of pilots failing to tune their radios to establish contact with interceptors. Sometimes, the pilot is not immediately aware they are being intercepted.

> *On [a Monday in August], I was returning to Tucson. I was not aware of any restrictions. I was squawking 1200 on my transponder and listening to 122.9 on my radio. In this area I am unable to talk to [Albuquerque Center Control] below 8000 ft. When I was at approximately 7000 ft, an F-16 came up beside my plane. At first I didn't realize the F-16 was there because of me. The F-16 turned in front of my plane and then appeared on my left wing. It circled around me and dropped some flares. I then realized it didn't want me near Mount Lemon so I went north towards Winkleman and circled around to Marana and then to La Cholla Airpark. When I landed at La Cholla Airpark (57AZ), a gentleman from the military was on the telephone for me. He told me I had come within 20 miles of the center of the TFR. I gave him my name, address, telephone number, and address and identity of my airplane. He wanted to know why I didn't go to the air guard emergency channel so I could communicate with the F-16. I told him I didn't know it couldn't reach me. I only thought the F-16 wanted me to avoid the area so I turned around and headed north. I didn't know I was in a TFR…. I have learned from this incident that I should do everything I can to ensure there are no TFRs on my route of flight.* [ACN 593033]

From other narratives, it appears that some occupants of interceptors have taken to holding signs up to their cabin windows in order to tell pilots to contact them by radio. There are standard communication signals for interception that do not depend on radios, involving the visual behavior of the aircraft (FAA, 2004d). However, as the narrative above illustrates, these do not

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always appear to be working. In other cases, the interceptor is perhaps too aggressive in drawing the attention of the pilot.

> *...S of Waco, near Temple, TX, I was severely rattled by a fighter (hard enough to cause scrapes, bruises and contusions to my passenger and myself). He rocked his wings, meaning to follow, which I immediately did and I tried to contact him on 121.5. He sped off to the north until I could no longer see him and I never heard him respond to my 2 or 3 calls. I was confused by the action and not having any direction, decided that I must have wandered into a Military Operations Area not shown on the GPS database, (it was current), so I returned to course. About 10-15 minutes later, I was rattled even harder. This rattle actually broke a hand held radio, caused some damage to the aircraft, additional injury and frighten my passenger. This time the fighter responded to my call on 121.5 and provided a contact frequency to Waco Approach. Approach requested I return and land at Waco Regional Airport for an interview. Being based in Georgetown (less than 75 miles s of Waco) and flying from Georgetown to Dallas Executive Airport frequently, I am very well aware of the P-49 TFR. After this call, I strongly suspected I had entered the TFR. After landing, I was asked to call the tower. It was confirmed by the tower controller that I had, in his words 'nicked the TFR.'...*
> [ACN 588498]

Modern fighters like the F-16 are ill suited for intercepting the small piston-driven airplanes associated with most violations of restricted airspace. It is simply difficult to make a supersonic fighter fly slow enough to not run away from such an aircraft. Once flying relatively slowly (and closely, as necessary for interception), the wake turbulence of a 30,000-pound fighter can be hazardous. In some cases, agencies have taken to intercepting violators with passenger helicopters and business jets apparently due to their better low-speed capabilities. Such aircraft, however, may have limited capability to force an intercepted aircraft to comply with direction.

### 5.5.4.    Pilotage Limitations

As airspace communication problems are consistent with violations being due to the lack of correct detailed knowledge of the airspace, then pilotage limitations is consistent with navigation imprecision causing violations. Pilotage is navigation by ground references using a detailed map, and is a simple and common means of navigating for VFR flight. However, as the ADIZ and TFRs are not defined by ground references, keeping the aircraft clear of the imaginary dividing line between restricted and normal airspace can be a challenge, even when augmented with some electronic aids.

> *I was on a flight checking out a pilot in a new twin Comanche aircraft he had purchased. We were en route from Barstow (BOW) to Sanford (FL). No contact was made with ATC as it was his first flight in type and I didn't want to be concerned with altitude holding. I was aware of the Disney TFR. I dialed in the 030 degree radial from the Lakeland VOR to keep us clear of the TFR. I later moved it to 027 degrees. However, we were later informed that we had flown through it. I was sure we were clear. I have flown over Disney before on IFR plans. This time we were not in contact with ATC, so we were visually navigating. Unfamiliarity with the Disney area was a contributing factor. We relied on the Epcot ball [a large distinct building near Disney] and estimated we were 10 to 12 miles west of it. Next time I go anywhere near Disney I will be talking with ATC again. It is too easy to get distracted and fly into these TFRs. It is also easy to assure you are clear of 'Disney' by keeping a distance from a prominent 'Disney' landmark and find that this is not sufficient.* [ACN 579114]

There are definitely cases where the reporter identifies pilotage limitations as contributing to the violation. However, due to the unreliability of the scheme for categorizing the presence of this factor in the narratives, the proportion of cases with this factor is unknown. It does not appear to be especially frequent, suggesting it may not be as important a factor as other factors. Widespread use of GPS in and of itself cannot be expected to significantly reduce the number of TFR violations.

### 5.5.5. *Remaining Factors*

Quite frequently, the reporter points to general human factors (e.g., fatigue, distraction) as a contributor to the violation. However, as such factors may contribute to human error in any situation, this provides little insight into interventions specifically concerning reduction of violations of restricted airspace.

Pilots relatively rarely blame equipment failure for violations of restricted airspace. Likewise, there appears to be very few complaints about the TFRs or ADIZ being unnecessarily strict and very few calls to reduce the restrictions or responsibilities imposed on pilots. Such comments are so few that a reliable percentage of narratives including such statements cannot be determined. Pilots, even those who have been accused of violating TFRs or ADIZs, appear to accept the need for greater control over the airspace in the interests of improved security.

## 6. Conclusion

## 6.1. Implications of the Basic Characteristics of Violations

Based on the records of nearly 3000 violations recorded by FSOSC, most violations are associated with small general aviation aircraft, namely single engine piston-powered airplanes. In other words, most violations are by the lowest cost and least well-equipped aircraft likely operated by a single pilot crew. The operation of these aircraft is an economic and practical necessity. However, such aircraft imply constraints on any solution to the problem of reducing violations of restricted airspace. To maximize its effectiveness, any technical solution should be:

- Low cost for the pilots.

- Simple to use with little training required.

- Low workload, especially while in flight.

- Adaptable to a large range of aircraft, including older aircraft without digital displays, and possibly without even electrical systems.

Based on the FSOSC data, about three-quarters of all violations concern "static" or "recurrent" restricted airspace, where static restricted airspace remains in effect over a specific geographic location for a long and indefinite period (e.g., the DC ADIZ or the Disney TFR), and recurrent restricted airspace periodically goes into effect over the same specific geographic location (e.g., Newport Chemical Depot or the Camp David P-40 expansion). Pilots have expressed greatest concern about TFRs that are not so predictably associated with a specific location (Charles, 2002, 2004). This includes, justifiably, the Presidential TFRs, which in principle can crop up anywhere anytime and account for nearly a quarter of the violations. However, pilots are also particularly concerned with the TFRs for nuclear power plants, large public gatherings, and such for which the associated NOTAMs do not give a specific geographic location or time. A "blanket" NOTAM

covers each of these TFRs without listing where the locations might be or how a pilot can find out about them. It is understandable that pilots will feel anxious about being given a requirement to fulfill without the guidance needed to fulfill it. However, violations of these TFRs are statistically incidental, accounting for a few percent of the cases. Substantially reducing the number of violations means reducing the number of violations associated with static and recurrent restricted airspace. It cannot be assumed that because a TFR "should be well-known," it is not subject to frequent violations.

## 6.2. Pilots Need the Details

This study analyzed over 200 ASRS reports involving a concern about a violation of restricted airspace. Converging evidence from analyses for probable cause and from reporter-identified factors suggests that most violations of restricted airspace observed in the ASRS data are due to pilots having inadequate specific information about the airspace, not due to lack of awareness about the airspace. Better awareness of the existence of TFRs and ADIZs should reduce the number of violations but these results imply it cannot eliminate most of them. Most of the time, the pilots lacked certain correct details about the airspace, details that were necessary to avoid a violation.

It may be remembered that ASRS data is voluntarily submitted, and thus the actual proportions of probable cause among all violations may differ from those observed here. Efforts were made to minimize bias by statistically matching the ASRS sample to the FSOSC data. Nonetheless, it remains conceivable that, among all pilots, more violate restricted airspace due to lack of awareness than lack of correct details. However, barring compelling evidence that supports an enormous bias in probable cause of such violations reported to ASRS, it appears at the very least that lack of correct details is a very important reason –if not *the* most important reason –for violations of restricted airspace. Furthermore, these results from the ASRS data are consistent with the results from the FSOSC data, a sample of violations that does not have any volunteer bias. The FSOSC data showed that most violations concern static or recurrent restricted airspace, airspace whose existence should become widely known over time. It is more plausible that violations of such airspace would be due misunderstanding its details than simply not knowing it exists.

Chief among the details that pilots lack, especially for TFRs, is a reliable, unambiguous, and usable representation of the lateral boundaries of the airspace. Text descriptions of the boundaries, as often found in a NOTAM for the TFR, are likely to be inadequate. In mid-2003, the FAA began making graphic representations of TFRs available to pilots (e.g., via tfr.faa.gov) (Aircraft Owners and Pilots Association, 2003c). This is a very significant step. However, it should be pointed out that most ASRS cases analyzed in this study occurred after these graphical TFRs became available.

Furthermore, knowing the boundaries of the airspace is only part of the issue. For ADIZs and ADIZ-like TFRs, where penetration is allowed for pilots that follow certain procedures, the details for such procedures do not appear to be making it to all the pilots that need them, thus contributing to violations of such airspace. It does little good to tell a pilot he is at an airport in an ADIZ when the problem is the pilot thinks he can get a clearance after becoming airborne.

Pilots conventionally receive such details through briefings, either by FSS professionals or by electronic means. However, there are many cases where pilots were briefed but nonetheless still failed to get the necessary information to avoid a violation. Perhaps there are difficulties in making up-to-date and correct information available to these sources. Perhaps it is difficult for

pilots to acquire and interpret the information that is provided. TFR and ADIZ information is given primarily as text or spoken words. Perhaps there are limits to the effectiveness of transmitting information of this type verbally.

While TFRs and ADIZs have been around for a long time, only recently have so many pilots had to confront them so often. Lacking adequate information, pilots naturally fall back on their training, experience, and the information they do have available. They extend the rules they know to the new experience of TFRs and ADIZs. They use the boundaries of other significant airspace to judge the boundaries of the restricted airspace. They attempt rely on published sectional maps for flight planning. They assume the rules for IFR flight are the same as for flight in an ADIZ. All these response have been associated with violations.

Any solution that aims to reduce the frequency of TFR and ADIZ violations must address providing the right detailed information to the pilot. Pilots need to know where the airspace is, and what they must do to comply with it for whatever place they happen to be at the time.

## 6.3.    ATC and FSS Performance

In many ASRS reports, a pilot claims that an FSS briefer or air traffic controller made an error, sometimes in providing information and sometimes (in the case of the controller) in accusing the pilot of a violation. As nearly all the analyzed cases provide strictly the pilot's point of view, it is not possible to assess the validity of these claims, and it should be pointed out that many pilots also find ATC and FSS personnel to be highly knowledgeable and professional (Daly, 2003). However, there may be reason to believe that ATC is being overloaded with the additional demands imposed by ADIZs and TFRs.

An increase in ATC workload may itself be contributing to violations (as well as having safety implications; a couple of reviewed ASRS reports concerned near mid-air collisions in the DC ADIZ). Further study of this is warranted to determine if indeed ATC is being overworked, and whether some adjustments are necessary. Pilots are looking to more ATC services to avoid violations of restricted airspace, so the demands on ATC may be increasing.

Even if the workload for ATC is adequately managed, it should be noted that increased reliance on ATC is not a strategy that will fit all pilots. IFR flight and radio communications are relatively advanced skills for some private pilots. Pilots must first master VFR flight before attempting to acquire these skills, otherwise the increased workload and distraction may disrupt the learning pilot's ability to conduct flight safely. Pilots, right up to the most experienced air transport pilot with tens of thousands of hours of IFR flight logged, typically started flying under VFR. Any solution that aims to reduce the frequency of TFR and ADIZ violations must allow for a population of pilots who fly without contact with ATC (i.e., VFR).

## 6.4.    Interception and Communication

While it may not concern the reduction of the number violations of restricted airspace, it appears that there have been some issues involving the communication between violating aircraft and an interceptor. Standard procedures exist, even for communication without radio, but nonetheless confusion and even injury has apparently resulted. This warrants further study, as, following an accidental violation of an ADIZ or TFR, a failure of communication with an armed interceptor is the next error in the series that may result in an innocent pilot being shot down.

# 7.     Abbreviations and Acronyms

ACN ............. Ascension Number

ADIZ ............ Air Defense Identification Zone

AGL.............. Above Ground Level

AOPA ........... Aircraft Owners and Pilots Association

APP............... Approach

ASRS............ Aviation Safety Reporting System

ATC.............. Air Traffic Control

ATIS ............. Automatic Terminal Information Service

AWOS .......... Automated Weather Observing System

BOW............. Bartow Municipal Airport

COM1........... Communications radio 1

CRM ............. Crew Resource Management

CTAF............ Common Traffic Advisory Frequency

DUAT........... Direct User Access Terminal

DUATS......... Direct User Access Terminal System

E ................... East

FAA.............. Federal Aviation Administration

FBO .............. Fixed Base Operator

FDC .............. Flight Data Centers

FRZ............... Flight Restricted Zone

FSOSC.......... Flight Service Operations Support Center

FSS .............. Flight Service Station

GA ................ General Aviation

GPS............... Global Positioning System

HF................. Human Factors

IFR................ Instrument Flight Rules

LA................. Los Angeles

LAX.............. Los Angeles International Airport

Max............... Maximum

MHz.............. Megahertz

MMH............ Mammoth Yosemite Airport

MOA............. Military Operations Area

MSL.............. Mean Sea Level (i.e., the altitude above it)

MSP.............. Minneapolis-St Paul International Airport

MTN............. Martin State Airport

N................... North

NASA........... National Aeronautics and Space Administration

NECD........... Newport Chemical Depot

nm................. Nautical Mile

NOTAM ....... Notice to Airmen

ORD ............. Chicago O'Hare International Airport

PCT.............. Potomac TRACON

PF ................. Pilot Flying

PIC............... Pilot In Command

PNF.............. Pilot Not Flying

SA................. Situation Awareness

SFRA............ Special Flight Rules Area

SW................ Southwest

TFR............... Temporary Flight Restriction

TIBS ............. Telephone Information Briefing Service

TRACON ..... Terminal Radar Approach Control

UNICOM...... *Aeronautical Advisory Station*

Unk............... Unknown

US................. United States

VFR.............. Visual Flight Rules

VHF.............. Very High Frequency

VIP .............. Very Important Person

VMC............. Visual Meteorological Conditions

VOR ............. VHF Omnidirectional Range

VORTAC ..... VOR and Tactical Air Navigation

WX ............... Weather

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# Appendix: Documentation for Categorization of Narratives

## Airspace

Identify the restricted airspace of concern in the narrative. Pick choice that best fits based on narrative and synopsis. Chose the actual airspace pilot potentially violated (if pilot is accused of violating A while trying to avoid B, code for A). Use locations given in report to determine most likely airspace.

- **DC ADIZ / FRZ / P56 / P73**. Includes any restricted airspace completely enclosed within the DC ADIZ. Includes restricted airspace related to "SFRA," "the White House," "the Capital," "the Capital," or "DC" if the state is VA, MD, or DC.

- **Crawford / P49**. Includes restricted airspace around the President's ranch in Texas, both permanent (P49) and temporary (e.g., 30 nm TFR).

- **Camp David / Thurmont / P40**. Includes restricted airspace around Camp David such as P-40 and R4009. Includes restricted airspace related to "Thurmont" and "Hagerstown" if the state is WV, MD, or PA. Includes any TFR expansion of P40.

- **Kennebunkport / P67**. Includes permanent and temporary restricted airspace around the Bush family home in Kennebunkport, ME. Includes restricted airspace related to "Kennebunk."

- **VIP (nonresidence).** Includes any temporary restricted airspace related to the location of a VIP or government official (including foreign) *other than* those listed above. Includes any restricted airspace related to a visit by the President or Vice President.

- **NY ADIZ.** ADIZ for NY that was in effect a while ago. Includes any TFR for the city of NY itself. Does not include separate TFRs for surrounding cities or states.

- **US ADIZ.** Contiguous US ADIZ offshore. Includes any ADIZ violation by an aircraft coming from overseas unless another specific ADIZ is given (e.g., DC or NY).

- **Newport Chemical Depot, IN.** TFR for Army chemical weapons depot in Newport IN. Includes any restricted airspace related to "NECD," "Newport Chemical," or any military facility at Newport, IN. Includes any restricted airspace related to "Newport," "Chemical" if the state is IN or IL (unless other text makes it clear it does not refer to NECD).

- **Disney (either).** TFR for Disneyland and Disneyworld. Includes any restricted airspace identified as "Anaheim" or "Orlando." Does not include restricted airspace identified at "LA," "LAX," or "Los Angeles."

- **NASA / Shuttle.** TFR related to rocket launches at Cape Canaveral, FL. Includes any restricted airspace related to "NASA" or "Shuttle" if the state is FL.

- **Sports (anywhere).** Any TFR related to any large public gatherings. Includes any TFR related to a stadium including stadiums identified by name (e.g., Commerica in MI). Includes any TFR for any public event identified by name (e.g., "Superbowl") or type (e.g., "Fireworks") other than airshows.

- **Airshow (anywhere).** Any TFR related to an airshow, including airshows or events identified by name (e.g., "Oshkosh," or "Lakeland.").

- **Hazards (anywhere).** Any TFR placed because flight represent a hazard to the pilot or others (excluding Airshows or NASA/Shuttle). Includes hazards identified by name or type (e.g., forest fire, crane).

- **Other / Unknown.** Any other TFR. Generally these are security TFRs or specific R- and P-zones other than those given above (e.g., Bangor, St. Marys). Often these are associated with military facilities (other than Newport). Also use this code if the airspace is ambiguous (e.g., "Texas TFR"). Describe in the Details field.

## Violation of Concern

Code for the violation or potential violation that the narrative and synopsis concern.

|  | Code | Rules |
|---|---|---|
| 0. | No Concern of Violation of Restricted Airspace | No party in the narrative is concerned that a violation of restricted airspace occurred or might occur in the future. Use this code if violation of concern involves airspace other than a TFR, ADIZ, R-zone, or P-zone (e.g., Class B airspace, MOA, Warning areas). The pilot may have done something wrong, illegal, or even dangerous, but it wasn't violating restricted airspace. This includes the pilot doing did something questionable as a side effect of handling a TFR.<br><br>Do *not* code 0 if:<br><br>- Pilot cited or accused of a violation of restricted airspace, whether pilot believes s/he made a violation or not.<br><br>- Pilot believes there may have been a violation (even though not cited), or otherwise felt confused about what was required.<br><br>- Pilot believes current system may result in a violation in the future by him/herself or others.<br><br>Examples of Code 0 include:<br><br>- Pilot thought he was broadcasting on CTAF, but was actually broadcasting on the approach frequency still tuned from going through ADIZ.<br><br>- To avoid WX and a TFR, pilot flew into Class C airspace without a radio.<br><br>If Code 0 is applied, do not code for Cause and Factors. |

| | **Code** | **Rules** |
|---|---|---|
| 1. | Entry into Restricted Airspace | Narrative or synopsis concerns an aircraft entering airspace when entry is not allowed. Also, use this code if narrative explicitly says pilot may not have filed a flight plan as required before entered airspace.<br><br>Do not code this if the aircraft is allowed in the airspace but the narrative or synopsis concerns failing to follow one of the requirements for doing so as classified in Codes 2 through 5. However, Code as 1 if the narrative or synopsis concern multiple violations as classified in Codes 3 through 5(e.g., 3 by terminating radio communications with ATC and 5 departing the flight plan).<br><br>Use Code 2 if the pilot filed a flight plan, but did not do other steps required for penetrating the restricted airspace. Use Code 2 for failure to get a discrete transponder code, even though it could be argued that the pilot necessarily also use the transponder incorrectly (Code 4). Also use Code 2 for failure to get a clearance into the restricted airspace even though this may also involved a failure to establish communication with ATC (Code 3) in order to get that clearance. |
| 2. | Activation or Clearance | Narrative or synopsis concern failure to get proper authorization prior to entering restricted airspace. This includes activating ("opening") a flight plan, getting a clearance into the airspace, and getting a discrete transponder ("squawk") code.<br><br>If narrative or synopsis explicitly says the pilot may not have correctly filed a flight plan, use Code 1. If the narrative only concerns activating or "opening" the flight plan, assume a flight plan was filed and use this code. |
| 3. | ATC Communications | Narrative or synopsis concern failure to establish or maintain communication radio communications with the appropriate air traffic controller after entry into the restricted airspace. Does not include failure to get a clearance to enter the airspace in the first place (Code 2). However, use this code if the pilot fails to contact ATC *after* getting a discrete transponder code or otherwise getting cleared into the airspace (e.g., takes off from non-towered airport with FSS-supplied transponder code but does not contact Approach once leaving the pattern for the airport). |

| | Code | Rules |
|---|---|---|
| 4. | Transponder Use | Narrative or synopsis concerns failure to correctly use the transponder as required for the airspace. Includes failure to enter the proper *standard* (non-discrete) transponder code as required for certain situations. Does not include failing to *get* a *discrete* transponder code prior to airspace entry (see Code 3). However it does include failure to *enter or use* the correct transponder code at the correct time or place, including failure to enter or use the right standard (non-discrete) codes for certain procedures or flight paths (e.g., departure or arrival at certain airports).<br><br>Code 5 for incorrect flight path in response to a failed transponder. |
| 5. | Flight Path or Procedure | Narrative or synopsis concern a prohibited flight path or procedure for the restricted airspace that otherwise allows flight. For certain cases, pilots are prohibited from:<br><br>▪ Departing the airspace by a less than shortest route.<br><br>▪ "Loitering" within the airspace.<br><br>▪ Departing from the filed flight plan while in the restricted airspace.<br><br>▪ Leaving the pattern of an airport (as during flight training).<br><br>▪ Conducting certain training exercises (e.g., touch and goes).<br><br>▪ Continuing on a flight with a failed transponder.<br><br>Code as 1 if pilot is simply not allowed in the airspace but flight path may have taken him/her there. Also Code as 1 for failure to correctly file a flight plan for entering prohibited airspace. |
| 6. | Other | Narrative or synopsis concern failure to meet a requirement for entry into the airspace other than above codes. Put details in Notes. |

## Pilot Caught/Interception

**Pilot Caught.** Pilot actually caught (check, no check) by federal officials. Check if contacted by ATC and accused of a violation, was asked to make a phone call or given a phone number on landing, was contacted by law enforcement, or was intercepted. Do not check if not explicitly stated in narrative or synopsis.

**Interception.** Interception reported (check, no check). Check if any mention of an intercept being attempted. The actual intercept does not necessarily have to be completed. Check if ATC says a scramble was ordered. Check if an interceptor reaches the pilot's aircraft. Check if the an interceptor reaches the pilot's aircraft even after the latter lands. An interceptor is considered to be any tactical military aircraft (e.g., F-16 Fighting Falcon) or helicopter (e.g., H-60 Blackhawk) or any aircraft transporting military or law enforcement personnel (e.g., secret service, customs officials, local police).

Do not check if no attempted intercept was reported. Do not check if reporter explicitly or quantifiably states the aircraft reached the pilot's aircraft more than 12 hours after the target aircraft landed.

## Got NOTAMs/Briefing

This field is used to indicate **if pilot says got or did not get** any information in the form of **NOTAMs or a briefing for the flight** associated with the potential violation. This does not necessarily have to be information specifically about the restricted airspace itself. Code this based on information in the narrative and synopsis.

Code **Unknown** if there is no indication that the pilot did or did not get NOTAMs or a briefing, code Unknown.

Code **No** if the pilot is reported to have gotten *no* NOTAMS or *no* FSS briefing, code as No.

Code **Yes** if the pilot is reported to have gotten *any* NOTAMs or *any* FSS briefing for the flight

| Narrative | Code | Rationale |
|---|---|---|
| Not get briefing from FSS or check NOTAMs.[10] | No | Explicitly didn't get briefing or check NOTAMs. |
| I did not get briefing or read NOTAMs due good weather and being in a hurry. | No | Explicitly didn't get briefing or check NOTAMs. |
| I didn't check with FSS. | No | Explicitly didn't get briefing. No mention (anywhere in narrative) of getting NOTAMs. |
| No briefing since good WX. | No | Explicitly didn't get briefing. No mention (anywhere in narrative) of getting NOTAMs. |
| I checked for NOTAMs for flight | Yes | Expicitly says pilot got NOTAMs. |
| Downloaded NOTAMs for flight | Yes | Expicitly says pilot got NOTAMs. |
| FSS briefed me on the weather. | Yes | Expicitly says pilot got briefing, even though briefing may not have included TFRs. |
| I only checked for NOTAMs going to XXX since I was not expecting to divert to into YYY. | Yes | Explicitly got at least some NOTAMs, even though may not have been all necessary NOTAMs. |

1.  **Code for *getting or not getting* NOTAMS/briefing, not for knowledge or understanding of restricted area.**

The narrative must explicitly refer to getting or not getting NOTAMs or briefing in order to code as Yes or No. Do not code based on statements indicating how much the pilot knows about the restricted airspace. Only statements showing that the pilot did or did not get NOTAMs or a briefing are used to fill this field.

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[10] For all examples of Getting NOTAMS/Briefing, consider the example is the only text in the ASRS narrative concerning NOTAMs/briefing. All text in the narrative must be included in actual coding.

Code **Unknown** if all the narrative says is "I was fully familiar with the restricted area," with no statement on where this information came from (maybe the pilot read a NOTAM, or maybe they heard it from a flight instructor, a mechanic, or TV). Even if the pilot quotes the NOTAM verbatim, code as unknown unless there is explicit indication the pilot got the NOTAMs or briefing for that flight. Statements about knowledge of the airspace are not relevant for coding this field.

Code **No** if narrative explicit refers to not getting any NOTAMs or a briefing. Note that the pilot may know everything about the restricted airspace but this field is still coded as No (e.g., the pilot knows the NOTAM from prior flight, so says he didn't check it again for the flight of concern).[11]

Code **Yes** if narrative explicitly refers to getting any NOTAMs or a briefing. Note that this means a pilot may know nothing about the restricted airspace but this field is still coded as Yes (e.g., because the pilot was briefed, but the briefing apparently did not include information about the airspace).

| Narrative | Code | Rationale |
|---|---|---|
| I knew there was a TFR in effect. | Unk | Does not explicitly refer to getting NOTAMs or a briefing. |
| The NOTAM said I could do pattern work. | Unk | Does not explicitly refer to getting NOTAMs. |
| I had no idea the ADIZ existed | Unk | Does not explicitly refer not getting NOTAMs or a briefing. |
| I had no idea the ADIZ existed because I didn't get a briefing | No | Explicitly states there was no briefing. |
| I had no idea the ADIZ existed even though I got a briefing | Yes | Explicitly states there was a briefing. |

## 2. Yes if any indication that pilot got briefing or NOTAMs.

If there are contradictory statements in the narrative, coding precedence is to statements that indicate the pilot got briefing/NOTAMs.

Code **Unknown** if the narrative has no statements that meet the criteria for Yes of No for *either* briefing or NOTAMs.

Code **No** if *all* relevant statements in the narrative say the pilot did not get a briefing or NOTAMs. If the pilot is reported to have gotten no NOTAMs and there's no mention of a briefing (or vice versa), code as No.

Code **Yes** if anywhere in the narrative there is a statement that meets the criteria for getting briefing/NOTAM.. This includes the narrative stating that the pilot got *either* NOTAMs *or* an FSS briefing. If the pilot is reported to have gotten NOTAMs but no FSS briefing, or vice-versa, code as Yes.

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[11] The Probable Cause field affords and opportunity to indicate that the pilot did not know about or did not fully understand a NOTAM or briefing regarding the restricted airspace.

| Narrative | Code | Rationale |
|---|---|---|
| No briefing or check of the NOTAMs. | No | Explicitly got neither briefing nor NOTAMs. |
| I couldn't get anyone to brief me. | No | Explicitly no briefing. No mention of NOTAMs one way or the other. |
| I shouldn't have skipped checking the NOTAMs | No | Explicitly no NOTAMs. No mention of briefing one way or the other. |
| Because I got a briefing from FSS, I didn't bother to check the NOTAMs myself. | Yes | Explicitly did not check NOTAMs but explicitly got briefing. |
| I didn't check for NOTAMs. Before I left I saw the TFR in the NOTAMs. | Yes | A statement in the narrative meets criteria for Yes (even though previous statement meets criteria for No). |

**3.  Yes for getting partial briefing or NOTAMs**

Code **Unknown** if the narrative does not mention getting or not getting NOTAMs, restricted airspace information, or a briefing. Code Unknown if pilot is reported to have only gotten an "outlook" from FSS or a source of NOTAMs  (e.g., DUAT) with no mention of getting any actual NOTAMs.

Code **No** if the narrative indicates the pilot failed to get *any* NOTAMs or *any* briefing.

Code as **Yes** if the narrative states the pilot got *any* NOTAMs or *any* briefing or otherwise was successful in checking for NOTAMs or getting a briefing, even if the pilot did not get all NOTAMs s/he ultimately needed, or if the briefing was incomplete. Code Yes even if the pilot explicitly says the NOTAMs or briefing did not include information about the restricted airspace. Code Yes even if reporter characterizes briefing as only a "weather briefing." Code Yes even if method of extracting NOTAMs or a briefing was flawed, as long as access to the source was at least partially achieved.

| Narrative | Code | Rationale |
|---|---|---|
| FSS gave me the outlook for the day. | Unk | "Outlook" does not count as a briefing. |
| I tried to search for NOTAMs, but it wouldn't work. | No | Failed attempt to get any NOTAMs. |
| I couldn't get through to get a briefing | No | Failed to get even a partial briefing. |
| I searched for NOTAMs, and didn't find any for my flight. | Yes | Pilot checked for NOTAMs, but there apparently weren't any. |
| I loss my phone connection before he finished briefing. | Yes | Partial briefing (briefing had been started but not finished). |

| Narrative | Code | Rationale |
|---|---|---|
| The briefer asked if I was aware of the TFR, and I said "yes." | Yes | A briefing was given, although it lacked important detail. |
| The printer broke before all NOTAMs printed. | Yes | Got some NOTAMs, but not all. |
| Got NOTAMs from DUATS but missed that one. | Yes | Pilot got at least some NOTAMs. |
| When I checked after the flight, I discover I hadn't included that TFR with the NOTAMs I read. | Yes | Pilot got at least some NOTAMs. |
| By going with an abbreviated briefing, I missed the TFR information. | Yes | Pilot got at least a partial briefing. |

## 4. FSS briefings versus other briefings.

Code **Unknown** if all information about the restricted airspace came from sources other than FSS or written NOTAMs, regardless of the reliability of the source (e.g., instructor, FBO employee, ATC, other pilot). Also code Unknown if the "briefing" is clearly the type that would not concern restricted airspace (e.g., or pre-takeoff or approach briefing) or not by FSS personnel or from a aviation-related electronic source of NOTAMs (e.g., by DUATS). Code as Unknown if reporter explicitly says the briefing was only an "outlook briefing.".

Code **No** if there is any statement about failing to get a "briefing" without further qualification. Assume the briefing is by FSS unless there is reason in the narrative not to. Code No if the narrative states the pilot failed to get an electronic "briefing" from an aviation-related source of NOTAMs such as DUATS.

Code **Yes** if there is any statement about getting a "briefing" without further qualification. Assume the briefing is by FSS. Code Yes for an electronic "briefing" from an aviation-related source of NOTAMs (e.g., DUATS). Code Yes irrespective of the stated type or content of such a briefing (from FSS or an aviation-related source of NOTAMs), *except* for "outlook" briefings.

| Narrative | Code | Rationale |
|---|---|---|
| We were busy doing the approach briefing. | Unk | Not a briefing on airspace by FSS. |
| The flight instructor mentioned nothing about TFRs in his briefing. | Unk | Not a briefing by FSS personnel. |
| I check the weather before leaving | Unk | No mention of a formal briefing or restricted airspace information. |
| I skipped the briefing. | No | Briefing assumed to be by FSS. |
| I didn't check for any NOTAMs in my DUAT briefing. | No | Not a briefing by FSS personnel. Explicitly did not get any NOTAMs. |

| Narrative | Code | Rationale |
| --- | --- | --- |
| I was briefed before flight. | Yes | Briefing assumed to be by FSS. |
| The PIC gave me the NOTAMs to read. | Yes | Concerns getting written NOTAMs, not a verbal briefing. |
| Got a WX briefing from FSS | Yes | Briefing by FSS. |
| I didn't ask about TFRs in my briefing. | Yes | Briefing assumed to be by FSS. |
| I glanced at the briefing from DUAT. | Yes | Briefing from DUAT or DUATS. |
| The briefing warned of thunderstorms to the North. | Yes | Briefing assumed to be by FSS. |

5.  **Code based on statements of access of sources of NOTAMs and briefings.**

Code **Unknown** if source of NOTAMs or the briefing is explicitly not a FSS or aviation-related electronic sources of NOTAMs or restricted airspace information, such as the TIBS, DUAT, DUATS, AOPA, and FAA web sites. Code Unknown if, in relation to accessing these sources, narrative does not explicitly mention NOTAMs, restricted airspace information, or a briefing of any kind. Code Unknown if the briefing or information is characterized as an "outlook."

Code **No** if narrative explicitly states the pilot's attempts to access sources of NOTAMs or briefings failed (assuming there is no statement indicating that the pilot got some NOTAMs or a briefing by other means). It is not necessary for the narrative to say the purpose was to get NOTAMs, a briefing, or restricted airspace information.

Code **Yes** if narrative explicitly mentions accessing, checking, contacting, talking to, or listening to FSS or aviation-related electronic sources of NOTAMs or TFR information in order to get a "briefing," NOTAMs, or information on restricted airspace. Narrative must explicitly mention that a 'briefing," NOTAMS, or restricted airspace information in relation to the information source. A "briefing" must not be characterized as an "outlook." Accessing the source must also be at least partially successful to be coded Yes. Assume any mention of contact was successful unless explicitly stated otherwise. Aviation-related electronic sources include TIBS, DUAT, DUATS, AOPA, and FAA web sites.

| Narrative | Code | Rationale |
| --- | --- | --- |
| I asked my instructor about any TFRs before leaving. | Unk | Not an FSS briefer. |
| The news didn't say anything about the President visiting this weekend. | Unk | Not a source for NOTAMs. |
| I called FSS before leaving. | Unk | Does not state purpose was to get a briefing or restricted airspace information. |
| I checked the FAA web site before departure. | Unk | Does not state purpose was to get NOTAMs or restricted airspace information. |

| Narrative | Code | Rationale |
|---|---|---|
| I filed my flight plan with the local FSS | Unk | Does not state purpose was to get a briefing, NOTAMs, or restricted airspace information. |
| I used DUATS for this flight. | Unk | Does not state purpose was to get a briefing, NOTAMs, or restricted airspace information. |
| I verified with DUATS that the weather was fine. | Unk | Does not state purpose was to get, NOTAMs, or restricted airspace information. |
| I got the outlook from DUATS. | Unk | No mention of NOTAMs or restricted airspace information. Not a "briefing." |
| I called FSS before I left, but there was no answer. | No | Explicitly states that access to briefing source failed. |
| I tried the AOPA website, but it was down | No. | Explicitly states that access to NOTAM source failed. |
| I called FSS to check for TFRs before leaving. | Yes | Explicitly states attempt to access FSS for restricted airspace information. Assumes access was successful. |
| I got a briefing from DUATS. | Yes | Explicitly states got standard briefing. |
| I got all the NOTAMs I thought I'd need from DUATS. | Yes | Explicitly states got NOTAMs. |
| I checked the FAA TFR site before departure. | Yes | Explicitly states got restricted airspace information from a source of NOTAMs. |
| I didn't see anything about this TFR on the FAA site. | Yes | Explicitly mentions restricted airspace information in connection to accessing a source of NOTAMS. |
| The AOPA site was down, so I used the FAA site to check on TFRs. | Yes | Explicitly states got restricted airspace information from a source of NOTAMS. |

**6. Coding of statements implying a pilot did/didn't get briefing/NOTAMs**

Code **Unknown** statements concerning knowledge of the restricted airspace even if the detail of knowledge "must" mean the pilot read the NOTAM or got a briefing. Also code Unknown statements of plans or recommendations on *the manner* to access or read NOTAMs or get a briefing.

Code as **Yes** any statements that logically or sequentially require that the pilot got some NOTAMs or a briefing. For example, "The FSS briefing never mentioned this TFR," indicates the pilot got a briefing, even if it was possibly incomplete. Code as **No** if the narrative gives plans or recommendations to get a briefing or NOTAMs in the future, as this implies the pilot got no briefing or NOTAM for the reported flight.

| Narrative | Code | Rationale |
|---|---|---|
| I assumed the NOTAM meant 5000 feet MSL, not AGL. | Unk | Indicates knowledge of TFR, not whether pilot actually got a written copy or FSS briefing on it. |
| Pilots should always read the NOTAMs carefully | Unk | Statement of manner to get NOTAMs. Does not necessarily imply the pilot got no NOTAMs for the flight. |
| I should ask the briefer specifically about TFRs every time | Unk | Statement of manner in which to get a briefing. Does not necessarily pilot got no briefing at all. |
| I'll rely on DUATS for NOTAMs from now on | Unk | Statement of manner in which to get NOTAMs. Does not necessarily imply the pilot got no NOTAMs for the flight. |
| Next time, I'll get a briefing no matter what the weather is like | No | Implies pilot did not get a briefing for the flight of concern. |
| Always check NOTAMS. Always, always, always. | | Implies pilot did not check NOTAMs for the flight of concern. |
| When I read the NOTAM, I assumed 5000 feet was MSL, not AGL. | Yes | Pilot must have had written copy of NOTAM in order to read it. |
| I realize now that I missed that NOTAM | Yes | Implies pilot got some NOTAMs, although not all that were needed. |
| It would have been worse if I didn't read any of the NOTAMs for the ADIZ, but next time I'll read every NOTAM | Yes | Implies pilot got some NOTAMs, although not all that were needed. |

## 7. Getting versus reading NOTAMs.

Code **Unknown** if the narrative does not explicitly say the pilot accessed, got, learned about, saw, or read the NOTAMs. Also code as Unknown if the narrative explicitly says the pilot was informed verbally about the NOTAMs or restricted airspace information, unless it was by an FSS briefer.

Code **No** if it is explicitly stated that the pilot did not read or look at the NOTAMs even if the pilot successfully accessed some NOTAMs.

Code **Yes** if the pilot is reported to have access the NOTAMs without further qualification. It is assumed that s/he saw and read at least some of them. .

| Narrative | Code | Rationale |
|---|---|---|
| The NOTAM clearly allows pattern work without a squawk code. | Unk | Does not say pilot actually got the NOTAM before flight. |

| Narrative | Code | Rationale |
|---|---|---|
| I heard that the TFR was going hot that afternoon. | Unk | Information about the restricted airspace was not from a written source or explicitly from an FSS briefer. |
| There were so many NOTAMs I decided I didn't have time to read any. | No | Got NOTAMs but explicitly states pilot did not read any of them. |
| I printed out the NOTAMs, but didn't read all of them. | Yes | Pilot read some NOTAMs |
| I connected to DUATS for the NOTAMs. | Yes | Pilot accessed NOTAMs. It is assumed he read at least some of them. |
| I heard from the FSS that the TFR was going hot that afternoon. | Yes | Restricted airspace information from FSS. |

**8. Code Unknown if determined that NOTAM/briefing (or lack thereof) is old or for a different flight or occurred after violation of concern.**

A single "flight" has one takeoff. Treat multi-leg trips as multiple flights.

Code **Unknown** if it can be quantitatively determined from the report that the pilot got the NOTAM was more than 36 hours before the start of the flight associated with the violation of concern. Also code Unknown if the NOTAM was explicitly gotten for a flight that occurred an indeterminate time before the flight associated with the violation of concern. Also code Unknown if explicitly determined that NOTAM or restricted airspace information was sought after the violation of concern occurred.

Code **No** if the pilot is reported to have *not* gotten a briefing or NOTAMs without further qualification. Assume it was for the flight associated with the violation of concern.

Code **Yes** if the pilot is reported to have gotten a briefing or NOTAMs without further qualification. Assume it was for the flight associated with the violation of concern.

| Narrative | Code | Rationale |
|---|---|---|
| I checked the NOTAMs a couple days before I left. | Unk | Explicitly says got NOTAM more than 36 hours ago. Does not count as getting the NOTAM for flight associated with the violation of concern. |
| I had read the NOTAMs for the ADIZ every time I flew last year, so I know it inside and out. | Unk | Explicitly says NOTAM was read for some other flight(s) that occurred some indeterminate time in the past. |
| I still had the NOTAM for my trip into YYY. Potomac said I violated the ADIZ when I left YYY. | Unk | Explicitly says pilot got NOTAM some other flight that occurred an indeterminate time in the past. |

| Narrative | Code | Rationale |
|---|---|---|
| I checked the NOTAM after being interviewed by the customs officials and saw it was indeed for up to 5000 feet. | Unk | NOTAM sought after occurrence of violation of concern. |
| I had a chance to check DUATS the day before I left, but I didn't. | No | Pilot says he did not get NOTAM less than 36 hours before departure. |
| I never use FSS. | No | Pilot says he did not get briefing for any flights, including flight associated with the violation of concern. |
| I didn't check the NOTAMs for my trip into YYY. Potomac said I violated the ADIZ when I left YYY in later that same day. | No | Pilot says he did not get NOTAM less than 36 hours before departure. |
| I had read the NOTAM about the TFR. | Yes | Assumes NOTAM was read for the reported flight. |
| I still had the NOTAM for my trip into YYY . Potomac said I violated the ADIZ when I left YYY in later that same day. | Yes | Pilot determined to have gotten NOTAM less than 36 hours before departure of flight associated with violation of concern. |
| I read the NOTAM for the TFR but it was a very long time ago | Yes | NOTAM was read. Time ago is cannot be quantitatively determined to be greater than 36 hours. |
| I got that NOTAM last month, and the briefing suggested no reason that it would be different. | Yes | NOTAM determined to be greater than 36 hours old, but pilot got a briefing, which is assumed to be for the reported flight. |

## Probable Cause

**Applies Violation of Concern.** This a code for the probable cause of the violation as represented in the Violation field. It may be an actual violation, alleged violation, or merely some concern about a possible or future violation by a party in the narrative.

Code the **probable cause** of the violation of concern. That is, assuming the violation of concern did in fact occur (or will in fact occur) as described in the narrative, code for the most likely cause of the violation.[12] If the narrative concerns the avoidance of a violation of restricted airspace, code for the element that prevented the violation, treating the lack of if as the probable cause if the violation were to occur.

Only one code is allowed per ASRS report.

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[12] While it is assumed that a violation occurred for the purposes of assigning probable cause, if the information provided in the narrative strongly indicates a mistaken concern for a violation (e.g., an error in accusation by ATC), indicate this in the Notes field.

Unlike Pilot-reported Factors, Cause coding **requires as certain amount of interpretation** beyond what is actually stated by the pilot. The **narrative synopsis** (written by the ASRS staff) **can be used to help** make such interpretations. For example, if the synopsis states that the pilot was unaware of the TFR (apparently based on the fact that the pilot never mentions it in the narrative and says he can't understand what he did wrong since he was clearly outside Class D airspace), then assume that is a correct judgment and code accordingly.

Keep in mind this is a coding of **probable causes of restricted airspace violations**. A pilot may state they misunderstood something in a TFR NOTAM, but do not code anything other than 0 unless, based on the facts as presented in the narrative, that misunderstanding probably led to a violation of a P-zone, R-zone, ADIZ, or TFR.

While selecting the most probable cause requires an interpretation, the facts should not be open to interpretation. Instead, **assume the facts of the case are as stated as the reporter** even if it seems more reasonable that s/he is mistaken. If a pilot says his autopilot malfunctioned and carried him into a TFR, assume that is true, not the more likely interpretation that he incorrectly programmed the autopilot or GPS. Where there is a conflict on the facts in the narrative, assume the reporter is correct. For example, if the FSS briefer says she explain the NOTAM to the pilot, but the pilot says she didn't, assume she did if the reporter is the briefer, and assume she didn't if the reporter is the pilot.

The Code 2's are broken down into a **hierarchy of subcategories** of progressively greater specificity. Code with the most specific subcategory possible. If more than one sub-category applies (only one Cause may be assigned per ASRS report), or it's not clear which of two sub-categories apply, code as the next level up.

| Code | Category | Rules | Examples |
|---|---|---|---|
| 0 | Indeterminant / Multiple / Other | The violation of concern was due to unspecific causes, or a combination of multiple causes below, or for causes not included below (e.g., equipment malfunction). | Transponder mysteriously starts squawking 1200 while in the ADIZ. Pilot does not believe he changed it.<br><br>Pilot didn't get NOTAMs for TFR, but even if he did, he says he would've flown into the TFR anyway because of the emergency he experienced.<br><br>Pilot violated TFR, but narrative and synopsis provide no information on if pilot knew the TFR existed, understood the details of the TFR, or whether or not pilot correctly executed control inputs with respect to the TFR. |
| 1 | Presence of airspace not known or recalled | There was lack of knowledge of the restricted airspace or failure to recall of presence of the restricted airspace as the aircraft approached it.<br><br>Code this only if the pilot does not even know the restricted airspace existed round the general region.<br><br>Treat each airspace separately. A TFR may effectively be an "expanded" prohibited zone, but it is still considered different airspace. Use this code if the pilot was aware of the P-zone, but not aware of its temporary expansion. | Pilot was unaware of ADIZ, and only concern with avoiding Class B airspace.<br><br>Pilot didn't notice the TFR NOTAM in the DUATS printouts.<br><br>Pilot did not check with FSS for a briefing due to obviously good weather.<br><br>Just plain forgot about it even though had flown regularly in and out of ADIZ before.<br><br>Relied on local media to alert when President visits area. Didn't hear anything, so assumed he wasn't around. |

| Code | Category | Rules | Examples |
|---|---|---|---|
| 2 | Incorrect or lack of information | Aware that restricted airspace is in effect, but lack sufficient or correct knowledge to prevent a violation or potential violation.<br><br>This code or any of the "2" subcategories should be selected if there is a conflict about the correct interpretation of a NOTAM. That is, if ATC thinks the pilot was inside the TFR bounds but the pilot is sure he was outside, or vice versa, still code a 2 or 2-subcategory. Whoever is right, *someone* has incorrect or lack of information that can cause a real violation or the accusation of a violation, both which are concerns. | Chain of events lead to entering restricted airspace even though pilot had reviewed NOTAM for it. |
| 2.1 | Incorrect understanding distance to airspace | Misunderstanding plane position relative to airspace boundaries.<br><br>Code this if it's not clear whether the plane may not be where thought, or the airspace boundaries may not be where thought. | Pilot believed he was E of the airspace.<br><br>Pilot was depending on unreliable visual cues to estimate distance from TFR, such as how far away the Epcot dome appeared to be. |

| Code | Category | Rules | Examples |
|---|---|---|---|
| 2.1.1 | Navigation error / Aircraft position not correctly known | The precise airplane geographic position is not correctly known. Aircraft believed to be at one point but may have been at another.<br><br>Errors due to pilotage get this code, including the pilot thinking a feature on ground is one place, but learns it's somewhere else.<br><br>Also code this if pilot got lost, or just wasn't tracking own position (lost of geographic SA).<br><br>Also code this if the aircraft may have been at a different altitude than the pilot thought.<br><br>Narrative or synopsis must explicitly refer to uncertainty or error as to geographic position/altitude of the aircraft in connection with possibly violating the restricted airspace. | Pilot got lost looking for airport once outside ADIZ and re-entered it.<br><br>Pilot was not aware that vector would overfly Disneyland until he looked down and saw it.<br><br>Pilot reports undetected drift due to winds. Didn't figure it out until too late.<br><br>Progressed further E than anticipated after changing plan en route due to WX.<br><br>Had baroaltimeter mis-set resulting in flying lower and into TFR rather than just over it. |
| 2.1.2 | Airspace boundaries not correctly known | Misunderstanding of the precise spatial location of airspace boundaries. Pilot knows where s/he is relative to points on ground (or on the sectional) and apparently knows his/her altitude correctly, but may not be correct where the restricted airspace begins and ends in absolute terms.<br><br>Narrative or synopsis must explicitly refer to uncertainty or error as to boundaries of the restricted airspace in connection with possibly violating it. | Did not know ADIZ was out to limits of Class B and to the ground.<br><br>Thought TFR was smaller and lower.<br><br>Knew where he was. Just didn't think that was in the TFR. |

| Code | Category | Rules | Examples |
|---|---|---|---|
| 2.1.2.1 | Horizontal airspace boundaries not correctly known | Misunderstanding of horizontal boundaries. Pilot may have thought the horizontal edge was farther from its actual geographic point. Narrative or synopsis must explicitly refer the horizontal trajectory or position relative to the restricted airspace (e.g., aircraft course, or bearing or nm to boundaries) or horizontal dimension of the restricted airspace (e.g., diameter, relative position of navaid or ground references to boundary). | FSS gave bad advice on course to avoid P-40.<br><br>Lateral boundaries of ADIZ assumed to coincide with Class B.<br><br>Flew too far S avoiding possible P-40 max limits and entered ADIZ.<br><br>Thought destination was outside TFR edge.<br><br>Assumed "10nm TFR" referred to its diameter, not radius. |
| 2.1.2.2 | Vertical airspace boundaries not correctly known | Misunderstanding of vertical boundaries. Pilot may have thought altitude ceiling for airspace was different than actual. Narrative or synopsis must explicitly refer the vertical trajectory or position relative to the restricted airspace (e.g., "over" or number of feet above) or vertical dimension of the restricted airspace (e.g., its height or altitude). | Thought ADIZ vertical structure coincided with Class B, and tried to fly "under" it.<br><br>TFR was always capped at 3000 ft, but this time is was 5000 ft. |
| 2.2 | Time or date of effect not correctly known | Misunderstanding or failure to recall the time or day when restricted airspace would be in effect. Includes lack of awareness of current time or date relative to time or date when airspace would be in effect. Includes lack of awareness that a known restricted airspace is "hot" (must explicitly indicate airspace is known). | Believed TFR would end at 3:00 pm.<br><br>Thought the TFR would have been lifted by now. |

| Code | Category | Rules | Examples |
|------|----------|-------|----------|
| 2.3 | Procedures for allowed penetration not understood | Misunderstanding of the procedures for legally penetrating restricted airspace. There no reason to believe the pilot misunderstood the boundaries for the airspace, and aircraft are allowed in the airspace at that time but only if they follow certain procedures. There appears to be some question on whether the pilot followed the correct procedures. Includes pilot contacted ATC too late for both a clearance and a transponder code. | Thought it would be okay to get clearance shortly after takeoff from airport in ADIZ.<br><br>ATC and pilot confused on presence of flight plan or need for squawk. |
| 2.3.1 | Flight plan submitting requirements not understood | Misunderstanding submitting a flight plan. Pilot may have not submit a flight plan as may be required, or maybe submitted it to the wrong place, or at the wrong time or by contacting the wrong agency.<br><br>Code this if any misunderstanding or human error (by pilot or anyone else) led to incorrect submission. | Tried to air file flight plan after entering ADIZ. |
| 2.3.2 | Transponder usage not understood | Misunderstanding transponder usage. Pilot may not know how to get right code, or someone thought no special code was necessary, or there's conflict on what the right code is. Confusion over the right procedure in the event of a broken transponder. Pilot may have misheard the transponder code.<br><br>If pilot contacted ATC too late for both a clearance and a transponder code, code as 2.3. | Safety concerns delay squawking transponder code until after takeoff from airport in ADIZ. Pilot thought that would be okay.<br><br>Used transponder code from old NOTAM rather than call FSS for discrete code. |

| Code | Category | Rules | Examples |
|------|----------|-------|----------|
| 2.3.3 | Radio usage or required clearances not understood | Misunderstanding of required communications or clearances.  Includes errors with opening (but not filing) a flight plan. Pilot may have made contact at the wrong place or time or with the wrong party. Pilot announces entry by radio into airspace but maybe should have requested clearance first.<br><br>If pilot may have contacted ATC too late for both a clearance and a transponder code, code as 2.3. | Not aware/ forgot to establish radio contact as required when leaving a pattern in ADIZ.<br><br>FSS said it was okay to open flight plan after airborne, but when pilot tried, was told he violated the ADIZ. |
| 2.3.4 | Allowed flight paths or procedure not understood | Misunderstanding allowed flight paths. Particular path was believed to be allowed through restricted airspace, but this may be been wrong.<br><br>Do not code this if someone thought path would avoid airspace but it may not have. Code that as 2.1.2. | Was doing pattern work in ADIZ, which is allowed, but ATC still accused them of a violation.<br><br>Thought flights directly out of ADIZ from airport were allowed. |
| 3 | Control setting error | Tried but may not have executed appropriate actions even though requirements of the restricted airspace understood correctly.  This includes "slips" or errors in using avionics. This includes not knowing how to properly operate avionics or other controls. Does *not* include incorrect or lack of inputs due to incorrect or inadequate knowledge about the restricted airspace or its requirements (see Code 2). Use this code only if the pilot was unable to make the correct entry despite the intention to do so. Forgetting to perform a certain action as required for the airspace is one of the codes under 2 (see). | Failed to land to full stop as required due to botched landing. ATC may have thought it was a touch-and-go, which is not allowed at airport.<br><br>Forgot to switch to COM1 for frequency to maintain contact with approach.<br><br>Possibly accidentally set wrong transponder code. |

## Reporter Identified Factors

**Applies to Real and Potential Violations.** These codes are for factors the reporter has identified to have contributed to a violation or apparent violation, or may lead to future violations.

Factors also include recommended **remedial actions that may prevent future violations**. This is a flip side of any factor code: if an action would prevent a violation, the failure to take such an action is a reported contributing factor to a violation.

**An ASRS report may have any number of factors**. More than one factor may be coded per ASRS report. However, the same factor may only appear once regardless of how many statements qualify for that coding. A single sentence can result in two factors. A report may have zero factors coded.

Unlike probable cause, pilot-reported factors are things that *the pilot says* may have lead to (or may lead to) a violation of restricted airspace. That is, it is the cause from the perspective of the pilot. As such**, factors should be apparent from the content** of the narrative with minimal interpretations. Pilot factors may be identified by any of the following:

- Explicit statement of the reason for a violation  ("It happen because I…", "The violation was due to…")

- Intentions to change own behavior ("Next time, I'll be sure to…")

- Recommendations for changes to the system ("NOTAMS on TFR should be…", "The FAA could…")

- Recommendations to other individuals ("Pilots must never…", "Someone should…")

- Statements of hypothetical or alternative actions in the past ("I should have…", "If they had told me…")

However, such explicit language is not necessary to code for a factor. Include as a factor **any event that the narrative places in the chain of events leading up to the concern for the violation**. For example, if a pilot says "I had been up for 22 hours straight… [Later,] ATC said I violated a TFR," then being up for 22 hours becomes a factor. Factors may also be identified by inferring the intent of the pilot in providing a statement. For example, if a pilot says " I flew into the TFR. I missed seeing that NOTAM in the briefing," then it is safe to infer the pilot believes he flew into the TFR *because* he missed the NOTAM**.** As long as it is evident that a statement in the narrative was included in order to explain the potential violation, the factor is be coded.

Code only for factors that reportedly **result *directly* in possible violation** of restricted airspace. For example, if according to the narrative ATC incorrectly advises the pilot he is keeping clear of the restricted airspace, then that would be coded as 2. However, if ATC gives the pilot an incorrect radio frequency, causing confusion that distracts the pilot from keeping clear of the restricted airspace, then that is *not* coded as 2 (it would be coded as a 5 however).

Do not code as factors simple statements of making, or failing to make, an action that is legally required in order to comply with the airspace. **Factors are things to *contribute to* the violation occurring**. They are not the violation itself. Compare the following examples:

| Statement | Factor | Statement | Factor |
| --- | --- | --- | --- |
| I violated the TFR because I flew into it | None. Flying into the TFR is the violation itself. | I violated the TFR because I didn't understand the NOTAM for it. | 1 |
| Next time, I'll call ATC for a clearance into the ADIZ. | None. This is a requirement for the ADIZ. | Next time, I'll call ATC for flight following to make sure I don't go into the ADIZ. | 3 |

| Statement | Factor | Statement | Factor |
|---|---|---|---|
| Pilots should be extra careful about avoiding these TFRs | None. Pilots are required to avoid such TFR. | Pilots should give the boundaries of these TFRs a 2 nm margin to be sure to avoid them. | 4 |

## 1. Airspace Communication

Any problem or remedy concerning correctly communicating information about the restricted airspace or the pilot's flight plans with respect to the airspace prior to the violation of concern.
This includes communication though any of the following media:

### *FSS personnel or an unspecified briefer.*

- Briefer provided apparently incorrect or insufficient information concerning the restricted airspace

- Pilot misunderstood or failed to receive information supplied by briefer.

- Wrong pilot apparently received information or instruction.

- An incomplete or unclear briefing, or failure to ask clarifying questions in a briefing.

- Suggestions to improve information clarity or accuracy, or to provide more information.

  **Examples:**
  FSS not alert pilot of ADIZ,
  FSS said it was okay to open flight plan after airborne.
  FSS gave bad advice on course to avoid P-40.
  FSS erroneously said that if clear of Class B, no need to file IFR.
  FSS said "10nm TFR"; thought it was diameter, not radius.

### *NOTAMs or sources of NOTAMs.*

- NOTAM relevant to restricted airspace was not detected in the pilot's perusal of printed or electronic NOTAMs.

- Pilot used wrong or obsolete NOTAM.

- Any inability to access correct NOTAMs.

- Information within a NOTAM was missed or misunderstood

- General failure to thoroughly review a NOTAM.

- Suggestions to search NOTAMs more carefully or make relevant NOTAMs easier to spot, or improve NOTAM distribution or access.

- Suggestions to study relevant NOTAMs more carefully or make NOTAMs easier to read and understand.

  **Exceptions:**

  Do not use this code to indicate that the pilot failed to get any NOTAMs. On the contrary, this code often implies the pilot got at least some NOTAMs (but not necessarily related to the restricted airspace). The Got Briefing/ NOTAMS field is used to indicate a failure to get any NOTAMs at all.

  **Examples:**
  Too much info in DUATS to sort through.
  TFR NOTAMs should be first in list,

Missed seeing NOTAM in 11 pages of DUATS.
In on-line briefing, missed that TFR coming on later in day.
Did not catch TFR in on-line briefing.
Should have look at NOTAMs more closely.
NOTAM not posted.
DUATS should recognize and flag flight plan through/over TFRs.
NOTAM followed obsolete. DUATS from same day did not have update.
NOTAM should use mixed case and headings.
More thorough examination of NOTAM and discussion among crew.
NOTAM must be read carefully.
No visual aids in ADIZ description to keep clear of it,
Poor graphic of ADIZ from web.

*Charts or other maps.*

- Restricted airspace not present or not found on printed or electronic navigation charts or maps

- Restricted airspace or shown in an incomplete, incorrect or confusing manner.

- Misreading restricted airspace information from map.

- Suggestions to print or mark restricted airspace on maps.

    **Examples:**
    ADIZ not shown on chart.
    Should show ADIZ on chart.
    TFR not on chart.
    Max P-40 boundary not on charts.
    Chart not show potential TFRs

*Other media.*

- Unspecified individuals or individuals other than ATC or FSS,

- Written/printed material other than NOTAMs or charts.

- Signs and notices.

- Training materials or classes specific to restricted airspace.

- Avionics.

- Ground-based electronic systems.

    **Exceptions:**

    Does not include communication problems related to handling an alleged violation (e.g., during interrogation by law enforcement). See 7.

    Use this code if it is reported the pilot did not know how to correctly get a clearance or open a flight plan. However, do *not* use this code for communication problems related to ATC such as *getting* a clearance from them. See 2 and 3.

    Only training specific to restricted airspace is coded as 1. A need for general flight training is coded as 5.

    **Examples:**
    No mention of restrictions by ground personnel.
    PIF and dispatcher not say two-way radio necessary for pattern work.

Someone should broadcast advisory over Unicom.
Pilot not told where to get IFR clearance.
Airport directory should say that airport is in ADIZ.
Someone should organize a seminar to explain ADIZ.
Pilot needs additional TFR training.

2. **ATC/Clearance Problem**

Prior to the violation of concern, there was a communication problem, breakdown, or error involving ATC controller, getting clearance into the restricted airspace, or opening (activating) a flight plan.

▪ ATC controller provided pilot with apparently incorrect or incomplete information or instructions

▪ Pilot misunderstood or failed to receive information or instructions.

▪ Wrong pilot apparently received information or instruction.

▪ Pilot draws incorrect inferences from information or guidance from ATC.

▪ Difficulty or inability to contact or communicate with ATC *when required* due to congestion or ATC being too busy or having technical problems.

▪ Difficulty or inability get a clearance or activate a flight plan due to congestion or federal authority being too busy or having technical problems.

▪ Suggestions to cross-check information or to improve accuracy of information from ATC.

   **Exceptions:**

   Does not include errors in accusation of pilot of violating airspace (see 7).

   Only includes communication problems related to *required* contact or communication with ATC. For problems with *optional* ATC services, see 3.

   Only includes communication difficulties due frequency congestion or ATC/clearance authority being busy or having technical problems. Does not include difficulties due to pilot lack of knowledge of person, place, time, or procedure for making contact as required for the airspace (see 1). Does not include difficulties due to on-board equipment problems (see 6).

   **Examples:**
   Vectored by ATC into TFR. Not see it until over it.
   ATC comment that visual APP possible makes pilot think airport is outside ADIZ.
   ATC does not give squawk, but thought was due to military flight, as happened before.
   Mistook ATC advisory as upcoming incursion into ADIZ, and thus turned N right into TFR.
   No mention of restrictions by ATC.
   ATC cleared pilot into the ADIZ, but thought he was clearing someone else.

3. **Under-use of Optional ATC**

Lack of use of optional ATC services from a controller.

▪ Inability or failure to request or receive information or guidance from ATC

▪ Not filing IFR.

▪ Not using flight following or advisory services.

- Difficulties communicating with ATC in order to get optional service.

- Failure or difficulties in monitoring ATC (when not required to do so).

- Suggestions to use ATC optional services or IFR more, or to make them more readably available.

   **Exceptions:**

   Does not include pilot failure to contact ATC or get clearance *as required for airspace* or any other required actions.  That's a violation, not a factor of the violation.

   Does not include difficulties in getting *required* communication or clearances from ATC or ATC providing apparently insufficient or incorrect information. See 2.

   **Examples:**
   Should file IFR
   Should have requested flight following.
   Should seek advisory services if lost.
   Should talk to ATC when near Disney.
   Contact PCT sooner for flight following.
   Monitor PCT freq to learn what's going on.
   Not request clarification from ATC after hearing need for squawk on party line.

4. **Pilotage Limitations**

Imprecision in navigation due to reliance on pilotage.

- Errors in navigation not evidently related to the use of electronics.

- Errors due to winds.

- Incorrect identification of or inability to identify ground references, or other incorrect reliance on ground references.

- Suggestions to use more precise electronic navigation methods (e.g., GPS, navaids) or determine or define boundaries of restricted airspace based on electronic navigation methods.

- Suggestions to allow for a greater margin of lateral error or higher altitude (unless navigation was explicitly not by pilotage).

- Suggestions to use more reliable ground references.

   **Examples:**
   Mistake in position: not as far North as thought. Should fly with GPS.
   Ended up off course due to unanticipated winds. Simply became disoriented and not reorient fast enough.
   Winds from SW may have caused drift towards Class B.
   Should plan to give ADIZ wider berth,
   Plan routes with greater TFR clearance, plan altitude well above TFRs.
   Visual landmarks not sufficient.
   Flew too far S avoiding possible P-40 max limits and entered ADIZ. Not ensure flight free of restricted airspace.
   Not thinking of ADIZ because had over flown Bay Bridge, which is well outside.
   Training will now be done at an airport more distant from ADIZ.

### 5. General HF Antecedents

Miscellaneous human factors that may play a role in any incident, not just a violation of restricted airspace.

- Fatigue.
- Stress.
- Distraction
- Complacency
- Rushing or falling being schedule.
- Unfamiliarity with region.
- *General* flight training.
- CRM issues.
- Physiological factors.

   **Exceptions:**

   Does not include training or training materials specifically concerning restricted airspace. See 1

   **Examples:**
   Possible hypoxia may have affected judgment.
   Should focus on responsibilities and guard against complacency.
   Thought PIC had taken care of everything and didn't crosscheck.
   Flown same route without ADIZ last year, (habit)
   Rushed due to delays.
   Distractions and sun interfere with map reading.
   Entering ADIZ from unfamiliar angle.
   Unfamiliarity with Disney area.
   PNF handle radios and not communicating with PF.

### 6. Equipment Failure

Failure of aircraft or on-board equipment leads directly to possible violation.

- Failure of navigation equipment leading to course error.
- In-flight emergency requiring landing in restricted area.
- Any loss of control of aircraft resulting in flight into restricted airspace.

   **Exceptions:**

   Code as 5 if equipment failure led to distractions rather than directly in a violation.

   **Examples:**
   Transponder mysteriously starts squawking 1200.

   Radio electrical problems prevent contacting ATC as required.

### 7. Violation Handling Error

Apparent error in procedure or execution of the handling an alleged violation of restricted airspace.

- Apparent errors in determining the existence of a violation.

- Apparent errors in providing information or instruction *after* the violation of concern

- Suggestions to change or improve the handling of violations.

   **Exceptions:**

   Does not include errors by any personnel *prior* to the violation of concern. See 1 for apparent errors by FSS or within restricted airspace information media that lead to the violation. See 2 for apparent errors by ATC that lead to the violation.

   **Examples:**
   Pilot believes ATC is mistaken in accusing him of violating airspace.
   Customs officials get wrong tail number and interrogate wrong pilot.
   Interceptor closes on the wrong aircraft.
   FBO worker gave pilot a phone number to call, but it was meant for another pilot.
   Pilot was not a sufficient threat to warrant an interception.
   Interceptors should monitor 121.5.

### 8. Overly Restrictive Rules

Rules regarding airspace restrictions unnecessarily strict or extreme.

- TFR being too large or unnecessary.

- Suggestions for changes in rules for using airspace.

   **Examples:**
   If flight plan filed on ground, should be allowed to get transponder code in air.
   TFR too large.

### 9. Other

Other factors given by pilot that are worth capturing.

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**14. ABSTRACT**

This document provides the results from a study into the apparent factors and causes of violations of restricted airspace, particularly temporary flight restrictions (TFRs) and air defense identification zones (ADIZs). By illuminating the reasons for these violations, this study aims to take the first step towards reducing them. The study assesses the basic characteristics of restricted airspace violations as well as the probable causes and factors contributing to violations. Results from the study imply most violations occur where the restriction has been in place for a significant amount of time prior to the violation. Additionally, the study results imply most violations are not due to the pilot simply being unaware of the airspace at the time of violation. In most violations, pilots are aware of the presence of the restricted airspace but have incorrect information about it, namely, its exact boundaries or procedures for authorized penetration. These results imply that the best means to reduce violations of restricted airspace is to improve the effectiveness of providing pilots the details required to avoid the airspace.

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