COMMERCIAL AVIATION 101

GREG GAYDEN

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443 CRITICAL
Dallas, Texas

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INFORMATION SOURCES

All of the information that you are reading about in this book is open-source, which means that it is all publicly available and accessible to anyone with an Internet connection, even those few folks still plodding along with dial-up. For all the conjecture about the U.S. government classifying "everything" and being overly secretive, it is quite remarkable what information **is** made public. Between the public websites of federal government agencies, texts of public laws, a smorgasbord of Government Accountability Office reports (which most people probably never read, but I've leaned on extensively in this book) and other raw statistics, it was rather simple to obtain more than enough information to explain everything in this book.

Internally, TSA is a (somewhat controversially) heavy user of what is called Sensitive Security Information (SSI). SSI is information that, if publicly released, would be detrimental to transportation security, as defined by Federal Regulation 49 C.F.R. Part 1520. Basically, SSI is considered sensitive, but not worthy of being classified.

As a category of information, SSI got its start in the Air Transportation Security Act of 1974 and is primarily used by people who work in transportation security. As SSI information cannot be released to the general public, you won't find any of it (airline security programs, detailed TSA screening procedures, etc.) here. SSI material cannot be released to persons without a need to know. 49 CFR 1520 discusses SSI in more depth; however, releasing SSI information to the public is grounds for being assessed a civil fine.

SSI information does not rise to the level of Secret or Top Secret data, release of which would cause grave damage to the national security of the U.S.

INTRODUCTION

I've been gainfully employed in the aviation security business since I joined the Transportation Security Administration (TSA) in September 2002. For the past 13-plus years I've worked as a regulatory Inspector in various positions both in the field and at TSA Headquarters.

I spent several years as a domestic Inspector at Dallas/Fort Worth International Airport (DFW) working with both foreign and domestic carriers, the airport itself, as well as conducting all the other functions that Inspectors do - don't worry; those are described elsewhere in this book.

In March 2009, I moved to the position of Regional Security Inspector at TSA Headquarters near Washington, D.C. While there I was responsible for overseeing a region that encompassed five Southwestern states (Arizona, California, Hawaii, Nevada, New Mexico) as well as three territories in the Pacific (American Samoa, Guam, Saipan) – an area of over 50 commercial airports and 100-plus TSA inspectors – in addition to providing technical guidance on aviation security regulations to various stakeholders and industry partners. I answered technical questions from Inspectors in the field and helped review and write new regulations that were being issued as well as the annual national work plan for inspectors. I also taught new hires at the TSI Basic Training course from time to time.

After a few years in D.C. I was ready to return home to Texas; in June 2012, I took a position as an international Inspector based in Dallas. Nowadays, I conduct foreign airport assessments and inspections of carriers at airports overseas (primarily in Canada, Mexico, and Central America).

In my free time, I enjoy airplane spotting (I am an unofficial world record holder for tail logs) and photographing commercial airplanes. When I was growing up my father would take me to watch the planes at LAX and London Heathrow – I can still remember seeing the Concorde and old Pan Am 747s – and I guess the "fever" has stuck with me since then. I also run a fairly popular website (*DFW Tower.com*)

related to these endeavors and North Texas commercial aviation. I've been quoted and had my website linked to several times in commercial aviation articles in both the Dallas Morning News and Fort Worth Star-Telegram and even on local television morning news programs.

Between my own personal interests and over fifteen years working in the industry, I think it is reasonable to say that I've gained a healthy amount of knowledge and expertise both of aviation security and commercial aviation overall. After working for various lengths of time and visiting over 75 airports in the U.S. and another 50 or so in nearly two dozen foreign countries, I've been fortunate enough to observe and learn how things are done in a wide variety of places. I typed this book as a way of writing it all down and sharing it – well over 45,000 words – that I hope you will find it somewhat useful.

GREG GAYDEN
Fort Worth, Texas

Note: If you are interested, the various topic titles are in a font called Langdon that I found online, took a liking to, and downloaded for free.

A BRIEF HISTORY OF AVIATION SECURITY

Aviation security has come a long way in our country to where it stands today. Long gone are the days when one could simply drive to the airport and walk onto the plane; of course, the memory of even a humble X-Ray and walk-through metal detector can seem quaint now as you stand in a circular device with your arms up and the walls of the machine rotating around your body. I can remember being invited up to the cockpit on British Caledonian flights as a young boy in the 1980s during the long trip to London; such a thing would not even be considered today with hardened cockpit doors that remain closed for nearly the entire flight.

So how exactly has aviation security evolved over the years, and when did the process we are now familiar with begin to take shape?

The first recorded hijacking of a commercial flight occurred in 1948 on a flight from Macau to Hong Kong. Both pilots were shot and killed and the aircraft then crashed into a river, killing 25 people.

In the U.S., an ugly incident happened in November 1955 with United Flight 629. A 23-year old man named Jack Graham placed some dynamite in his mother's checked luggage; it detonated during flight, killing his mother along with all 39 passengers and five crew on board of the DC-6. It was later found that Graham had purchased a large life insurance policy on his mother not long before her ill-fated trip. Interestingly, in 1955 there was no federal statute that made it a crime to blow up an aircraft! Graham was instead charged with premediated murder against his mother, found guilty, and was subsequently executed in 1957.

The first attempted hijacking on U.S. soil took place in July 1961 in, of all places, Chico, California. A man shot two airline employees as he attempted to hijack a Pacific Airlines flight before being subdued by passengers.

That same year, President Kennedy ordered the first armed guards to be placed on commercial aircraft. Throughout the 1960s, there were several hijackings of commercial aircraft; in 1968 alone there were 82 aircraft hijackings, the most ever recorded in a single year in the history of civil aviation.

UNITED STATES DEPARTMENT OF JUSTICE

$10,000 REWARD $10,000

HIJACKING OF AIRLINERS

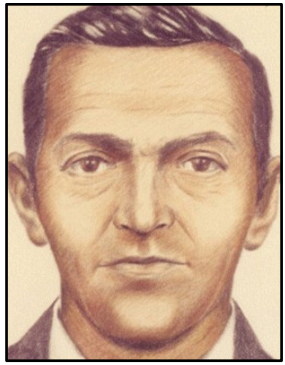
The Attorney General of the United States hereby offers a reward of Ten Thousand Dollars ($10,000.00) for information leading to the arrest and conviction of anyone for violating any federal statute in any actual, attempted, or planned hijacking of aircraft.

As used in this offer, "hijacking" means the use of force, threats, or other means in illegally obtaining control of an aircraft of United States registry, or of any aircraft while in or over United States territory, for purposes which include the unauthorized removal of such aircraft from the United States or the unauthorized prevention of its return to the United States. This offer is made pursuant to Title 18, United States Code, section 3059.

Anyone having any information which he or she believes may be of the kind described above should give *such information promptly* to the nearest office of the Federal Bureau of Investigation.

August 4, 1961
at Washington, D. C.

Robert F. Kennedy
Attorney General



1971 saw the infamous D.B. Cooper incident onboard a Northwest Orient Boeing 727. A man identified as "Dan Cooper" bought a ticket for Fl. 305 from Portland, Oregon to Seattle, Washington. Once the flight was underway, Cooper passed a note to a flight attendant stating he had a bomb. Cooper demanded the aircraft land in Seattle, where he was to be given $200,000 in cash as well as a few parachutes. *(Left: Sketch of D.B. Cooper)*

After the aircraft landed in Seattle, Cooper released all the passengers except for the flight deck crew and one flight attendant. After the aircraft was refueled and airborne again, he directed the crew to fly towards Reno, Nevada.

Approximately 30 minutes into the flight, Cooper released the rear air stairs of the aircraft and parachuted with the money out of the aircraft - he was never seen again. The case is one of the most celebrated robberies of all time; it was only in July 2016 that the Federal Bureau of Investigation (FBI) announced that they would no longer continue to actively pursue the only unsolved act of air piracy in American aviation history.

Physical passenger screening was introduced in 1972, as the Federal Aviation Administration (FAA) ordered that all passengers and their carry-on baggage be screened by metal detectors or hand.

In 1973, a violent incident transpired in Rome when Palestinian terrorists opened fire and hurled bombs onto a Pan Am aircraft, killing 30.

In 1985, Lebanese terrorists hijacked a Trans World Airlines (TWA) flight from Athens to Rome. The saga ended after 17 days and the murder of a passenger - a U.S. Navy diver. Subsequently, Federal Air Marshals were set up as a permanent workforce and begin flying on international flights.

As an additional action after this incident, Congress mandated that the U.S. government (originally via the FAA but now TSA) conduct

regular assessments of security measures at foreign airports that serve the U.S. These assessments are conducted by international inspectors in TSA's Office of Global Strategies.

(Above: The remains of Pan Am 103.)

Pan Am Flight 103 was lost in December 1988 when a bomb that was hidden in a cassette player detonated over Scotland; 270 people were killed in the attack. The principle of positive passenger bag match (PPBM) came in to fruition after this incident, and nearly all checked baggage that was on board an international flight had to belong to a passenger who was also on board the aircraft. *It bears noting that PPBM is not currently a requirement for all flights.*

While the Bojinka plot of 1995 was thankfully foiled it was instructive in many regards. In addition to planning to assassinate Pope John Paul II while he visited the Philippines, the plotters also sought to blow up 11 aircraft that were flying from Asia to the U.S. in a 48-hour period. In the pre-attack planning and test runs, a Japanese man lost his life on board Philippine Airlines Flight 434 in December 1994 when a bomb smuggled aboard in the heel of a shoe worn by Ramzi Yousef (and later

left on board the aircraft) detonated. The aircraft sustained heavy damage but was able to land safely.

Yousef was later apprehended in February 1995 in Pakistan and is currently serving life without parole at a federal Supermax prison in Colorado.

In 1998, the Computer Assisted Passenger Prescreening System (CAPPS) began operations. CAPPS was the first system that designated passengers who were thought to need additional screening as selectee passengers.

Sadly, September 11, 2001 needs little further explanation; a band of 19 Al Qaeda terrorists hijacked four U.S. aircraft and proceeded to crash them into the World Trade Center towers in New York City, the Pentagon in Arlington, Virginia, and a field in Pennsylvania. Nearly three thousand people were killed on the day that forever changed the landscape of aviation security at large.

On November 19, 2001, the Aviation and Transportation Security Act (ATSA) was signed into law. ATSA removed private screeners and gave the federal government full responsibility for security screening at U.S. airports with the creation of TSA.

December 22, 2001 witnessed the failed attempt of 'shoe bomber' Richard Reid to ignite C-4 explosives hidden in his shoes on an American Airlines flight from Paris to Miami. As a result of this attempt, passengers have subsequently been required to remove their shoes while passing through security checkpoints at U.S. airport.
(Left: Reid.)

In June 2002, TSA began deploying explosives detection systems (EDS) to more than 400 airports in the U.S. as part of a mandate to screen 100% of all checked baggage using EDS systems.

August 2006 saw the foiled plot of several terrorists to use liquid explosives on several trans-Atlantic flights. Immediately after, liquids were temporarily banned from being taken on-board aircraft by

passengers; to this day, there are restrictions in place to the type and amount of liquids and gels, which may be brought onto the cabin of an aircraft.

By March 2008, TSA was deploying canines to aid in the screening of 100% of all air cargo that is loaded onto passenger aircraft.

On December 25, 2009, the so called “underwear bomber” attempted to detonate a concealed explosive while on board a Delta Air Lines flight from Amsterdam Schipol (AMS) to Detroit (DTW). This event caused, among other changes, TSA to seek new avenues beyond the No Fly and Selectee lists to mitigate risks presented by unknown passengers.

Late 2010 saw TSA’s Secure Flight Program providing pre-screening for 100% all covered flights to, from, and within the U.S..

In June 2017 TSA added new procedures that required enhanced screening for electronics and more thorough passenger vetting at foreign airports that fly directly to the U.S. One month later, TSA issued new screening procedures for carry-on items that required travelers to place all electronics larger than a cell phone in bins for X-ray screening at U.S. airports.

Over the years, plots and threats will continuously evolve and change. It is incumbent upon all individuals who work in the aviation security field to adapt quickly and precisely to meet these emerging dangers.

A BRIEF HISTORY OF TSA

Any wide-ranging study of aviation security in the U.S. today necessarily includes a closer look at the TSA. We've just discussed the raw history and development of aviation security through the years, but now let's take a more in-depth review of the federal government agency that is responsible for securing our nation's aviation (and transportation) security system.

After the September 11, 2001 attacks, Congress decided that it was necessary for the federal government to take over passenger security screening functions in the U.S. Having the federal government conduct passenger screening is a practice that differs from many other industrialized nations in the western world; most other countries contract this function out to private companies with government oversight.

The Aviation and Transportation Security Act (ATSA) created the TSA and was signed into law by President Bush on November 19, 2001. TSA was originally formed as a component of the Department of Transportation (DOT), where it remained until its transfer to the newly created Department of Homeland Security (DHS) on March 9, 2003.

(Above: The original TSA logo.)

While TSA focuses nearly exclusively on airports, the agency's stated mission is to "protect the nation's transportation systems to ensure freedom of movement for people and commerce."

TSA was hobbled in its first few years with a revolving carousel of senior leadership, including three different administrators in its first two years of existence: John Magaw, James Loy and the late David

Stone all held the post from 2002-2003, with Stone staying on board until 2005. As of this writing, TSA has had seven permanent and seven acting administrators in its 16-year history.

It was only from 2005 that TSA enjoyed some relative steadiness at the helm, when the fourth administrator, Edmund "Kip" Hawley, took over on July 27, 2005. Hawley remained in the position until the sunset of the Bush Administration on January 20, 2009. After that, the post of Administrator was technically vacant for another 18 months, albeit filled by an Acting Administrator. John S. Pistole, the former Deputy Director of the Federal Bureau of Investigation (FBI), was unanimously confirmed as Administrator by the U.S. Senate on June 25, 2010. Pistole remained in the position until his retirement on December 31, 2014.

(Above: Then-TSA Administrator John Pistole meets with President Obama and DHS Secretary Janet Napolitano, October 12, 2010.)

After Pistole's departure, an Acting Administrator served for six months until Peter Neffenger, a retired Vice Admiral in the U.S. Coast Guard became the sixth Administrator of TSA on July 4, 2015. Neffenger resigned with the expiration of President Obama's second term on January 20, 2017. David Pekoske, like Neffenger a retired

Coast Guard Vice Admiral, was nominated by President Trump on June 6, 2017 and confirmed in a voice vote by the U.S. Senate on August 3, 2017; he began work on August 10, 2017. Pekoske is TSA's seventh Administrator and, interestingly enough, the fourth who was a former high-ranking Coast Guard official.

Every different Administrator has his (so far) own unique agenda on how to move TSA forward. Kip Hawley was heavily focused on improving screener morale, going so far as to give the screeners a police-like metal badge in 2008. Hawley claimed in his post-TSA book *Permanent Emergency* that he spent a good deal of his tenure using the latest intelligence reports to fashion TSA policies and procedures.

John Pistole championed the risk-based security agenda, which accepts that there is no such thing as "100%" security; the vast majority of passengers today present no threat to aviation security. By accepting that these travelers pose a limited risk, TSA is able to provide more common-sense screening programs and focus limited resources on unknown passengers and known threats.

Peter Neffenger spent his brief 18-month tenure focusing primarily on improving and streamlining training standards for TSA employees.

TSA ADMINISTRATORS

Name	Type	Start Date	End Date	Days
John Magaw	Permanent	January 28, 2002	July 18, 2002	172
James M. Loy	Permanent	July 19, 2002	December 7, 2003	507
David Stone	Acting	December 8, 2003	July 22, 2004	228
David Stone	Permanent	July 23, 2004	June 3, 2005	316
Kenneth Kasprisin	Acting	June 4, 2005	July 26, 2005	53
Edmund “Kip” Hawley	Permanent	July 27, 2005	January 20, 2009	1273
Gale Rossides	Acting	January 20, 2009	June 24, 2010	521
John S. Pistole	Permanent	June 25, 2010	December 31, 2014	1651
Melvin J. Carraway	Acting	January 1, 2015	June 1, 2015	151
Mark Hatfield	Acting	June 1, 2015	June 4, 2015	4
Francis X. Taylor	Acting	June 5, 2015	July 3, 2015	28
Peter Neffenger	Permanent	July 4, 2015	January 20, 2017	566
Huban A. Gowadia	Acting	January 20, 2017	August 10, 2017	202
David Pekoske	Permanent	August 10, 2017	*PRESENT*	

STRUCTURE OF TSA

TSA is headquartered in the Washington, D.C. area in Arlington, Virginia, just a short hop, skip, and jump from the Pentagon. The agency staffs around 3,800 people at its two matching 12-story buildings at 601 S. 12th Street. TSA's budget for FY 2017 was $7.36 billion.

(Left: TSA Headquarters building.)

As mentioned, TSA is headed by an Administrator who is a presidential appointee requiring Senate confirmation.

Reporting directly to the Administrator is a Deputy Administrator, which is the highest-ranking civilian post in the agency. The Deputy Administrator then has, somewhat remarkably, nearly 20 Assistant Administrators (AA) who report to him or her. These AAs each head up their own individual branches within TSA. By far the biggest is the Office of Security Operations (OSO), which houses screening operations and the tens of thousands of blue-shirted screeners you see at our nation's airports. After that, there are the usual offices you might expect within any federal agency - Human Capital, Legislative Affairs, Chief Counsel, Training and so on.

As OSO is by far the division in TSA that all passengers have direct contact with every time they take a flight, let's take a closer look at its organization.

The Assistant Administrator for OSO is charged with managing the daily operations of some 50,000 total employees, including all the screeners, at the nearly 450 airports nationwide that TSA operates from.

TSA divides the country into different regions, and there are Regional Directors in each region who oversee Federal Security Directors (FSD) and their staff at airports across each region.

Federal Security Director (FSD)

The Federal Security Director (FSD) is the highest-ranking TSA official at an airport. While screening operations are the FSD's main focus and responsibility, they are ultimately responsible for all TSA operations at that airport and any spokes that fall under their area of responsibility (AOR).

It is a primary function of the FSDs to evaluate staffing levels and determine where staffing resources may be effectively moved from one location in the airport to another. In addition to this, there are literally dozens and dozens of responsibilities and tasks that are assigned to an FSD. Of course, as in many organizations, the FSD will have a staff that he or she will then delegate many of these tasks to.

On a day-to-day basis, an FSD will spend a good amount of time interacting with other stakeholders at the airport - particularly the airlines and airport authority. FSDs have multiple balls to juggle attempting to keep all the disparate groups and interests at an airport happy.

Each FSD has their own staff comprised of (at larger airports) a Deputy FSD and several Assistant FSDs, each in charge of their own section of operations at that airport and/or its spokes. Human Resources personnel and regulatory Inspectors are also considered FSD staff.

Did You Know? TSA had 80 FSDs as of March 2015.

Now that we've covered senior management; let's discuss the people who really drive the engine of TSA, the people who screen over 3.2 million checked and carry-on bags each day – over one billion a year!

The most common employees are the uniformed screeners, who have in the past few years been given, somewhat controversially, the official title of Transportation Security Officer (TSO). This is the entry-level

job within TSA. Ranking just above a TSO is the Lead TSO position and then the Supervisory TSO. As these are the most common positions within the agency, let's take a quick look at each position a little further.

Upon being hired, all screening personnel must complete the New Hire Training Program (NHTP) which includes at least 40 hours of classroom training focused on their duties as a screener, a minimum of 60 hours of on-the-job training (OJT), and certification tests for the functions they will be performing. TSO candidates performing on-the-job training are supervised by a qualified OJT monitor and cannot make independent decisions to clear passengers or property until after they have completed all OJT requirements.

Once on the job, all screening personnel are required to take recurrent training throughout the year to maintain proficiency with skills learned during the NHTP, and to remain up-to-date with changes in screening standard operating procedures (SOP), as well as emerging threats. Recurrent training is laid out annually in the National Training Plan (NTP), and TSOs must complete all training by the end of each fiscal year. The majority of recurrent training is comprised of Online Learning Center courses, including X-ray image identification training. Some instructor-led classroom training is also included in the NTP.

Transportation Security Officer (TSO)

The "rank and file" employee is the screener, officially known as a Transportation Security Officer. You will see them in blue shirts with patches on each sleeve and a big, shiny badge on their chest.

Wait a minute, I see a lot of people in blue shirts? Fair enough. Look on their shoulders at the black epaulets with 'TSA' stitched on that they are wearing. If you see one stripe on the bottom, you are looking at a TSO. (Leads have two stripes and Supervisors have three.)
The job of a TSO is hardly glamorous; in fact, it can be a rather redundant position in which an employee does nearly the same thing each and every day. Looking at the X-ray screen, checking inside bags or patting passengers down is what a TSO spends most of the time doing.

TSOs perform the majority of security functions to screen people and property to mitigate threats. Screening may include pat downs, search of property, and operating technology including walk-through metal detectors, X-ray machines, and explosives detection equipment, among other things.

Recent years have seen TSOs primarily, although LTSOs and STSOs will sometimes take a turn, being tasked with working the Travel Document Checker (TDC) position. The TDC is positioned to ensure that boarding passes and IDs match up, and that those IDs are valid and not forged documents. You'll see the TDC at a podium as you enter the screening checkpoint, looking at your ID under an ultraviolet light, marking off your boarding pass and so on.

In addition to all of these tasks, TSOs are subjected to what can be an extreme level of open hostility and rudeness from the traveling public, particularly at larger (and busier) airports.

TSOs are the frontline "worker bees" of the agency in many ways. A TSO can expect to pull down an annual salary of anywhere from $26,291 to $39,437; these figures do not include locality adjustments, any shift differentials or overtime they might earn. It is worth noting that TSA does not utilize the General Schedule (GS) pay system but rather a different system known as Pay Banding.

Lead Transportation Security Officer (LTSO)

Moving up the ladder, our next position is the Lead TSO, whom you can identify by two stripes on their black epaulets. The Lead TSO does nearly all of the functions of the TSO, but also will serve as the supervisor or senior TSO of an individual screening lane if applicable. A Lead TSO is commonly responsible for establishing the rotation of the work positions on the checkpoint, setting break times, and helping with reams of paperwork and so forth. LTSOs implement security procedures and provide coaching and guidance to TSOs in performing screening duties, among other things. LTSOs also perform screening functions along with added responsibilities, such as resolving alarms and supervising screening locations when a supervisor is not available.

LTSOs can expect to earn anywhere from $34,646 to $52,024 as their basic rate of pay.

Supervisory Transportation Security Officer (STSO)

The Supervisory TSO is the person in charge of all the TSOs and LTSOs at a given screening checkpoint. You will most commonly find them towards the back of the checkpoint, overseeing operations and making sure that things are running smoothly. The epaulets on their shoulders will have three stripes. Supervisory TSOs will have the last word in most cases on any disputes a passenger may have over an item that has been deemed unacceptable to pass through a screening checkpoint. A good STSO will be quick to intervene and diffuse any situations with passengers that may be getting too tense. In addition to overseeing the smooth operation of their checkpoint, Supervisors are also responsible for monitoring employee performance, approving leave (at some airports), and recommending corrective or disciplinary actions, among other things. Additionally, STSOs ensure that all necessary training is completed, required daily shift paperwork is documented and turned in, making sure that equipment on the checkpoint is maintained and so forth. STSOs also will perform actual screening operations from time to time as well, depending on the airport and circumstances.

A Supervisor will earn anywhere from $40,552 to $62,830 as their basic rate of pay. So yes, with TSA's pay banding system, it is quite possible for Lead TSOs, subordinate to STSOs, to be making more money than the Supervisor.

Transportation Security Manager (TSM)

Now we have an overview of the folks who operate the "heavy machinery" of TSA's day-to-day operation. Overseeing the screening workforce are Security Managers, formerly known as Screening Managers. These are the folks you may see from time to time in the checkpoints in suits. The Security Managers are the first line managers in the screening organization. They are responsible for the overall management of the screening checkpoints and ensuring they are

properly staffed, that all the equipment is up and running and will answer any questions that the screening workforce may have. Security Managers are also responsible to ensure that various information is collected and fed into TSA's multiple data banks of performance metrics - data which is used to determine average wait times, how many TSOs are needed at a checkpoint and so forth. In an incident, Security Managers will take the lead and coordinate with local airport officials and law enforcement as necessary. Additionally, TSMs may manage various programs as assigned by the FSD. Salary? Security Managers earn anywhere from $49,462 to $76,644.

At the larger airports, there may be an unofficial Terminal Manager, who is essentially a Security Manager who has been given final responsibility for the entire terminal. The next level of management is an Assistant Federal Security Director for Screening (AFSD-S), who is in charge of all screening operations at the airport. The AFSD-S will report directly to either the Deputy Federal Security Director (DFSD) or Federal Security Director (FSD), depending again on the size of an airport. The bigger the airport, the more staff it will have - for better or worse.

Screener proficiency is tested on an ongoing basis. The Threat Image Projection (TIP) system displays fictional threat items, such as guns or explosives, onto X-ray images of actual passengers' carry-on bags to test TSOs' ability to identify prohibited items in a live operational environment. TSOs operating the X-ray machine at the checkpoint are monitored to see if they positively identify the threat image and call for the bag to be searched. TSOs are responsible for positively identifying the threat image and calling for the bag to be searched.

Additionally, in April 2016, TSA began deploying headquarters-based covert testing teams in both the checkpoint and checked baggage screening environments. TSA conducts roughly 8,000 field-based and 4,000 headquarters-based covert tests each year and plans to continue conducting these test in future years.

All of this screening doesn't come cheap of course. TSA budgeted $2.294 billion for checkpoint screening and another $1.331 billion for checked baggage screening in FY 2015. These costs include payroll and equipment.

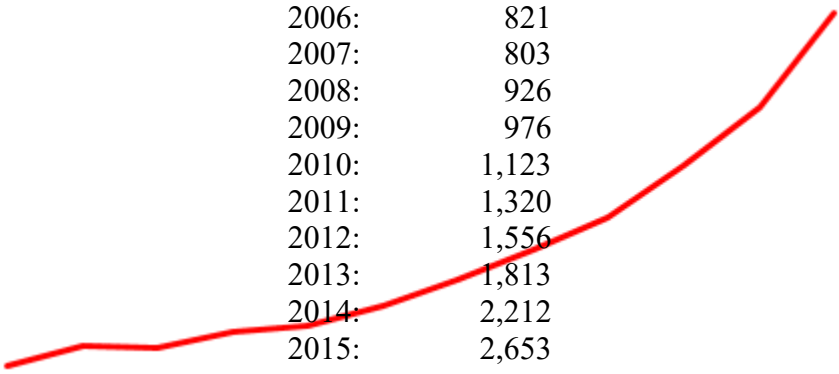
OK, now we've learned about the different types of screeners, but how much work is there to be done for them? In 2015, TSA checked 708,316,339 passengers, 1.6 billion carry-on bags, 432 million checked bags and 12.9 million airport employees. In 2016, U.S. airlines flew 823 million passengers and TSA screened 738,318,264 of them (the rest were screened overseas or by private contractors).

Screeners find all sorts or prohibited items in passengers' carry-on bags, and of course, they often come across hand guns. The number of guns that TSA screeners have found has increased significantly over the past decade.

In fact, every year since 2008 has established a new record for firearms caught, and as of this writing, 2017 is on pace to smash the records set in 2016: TSA finds an average of 10 guns per day nationwide in carry-on bags. So how many guns have been found each year?

GUNS IN CARRY-ON BAGS FOUND BY TSA, 2005-2016

2005:	660
2006:	821
2007:	803
2008:	926
2009:	976
2010:	1,123
2011:	1,320
2012:	1,556
2013:	1,813
2014:	2,212
2015:	2,653
2016:	3,391



Did You Know? Screener uniforms originally featured a white shirt; the current blue shirts were introduced nationwide in September 2008.

Did You Know? TSA assesses civil penalties (fines) of $1,500-$3,000 for unloaded firearms and $3,000-$7,5000 for loaded firearms when

the items are discovered at the screening checkpoint in carry-on baggage.

Did You Know? You may transport unloaded firearms in a locked hard-sided container as checked baggage only. Declare the firearm and/or ammunition to the airline when checking your bag at the ticket counter. The container must completely secure the firearm from being accessed. Locked cases that can be easily opened are not permitted.

Did You Know? TSA screeners come across any and every conceivable item; many end up being posted on the agency's Instagram account. In May 2016, a full-size, realistic corpse, used as a movie prop, was brought through the checkpoint in Atlanta. What else has turned up? A bottle of liquor with endangered seahorses was found, as was an inert anti-tank mine. An 8.5-inch knife was once hidden inside an enchilada, while another passenger was found to have an icepick concealed in the handle of a cane. Another time daggers were found concealed inside the soles of a pair of sneakers. Someone tried to check a gas-powered chainsaw, which was emitting fuel vapors. One screener I know even had a voodoo curse placed on him after he didn't allow an item through the checkpoint!

Did You Know? TSA employees are subject to random drug tests: in 2016 17,649 employees were tested, with only 99 testing positive for illegal substances such as alcohol, cocaine, marijuana, opiates, or amphetamines – a .006% failure rate.

BUDGET AND STAFFING

Obviously, TSA has a lot of employees… but what exactly is the agency's budget? TSA funding has been cut by over half a billion dollars in the past few years, based on a variety of factors: the 2013 budget sequester passed by Congress which cut budgets across the federal government, as well as TSA's own budget requests which have asked for less money in the past few years. With the Pre-Check program expanding, TSA also anticipated needing less staff, and thus requested less money, although Pre-Check didn't grow nearly as fast as had been hoped for. Let's take a closer look at the budget for the last seven fiscal years, which run from October 1 through September 30.

Hat tip to Eric Katz over at GovExec.com for providing the actual figures here.

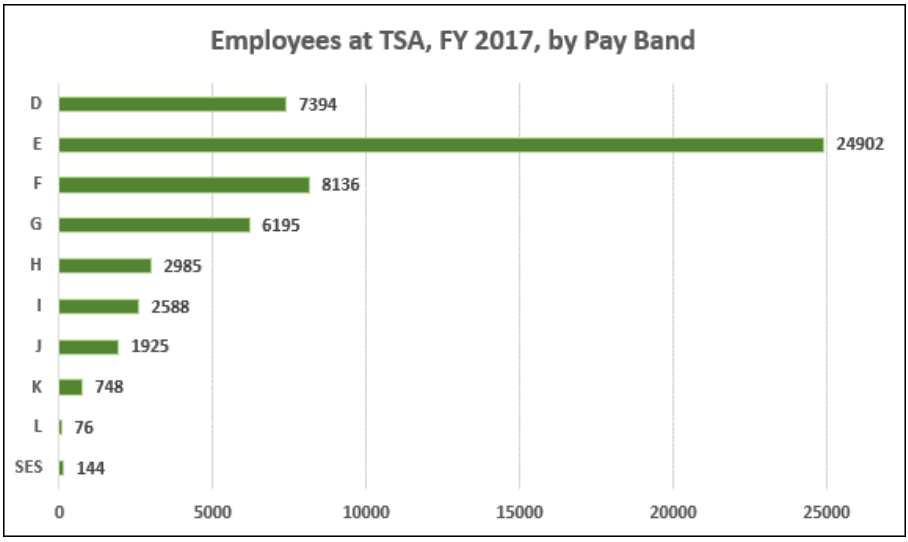
TSA Annual Budgets
2011: $7.69 billion
2012: $7.86 billion
2013: $7.93 billion
2014: $7.36 billion
2015: $7.18 billion
2016: $7.27 billion
2017: $7.36 billion

Now, during the past several years, how many overall employees did TSA have?

2013: 54,133
2014: 52,285
2015: 55,016
2016: 51,309
2017: 52,956 (requested in FY 2018 president's budget)

While we are looking at annual employee counts, you might be wondering how many employees were at the various pay bands at TSA? Let's take a look at numbers from FY 2017. K band employees

would be equivalent to GS-15s, while a D band would be closer to a GS 5/7, more or less.



Did You Know? TSA employed 42,525 full-time screeners in 2016, making up 83% of all agency employees.

Did You Know? 7,607 employees left TSA in 2015.

COMMON EQUIPMENT IN USE TODAY

So now that we have run through the main players associated with TSA screening, what types of devices are you typically going to see in use today at an airport screening checkpoint?

X-Ray

X-Rays are used to get a look inside passenger luggage to ensure there are no bombs, guns, or prohibited items inside without having to physically handle the bag. Different materials are displayed in different colors on the screen the operator analyzes.

Walk-through metal detector (WTMD)

While "the mag" is becoming less common as millimeter wave scanners are more widely used, you still will find it in use at quite a few airports. The device is simple enough – it is designed to detect metal on a person when they walk through. In FY 2015 there were 1,435 WTMDs in use at 437 airports.

Advanced Imaging Technology (AIT)

In many cases at airports now, the majority of passengers will not use the older Walk Through Metal Detectors but a newer millimeter wave scanner device commonly called an AIT. These devices use electromagnetic radiation and are also known as full body scanners. There remains an ongoing debate as to

the long-term health effects of these machines, but they are certainly more effective in detecting non-metallic items or threats on a person. The FAA Modernization and Reform Act of 2012 mandated that scanners of this type in use by TSA at airports must show a more generic outline (ginger bread man) of a person rather than the initial graphic x-ray images that were produced. In FY 2015 there were 780 AITs in use at 190 airports.

Hand-held metal detector (HHMD)

The hand-held metal detector is pretty straightforward – it is used to check for metal on a person. If it beeps, it has detected metal, and it is up to the screener to resolve the alarm.

Explosives trace detector

ETDs are primarily used in airports to detect vapors and residues of explosives on a person or piece of luggage. You may see a screener rubbing a swab along the interior or exterior of an object, or over the inside of a passenger's hands, and then place the swab in the ETD. At this point, the machine chemically analyzes the swab to identify any traces of explosive materials. At airports without EDS machines, ETDs are used as the primary method for screening checked baggage. At the end of FY 2015 there were 2,291 ETDs in use at 437 airports.

Explosives Detection Systems (EDS)

EDS machines are designed to scan a high quantity of checked baggage (hundreds per hour) using a combination of X-Ray scanning and image analysis. Operators are able to view "slices" of a bag at various angles to ensure it does not contain a threat item. These machines can also automatically assess explosive threats. Generally, a checked baggage screening system at airports with EDS includes a three-level

screening process. First, EDS machines perform automated screening. If the EDS machine determines that a checked bag requires additional screening, it sends an alarm to a TSO who performs a secondary inspection known as On-Screen Resolution by reviewing an image of the contents of the bag on a computer monitor. If the TSO cannot resolve the alarm using on-screen resolution tools and determines a physical bag search is necessary, the bag goes to the Checked Baggage Resolution Area where a TSO performs a manual inspection of the bag assisted by an ETD machine. At the end of FY 2015 TSA had 1,717 EDS machines in use at 263 airports.

TYPES OF SCREENING

TSA currently administers three types of screening for passengers: standard, enhanced (for selectees), and expedited (for low-risk types).

Standard screening is the basic, everyday screening that you are familiar with. Passengers enter the sterile terminal area via an "old school" walk-through metal detector (WTMD) or an Advanced Imaging Technology (AIT) device – the kind you stand in and put your arms up as the walls whirl around you. You may also get a pat-down and have your bags checked by hand or by explosives trace detection (ETD) search. After reading the last page, you know that ETD is the little wand that a screener runs over your bag, before taking the small linen cloth attached to it and feeding it into a machine that then gives a beep.

Enhanced screening is everything you get with the standard option and a guaranteed pat-down and ETD check, as well as a closer look of your accessible property, electronics, and footwear.

Expedited screening exists for those low-risk passengers, determined by Secure Flight or TSA Pre-Check. If you get expedited screening, you can usually keep your shoes and belt on, and keep your laptop in your carry-on bag.

PROHIBITED ITEMS

Working for TSA, I invariably get asked several times a year by friends or acquaintances if they can bring such and such items on the plane. My answer is always to direct them to the TSA website to look up the latest prohibited items list. After all, my job has nothing to do with the screening work force! Of course, the questions keep coming and since this is a book about the aviation industry and aviation security practices, it makes sense to add the current TSA Prohibited Items list to it.

In regards to liquids and gels, passengers are allowed to bring a quart-sized bag of liquids, aerosols, gels, creams and pastes in your carry-on bag and through the checkpoint. These are limited to travel-sized containers that are 3.4 ounces (100 milliliters) or less per item. Placing these items in a small bag and separating from your carry-on baggage facilitates the screening process. Pack items that are in containers larger than 3.4 ounces or 100 milliliters in checked baggage. Any liquid, aerosol, gel, cream or paste that alarms during screening will require additional screening.

Did You Know? TSA may impose a civil penalty (fine) of up to $12,856 per violation per person if you have certain prohibited items in your bags when you are screened.

Item Type	Carry-on Bags	Check Bags
Make-up & Toiletries (> 3 oz. and not in a clear bag)		
All creams and lotions including Neosporin or first-aid creams and ointments, topical or rash creams and ointments, suntan lotions, moisturizers, etc.	No	Yes
Bug sprays	No	Yes
Bubble bath including gel- or liquid-filled bubble bath balls, bath oils, or moisturizers	No	Yes
Gel deodorants	No	Yes

Gel cap type pills	No	Yes
Hair styling gels	No	Yes
Hair sprays of all kinds including aerosol	No	Yes
Hair straightener or detangler	No	Yes
Lip gels, glosses, or liquids	No	Yes
Liquid foundations	No	Yes
Liquid soaps	No	Yes
Make up removers or facial cleansers	No	Yes
Mascara	No	Yes
Mouthwash	No	Yes
Nail polish and removers	No	Yes
Perfumes or colognes	No	Yes
Toothpaste	No	Yes

Item Type	**Carry -on Bags**	**Check Bags**
Food & Drinks		
All beverages	No	Yes
Liquid Medications (These items should be separated from your zip-top bag, and they must be declared for inspection at the security checkpoint.)	Yes	Yes
Empty Camelbaks, similar backpacks and water bottles	Yes	Yes
Gel-based sports supplements	No	Yes
Jellos	No	Yes
Puddings	No	Yes
Yogurts or gel-like substances	No	Yes
Non-liquid, non-gel foods (such as sandwiches)	Yes	Yes

When traveling with an infant or toddler: baby formula and food, breast milk, and juice in reasonable quantities exceeding 3 oz. (Recently, the TSA has amended this rule to allow you to carry on baby formula even if you are not traveling with an infant. These items should be separated from your zip-top bag, and they must be declared for inspection at the security checkpoint.)	Yes	Yes

Item Type	Carry-on Bags	Check Bags
Personal Items		
Baby teethers with gel or liquid inside	No	Yes
Children's toys with gel inside	No	Yes
Cigar Cutters	Yes	Yes
Corkscrews	Yes	Yes
Cuticle Cutters	Yes	Yes
Eyeglass Repair Tools (including screwdrivers)	Yes	Yes
Eyelash Curlers	Yes	Yes
Gel candles	No	Yes
Gel shoe inserts	No	Yes
Knitting and Crochet Needles	Yes	Yes
Knives - prohibited as carry-on except for plastic or round bladed butter knives.	No	Yes
Nail Clippers	Yes	Yes
Nail Files	Yes	Yes
Personal care or toiletries with aerosols, in limited quantities (such as hairsprays, deodorants)	Yes	Yes
Safety Razors (including disposable razors)	Yes	Yes
Scissors - plastic or metal with blunt tips	Yes	Yes
Scissors - metal with pointed tips and blades **shorter** than four inches in length	Yes	Yes
Toy Transformer Robots	Yes	Yes
Toy Weapons (if not realistic replicas)	Yes	Yes

Tweezers	Yes	Yes
Umbrellas (allowed in carry-on baggage once they have been inspected to ensure that prohibited items are not concealed)	Yes	Yes
Walking Canes (allowed in carry-on baggage once they have been inspected to ensure that prohibited items are not concealed)	Yes	Yes

Item Type	Carry-on Bags	Check Bags
Medication and Special Needs Devices		
Blood sugar treatment up to 8 oz. of liquid or gel	Yes	Yes
Braille Note-Taker, Slate and Stylus, Augmentation Devices	Yes	Yes
Diabetes-Related Supplies/Equipment, (once inspected to ensure prohibited items are not concealed) including: insulin and insulin-loaded dispensing products; vials or box of individual vials; jet injectors; pens; infusers; and preloaded syringes; and an unlimited number of unused syringes, when accompanied by insulin; lancets; blood glucose meters; blood glucose meter test strips; insulin pumps; and insulin pump supplies. Insulin in any form or dispenser must be properly marked with a professionally printed label identifying the medication or manufacturer's name or pharmaceutical label.	Yes	Yes
Nitroglycerine pills or spray for medical use (if properly marked with a professionally printed label identifying the medication or manufacturer's name or pharmaceutical label)	Yes	Yes
Ostomy Scissors - All scissors with blades four inches or less	Yes	Yes
Prescription medicine with a name that matches the passenger's ticket	Yes	Yes
Non-Prescription medicine up to 4 oz.	Yes	Yes
Prosthetic Device Tools and Appliances, including drills, allen wrenches, and pullsleeves used to put on or remove prosthetic devices, if carried by the individual with the prosthetic device or his or her companion	Yes	Yes

Item Type	Carry-on Bags	Check Bags
Electronic Devices		
Camcorders	Yes	Yes
Camera Equipment - The checked baggage screening equipment will damage undeveloped film in camera equipment. We recommend that you either put undeveloped film and cameras containing undeveloped film in your carry-on baggage or take undeveloped film with you to the checkpoint and ask the screener to conduct a hand-inspection.	Yes	Yes
Laptop Computers	Yes	Yes
Mobile Phones	Yes	Yes
Pagers	Yes	Yes
Personal Data Assistants (PDA's)	Yes	Yes

Item Type	Carry-on Bags	Check Bags
Sharp Objects		
Box Cutters	No	Yes
Ice Axes/Ice Picks	No	Yes
Knives - prohibited as carry-on except for plastic or round bladed butter knives.	No	Yes
Meat Cleavers	No	Yes
Razor-Type Blades, such as box cutters, utility knives, razor blades not in a cartridge, but excluding safety razors (disposable razors and their cartridges are permitted)	No	Yes
Sabers	No	Yes
Scissors - metal with pointed tips and blades longer than four inches	No	Yes
Swords	No	Yes

Item Type	Carry-on Bags	Check Bags
Sporting Goods		
Baseball Bats	No	Yes
Bows and Arrows	No	Yes
Cricket Bats	No	Yes
Golf Clubs	No	Yes
Hockey Sticks	No	Yes
Lacrosse Sticks	No	Yes
Pool Cues	No	Yes
Ski Poles	No	Yes
Spear Guns	No	Yes
Skates (including ice skates and roller blades)	Yes	Yes

Item Type	Carry-on Bags	Check Bags
Guns and Firearms		
Ammunition	No	Yes
BB guns	No	Yes
Compressed Air Guns	No	Yes
Firearms	No	Yes
Flare Guns	No	Yes
Flares	No	No
Gun Lighters	No	No
Gun Powder (including black powder and percussion caps)	No	No
Parts of Guns and Firearms	No	Yes
Pellet Guns	No	Yes
Realistic Replicas of Firearms	No	Yes
Starter Pistols	No	Yes

Item Type	Carry-on Bags	Check Bags
Tools		
Axes and Hatchets	No	Yes
Cattle Prods	No	Yes
Crowbars	No	Yes
Hammers	No	Yes
Drills (including cordless portable power drills)	No	Yes
Saws (including cordless portable power saws)	No	Yes
Tools (greater than seven inches in length)	No	Yes
Tools (seven inches or less in length)	Yes	Yes
Screwdrivers (seven inches or less in length)	Yes	Yes
Wrenches and Pliers (seven inches or less in length)	Yes	Yes

Item Type	Carry-on Bags	Check Bags
Martial Arts/Self Defense Items		
Billy Clubs	No	Yes
Black Jacks	No	Yes
Brass Knuckles	No	Yes
Kubatons	No	Yes
Mace/Pepper Spray (118mL / 4 oz.)	No	Yes
Martial Arts Weapons	No	Yes
Night Sticks	No	Yes
Nunchakus	No	Yes
Stun Guns/Shocking Devices	No	Yes
Throwing Stars	No	Yes

Item Type	Carry-on Bags	Check Bags
Explosive Materials		
Blasting Caps	No	No
Dynamite	No	No
Fireworks	No	No
Flares (in any form)	No	No
Hand Grenades	No	No
Plastic Explosives	No	No
Realistic Replicas of Explosives	No	No

Item Type	Carry-on Bags	Check Bags
Flammable Items		
Aerosol (any except for personal care or toiletries in limited quantities)	No	No
Fuels (including cooking fuels and any flammable liquid fuel)	No	No
Gasoline	No	No
Gas Torches	No	No
Lighter Fluid	No	No
Lighters	No	No
Strike-anywhere Matches	No	No
Flammable Paints	No	No
Turpentine and Paint Thinner	No	No
Realistic Replicas of Incendiaries	No	No

Item Type	Carry-on Bags	Check Bags
Disabling Chemicals and Other Dangerous Items		
Chlorine for Pools and Spas	No	No
Compressed Gas Cylinders (including fire extinguishers)	No	No

Small compressed gas cartridges (Up to 2 in life vests and 2 spares. The spares must accompany the life vests and be presented as one unit.)	Yes	Yes
Liquid Bleach	No	No
Spillable Batteries (except those in wheelchairs)	No	No
Spray Paint	No	No
Tear Gas	No	No
Vehicle Airbags	No	No

Item Type	Carry-on Bags	Check Bags
Religious and Cultural Items		
Wearing Loose Fitting Garments	Yes	Yes
Head Coverings	Yes	Yes
Religious/Cultural/Ceremonial Knives or Swords	No	Yes

Item Type	Carry-on Bags	Check Bags
Other Items		
Gel-type candles	No	Yes
Gel shoe inserts (Gel shoe inserts are not permitted, but shoes constructed with gel heels are allowed and must be removed and screened.)	No	Yes
Non-flammable liquid, gel, or aerosol paint	Yes (3 oz. or smaller container)	Yes
Flammable liquid, gel, or aerosol paint	No	No
Snow globes and like decorations regardless of size or amount of liquid inside, even with documentation.	No	Yes
Knitting Needles and Needle Point	Yes	Yes
Circular Thread Cutters (or any cutter with a blade contained inside	No	Yes

Marijuana	No	No

Item Type	Allowed Through Security
Passengers Traveling with Disabilities and Medical Conditions	
CPAPs, BiPaps, and APAPs	Yes
Nebulizers	Yes
Diabetes-related supplies, equipment, and medication, including liquids	Yes
Ostomies	Yes
Prosthetics	Yes

LOOSE CHANGE

Since 2005, TSA has been permitted to keep all of the loose change and money that is left behind by passengers at airport screening checkpoints – a few pennies here, a dime there, all left in the familiar little dog food bowls or plastic tubs. Added up, it all ends up being a fairly sizable sum. In fact, in FY 2017, the total amount retained was $787,477.51. Since 2008, passengers have left $5,110,775.05 at checkpoints! So, what are the annual totals?

2008: $383,413.79
2009: $432,790.62
2010: $409,085.56
2011: $487,869.50
2012: $531,395.22
2013: $638,142.64
2014: $674,841.06
2015: $765,759.15
2016: $787,477.51

Now of course you might be wondering, wow, just how much was collected at my local airport? Luckily, I want you to get your money's worth, pun intended, out of this book, so I've done the leg work for you and compiled the data for FY 2014 - 2016 for the various hub airports around the country. You may note that people in Pago Pago, American Samoa, are very careful not to leave any coins in the bins.

PORT	HUB	FY2014	FY2015	FY2016	FY14-16 TOTALS
ABE	Lehigh Valley International	$245.13	$41.27	$303.13	$589.53
ABQ	Albuquerque	$1,804.45	$4,009.09	$2,205.02	$8,018.56
ACY	Atlantic City	$358.41	$740.12	$760.32	$1,858.85
ALB	Albany, NY	$948.12	$743.69	$986.01	$2,677.82
ANC	Anchorage	$2,929.55	$2,169.12	$1,140.78	$6,239.45
ATL	Atlanta	$10,630.43	$9,693.81	$10,497.58	$30,821.82

PORT	HUB	FY2014	FY2015	FY2016	FY14-16 TOTALS
AUS	Austin	$4,218.88	$6,825.40	$5,188.79	$16,233.07
BDL	Hartford	$1,762.47	$2,904.88	$2,571.77	$7,239.12
BHM	Birmingham	$1,500.85	$1,533.09	$1,300.63	$4,334.57
BIL	Billings, MT	$645.42	$1,152.26	$1,402.72	$3,200.40
BIS	Bismarck	$553.40	$873.48	$603.22	$2,030.10
BNA	Nashville	$6,159.62	$9,364.10	$9,097.26	$24,620.98
BOI	Boise	$838.94	$4,098.81	$1,623.80	$6,561.55
BOS	Boston Logan	$13,513.50	$19,733.50	$23,691.83	$56,938.83
BTR	Baton Rouge	$656.87	$176.20	$2,921.53	$3,754.60
BTV	Burlington	$323.31	$870.06	$998.92	$2,192.29
BUF	Buffalo Niagara	$248.00	$1,553.81	$2,183.28	$3,985.09
BUR	Burbank, CA	$2,409.04	$1,535.15	$1,695.82	$5,640.01
BWI	Baltimore	$8,477.50	$12,845.00	$5,946.50	$27,269.00
CAE	Columbia	$1,049.72	$216.44	$832.07	$2,098.23
CHS	Charleston, SC	$1,404.20	$3,136.28	$3,054.19	$7,594.67
CLE	Cleveland	$4,239.65	$6,738.45	$7,133.42	$18,111.52
CLT	Charlotte	$5,513.38	$5,079.37	$7,480.07	$18,072.82
CMH	Columbus, OH	$4,073.93	$3,828.22	$4,297.79	$12,199.94
COS	Colorado Springs	$557.54	$481.78	$152.38	$1,191.70
CPR	Casper, WY	$158.23	$1,131.65	$934.67	$2,224.55
CRW	Charleston, WV	$134.25	$541.95	$219.28	$895.48
CVG	Cincinnati/Northern Kentucky	$2,677.20	$4,514.16	$3,154.68	$10,346.04
DAL	Dallas Love Field	$7,988.48	$6,304.26	$7,023.05	$21,315.79
DCA	Washington National	$9,591.57	$10,825.59	$18,753.31	$39,170.47
DEN	Denver	$11,379.65	$12,592.06	$12,130.06	$36,101.77
DFW	Dallas/Fort Worth	$29,684.03	$30,420.36	$42,305.26	$102,409.65
DSM	Des Moines	$1,225.39	$1,932.74	$1,780.84	$4,938.97
DTW	Detroit	$8,203.47	$9,742.58	$19,404.46	$37,350.51
ELP	El Paso	$1,398.03	$2,278.35	$2,584.28	$6,260.66
EWR	Newark, NJ	$16,669.72	$12,846.78	$19,590.43	$49,106.93
FAI	Fairbanks	$192.63	$509.25	$2,893.88	$3,595.76
FAT	Fresno/Yosemite	$656.07	$664.50	$200.35	$1,520.92
FLL	Fort Lauderdale	$12,341.20	$15,565.43	$11,681.04	$39,587.67

PORT	HUB	FY2014	FY2015	FY2016	FY14-16 TOTALS
FSD	Sioux Falls	$256.03	$388.65	$401.26	$1,045.94
GEG	Spokane	$909.51	$897.58	$22.22	$1,829.31
GJT	Grand Junction, CO	$76.10	$436.61	$153.88	$666.59
GRB	Green Bay	$332.33	$439.62	$3,313.45	$4,085.40
GRR	Grand Rapids	$623.49	$1,346.12	$1,202.12	$3,171.73
GSN	Saipan	$52.71	$64.68	$167.14	$284.53
HNL	Honolulu	$9,352.93	$7,492.78	$7,044.01	$23,889.72
HOU	Houston Hobby	$4,961.44	$6,086.10	$5,631.66	$16,679.20
IAD	Washington Dulles	$22,037.55	$22,234.27	$20,801.25	$65,073.07
IAH	Houston Intercontinental	$26,839.01	$19,129.32	$23,723.25	$69,691.58
ICT	Wichita	$486.44	$473.42	$450.33	$1,410.19
IND	Indianapolis	$1,502.26	$7,074.27	$4,102.99	$12,679.52
JAN	Jackson, MS	$1,136.11	$904.32	$1,074.76	$3,115.19
JAX	Jacksonville	$3,396.67	$3,346.46	$3,172.89	$9,916.02
JFK	New York Kennedy	$42,550.00	$43,715.81	$70,615.00	$156,880.81
KOA	Kona, HI	$1,536.59	$1,721.35	$1,481.39	$4,739.33
LAS	Las Vegas	$27,676.71	$32,729.48	$32,671.38	$93,077.57
LAX	Los Angeles	$41,506.64	$55,086.39	$44,811.84	$141,404.87
LBB	Lubbock	$983.02	$1,347.59	$1,115.43	$3,446.04
LGA	New York LaGuardia	$16,786.05	$23,413.61	$27,963.46	$68,163.12
LGB	Long Beach	$590.64	$1,081.46	$1,279.97	$2,952.07
LIH	Lihue	$1,209.02	$1,241.10	$971.69	$3,421.81
LIT	Little Rock	$885.83	$1,460.73	$1,302.80	$3,649.36
MCI	Kansas City	$4,132.43	$7,375.58	$5,624.98	$17,132.99
MCO	Orlando	$20,757.81	$22,938.25	$17,551.13	$61,247.19
MDW	Chicago Midway	$9,286.83	$9,313.49	$10,359.75	$28,960.07
MEM	Memphis	$1,656.05	$2,242.40	$1,636.15	$5,534.60
MHT	Manchester, NH	$1,206.89	$1,066.16	$1,289.46	$3,562.51
MIA	Miami	$32,590.43	$50,955.58	$43,991.36	$127,537.37
MKE	Milwaukee	$1,849.04	$2,843.97	$1,663.54	$6,356.55
MLI	Moline/Quad City, IL	$483.85	$978.10	$601.65	$2,063.60
MOB	Mobile, AL	$203.99	$46.42	$247.02	$497.43

PORT	HUB	FY2014	FY2015	FY2016	FY14-16 TOTALS
MSN	Dane County/Madison	$368.25	$349.27	$327.83	$1,045.35
MSP	Minneapolis-St. Paul	$6,896.81	$8,322.50	$11,099.00	$26,318.31
MSY	New Orleans	$5,518.68	$12,651.46	$5,358.86	$23,529.00
OAK	Oakland	$4,595.10	$8,882.80	$6,407.16	$19,885.06
OGG	Kahului, HI	$1,307.37	$2,345.96	$2,473.44	$6,126.77
OKC	Oklahoma City	$854.97	$1,406.74	$685.15	$2,946.86
OMA	Omaha	$1,965.35	$2,692.83	$2,347.01	$7,005.19
ONT	Ontario, CA	$1,602.48	$2,012.05	$4,537.91	$8,152.44
ORD	Chicago O'Hare	$21,068.69	$25,334.97	$25,425.75	$71,829.41
PBI	Palm Beach	$3,932.44	$2,281.22	$2,640.57	$8,854.23
PDX	Portland	$4,895.37	$6,569.21	$8,790.80	$20,255.38
PHL	Philadelphia	$6,789.57	$6,709.90	$13,437.11	$26,936.58
PHX	Phoenix	$8,696.46	$10,819.40	$10,771.14	$30,287.00
PIT	Pittsburgh	$2,928.58	$4,387.71	$3,343.79	$10,660.08
PNS	Pensacola	$604.28	$1,666.42	$846.04	$3,116.74
PPG	Pago Pago	$2.16	$1.99	$2.11	$6.26
PVD	Providence, RI	$3,051.33	$1,131.27	$1,042.21	$5,224.81
PWM	Portland, ME	$989.38	$1,312.38	$789.83	$3,091.59
RDU	Raleigh/Durham	$5,608.38	$4,069.95	$4,002.26	$13,680.59
RIC	Richmond	$1,160.88	$4,879.58	$3,730.90	$9,771.36
RNO	Reno/Tahoe	$1,533.75	$2,330.12	$2,270.81	$6,134.68
ROC	Rochester, NY	$796.42	$896.39	$1,374.00	$3,066.81
RSW	Fort Myers	$3,744.22	$2,472.50	$4,303.32	$10,520.04
SAN	San Diego	$5,534.87	$5,631.01	$5,566.69	$16,732.57
SAT	San Antonio	$5,732.63	$4,063.76	$4,830.65	$14,627.04
SAV	Savannah, GA	$786.30	$1,951.50	$1,904.86	$4,642.66
SBA	Santa Barbara	$220.52	$407.71	$271.60	$899.83
SDF	Louisville	$2,089.60	$347.67	$1,489.20	$3,926.47
SEA	Seattle-Tacoma	$11,977.47	$11,149.36	$15,302.58	$38,429.41
SFO	San Francisco	$34,889.63	$38,770.86	$24,711.34	$98,371.83
SJC	San Jose	$4,499.13	$3,965.87	$4,475.75	$12,940.75
SJU	San Juan, PR	N/A	$7,526.16	$1,227.30	$8,753.46

PORT	HUB	FY2014	FY2015	FY2016	FY14-16 TOTALS
SLC	Salt Lake City	$5,986.62	$5,549.95	$4,490.64	$16,027.21
SMF	Sacramento	$4,314.26	$4,554.86	$6,866.70	$15,735.82
SNA	Santa Ana, CA	$3,423.49	$3,789.71	$2,800.45	$10,013.65
STL	St. Louis	$5,259.80	$5,118.03	$4,959.50	$15,337.33
STT	St. Thomas, VI	$462.67	$525.00	$686.64	$1,674.31
SYR	Syracuse, NY	$532.86	$474.98	$620.80	$1,628.64
TLH	Tallahassee	$217.00	$234.11	$241.05	$692.16
TPA	Tampa	$5,961.85	$6,094.61	$11,178.51	$23,234.97
TUL	Tulsa	$1,366.56	$1,914.71	$1,560.38	$4,841.65
TUS	Tucson	$782.65	$534.68	$931.27	$2,248.60
TVC	Traverse City, MI	$251.09	$278.03	$190.97	$720.09
GRAND TOTALS		**$638,416.55**	**$756,493.90**	**$787,477.41**	**$2,182,387.96**

Did You Know? The FY 2005 DHS Appropriations Act (P.L. 108-334) requires the TSA Administrator to report to Congress annually on the collection of unclaimed money at airports and the expenditure of those funds. TSA is using unclaimed money collected to support the expansion of the Pre-Check program. Leafing through the last few years of these reports is where I gathered all this data.

CHICAGO CONVENTION

The seed for every modern rule and regulation in international air travel that exists today was planted at the Chicago Convention in 1944. Officially known as the Convention on International Civil Aviation, but more commonly known as the Chicago Convention as the meetings were held there, the International Civil Aviation Organization (ICAO) was established at this gathering. ICAO is a specialized agency of the United Nations which is responsible for coordinating and regulating international air travel.

So what exactly are we talking about here, in regards to international aviation rules and regulations? The Convention established several articles that cover various topics. These articles provide a broad framework and set forth some "norms" to be followed. For example, signatories agree that they will not use weapons against civil aircraft and all signatory countries must render aid and hospitality to aircraft in distress, despite any other differences that may exist between the two. A good example of this would be a June 2005 incident in which a Northwest Airlines Douglas DC-10 on its way from Bombay, India to Amsterdam, Netherlands had to make an emergency landing in Tehran, Iran due to a technical issue with the aircraft. Despite long standing hostilities between the U.S. and Iranian governments, local mechanics helped to resolve the issue and the plane was back underway several hours later.

Nineteen annexes to the Convention have been established, and these contain standards and recommended practices that all signatories must follow. The annexes are the "nuts and bolts" in which Standards and Recommended Practices (SARPs) are written. Signatory states to the Chicago Convention must follow all Standards, while Recommended Practices are just that, recommended.

Annex 17, Security: Safeguarding International Civil Aviation Against Acts of Unlawful Interference is the most applicable to TSA and the area in which TSA's international Inspectors review at foreign locations. It is this Annex, adopted in March 1974, which outlines basic aviation security requirements that are to be followed worldwide.

Did You Know? The Chicago Convention set forth that commercial aviation fuel for foreign carriers in any location other than their home state is non-taxable.

ICAO AND IMPACT ON TSA

One of the most important things to remember about aviation security is that many of the rules in place today have not necessarily been created here in the U.S., but by the International Civil Aviation Organization (ICAO). Today, ICAO comprises 191 member nations.

ICAO meets in session no less than every three years and works to create, adjust, and implement international aviation security policies. For example, by creating set standards for passports, visas, and machine-readable documents, ICAO has facilitated the easier movement of aircraft and passengers across international borders.

Major changes to international policy take place at occasional Conventions, of which there have been six since 1944.

As a signatory nation, the U.S. is compelled to implement policies that ICAO agrees to. While it is up to individual member states to incorporate new statutes and requirements into their own national legislation, the nexus of most of the rules in place today come from ICAO rather than some "bureaucrat" sitting at FAA or TSA headquarters in Washington, D.C. dreaming random things up.

CODE OF FEDERAL REGULATIONS (CFR)

Much of the framework that establishes aviation security in the U.S. today is public record, and has been for many years, as it is codified in the Code of Federal Regulations (CFR).

Chapter 12 of Title 49 of the Code of Federal Regulations features regulations for the TSA. For our purposes, we will focus on the meaty section - Subchapter C, which deals with Civil Aviation Security.

Once we get into this area, you will see the baseline for aviation security in the U.S. today. All of the basics are here; more detailed requirements or practices can be found in other documents, particularly the various security programs. Those programs are not publicly available, for good reason. The CFRs are the "what" of aviation security, as in, what is required. The security programs are the "how," as in how the regulated party, i.e. the airport or air carrier, meets the requirements. Think of the security programs as the instruction guides.

So, what exactly are we getting at here insofar as the **what** and the **how**? Let's take a quick review: 49 CFR 1542.201(b) is the what, and it states that airport operators *"must prevent and detect the unauthorized entry, presence, and movement of individuals and ground vehicles into and within the security area…"*

OK, that's easy! The airport has to keep unauthorized people from entering the secured area at the airport. But wait, the CFR doesn't say *how*. There is no requirement, for instance, for the airport to put a fence up. Maybe there are guards stationed every few hundred yards in a field as in some African airports, or maybe there is a moat with crocodiles is in place instead. *Yes, those airports do exist in the world*! The main requirement for the airport is to "prevent and detect unauthorized entry,' and yes, fences are certainly the most common tool used to do that. In the end, the airport's security program will state just how an airport is going to prevent unauthorized access to its grounds.

Each section of the CFRs is set up in a similar manner. 1540 deals with individual responsibilities – this is the section that allows the government to fine a person who brings a gun to the airport. 1542 covers airports; 1544 domestic carriers; 1546 foreign carriers; 1548 indirect air carriers and so on and so forth. In fact, let's list them all:

1540 Individuals
1542 Airports
1544 U.S. carriers
1546 Foreign carriers
1548 Indirect air carriers
1549 Certified cargo screening
1550 General aviation
1552 Flight schools
1560 Secure Flight
1562 Maryland Three airports

Now that we have a basic understanding of the CFRs, let's start looking at some of the other programs and processes in place today as they relate to commercial aviation security.

CBP PRECLEARANCE

Customs and Border Patrol (CBP) operates preclearance facilities at several foreign airports, most commonly in Canada. The program has been around for over 65 years as the first preclearance facility was opened at Toronto Pearson in 1952. Preclearance facilities are U.S. customs and immigration foreign inspections stations that are located on foreign soil. The purpose of these preclearance facilities is to allow passengers to pass through U.S. customs and immigration checks before boarding their U.S. bound flight in the host nation. Subsequently, when these passengers arrive in the U.S., they are treated in the same manner as domestic passengers arriving from other U.S. airports. If you are entering the U.S., preclearance certainly makes things easier, especially if you have a connecting flight, as you have already cleared U.S. customs.

Preclearance facilities are set up after the U.S. government makes an agreement with the host nation. It should be noted that while CBP officers are stationed overseas and conduct official U.S. customs and immigration checks, they are not (historically) armed and have no legal powers in foreign lands - they cannot arrest anyone.

How does it work?

When checking in for a flight, the passenger's checked bag receives a photo, an X-Ray image, and has its weight recorded before it enters the checked baggage screening system. The passenger then enters the Preclearance area, gets through Customs (verifying the photo of their checked baggage) and then receives TSA-equivalent security screening at the passenger screening checkpoint. After that, they are in the terminal waiting their flight back to the U.S.

What are the current Preclearance airports?

Aruba
Bermuda
Bahamas: Freeport and Nassau.

Canada: Calgary, Edmonton, Halifax, Montreal, Ottawa, Toronto Pearson, Vancouver, Victoria, and Winnipeg.
Ireland: Dublin and Shannon.
United Arab Emirates: Abu Dhabi

The preclearance facility in Abu Dhabi was contentious in many circles, particularly as no U.S. airlines fly to the U.S. from that airport; only Etihad Airways, a flag carrier of the United Arab Emirates, offers U.S. bound flights. After this facility was opened, U.S. laws were changed to state that at least one U.S. passenger carrier must operate at a foreign airport before preclearance facilities will be considered.

The U.S. and Canada agreed in March 2016 to add preclearance facilities at Quebec City and Toronto City airports in the future. However, as only one Canadian carrier, Porter Airlines, operates flights to the U.S. from Toronto City, its future preclearance status would appear murky. A preclearance facility in Stockholm, Sweden is under construction and due to open in 2018.

Did You Know? The preclearance agreement with Canada is reciprocal; however, the Canadian government has so far declined to open a Canadian preclearance facility in the U.S.

SECURITY LOOPHOLE?

There is no requirement to check my passport to make sure it hasn't been stolen?

The mysterious case of Malaysia Airlines Fl. 370, the Boeing 777-200 that vanished on March 8, 2014, presented the opportunity to examine a gaping loophole in aviation security that many people were unaware of.

After the flight disappeared, it came to light that at least two passengers traveling on the aircraft were doing so on stolen passports. Many people wondered how that could happen. Weren't there checks in place to prevent this?

The answer is yes. And no.

Certainly, in the U.S. we are used to having to present identification when we travel, most commonly a driver's license or a passport. In fact, when you are booked on an international flight, your passport is checked multiple times and against various databases to ensure you do not present a threat.

INTERPOL, the International Criminal Police Organization, maintains an extensive database of over 40 million lost or stolen travel documents, including passports. Information for this database is provided by over 160 countries, and was searched over 800 million times in 2013.

However, there is currently no international requirement in place to verify passport information against this database, and in many countries around the world, it just isn't done. In fact, it has been reported that nearly 40% of all international passengers do not have their applicable travel documents checked against the database. Of the over

800 million checks that were done in 2013, nearly 100 million were done by the United Arab Emirates. The U.S. and Britain were also heavy users of the database as well, to no great surprise.

As it stands, there are many places around the globe where there is no verification that the passport being presented by a passenger is not a stolen document belonging to another person. Who might take advantage of this loophole? Perhaps anyone who might not want to be noticed while they travel - drug mules, illegal immigrants, criminals or even hardened terrorists.

Did You Know? If you wish to see what various passport books from around the world look like, you should visit www.passportindex.org.

ARMED PERSONNEL ON BOARD

Another of TSA's multiple layers of security is the presence of armed personnel on board commercial aircraft. Most people are aware of at least one of these groups - the Federal Air Marshals - so let's briefly discuss them and one other program - the Federal Flight Deck Officers (armed pilots) - that are in place.

Federal Air Marshals (FAM)

Tracing its roots back to the early 1960s, the Federal Air Marshal Service is the law enforcement arm of TSA. Originally known as "Sky Marshals," FAMs are covertly deployed on flights within, to and from the U.S. as an additional layer of security. The exact number of FAMs and the percentage of flights they are on-board are kept secret.

The basic purpose of the Air Marshal program is simple - to prevent a hijacking or terrorist event on board an aircraft. TSA is authorized to deploy federal air marshals on every passenger flight of a U.S. air carrier and is required to deploy federal air marshals on every such flight determined by the Secretary of Homeland Security to present high security risks, with nonstop, long-distance flights, such as those targeted on September 11, 2001, considered a priority.

Air Marshals undergo a rigorous 16.5-week training program conducted at Federal Law Enforcement Training Center (FLETC) facilities in Artesia, New Mexico and Atlantic City, New Jersey. FAMs have historically been some of the most accurate shots in the federal government.

There were 33 air marshals employed on September 11, 2001 – although the program grew exponentially after that. The FAM budget peaked at $966 million in FY 2012, before dropping to $800.6 million

in FY 2015. DHS requested $805 million for FAM operations in FY 2018.

FAMs may deploy on flights for which a known or suspected terrorist is ticketed. Flights like this are referred to as Special Mission Coverage (SMC).

Interestingly, the FAMs have seen several organizational transfers since 2001. Originally under FAA within the Department of Transportation (DOT), they were transferred within DOT to TSA once that agency was created. In March 2003, TSA was moved from DOT to the newly created Department of Homeland Security (DHS). In November 2003, FAMS were moved within DHS from TSA to Immigration and Customs Enforcement (ICE), before being returned to TSA in October 2005.

Did You Know? FAMs may not be deployed on foreign-flagged carriers.

Federal Flight Deck Officer (FFDO)

Federal Flight Deck Officers (FFDO) are armed commercial pilots who have been deputized as Federal Law Enforcement officers on board an aircraft. FFDOs represent one of the last layers of security on board an aircraft – a hot response to a flight deck (cockpit) intrusion.

The FFDO program was created by the Arming Pilots Against Terrorism Act of 2003 (P.L. 107-296), and is administered by the Federal Air Marshal Service. FAMs provide training and guidance to FFDOs on the use of force and firearms, defensive tactics and other topics. The first FFDOs were sworn in on April 19, 2003.

The program is entirely voluntary; FFDOs are not compensated in any way by the government and even pay their own way for training. FFDO training includes combination of law enforcement schooling in

firearms proficiency, self-defense tactics, authority, use-of-force, and decision-making in defense of both commercial and cargo aircraft. FFDOs have no powers or authority outside of the aircraft.

DHS projects that TSA will spend $20.6 million on the FFDO program in FY 2018.

Other Armed Personnel

It bears noting that just because a FAM or FFDO is not on-board your flight does not mean there may not be an armed official on board. Nearly every federal agency has law enforcement officers, and these folks are allowed to carry their weapons on board with them as they fly around the country on official business.

Did You Know? The U.S. is not the only country that utilizes air marshals. Several countries have their own air marshal programs, operating on both domestic and international flights.

SCREENING PARTNERSHIP PROGRAM (SPP)

When ATSA created TSA in 2001, five airports remained staffed with private contractors conducting screening operations under federal oversight as part of a pilot program. Of the five, Kansas City, Missouri (MCI) and San Francisco (SFO) were the two largest. In 2004 this pilot program ended and the Screening Partnership Program was officially born, with the original five airports included. The program has slowly expanded since then, and as of September 2017 there are 22 (mostly small) airports included. The program seems particularly popular in Montana, with eight airports participating.

If and when airports convert from TSA to private contractors, the contract companies that end up running screening operations must adhere to the **exact** same rules and procedures that are employed by TSA. Privatized screeners at SPP airports attend the same training as TSA screeners. There is no change in the security measures in place at an airport staffed with TSA employees or one with private security contractors. Even the uniforms are nearly identical! The screeners must be compensated at an amount commensurate with their TSA counterparts as well.

To join the SPP, airports that wish to "opt-out" of TSA screening must submit an application. Critics, including some vocal members of Congress, have charged that TSA has either dragged its feet on applications or simply ignored them outright. In March 2012, the SPP application was amended to comply with requirements in the FAA Modernization and Reform Act of 2012. Some of the key changes included:

> TSA must approve or deny the application within 120 days after receiving it. TSA must approve the application as long as it does not compromise security, negatively affect budget efficiencies or screening effectiveness. Finally, within 60 days of any denials, TSA essentially has to explain itself

to the airport as well as applicable committees in both the House of Representatives and the Senate whenever an application is denied.

To date, only a small handful of airports have expressed an interest in replacing TSA with private contractors, although as TSA encountered staffing shortages and difficulties in screening increased passenger volume in 2016, several large airports including Atlanta, New York (both JFK & LGA), and Seattle, threatened to look into privatizing their screening personnel.

Current SPP Airports as of September 2017:

Bozeman, Montana (BZN)
Glacier Park, Montana (GPI)
Glasgow, Montana (GGW)
Glendive, Montana (GDV)
Havre City, Montana (HVR)
Jackson Hole, Wyoming (JAC)
Kansas City (MCI)
Key West, Florida (EYW)
Orlando Sanford (SFB)
Portsmouth, New Hampshire (PSM)
Punta Gorda, Florida (PGD)
Rochester, New York (ROC)
Roswell, New Mexico (ROW)
San Francisco (SFO)
Sarasota, Florida (SRQ)
Sidney, Montana (SDY)
Sioux Falls, South Dakota (FSD)
Sonoma County, California (STS)
Tupelo, Mississippi (TUP)
Wolf Point, Montana (OLF)
Yellowstone, Montana (WYS)

KNOWN CREWMEMBER PROGRAM (KCM)

Quite often in past years, passengers would see pilots being screened at the checkpoint, shake their heads and think “what is the point?” After all, if the pilot had ill intent, he or she is at the controls of the aircraft. What does it matter if they have a small Swiss Army knife?

The Known Crewmember program addresses that reality and allows airline pilots to receive identity based (ID check), rather than physical, screening. The program is a joint venture between Airlines for America (A4A), the Air Line Pilots Association (ALPA) and the TSA. The Known Crewmember program utilizes airline employee databases to help TSA screeners verify crewmember identity and employment status before allowing them to access the sterile area of the airport via a Known Crewmember access point, rather than the screening checkpoint.

Pilots and flight attendants must be employed by a participating airline to use the Known Crewmember access point, which exist at 74 airports as of September 2017. When accessing a Known Crewmember access point, crewmembers must not have a prohibited item in their possession. They are not allowed to transport someone else’s property and remain subject to random screening at all times - in other words, they can be sent to the passenger screening checkpoint.

SCREENING PASSENGERS BY OBSERVATION TECHNIQUE (SPOT)

One of the most controversial programs in TSA history is the Screening Passengers by Observation Technique or SPOT program. SPOT created the position of Behavior Detection Officer (BDO). Established in 2007 at 42 airports, the SPOT program expanded to 176 airports by 2012 with nearly 3,000 BDOs on duty. The program has been reduced somewhat in recent years, and as of FY 2016, there were 2,393 BDOs at 87 airports, with $186 million being budgeted for the program that year. The program has cost approximately $900 million dollars since its inception and theoretically represents another of TSA's layers of security.

Passengers will often see BDOs standing and seemingly milling about at the front of the screening checkpoint or in the queue. Their main function is to "observe and visually assess passengers, primarily at passenger screening checkpoints, and identify those who display clusters of behaviors indicative of stress, fear, or deception."

If a BDO determines that a passenger has displayed enough indicators to warrant concern, they will direct them to the side for SPOT referral screening. At this point, the BDO will attempt to engage the passenger in casual conversation and hopefully make a determination if the passenger does indeed pose a possible threat or not. Passengers picked for a SPOT referral will also have their persons and belongings physically searched.

Over the years, the SPOT program has been singled out repeatedly with questions about its usefulness and value. In early 2014, the Government Accountability Office (GAO) recommended that TSA essentially scrap this program, citing "the absence of scientifically validated evidence" in the program, particularly when weighed against its cost. GAO added that TSA couldn't demonstrate that the SPOT program "can reliably

and effectively identify high-risk passengers who may pose a threat." DHS disagreed with GAO's findings and the program remains in place today. A further 2017 GAO report found that:

> "TSA does not have valid evidence that most of the indicators in its revised list of behavioral indicators can be used to identify individuals who may pose a threat to aviation security. In our review of all 178 sources TSA cited in support of its revised list, we found that 98 percent (175 of 178) of the sources do not provide valid evidence applicable to the specific indicators that TSA identified them as supporting."

Did You Know? In October 2016, TSA also began conducting a covert assessment to collect data on the effectiveness of BDOs in identifying certain behavioral indicators that may be indicative of stress, fear, or deception. As of August 2017, TSA had conducted a first phase of the covert testing at four airports but had no plans for additional testing at that time.

TERRORIST WATCHLISTS

Many people mistakenly assume that the TSA compiles and/or maintains "the list" of terrorists that the government has. But what exactly is “the list” and who is in charge of it?

The Terrorist Screening Database (TSDB) is of course known colloquially as the "terrorist watch list." This contains records with identifying and/or biographical information of both foreign and U.S. citizens who are known or suspected to have links to terrorism.

On September 16, 2003, Homeland Security Presidential Directive (HSPD) 6 was issued, which provided for the establishment of what would become the Terrorist Screening Center (TSC). The TSC has been under the administration of the FBI since it stood up in December 2003. The TSC maintains and operates the TSDB.

The No Fly and Selectee lists are basically subsets of the TSDB, although not everyone listed in the TSDB is necessarily on either the No Fly or Selectee lists.

The TSC does not collect intelligence itself but rather serves as a type of aggregator or repository for information collected from various government agencies and entities. The TSC consolidates this into a watch list that is available for review by appropriate parties.

Terrorist Identities Datamart Environment (TIDE)

The National Couterterrorism Center posts a nice fact sheet each year about the Terrorist Identities Datamart Environment (TIDE), which it manages. According to that fact sheet:

> TIDE is the U.S. government's central database of information on known or suspected international terrorists. It supports the US Government’s various terrorist screening efforts by supplying identities to the unclassified Terrorist Screening Database (TSDB), which resides in the FBI-led Terrorist Screening Center (TSC). The TSDB commonly referred to as “the Watchlist,” supplies databases “downstream” with identifiers

> used for screening. To the extent permitted by law, the TIDE database includes information the U.S. Government possesses related to the identities of individuals known or appropriately suspected to be or to have been involved in activities constituting, in preparation for, in aid of, or related to terrorism (with the exception of purely domestic terrorism information). This information is available to counterterrorism professionals throughout the Intelligence Community via the web-based, read-only "TIDE Online."

U.S. persons account for around 16,000 of the 1.6 million people (as of February 2017) that are in the TIDE database.

Extracts of the TIDE database are provided to the TSC, and are in turn used to help compile the TSA No Fly List and other watch lists used by other government agencies.

Did You Know? Names can be removed from the TIDE. From February 2011-2017 over 228,000 records were deleted from TIDE after they were determined to no longer meet the criteria for inclusion.

NO FLY AND SELECTEE LISTS

The No Fly and Selectee lists, which premiered in 2002, are subsets of the TSDB that is managed by TSC. It is a common misperception that the TSA creates and manages these lists when in fact the No Fly and Selectee lists are forwarded by the TSC to TSA on a daily basis.

If someone is on the No Fly list, they are, unsurprisingly, not allowed to board a commercial aircraft for travel to, from, or within the U.S., or on a U.S. carrier that may be operating in foreign countries.

Individuals on the Selectee list will find themselves subjected to additional inspection when they arrive at the airport and go through the security-screening checkpoint. Enhanced screening generally includes, in addition to the procedures applied during a typical standard screening experience, a pat-down and an explosives trace detection or physical search of the interior of the passenger's accessible property, electronics, and footwear.

In years past, it was the responsibility of the air carriers to check their passenger manifests against the No Fly and Selectee lists and ensure that any No Fly passengers were denied boarding and any Selectee passengers were subjected to additional security measures. In July 2004, the 9/11 Commission recommended that the federal government take over this role, and the subsequent Intelligence Reform and Terrorism Prevention Act of 2004 (IRTPA) made this recommendation a requirement. By November 2010, TSA had accomplished the task, and since then TSA has conducted watch list vetting of all passengers on U.S. and foreign air carrier flights to, from, and within the U.S. as well as flights operated by U.S. carriers in foreign countries.

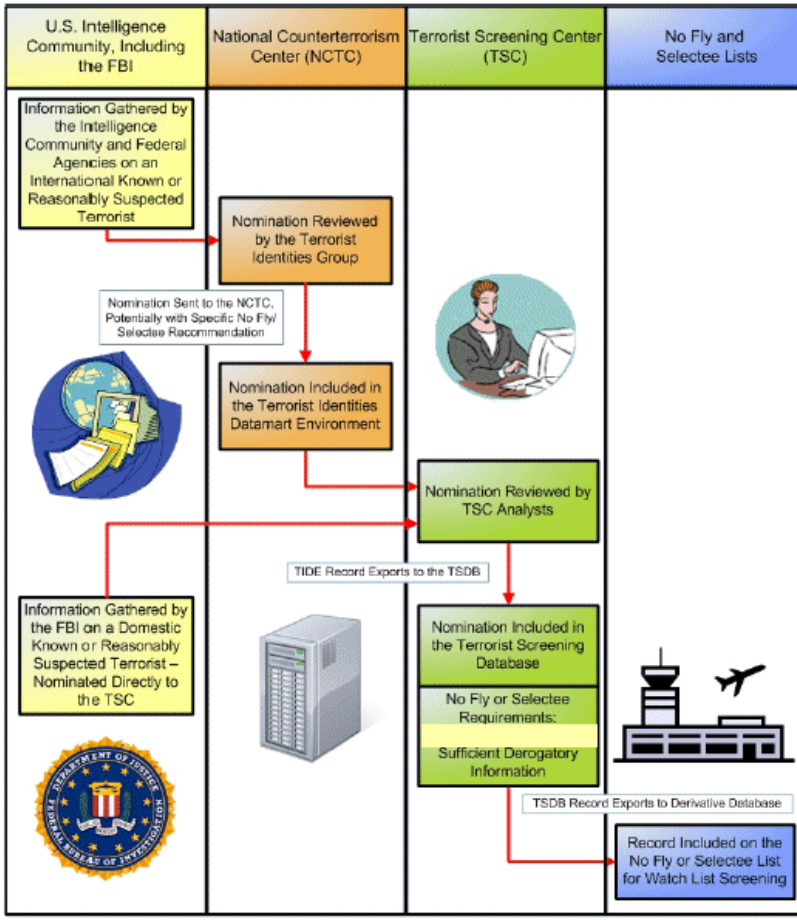
How do you end up on these lists?

We've all probably heard a relative, friend or neighbor who insists he or she "must be on the list" because "every time" they go to the airport, they "get searched." Let's not indulge ourselves in exaggeration but look to the facts: if your relative, friend or neighbor is actually "on the list," you might want to start hanging out in different circles. (Some published reports suggest there are as many as 47,000 people on the No Fly list, including 800 Americans.)

You've already learned that TSA receives the No Fly and Selectee lists from the TSC each day. Contrary to the belief of some, TSA certainly cannot add anyone to a watch list in retaliation because they somehow irritated an agency employee; to be included on the No Fly or Selectee lists there has to be some rather solid suspicion and evidence that the person could pose a threat to the civil aviation system.

So, unless your acquaintance has been planning or actually committing a terrorist attack, it is highly doubtful they will find themselves on the No Fly or Selectee lists, or any other terrorist watch list.

On the next page is an illustrated version of the process for inclusion onto the lists:



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What if I am mistakenly on one of these lists and want to get off?

If you have been denied or delayed boarding at the airport, or found yourself repeatedly referred for additional or secondary screening, you may want to file an inquiry and seek redress. DHS has a Traveler Redress Inquiry Program (TRIP) for people with watch list issues.

When you apply for Redress, you will be given a seven-digit Redress Number. A Redress Control Number, which you can use to track the status of your inquiry, or use after your inquiry is completed when

making an airline reservation. If you've bought tickets online, you've probably noticed a box for Redress Numbers to be entered. This is where you would put this, which would help expedite things in the future if you had been indeed mistakenly added to a list.

Historically, the government has not revealed if a person is or is not on a watch list, although the Department of Justice stated in documents filed in a federal court in April 2015 that people who have been denied boarding will now receive a letter informing them of their status on the No Fly list.

Did You Know? The Expanded Selectee List includes all records in the Terrorist Screening Database with a full name (first name and surname) and full date of birth that meet the Terrorist Screening Center's standard to be considered a known or suspected terrorist, but that are not included on the No Fly or Selectee Lists.

SECURE FLIGHT

We've now learned how in the "old days" it was the airline's responsibility to check passenger names against the No Fly and Selectee lists. IRTPA subsequently required this function to be removed from the purview of the airlines and given to TSA. This was accomplished by late 2010:

1. June 22, 2010 - 100% watch list matching for domestic flights
2. November 30, 2010 - 100% watch list matching for foreign flights

But what exactly is Secure Flight?

Let's get an official explanation from TSA's website, which tells us that "the mission of the Secure Flight program is to strengthen the security of commercial air travel into, out of, within, and over the U.S. through the use of expanded watch list matching using risk-based security measures."

More simply, Secure Flight is a program that checks every passenger (more than 816 million in FY 2015) against various government watch lists to make sure that nobody on the No Fly List is allowed to board an aircraft. Secure Flight checks passenger manifests for all domestic and international commercial flights to, from, and within the U.S., as well as certain flights overflying the continental U.S. (overflights) and international point-to-point flights that are flown by U.S. flagged airlines.

When making a flight reservation, every passenger is required to provide (to the airline) their full name (as it appears on the government issued ID they will use when traveling), date of birth, and gender. This information is known as Secure Flight Passenger Data (SFPD). Note that Secure Flight does not use any commercial data like your bank account or credit card numbers to help in watch list matching.

The airline will then submit the SFPD to Secure Flight 72 hours prior to the scheduled departure. Secure Flight in turn will vet the passenger's

information against the various lists we have discussed and, once completed, send the results back to the airlines so they can issue the passenger's boarding pass.

TSA also maintains a Cleared List, which contains names of individuals who have applied and been cleared via the DHS Redress program. If you make a reservation online for a ticket, you may have seen a box when you are entering your personal information that says "Redress Number." That's for people on the Cleared List.

Now this all sounds pretty complicated, but in reality, it is not, nor does it take very long. Secure Flight is capable of performing real-time matching for all flights - in fact; watch list matching takes just a few seconds. This covers all those folks who buy their tickets less than 72 hours before departure.

Everything you are reading here talks about the airlines collecting and submitting passenger data; what about people who buy their tickets on Orbitz or a similar website? The Secure Flight Final rule doesn't regulate travel agents or any other third parties, but it is up to the airline to ensure that they are submitting all required information, so the reality is the airlines have all made arrangements with the Orbitzes and others of the world to do just this.

Since Secure Flight began in 2009, the program has changed from a program that identifies passengers as high risk solely by matching them against federal government watch lists to one that uses additional lists and risk-based criteria to assign passengers to a risk category. Specifically, Secure Flight now identifies passengers as high risk if they are matched to watch lists of known or suspected terrorists or other lists developed using certain high-risk criteria and as low risk if they are deemed eligible for expedited screening through TSA Pre-Check, or through the application of low-risk rules. Secure Flight identifies passengers as unknown risk if they do not fall within the other two risk categories.

To separate passengers into these risk categories, TSA utilizes lists in addition to the No Fly and Selectee Lists, and TSA has adapted the Secure Flight system to perform risk assessments, a system

functionality that is distinct from both watch list matching and matching against lists of known travelers. At airport checkpoints, those passengers identified as high risk receive enhanced screening, passengers identified as low risk are eligible for expedited screening, and passengers identified as unknown risk generally receive standard screening. Passengers matched to the No Fly List or the Centers for Disease Control and Prevention's Do Not Board List—a list which includes individuals who pose a significant health risk to other travelers and are not allowed to fly—are considered highest risk, and thus are not to receive boarding passes, and should not be allowed entry into the sterile area.

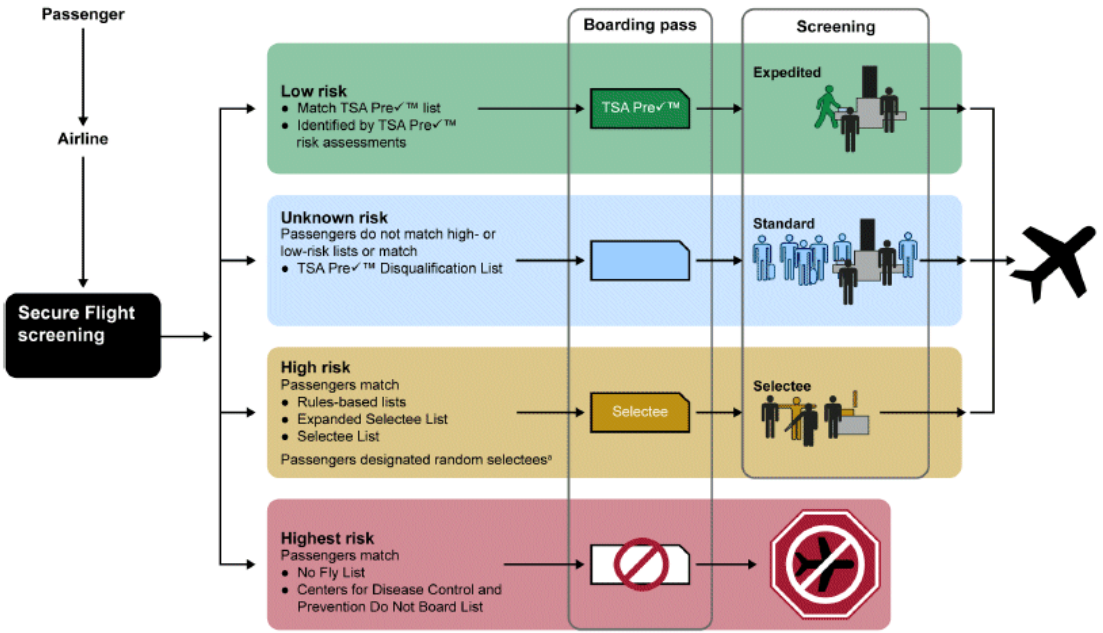
How much does all this cost? TSA spend $99.2 million on Secure Flight in FY 2015 and requested a budget of nearly $103 million for FY 2018.

The next page features a nice little graphic that shows the TSA Passenger Prescreening Process. I lifted this from a September 2017 GAO report.

Did You Know? Secure Flight pre-screens an average of six million passengers daily – approximately two million each 72 hours, 48 hours, and 24 hours out from scheduled flights.

Did You Know? In FY 2015, TSA identified 9,639 passengers as expanded selectees, 5,019 passengers on the Selectee List, and 725 passengers on the No Fly List.

TSA PASSENGER PRESCREENING PROCESS



Source: GAO analysis of TSA information. | GAO-17-794

[a]These individuals are identified for enhanced screening at random, not because they are included on government watch lists.

TRUSTED TRAVELER PROGRAMS

Currently, DHS has several Trusted Traveler programs available, which if you travel with any regularity, are well worth a look at. These programs accept a basic fundamental truth - the vast majority of people traveling have no ill intent and simply want to get to their destination safely and quickly.

Let's crack on then and take a deeper look on the next few pages at what is currently available as of this writing in the spring of 2016.

TSA PRE-CHECK

We will begin with TSA Pre-Check because it is almost certainly the program that you have heard the most about.

TSA Pre-Check is probably considered to be the "crown jewel" of TSA's risk-based security programs that are in place as of this writing. TSA Pre-Check is a program that moves away from the old style "one size fits all" mentality and towards a more intelligence-driven and risk-based security model. In plain English, TSA realizes that Grandma probably isn't a huge security risk, and would rather spend more time focusing on bigger perceived, and unknown, risks.

As of September 2017, over five million people have been enrolled in the program, and Pre-Check is available at over 200 airports in the U.S., with 37 airlines currently participating.

Who is eligible to join?

There are several categories of people who are eligible to join TSA Pre-Check. U.S. citizens of frequent flier programs who meet certain criteria and have been invited to join. Anyone who has a Known Traveler Number or is a member of CBPs trio of trusted traveler programs - Global Entry, SENTRI, and NEXUS are of course eligible. If you are a member of the U.S. military, you are automatically eligible.

But membership is not limited to U.S. citizens. Canadians who are members of NEXUS are welcome to join, as are foreign nationals who are members of Global Entry.

What do I get with TSA Pre-Check?

Generally, you can expect to get through the security checkpoint quicker, as you won't have to take your shoes or belt off, for starters, and you'll be able to keep your laptop in your bag. And that light jacket you have on? Now you can keep it on too. You'd be surprised how

much easier these few little things make getting through security, both in time and hassle.

Now you might ask yourself, if I always had to take my shoes off before I got on with TSA Pre-Check, why can I leave them on now? And for that matter, why can I keep my belt and coat on now?

As a member of TSA Pre-Check, you've had your background checked, and TSA can reasonably expect that you aren't out to cause any woe on your next flight. You represent an acceptable level of risk. Conversely, people who are not members of TSA Pre-Check or other trusted traveler programs have not had the same level of scrutiny conducted on them before they get to the airport, therefore, they are more of an unknown quantity and will require a more robust level of screening at the airport. As such, why waste time giving people who've been more thoroughly vetted a full check? Remember the "Grandma" analogy about the old "one size fits all" mentality? Why spend additional time on someone that has been checked out to a good extent already? It is better to focus limited resources on the unknowns, which in this case are passengers who haven't already been scrutinized before arriving at the airport.

What's in it for me?

So what is so wonderful about TSA Pre-Check? Why should I sign up? The main benefit is that in most cases, you are going to be able to get through the security checkpoint at the airport quite a bit faster. You won't have to bother with taking off your shoes, belt or even your jacket (unless it is a large, puffy, heavy, winter type coat.) You can even keep your laptop in your bag too. If you are traveling with your kids, as long as they are under age 12, you can bring them along with you in the TSA Pre-Check lane as well.

Theoretically, the TSA Pre-Check lines are shorter than the normal checkpoint lanes, so you are saving both time and hassle

How do I enroll?

To enroll in TSA Pre-Check, you will have to visit an enrollment center (there are over 330) and provide your name, date of birth, address as well as fingerprints. You will also have to provide ID and proof of U.S. citizenship and fork over a non-refundable fee of $85.

Within two or three weeks you should receive a Known Traveler Number (KTN) - just the number, there is no physical card. The KTN is good for five years, and you will now use this when booking travel reservations in the future. This KTN is what will help let the reservation annotate that you are a member of TSA Pre-Check.

Of course, it is important to remember that even as a member of TSA Pre-Check, or any trusted traveler program, you are not guaranteed access to expedited screening processes each time. Sometimes you will still be directed to the "old fashioned" standard screening lane. This is all part of TSA's random and unpredictable security measures. Enrollment is good for five years.

Finally, if you are already a member of Global Entry, NEXUS or SENTRI, there is no need to enroll in TSA Pre-Check; you are already a member! After all, the government has already vetted your background, checked your fingerprints and done all that stuff.

Did You Know? You will always see TSA Pre-Check referred to by the agency as Pre√. Pre-Check is actually the name of a background screening company that was founded in 1983 that provides their services to the healthcare industry.

Did You Know? A portion of the $85 Pre-Check enrollment fee is remitted by TSA to the Federal Bureau of Investigation (FBI) for their work in conducting background checks on passengers who have applied.

GLOBAL ENTRY

If you travel internationally, you know there is nothing worse than taking a long flight only to then find a colossal line in the Customs hall that you have to wait in. Global Entry eases those pains. In fact, in my personal experience as a Global Entry participant, I have made it through both Customs and Immigration in less than five minutes for nearly all of my three-dozen odd international trips over the past few years.

Global Entry is administered by U.S. Customs and Border Protection (CBP) and allows expedited clearance for pre-approved, low-risk travelers upon their arrival in the U.S.

Global Entry uses the little four-foot tall grey kiosks you see in the Customs hall. Instead of filling out the old blue I-94 form, you simply answer a few questions on a touch screen. After this, you'll get a printed receipt that you then hand to an Immigration officer and that's it, you are back in the U.S. – it couldn't be any easier.

If you like getting a re-entry stamp as a matter of course in your passport when you arrive back in the U.S., then Global Entry is not for you. (You'll have to ask politely for a stamp.) If all the other benefits you've just read sound enticing, then this program is yours to enjoy.

Did You Know? U.S. citizens, U.S nationals and U.S. Lawful Permanent Residents may apply for Global Entry as well as citizens of certain countries with which CBP has trusted traveler arrangements, including Argentina, Colombia, Germany, India, Mexico, the Netherlands, Panama, the Republic of Korea, Singapore, Switzerland, and the United Kingdom. Canadian citizens and residents enrolled in NEXUS may also use the Global Entry kiosks. but are not eligible to join the program itself.

Did You Know? As stated earlier, if you are enrolled in Global Entry, you are automatically entered into TSA Pre-Check. Pre-Check costs $85, while Global Entry is $100. Therefore, if you travel internationally, it is probably best to pay the $100 to Global Entry and get the benefit of both programs rather than simply paying $85 for Pre-Check.

Did You Know? As of July 2017, there are more than four million members in the Global Entry program, which is available at 53 U.S. airports and 15 Preclearance locations.

NEXUS

If most of your travels are between the U.S. and Canada, you may want to take a closer look at NEXUS. Jointly run by the CBP and Canada Border Services Agency (CBSA), NEXUS allows pre-screened travelers expedited processing at northern border ports of entry and exists as an alternative to the passport for U.S. and Canadian citizens.

Participants are issued a photo ID card with a RFID chip.

What are the benefits?

Like all trusted traveler programs, NEXUS provides members with a quicker and easier time of things, in this case, at all land, sea, and air border crossings between the U.S. and Canada. You can expect to receive a minimum number of questions from customs and immigrations officials - again, your background has been previously vetted.

How can I apply?

You can apply online at the CBP Global On-Line Enrollment System (GOES) website - be ready for a $50 application fee. If you are a U.S. or Canadian citizen or permanent resident, and are legally admissible to both nations, you are eligible to apply. After applying, your background will be checked against various watch lists from the U.S., Canada, United Kingdom and more. If you come through that with no issue, you will be directed to schedule an interview at a NEXUS enrollment center. Once all that is done and you are finally approved, you can expect to receive your NEXUS card, which is valid for five years, in the mail within seven to ten business days.

SENTRI

SENTRI is the Secure Electronic Network for Travelers Rapid Inspection, which provides expedited CBP processing at U.S. - Mexico border stations. The program is similar to NEXUS; voluntary applicants provide information and fingerprints for a background check and then undergo a personal interview with a CBP officer. After final approval, applicants are issued a RFID card which is valid for five years.

Established in 1995, today now exists at ten border crossings in Arizona, California, and Texas. Each of these border crossings has a dedicated SENTRI lane for access into the U.S.

SENTRI applicants can expect to pay higher initial fees than those that exist in NEXUS, with SENTRI fees reaching $122.25. These fees are broken down into three segments: a $25 application fee; a $14.50 fingerprint fee; and an $80 systems costs fee.

BIOMETRIC TRAVEL SECURITY INITIATIVES

Since 2004, CBP has been using biometric information (fingerprints) from travelers as they enter and exit the U.S. In the summer of 2016, these efforts expanded to include further biometric information to include facial patterns and iris scans that measure and record a person's unique physical characteristics.

How do some of these biometric initiatives work? According to CBP, by "using the flight manifest, CBP builds a flight specific photo gallery using photographs from the travel document the traveler provided to the airline. CBP then compares the live photo against the document photo in the gallery to ensure the traveler is the true bearer of the document. If the photo captured at boarding is matched to a U.S. passport, the traveler - having been confirmed as a U.S. citizen - is automatically determined to be out of scope for biometric exit purposes and the photo is discarded after a short period of time."

It's not hard to see the usefulness of these efforts in combating illegal immigration, human trafficking, or other potential crimes. For example, using facial recognition, CBP can now better confirm the identity of travelers entering the U.S. and ensure the person presenting the passport is the true owner. Collecting both arrival and departure data in the form of biographic and biometric information increases the accuracy of matching entry and exit records, increases the accuracy of identifying foreigners who have overstayed their period of admission, as well as helps protect travelers from identity theft or other illicit use of their documents.

CBP is also working with U.S. airlines to integrate biometrics into their boarding process, with tests underway at a few airports that allow passengers to board an aircraft using their fingerprints or by facial recognition.

PASSPORTS

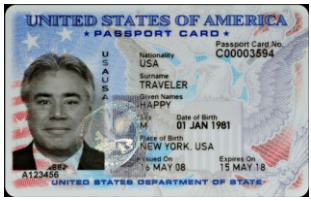
While we are discussing entry documents, let's take a quick detour and learn a bit about passports. The first U.S. passports were issued during the Revolutionary War and were designed by none other than Benjamin Franklin.

Today, there are three types of passports issued by the U.S. government. Standard U.S. passports (the ones with the navy-blue covers) are valid for ten years; with the expiration date being one day prior to the date of issue, ten years later. Passports today measure 4 7/8" by 3 3/8", but prior to World War I, they were as large as 11" x 17"!

The blue passport is of course the most common, issued to all citizens and non-citizen nationals. The government also issues a maroon colored Official Passport and black Diplomatic Passports. The maroon Official Passports are for U.S. government employees (not in the diplomatic corps) who are traveling overseas on official business. The black Diplomatic Passports are for, of course, diplomats and their immediate families as well as some U.S. government employees who are stationed overseas.

There were just under 132 million U.S. passports in circulation in 2016; around 40% of U.S. citizens have a passport. Over 16 million new and renewed passports were issued in 2016.

From November 1, 2016, U.S. passport applicants have been required to remove their glasses off before taking their passport photo. This new policy is the result of over 200,000 applications in 2015 being delayed or rejected due to poor quality photos caused by glare or shadows from glasses.



Passport cards are issued for people who don't want or need a full passport, but still need to be able to travel by land and sea to/from Canada, Mexico, the Caribbean and Bermuda. (If you travel by air to these places, you will need the passport book.) As of March 2015, slightly less than eight million passports cards have been issued.

What's this little icon on my passport? Since August 2007, all U.S. passports have been embedded with a 64 kilobyte (KB) Radio Frequency Identification (RFID) chip. The chip holds the same information that is on the passport's main photo page, including a digital version of your picture. Data in the chip can be scanned by electronic readers, which helps to speed up processing.

Did You Know? U.S. passports issued in 1993 featured a green cover in commemoration of the 200th anniversary of the U.S. Consular Service. As more than ten years have passed, if you come across one, it is assuredly expired!

Did You Know? The president receives a Diplomatic Passport, but he certainly doesn't wait in line at customs when he lands overseas. Instead, State Department employees will take his passport, along with those accompanying him, and get them stamped through the host country's customs procedures. As an added perk of the presidency, the president is allowed to keep a Diplomatic Passport for life.

Did You Know? In 1989, only three percent of the U.S. population had a passport! There were 7.26 million passports in circulation then while the U.S. population stood at 246.8 million people.

NATIONAL EXPLOSIVES DETECTION CANINE TEAM PROGRAM

It wouldn't be an understatement to suggest that a good number of people are unaware that TSA operates a fairly expansive canine program, with over 1,000 dogs in the mix to help conduct screening of passengers and cargo.

The National Explosives Detection Canine Team Program (NEDCTP) trains, deploys, and certifies explosives detection canine teams in order to deter and detect the introduction of explosive devices into U.S. transportation systems. Each canine team consists of a handler paired with a canine trained in explosives detection. The canine handlers are generally either a state or local law enforcement officer (LEO) or a TSA employee.

Two types of LEO teams and two types of TSA-based teams were trained to operate in the aviation environment during fiscal year 2015. First, TSA explosives detection canine (EDC) teams patrol terminals, curbside areas, and other airport environments while TSA passenger screening canine (PSC) teams primarily search for explosives odor on passengers in airport terminals. Second, LEO aviation teams patrol airport terminals, curbside areas, and sterile areas while LEO multimodal teams operate in the airport environment and screen air cargo but also operate in mass transit and maritime environments.

By FY 2018, TSA plans to deploy 1,047 canines, 372 of which are led by TSA handlers while the remaining 675 are used by local law enforcement in transportation environments, including airports and mass transit. TSA's canine teams are spread across 49 locations, so the next time you are at the airport, keep your eyes open for them!

Did You Know? TSA spent $119.3 million in FY 2015 on canine activity.

TSA REGULATORY PROGRAM

TSA has a regulatory program in place that represents one of the most important parts of the agency's overall layered security approach. Regulatory Inspectors have often been described as the professional arm of TSA and with good reason; it can take two to three years for an Inspector to really feel completely comfortable and confident in knowing and understanding the regulations they are tasked with enforcing.

Inspectors were originally known as Special Agents when the FAA managed the program; after moving to TSA they were then called Aviation Security Inspectors.

Known today as Transportation Security Inspectors, TSIs have one of the most complex jobs within the agency. While TSA screeners are charged merely with screening bags at an airport checkpoint, TSIs are responsible for enforcing and must become knowledgeable with a dizzying array of constantly evolving aviation security regulations and functions. TSIs must be familiar with the intricacies of the Aircraft Operations Area (AOA), the Security Identification Display Area (SIDA), access control measures, security programs, procedures and amendments, as well as airport and airline operations in general.

As if that wasn't enough, TSIs provide oversight of and inspect security functions at Fixed Base Operators (FBO), flight schools, repair stations and conduct full-fledged investigations into security violations. In their remaining time, TSIs conduct any additional investigations that may be needed and also may help assist with the processing of civil penalties (fines) against passengers who are caught with guns and knives at the airport. Additionally, TSIs can write enforcement actions or civil penalties against airlines or airports as warranted.

Put more simply, TSA Regulatory offices, also known as Compliance, are where you will find a lot of the everyday work being done that makes things function as they are intended. TSIs working at domestic (and foreign) airports are certifying that airlines and airports are

heeding security regulations that have been put in place. Ensuring regulatory compliance isn't always the most glamorous of jobs - after all, just think how many times you have heard over the years of "regulatory overreach" by the government, or "regulations that are strangling" business. However, the rules are in place and it is up to TSIs to ensure compliance with them.

So how is that accomplished? Let's take a closer look at these TSIs.

Transportation Security Inspectors (TSI)

When most people think of TSA and its employees, they automatically think of the blue-shirted screeners, and why not? That is whom you are most likely to see and interact with each and every time you are at an airport. While there are over 40,000 TSA screeners, TSIs are a force of employees that you most often do not see, and, unless you are employed as one, probably haven't heard of.

TSIs are arguably the most important group of employees TSA has at each airport. Why?

While screeners guard the front door at the airport, it is the TSI who is checking the back and side doors. Working in plain clothes behind the scenes, TSIs go out and actively look for vulnerabilities and threats that may exist so that they can be dealt with quickly and efficiently.

Now, this all sounds interesting, but what does it all mean? I was about to sit and type up a long narrative telling you just what TSIs do, but it turns out, a pretty good description has already been put together by some of the fine authors with the General Services Administration (GSA). Here is how they described the duties of a TSI in a 2008 report:

> TSA conducts inspections of air carriers throughout the year as part of regular inspection cycles based on annual inspection plans. These inspections are based on inspection guidelines known as PARIS prompts, which address a broad range of regulatory requirements (including airport perimeter security and cargo security, as well as screening of employees, baggage, and passengers).

> TSIs are responsible for a multitude of TSA related activities, including conducting inspections and investigations of airports and air carriers, monitoring compliance with applicable civil aviation security polices and regulations, resolving routine situations that may be encountered in the assessment of airport security, participating in testing of security systems in connection with compliance inspections, identifying when enforcement actions should be initiated, and providing input on the type of action and level of penalty commensurate with the nature and severity of a violation that is ultimately recommended to TSA's Office of Chief Counsel (OCC).

Aviation TSIs primarily conduct inspections of commercial airports (which we will discuss in the next few pages) and all domestic and foreign commercial carriers, as well as flight schools. Cargo TSIs are most often found at Indirect Air Carriers (IAC), freight forwarders and all cargo operators, reviewing airway bills and checking security procedures. K-9 TSIs are teamed of course with a dog that is trained to sniff out explosives in cargo shipments, while Surface TSIs work with rail and mass transit systems.

All told, TSIs conduct inspections on over 1,500 domestic and international carriers that operate in the United States, as well as over 7,500 IACs that require periodic inspections.

TSIs are trained and must pass a five-week training course that is conducted at the Federal Law Enforcement Training Center (FLETC) in Glynco, Georgia. Previously, the course was conducted at an FAA training center in Oklahoma City.

Regional Security Inspectors (RSI)

Regional Security Inspectors (RSI) are based at TSA Headquarters and have indirect oversight of TSIs in airports in an assigned region. RSIs serve as subject matter and technical experts (SME) and answer any questions that field inspectors have in relation to aviation regulations and security programs. Additionally, RSIs will help write the annual compliance work plan, provide input on language in new and existing security programs, as well as conduct site visits to airports within their regions. RSIs help to ensure that local field offices are keeping up with their annual work plan and assigned inspections. RSIs will also provide

high-level briefings of compliance activity to field staff as well as FSDs and Regional Directors as necessary.

SECURITY RESTRICTED AREAS AT AIRPORTS

As the regulatory authority for civil aviation security, TSA inspects airports, air carriers, and other regulated entities to ensure they are in compliance with federal aviation security regulations, TSA-approved security programs, and other requirements. As you know, these inspections are conducted by TSA Inspectors, who also provide guidance to airports and airlines to maintain and improve the security of their facilities and access control measures.

With all that being said, let's talk a little bit about how airports establish and control access to their security restricted areas (SRA) as this is an important topic. Now, I'd like to say I typed up the next section, but I found this area was already covered quite well in a prior Government Accountability Office (GAO) report, so I will just use their text here:

> TSA oversees security operations at airports through compliance inspections, covert testing, and vulnerability assessments to analyze and improve security, among other activities. TSA must on an ongoing basis, assess and test for compliance with access control requirements.
>
> Airport operators have direct responsibility for implementing security requirements in accordance with their TSA-approved airport security programs. Airport security programs generally cover the day-to-day aviation operations and implement security requirements for which commercial airports are responsible, including the security of perimeters and access controls protecting security-restricted areas.
>
> Airport security programs must include descriptions of the security-restricted areas—that is, areas of the airport identified in their respective security programs for which access is controlled and the general public is generally not permitted entry— including a map detailing boundaries and pertinent features of the security-restricted areas.
>
> Although, pursuant to regulatory requirements, the components of airport security programs are generally consistent across airports, the details of

these programs and their implementation can differ widely based on the individual characteristics of airports.

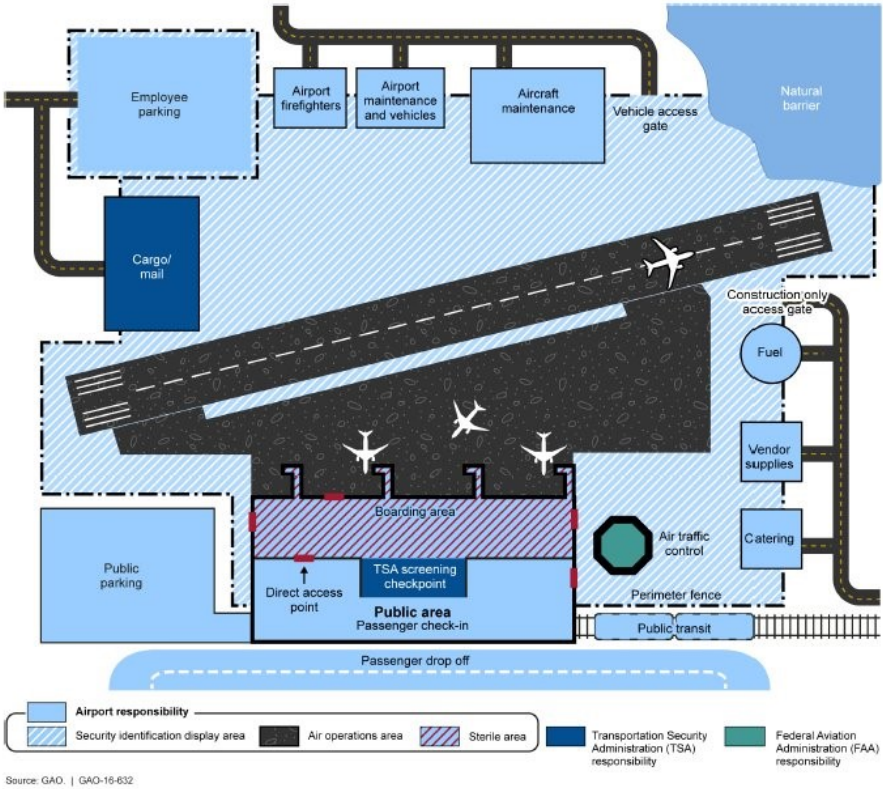
TSA generally characterizes airport perimeter security at commercial airports to include protection of the fence line—or perimeter barriers—vehicle and pedestrian gates, maintenance and construction gates, and vehicle roadways, as well as general aviation areas.

Access control security generally refers to security features that control access to security-restricted areas of the airport that may include baggage makeup areas, catering facilities, cargo facilities, and fuel farms. Specifically, airport perimeter and access control security measures are designed to prevent unauthorized access onto the airport complex and into security-restricted areas. For example, airport operators determine the boundaries for the security-restricted areas of their airport based on the physical layout of the airport and in accordance with TSA requirements.

Security programs for commercial airports generally identify designated areas that have varying levels of security, known as secured areas, security identification display area (SIDA), Air Operations Area (AOA), and sterile areas (referred to collectively in this report as "security-restricted areas"). For example, passengers are not permitted unescorted access to secured areas, SIDAs, or the AOA, which typically encompass baggage loading areas, areas near terminal buildings, and other areas close to parked aircraft and airport facilities.

Aviation workers may access the sterile area through the security checkpoint (at which time they undergo screening similar but not identical to that experienced by a passenger) or through other access points secured by the airport operator in accordance with its security program.

The image on the next page will hopefully tie things together a bit and provide a detailed overview of a typical commercial airport in the U.S. and its security-restricted areas:



Source: GAO. | GAO-16-632

Note: This figure shows airport security-restricted areas designated in accordance with TSA requirements. Pursuant to 49 C.F.R. § 1542.205, each airport area defined as a secured area in a security program must be a SIDA, though other areas of the airport may also be designated as SIDAs by the airport operator. For example, some airport operators designate all AOAs as SIDAs.

INTERNATIONAL AIRPORT ASSESSMENTS

Shortly after the hijacking of TWA Flight 847 in June 1985, Congress decided that the U.S. government should begin conducting assessments of the security posture at foreign airports that hosted flights to the U.S. from both foreign and domestic carriers.

49 U.S.C. 44907 establishes the foreign airport assessment program, which is now the responsibility of the TSA to implement. Similar to the domestic TSIs that conduct domestic airport inspections and tests, International Transportation Security Specialists (ITSS) conduct assessments at foreign airports to determine if they are meeting minimum International Civil Aviation Organization (ICAO) standards. ITSSs also conduct inspections of both foreign and domestic carriers that provide service to the U.S.

Within TSA, these ITSSs are housed in the Global Compliance division of TSA's Office of Global Strategies.

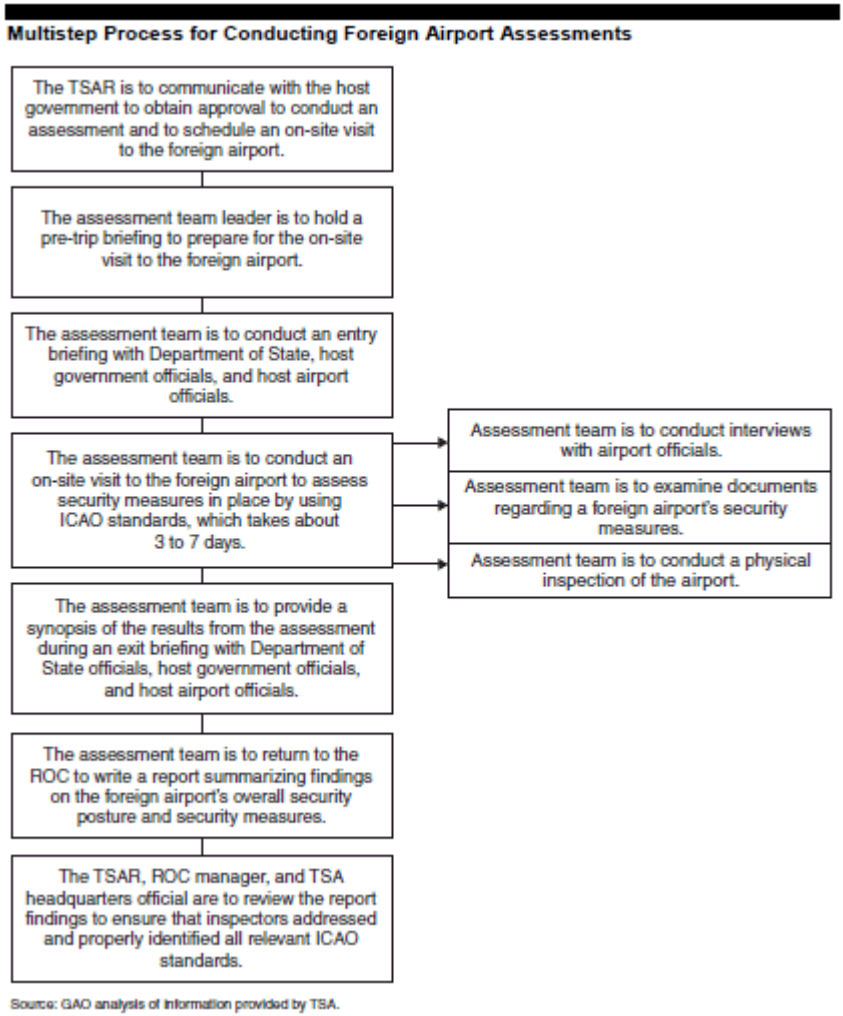
When are foreign airports assessed?

Foreign airports are categorized into three tiers, which are risk-based. Tier 1 airports are considered to be low risk and are assessed every three years. Tier 2 airports are determined to present medium risk and are assessed every two years. Finally, we have Tier 3 airports, which are considered high risk and are assessed every year.

Overall, TSA assesses approximately 300 foreign airports.

Wait, foreign countries just let TSA walk in and poke around their airports?

Well, no, of course not. There is a well-defined process for requesting, scheduling, and ultimately conducting an assessment of a foreign airport. The following graphic describes the process in more detail.



Source: GAO-12-163, Appendix IV

What does TSA look for on a foreign airport assessment?

There are several ways to determine a foreign airport's compliance with ICAO standards, and TSA employs them all. Interviews with airport officials and a review of documents that discuss airport security measures are two key components of a foreign airport assessment.

Of course, it is one thing to talk and read about procedures but it is vital to see them in action. TSA's ITSSs will conduct physical reviews of an airport's security measures as well. Walking the grounds and perimeter of an airport will allow a more complete review of security measures that are in place. ITSSs will also observe access control procedures such as employee and vehicle identification methods, and take a look at passenger and baggage screening procedures as they take place.

What ICAO Standards does TSA use to Assess Security Measures at Foreign Airports?

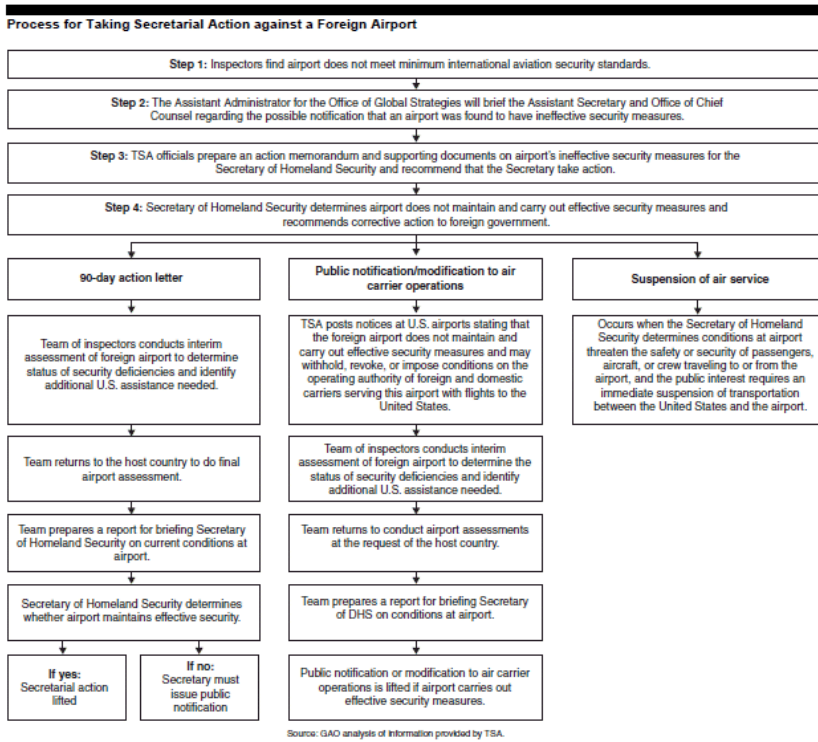
ITSSs conduct foreign airport assessments *in accordance with* ICAO standards, although please remember that they are *not* ICAO auditors nor is a TSA foreign airport assessment an ICAO audit. ITSSs review several dozen Standards and Recommended Practices (SARPs) during these assessments; to get an idea of what is asked you should review Appendix III of GAO-12-163.

What happens when a foreign airport does not maintain or carry out effective measures?

When conducting a foreign airport assessment, it is imperative to remember that TSA has no authority to mandate changes; after all, ITSSs are operating in a foreign country as guests of the host government. However, recommendations for improvement can undoubtedly be made. In extreme (and rare) cases when a foreign government and/or airport are not meeting international standards, there are a few options available. Foreign government officials are given 90 days to address security deficiencies that were identified. If, after that time, the security measures are still not meeting ICAO standards, the public will be notified that said airport does not maintain and carry out effective security measures. This notification will be placed in the Federal Register, but more importantly, prominently

displayed at U.S. airports – usually in and around the screening checkpoint.

This page features a graphic that explains the process in more detail:



Did You Know? Foreign countries also send their own teams to U.S. airports to conduct assessments as well from time to time.

TSA REPRESENTATIVE (TSAR)

If issues are identified during a foreign airport assessment, it often falls upon the TSA Representative (TSAR) to follow up and work things out with the host government after the foreign inspectors have departed. TSARs are stationed overseas and communicate with foreign government officials to address transportation security matters and to conduct foreign airport assessments.

Specifically, the TSARs serve as on-site coordinators for TSA responses to terrorist incidents and threats to U.S. assets at foreign transportation modes. TSARs also serve as principal advisors on transportation security affairs to U.S. Ambassadors and other embassy officials responsible for transportation issues to ensure the safety and security of the transportation system.

For the foreign airport assessment program, TSARs are sometimes involved in arranging pre-assessment activities, assessment visits, and follow-up visits. Additionally, TSARs are responsible for completing portions of the airport assessment reports and reviewing completed assessment reports. TSARs also help host government officials address security deficiencies that are identified during assessments.

INTRODUCTION TO THE COMMERCIAL AVIATION INDUSTRY

We've now gone over some of the basics as far as aviation security and the various programs in place that contribute to that effort. Of course, to be successful in any profession, it is imperative that you have a fairly good knowledge of the industry you are in. With that being said, let's take a look at the ins and outs of the aviation industry itself - the business side of things.

Have you ever wondered how airports make money or how airlines work out scheduling? What about all the various acronyms and codes that are in use? That's what this section of the book will answer.

The commercial aviation industry is a highly cyclical business characterized by boom and bust cycles. The largest airlines today are behemoths that operate hundreds, and in some cases, over 1,000 aircraft. Airlines themselves run far more than flights – entire divisions exist to operate and manage facilities and buildings, among other things. Airlines own fleets of literally thousands of cars and other specialty vehicles, all of which require maintenance and repair. One carrier, Delta, even owns and operates its own oil refinery! Each major airline also has huge divisions devoted to marketing, scheduling, ticketing, acquisitions, human resources, and so on.

In the second half of this book, we will discuss these topics and dive in a bit deeper to try and help untangle other mysteries of the industry to help you get a better handle on things.

By no means is this guide an all-inclusive review of every topic in commercial aviation (for example, you probably aren't too concerned

with airlines sending out blankets to local laundry services – yes, it does happen), but hopefully we will cover enough ground to familiarize you with some of the more common subjects within.

Before we get to all that though, let's have a quick review of how the airline industry in the U.S. came to be today. For the first 50 years of its history, the federal government closely regulated the airline industry; it has only been since the late 1970s that airlines have really been subjected, for the most part, to the forces of the open market.

REGULATION AND DEREGULATION

While the federal government's regulation of the commercial airline industry began as far back as 1925, it wasn't until 1938 that the Civil Aeronautics Board (CAB) was created. From that time onwards, the aviation industry was treated by the government as a public utility, with the CAB regulating all domestic interstate airline routes, fares, and setting service schedules.

Over the years, many of the major airlines favored the status quo, as they were guaranteed a reasonable rate of return and protection of their monopolies. However, passengers grew frustrated as prices continued to rise without any true competition in the market.

Things came to a head and the entire industry changed with the Airline Deregulation Act of 1978. This act removed most federal government controls over the aviation industry and led to airlines being subjected to raw market forces. One of the quickest changes was the near wholesale abandonment of the point-to-point system and the adoption of the hub and spoke model. Airlines were no longer forced to fly planes from one location to another, regardless of market need, and quickly set up large operations at central hub airports and fed flights to and from these hubs from smaller cities. *The hub and spoke system is discussed in greater detail in the next section.*

Overall, fares have remained at the same levels, or lower, when adjusted for inflation since the days of regulation. However, it hardly escapes notice that service levels have decreased markedly, and the airline industry itself has become a model of cyclical volatility. Several storied U.S. carriers (Braniff, Eastern, Pan Am, and TWA) have vanished since deregulation, while every other large, legacy carrier has filed for bankruptcy at least once. Once formidable hubs (Cincinnati, Pittsburgh, and St. Louis) now find they are little more than common outstations today and airlines seemingly come and go with startling regularity.

The U.S. airline industry today might well be considered an oligopoly, with four large carriers and about half a dozen, smaller carriers providing essentially all the service for a nation of some 320 million people.

Did You Know? U.S. airlines employed 699,000 people as of June 2017, including over 583,000 full-time employees. American Airlines employed 94,000 full-time employees, while both United and Delta had 77,000 full-time personnel.

HUB AND SPOKE SYSTEM

Prior to deregulation, the federal government controlled commercial aviation and decided in many cases what routes would be flown. Many of the resulting itineraries were direct flights from one small market to another, where, unsurprisingly, half empty planes often plied the routes. After airline deregulation in 1978, the hub and spoke system became the most widely used model for major airlines.

The hub and spoke system scrapped many of the unprofitable point-to-point routes and instead directed flights from small markets, or spokes, to a large, central hub airport. Imagine a bicycle wheel; with the center being the hub, and every little spoke being another small city. Atlanta for Delta and Dallas/Fort Worth for American are two prime examples of hub airports.

The hub and spoke model saves airlines money and also gives passengers more flexibility. Someone flying from a small spoke now has several more options on flights from the hub to his or her final destination. Let's take someone in Waco, Texas. He may want to take a trip to Burbank, California. Obviously, there are no direct flights from Waco to Burbank or anywhere even remotely close. With the hub and spoke model, he can get a flight to the hub at DFW, and then choose to fly to Burbank, or even Los Angeles, Santa Ana, Long Beach, or

Ontario. He now has several more options with different times and fares.

The hub and spoke model has remained relatively unchanged even with the increase in regional jet flying over the past 20 plus years; the regionals now handle most of the flying to and from spoke airports while the mainline carriers handle the trunk routes.

Nationally, Southwest Airlines is one of the few airlines that never embraced the hub and spoke model but instead continues to operate with the point-to-point model, flying short distances between two cities. The point-to-point model remains fairly popular in Europe, particularly with low cost carriers.

Did You Know? The FAA groups airlines into four categories – major, national, large regional, and medium regional. Major airlines are those that have over $1 billion in annual operating revenue. National airlines have over $100 million to $1 billion in annual operating revenue, while large regionals have $20 million to $100 million in annual operating revenue. Finally, medium regionals have less than $20 million in annual operating revenue.

SCHEDULING

Airline scheduling can be a confusing thing for the uninitiated to understand as well. For example, there are flight times, block times, push times, wheels up times and more. What does it all mean?

Flight time refers to the time the aircraft first moves under its own power until it comes to rest after landing. Once the aircraft is pushed back, disconnected from the tug and begins to taxi under its own power that is considered the beginning of the flight time. Block time is the time the airline schedules for the flight, which includes flight time as well as taxi time.

The Department of Transportation (DOT) considers a flight "on time" if it leaves or arrives at its gate within 15 minutes of its schedule.

Push time refers to when the aircraft is pushed back from the gate and is really the time that is considered for recordkeeping purposes.

So, an aircraft that is scheduled to depart at 11:45 may be considered on-time if it "pushes" at 11:57, even if you then sit on the tarmac for another 45 minutes and the "wheels up" time, when you actually take off, isn't until 12:42. As such, airlines certainly pad their schedules a bit, and have been known for scheduling sleight of hand like a two-hour block time for an hour and twenty-minute flight.

Did You Know? Airlines operate on two “seasons” when drawing up schedules – the summer and winter periods. Summer schedules run from the end of March through the end of October while winter schedules run the other half of the year. The 2017 Winter Season starts on October 29, 2017 and ends on March 24, 2018; the 2018 Summer Season starts on March 25, 2018 and ends on October 27, 2018.

HOW TO READ AN AIRLINE SCHEDULE

Looking at an old airline timetable or even a schedule today can sometimes feel like you are being forced to decipher a strange series of codes. Let's take an example:

AA123 JFK1200 1500LAX 763 12467

What does this mean?

The first code, AA123, represents the airline code and the flight number. The code is the carrier's two-character IATA code. In this case, AA represents American Airlines. 123 is the flight number. So now we know we are talking about American Fl. 123.

JFK1200 1500LAX is up next. JFK1200 is the departure airport and the time the flight departs. 1500LAX is the arrival airport and the time the flight arrives. All times are in the local time of the airport in question. So now we know that the flight leaves New York (Kennedy) at 12pm and arrives in Los Angeles at 3pm.

763 is up next, and that is the aircraft code. We will explain the aircraft code later on, but 763 means the aircraft to be used is a Boeing 767-300.

Finally we have a jumble of numbers – 12467. These numbers represent the days the flight operates. Day 1 is Monday; Day 2 is Tuesday and so on. So as Day 3 and 5 are missing, we know this flight operates every day except Wednesday and Friday.

If you saw a D instead of numbers, that would represent a daily flight.

OK, that is pretty easy, right?

FLIGHT NUMBERS - WHAT DOES IT ALL MEAN?

Like everything else in commercial aviation, there is a method to the madness of flight numbers. You didn't think that flight numbers were just pulled out of a hat did you?

In most cases, flights heading east or north are given even numbers, while flights heading west or to the south get odd numbers. Return flights are typically given a number that is one higher/lower than the outbound flight. For example, British Airways Fl. 283 departs London and heads west to Los Angeles; Fl. 282 is the return flight.

The lower the flight number, the more esteem the airline has assigned to that route. One or two-digit numbers often go to popular (and profitable) long-haul routes. Air New Zealand's flagship route from Auckland to Los Angeles and on to London is Fl. 1, for instance. British Airways' old Concorde service from London to New York was also Fl. 1.

Flights numbered in the 3000s or 4000s are typically regional flights operated by a regional airline partner and/or a codeshare. Flights in the 5000s are usually reserved strictly for code-share flight numbers. 9000 series flights are often ferry flights, delivery flights, or even private charters.

Flight numbers will often remain unchanged for years and years – in fact, some of Delta's European flight numbers can trace their origins to Pan Am – Delta bought Pan Am's European network well over 20 years ago. Of course, anytime there is a negative incident or a crash with a particular flight, the airline will usually retire that flight number in short order.

LOBBYING

We all know that in the real world money talks, and perhaps with no louder megaphone then when we get into the political arena. The airline industry is no stranger to the lobbying game, with both airports and airlines having their own lobbying groups. Who are the main players?

To start with, we have the American Association of Airport Executives (AAAE), a group that represents airports of all sizes throughout the country and boasts a $30 million annual budget. Airports Council International (ACI) is a similar group, but representative of airports worldwide.

On the airline side, Airlines for America (A4A) counts all the U.S. major airlines as members and tries to persuade Congress and other decision makers, via various donations, junkets and such, to see things the way the carriers would like.

In addition to their lobbying efforts, most of these groups put out daily newsletters with various links, articles, and opinion pieces for subscribers to review. Naturally, generous donations are made to members of Congress by many lobbying groups.

AIRLINE REVENUE MEASUREMENTS

Figuring out airline revenue management can in some ways seem remarkably similar to rocket science; indeed, there are many jobs and careers built entirely on the study and analysis of this data.

Now of course we won't get into all of that, but a basic understanding of the matter can be instructive. Let's take a look at some basic measurements, then, beginning with Available Seat Miles (ASM). At its core, one seat flying one mile represents one ASM. If you have a 100 seat aircraft flying a 500-mile segment, you have 50,000 ASMs.

Next we have Revenue Passenger Miles (RPM). A passenger who has paid for his or her seat represents one RPM for every mile flown. So, if we take our 100 seat aircraft and have 85 passengers who have paid for seats on this 500-mile flight, we have generated 42,500 RPMs.

Now we arrive at load factor. We can determine load factors a couple of ways. If you are looking for a load factor on a given flight or route, you can divide the number of revenue passengers by the number of seats on the plane; for our ongoing example we have 85 passengers on a 100 seat aircraft. This represents an 85% load factor. If we wanted to determine an airline's overall, or system-wide, load factor, we would divide RPMs by ASMs.

Of course it is important to remember that high load factors do not necessarily mean a certain flight or route is profitable, nor do low load factors mean an airline is losing money. An airline may sell every seat on the flight, but if the costs of the tickets that have been sold do not meet the cost of operating the flight, a full aircraft doesn't do much good for the bottom line. That's where yield comes in to play.

Once again, we have a few ways to determine yield. If we are simply trying to find a customer's yield, we simply divide the price of the ticket by the mileage of the flight. On our 500-mile flight, we have passengers

who have paid $150 for their tickets. That puts the yield for that passenger at .30 cents per mile. To determine an airline's system-wide yield, we divide the total passenger revenue by the total RPMs.

Clearly, airlines make large portions of their ticket revenues off First and Business class seats; in many cases, Economy class tickets are at best a break-even proposition. As you can see, a full aircraft does not automatically mean a profitable flight; a great deal depends on how much the tickets have been sold for. Additionally, the last several years have seen airlines maximize the usage of available cargo space in the belly of their aircraft, generating even more revenue where they can.

With all of this being said, we are talking strictly about ticket sales, and not including all of the ancillary fees that airlines have begun charging in the last decade or so. Let's take a look at those next.

ANCILLARY FEES

As the new millennium dawned, airlines were reeling from the devastating impact the September 11, 2001 terrorist attacks had on the industry and were left searching for new forms of revenue.

Enter the era of the ancillary fee. Ancillary fees include anything other than the ticket that an airline will charge you for – baggage fees, frequent flier miles, food, Wi-Fi, and so on, down to even picking your seat or when you board the flight. Airlines are in essence now offering a la carte pricing for services that used to be included with the purchase of your ticket.

How much has the industry shifted its focus away from solely selling tickets to marketing and selling ancillary fees? Spirit Airlines makes nearly 40% of its revenue from ancillary fees. Let's look at things in a broader context, too. In 1990, airlines derived 88.5% of their operating revenue from passenger fares. By the second quarter of 2016, that number had fallen to 74.3%.

The most profitable ancillary fee in the industry may not be what you think (baggage) but rather the sale of frequent flier miles. Airlines earned over $27 billion from selling frequent flier miles in 2013.

That doesn't mean that baggage fees don't generate revenue. Baggage fees have raised billions of dollars for a service that until around ten years ago had been free. In fact, in 2016 alone scheduled passenger carriers in the U.S. pocketed $4.2 billion in bag fees, and over $3.8 billion in 2015. For the record, in 2008 American Airlines became the first big U.S. carrier to charge for checked bags.

Miles and bags generate nearly 80% of all ancillary revenue today, but there is more to come. Airlines expect to collect over $3 billion by 2024 from the use of in-flight Wi-Fi as well. Looking to change your flight? There is usually a fee for that as well, and U.S. carriers earned $2.9 billion in 2016 from those charges.

All of this demonstrates again that the number of seats filled on a plane does not necessarily determine the economic health of a flight or airline in general.

I'd love to give further details on how much carriers are making from each of their additional fees, but "baggage fees and reservation change fees are the only ancillary fees paid by passengers that are reported to [the Bureau of Transportation Statistics] as separate items. Other fees, such as revenue from seating assignments and onboard sales of food, beverages, pillows, blankets, and entertainment are combined in different categories and cannot be identified separately".

Overall, how much do you think airlines are saving by having passengers do a lot of the work for them? You now usually make your reservation online, check-in online at home, on your phone, or at a kiosk at the airport. As far back as 2009, IATA estimated that web check-in saves airlines $3.50 per checked-in passenger! Many carriers now have passengers add the checked baggage tag to their own luggage. All of this allows the airlines to cut more and more staff positions, saving money.

Did You Know? Airlines typically sell frequent flier miles for about 1.4 cents a mile to credit card companies and others who buy them and offer mileage programs.

JOINT VENTURES

A Joint Venture (JV) is the most comprehensive form of cooperation in the airline industry. In a JV, airlines align services and share costs, revenue, profit and risk - almost as if they were merging, but only on certain routes that are part of the JV. Interestingly, with JVs airlines may be partners on some routes and competitors on others. JVs are "metal neutral," but what does that really mean? Here is an example: British Airways and American Airlines have a wide ranging JV – at DFW, British Airways operates one daily flight to London Heathrow (LHR) while American offers two or three daily flights, depending on the season. The total profits or losses are split evenly amongst both carriers. If the British flight is full each day and the American flights are half empty, the profit or loss is still split 50/50 between both airlines.

JVs allow airlines to save money by operating more efficient networks as they can reduce duplicative routes and flights in many cases. If one airline partners with another on a JV, that may eliminate the need for both airlines to operate flights on the same route, while both airlines contribute passengers and "feed" to the underlying route.

HOLDING COMPANIES

One thing you might have noticed in the airline industry is the close relationship between some of the carriers. There are mainline carriers (think American, Delta, and United) and then there are regional airlines, which we will discuss in a moment. Beyond the airlines though is another important entity, which is called a holding company.

A holding company is a company that owns more than one airline or is the parent company of a single airline. For example, the Alaska Air Group owns Alaska Airlines, as well as regional subsidiary Horizon Air and Virgin America.

Holding companies exist for the purpose of controlling another company. The holding company itself is protected from the losses of one of its wholly owned subsidiaries. In aviation terms, if one airline goes bankrupt or encounters severe financial troubles, it won't bring down the entire enterprise, i.e. the holding company.

In the U.S. there are several major holding companies in the commercial aviation industry in addition to the aforementioned Alaska Air Group:

- American Airlines Group which owns American Airlines, Envoy Air, Piedmont Airlines and PSA Airlines
- Atlas Air Worldwide Holdings, Inc. owns Atlas Air and Polar Air Cargo
- Delta Air Lines, Inc. owns Delta Air Lines and Endeavor Air
- Republic Airways Holdings owns Republic Airlines
- SkyWest, Inc. owns SkyWest Airlines and ExpressJet Airlines
- Trans States Holdings owns Compass Airlines, GoJet Airlines, and Trans States Airlines
- United Continental Holdings owns United Airlines

DOING BUSINESS AS (DBA)

If you have been to an airport, you have more than likely seen a “doing business as” carrier.

A Doing Business As or “dba” carrier is typically a regional or “feeder” airline that contracts to provide service for a mainline aircraft operator. For example, an airport may have service from some of these carriers, such as ExpressJet, Republic, SkyWest and so on, that are “doing business as” Delta Air Lines. In most, but not all cases, the ‘dba’ airlines will be painted in the livery of the mainline carrier.

Well, that’s all good and well, but how can you tell if an aircraft is a “dba” or “feeder” carrier? They look the same as the regular planes; after all, they are painted in the exact same livery.

A good rule of thumb is this – in almost all cases, the “dba” or “feeder” carrier will be utilizing small regional jets. In other words, you will never see a SkyWest Boeing 737 or an ExpressJet Airbus A319 aircraft. “DBA” and “feeder” airlines are almost always going to operate a regional jet such as a Canadair CRJ, Dash-8, Embraer E145, E175, or even the old Saab 340.

Despite wearing the paint scheme, or livery, of the mainline carrier, you will be able to see a small sticker, typically near the nose or the front door of the aircraft that will say "Operated by [Regional Airline]."

Finally, many of the "dba" or "feeder" airlines will have the name of the mainline aircraft operator, but they'll add in "Connection," "Express" or something along those lines after the mainline aircraft operator name.

Included on the next page is a handy reference to help you understand which "feeder" airlines belong to whom, along with their FAA/TSA four-character designators.

REGIONAL AIRLINE FAMILY TREE

A quick look at the holding companies that own the various regional airlines:

American Airlines Group
American Airlines (AALA)
Envoy Air (SIMA)
Piedmont (HNAA)
PSA Airlines (VNAA)

CJT Holdings
Air Wisconsin (A6WA)

Delta Air Lines (DALA)
Endeavor Air (REXA)

Mesa Air Group
Mesa (MASA)

Republic Airways Holdings
Republic Airlines (R61A)

SkyWest, Inc.
ExpressJet (ASOA)
SkyWest (SWIA)

Trans States Holdings
Compass Airlines (C77A)
GoJet (N6WA)
Trans States Airlines (RAIA)

AIRCRAFT LEASES

Airplanes, particularly new ones, are rather expensive – a Boeing 737-800 on the showroom floor will set you back over $93 million. So when you read about airlines ordering dozens or even hundreds of aircraft, you can bet they aren't paying cash for many of these frames. No, the vast majority of aircraft in use today are leased, and there are two common types of leases in existence today: wet leases and dry leases.

Dry leases are the simpler of the two and far more common. Think of it this way – a dry lease is about the same as when you are leasing a car. The lessor is providing the aircraft without any insurance, crew, equipment, or maintenance. It is up to the lessee to provide all of these, in much the same was as it is up to you to insure and register your car, gas it up, change the oil, and so on.

In a wet lease, an airline will obtain the aircraft, the complete crew, maintenance and insurance (ACMI) from another airline. Wet leases are typically used when one airline is short on aircraft or crew during a busy holiday season, or perhaps one of their aircraft finds itself languishing in the hangar for maintenance or some type of issue. If you've ever taken an Uber, that's almost like a wet lease. The lessor is providing the car, the insurance, and the crew (the driver).

Two of the largest aircraft lessors are General Electric Commercial Aviation Services (GECAS) and the International Lease Finance Corporation (ILFC). Both GECAS, which owns over 1,570 aircraft, and ILFC serve as lessors, while airlines act as lessees. Leases typically include a set time frame, and a limit on the number of cycles and hours that can be accrued by the lessee on the aircraft – if an aircraft is returned with more cycles or hours than permitted, a penalty fee will be applied.

With the huge capital costs that airplanes represent, airline executives have to decide whether to buy or lease when acquiring new airframes. Newer, more modern aircraft are much more efficient and burn less fuel, while older frames will naturally require more maintenance and a higher bill at the fuel pump – but may be nearly paid off. As the lease

rate on a single airplane can run into the hundreds of thousands of dollars per month, there are many calculations and decisions to be made.

Case Study: While American and United have made significant investments in purchasing hundreds of brand new aircraft, Delta has ventured in a different direction to some extent, purchasing nearly every second-hand McDonnell Douglas MD-90 in the world. The MD-90 seats about the same number of people as a Boeing 737-800, but can be purchased at a considerably lower cost. Additionally, Delta picked up nearly 90 Boeing 717s from Southwest a few years ago – frames that were previously operated by AirTran. Southwest was so eager to dispose of these that they paid to redo the cabin into Delta's preferred layout! Delta has calculated that the increased fuel consumption and maintenance costs on these older frames will still be less in the long run than the much higher monthly lease or payments they would make on a brand new aircraft.

AIRCRAFT MODEL TYPES

Every aircraft made by Airbus and Boeing has its own model number, although most passengers are more familiar with the series number. For example, you may be aware that you are flying on a Boeing 737-800, but not realize that the model is in reality a 737-8H4 if you are on a Southwest aircraft and a 737-823 if you are flying on American. So what is the difference?

Not very much.

Historically, Boeing affixed unique customer codes to all of its commercial aircraft from the 707 through the 777. The 787 is the first Boeing model not to use customer codes, and the practice ended across Boeing's entire commercial aircraft range from January 2017. The truth is that the only people who typically realize and understand the customer codes are aviation aficionados or nerds.

Previously, the customer codes ended up on every model of aircraft an airline will buy from Boeing. Delta Air Lines has a customer code of 32, which meant that their 737-800s will be 737-832s, while their 757-200s will be 757-232s, and so on. The codes do not change if and when the aircraft goes to a different operator. As Boeing ended the practice, all aircraft will simply be referred to as 737-800s, 777-300s and so on, including on the FAA certificates.

Airbus has employed a different system in annotating the model of their aircraft, using technical specifications rather than a customer code assigned to an individual airline. With this system, many airlines may end up operating the same model number aircraft. Airbus denotes their aircraft by three categories: version, engine manufacturer and engine type. So, for example, an Airbus A319-112 will be a 100 series aircraft, with engines manufactured by CFM International with 23,500 pounds of thrust.

AIRCRAFT ABBREVIATIONS

When reviewing schedules, you are most likely going to come across aircraft abbreviations. Here is an example of what I am talking about:

WN3034 MCI0920 – 1310LGA 73W D
WN333 MCI1630 – 2020LGA 735 D

We've already learned how to read an airline schedule, but now we have some abbreviations to discuss: 73W and 735 in this case. 73W means the aircraft is a Boeing 737-700 with winglets, while 735 means it is a Boeing 737-500. So, how on earth are you to figure out what all these codes stand for?

ICAO defines these aircraft designator codes, and if you are interested, they are published in ICAO Document 8643 – Aircraft Type Designators. However, to add confusion, the ICAO codes are mostly used by air traffic control and flight planning departments. So, when you are booking flights online, you are most likely to come across the IATA codes, and that is what we have on the next few pages.

CODE	MODEL	CODE	MODEL
310	Airbus A310 all pax models	74M	Boeing 747 all Combi models
312	Airbus A310-200 pax	74T	Boeing 747-100 Freighter
313	Airbus A310-300 pax	74X	Boeing 747-200 Freighter
318	Airbus A318	74Y	Boeing 747-400 Freighter
319	Airbus A319	752	Boeing 757-200 pax
31F	Airbus A310 Freighter	753	Boeing 757-300 pax
31X	Airbus A310-200 Freighter	757	Boeing 757 all pax models
31Y	Airbus A310-300 Freighter	75F	Boeing 757 Freighter
320	Airbus A320-100/200	75M	Boeing 757 Mixed Configuration
321	Airbus A321-100/200	763	Boeing 767-300 pax
32S	Airbus A318/319/320/321	764	Boeing 767-400 pax
330	Airbus A330 all models	767	Boeing 767 all pax models
332	Airbus A330-200	76F	Boeing 767 all Freighter models
333	Airbus A330-300	76X	Boeing 767-200 Freighter
340	Airbus A340 all models	76Y	Boeing 767-300 Freighter
342	Airbus A340-200	77L	Boeing 777-200 long-range pax
343	Airbus A340-300	772	Boeing 777-200 pax
345	Airbus A340-500	77W	Boeing 777-300 pax
346	Airbus A340-600	773	Boeing 777-300 pax
359	Airbus A350-900	777	Boeing 777 all pax models
351	Airbus A350-1000	789	Boeing 787-9
380	Airbus A380 pax	788	Boeing 787-8
717	Boeing 717 all models	78J	Boeing 787-10
712	Boeing 717-200 pax	787	Boeing 787 all pax models
733	Boeing 737-300 pax	CS1	Bombardier CS100
734	Boeing 737-400 pax	CS3	Bombardier CS300
735	Boeing 737-500 pax	CRJ1	Canadair Regional Jet 100
736	Boeing 737-600 pax	CRJ2	Canadair Regional Jet 200
737	Boeing 737 all pax models	CRJ7	Canadair Regional Jet 700
738	Boeing 737-800 pax	CRJ9	Canadair Regional Jet 900
739	Boeing 737-900 pax	E70	Embraer 170

CODE	MODEL	CODE	MODEL
73F	Boeing 737 all Freighter models	E90	Embraer 190
73G	Boeing 737-700 pax	EM2	Embraer EMB.120 Brasilia
73H	Boeing 737-800 (winglets) pax	EMJ	Embraer 170/190
73M	Boeing 737-200 Combi	ER3	Embraer RJ135
73W	Boeing 737-700 (winglets) pax	ER4	Embraer RJ145
73X	Boeing 737-200 Freighter	ERD	Embraer RJ140
73Y	Boeing 737-300 Freighter	ERJ	Embraer RJ135 / RJ140 / RJ145
7M7	Boeing 737 MAX 7	M1F	McDonnell Douglas MD11/F
7M8	Boeing 737 MAX 8	M1M	McDonnell Douglas MD11 Combi
7M9	Boeing 737 MAX 9	M80	McDonnell Douglas MD80
744	Boeing 747-400 pax	M81	McDonnell Douglas MD81
747	Boeing 747 all pax models	M82	McDonnell Douglas MD82
748	Boeing 747-800 pax	M83	McDonnell Douglas MD83
74E	Boeing 747-400 Combi	M87	McDonnell Douglas MD87
74F	Boeing 747 all Freighter models	M88	McDonnell Douglas MD88
74J	Boeing 747-400 (Domestic) pax	M90	McDonnell Douglas MD90
		SSJ	Sukhoi SuperJet

AIRCRAFT ACRONYMS

Perhaps you've seen an article that mentions a recent order for aircraft and states either *ceo* or *neo*. CEO means "current engine option" while NEO means "new engine option." NEOs are next generation aircraft with engines that will be more efficient.

Some other common initials rather than acronyms you may run across are ER, LR, and F. ER means Extended Range, LR means Long Range, and F means freighter. Airbus has created XWB to stand for "Extra-Wide Body" as well in recent years, although it is mainly a marketing term rather than representing any vastly greater size over any comparable aircraft.

AIRLINE CODES

Airlines are given short-hand codes to designate them in schedules. The International Air Transport Association (IATA) uses a two-character code, while the International Civil Aviation Organization (ICAO) uses a three-character code. To make things even more confusing, both the FAA and TSA bypass these well- known standards entirely and use a four-character code established by the FAA!

Both the IATA codes, which were based on the ICAO codes, and the ICAO codes themselves debuted in 1947. The IATA two character codes are by far more prevalent, and you will see them when Googling a flight or when listed on any schedule. For example, BA193 would represent British Airways Fl. 193.

Did You Know? After an airline goes out of business, IATA can make its two-character code available for reuse after a six-month period. The re-issue is called a "controlled duplicate" and is given to airlines whose destinations are not likely to overlap. Examples: YX is given to Republic Airlines, but years ago it belonged to Midwest Airlines. Air Canada Rouge uses RV currently, but in the past that code belonged to three other carriers.

AIRPORT CODES

Let's talk a bit about the three-letter airport codes and how many of them came to be. Officially, the three-letter codes are called IATA Location Identifiers. In the very early days of flight, airplanes landed at any flat field with a decent wind. The National Weather Service (NWS) took weather reports from cities around the U.S. and used a two-letter code to identify these. Early on, airlines and airfields basically used these codes, but as the industry expanded, cities that didn't have a NWS station got into the mix, thus, the three-letter code was born.

Some cities simply added an X at the end of their current weather-station code, hence LAX for Los Angeles, PDX for Portland and so-on. Other airports simply took the first three letters of the city name, hence ATL is Atlanta, BOS is Boston, etc. Overseas, Madrid took MAD, Sydney took SYD in the same manner. Airports for multiple cities ended up taking the initials of each, such as DFW for Dallas/Fort Worth and MSP for Minneapolis/St. Paul.

The U.S. Navy kept the letter N for its uses. Similarly, W and K codes were kept by the Federal Communications Committee (FCC) and used by radio stations, with W generally being kept west of the Mississippi River and K east of the Mississippi. This is why you don't see airport codes starting with K, N, or W, and how Newark became EWR and Kansas City ended up as MCI.

Q and Z have also been kept for other uses and our friends in Canada kept all the Y codes for themselves.

Of course, some airports have codes that seemingly have no relation to the city. Chicago O'Hare is ORD, named for an old airstrip north of Chicago named Orchard Field. Other airports have ended up with somewhat unfortunate codes… Fresno, California's Fresno Air Terminal is FAT while Sioux City, Iowa is SUX.

Finally, worldwide air traffic control and weather agencies use a four-letter ICAO identifier for airports, but that's a whole separate topic and one you won't come across very often.

Did You Know? The first and second letters or second and third letters of an identifier may not be duplicated" from an airport within 200 nautical miles. This is why you have DCA for Washington National and IAD for Washington Dulles; the original DIA for Dulles was confusing with DCA nearby.

Did You Know? Three-letter codes can be recycled after one year? If an airport closes or changes its code, the old code can be used by another airport after a year. New York Kennedy is JFK, but originally it was known as Idlewild Airport (IDL). IDL is now used by Indianola, Mississippi.

CALL SIGNS

Call signs or telephony designators are used by airlines to identify themselves to air traffic control; “American 61” is American Airlines Fl. 61. Of course, the call sign is not necessarily the same name as the airline itself. British Airways’ call sign is *Speedbird*, while Virgin America’s is *Redwood*. So in this case, you would hear “Redwood 879” to describe Virgin America Fl. 879.

Did You Know? Aircraft with a gross take-off weight of over 300,000 pounds (basically, any wide-body) will add the word “heavy” to the end of their call sign: “American 61 Heavy.” This is done to indicate that the aircraft may cause significant wake turbulence. The “heavy” designator is mainly used in the U.S.

Did You Know? The Airbus A380 is the only passenger aircraft that uses the term “super” rather than heavy: “Qantas 7 Super.”

REFERENCE CHART FOR U.S. CARRIERS (CODES, CALL SIGNS, ETC.)

Yes, it can be a bit confusing to keep up with the various codes and call signs for all the carriers. Here are a few charts of the most common airlines to get you started, first for U.S. carriers and then for foreign carriers.

CARRIER	IATA	ICAO	TSA/FAA	CALL SIGN
Air Wisconsin	ZW	AWI	A6WA	Wisconsin
Alaska	AS	ASA	ASAA	Alaska
Allegiant	G4	AAY	WX0A	Allegiant
American	AA	AAL	AALA	American
Compass	CP	CPZ	C77A	Compass
Delta	DL	DAL	DALA	Delta
Eastern	EA	EAL	29EA	Eastern
Endeavor Air	9E	FLG	REXA	Flagship
Envoy	MQ	ENY	SIMA	Envoy
ExpressJet	EV	ASQ	ASOA	Acey
Frontier	F9	FFT	F3LA	Frontier Flight
GoJet	G7	GJS	N6WA	Lindbergh
Hawaiian	HA	HAL	HALA	Hawaiian
Horizon	QX	QXE	QXEA	Horizon
JetBlue	B6	JBU	YENA	JetBlue
Mesa	YV	ASH	MASA	Air Shuttle
Piedmont	PT	PDT	HNAA	Piedmont

CARRIER	IATA	ICAO	TSA/FAA	CALL SIGN
PSA Airlines	OH	JIA	VNAA	Blue Streak
Republic	YX	RPA	R61A	Brickyard
SkyWest	OO	SKW	SWIA	Skywest
Southwest	WN	SWA	SWAA	Southwest
Spirit	NK	NKS	GTIA	Spirit Wings
Sun Country	SY	SCX	SCNA	Sun Country
Trans States	AX	LOF	RAIA	Waterski
United	UA	UAL	CALA	United
Virgin America	VX	VRD	VQIA	Redwood

REFERENCE CHART FOR FOREIGN CARRIERS (CODES, CALL SIGNS, ETC.)

CARRIER	IATA	ICAO	TSA/FAA	CALL SIGN
Aer Lingus	EI	EIN	MEDF	Shamrock
Aeroflot	SU	AFL	SOVF	Aeroflot
Aero Mexico	AM	AMX	ASMF	Aero Mexico
Air Canada	AC	ACA	ARNF	Air Canada
Air Canada Rouge	RV	ROU	6CDF	Rouge
Air China	CA	CCA	CAAF	Air China
Air France	AF	AFR	CNFF	Airfrans
Air India	AI	AIC	AINF	Air India
Air New Zealand	NZ	ANZ	ANZF	New Zealand
Air Transat	TS	TSC	ATFF	Air Transat
Alitalia	AZ	AZA	2CAF	Alitalia
All Nippon Airways	NH	ANA	ANPF	All Nippon
Asiana	OZ	AAR	ZZLF	Asiana
Austrian	OS	AUA	AUXF	Austrian
Avianca	AV	AVA	ANCF	Avianca
British Airways	BA	BAW	BRAF	Speedbird
Cathay Pacific	CX	CPA	VHCF	Cathay
China Airlines	CI	CAL	SAJF	Dynasty
China Eastern	MU	CES	NZXF	China Eastern
China Southern	CZ	CSN	C4XF	China Southern
Condor	DE	CFG	CFGF	Condor

CARRIER	IATA	ICAO	TSA/FAA	CALL SIGN
Edelweiss Air	WK	EDW	88DF	Edelweiss
EgyptAir	MS	MSR	EGYF	Egyptair
El Al	LY	ELY	EILF	El Al
Emirates	EK	UAE	ZCQF	Emirates
Ethiopian	ET	ETH	ETIF	Ethiopian
Etihad	EY	ETD	YY6F	Etihad
EVA Airways	BR	EVA	QOCF	Eva
Finnair	AY	FIN	FIOF	Finnair
Hainan Airlines	HU	CHH	3HAF	Hainan
Iberia	IB	IBE	ILAF	Iberia
Icelandair	FI	ICE	ILRF	Iceair
Interjet	4O	AIJ	23IF	Interjet
Japan Airlines	JL	JAL	JACF	Japanair
Jazz Air	QK	JZA	NZAF	Jazz
Jet Airways	9W	JAI	J9QF	Jet Airways
KLM	KL	KLM	KRDF	KLM
Korean Air	KE	KAL	KALF	Korean Air
LATAM	JJ	TAM	LANF	TAM
LOT Polish	LO	LOT	LOPF	LOT
Lufthansa	LH	DLH	DLAF	Lufthansa
Norwegian Air Int'l	D8	IBK	6NRF	Nortrans
Philippine Airways	PR	PAL	SCOF	Philippine
Qantas	QF	QFA	QLMF	Qantas
Qatar	QR	QTR	QYCF	Qatari
Royal Jordanian	RJ	RJA	RJAF	Jordanian
Saudia	SV	SVA	SAFF	Saudia

CARRIER	IATA	ICAO	TSA/FAA	CALL SIGN
Scandinavian	SK	SAS	SCSF	Scandinavian
Singapore Airlines	SQ	SIA	SBOF	Singapore
Sky Regional	RS	SKV	6SYF	Maple
South African	SA	SAA	SOFF	Springbok
Sunwing	WG	SWG	U6WF	Sunwing
Swiss	LX	SWR	UCSF	Swiss
TAP Portugal	TP	TAP	TAPF	Air Portugal
Thai Airways	TG	THA	N/A	Thai
Turkish	TK	THY	TQKF	Turkish
Vietnam	VN	HVN	N/A	Viet Nam Airlines
Virgin Atlantic	VS	VIR	VAWF	Virgin
Virgin Australia	VA	VOZ	V43F	Velocity
Viva Aerobus	VB	VIV	V80F	Viva
Volaris	Y4	VOI	Z5XF	Volaris
WestJet	WS	WJA	WJ0F	Westjet
WestJet Encore	WR	WEN	5WJF	Encore
WOW air	WW	WOW	6WRF	Wow Air
Xiamen	MF	CXA	88MF	Xiamen Air

Did You Know? (Or Notice)? All foreign carriers' TSA/FAA designator codes end in F.

REFERENCE CHART FOR CARGO CARRIERS (CODES, CALL SIGNS, ETC.)

CARRIER	IATA	ICAO	TSA/FAA	CALLSIGN
ABX Air	GB	ABX	ABXA	A Bex
Aerologic	3S	BOX	4ALF	German Cargo
AeroUnion	6R	TNO	UOOF	Aero Union
Air Transport Intl.	8C	ATN	IXXA	Air Transport
AirBridgeCargo	RU	ABW	3ABF	Air Bridge Cargo
Amerijet	M6	AJT	PCSA	Amerijet
Atlas Air	5Y	GTI	UIEA	Giant
Avianca Cargo	QT	TPA	TAMF	Tampa
Cargolux	CV	CLX	CISF	Cargolux
Centurion Air Cargo	WE	CWC	CLCA	Challenge Cargo
DHL Air	D0	DHK	DH6F	World Express
Estafeta	E7	ESF	E6ZF	Estafeta
FedEx	FX	FDX	FDEA	FedEx
Florida West	RF	FWL	FWTA	Flo West
IFL Group	IF	IFL	VGCA	Transauto
Kalitta Air	K4	CKS	KCSA	Connie
Kelowna Flightcraft	FK	KFA	UKFF	Flightcraft
LATAM Cargo	UC	LCO	FCLF	LAN Cargo
Lufthansa Cargo	LH	GEC	LU7F	Lufthansa Cargo
National Air Cargo	N8	NCR	U2RA	National Cargo
Polar Air Cargo	PO	PAC	P5CA	Polar Tiger

CARRIER	IATA	ICAO	TSA/FAA	CALLSIGN
Silk Way	ZP	AZQ	7KWF	Silk Line
Singapore Cargo	SQ	SQC	O3YF	Singcargo
Sky Lease Cargo	GG	KYE	WRNA	Sky Cube
Southern Air	9S	SOO	Q2SA	Southern Air
UPS	5X	UPS	IPXA	UPS

REGISTRATION PREFIXES

Much like cars, aircraft also have "license plates" in the form of registrations. You've probably heard it referred to as the "N-Number," as all aircraft registrations in the U.S. start with N.

Article 20 of the Convention of International Civil Aviation requires that "every aircraft engaged in international air navigation shall bear its appropriate nationality and registration marks." Each signatory country has been assigned its own unique prefix. For example, beyond "N" for U.S. aircraft, you will see "G" on all British aircraft, "C" on Canadian and so on. Some countries will have a two-digit/letter prefix; Mexico uses "XA" on commercial aircraft. An aircraft can only be registered in one country at a time.

The international norm is for registration to have five digits/letters, although there are some exceptions. For those who are fascinated by this topic, the next page contains a good listing of the more common countries and their prefixes. The FAA's N-Number registry allows you to research U.S. registered aircraft online.

FAA N-Numbers may be one to five numbers (N12345), one to four numbers followed by one letter (N1234Z), or one to three numbers followed by two letters (N123AZ). The FAA states that to avoid confusion with the numbers one and zero, the letters O and I are not to be used. Additionally, an N-Number may never begin with a zero.

Did You Know? Registration numbers N1 through N99 are reserved for FAA internal use.

REGISTRATION PREFIXES BY COUNTRY

4K-	Azerbaijan
4X-	Israel
5R-	Madagascar
5Y-	Kenya
6Y-	Jamaica
7T-	Algeria
9K-	Kuwait
9M-	Malaysia
9V-	Singapore
9Y-	Trinidad and Tobago
A6-	United Arab Emirates
A7-	Qatar
AP-	Pakistan
B-	China
B-	Taiwan
C-	Canada
CC-	Chile
CS-	Portugal
CU-	Cuba
D-	Germany
EC-	Spain
EI-	Ireland
EP-	Iran
ET-	Ethiopia
F-	France
G-	United Kingdom
HA-	Hungary
HB-	Switzerland
HK-	Colombia
HL	South Korea
HS-	Thailand
HZ-	Saudi Arabia
I-	Italy
JA	Japan
JY-	Jordan
LN-	Norway
LV-	Argentina
LX-	Luxembourg
LZ-	Bulgaria
N	United States
OE-	Austria
OH-	Finland
OK-	Czech Republic
OO-	Belgium
OY-	Denmark
PH-	Netherlands
PK-	Indonesia
PP-	Brazil
PZ-	Suriname
RA-	Russian Federation
RP-	Philippines
SE-	Sweden
SP-	Poland
SU-	Egypt
SX-	Greece
TC-	Turkey
TF-	Iceland
TG-	Guatemala
UR-	Ukraine
VH-	Australia
VN-	Vietnam
VP-B	Bermuda
VT-	India
XA-	Mexico (Commercial)
XB-	Mexico (Private)
XC-	Mexico (Government)
ZK-	New Zealand
ZS-	South Africa

AIRPLANE DIAGRAM

Unless you've been in and around the aviation industry for some time, there is a good chance that you aren't totally familiar with the various bits and pieces of an aircraft. The above diagram (featuring a Boeing 787-8) breaks down some of the most important parts on the exterior of an airplane.

Now you can't see them on this photo, but up near the front of the aircraft's nose are several other metal prongs, which are known as pitot tubes. Pitot tubes are used to measure air speed and are very sensitive pieces of equipment. *Don't ever touch these!*

Wait; there are engines *and* nacelles? What is all that? Quite simply, the nacelles are the protective housing for the engine. You may also see the nacelles slide open during landing to assist in the braking process.

Obviously aircraft are complex machines, and like every machine, they require maintenance. Let's take a look at how that all works next.

Did You Know? One aircraft with multiple cabin doors and emergency exits, the doors are typically referred to as 1L, 2L, 1R, 2R, etc. Basically, 1L is the first door on the left, or port, side of the aircraft, 2L is the second, while 1R would be the first on the right, or starboard side, and so on.

Did You Know? Commercial aircraft tires are typically inflated anywhere from 180 – 200 psi.

AIRCRAFT PAINTING

Quite a few people have asked me about how aircraft are painted, so I've decided to add a section on the matter in for the third edition of this book.

The Federal Aviation Administration (FAA) has a 22-page handbook that goes over Aircraft Painting and Finishing and tells you how the entire process works, what's involved, and so forth. While it reads as dry as an El Paso parking lot, it does have some points of interest for me to borrow:

> Paint, or more specifically its overall color and application, is usually the first impression that is transmitted to someone when they look at an aircraft for the first time. Paint makes a statement about the aircraft and the person who owns or operates it.
>
> Paint is more than aesthetics; it affects the weight of the aircraft and protects the integrity of the airframe. The topcoat finish is applied to protect the exposed surfaces from corrosion and deterioration. Also, a properly painted aircraft is easier to clean and maintain because the exposed surfaces are more resistant to corrosion and dirt, and oil does not adhere as readily to the surface.
>
> A wide variety of materials and finishes are used to protect and provide the desired appearance of the aircraft. The term "paint" is used in a general sense and includes primers, enamels, lacquers, and the various multipart finishing formulas. Paint has three components: resin as coating material, pigment for color, and solvents to reduce the mix to a workable viscosity.

The painting process more or less works like this: if it is getting a fresh coat, the aircraft has the old paint stripped off. Various chemicals are sprayed over the aircraft to help break up the old paint. Once that's all cleared out, primer is applied. After that, a team of anywhere from eight to 15 people starts painting, using various sprayers. Depending on the size of the aircraft, the paint can add 500 to over 1,000 pounds to the aircraft's weight. The entire process can take about a week and cost well over $100,000.

The plane will then need anywhere from a day to a week, again, depending on the type of paint, to dry. Airplanes are usually repainted every five to seven years, typically. There are quite a few cool videos on YouTube showing the whole process that you might want to check out.

“Bare metal” liveries, like the old American Airlines paint, were not in fact the bare metal but coated with various protectants, lacquers, and such.

While most aircraft in an airline’s fleet have a standard livery applied, there are often some special schemes painted on and flying about. In fact, trying to catch a special livery is one of the things that makes plane spotting so exciting. If you are into that kind of thing. These special liveries are often painted by hand and require significantly more work (and cost) as additional colors and patterns may be used.

ONE MAN. THREE ICONIC AVIATION LOGOS.

The name Saul Bass (1920-1996) is familiar to any student of graphic design; after all, he is the man who designed, amongst many other well-known logos, the old "Ma Bell" icon, the AT&T ball, as well as the logos of United Way, Quaker Oats, and several other corporations and companies. Beyond those endeavors, Bass was an early pioneer in using title sequences in movies to help foreshadow the coming story line.

But did you know that Bass designed three of the most iconic airline logos in history? These three logos are well known to aviation aficionados and to this day have a long list of admirers. In fact, one of these has been brought back into use after a nearly three decade hiatus!

Let's take a quick look at the trio of logos in question.

We will begin with a logo known to many people who have been around the aviation industry for some length of time. In 1968, Bass was contracted by Continental Airlines to develop a new logo and branding; he returned with the "jetstream" logo. This effort, affectionately known by many as the "meatball," would last 23 years until it was replaced in 1991 by the "globe" logo.

Bass' pens were at it again a few years later when he created surely his most memorable aviation design, the United Airlines "tulip." This logo was introduced in 1974 and remained in use throughout several different re-brandings and liveries – the primary colors may have changed, but the tulip always remained. Indeed, the United "tulip" was only retired a few years ago when United merged with Continental and the new management (former Continental types) opted to keep Continental's visual identity, including their logo.

The third and final legacy of Bass' work for commercial airlines is the stylized "f" logo he created for the original Frontier Airlines. Introduced in 1978, this logo lasted until the demise of the airline in the mid-1980s. It has proven so popular that the current version of Frontier Airlines brought it back into use in their latest re-branding. The Bass "F" is now green and features prominently in billboard titles on the fuselages of Frontier aircraft.

One man and three logos that have stood the test of time and now occupy a place in aviation history - yesterday, today, and tomorrow.

AIRCRAFT MAINTENANCE CHECKS

Just like cars or any other mechanical device, aircraft need standard and heavy maintenance to keep them up and running. For commercial aircraft, four distinct checks are performed: A check, B check, C check, and D check, with the complexity of each check rising from A to D. What are the differences then?

A check

A checks are required after every 125 flight hours or 200-400 cycles. This takes anywhere from 20-50 total hours and can be done overnight at a gate or in the hangar.

B check

B checks take place every four to six months and take about 150 total hours. They will most often be done over the course of a few days at a hangar.

C check

C checks are due around every two years for the most part, and are a fairly extensive check with a large chunk of the aircraft's components being checked. The aircraft will be out of service for one or two weeks, as a C check will take anywhere from six to even 15,000 hours or more to perform, depending on the type of aircraft.

For the Airbus A380, the most extensive maintenance check is a 3C check. This takes places after about six years of service and will take up to two months to complete.

D check

The biggest and most expensive maintenance check is the D check, also called a "heavy maintenance visit." D checks occur every six years, give or take. During a D check, the entire aircraft is essentially taken completely apart down to its bare metal. D checks can take up to 50,000 hours, again, depending on the type of aircraft, and put the plane out of service for two months. Cost? It is not uncommon to see a bill over $5 million. With all that in mind, airlines have to schedule D checks well in advance, and it is not uncommon for an aging aircraft to be retired rather than be put through another D check – the cost of the check may be more than the value of the aircraft towards the end of its life.

Keep in mind that these are rough outlines for all the types of checks. Depending on the airline, the country, and even the aircraft manufacturer, the time frames and man hours will vary somewhat, but the figures supplied here are fairly good ballparks for what is involved.

AIRCRAFT CYCLES

OK now, we've talked about cycles when discussing maintenance checks, but what exactly is a cycle? A cycle is one takeoff and one landing. How many cycles can an airplane rack up before it gets worn out? That all depends, of course – some airplanes are built sturdier than others! Here is a list showing how many cycles some of the most common aircraft are certified for:

AIRCRAFT	CYCLES	AIRCRAFT	CYCLES
Airbus A300-B2	48,000	Boeing 737 NextGen (600-900)	75,000
Airbus A300-B4	40,000	Boeing 747 Classic (100-300)	20,000
Airbus A300-B4-200	34,000	Boeing 747-400	20,000
Airbus A310-200	40,000	Boeing 757	50,000
Airbus A310-300	35,000	Boeing 767	50,000
Airbus A318	48,000	Boeing 777	44,000
Airbus A319	48,000	Boeing 787	44,000
Airbus A320-100	48,000	Canadair CRJ-700	60,000
Airbus A320-200	48,000	Canadair CRJ-900	60,000
Airbus A321	48,000	Douglas DC-9	100,000
Airbus A330	40,000	Douglas DC-10	42,000
Airbus A340	20,000	Embraer E145	60,000
Airbus A340-600	30,000	Embraer E170	80,000
Airbus A380	47,500	Embraer E190	80,000
Boeing 707	20,000	Lockheed L-1011	36,000
Boeing 717 (MD-95)	60,000	McDonnell Douglas MD-11	20,000
Boeing 727	60,000	McDonnell Douglas MD-80	50,000
Boeing 737 Classics (100-500)	75,000	McDonnell Douglas MD-90	60,000

THE END OF AN AIRPLANE'S LIFE

On the last page we looked at the expected lifespan of various commercial aircraft. Airplanes, much like cars, are complex mechanical devices that inevitably reach the stage where they are too costly to maintain and operate. After a few decades of faithful service, including tens of thousands of hours in the air, what exactly happens to an airplane at the end of its life?

The ultimate results are an obscene spectacle that will make even the hardest stomach turn.

Elderly airplanes are inevitably retired, many times before an expensive and thorough heavy maintenance check is due. They are most often flown out to a desert "boneyard" in the southwestern U.S. and parked. The dry conditions in the desert help reduce corrosion, and the hard, alkaline soil means aircraft can be towed and parked without sinking – and without the need to even pave the surface.

If there is a chance the airplane may fly again, it is mothballed. During this process, the landing gear, engines, and windows are covered up to protect against sand and dirt. A well-sealed plane can last for years in the desert thanks to its low humidity.

For planes that have been retired and have no hope of ever taking to the skies again, the process is grim. After being parked, the airplane is then stripped of all re-usable or re-sellable parts. Indeed, various companies buy up recently retired airplanes just to salvage and sell their parts. Engine turbine blades, landing gear, cockpit screens, gauges, auxiliary power units, actuators, service carts, overhead bins, and every other conceivable piece from an aircraft will be stripped and stored for further resale. What's left after that is the bare metal frame.

Fuel tanks are emptied and hatches left open so the tanks can completely dry out; all fluids are drained from the aircraft. After all, we don't want anything flammable to remain for the next stage.

Now is when things get ugly and all sentiment is cast aside. A giant excavator will violently gash the aluminum frame apart, tearing and rending the once proud airplane into grotesque heaps of twisted aluminum and steel, all destined to be recycled. But how exactly are the various types of metals sorted out from this large pile?

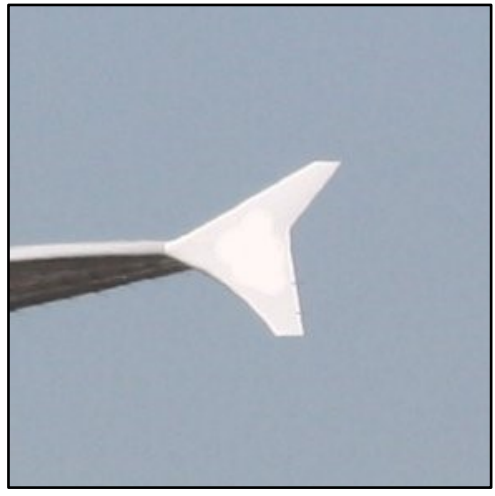
The shredded pile of metal is fed onto a conveyor belt that then uses steel teeth to mash the bits down into thousands of smaller pieces. These pieces are in turn sorted onto another conveyor belt, where various magnets separate aluminum and steel from each other. Aluminum goes one way and steel goes another; each to be recycled. A large commercial aircraft can fetch tens of thousands of dollars just in recycled metal.

Just think, your next can of Coke could be made from a former airplane! The circle of life.

WINGLETS

With their ability to dramatically increase fuel efficiency by reducing drag and increasing lift, winglets have become more common over the last 10-15 years, with airlines all over the world retro-fitting their existing fleets with them.

That's great, but what exactly are winglets? The easy answer is that winglets are the pointy pieces on the end of the wing. Let's take a look at four of the most common winglets you will see on commercial aircraft today.



Fenced Wingtips

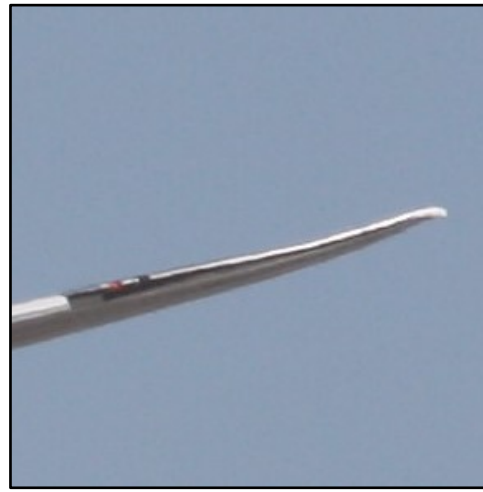
Airbus has historically been a big proponent of the fenced wingtip, and you will see it across their entire range of commercial aircraft. A fenced wingtip has surfaces above and below the wingtip. In recent years, Airbus has now adopted the more conventional Blended Winglet, although they call their version a "sharklet."

Blended Winglets

Blended Winglets rise up eight feet or more, with the width being four feet at the base and two feet at the top. Blended Winglets provide up to a six percent increase in fuel efficiency at cruise over aircraft that are equipped with “regular” wings.

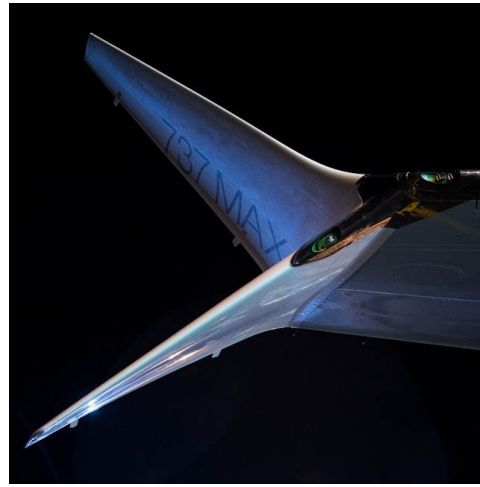
Split Scimitar Winglets

Split Scimitar winglets are a further modification and improvement over blended winglets, and can save over 45,000 gallons a year on a typical 737-800 equipped solely with blended winglets.



Raked Wingtips

With reduced drag, raked winglets increase fuel efficiency and climb performance. These can be seen on the Boeing 787, 747-800, 767-400, as well as 777-200/LR and-300/ER aircraft.



Split Tip Winglets

With the introduction of the 737 MAX series of aircraft, Boeing has introduced the “split tip” winglet, which they market as “the most efficient winglet on any airplane.” The two aerofoils are said to

maximize the overall efficiency of the wing, with the lower half of the winglet generating more vertical lift.

ETOPS

You may have already come across this written on a few aircraft, particularly heavies, which you've encountered on the ramp. ETOPS. What does it stand for? Extended-range Twin-engine Operational Performance Standards.

ETOPS allows twin-engine aircraft to fly routes that were previously off limits to them. In plain English, an aircraft that is ETOPS approved can fly a certain number of minutes from the nearest suitable runway on just one engine. With ETOPS approvals in place, airlines can route their aircraft more efficiently. If an engine goes out, the airplane is allowed to continue flying for as long as it is ETOPS approved, rather than having to land right away at the nearest runway.

The Boeing 767 was the first large aircraft to obtain ETOPS certification, with a 120-minute certification in 1985.

ETOPS-180 is the most common certification, and allows aircraft to fly up to 180 minutes from a suitable airfield on one engine. This puts 95% of the Earth's surface in range of ETOPS-180 flights.

The success of ETOPS, thanks in large part to the sound reliability of today's jet engines, ultimately has led to the downfall of less efficient tri-jets (three engine DC-10s, L-1011s) and even lower utilization of the venerable Boeing 747 on long-haul routes. Indeed, the twin-engine Boeing 787 is certified for ETOPS-330, while EASA (Europe's version of the FAA) has certified the Airbus A350 for 370 minutes!

Government-owned aircraft, including military, do not adhere to ETOPS regulations, nor do private jets in the U.S. ETOPS standards are international and apply to all carriers, both U.S. and foreign.

Did You Know? One slang term for ETOPS is Engines Turning or Passengers Swimming.

NEXTGEN

NextGen is the FAA's Next Generation Air Transportation System, a radical departure from the World War II era radar technology that has been used to direct air traffic for the past 70-odd years. In a nutshell, NextGen replaces vintage radar with precision satellite guidance.

Satellite guidance lets pilots know the exact location of nearby aircraft and weather patterns. Using more accurate navigation, NextGen allows planes to fly more direct routes, getting to their destinations in less time while using less fuel. Some reports have even indicated a reduction of 300-500 pounds of fuel used per flight.

For decades there have been a limited number of "highways" in the air that are open to aircraft - with NextGen the FAA has been able to open scores of new flight paths at Metroplexes – large metropolitan areas with multiple airports. As a result, air traffic controllers can move another 8 to 12 aircraft off the ground per hour, and it now takes just one minute to clear a flight for departure rather than the two minutes that have been traditionally necessary.

You may notice the effects of NextGen as well when you are flying. If you are sitting on an aircraft that is descending and approaching to an airport, you won't hear and feel the repeated engine adjustments – throttling up and throttling down – as the aircraft works down the altitude ladder. With NextGen, the approach is a smooth and consistent descent.

NextGen also uses surface surveillance data to track not just aircraft but ground vehicles as well, all leading to greater safety at the airport.

AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST (ADS-B)

How do airplanes "talk" to controllers on the ground? Automatic Dependent Surveillance - Broadcast (ADS-B) is replacing radar as the primary method to control aircraft around the world. In the U.S., it is a pivotal part of the FAA's aforementioned NextGen initiative. So how does it work? An aircraft determines its own position via satellite navigation and then broadcasts this out via radio transmissions, all of which is rather a bit different from radar searching out, finding, and then reporting the aircraft's location.

ADS-B allows Air Traffic Control to see the position of aircraft in real time, and also allows pilots in ADS-B equipped aircraft to see other planes in the area.

ADS-B equipped aircraft (all aircraft in the U.S. by 2020 will be required to have ADS-B equipment) regularly broadcast their ID, position, altitude, and speed in real-time, and with greater accuracy than radar. These aircraft can also receive transmissions from other aircraft (which gives pilots a better grasp of their surroundings) and better weather information to boot.

Of course, receiving radio transmissions is a tad bit cheaper than setting up radar coverage, so with ADS-B, we enjoy much greater geographic coverage as well as more accurate and timely information.

All of this allows for more direct routing of aircraft and more precise spacing - which means lower fuel costs and quicker flight times.

Did You Know? Any "avgeek" can buy a USB stick for about $20 that receives ADS-B signals (which are broadcast at 1090 MHz) and collect the transmissions from nearby overhead aircraft. There are several

programs that allow you to decode the transmissions and read them for yourself and plot them on a map.

FREEDOMS OF THE AIR

The various freedoms of the air govern the rights of commercial airlines to operate in and over the airspace of another country. There are presently nine freedoms, although it is just the first five that are officially recorded in international treaties. These freedoms represent the foundations of international commercial aviation, so let us briefly discuss each one:

First Freedom – This is the right to fly over another country without landing.

Second Freedom – Provides for carriers to refuel or conduct maintenance in a foreign country without picking up or dropping off passengers or cargo.

Third Freedom – This is the right for carriers to fly from their own country to another.

Fourth Freedom – Allows for a carrier to fly from another country back to their home country.

Fifth Freedom – This freedom gives carriers the right to fly between two foreign countries on a flight that starts or ends in their own country. For example, Air New Zealand operates a Fifth Freedom flight from Auckland to Los Angeles and on to London.

Sixth Freedom – The sixth freedom is the right to fly from a foreign country to another while stopping in the carrier's home country for non-technical reasons.

Seventh Freedom – Seventh Freedom flights allow carriers to operate between two foreign countries while not stopping in the carrier's home country. This is a variation of sorts of Fifth Freedom flights and is seen in Europe occasionally. With European Union open-skies agreements

in place, several carriers will operate flights between two points that are not in the carrier's home country.

Eighth Freedom – This is the right to fly inside a foreign country when continuing on to a carrier's home country. Eighth Freedom flights are rare outside of Europe.

Ninth Freedom – The Ninth Freedom allows pure cabotage – a foreign carrier operating domestic routes – and is extremely rare.

NEW YORK CITY AREA AIRPORTS CAUSE DELAYS

While it may sound absurd at first, the three New York City area airports - John F. Kennedy International (JFK); Newark, New Jersey (EWR); and the confines so aptly described as "third world" by then-Vice President Joe Biden in February 2013 - LaGuardia (LGA), along with Philadelphia (PHL) cause ***one half of the delays nationwide*** in the aviation system. How can this be?

For starters, there is a tremendous amount of traffic going to and from these airports, and these airports are known to succumb to weather delays on a somewhat regular basis.

Secondly, and most acutely in the case of LaGuardia, airlines for years simply scheduled more flights in a given hour than the airport (with one runway) was physically capable of handling. With that practice in place, it is scarcely a revelation that chronic delays would ensure.

If your flight from Boston to Denver was on an aircraft arriving from LaGuardia, and was delayed, then obviously your departure will be delayed, and then the following flight and so on.

To combat this, the federal government mandated that airlines reduce the amount of flights that were operated and introduced slot pairs at these airports. For example, JFK is limited to 81 scheduled operations per hour during peak times while LGA is capped at 71.

SLOT PAIRS

Some congested airports control traffic by issuing slot pairs, which is a takeoff and landing pair during a specific time frame. If an airline cannot acquire a slot pair at a desired airport and/or time, it will not be able to operate flights. It is not unknown for airlines to trade or sell slot pairs at certain airports; in early 2016 Persian Gulf carrier Oman Air paid the Air France-KLM Group $75 million for a pair of take-off and landing slots at London Heathrow (LHR). The arrival slot was good only for a 5:30 a.m. time as well!

In the U.S., Newark, New Jersey (EWR), New York Kennedy (JFK), New York LaGuardia (LGA), and Washington National (DCA) are slot restricted airports. JFK has been operating under slot restrictions since 1968.

HOW DO AIRPORTS MAKE MONEY?

Airlines earn most of their money from passengers, but how do airports pay their bills? Airports in Asia, Africa, and the Middle East are typically still state-owned, where earning extra revenue, or a profit, is not the foremost concern. In fact, two-thirds of airports around the world lose money.

In the U.S. and Europe, things are different, and airports are on their own in most cases. In the U.S., airports typically make their money from a variety of sources, with the biggest two being parking and airline landing fees. Remember that FAA regulations prohibit an airport from earning a profit on aviation activities.

Additionally, airports receive a good chunk of money in the form of rent from airlines, concessionaires (McDonalds, etc) and other tenants. Rental car facilities and their related fees also kick in some extra bread as well. Worldwide, airports reportedly earned over $150 billion from "non-aeronautical" revenue in 2015.

While remembering that these fees will of course vary by airport, let's take a closer look at some of these fees using Dallas/Fort Worth International Airport (DFW) as an example. DFW is the nation's fourth busiest airport, and handled over 64.1 million passengers in 2015.

Parking

Apart from landing fees collected from airlines, parking is most often an airport's biggest revenue generator, and it can produce significant income. In North America, airport parking lots earn a total of 40% of all non-aeronautical revenue at airports. DFW had 41,851 public parking spaces available in FY 2016, with daily parking rates ranging from $9 to $29 per day. The airport anticipated revenues of over $143 million from parking that

year. Additionally, the airport takes a 10% cut from all off-airport parking lots that are nearby. Not bad for a few hundred acres of idle concrete.

Lest you think I am attempting to dazzle you with one lone example: Atlanta (ATL) has 33,317 public parking spaces and projected $118.47 million in parking revenue for 2014. Miami International Airport (MIA) collected $42.571 million in parking revenue in FY 2013.

It has been estimated that parking and ground transportation revenue accounts for 41 percent of all non-aeronautical revenue at airports nationwide.

Interestingly enough, some airports are beginning to realize a noticeable decrease in parking revenue as more and more travelers use Uber to get to and from the airport. After all, why spend $20 or so a day to park for a week or so when you can get a ride to and from the airport for around the same or slightly more than one day's parking fee?

Landing Fees

Airports all charge landing fees, and those fees can vary widely. In fact, the price of landing fees can sometimes be the difference between one airport and the next when trying to lure a new carrier or route. High landing fees can also drive away carriers or flights, or at the very least cause heartburn. Reference United Airlines' lawsuit against the Port Authority of New York and New Jersey in regards to landing fees at Newark for more on that.

Landing fees are usually charged per 1,000 pounds of the maximum gross takeoff weight of each aircraft. Based on the size of the airport, the type of aircraft that it sees and the actual fees, these revenues can vary widely.

In FY 2015, DFW estimated they would make $107.6 million in landing fees, while Los Angeles International (LAX) projected they would collect $235 million. Both airports are massive and similar in size, however, LAX operates significantly more flights with wide-body or "heavy" aircraft than DFW does – just one reason they earn more than double the amount in landing fees.

Rental Cars

Every large airport has a sizable rental car facility, and rental cars are a favorite of local and state governments to add all sorts of taxes and fees on to. After all, most of the people renting are from out of town, so all the extra costs that are added on are paid by people who, predominantly, don't live in the area.

It is estimated that rental cars and their facilities earn up to 20% of all non-aeronautical revenue for airports in the U.S. and Canada.

2014 Estimated Landing Fees Per 1,000 Pounds MTOW

Newark, New Jersey (EWR)	$11.77
New York La Guardia (LGA)	$9.28
Chicago O'Hare (ORD)	$7.42
New York Kennedy (JFK)	$6.71
Denver (DEN)	$4.67
Boston (BOS)	$4.60
Los Angeles (LAX)	$4.54
San Francisco (SFO)	$4.50
Washington Dulles (IAD)	$3.86
Washington National (DCA)	$3.60
Philadelphia (PHL)	$3.52
Houston Intercontinental (IAH)	$2.99
Dallas/Fort Worth (DFW)	$2.64
Miami (MIA)	$1.76
Atlanta (ATL)	$0.82

Based on this chart, let's take an example and figure out some landing fees at different airports. A Boeing 737-800 has a maximum takeoff weight of 174,200 pounds, which divided by 1,000 pounds comes to 174.2. So let's say that plane lands at Newark, with an $11.77 landing fee, and at nearby New York Kennedy, with a $6.71 landing fee. An airline would pay $2,043.36 to land that plane at Newark, but $1,168.88 at Kennedy, a difference of $874.48.

Now, if you were an airline executive and had 10 flights a day to New York, where would you prefer to fly? You would save over $8,700 a day at Kennedy!

Of course, in the high stakes world of luring new aircraft services, airports are known to provide deep discounts or even waive landing fees for new carriers and service. In early 2014, Atlanta, which charges

some of the lowest landing fees in the nation, offered to waive landing fees for up to two years on certain routes.

Side Note: Las Vegas (LAS) makes a little bit extra income by way of some 1,300 slot machines that entice travelers in the airport. In 2016 these slots brought in $29.5 million in revenue to the airport.

AIRPORT IMPROVEMENT PROGRAM

Airports also have access to a large amount of funding from the Airport Improvement Program (AIP), which is administered by the FAA to help fund public-use airport infrastructure projects. These grants can help finance airport projects to rehabilitate aging infrastructure, meet current FAA standards for airport design, or help accommodate larger aircraft or growth in passenger activity. Runway extensions, taxiway improvements, airport signage, lighting and markings – all can be funded via AIP grants.

For all AIP-funded projects, the airport must provide a share of matching funds. The federal share is from 75 to 90 percent depending on the size of the airport or type of project. According to FAA, at the end of fiscal year 2014, the trust fund had an uncommitted balance of $5.7 billion.

Real World Examples: In June 2015 the FAA awarded a $12.9 million grant to Columbus, Ohio to help pay for runway repairs and improvements. This covered 82% of the project's $15.7 million cost. In August 2017 the FAA awarded a $10.1 million grant to Tyler, Texas to help pay for runway repairs and improvements, covering 90% of the project's overall cost.

ESSENTIAL AIR SERVICE PROGRAM (EAS)

One of the lesser known programs in the public eye is the Essential Air Service (EAS) program, which sees the federal government spend tens of millions of dollars each year to send, in many cases, mostly empty planes back and forth from small, out of the way ("podunk") towns, to larger hub airports.

The program was established in response to the Airline Deregulation Act, which, when passed in 1978, gave airlines nearly total freedom to determine which routes to serve. As such, many cities that are served today would most likely not see commercial service without these government subsidies, as they are not profitable.

Today, the program serves 163 rural communities with an average of three round trip flights per day on 19 seat aircraft. Subsidies provided for passenger range from a few dollars to several hundred each. The budget for the program in FY 2014 was $246 million and $261 million in FY 2015.

How does it work?

The DOT issues a request for proposal 90 days prior to the termination of a current contract on a route. Carriers will then submit their bids, which are reviewed against four factors, including the preferences of the local community. After all of this is completed, a contract is awarded, typically for a two-year term. Once up and running, the carrier will submit an invoice to the government showing which flights were completed, and the government then cuts them a check. It doesn't matter how many passengers were on the flight - as long as the flight is operated, the carrier will be paid.

If this seems strange to you, you are not alone. Many people have wondered aloud why people who live in rural areas simply cannot drive

to the nearest large airport, and in recent years, members of Congress have begun to question the need for the program.
In 2012, with fiscal concerns in mind, some changes came to the EAS with the passage of the FAA Modernization and Reform Act. This law stated that communities must maintain at least ten passengers per flight per day, and that no new communities can enter the program.

For the carriers, EAS can be quite lucrative as they get paid for every flight completed, regardless of the number of passengers on board.

Case Study: SkyWest was recently awarded an EAS contract to service Alpena, Michigan (APN) for FY 2017/2018 at an annual subsidy of $2,348,781. SkyWest will provide 13 round trips per week from Alpena to Detroit (DTW) on Canadair CRJ-200 equipment. That comes to 650 seats per week, or 33,800 per year.

For the 12 months ending February 2016, Alpena had 19,025 passengers on 858 scheduled flights, all to Detroit; 22.17 passengers for flight.

If those passenger counts were to continue, SkyWest will be getting paid $3,613.51 per flight, with each flight seeing just 45% of its seats filled. The drive from Alpena to Detroit takes a little over four hours.

AIRFIELD RUBBER REMOVAL

When an aircraft lands on the runway, its wheels are not spinning – they land and skid at first before getting their grip and then rolling normally. This process is known as the "spin up time." With hundreds of planes weighing hundreds of thousands of pounds landing each day on major airports' runways, layers of rubber residue from the tires slowly builds up on the runway. Excess levels of rubber on the runway can affect friction and reduce braking and handling performance. Thus, airports must periodically remove the rubber from the runway. In fact, rubber removal is included in most airport maintenance schedules.

So, how exactly is the rubber removed?

There are multiple methods commonly in use, from hydro cleaning to chemical removal and sandblasting.

When a runway receives a hydro cleaning, water is sprayed on the runway at anywhere from 2,000 psi to 40,000 psi, with the impact of the water alone breaking up the hardened rubber from the runway. The bits and pieces are then picked up by brushes or vacuums on the same truck as the sprayers.

With chemical removal, various cleaning solutions are brushed onto the runway, which break down the rubber. After a period of time, water is added to wash the runway off. Chemical removal can be quite costly.

Sandblasting essentially involves smashing small abrasive particles at high speed against the pavement, blasting the rubber pieces up from the service where they can quickly be collected.

Did You Know? While we are on the topic of rubber and tires, did you know that the Michelin Man's "real" name is Bibendum? This has little to do with aviation but I wanted to pass along nonetheless.

PASSENGER FACILITY CHARGE

One of the many fees that passengers are charged is the FAA's Passenger Facility Charge, which was established by Congress in 1990. This allows the collection of up to $4.50 per passenger for airports that are controlled by public agencies. The FAA states "airports use these fees to fund FAA-approved projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition." In plain English, the funds are used to improve airport infrastructure.

Keep in mind; the $4.50 fee is imposed at each airport on an itinerary. If you were flying from Buffalo, New York to Omaha, Nebraska, with a connection in Chicago, you may pay the fee three times! That's $13.50 on top of your base fare, while $18 is the maximum allowable charge.

Airports have been lobbying, unsuccessfully so far, to raise the fee to $8.50, claiming the increase is needed to combat inflation; the $4.50 cap was set in 2000.

Did You Know? As airlines collect PFC monies and turn the funds over to airports, they are allowed to maintain eight cents of each PFC they remit to the collecting airports.

SEPTEMBER 11 SECURITY FEE

To help fund TSA's operations, the September 11 Security Fee has been added to the cost of each airline ticket, at a rate of $5.60 per one-way trip and no more than $11.20 for a single itinerary. The airlines collect the fee and then remit the monies to TSA; the total of all fees each calendar month must be sent to TSA by the last calendar day of the following month.

Since 2013, Congress has diverted up a large chunk of these collected fees to pay down the national debt; Airports Council International – North America (ACI-NA) claims that $1.19 billion of the $3.5 billion in passenger fees in 2015 was diverted to non-security programs. Indeed, 60¢ of the one-way fee and up to $1.20 for the total itinerary gets diverted from TSA and sent instead to national debt payments.

How much has been collected via this fee since its inception? Nearly $30 billion! Here are the amounts per fiscal year, since 2002:

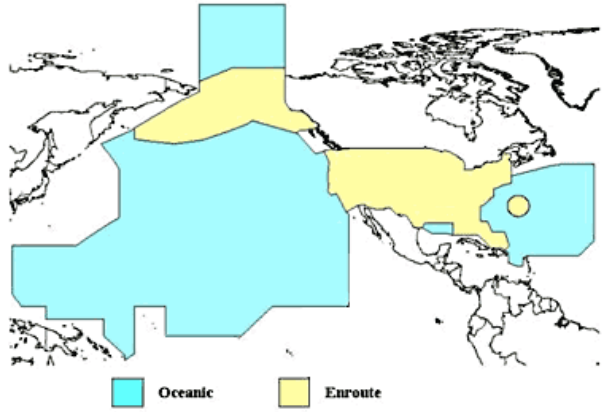
2002:	$ 995,400,000
2003:	$1,199,700,000
2004:	$1,600,200,000
2005:	$1,866,300,000
2006:	$1,855,800,000
2007:	$1,959,800,000
2008:	$1,920,100,000
2009:	$1,756,000,000
2010:	$1,808,000,000
2011:	$1,847,500,000
2012:	$1,877,700,000
2013:	$1,878,900,000
2014:	$2,087,000,000
2015:	$3,508,200,000
2016:	$3,694,217,000
Total:	**$29,854,817,000**

OVERFLIGHT FEES

Carriers that neither takeoff nor land in the US but fly over US airspace are charged overflight fees by the FAA. After all, FAA air traffic controllers must still handle these flights, and they like to be paid as well. As of January 2017, these rates are, per every 100 nautical miles, $58.45 over land and $23.15 over water.

Overflight fees were initially authorized by the Federal Aviation Reauthorization Act of 1996, and were implemented in their current form in 2001. In November 2016, the FAA announced that the Overflight fees will increase in three annual increments, taking place on January 1 of each year until 2019. The final rates will reach $61.75 per every 100 nautical miles over land and $26.51 per every 100 nautical miles over water. The minimum billing threshold is $400.

An Air Canada flight from Toronto to Mexico City would travel around 1000 miles over the continental US, and another 400 miles over US waters before heading into Mexico. A quick estimate shows that Air Canada would be charged over $650 for the overflight of the US.



Did You Know? Airlines can pay these bills online at Pay.gov.

INTERNATIONAL AVIATION SAFETY ASSESSMENT PROGRAM (IASA)

Established in 1992, the FAA conducts the International Aviation Safety Assessment Program (IASA), which checks to see if the Civil Aviation Authority (the FAA equivalent in a foreign country) is providing adequate safety oversight to its airlines. This oversight must meet established international standards, which have been developed by ICAO, the International Civil Aviation Organization.

If a country meets these standards, they are given a Category 1 rating by the FAA. With that rating in hand, airlines from that country can start or continue service to the U.S., and participate in code-sharing agreements with U.S. airlines.

If a country fails to meet these standards, they are tagged with a Category 2 rating. This means they are lacking laws or regulations needed to oversee their airlines in accordance with ICAO minimums.

When this happens, airlines from that country cannot start any new service to the U.S. - they can only operate existing routes. Code sharing with U.S. carriers is not allowed from carriers in Category 2 countries. Finally, carriers from Category 2 countries will be subject to additional inspections at U.S. airports.

These ratings are released to the public, but of course, being named as a Category 2 country can cause great embarrassment for obvious reasons. As of February 2017, Bangladesh, Barbados, Curacao, Ghana, Sint Maarten, Thailand, and Uruguay have Category 2 ratings.

METAR

METAR (Meteorological Aerodrome Report) is a routine aviation weather report predominantly used by pilots, issued at airports or permanent weather observations stations, typically on the hour. You'll find temperature, dew point, wind speed and direction, as well as any precipitation, cloud cover and ceilings, visibility and such on a METAR. METARs are issued in a "coded" format which requires some basic knowledge to understand.

KDFW 271853Z 01008KT 10SM FEW003 FEW150 SCT250 21/04 A3018 RMK AO2 SLP216 FU FEW003 SW T02060044 $

So, how in the heck do I read this? Well, let's break it down. To start we have the station identifier, which in this case is **KDFW**, Dallas/Fort Worth International Airport. Next, we see the date and time of the report: **271853Z**. The first two numbers are the date of the month in which the report was made, followed by time which is Zulu, or Greenwich Mean Time. We now know that the report was made on the 27th of the month at 1853 Zulu. *METARs will not indicate the actual month or year of the report.*

Moving ahead, let's get further into things. **01008KT** tells us that winds are from the north, at 010 degrees, with gusts up to eight knots. Next is **10SM**, which means visibility is 10 statute miles.

The next section covers the sky conditions: **FEW003 FEW150 SCT250**. FEW means that just 1/8 or ¼ of the sky is covered, while SCT means 3/8 or ½ of the sky is covered with clouds. The numbers afterwards represent the height of the clouds in hundreds of feet above the ground. So, at 15,000 feet we have very few clouds, while up to ½ of the sky is covered at 25,000 feet.

21/04 is simply the temperature, in Celsius, and the dew point, also in Celsius.

A3018 is the altimeter setting, or equivalent sea level pressure in inches of Mercury. This is important for pilots to help ensure their altimeter is showing the correct altitude.

Finally, we have the Remarks: **RMK AO2 SLP216 FU FEW003 SW T02060044 $.** AO2 notifies us that the KDFW station is automated with a rain/snow sensor, for example, while the rest gets into further information about barometric pressure, as well as temperature and dew points.

Of course, unless you are a pilot, this probably isn't of much value to you! You may as well just check your phone for the current temperature.

Did You Know? A simple way to get a fairly close (but not 100% accurate) estimate of a Celsius temperature in Fahrenheit is to double it and add 30. For example, if it is 20°C, the temperature is 68°F. Double 20 to get 40 and add 30 and you are at 70. Not an exact conversion, but close enough to know if you need a sweater or not. Thanks to my Grandmother for that tip many years ago.

THE AVIATION ALPHABET

To help eliminate any confusion between aircraft, air traffic control, and the tower, an “aviation alphabet” was developed by ICAO in the 1950s to help spell out letters more clearly. This is particularly helpful when identifying taxiways, holding points and so on.

Technically, this is called the NATO phonetic alphabet, or the International Radiotelephony Spelling Alphabet, but we can just call it the aviation alphabet.

A = Alpha	J = Juliet	S = Sierra
B = Bravo	K = Kilo	T = Tango
C = Charlie	L = Lima	U = Uniform
D = Delta	M = Mike	V = Victor
E = Echo	N = November	W = Whiskey
F = Foxtrot	O = Oscar	X = X-Ray
G = Golf	P = Papa	Y = Yankee
H – Hotel	Q = Quebec	Z = Zulu
I = India	R = Romeo	

FUEL HEDGING

From time to time airlines use fuel hedging as a way to try and keep fuel costs down. Hedges are contractual tools that allow airlines to establish a set cost for their fuel ahead of time. Hedging can be a gamble – airlines can reap substantial savings if fuel costs rise after they have made their hedges, but they can also be left holding the bag and paying above market rates if fuel costs plunge. It is common for airlines who hedge to only do so for a portion of their overall fuel requirements – after all, it is rarely clever to put all your eggs in one basket.

Of all the commercial carriers in the U.S., Southwest Airlines has been known to be aggressive in their use of fuel hedges in the past. The Dallas based carrier reportedly saved over $3.5 billion due to hedges in the first decade of the new millennium.

How much does jet fuel cost? In June 2017, U.S. carriers paid an average of $1.54 per gallon.

Did You Know? One gallon of jet fuel weighs 6.7 pounds.

Did You Know? Jet fuel is typically 100 octane.

CIVIL RESERVE AIR FLEET

The U.S. government maintains a Civil Reserve Air Fleet (CRAF) that is comprised of well over 500 aircraft from domestic commercial carriers. These aircraft can be called upon in times of emergency (typically war) when the government needs additional capacity to transport personnel to various parts of the globe. If notified that their aircraft will be needed, carriers have up to 48 hours to get the equipment and crew ready.

The CRAF has two main segments: international and national. The international segment is further divided into the long-range and short-range sections and the national segment satisfies domestic requirements. Assignment of aircraft to a segment depends on the nature of the requirement and the performance characteristics needed.

The long-range international section consists of passenger and cargo aircraft capable of transoceanic operations. The role of these aircraft is to augment the Department of Defense's long-range C-5s and C-17s during periods of increased airlift needs, from minor contingencies up through full national defense emergencies.

GLOSSARY

Above wing – Above wing services include ticket counter and gate operations, passenger service, aircraft cleaning/grooming and even catering operations.

ACARS – Aircraft Communications Addressing and Reporting System. Essentially, ACARS is an electronic message system that is used to send and receive information to and from aircraft. Updated weather reports, flight plans, revised flight plans and such are commonly sent.

ADS-B - Automatic Dependent Surveillance - Broadcast. *There is a whole page discussing ADS-B earlier in this book.*

Aircraft utilization – A measure of aircraft productivity which shows how much time an aircraft spends in the air, per day. Aircraft don't make money sitting on the ground.

Airline alliance – Agreement between two or more airlines who agree to cooperate on marketing, codeshares, and more. The big three alliances are Star Alliance, SkyTeam, and Oneworld.

Airport Code - This is the short code used to identify an airport. There are two common systems: the most common is the IATA code, which is a three-letter code used for reservations, ticketing and such. A second code, the ICAO code, is a four-letter code more commonly used by air traffic control and airline operations flight planning departments.

Airspace – The air over the land of sea area occupied by a state or country, and subject to the authority of that state or country.

Air Carrier Operating Certificate – Known as an Air Operator's Certificate in most of the world, the Operating Certificate is granted by a national aviation authority and grants an airline the right to operate commercial aircraft.

Air Operator's Certificate – The AOC is an approval granted by the national aviation authority to an aircraft operator that allows it to operate aircraft for commercial purposes.

Air Pocket – A euphemism for a bit of turbulence.

Air Stairs - Some smaller airports don't have jet bridges, so a modified truck with a flight of stairs attached to the bed will pull up to the plane so you can walk off.

AIT – Advanced Imaging Technology. When you go through the airport, get into a roundish looking pod and raise your arms while a door swings around, you are being scanned by a millimeter wave AIT machine. AIT uses automated target recognition software that eliminates passenger-specific images and instead auto-detects potential threats by indicating their location on a generic outline of a person. Non-metallic threats can be detected via AIT. AITs provide enhanced security benefits compared to WTMD because they are able to identify nonmetallic objects and liquids as well as metallic objects that may pose a threat.

All Call – A variation of the crosscheck, all of the cabin crew is reporting to the purser or lead flight attendant that aircraft doors and slides are properly armed or disarmed.

Alliance – Many of the major airlines in the world today have joined up one of the various airline alliances. The three major alliances in existence today are the Star Alliance, Oneworld and Sky Team. These alliances provide several benefits, such as an extended route networks and reduced costs by sharing operational facilities and staff.

AOA - Air Operations Area. Any portion of an airport that is used for take-offs, landings or taxiing of aircraft.

AOG – Aircraft on Ground. Airline term for when an airplane is out of service and requiring maintenance or technical work.

AOSSP – Aircraft Operator Standard Security Program. A TSA issued security program used by U.S. registered airlines.

APIS – Advance Passenger Information System. A CBP electronic data interchange system that allows carriers to transmit traveler data to CBP. APIS data includes passenger information that would be found on the face of a passport, such as full name, gender, and country of passport issuance. The current APIS requirements were established in April 2005 with the publication of the APIS Final Rule. The APIS program is recognized by commercial carriers and the international community as the standard for passenger processing and enhanced security in the commercial air and vessel environment.

Apron – The apron is most commonly the area near the terminal building where airplanes load and unload passengers, take on cargo, get serviced, refueled etc.

Area of weather – Have you been on a flight and heard the pilot come on the microphone and say there is an "area of weather" up ahead? That's just a fancy way of saying there is a storm of heavy rain, and the plane will soon fly around it.

ARFF – Aircraft rescue and firefighting.

ATC - Air Traffic Control.

ATIS – Automatic Terminal Information Service. ATIS plays a recorded message on a set frequency detailing current weather conditions, active runways, and other information at major airports.

ATSA – The Aviation and Transportation Security Act of 2001 is the law that created the TSA.

AT X-Ray – Advanced Technology X-Ray. A fancy term to denote the latest generation, more advanced X-Ray systems.

Auxiliary Power Unit – APUs provide power for an aircraft to start the main engines. While on the ground, an APU will run and provide power to run electrical systems and heat or cool the aircraft cabin.

Average Stage Length – The average distance of a non-stop flight between take-off and landing.

Avgeek – A fan of commercial aviation, one who may enjoy aviation artwork, collectibles, spotting, aviation photography, and keeps up with industry news and information.

Avionics – Aviation electronics.

AVOD - Audio/Video on Demand. AVOD is how you can watch a movie, TV show or listen to music at any time you want, rather than wait for it to be shown on the main system in the aircraft.

AVSEC – Aviation Security.

Base – The home airport of a flight crew is their base.

Belly – The cargo hold in the bottom of the plane where luggage and cargo are stored.

Below wing – Below wing services include ramp operations such as pushback and marshaling of aircraft, applying ground power, fueling, lavatory service, baggage handling, cargo and the like.

Belt Loader - This is the little car with the conveyor belt that comes up to the cargo door on an aircraft. You'll see luggage and boxes on the belt being loaded to/from the belly of the plane.

Black box – The cockpit voice recorder (CVR) or flight data recorder (FDR) is commonly called the black box, a vital item to recover after an incident or accident to help investigators determine what went wrong.

Blue juice - The blue liquid you see in the lavatory.

Boarding pass – Your boarding pass is your ticket.

BOB – Abbreviation for "buy-on board" and used mainly between flight crew. Refers to meals and drinks that passengers can buy in flight.

Bottle to throttle – The number of hours that a crew member has between the time they can't have a drink and their next flight.

Bulkhead – The dividing wall between two different cabins on an aircraft.

Bumped - Anyone who has seen their seat on a flight taken from them, either for weight and balance, or when a flight is oversold, will find himself or herself "bumped" to the next available flight.

Buttoned Up – All the aircraft doors are closed and locked.

Cabotage – The practice of allowing a foreign carrier to operate domestic flights is known as cabotage. As an example, Qantas operates a flight from Sydney to Los Angeles and then on to New York. As a foreign carrier, they cannot sell tickets to a passenger solely for the Los Angeles to New York portion of the flight. Not surprisingly, there aren't too many countries that allow cabotage; Italy does and nearly half of all seats in the domestic market are operated by foreign carriers. It is perhaps unsurprising then that flag carrier Alitalia has been in dire financial straits for years.

Callsign – The callsign is used in radio transmission to identify an aircraft. For example, "Speedbird 192" would indicate British Airways Fl. 192, while "American 2466" would identify American Airlines F. 2466.

Captain – The captain is legally in charge of everything and everyone on the plane while in air. You'll see them wearing four stripes on their should epaulets and they sit in the left seat of the cockpit.

Catchment area – the number of people living within a two-hour car or train ride to an airport.

C.A.T.S.A. – The Canadian Air Transport Security Authority. Established on April 1, 2002, CATSA is responsible for passenger and baggage screening, as well as the screening of airport workers at airports in Canada.

C.B.P. – U.S. Customs and Border Protection.

C.B.S.A. - Canada Border Services Agency. Canada's version of the CBP.

Ceiling – The ceiling is essentially the elevation of the lowest layer of clouds, or the highest altitude at which an aircraft can fly.

Cheatlines – Commonplace on airline liveries up until the late 1990s or so, a cheatline is a long, painted line running horizontally across the fuselage of an aircraft. Think of the classic red, white, and blue stripes in the middle of the old American Airlines planes; that is a cheatline.

Checkride – Checkride is a slang term for the FAA Practical Test that all applicants must complete to receive a pilot's certification, or to be endorsed for additional flight privileges. In addition to the checkride, an oral test must also be passed.

Check airman – Check airmen are usually captains who perform line checks. The check airman will be observing (from the jumpseat) the captain in how he or she handles their duties, knowledge of procedures and checklists, as well as overall efficiency – all during a revenue flight. Every two years a captain is required to be observed by a check airman.

Chief pilot – Sometimes known as "God," the Chief pilot oversees the pilots at their base, and mediates any disputes. The Chief pilot will generally oversee the flight assignments and supervise pilots in their base. Generally, line pilots don't want to be called to see the Chief pilot!

Chocks – Chocks are wood or rubber parking bricks, for lack of a better term, used in front and back of the landing gear wheels to keep an aircraft from rolling away when parked.

Coach roach – A flight attendant who enjoys working the economy/coach cabin.

Codeshare - A codeshare is where two or more airlines share the same flight. For example, American Fl. 1174 operates from Reno to

Dallas/Fort Worth. Iberia, British Airways, and Qantas all codeshare on this flight. So, Iberia will market the flight as Iberia 4038 and sell tickets for it, but it will be operated by American. One big benefit to codesharing is the ability for passengers to fly on two separate airlines on one single itinerary. Additionally, passengers will often earn frequent flier miles or points on a codeshare partner airline.

COMAT – Company Material. COMAT is non-revenue cargo, such as aircraft parts, printed materials or anything else an airline may send from one station to another on its aircraft.

Commuter – A crewmember who lives in one city but is based in another; they take a plane to get to work.

Commuter flight – A commuter flight is basically a flight on a smaller regional jet operated by a regional airline, where demand does not warrant mainline service.

Completion Factor – The percentage of scheduled flights completed in a day.

Concourse – The concourse is a wide area in the airport for people or passengers to walk.

Concourse shoes – Fancy shoes, high-heels, etc., that flight attendants wear while walking through the airport that are promptly ditched for more comfortable shoes once on board.

Connecting flight – A connecting flight will take at least two different planes with two different flight numbers to get you to your final destination.

Cookie sheet – Large (commonly 8'x10') sheets of aluminum that various air cargo shipments and pallets are placed on prior to being loaded onto the aircraft.

Crashpad – A shared house or apartment that is used by multiple airline employees who live in one city but are based in another. Rather than moving or paying for a second residence, a group will pitch in on

a small place and share the rent. In many cases, the sparsely furnished crashpad may just be a bed and a shower with little other in the way of accommodations.

Crew rest area – Crew rest areas are small spaces where cabin crew can catch a quick nap on board. On long haul aircraft, these can be small bunks often squeezed into the ceiling space of a cabin. On smaller aircraft, a row of seats may be curtained off for crew to use.

Crosscheck – You've heard this on nearly every flight you've ever taken at some point. Crosscheck simply means that a pilot of flight attendant has verified the work of another person. In the cabin it basically means verifying that the aircraft doors are armed or disarmed.

Crosswind – Winds that are perpendicular to the motion of the aircraft.

Crotch watch – When the flight attendants walk up and down the aisle prior to departure to ensure passengers have their seat belts on. Also known as a groin scan.

Crumb crunchers – Slang term for passengers who are young children.

CUTE – Common Use Terminal Equipment systems are used at airports where airlines share gates; Delta may be at the gate at 10am and American may be operating a flight at the same gate at 1130am. Rather than each airline having their own computer and system installed, they operate a common use terminal, where various carriers can log in and handle their gate operations.

CVR – Cockpit Voice Recorder. Also known as one of the 'black boxes," the CVR typically records the last 30 minutes of audio inside the cockpit, including conversations, radio transmissions and other background noises.

CX - Cancelled.

Cycle – A cycle for an aircraft is one takeoff and landing.

Deadhead - You may have seen a pilot or flight attendant sitting in a passenger seat on your plane. In this case, it is entirely possible, and quite likely, that this person is deadheading, or simply repositioning to another duty location and assignment. For example, a pilot may have flown a Chicago to Dallas leg, and then will 'deadhead' to Houston the next day to fly a Houston to Los Angeles flight.

De-icing – The process of removing ice or snow from an aircraft. When you see huge nozzles spraying down an aircraft on a cold day, it is being de-iced.

Deplane – To get off the aircraft.

D.G.C.A. – Directorate General for Civil Aviation. The DGCA, sometimes DGAC, serves as the national body in many countries for civil aviation regulation and oversight.

D.H.S. – Department of Homeland Security, the parent agency of the T.S.A., established on November 25, 2002.

Diesel – Older term for a Douglas aircraft; a DC-9 would be referred to as a Diesel Nine.

Dinosaur – A very senior flight attendant.

Direct flight – A direct flight is different from a non-stop flight in that the direct flight may indeed have stops. Southwest Airlines may run a direct flight, with the same flight number, from Houston to Los Angeles that will stop in El Paso before landing in Los Angeles. Direct and nonstop are **not** interchangeable terms.

Disembark – To get off the aircraft.

Dry Lease - A leasing arrangement where the owner of the aircraft (the lessor) leases the aircraft without crew to another person (the lessee). This is similar to how you may be leasing your car from a dealership.

Dwell time – Industry term used to discuss the time passengers have before a flight departs that can be spent shopping or dining inside the airport.

E.A.S.A. – The European Aviation Safety Agency. Basically, this is the equivalent of the FAA for countries in the European Union (EU).

E-AWB – Electronic Air Waybill. The electronic version of the cargo air waybill.

EMAS – Engineered Materials Arresting System, an arrester bed at the end of a runway that reduces risk of a runway excursion or overrun. Typically, a lightweight, crushable concrete that will catch and slow down an aircraft. Second generation EMAS is a foamed silica bed made from recycled glass and a plastic mesh system.

Enplane – Getting on the aircraft.

ESTA – Electronic System for Travel Authorization. ESTA is an automated system that determines the eligibility of visitors to travel to the United States under the Visa Waiver Program (VWP). Authorization via ESTA does not determine whether a traveler is admissible to the United States. U.S. Customs and Border Protection officers determine admissibility upon travelers' arrival. The ESTA application collects biographic information and answers to VWP eligibility questions. ESTA applications may be submitted at any time prior to travel, though it is recommended that travelers apply as soon as they begin preparing travel plans or prior to purchasing airline tickets.

ETA – Estimated Time of Arrival; when the flight is estimated to arrive at its destination.

ETOPS – Extended-range Twin-Engine Operational Performance Standards.

Equipment – An airplane.

Equipment change/swap – When an airline changes out the airplane used for a flight, an equipment change has taken place. This typically

occurs after a maintenance issue has taken the original plane out of service.

Eurowhite – Derogatory term for an airline livery that is painted mostly all white.

FA – Flight attendant.

F.A.A. – The Federal Aviation Administration, the U.S. government agency responsible for ensuring civil aviation safety. The FAA was created on August 23, 1958 as the Federal Aviation Agency, switching to Administration in 1966.

FAM – Federal Air Marshal.

Fare basis code – Fare basis codes are alpha-numeric codes used by airlines to identify the fare type on a ticket. F is first class, J is business class, W is premium economy and Y is basic economy.

FARs – Federal Aviation Regulations, or the laws which govern airmen in the U.S.

F.B.O. – Fixed Base Operator. FBOs are commercial businesses that typically provide fueling, hangar services, parking, aircraft rental and maintenance, flight instruction and so on. You will see FBOs most usually at General Aviation airports, but also at larger commercial airports where they cater typically to business and private jet operations, often to well-heeled customers.

Feeder - A feeder carrier is the same as a commuter carrier - these are the smaller regional jet operators who run passengers from smaller cities to, in most cases, larger hub airports where the mainline carrier can them fly them onwards. *Related –Regional airline, Virtual carrier.*

Feeder traffic – Regional jet flights into a large, hub airport are known as feeder traffic as they "feed" the mainline aircraft with additional passengers.

FFDO – Federal Flight Deck Officer. An armed pilot.

Ferry - A 'ferry' flight is basically a positioning flight, with no passengers, from one city to another.

FIDS – Flight Information Display System. FIDS are the television screens in the terminal which list all the arriving and departing flights, their times, gate assignments, boarding status, and such.

FIS – The FIS, or Federal Inspection Service, is where arriving passengers on international flights are cleared through customs and immigration. These passengers cannot be allowed into the public portion of the terminal until they are cleared.

FL – Flight Level. Used mostly above 18,000 feet, there is a more official definition that gets into barometric settings and such. For us, look at it this way; FL280 is a flight operating at 28,000 feet, FL390 is operating at 39,000 feet.

Flag Carrier - Historically, flag carriers were owned and operated, predominantly, by a national government. In recent years though, a flag carrier could also be considered as a company that receives preferential rights and privileges in their country. The U.S. has never had an official flag carrier, although Pan American was considered the “unofficial” flag carrier during its heyday.

Flight deck – The cockpit.

Focus city – A focus city is not a hub, but a station from which an airline will have non-stop flights to various destinations other than its hub.

FO – First officer. FO’s have three stripes on their shoulder epaulets and sit in the right seat of the cockpit.

FOD - If you ever see a big metal barrel or garbage can on the tarmac or anywhere on the airport marked "FOD,' that stands for Foreign Object Debris. Any trash floating around on the ramp is called FOD,

and should be collected and put into a FOD container, before it gets sucked into an aircraft engine.

Fortress Hub - A fortress hub exists at an airport where one carrier operates over 70 percent of the flights. In the U.S. alone there are several fortress hubs: Dallas/Fort Worth (American), Detroit (Delta), Houston (United).

Fuel Farm – An area near the airport where several large tanks are maintained, each holding aviation fuel.

Fuselage – Take the wings and tail off of an aircraft and you are left with the cockpit and cabin, the long metal tube. This is the fuselage.

FY – Fiscal Year. As referenced throughout this book, the federal government operates on a calendar that starts on October 1 and ends on September 30 the following year. It is **not** called a "physical year."

Galley Queen – A flight attendant who is working the galley and doesn't like for passengers or other crew to enter his or her "office' area.

Gate – Your gate is where you go to get on an aircraft. The gate is the entrance to the jet-bridge or stairs that let you board.

Gate Check - When the overhead space is full or you just change your mind at the gate and want to check your bags and not bother with them, you can gate check them. They will then go in the belly of the aircraft and you can pick them up after the flight.

Gate Lice – You've seen these folks any time you walk through a terminal – the horde of people who rush up and crowd the gate area as soon as an announcement is made that a flight will start boarding in a few minutes. Gate Lice rush up to the front of the gate and get in the way, standing around waiting for 20 minutes before their Group Five seat is called to board.

General Aviation (GA) – All civil aviation except scheduled passenger and cargo operations and excludes military flights. General

aviation traffic ranges from small propeller planes flying from private runways to large jets based at major airports.

Global Distribution System (GDS) – Networks operated for the benefit of third party companies to review available ticket inventory. Basically this is what travel agents use to book tickets.

Glycol – Glycol is a fluid used for aircraft deicing and anti-icing. There are a few different types and mixtures, but in the end, it is all glycol. Glycol is usually seen in a yellowish color.

Go-Around - When an aircraft aborts its landing attempt and "goes around" back into the pattern to try again.

Ground Handler – A ground handler is a company that handles most "below wing" operations, such as baggage loading & unloading, for an airline. In many cases airlines will contract with third party ground handlers at smaller stations as it is quite often cheaper than doing these tasks in house.

Ground load – If you are walking on the ramp to board an aircraft, and not using a jet bridge, then you are boarding via a ground load gate.

Ground Power Unit (GPU) – Small vehicles that can supply power to parked aircraft; GPUs may also be built into a jet bridge.

Ground Security Coordinator (GSC) - GSCs exist at every U.S. airline, but are not required at foreign carriers. The main functions of a GSC, mandated by 49 CFR 1544.215, are to review all security-related functions and make sure the airline is in compliance with these requirements, and to immediately correct any issues of noncompliance.

Ground stop – When there is a ground stop, nothing is taking off or landing from a particular airport. Ground stops can be the result of bad weather or air traffic control trying to get a traffic backlog sorted out.

Ground Support Equipment (GSE) - All the little tugs, belt loaders, vehicles, tow bars, fuel trucks and so on that you will see in action on the ramp.

Hangar – The "garage" where aircraft are parked and receive maintenance.

Hangar Queen - An aircraft that spends too much time undergoing maintenance or repairs; in other words, it is always in the hangar getting work done.

Heavy – A U.S. Air Traffic Control term for any aircraft with a takeoff weight or 300,000 pounds or more - most commonly a large, wide-body aircraft. *The Airbus A380 and Antonov An-225 are two even larger aircraft that are given the term "super."*

Hidden city ticketing – You wish to fly from City A to City B, but the ticket is too pricey. You then find a cheaper ticket from City A to City C, with a connection in City B, where you get off the plane and skip the flight to City C. This is hidden city ticketing – a practice airlines frown upon; they may even cancel the rest of your ticket if they catch you doing it.

Holding – Airplanes in holding patterns are essentially making large ovals in the sky while they wait out a storm or work out another issue. Holding is sort of like pulling to the side of the road in your car while you fiddle with the GPS.

Hub - An airline hub is an airport that is used primarily as a connecting airport to move passengers around the country. Perhaps you live in an area where your nearest airport is a small field, with only a few flights a day, but you are going to Paris for a vacation. You would jump on a flight here to the nearest hub airport and connect to a larger aircraft that will take you directly to Paris.

Hybrid livery – You may see an aircraft with the logo and/or title of one airline but the livery of another. Perhaps there was a merger, or maybe an aircraft is being leased for a short period of time. In this case, you may come across a hybrid livery.

I.A.T.A. – The International Air Transport Association is the trade association for the world's airlines, with well over 200 members. IATA helps to form industry policy and standards.

I.C.A.O. - International Civil Aviation Organization. Formed following the 1944 Convention on International Civil Aviation (also known as the Chicago Convention). ICAO became a specialized agency of the United Nations (UN) in 1947. One of the primary objectives for ICAO is to provide for the safe, orderly, and efficient development of international civil aviation. There are currently 191 signatory nations to the ICAO convention, all of whom agree to cooperate with other member states to meet standardized international aviation security measures. International security standards and recommended practices are detailed in Annex 17.

IFE – In-Flight Entertainment. The audio, TV, movies and whatever else you have available on your flight, either on the screens above you or in the little TV in the back of the headrest in front of you.

IFR – Instrument Flight Rules discuss how to operate an aircraft in instrument, or often less than ideal, conditions.

Illegal – When a crewmember crosses over the maximum hours they are allowed to work per flight, day, or schedule without sleep or a rest period.

ILS – Instrument Landing System. The ILS has a localizer, glide scope transmitter, and various markers all to aide pilots in landing during instrument flight rules (IFR) operations.

IROP – Irregular operations are events which disrupt flight schedules and adversely affect the normal flow of passengers. Typically found after heavy storms move through an area or an airport.

IRTPA - Intelligence Reform and Terrorist Prevention Act of 2004 (Public Law 108-458).

Interline - A voluntary agreement between airlines to handle passengers traveling on itineraries that include multiple airlines. For example, you are traveling from Los Angeles to Dallas on American

and then transferring to Delta to travel on to Atlanta. American will issue you both tickets in Los Angeles as they have an interline agreement with Delta.

Jet Bridge - The enclosed metal (in most cases) bridge you walk on from the gate to the aircraft.

Jump Seat – The uncomfortable fold down seats in an aircraft that flight attendants sit in are known as jump seats.

Jungle jet – An Embraer aircraft; built in Brazil.

Kiosk – Kiosks are the small little computers near the ticket counter where you can check in for your flight, pay for your checked bags, get your boarding pass printed out, and so on.

Knot – A nautical mile (nm) per hour, which is 1.15 miles per hour. For example, an aircraft travelling at 450 knots would be going at 518 mph.

KTN – A Known Traveler Number is provided to passengers who have been approved as eligible for TSA Pre-Check. It is basically an ID number that shows you are enrolled in the program – you should enter it in the KTN field when making reservations.

Last Point of Departure (LPD) - The final airport outside of U.S. territory from which a flight departs to U.S. territory.

Lavatory - The "lav" is the bathroom on an aircraft.

Layover – Time spent at a connecting airport before your next flight.

Legacy carrier – In the U.S., a legacy carrier is one which had interstate routes before the Airline Deregulation Act of 1978. American Airlines, Delta Air Lines, and United Airlines are the "big three" legacy carriers, although Alaska and Hawaiian may also be considered legacy carriers as well.

LEO – Law enforcement officer.

Line – A flight attendant's monthly schedule of trips is known as the line.

Line check – A revenue flight in which the captain of the aircraft is observed by a check airman to verify that company standards and FAA regulations are being followed as expected.

Line holder – A flight attendant who has bid on and won a line, and isn't working reserve.

Livery - The livery is the paint scheme on an aircraft.

Load factor – The percentage of seats filled on a flight or route.

Lounge – Small rooms in the terminal with couches, (maybe) vending machines, and computers for flight crew to rest, sign in and get briefings before a trip.

Lounge lizard – A flight crew member who is a known commuter and hangs out in the lounge between trips (being too cheap to pay for a hotel or crash pad) is known as a lounge lizard.

Low-cost carrier – An LCC is a "budget" airline that offers less perks and comforts on board in exchange for lower ticket fares. LCCs typically operate in an all-economy class configuration. Think Southwest Airlines.

Mad Dog - A Mad Dog is a McDonnell Douglas MD-80 or MD-90 series aircraft.

Mag – "The Mag" is a slang term for the magnetometer, or walk-through metal detector.

Mainline - This refers to the main operations of an airline group. American Airlines is a mainline carrier, while any American Eagle branded flights are not.

Managed inclusion – A practice that saw non-Pre-Check travelers being placed into Pre-Check security lanes in order to ease congestion

at TSA screening checkpoints. Managed inclusion was discontinued in September 2015.

Marshaling – Visual signaling between ground crew and the pilots of an aircraft. Marshallers will help guide an airplane to and from the gate and tell the pilots when to turn off the engines.

Mayday – The international radio distress call, indicating imminent danger to the life of all onboard; immediate assistance requested.

Metal – The aircraft of the airline operating the flight – basically, what airline is operating the flight. For example, you may be on a Delta Connection flight and the plane is painted up in Delta's livery. However, as the flight is operated by Endeavor Air, the "metal" is Endeavor, not Delta.

Metroplex – A large metropolitan area with multiple airports.

Mileage run – A trip that is set up to get the most miles possible from one destination to the next. For example, rather than a direct flight from San Francisco to Houston (1,635 miles), a passenger on a mileage run may book the trip with a stop in Denver, for a total of 1,829 miles on the San Francisco – Denver – Houston ticket. Mileage runs have faded from favor as many airlines have changed their rewards system accruals from pure miles flown to the amount spent on tickets.

Minimum Equipment List – The MEL is an aircraft-specific document that lists which pieces of equipment are allowed to be inoperable while the aircraft still maintains its airworthiness. Basically, the MEL lists which parts are allowed to be broken and not cause the cancellation of a flight.

Miracle flight – When there are passengers who need assistance or wheelchairs prior to boarding but are later they are able to deplane on their own upon arrival, a miracle flight is said to have occurred.

Movement – A movement, for statistical purposes, is a landing or a takeoff of an aircraft. In 2015, Atlanta was the busiest airport in the world in terms of aircraft movements, with 882,497.

MRO – Maintenance/Repair/Overhaul. Aircraft maintenance services that are sometimes performed by one carrier for another and then charged via an electronic invoice.

MSP – Model Security Program, a TSA issued security program used by foreign carriers operating to or from the U.S.

MTOW – Maximum Take-Off Weight for an aircraft.

MX - Maintenance.

N-Number - Every aircraft in the U.S. must be registered with the FAA. The N-Number is basically the license plate for each aircraft; you will see it (N123XX) in large font somewhere on the rear of the plane's fuselage.

Narrow Body - A single aisle aircraft, such as an Airbus A319/320, Boeing 737 or McDonnell Douglas MD-80/90 series.

Net margin – The net income or loss as a percentage of operating revenue.

Non-Rev – A person who is travelling and not paying for his or her ticket. Non-Revs are almost always airline employees who are flying, usually for personal business.

Nonstop – Differing from a direct flight, a nonstop flight is pretty cut and dry, a single flight between two airports with no stops.

Nose Number - This is the airline's internal number for the aircraft. Most airlines don't use the FAA N-Number to identify planes internally. For example, N951AA is the N-Number of a Boeing 737 with American Airlines, but its nose number is 3CF. So, American will refer to this aircraft internally as 3CF (for dispatch, maintenance, etc) rather than 951.

No-Show – A passenger with a confirmed reservation who fails to check-in or board on time.

NOTAM – Notice to Airmen. NOTAMs are issued to notify pilots of changes in aeronautical information.

N.T.S.B. – The National Transportation Safety Board, a government agency tasked with investigating all civil aviation accidents in the U.S.

O&D - Originating and Destination passengers. This term essentially refers to the amount of passenger traffic that can be generated in the areas nearby an airport. Los Angeles International Airport (LAX) has some of the highest O&D numbers in the industry, while a large connecting hub like Dallas or Denver may see the larger majority of its passenger traffic generated by passengers arriving from smaller cities and then connecting onwards.

Offline city – A city to which an airline doesn't fly.

Open-jaw ticket – An open-jaw ticket is a round trip ticket in which the passenger departs to return home from a different city from where he or she first landed. An itinerary of PHL-JFK-LHR and then CDG-PHL would be an example of an open-jaw ticket.

Operating margin – The operating profit or loss as a percentage of operating revenue.

Oversold - Airlines typically oversell their flights; in other words, sell more tickets than they have seats available. Why? Quite a few people don't show up for their flight. Rather than fly empty seats, the airlines would of course prefer to fly their planes as full as they can. In the event everyone shows up and there are more passengers than seats, they'll usually offer a few hundred dollars for a volunteer to take a later flight. If that doesn't work, someone is likely to be involuntarily bumped onto a later flight.

PARIS – The Performance and Results Information System (PARIS) is the primary database used for maintaining information associated with TSA's regulatory investigations, security incidents, and enforcement actions, as well as for recording the details of security incidents involving passenger and property screening.

Part 121 – Part 121 refers to the section of the Federal Aviation regulations that deal with scheduled commercial carriers in the U.S. When you hear the term "121 carrier" that is a reference to a commercial airline.

Paperwork – When you hear the pilots talking about "paperwork" they are referring to various logs or the weight and balance records that need to be completed before the aircraft can push back.

Pax – Shorthand for passengers.

Payload – The combined weight of revenue passengers and/or cargo.

Penalty box – When an aircraft needs to be parked somewhere for a short period of time and get out of the way of other aircraft, it is placed in an out of the way area known as the "penalty box." This saves the aircraft from taking up a gate needlessly.

PFC – Passenger facility charge is a fee collected by the airline and remitted to the airport that the airport then uses for capital improvements.

PIDS – Perimeter intrusion detection systems. Multi-faceted systems that can employ radar, video motion detection, infrared cameras, and face sensors, among other things.

Pitch - The distance from a spot on one row to the same place on the next one. So, the more seat pitch, the more space and legroom you are going to have.

Playbook – A risk-based program that authorized FSDs to carry out random, unpredictable combinations of security operations at all areas of an airport to address real-time threats and to deter potential terrorist attacks. Since March 2015, TSA Headquarters has directed that a high percentage of Playbook operations focus on the insider threat, primarily through the random screening of workers, property, and vehicles.

PMIS – Performance Measurement Information System. This is a TSA system used internally to record various performance metrics.

PNR - Passenger Name Record. This will contain the itinerary of a passenger or group of passengers who are traveling together.

Positive Space – A person holding a positive space ticket is guaranteed a seat on the flight.

Power plants - The engines of an aircraft.

Powerback - You won't see this much anymore if at all, and certainly not in the U.S. In the old days, some aircraft, particularly DC-9s and Super 80s, would push themselves back from the gate using reverse thrust.

PPBM – Positive Passenger Bag Match.

PRASM – Passenger Revenue per Available Seat Mile is a typical way to measure how much profit an airline is making per seat mile, and is often shown in cents per mile.

Pre-board – A few minutes before general boarding begins, pre-boarding allows families with young children, passengers with disabilities, elderly folks, or anyone who might need a little more time boarding to get on the plane before the masses.

Public area – An area of an airport where entry is not restricted – typically the ticketing halls and baggage claim areas.

Purser - The purser is basically the chief flight attendant. They are responsible for making sure passengers are well looked after, and often complete various reports and paperwork for a flight.

Pushback - When an aircraft is pushed backwards away from the gate.

Quick Turn – When a wide-body aircraft is in and out of the gate in less than 60 minutes, a quick turn has occurred.

Queen of the Skies – The Boeing 747 is affectionately known as the Queen of the Skies.

RAIC – Restricted Area Identity Card. Used in Canada, the RAIC system uses iris and fingerprint biometric identifiers to allow non-passenger access to restricted areas of airports.

Ramp – The ramp is basically the tarmac where planes park and taxi.

Ramper / Ramp Rat - 'Rampers' are the guys you see on the tarmac loading and unloading the bags onto an aircraft.

Ramp Rash - Little bumps and scuffs from jet way bridges, air stairs, baggage loaders and other service vehicles that can be seen generally around cabin doors and cargo compartment doors.

Ramp workers should always report any bumps or nicks into aircraft, no matter how minor. On December 26, 2005, a "ramper" bumped an Alaska Airlines MD-80 with a baggage loader and failed to report it. That small crease opened up into an 18-inch hole in the fuselage in flight, causing cabin depressurization. Luckily, the event was not catastrophic.

Red-eye – An overnight flight.

Regional airline – Regional airlines operate in two ways: as an affiliated airline with a major airline, flying under the major's brand; as an independent airline operating under their own brand. Most independent airlines operate in small and isolated areas.

Remote stand – When an aircraft is parked at a location that is not adjacent to the terminal, it is parked at a remote stand.

Retired – When an aircraft is withdrawn from the fleet and active revenue service.

Repositioning – Moving an aircraft from one airport to another, done without any passengers or cargo. For example, an airline operates a charter from Boston to Reno, Nevada, then repositions the aircraft to Las Vegas for its next revenue flight.

Revenue Service - Any flight that is being operated for commercial reasons; i.e. a scheduled flight with paying passengers.

RJ – Regional Jet. Any Embraer or Canadair is an RJ.

Roll-aboards - The carry-on baggage a lot of people have that they stick up in the overhead luggage compartment.

RON – Remain Overnight aircraft. If an aircraft is parked overnight at an airport, it is considered a RON aircraft. RON aircraft typically are cleaned and have maintenance performed on them while they sit.

Rotate – When the aircraft lifts off the ground.

Runner – A passenger running down the concourse to the gate at the last minute.

Runway – the long concrete "street" where aircraft take-off and land.

Runway Safety Area – The RSA is the surface surrounding the runway prepared or suitable for reducing the risk of damage to airplane in the event of an undershoot, overshoot, or excursion from the runway.

SARPs – Standards and Recommended Practices developed by ICAO to help deter and prevent acts of unlawful interference (terrorism) against civil aviation around the world.

Scarebus – Derogatory slang term for an Airbus aircraft.

Scrapped - The sad process when an aircraft is cut up into little pieces which are sent for to be recycled.

Screening Partnership Program (SPP) - This is a program that allows airports to "opt-out" of TSA provided screening and replace them with private contractors. As of September 2017, there are 22 (mostly small) airports that are participating.

Secured Area – A secured area is where aircraft operators with security programs enplane and deplane passengers and sort and load baggage and any adjacent areas that are not separated by adequate security measures, a SIDA is an area in which appropriate identification must be worn, and an AOA is an area providing access to aircraft movement and parking areas.

Secure Flight – A program designed "to strengthen the security of commercial air travel into, out of, within, and over the U.S. through the use of expanded watch list matching using risk-based security measures."

Security threat assessment (STA) – An intelligence-related check conducted by TSA that searches domestic and international government databases against information submitted by an applicant seeking authorization to perform various security functions. As of April 2017 there are approximately 2.9 million badged aviation workers in the U.S.

Segment – If you are traveling from Seattle to New York via Denver, you are flying two segments, or flights, on your journey.

SENTRI - Secure Electronic Network for Travelers Rapid Inspection.

Shower of Affection – Airport fire trucks will position on either side of an aircraft and use the water cannons to spray a stream of water in an arch over the aircraft as it taxis by. This is most commonly done on the initiation of a new route or a pilot's retirement flight.

SIDA - (Security Identification Display Area). The SIDA is the area designated by an airport operator where an ID must be displayed at all times. Most typically, this includes the ramp and other sensitive operational (secured) areas.

Silent airport – An airport where only a limited number of announcements are made over the terminal's public address system. Flight announcements, gates changes, etc. are all made via the FIDS television screens.

Skycap - These are the guys who you drop your bags with when you are checking in at the curb. You should tip them, because their salaries aren't that great as the airlines expect them to be tipped.

Slam-clicker – A flight attendant who stays in the hotel room on the road and skips the night out on the town with everyone else.

Slot – A slot is granted by an airport and allows an airline to schedule a take-off or landing during a specific time frame. Slots may be worth a lot of money at certain busy airports and can be bought, sold, or traded between airlines.

Speaker - A 'speaker' is airline lingo (at least for American Airlines) for an employee who speaks a different language, typically the predominant language of the destination for a flight. For example, the German-speaking gate agent working the flight to Frankfurt would be called the 'speaker.'

Spinner – A passenger who spins around, looking confused, while boarding and trying to find their seat. Spinners also can be observed after deplaning as they try and get their bearings in the terminal.

Spoke - A spoke airport is a smaller airport that typically feeds into a hub airport. For example, Tyler, Texas would be a spoke of the hub at Dallas/Fort Worth.

Spotter - Spotters are people who like to take photographs and/or record the tail numbers of airplanes at the airport. Harmless people who are more “avgeek” than threat. Similar to a “foamer” in rail parlance.

Squawks – An airplane’s transponder will send out responses, or squawks, from time to time that help communication with air traffic control. Squawks are numeric codes that indicate different situations. A squawk of 7500 indicates an aircraft hijacking; a squawk of 7700 is sent in an emergency situation.

Stage length – Stage length is essentially the length of an average flight for an airline or a fleet of that carrier. Typically, with longer stage lengths come reduced costs.

Standby – A person on standby status has a reservation but not a confirmed seat on the plane. They can fly once everyone else is boarded if there is still an open seat.

Station - A station is an airline's operation at any given airport.

Station Manager - The employee who is in charge of an airline's operations at a given station.

Sterile area – The sterile area is the area of an airport that provides passengers access to boarding aircraft and is an area to which access is generally controlled by TSA or a private screening entity under TSA oversight.

Stewardess - Older (politically incorrect) term for flight attendant, now considered by many to be derogatory in nature.

Super 80 – Marketing term coined by American Airlines for its DC-9-80 fleet purchased in the early 1980s.

Super – Beyond heavy is the relatively new term "super," which is used by Air Traffic Control to describe the Airbus A380 and the Antonov An-225 (a six-engined Soviet-era freighter of which only one frame exists).

Tag flight – A continuation of an international flight, or the preliminary segment of an international flight, where neither end of the flight is within the carrier's home country. Tag flights are most often operated under Fifth Freedom rights.

Tail number – The tail number is the "license plate" of the aircraft, as it is the registration number of the frame. In the U.S., these all start with N.

Tarmac – The tarmac is the ramp; the word itself comes from the "tar-penetration macadam" surfacing material, even though it is rare to find any actual tarmac at an airport.

Taxi – When an airplane is moving around the airport under its own power, without a tug or tractor.

Taxiway – An area on which aircraft can taxi when entering or departing from a runway.

Technical Standard Order (TSO) – Issued by the FAA, a Technical Standard Order (TSO) is a minimum performance standard for specified materials, parts, and appliances used on civil aircraft. When authorized to manufacture a material, part, or appliances to a TSO standard, this is referred to as TSO authorization. Receiving a TSO authorization is both design and production approval. These are in place partly to deter against fraudulent or sub-standard parts being used in commercial aircraft.

TFR – Temporary Flight Restriction. A TFR is a short-term, geographically limited airspace restriction in the U.S. There may be a TFR around the Super Bowl stadium which prohibits aircraft from flying in the area at a certain date and time, for example.

Throughput – The average number of flights that pass through an airport on a daily basis. For TSA, throughput is the average number of passengers that pass through the screening checkpoints on a daily basis.

Timetable – Increasingly rare, if not extinct, airline timetables are/were small booklets that airlines published which showed their full schedules at all stations. Timetables can now be found mostly in PDF form.

Touchdown – When the wheels hit the runway upon landing, the aircraft has touched down.

Tower – The super tall building at an airport where air traffic controllers typically sit and direct aircraft.

Transfer passenger – A passenger who arrives at one airport and then continues on another flight on a different aircraft.

Transit flight – A transit flight is a flight from Point A to Point B with a stopover at Point C, usually for refueling or cleaning of the aircraft. Some transit flights allow passengers to disembark and relax in a transit lounge, although they are not allowed into the terminal itself. Transit flights may also pick up additional passengers on the way at the stopover location. For example, Air New Zealand operates a flight from Auckland to Los Angeles that continues on to London. Passengers may disembark and stretch their legs in the transit lounge in Los Angeles,

but they do not clear U.S. Customs before they re-board the flight and head on to London; officially, they never entered the U.S. Additionally, passengers may purchase a ticket for the Los Angeles to London leg alone.

Transit passenger – A passenger who arrives at one airport and then continues on the same flight on the same aircraft.

Transport Canada – TC is the equivalent to TSA in Canada, and employs inspectors to check airlines and airports for compliance with Canadian aviation security regulations.

Trijet – An aircraft powered by three engines, also sometimes known as a "three-holer." More common "back in the day" when Boeing 727s, Lockheed L-1011s, and Douglas DC-10s were plying commercial passenger routes. Today, the only trijets you may expect to encounter at an airport are McDonnell Douglas MD-11/Fs carrying cargo and some business jets produced by French manufacturer Dassault.

Trunk Route – Basically, a trunk route is a route with high demand. Every airline has trunk routes, and some of these can be quite profitable. New York to Los Angeles would be a trunk route, while Charlotte to Richmond would not be. Dallas to Houston would be a trunk route, while Dallas to Waco would not be.

TSOC – The Transportation Security Operations Center acts as the primary coordination point for multiple agencies that oversee and respond to security-related operations, incidents and crises in aviation and transportation security.

Tug - the small little Jeep-like looking cars you see on the tarmac, usually carrying several baggage carts behind it. These are named after the company that produces them.

Turn - Flight crews will often work a 'turn,' which is basically a flight from their base and back in the same day. For example, if you were based in Los Angeles and were assigned a Houston 'turn,' that would mean you were flying from Los Angeles to Houston and then back to Los Angeles.

TRACON – Terminal Radar Approach Control is part of the air traffic control system.

Transcon – A flight across a continent; Los Angeles to Washington, Sydney to Perth.

T.S.A. – The Transportation Security Administration, the U.S. government agency responsible for ensuring civil aviation security.

UAV – Typically known as a drone, an unmanned aerial vehicle is piloted by remote control on onboard computers.

ULCC – Ultra-low cost carrier. The cheapest of the cheap.

Unaccompanied minor – A "UM" is a child, ages 5-14, who is traveling without their parent or legal guardian. The airline will look after the UM on the flight and escort them through immigration and customs, if necessary, before they are released to an adult listed on previously completed authorizations. UMs will often have a red & white striped button or badge.

Unit load device – ULDs are, typically, metal containers used to load luggage or freight onto aircraft.

Utilization – Operating hours per day per operating aircraft.

Virtual airline – A virtual airline is one that has outsourced as many operations and functions as possible, while retaining overall control of the business. In many cases, the branding of feeder or regional carriers are in reality virtual airlines: American Eagle, Delta Connection, United Express could all be considered virtual airlines in that they have outsourced nearly everything – ground handling, ticketing, marketing, flight operations, etc – to other entities.

Visa Waiver Program (VWP) – Established in 1986, the Visa Waiver Program allows nationals from the 38 VWP countries to travel to the

United States for tourism or business for up to 90 days without a visa. In return, those 38 countries must permit U.S. citizens and nationals to travel to their countries for a similar length of time without a visa for business or tourism purposes.

Wake turbulence – Turbulence that forms behind an aircraft as it passes through the air, and includes wingtip vortices and jetwash, is known as wake turbulence. Wake turbulence is most dangerous for nearby aircraft that are taking off or landing as it can lead to a sudden loss of control.

Wet Lease - A leasing arrangement where the owner of the aircraft (the lessor) leases the aircraft and at least one crew-member to another person (the lessee) for a defined period or number of flights. Please note that the FAA prohibits a foreign carrier from wet leasing to a U.S. carrier.

wfu - Withdrawn from use, term used for an aircraft that has been retired from active service.

Whale jet – The Airbus A380.

Wheels Up Time - This is the time the aircraft actually takes off.

Wide Body - A twin aisle aircraft, such as an Airbus A330/340/380 or Boeing 747, 767, 777 or 787.

Winglets – The small, tilted up bits of metal at the end of a wing. Winglets help reduce drag and increase fuel economy.

Wing-Walker – A wing-walker is a ramper who helps guide a plane in and out of the gate, making sure it doesn't bump into other planes, buildings, or ground equipment on the way.

Working the village – A flight attendant who is assigned to the economy (coach) cabin is said to be "working the village."

WX - Weather.

Yield – Yield is the revenue generated per passenger mile – the higher the better.

Zulu – Greenwich Mean Time or Universal Coordinated Time.

U.S. AIRPORTS AND CORRESPONDING CODES

ALABAMA	
Birmingham	BHM
Dothan	DHN
Huntsville	HSV
Mobile	MOB
Montgomery	MGM
ALASKA	
Anchorage	ANC
Aniak	ANI
Barrow	BRW
Bethel	BET
Cordova	CDV
Deadhorse	SCC
Dillingham	DLG
Fairbanks	FAI
Galena	GAL
Gustavus	GST
Haines	HNS
Homer	HOM
Hoonah	HNH
Juneau	JNU
Kenai	ENA
Ketchikan	KTN
King Salmon	AKN
Kodiak	ADQ
Kotzebue	OTZ
Nome	OME
Petersburg	PSG
Sitka	SIT
St. Mary's	KSM
Unalakleet	UNK
Unalaska	DUT
Valdez	VDZ
Wrangell	WRG
Yakutat	YAK

AMERICAN SAMOA	
Pago Pago	PPG
ARIZONA	
Bullhead City	IFP
Flagstaff	FLG
Grand Canyon	GCN
Mesa	AZA
Page	PGA
Peach Springs	GCW
Phoenix	PHX
Tucson	TUS
Yuma	YUM
ARKANSAS	
Fayetteville	XNA
Fort Smith	FSM
Little Rock	LIT
Texarkana	TXK
CALIFORNIA	
Arcata / Eureka	ACV
Bakersfield	BFL
Burbank	BUR
Carlsbad	CLD
Chico	CIC
Crescent City	CEC
Fresno	FAT
Long Beach	LGB
Los Angeles	LAX
Mammoth Lakes	MMH
Modesto	MOD
Monterey	MRY
Oakland	OAK
Ontario	ONT
Palm Springs	PSP
Redding	RDD
Sacramento	SMF

San Diego	SAN
San Francisco	SFO
San Jose	SJC
San Luis Obispo	SBP
Santa Ana	SNA
Santa Barbara	SBA
Santa Maria	SMX
Santa Rosa	STS
Stockton	SCK

COLORADO

Aspen	ASE
Colorado Springs	COS
Denver	DEN
Durango	DRO
Eagle	EGE
Grand Junction	GJT
Gunnison	GUC
Hayden	HDN
Montrose	MTJ

CONNECTICUT

Hartford	BDL
New Haven	HVN

FLORIDA

Daytona Beach	DAB
Fort Lauderdale	FLL
Fort Myers	RSW
Gainesville	GNV
Jacksonville	JAX
Key West	EYW
Melbourne	MLB
Miami	MIA
Orlando	MCO
Orlando Sanford	SFB
Panama City Beach	ECP
Pensacola	PNS
Punta Gorda	PGD
Sarasota / Bradenton	SRQ
St. Augustine	UST
St. Petersburg	PIE
Tallahassee	TLH
Tampa	TPA
Valparaiso	VPS
West Palm Beach	PBI

GEORGIA

Albany	ABY
Atlanta	ATL
Augusta	AGS
Brunswick	BQK
Columbus	CSG
Savannah	SAV
Valdosta	VLD

GUAM

Agana / Tamuning	GUM

HAWAII

Hilo, Hawaii	ITO
Honolulu, Oahu	HNL
Kahului, Maui	OGG
Kona, Hawaii	KOA
Kaunakakai, Maui	MKK
Lanai City, Lanai	LNY
Lihue, Kauai	LIH

IDAHO

Boise	BOI
Hailey	SUN
Idaho Falls	IDA
Lewiston	LWS
Pocatello	PIH
Twin Falls	TWF

ILLINOIS

Belleville	BLV
Bloomington	BMI
Champaign / Urbana	CMI
Chicago O'Hare	ORD
Chicago Midway	MDW
Marion	MWA
Moline	ML
Peoria	PIA
Quincy	UIN

Rockford	RFD
Springfield	SPI
INDIANA	
Evansville	EVV
Fort Wayne	FWA
Indianapolis	IND
South Bend	SBN
IOWA	
Cedar Rapids	CID
Des Moines	DSM
Dubuque	DBQ
Sioux City	SUX
Waterloo	ALO
KANSAS	
Garden City	GCK
Manhattan	MHK
Wichita	ICT
KENTUCKY	
Cincinnati/Covington	CVG
Lexington	LEX
Louisville	SDF
Owensboro	OWB
Paducah	PAH
LOUISIANA	
Alexandria	AEX
Baton Rouge	BTR
Lafayette	LFT
Lake Charles	LCH
Monroe	MLU
New Orleans	MSY
Shreveport	SHV
MAINE	
Bangor	BGR
Bar Harbor	BHB
Portland	PWM
Presque Isle	PQI
Rockland	RKD
MARYLAND	
Baltimore	BWI
Salisbury	SBY
Hagerstown	HGR
MASSACHUSETTS	
Boston	BOS
Hyannis	HYA
Nantucket	ACK
Provincetown	PVC
Vineyard Haven	MVY
Worcester	ORH
MICHIGAN	
Alpena	APN
Charlevoix	CVX
Detroit	DTW
Escanaba	ESC
Flint	FNT
Grand Rapids	GRR
Hancock / Calumet	CMX
Iron Mountain	IMT
Kalamazoo	AZO
Lansing	LAN
Marquette	MQT
Muskegon	MKG
Pellston	PLN
Saginaw	MBS
Sault Ste. Marie	CIU
Traverse City	TVC
MINNESOTA	
Bemidji	BJI
Brainerd	BRD
Duluth	DLH
Hibbing	HIB
International Falls	INL
Minneapolis	MSP
Rochester	RST
St. Cloud	STC
MISSISSIPPI	
Columbus	GTR

Gulfport / Biloxi	GPT
Hattiesburg	PIB
Jackson	JAN

MISSOURI

Columbia	COU
Joplin	JLN
Kansas City	MCI
Springfield	SGF
St. Louis	STL

MONTANA

Billings	BIL
Bozeman	BZN
Butte	BTM
Great Falls	GTF
Helena	HLN
Kalispell	FCA
Missoula	MSO

NEBRASKA

Grand Island	GRI
Kearney	EAR
Lincoln	LNK
Omaha	OMA
Scottsbluff	BFF

NEVADA

Boulder City	BLD
Elko	EKO
Las Vegas	LAS
Reno	RNO

NEW HAMPSHIRE

Lebanon	LEB
Manchester	MHT
Portsmouth	PSM

NEW JERSEY

Atlantic City	ACY
Trenton	TTN
Newark	EWR

NEW MEXICO

Albuquerque	ABQ
Farmington	FMN
Hobbs	HOB
Roswell	ROW
Santa Fe	SAF

NEW YORK

Albany	ALB
Binghamton	BGM
Buffalo	BUF
Elmira	ELM
Islip	ISP
Ithaca	ITH
New York	JFK
New York	LGA
Newburgh	SWF
Niagara Falls	IAG
Plattsburgh	PBG
Rochester	ROC
Syracuse	SYR
Watertown	ART
White Plains	HPN

NORTH CAROLINA

Asheville	AVL
Charlotte	CLT
Fayetteville	FAY
Greensboro	GSO
Greenville	PGV
Jacksonville	OAJ
New Bern	EWN
Raleigh	RDU
Wilmington	ILM

NORTH DAKOTA

Bismarck	BIS
Dickinson	DIK
Fargo	FAR
Grand Forks	GFK
Minot	MOT
Williston	ISN

NORTHERN MARIANAS ISLANDS

Saipan	SPN
Rota Island	ROP

OHIO

Akron / Canton	CAK
Cincinnati	LUK
Cleveland	CLE
Columbus	CMH
Columbus	LCK
Dayton	DAY
Toledo	TOL
Youngstown	YNG

OKLAHOMA

Lawton	LAW
Oklahoma City	OKC
Stillwater	SWO
Tulsa	TUL

OREGON

Eugene	EUG
Klamath Falls	LMT
Medford	MFR
North Bend	OTH
Portland	PDX
Redmond	RDM

PENNSYLVANIA

Allentown	ABE
Erie	ERI
Harrisburg	MDT
Latrobe	LBE
Philadelphia	PHL
Pittsburgh	PIT
State College	SCE
Wilkes-Barre/ Scranton	AVP
Williamsport	IPT

PUERTO RICO

Aguadilla	BQN
Ceiba	NRR
Ponce	PSE
San Juan Carolina	SJU
San Juan Miramar	SIG
Vieques	VQS

RHODE ISLAND

Providence	PVD
Westerly	WST

SOUTH CAROLINA

Charleston	CHS
Columbia	CAE
Florence	FLO
Greer	GSP
Hilton Head Island	HHH
Myrtle Beach	MYR

SOUTH DAKOTA

Aberdeen	ABR
Pierre	PIR
Rapid City	RAP
Sioux Falls	FSD

TENNESSEE

Bristol	TRI
Chattanooga	CHA
Knoxville	TYS
Memphis	MEM
Nashville	BNA

TEXAS

Abilene	ABI
Amarillo	AMA
Austin	AUS
Beaumont	BPT
Brownsville	BRO
College Station	CLL
Corpus Christi	CRP
Dallas Love	DAL
Dallas-Fort Worth	DFW
Del Rio	DRT
El Paso	ELP
Fort Hood/ Killeen	GRK

Fort Worth Alliance	AFW
Harlingen	HRL
Houston Intl	IAH
Houston Hobby	HOU
Laredo	LRD
Longview	GGG
Lubbock	LBB
McAllen	MFE
Midland	MAF
San Angelo	SJT
San Antonio	SAT
Tyler	TYR
Waco	ACT
Wichita Falls	SPS

U.S. VIRGIN ISLANDS

St. Thomas	STT
St. Croix	STX

UTAH

Provo	PVU
Salt Lake City	SLC
St. George	SGU
Wendover	ENV

VERMONT

Burlington	BTV

VIRGINIA

Charlottesville	CHO
Lynchburg	LYH
Newport News	PHF
Norfolk	ORF
Richmond	RIC
Roanoke	ROA
Staunton	SHD
Washington National	DCA
Washington Dulles	IAD

WASHINGTON

Bellingham	BLI
Friday Harbor	FRD
Pasco	PSC
Port Angeles	CLM
Pullman	PUW
Seattle	BFI
Seattle Tacoma	SEA
Spokane	GEG
Walla Walla	ALW
Wenatchee	EAT
Yakima	YKM

WEST VIRGINIA

Charleston	CRW
Clarksburg	CKB
Huntington	HTS
Lewisburg	LWB
Morgantown	MGW

WISCONSIN

Appleton	ATW
Eau Claire	EAU
Green Bay	GRB
La Crosse	LSE
Madison	MSN
Milwaukee	MKE
Mosinee	CWA
Rhinelander	RHI

WYOMING

Casper	CPR
Cheyenne	CYS
Cody	COD
Gillette	GCC
Jackson	JAC
Riverton	RIW
Rock Springs	RKS
Sheridan	SHR

CANADIAN AIRPORTS AND CORRESPONDING CODES

ALBERTA

Calgary	YYC
Edmonton	YEG
Fort Chipewyan	YPY
Fort McMurray	YMM
Grande Prairie	YQU
High Level	YOJ
Lethbridge	YQL
Lloydminister	YLL
Medicine Hat	YXH
Peace River	YPE
Rainbow Lake	YOP

BRITISH COLUMBIA

Abbotsford	YXX
Anahim Lake	YAA
Burns Lake	YPZ
Campbell River	YBL
Castlegar	YCG
Comox	YQQ
Courtenay	YCA
Cranbrook	YXC
Dawson Creek	YDQ
Esquimalt	YPF
Fort Nelson	YYE
Fort St John	YXJ
Gillies Bay	YGB
Kamloops	YKA
Kelowna	YLW
Klemtu	YKT
Nanaimo	YCD
Penticton	YYF
Port Alberni	YPB
Port Hardy	YZT
Powell River	YPW
Prince George	YXS
Prince Rupert	YPR
Quesnel	YQZ
Smithers	YYD
Terrace	YXT
Tofino	YAZ
Vancouver	YVR
Victoria	YWH
Victoria	YYJ
Williams Lake	YWL

MANITOBA

Berens River	YBV
Brandon	YBR
Brochet	YBT
Churchill	YYQ
Cross Lake	YCR
Dauphin	YDN
Flin Flon	YFO
Gillam	YGX
Gods Narrows	YGO
Leaf Rapids	YLR
Norway House	YNE
Oxford House	YOH
Red Sucker Lake	YRS
Ste Therese Point	YST
The Pas	YQD
Thicket Portage	YTD
Thompson	YTH
Winnipeg	YWG

NEW BRUNSWICK

Fredericton	YFC
Moncton	YQM
Saint John	YSJ
Saint Leonard	YSL

NEWFOUNDLAND & LABRADOR

Black Tickle	YBI

Cartwright	YRF
Charlottetown	YHG
Davis Inlet	YDI
Deer Lake	YDF
Fox Harbour/St Lewis	YFX
Gander	YQX
Goose Bay	YYR
Hopedale	YHO
Mary's Harbour	YMH
Nain	YDP
Port Hope Simpson	YHA
Postville	YSO
Rigolet	YRG
Saint Johns	YYT
St Anthony	YAY
Stephenville	YJT
Wabush	YWK
Williams Harbour	YWM

NOVA SCOTIA

Halifax	YHZ
Sydney	YQY
Yarmouth	YQI

NORTHWEST TERRITORY

Colville Lake	YCK
Deline	YWJ
Fort Good Hope	YGH
Fort Simpson	YFS
Fort Smith	YSM
Hay River	YHY
Holman	YHI
Inuvik	YEV
Lutselke/Snowdrift	YSG
Norman Wells	YVQ
Paulatuk	YPC
Rae Lakes	YRA
Sachs Harbour	YSY
Snare Lake	YFJ
Tuktoyaktuk	YUB
Wha Ti/Lac La Martre	YLE
Yellowknife	YZF

NUNAVUT

Arctic Bay	YAB
Arviat	YEK
Baker Lake	YBK
Cambridge Bay	YCB
Cape Dorset	YTE
Chesterfield Inlet	YCS
Clyde River	YCY
Coral Harbour	YZS
Gjoa Haven	YHK
Grise Fiord	YGZ
Hall Beach	YUX
Igloolik	YGT
Iqaluit	YFB
Kugaaruk	YBB
Kugluktuk/Coppermine	YCO
Nanisivik	YSR
Pangnirtung	YXP
Pond Inlet	YIO
Qikiqtarjuaq	YVM
Rankin Inlet	YRT
Repulse Bay	YUT
Resolute	YRB
Sanikiluaq	YSK
Taloyoak	YYH
Whale Cove	YXN

ONTARIO

Angling Lake	YAX
Attawapiskat	YAT
Big Trout	YTL
Cat Lake	YAC
Chapleau	YLD
Cornwall	YCC
Deer Lake	YVZ
Dryden	YHD
Fort Albany	YFA
Fort Frances	YAG
Fort Hope	YFH
Fort Severn	YER
Hamilton	YHM
Kapuskasing	YYU
Kenora	YQK

Kingston	YGK
Kitchener	YKF
Lansdowne House	YLH
London	YXU
Moosonee	YMO
Nakina	YQN
North Bay	YYB
North Spirit Lake	YNO
Ogoki	YOG
Opapamiska Lake	YBS
Oshawa	YOO
Ottawa	YOW
Peawanuck	YPO
Pembroke	YTA
Pickle Lake	YPL
Pikangikum	YPM
Poplar Hill	YHP
Red Lake	YRL
Sarnia	YZR
Sault Ste-Marie	YAM
Sioux Lookout	YXL
Smith Falls	YSH
St Catharines	YCM
Sudbury	YSB
Thunder Bay	YQT
Timmins	YTS
Toronto Pearson	YYZ
Toronto City Centre	YTZ
Webequie	YWP
White River	YWR
Windsor	YQG

PRINCE EDWARD ISLAND

Charlottetown	YYG

QUEBEC

Alma	YTF
Aupaluk	YPJ
Bagotville	YBG
Baie Comeau	YBC
Blanc Sablon	YBX
Bonaventure	YVB
Chevery	YHR
Chibougamau	YMT
Chisasibi	YKU
Gaspe	YGP
Havre St Pierre	YGV
Iles De La Madeleine	YGR
Inukjuak	YPH
Ivujivik	YIK
Kangiqsujuaq	YWB
Kangirsuk	YKG
Kuujjuaq	YVP
Kuujjuarapik	YGW
La Grande	YGL
La Tuque	YLQ
Mont Joli	YYY
Montreal Metro	YMQ
Montreal Trudeau	YUL
Montreal Mirabel	YMX
Natashquan	YNA
Nemiscau	YNS
Noranda/Rouyn	YUY
Pakuashipi	YIF
Port Meiner	YPN
Povungnituk	YPX
Quaqtaq	YQC
Quebec	YQB
Rimouski	YXK
Roberval	YRJ
Rouyn/Noranda	YUY
Salluit	YZG
Schefferville	YKL
Sept-Iles	YZV
Umiujag	YUD
Val-d'Or	YVO
Waskaganish	YKQ
Wemindji	YNC

SASKATCHEWAN

Hudson Bay	YHB
La Ronge	YVC
Points North Landing	YNL
Prince Albert	YPA
Regina	YQR
Saskatoon	YXE

Stony Rapids	YSF
Uranium City	YBE

YUKON TERRITORY

Dawson City	YDA
Old Crow	YOC
Whitehorse	YXY

TOP 50 MEXICAN AIRPORTS AND CORRESPONDING CODES

Acapulco	ACA	Merida	MID
Aguascalientes	AGU	Mexicali	MXL
Campeche	CPE	Mexico City	MEX
Cancun	CUN	Minatitlan/Coatzacoalcos	MTT
Chetumal	CTM	Monterrey	MTY
Chihuahua	CUU	Morelia	MLM
Ciudad del Carmen	CME	Puebla	PBC
Ciudad Juarez	CJS	Puerto Escondido	PXM
Ciudad Obregon	CEN	Puerto Vallerta	PVR
Ciudad Victoria	CVM	Querétaro	QRO
Colima	CLQ	Quetzalcóatl	NLD
Cozumel	CZM	Reynosa	REX
Culiacan	CUL	San Luis Potosi	SLP
Durango	DGO	Tampico	TAM
Guadalajara	GDL	Tapachula	TAP
Hermosillo	HMO	Tepic	TPQ
HuAnuco	HUX	Tijuana	TIJ
Ixtapa-Zihuatanejo	ZIH	Toluca	TLC
La Paz	LAP	Torreon	TRC
Leon	BJX	Tuxtla Gutierrez	TGZ
Los Cabos	SJD	Uruapan	UPN
Los Mochis	LMM	Veracruz	VER
Manzanillo	ZLO	Villahermosa	VSA
Matamoros	MAM	Xoxocotlan	OAX
Mazatlan	MZT	Zacatecas	ZCL

WORLD AIRPORTS AND CORRESPONDING CODES

Amsterdam	AMS	Melbourne	MEL
Auckland	AKL	Mexico City	MEX
Bangkok	BKK	Moscow Domodedovo	DME
Barcelona	BCN	Moscow Sheremetyevo	SVO
Beijing	PEK	Mumbai	BOM
Brisbane	BNE	Munich	MUC
Chengdu	CTU	Paris de Gaulle	CDG
Copenhagen	CPH	Paris Orly	ORY
Delhi	DEL	Rio de Janeiro	GIG
Doha	DOH	Rome	FCO
Dubai	DXB	Sao Paulo	GRU
Dublin	DUB	Seoul Incheon	ICN
Frankfurt	FRA	Shanghai Hongqiao	SHA
Guangzhou Baiyun	CAN	Shanghai Pudong	PVG
Hong Kong	HKG	Shenzhen	SZX
Istanbul Atatürk	IST	Singapore	SIN
Jakarta	CGK	Stockholm	ARN
Jeddah	JED	Sydney	SYD
Johannesburg	JNB	Taipei Taoyuan	TPE
Kuala Lumpur	KUL	Tokyo Haneda	HND
Kunming	KMG	Tokyo Narita	NRT
London Gatwick	LGW	Vienna	VIE
London Heathrow	LHR	Zurich	ZRH
Madrid	MAD		
Manchester	MAN		
Manila	MNL		

AIRCRAFT IDENTIFICATION

Now let's take a few pages to review some of the more common commercial aircraft out there today and help you get familiar with them.

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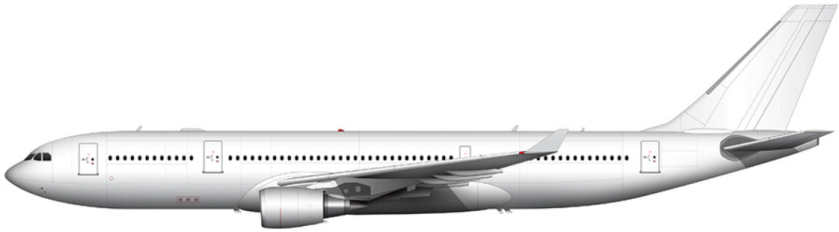
Airbus A320 Family

One of the most common narrow-body aircraft in the world is the Airbus A320 family, which includes the A318, the A319, the A320, and the A321, as seen in this photo. The easiest way to tell the difference between an A319 and an A320 is the over-wing doors; the A320 has two while the A319 just has one. The A321 is quite a bit longer than its two siblings and will have four full size doors on each side of the fuselage.

Airbus A330



The Airbus A330 is Airbus' twin-engine entry into the wide-body market. It essentially shares the same fuselage cross section with the four-engined A340.

Airbus A340

The A340 comes in two main variants; the -300 and the -600 (*top*). The -300 is known for its four small "hair-dryer" engines, while the -600 will be around forty feet longer and have much larger engines. These aircraft are rapidly being retired from commercial service.

Airbus A350

The A350 is Airbus' newest twin-engine wide-body aircraft, utilizing carbon-fibers for the fuselage and wing structures. Designed to replace the A340 and compete with the Boeing 777 and 787, the A350 entered revenue service in early 2015. The nose of the A350 is distinctive from all other Airbus commercial aircraft.

Airbus A380

The A380 is the largest passenger airline in the world, and the only frame to boast two seating decks for the entire length of the fuselage. The A380 can seat up to 853 passengers in an all economy layout, although no carrier has yet configured the aircraft in this manner yet. If you see an A380 it will assuredly be flown by a foreign carrier as no U.S. carriers operate, or have even ordered, the A380.

Did You Know? The A380 can hold 84,500 gallons of fuel.

Boeing 737

The top selling jet in aviation history, the Boeing 737 will doubtless be familiar to you, as over 9,600 have been delivered since 1967, with 14,000 total frames ordered. Nowadays, the most common variants are the -700, -800, and -900 series. Each of course is a progressively longer version. The easiest way to note the difference between a -700 and an -800 is that the -800 will have two exit doors over the wing, rather than the single door seen on the -700s. With the new 737 MAX frames you will notice the fuselage sits slightly higher, of course, the easiest difference to spot is the winglets as the MAX has a split rather than a blended winglet.

Boeing 747

Arguably the most well-known outline in commercial aviation history is that of the iconic Boeing 747. This four-engined wide-body sports an upper deck near the forward section of the fuselage and is fondly known as the "Queen of the Skies."

747s built as freighters (as seen below) will have a shorter "hump" or upper deck as compared to their passenger brothers. The freighter will also have a hinged nose, which can lift up to take on cargo through the front of the aircraft. Finally, there will be a large cargo door on the left side of the fuselage, behind the wing.

Did You Know? The Maximum Take Off Weight (MTOW) of the Boeing 747-8 is 987,000 pounds. The average weight of a male African bush elephant is 13,230 pounds, thus, 74 elephants would equal the weight of one fully loaded 747-8.

Boeing 757

The Boeing 757-200 is a mid-sized narrow body with two engines. You will notice it sits considerably higher off the ground than the 737. There are also a handful of stretched -300 variants in U.S. service with Delta and United.

Boeing 767

The Boeing 767 is a mid-sized wide-body designed for long haul routes. The -300 variant is the most common type in operation today, although both Delta and United operate a small batch of longer -400 variants.

Did You Know? The Boeing 767-300 is 21 feet longer than the original -200 variant, and the -400 is 21 feet longer than the -300.

Boeing 777

The Boeing 777 is the largest twin-jet in the world and can immediately be differentiated by the substantially larger than normal engines hanging under its wings. You can also check the landing gear to differentiate between the 767 and 777: the main gears on the 767 will have four wheels while the mains on the 777 will have six. The stretched 777-300 has essentially replaced the 747-400 as the "go to" aircraft for airlines looking for large, long haul aircraft. How can you tell a -200 and a -300 apart? The -200 will of course be shorter, with four large exit doors on each side of the fuselage, while the -300 will be 33 feet longer and have five full-size exit doors on each side of the fuselage.

Boeing 787

The first aircraft to use composite materials in the airframe, the Boeing 787 is quite similar in size to the 767 it was essentially designed to replace. How can you differentiate it with the 767? First, look at the two engines – they have a chevron pattern on the end of them. Secondly, the cockpit has four large windows and a much different nose contour. Finally, the wings are designed with a large curve to them, different than nearly all other commercial jets. Also, as 787s are made

from composite materials; you will never see any bare metal as part of its livery.

McDonnell Douglas DC-9-80 (Super 80)

The only major U.S. operator who operates the McDonnell Douglas Super 80 anymore is American Airlines, and as of this writing, they are under 100 frames left in the fleet.

The Boeing 717 is essentially a shortened MD-80, as it original started production as the MD-95 with McDonnell Douglas. Following Boeing's acquisition of McDonnell Douglas, the MD-95 was renamed the Boeing 717. Hawaiian and Delta are the main U.S. operators of the type.

McDonnell Douglas DC-10 / MD-11

One of the few "tri-jets" that remain in active service today are the McDonnell Douglas DC-10 and MD-11 frames. The main difference you will notice between the older DC-10 (pictured) and the MD-11 is that the MD-11 has winglets, while the DC-10 does not. Additionally, DC-10s and MD-11s operate today only as freighters – so you will most commonly see them with FedEx or UPS.

Embraer E175/190

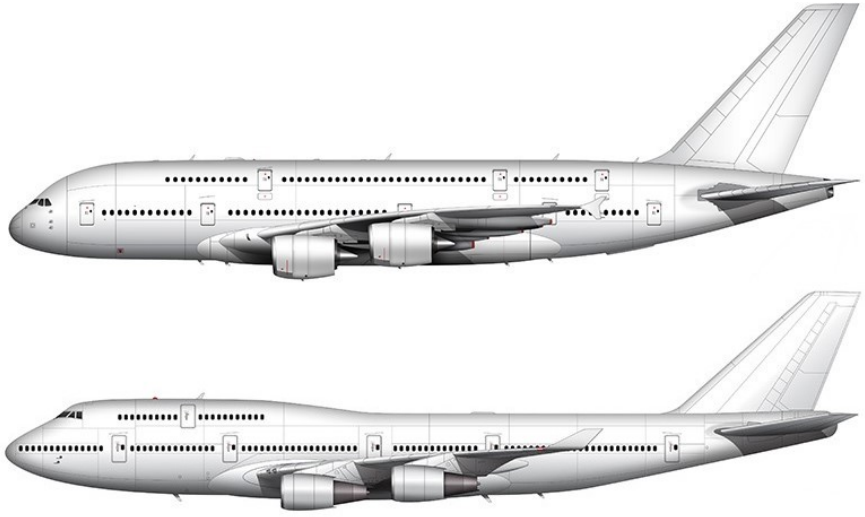
Brazil's Embraer is the manufacturer of the popular E175 and E190 series of regional jets. The E175, pictured above, is the more common variant; the E190 looks essentially the same except it has a longer fuselage.

Canadair CRJ-200/500/700/900

Another common series of regional jet are the Canadair CRJ frames. Pictured above is the CRJ700, you can easily guess that the main difference between this and the smaller CRJ200 and CRJ500s are a shortened fuselage, while CRJ900s are longer. The main difference between the CRJs and the E175/190s are that the CRJs are a "t-tail" concept while the Embraer frames are a more "traditional" style with the engines under the wings.

Remember that both the E175 and the CRJ frames will **only** be operated by regional carriers and not mainline operators. American Airlines does operate a handful of E190 frames under the mainline operation.

Comparison: Airbus A380 vs. Boeing 747

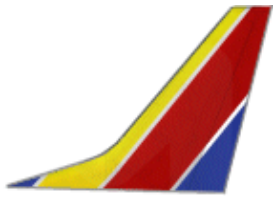


The easiest way to tell the difference between an A380 and a 747 is the fact that the A380 is a double decker for the entire length of the fuselage, whereas the 747 has a double deck only in the forward half of the fuselage.

U.S. AIRLINE TAILS

American Airlines

Delta Air Lines



Southwest Airlines

United Airlines

Alaska Airlines

Hawaiian Airlines

Spirit Airlines

Virgin America

Sun Country Airlines

JetBlue Airways

CANADIAN AND MEXICAN AIRLINE TAILS

Air Canada

WestJet *(Canada)*

AeroMexico

Interjet *(Mexico)*

Viva Aerobus (Mexico)

Volaris *(Mexico)*

SELECTED WORLD AIRLINE TAILS

Aer Lingus

Aeroflot

Air China

Air France

Air New Zealand

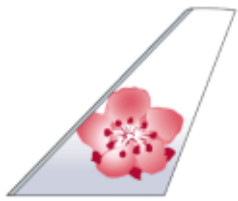
All Nippon

Asiana

Avianca

British Airways

Cathay Pacific


China Airlines

China Eastern

China Southern

Emirates

Etihad

EVA Air

Finnair

Iberia

Icelandair

Japan Airlines

KLM Royal Dutch

Korean Air

LATAM

Lufthansa

QANTAS

Qatar

Ryanair

Singapore

Turkish

Virgin Atlantic

FLIGHT LOG

DATE	FROM	TO	CARRIER	FL. NO	MILES	AIRCRAFT	TYPE	SEAT	NOTES
October 1, 2017	*DFW*	*LHR*	*British Airways*	*192*	*4,750*	*G-BNLN*	*B744*	*13A*	

NOTES

"A MASTERPIECE... AN ENCYCLOPEDIA OF AVIATION INFORMATION."

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" I did not come from industry nor did I have a background in aviation. This is simply an outstanding primer... mandatory reading."

"Required reading for new hires."