LIABILITY OF THE UNITED STATES ARISING OUT OF THE CIVILIAN USE OF THE GLOBAL POSITIONING SYSTEM

by

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ABSTRACT

As the number of civilian users of the United States Air Force's Navstar Global Positioning System (GPS) continues to increase at such a staggering rate, the government's exposure to potential liability also increases. The purpose of this thesis is to establish a legal framework to apply to GPS-related claims against the United States, primarily against the Air Force as operator of the system.

Part I consists of three chapters. Following an introductory chapter, *Chapter II* describes the system and the general characteristics of GPS. *Chapter III* outlines the military uses of the system and the increasing and evolving civilian uses.

Part II discusses the liability ramifications of providing GPS services for civilian use. *Chapter IV* provides the statutory bases for the U.S. government's traditional role in regulating civil aviation and maritime navigation. *Chapter V* analyzes the applicable domestic law under the existing statutes waiving the sovereign immunity of the United States, and *Chapter VI* looks at liability under international law. *Chapter VII* then draws some general conclusions as to how the existing law may apply to the government in regulating GPS use and operating the system itself.

RESUMÉ

Puisque l'utilisation par des civils du système Navstar Global Positioning System (GPS) ne cesse de croître à un rythme fulgurant la possibilité d'une action en responsabilité contre son propriétaire augmente également. Le but de cette thèse est d'établir les principes juridiques applicables aux actions en responsabilité intenté contre le gouvernement des États Unis d'Amérique, et principalement contre la U.S. Air Force à titre d'opérateur du système.

La première partie est divisée en trois chapitres. Suivant un chapitre d'introduction le chapitre deux décrit le système et les caractéristiques générales du GPS. Le chapitre III trace les grandes lignes des utilisations militaires du système ainsi que l'évolution des utilisations civils.

La deuxième partie traite des conséquences en responsabilité de fournir le système pour des utilisations civils. Le chapitre IV décrit les fondement législatifs pour l'implication traditionnel du gouvernement Américain dans l'aviation civil et la navigation maritime. Le chapitre V analyse les lois domestique applicable qui écarte L'immunité du gouvernement Américain. Le chapitre VI examine la responsabilité en droit internationale. Le chapitre VII tire des conclusions ayant trait à l'application des ces diverses règles juridiques pour la gestion et réglementation de ce système.

ABBREVIATIONS

A-S	Anti-Spoofing
ADF	Automatic Direction-Finding Equipment
AFSPACECOM	Air Force Space Command
AJEA	Admiralty Jurisdiction Extension Act
ANMs	Automated Notices to Mariners
ATC	Air Traffic Control
ATCs	Air Traffic Controllers
ATCM	Air Traffic Control Manual
BBS	Bulletin Board System
C/A-Code	Coarse/Acquisition Code
C4I	Command-Control-Communications-Computer-Intelligence
CAB	Civil Aeronautics Board
COPUOS	Committee on the Peaceful Uses of Outer Space
CNS/ATM	Communication, Navigation and Surveillance/Air Traffic Management
DGPS	Differential GPS
DME	Distance Measuring Equipment
DNSS	Defense Navigation Satellite System
DoD	Department of Defense
DoT	Department of Transportation
FAA	Federal Aviation Administration
FANS	Future Air Navigation System
FARs	Federal Aviation Regulations
FCA	Foreign Claims Act
FmHA	Farmers Home Administration
FHA	Federal Housing Administration
FHLBB	Federal Home Loan Bank Board
FSS	Flight Service Station
FTCA	Federal Tort Claims Act
GAs	Ground Antennas
GAO	General Accounting Office
GLONASS	Global Orbiting Navigation Satellite System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSO	Geosynchronous Orbit
IASA	Independent American Savings Association
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
INMARSAT	International Maritime Satellite Organization

INS	Inertial Navigation System
L1	Link 1
L2	Link 2
LADGPS	Local Area Differential GPS
LORAN	Long-Range Aids to Navigation
MCA	Military Claims Act
MCS	Master Control Station
MLS	Microwave Landing System
MSs	Monitor Stations
NANU	Notice Advisory to Navstar Users
NAPA	National Academy of Public Administration
NAS	National Airspace System
NAVSEG	Navigation Satellite Executive Group
NOTAMs	Notices to Airmen
NTSB	National Transportation Safety Board
P-Code	Precision Code
PPS	Precise Positioning Service
PRN	Pseudorandom Noise
PVA	Public Vessels Act
PVT	Position, Velocity and Time
RAIM	Receiver Autonomous Integrity Monitoring
SA	Selective Availability
SCATANA	Security Control of Air Traffic and Air Navigation Aids
SIAA	Suits in Admiralty Act
2SCS	Second Satellite Control Squadron
SECOR	Sequential Correlation of Range
SLAMs	Standoff Land Attack Missiles
SPS	Standard Positioning Service
STD	Standard
SVs	Space Vehicles
TACAN	Tactical Air Navigation System
UE	User Equipment
UTC	Coordinated Universal Time
VOR	VHF Omni-Directional Radio Range
WAAS	Wide Area Augmentation System
WADGPS	Wide Area Differential GPS
WGS-84	World Geodetic System 1984

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Part I: The Navstar Global Positioning System

Chapter I. Introduction

When the United States Department of Defense began development of the Navstar Global Positioning System (GPS) in the early 1970's, military planners could never have fathomed the rate at which the rest of the world would adopt GPS as its own. Designed for military use, GPS would reduce reliance on terrestrial-based navigation systems and provide precise information for navigation, targeting, and troop coordination.[1] The 1991 Gulf War demonstrated the value of GPS to military operations, with forces using GPS in areas such as targeting strategic Iraqi positions and identifying friendly troop positions in the vast desert via handheld GPS receivers. For those not already aware, the war also highlighted the obvious commercial uses of such a system -- from the precision navigation of civil aircraft and ocean vessels -- to mapping, geodesics and search and rescue operations -- and beyond to automobile and public transport navigation.[2]

GPS may realize its greatest utility with its integration into civil air traffic control (ATC) systems. GPS is expected to relieve problems faced by the existing ATC systems, strained under a current volume of traffic which is expected to grow at a rate of 5.5%

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[1] Joint Department of Defense/Department of Transportation Task Force, *The Global Positioning System: Management and Operation of a Dual Use System, A Report to the Secretaries of Defense and Transportation* (hereinafter *"Joint Task Force Report"*), December 1993, at 1.

[2] Department of the Air Force, Air Force Space Command, *Air Force Space Command Fact Sheet, Navstar Global Positioning System*, July 1995.

per annum until the year 2000 and triple by 2010.[3] By providing a navigational accuracy of less than 100 meters,[4] GPS will allow for closer spacing of en route and landing aircraft. Moreover, not only will it enable precision approaches in adverse weather conditions that would normally close an airport, GPS can provide a high accuracy/low cost capability to under-developed countries without an existing approach system.[5]

Realizing these benefits, the Council of the International Civil Aviation Organization (ICAO), on 26 October 1994, accepted an offer from the United States to make GPS available for use in international civil aviation.[6] As envisioned by the Future Air Navigation System (FANS) Committee of ICAO, GPS would be a key component of a future Global Navigation Satellite System (GNSS) that would eventually replace current long- and short-range navigational systems.[7] In addition to this use of GPS in international civil aviation, GPS use has already been planned and implemented in several U.S. domestic initiatives. For instance, the Coast Guard uses GPS in its harbor approach and navigation system and the Federal Aviation Administration has approved the use of GPS as a supplemental system in domestic and ocean navigation. By the end of the century, an augmented GPS will likely provide the primary means of navigation in the national airspace, while buyers in the market for a new car will be faced with the option of

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[3] A.A. Cocca, "The Chicago Convention and Technological Development in Air and Space" (1994) XIV, Part II *Annals of Air and Space Law* 135, at 142.

[4] Department of the Air Force, Air Force Space Command, *Air Force Space Command Fact Sheet, Navstar Global Positioning System*, July 1995.

[5] I. Lachow, "The GPS Dilemma, Balancing Military Risks and Economic Benefits" (hereinafter "The GPS Dilemma"), (Summer 1995) 20:1 *International Security* 126, at 131.

[6] ICAO Doc. SL 94/89, dated 13 December 1994.

[7] ICAO and IATA, *FANS CNS/ATM Starter Kit* (1995), §2, at 21.

a GPS receiver installed in their new vehicle. In short, the amazing proliferation of civilian use of GPS is quite unprecedented for a military satellite system.

This idea of nonmilitary uses of GPS, however, is not a new one. As early as 1981, in a notice in the Federal Register regarding the status of the Navstar GPS Satellite Navigation System, the Secretary of Defense stated:

> "The latest DoD policy concerning NAVSTAR GPS is that when the system is declared operational, the highest possible level of C/A signal accuracy will be made available to the worldwide civil/commercial community within the limits of national security considerations."[8]

In 1983, after Soviet forces shot down a Korean commercial airliner that accidentally strayed into Soviet airspace, President Reagan, in more public fashion, declared that the United States would make GPS available for international civilian use free of charge through the Department of Transportation. By 1992, less than ten years after the Reagan announcement, the number of civilian GPS users was already over forty per cent greater than the number of military users, even though its use in civil aviation was still minimal.[9] Because nonmilitary uses of GPS data cover such a broad range of activities, civilian use promises to eclipse military use by the end of the millennium.

As the United States Government, specifically through the Departments of Defense and Air Force, finds itself providing GPS services to more and more civil users, significant legal issues concerning liability of the United States as provider could arise. While much has been written lately concerning general issues of international liability and a prospective

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[8] 46 F.R. 20724 (April 7, 1981).

[9] In 1992, the estimated number of military users was 17,000, and the estimated number of civilian users was 24,000. Department of Defense and Department of Transportation, *Federal Radionavigation Plan*, 1992, at 3-41.

international legal regime for global satellite-based navigation system, little has been published concerning the liability of the U.S. under existing law, especially domestic. This thesis analyzes the liability ramifications of the U.S. government under applicable national and international law for the civil use of GPS. The following two chapters of this part, Part I, describe the system itself and its various uses. *Chapter II* provides a general description of the system, explaining how it works, its overall operation, and the specific characteristics built into the service. *Chapter III* shows the traditional military uses and the evolving civil uses.

Part II provides a basic legal framework to analyze future cases which may arise as a result of providing GPS services to civilian users. *Chapter IV* outlines the government's traditional role in regulating civil aviation and maritime navigation in the United States. *Chapter V* analyzes the applicable domestic law under the existing statutes waiving the sovereign immunity of the United States for tort claims against the government, i.e., the Federal Tort Claims Act, the Suits in Admiralty Act, and the Public Vessels Act. It does this by drawing on the existing body of caselaw concerning liability for torts committed by the government, primarily in suits involving the alleged negligence of the Federal Aviation Administration and the Coast Guard in providing traditional, terrestrial-based navigation assistance. *Chapter VI* then looks at liability under current international law, the domestic and international policy concerns surrounding GPS, and the likely international legal framework of the future. Finally, *Chapter VII* draws some general conclusions as to how the existing law may apply to the government in regulating GPS use and operating the system itself.

Chapter II. The System

The Navstar Global Positioning System (GPS) program began in 1973 when the United States Air Force, Army, Navy, Marine Corps and Defense Mapping Agency combined technical resources to provide a highly accurate, space-based radionavigation system.[10] Developed to exploit the benefits that a space-based radiopositioning and time-transfer system had over existing terrestrial-based systems, GPS could provide position, velocity and time (PVT) information to properly equipped users anywhere in the world or in space with a precision of accuracy never before enjoyed. As a universal positioning system, GPS possessed several mission-enhancing characteristics not found in existing navigation systems and equipment. These include:

- Extremely accurate three-dimensional PVT determination.
- A world-wide common grid easily converted to other local datum.
- Passive, all-weather operation.
- Real-time and continuous information.
- Increased survivability in a hostile environment.[11]

The following discusses in detail how GPS does this.

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[10] Prior to the GPS program, three services were developing separate navigation systems programs: the Navy began work on "TRANSIT" in 1959 and "Timation" in 1964. The Air Force designated its system "621B" in 1963. At about the same time, the Army was developing "SECOR" (Sequential Correlation of Range). In 1968, the Department of Defense (DoD) established a tri-service steering committee called NAVSEG (Navigation Satellite Executive Group) to coordinate the efforts. In 1973, DoD designated the Air Force as the lead agency to consolidate the various concepts into a single comprehensive DoD system, known as Defense Navigation Satellite System (DNSS). For a complete history of the GPS program, see S. Pace, *et al.*, *The Global Positioning System, Assessing National Policies* (hereinafter "*RAND Study*"), (Santa Monica, CA: RAND, MR-614-OSTP, 1995), at Appendix B; and ARINC Research Corporation, *GPS NAVSTAR User's Overview*, Fifth Ed. (hereinafter "*GPS NAVSTAR User's Overview*"), (Los Angeles, YEE-82-009D, 1991), at 14-24.

[11] *GPS NAVSTAR User's Overview*, supra note 10, at 6.

A. The Concept of Navigation by Satellite

Capturing radio transmissions emitted from a satellite in space to determine a position on the ground is not a new idea nor novel to the concept of GPS. Soon after the first satellite was launched in 1957, scientists and engineers began using a procedure which determined a ground position by measuring the Doppler shift of radio signals emitted from an overhead satellite.[12] Unfortunately, the technique of employing the Doppler shift required expensive ground equipment in addition to requiring subsequent readings from two separate satellite passes overhead. This latter requirement resulted in over a 100 minute wait before an accurate position could be given. Thus, the technique proved useful for something like land surveying, but could not provide the real time positioning and navigational data a pilot needed to instantaneously determine his or her exact location while in flight.

The Air Force's response was a system based on "ranging," the basic concept behind GPS.[13] Rather than using the Doppler shift in radio frequencies, ranging uses the measurements of distances to several on-orbit satellites. Thomas Herring[14] provides an excellent explanation of the concept as follows:

> Suppose, for example, one is able to ascertain that a particular satellite is 20,000 kilometers away. Then the person's position must be somewhere on a huge sphere 20,000 kilometers in radius (40,000 kilometers in diameter) that surrounds the satellite. Because satellites travel in

[12] The United States Navy's "Transit" satellite positioning system developed in the 1960's used the Doppler shift technique. The following discussion is taken predominantly from T.A. Herring, "The Global Positioning System" (February 1996) *Scientific American* 44, at 46.

[13] Also known as "time of arrival ranging." *GPS NAVSTAR User's Overview*, supra note 10, at 28.

[14] Supra, note 12.

> stable, predictable orbits, the location of the satellite, and the imaginary sphere surrounding it, is known exactly.
>
> If at the same instant that the first range is taken the person can also measure the distance to a second satellite, a second "sphere of position" can be determined. A third range to a third satellite gives a third sphere, and so forth. In general, there will be few places where all the spheres meet. For example, two spheres can intersect along a circle; three spheres can coincide only at two points. Because one of these points typically represents an unreasonable solution to the navigation problem (it may be deep within the earth or far out in space), three satellite ranges are sufficient to give one's exact position.[15]

Acquiring the range measurements necessary to determine the spheres of position requires no more than the simple process of transmission and reception. One way to do this is to transmit a radio pulse from the ground to a satellite and back again to measure the distance. However, such a technique would require identifiable radar bursts, thus compromising the location of the soldier, sailor or airman emitting the signal. Instead, a more passive method of measuring distance was employed. A GPS receiver will generate a set of codes (also known as pseudorandom sequences) identical to those being transmitted by the GPS satellite constellation. The receiver has the ability to calculate the time delay between its codes and the codes received from the satellites by determining how far it has to shift its own codes to match the satellites' codes. The time delay is then multiplied by the speed of light to find the distance from the receiver to the satellite. The

[15] *Id.*, at 46.

receiver repeats this process using three other satellites to determine its three-dimensional position, or the intersection point of the spheres of position described above.[16]

B. General System Description

GPS consists of three separate elements: a space segment, a control segment and a user segment.[17]

The Space Segment. The space segment consists of a constellation of twenty-four NAVSTAR satellites in six orbital planes. The satellites orbit at an altitude of 20,200 kilometers (10,900 nautical miles)[18] at an inclination of 55° with respect to the equator. Each satellite passes over the same location over the earth approximately once every day (every 23 hours and 56 minutes). The spacing of the satellites in their orbital planes is such that a minimum of five are in view everywhere on or near the surface of the Earth at any given time. The satellites broadcast a pair of L-band radio frequency signals, known as Link 1 (L1) and Link 2 (L2). The L1 signal carries both the precision ranging code and

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[16] "The GPS Dilemma," supra note 5, at 128. As the previous discussion on the "spheres of position" shows, a GPS receiver could calculate its three-dimensional position using three satellites. However, a fourth is used in practice because of the timing offset between the clocks in a receiver and in the satellites.

[17] Unless otherwise noted, the following system specification data is taken from *GPS NAVSTAR User's Overview*, supra note 10, at 6-8, with updated information from *RAND Study*, supra note 10, at Appendix A.

[18] Like with all decisions concerning space-bound hardware, military designers were faced with the choice of placing the satellites in either a low-orbit or geosynchronous orbit (GSO) 36,000 kilometers above the equator. Low orbit satellites, of course, would cost relatively little per launch and demand only modest power from satellite transmitters. However, the reliance on low orbit satellites would necessitate hundreds of separate satellites to provide global coverage. On the other hand, a constellation in a GSO would require far fewer satellites, but each would require a more powerful transmitter with its greater commensurate costs. Also, signals from a GSO would still have difficulty reaching the polar regions, areas undoubtedly considered necessary to military operations. The 20,200 kilometer altitude ultimately decided upon was a compromise solution. At that altitude, 17 satellites would be sufficient to ensure that at least four would always be available for positioning from any location on the Earth. Herring, supra note 12, at 48.

the coarse/acquisition code (both described in more detail below), while the L2 signal carries only the precision ranging code. It is on these codes that the navigation message data is superimposed, along with satellite clock and ephemeris parameters, satellite signal health data, and Coordinated Universal Time (UTC) synchronization information.

There are several types of GPS satellites currently in use, all built by Rockwell International. The first ones, known as Block I space vehicles (SVs), were launched from Vandenberg Air Force Base, California, between 1978 and 1985.[19] Beginning in 1989, the Air Force began replacing the Block I SVs with the launch of the first Block II SV from Cape Canaveral, Florida. The improvements made in the Block II SVs included radiation hardened electronics, increased capacity to store 180 days of navigation data compared to only a little more than three days with the Block I SVs, and an automatic detection mechanism for certain error conditions.[20] Twenty-one additional replenishment satellites, the Block IIR SVs, are currently being built by Lockheed Martin Astro Space and are scheduled for delivery through the fall of 2000. Improving on the Block II SVs, Block IIR SVs will have the capability to autonomously navigate themselves and generate their own navigation message data. Should the satellite be cut off from the ground control segment, these upgrades will enable the Block IIR SVs to autonomously maintain full accuracy for at least 180 days without ground control support. The Block IIR SVs also feature more protection from high nuclear and radiation levels, increased operational flexibility using redundant hardware and reprogrammable software for on-board tasks now

[19] The very first NAVSTAR GPS satellite, a refurbished Navy Timation satellite, was launched on 14 July 1974. However, these satellites were not part of the operational constellation and were used for concept validation purposes only. *RAND Study*, supra note 10, at 262.

[20] *GPS NAVSTAR User's Overview*, supra note 10, at 44-46.

performed by ground controllers, and reduced susceptibility to intentional and unintentional interference with new designs of antennas that are more jam-resistant.[21] Finally, the next generation of follow-on satellites planned, the Block IIF SVs, are scheduled to begin replacing the Block IIR SVs in about ten years.[22]

The Control Segment. The control segment consists of a Master Control Station (MCS) and a number of Monitor Stations (MSs) and Ground Antennas (GAs) around the world. The MCS is located at the Consolidated Space Operations Center, Falcon Air Force Base, Colorado, and is manned 24 hours per day, 7 days per week by Air Force Space Command's (AFSPACECOM's) Second Satellite Control Squadron (2SCS). There are a total of five MSs, one located at Falcon and the others on Hawaii, Ascension, Diego Garcia, and Kwajalein. The MSs are unmanned stations and operate via remote control of the MCS. The MSs track the satellites within view (up to 11 satellites simultaneously) and send the raw pseudorange measurements and navigational data to the MCS for processing in real time. There are three GAs co-located with the MSs on Ascension, Diego Garcia and Kwajalein. Like the MSs, the GAs are unmanned and operate under remote control of the MCS. The function of the GAs is to provide the ground side of the control-space interface and enable the MCS to command and control the orbiting satellites. Finally, there is also a Pre-launch Compatibility Station at Cape Canaveral, Florida, used primarily to check out the satellite space vehicles prior to launch,

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[21] "New GPS 2R Satellites to Operate Autonomously," (October 9, 1995) *Aviation Week & Space Technology*, at 54.

[22] As of 1995, the publication date of the *RAND Study*, supra note 10, at 219.

which can also be used as a backup GA in the event an overseas GA becomes inoperable.[23]

The Second Satellite Control Squadron (2SCS) is responsible for all activities required to support the constellation of satellites and network of communications connecting the MCS to the other control segment sites. These activities include:

- using the GAs and the control-space interface to monitor the state-of-health of satellite subsystems,
- performing necessary satellite housekeeping and maintenance tasks,
- resolving any satellite anomalies or detected aberrations in the space to user signal,
- controlling selective availability (SA) and anti-spoofing (A-S) (discussed later),
- activating spare satellites,
- keeping the satellites in their proper orbital positions, and
- using the MSs to monitor the proper functioning of the L-band signal in space from each satellite.[24]

Needless to say, how the 2SCS accomplishes the above tasks involves highly technical and complex processes. Basically, the 2SCS accomplishes its day-to-day control function by continuously tracking the satellites and providing periodic updates to their ephemeris constants and clock-bias errors. The satellites' signals are received by the MSs (except the Hawaiian MS which does not have a GA). Because the locations of the MSs are known with a great degree of accuracy and each MS is equipped with a cesium atomic clock, the pseudorange measurements read by each station for any given satellite can be

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[23] *GPS NAVSTAR User's Overview*, supra note 10, at 48.

[24] *Id.*, at 50.

combined to create an inverted navigation solution to fix the exact location and time of that particular satellite. The measurements are received by the MCS from the MSs and are processed to determine each satellite's ephemeris and timing errors. The MCS then corrects the errors by uploading new data to the satellites via the GAs, which is generally required about once per day.[25]

In the event of a scheduled or unscheduled outage in the system, and to keep users updated on the overall status of the GPS constellation, the 2SCS uses an electronic bulletin board system (BBS) and a Notice Advisory to Navstar Users (NANU) system. Current procedures require that 2SCS notify the FAA and Coast Guard Navigation Center of system outages, who in turn issue Notices to Airmen (NOTAMs) and Automated Notices to Mariners (ANMs).[26]

The User Segment. The user segment consists of a variety of user equipment (UE) sets and associated support equipment. There are many different types of UE sets, their design depending on the particular military or civil application. For instance, within the Department of Defense, there are over two dozen different UE sets for various mission applications.[27]

All UE sets, irrespective of the type, must perform certain basic functions in order to provide accurate position, velocity and time data from the GPS constellation. The basic UE set must have:

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[25] *RAND Study*, supra note 10, at 222-223. For a more detailed description of this process, see *GPS NAVSTAR User's Overview*, supra note 10, at 50.

[26] *GPS NAVSTAR User's Overview*, supra note 10, at 54.

[27] *Id.*, at 110-132.

•an L-band antenna to interface with the satellite-broadcast signal in space.

•a phase modulation (PM) radio receiver (also called the GPS receiver) to track the pseudorandom noise (PRN) ranging codes on one or both of the L-band (L1 or L2) radiofrequency carrier waves, generate pseudorange measurements, and demodulate the 50 Hz navigation message data.

•a data processor to resolve the positioning solution and control the operation of the GPS receiver.

•a method of communicating the processed position, velocity and time data to the user either through a control display unit or some combination of digital/analog input-output interfaces.[28]

In the most basic terms, UE enables a GPS user to passively read and interface with the satellite broadcasting the navigation data to determine three dimensional position, time and velocity.

C. Precise Versus Standard Positioning Services

User accuracy requirements of the Global Positioning System fall into two basic categories, requiring the provision of two different services, the Precise Positioning Service (PPS) and the Standard Positioning Service (SPS). The PPS is for users who require a real-time, military-level of accuracy, while SPS provides less accurate position, velocity and time data. Functionally, the PPS and SPS are virtually identical. The essential difference between the two is the level of accuracy that can be achieved.[29]

The PPS and SPS are based on two separate codes transmitted from the GPS satellites. The Precision or P-code transmission is designed for authorized users such as U.S. military forces, allied military forces, and certain civilian organizations and

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[28] *Id.*, at 52.

[29] *Id.*, at 8.

companies. The P-code is encrypted and can only be accessed by a receiver which contains a deciphering chip controlled by the Department of Defense. This prevents unauthorized users from acquiring the P-code and ensures the military advantage provided by the PPS remains with the United States and its allies. The PPS provides an accuracy level of 21 meters horizontally and 29 meters vertically.[30]

The Coarse/Acquisition or C/A-code is generally less accurate, easier to acquire, and easier to jam than the P-code. Without intentional modification, the C/A-code provides a level of accuracy very close to that of the P-code, 20-30 meters horizontally. Based on national security interests, DoD introduced a feature called "selective availability"[31] that submits an artificial error into the C/A-code to make it less accurate. An additional chip, like the deciphering chip that controls access to the P-code, is added to military receivers to adjust for the artificial error intentionally introduced. Receivers designed for civil use do not have this controlled chip. As a result, the accuracy level of the SPS is approximately 100 meters horizontally and 140 meters vertically.[32] More specifically, in accordance with standards established in the Federal Radionavigation Plan,[33] SPS provides navigation data and time signals in accordance with the following

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[30] "The GPS Dilemma," supra note 5, at 128.

[31] Described in more detail below in the following section.

[32] "The GPS Dilemma," supra note 5, at 129.

[33] The current Federal Radionavigation Plan was published in 1994. Department of Defense and Department of Transportation, *Federal Radionavigation Plan*, 1994. See also, Department of Defense and Department of Transportation, *Memorandum of Agreement between the Department of Defense (DoD) and the Federal Aviation Administration (FAA): Use of the Global Positioning System and the National Airspace System (NAS)*, May 15, 1992, at Attachment 1; and Department of Transportation, Federal Aviation Administration, *U.S. National Standard for the Global Positioning System Standard Positioning Service*, DOT 6880.1, August 16, 1993, at Appendix 1.

specifications:

> on GPS frequency L1, 1575.42 MHz, on a continuous basis;
>
> with daily horizontal positioning accuracy for any position worldwide will be 100 meters or better 95% of the time, and 300 meters or better 99.99% of the time;
>
> with daily vertical positioning accuracy will be 156 meters[34] or better 95% of the time and 500 meters or better 99.99% of the time;
>
> with a time accuracy within 300 nanoseconds[35] of Universal Coordinated Time (UTC) 95% of the time and 900 nanoseconds 99.99% of the time;
>
> with no ambiguity in position information; and
>
> with unlimited user capacity.

D. Selective Availability

Because DoD anticipated the civilian use of GPS, at least in the coarse/acquisition fashion, military planners were faced with the question of how to allow civilian access without jeopardizing the tactical advantage the GPS system provided the military. During testing in the 1970's, it was discovered that the C/A-code provided much better accuracy than expected, 20-30 meters horizontally rather than 100 meters. Because this was essentially identical to the accuracy provided by the P-code, the national policy regarding the availability of GPS to the public had to be reassessed.[36]

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[34] The standard listed by the FAA for aviation users is 140 meters. Department of Transportation, Federal Aviation Administration, *U.S. National Standard for the Global Positioning System Standard Positioning Service*, DOT 6880.1, August 16, 1993, at Appendix 1.

[35] The standard listed by the FAA for aviation users is 340 nanoseconds. *Id.*.

[36] *RAND Study*, supra note 10, at 222.

The DoD resolved this issue by limiting the accuracy of the C/A-code with a procedure called "selective availability." Generally, errors are introduced into the atomic clocks of each satellite in a process called "dithering." Because of this dithering, incorrect information is transmitted to unauthorized users concerning exactly when a satellite has sent its signal. More specifically, the errors transmitted have components that vary both rapidly and slowly over time. The dithered satellite transmission introduces errors into the user equivalent range error. Further errors are introduced into the satellite's orbital parameters which of course is part of the navigational message data read by the receiver. Because the errors misrepresent the position of a given satellite, the user's equivalent range error is increased.[37] In quantifiable terms, accuracy goes from 20-30 meters to 100 meters.

E. Differential GPS

Scientists and engineers outside the Defense Department took little time to circumvent the limitations imposed by selective availability. They accomplished this through a technique known as differential GPS (DGPS). The first demonstration of DPGS was conducted by members of the Massachusetts Institute of Technology during the fall of 1980.[38]

To correct the artificial bias errors introduced into the atomic clocks of the satellite constellation, scientists employed a fixed point on the ground to measure distance, a sort of "satellite on the ground." From this fixed point, signals from several satellites in view

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[37] *Id.*.

[38] Herring, supra note 12, at 49.

could be measured. Since the exact locations of the receiving antenna and the satellites were then known, scientists could easily compare the site's known position with the position measured by the GPS SPS. The difference in the two numbers represented the artificial error in the satellite clock and any inaccuracy in the clock used by the receiving equipment on the ground. By reading several satellites simultaneously, the clock error on the ground could be ascertained, allowing the clock error of the satellite to be calculated.[39] This information would then be transmitted to those subscribing to the DGPS system. The resulting accuracies range from one to five meters, which is equal to or better than those obtained through PPS.

DGPS does have some limitations. Even though it has been very successful in thwarting the degradation imposed by selective availability, the accuracy of DGPS positioning depends on a variety of factors. These include the user's range from the fixed ground station, the timeliness of the corrections made by the DGPS station, the geometry of the satellites and the user's equipment. Further, both the user receiver and the DGPS ground station must be reading the same set of satellites. This limits the range of differential GPS corrections to approximately 500 to 600 kilometers.[40] Finally, there is a problem of interference and allocation of the many frequencies needed for the operation of a DGPS station.

One solution to the 500-600 kilometer range limitation of DGPS mentioned above is to employ a technique known as wide area DGPS (WADGPS). Further building on the DGPS concept of using a fixed ground station, WADGPS employs several local DGPS

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[39] *Id.*, at 49-50.

[40] "The GPS Dilemma," supra note 5, at 129.

stations that are linked to a central facility. The local DGPS stations calculate corrections for their areas which are sent on to the central facility. The central facility uplinks the corrections to a separate constellation of satellites, which then broadcast the corrections to those users within range of any local DGPS reference station. Because the corrections are received from a satellite rather than a ground station, a user can travel much longer distances without losing the corrected DGPS signal.[41]

A prime example of a WADGPS is one currently planned by the Federal Aviation Administration (FAA). The FAA is planning to use International Maritime Satellite Organization (INMARSAT) satellites to transmit DGPS corrections across North American airspace in a program called the Wide Area Augmentation System (WAAS). According to the FAA, the WAAS will fill a gap for users requiring more than basic SPS but not within range of local DGPS service. Presently, WAAS plans call for a network of twenty-four local reference stations, two master stations, and two satellite uplink sites as well as three geostationary orbit satellites broadcasting L1-type signals.[42] The FAA sees WAAS as the answer to what most believe is an outmoded air traffic control system. In particular, WAAS will allow for the cancellation of an extremely costly microwave landing system (MLS) program not yet implemented. The airlines support the WAAS proposal, citing cost savings through more efficient routing, shorter flight times, fuel savings, and

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[41] *Id.*, at 130.

[42] Department of Transportation, Federal Aviation Administration, *Wide Area Augmentation System Request for Proposal*, DTFA01-94-R-21474, June 8, 1994. According to a subsequent report published in September 1994 by the General Accounting Office, the FAA estimates that the number of local reference stations should not exceed 33, master control stations should not exceed 6, and GSO satellites should not exceed 9. See, General Accounting Office, *Global Positioning Technology: Opportunities for Greater Federal Agency Joint Development and Use*, GAO/RCED-94-280, September 1994, at 22.

all-weather operations.[43]

While WAAS is the most sophisticated plan to employ DGPS, other U.S. government agencies are building augmented systems based on the SPS. According to the General Accounting Office, nine federal agencies (including the FAA) presently own or are planning to build DGPS reference stations.[44] They are the Coast Guard, the Environmental Protection Agency, the Bureau of Land Management, the Forestry Service, the U.S. Geological Survey, the St. Lawrence Seaway Development Corporation, the National Oceanic and Atmospheric Administration, and the Army Corps of Engineers. The FAA, Coast Guard and Army Corps of Engineers are primarily interested in navigation applications, while the others are more concerned with surveying and mapping.

The Coast Guard's planned use of GPS for navigation is particularly noteworthy. Like the FAA, the Coast Guard's interest is in navigation, but for maritime navigation along the coast of the United States and in the Great Lakes. Presently, the Coast Guard is establishing an network of approximately 50 DGPS stations along the U.S. coastline, the Great Lakes, Puerto Rico, Alaska and Hawaii. Expected to be completed in 1996, the differential corrections will be broadcast on Coast Guard marine radio frequencies. The corrections should improve position accuracies to as little as 1.5 meters up to a distance of 250 nautical miles from an individual radio beacon.[45] A future proposal to combine this

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[43] General Accounting Office, *National Airspace System, Assessment of FAA's Efforts to Augment the Global Positioning System*, Statement of Kenneth Mead before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, U.S. House of Representatives, GAO/T-RCED-95-219, June 8, 1995, at 4.

[44] General Accounting Office, *Global Positioning Technologies: Opportunities for Greater Federal Agency Joint Development and Use*, GAO/RCED-94-280, September 1994, at 4-5.

[45] *RAND Study*, supra note 10, at 135, citing from Department of Transportation, U.S. Coast Guard, *U.S. Coast Guard GPS Implementation Plan*, June 1994.

network with one operated by the Army Corps of Engineers along the Mississippi and Ohio River valleys is expected to meet the demanding accuracy requirements needed to navigate the inland waterways of the United States.[46]

F. GLONASS and Other Navigational Systems

This section discusses the other existing satellite navigation system comparable to GPS, then compares GPS with the accuracy levels of existing navigation systems.

GLONASS. The global orbiting navigation satellite system (GLONASS) is the Russian version of the United State's GPS.[47] Development of the system began about two decades ago in the former Soviet Union, and the system consists of twenty-one operational satellites and three spares. Like GPS, the Russians define GLONASS in three main components, a space, ground and user segment. The space segment satellites orbit at 19,100 kilometers in three orbital planes, eight satellites per plane at a 64.8 degree inclination. The orbit period is 11 hours and 15 minutes. The latest GLONASS space vehicle, the GLONASS-M Block 1 satellite, is expected to have a planned life of over five years, up from three or so years for the current generation. Satellites are launched from the Baikonur space center aboard PROTON rockets.

GLONASS has two radionavigation channels, the standard accuracy channel and the high accuracy channel. The standard accuracy channel is available to all users and has

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[46] *Id.*.

[47] Unless otherwise noted, the following discussion of GLONASS was taken predominantly from ICAO and IATA, *FANS CNS/ATM Starter Kit* (1995), Appendices.

an advertised accuracy of 60 meters horizontally and 70 meters vertically. The high accuracy channel is reserved for military use.

Like GPS, GLONASS was designed to operate with 24 satellites and serve both military and civil users. However, the GPS constellation is distributed in six orbits while the GLONASS satellites are in three. The higher inclination of GLONASS satellites (64.8 degrees versus 55 degrees for GPS satellites) gives it better accuracy at higher latitudes, but GPS provides better equatorial coverage. GLONASS provides better accuracy in the standard mode (60 to 70 meters accuracy versus 100 meters for GPS) and does not employ selective availability like GPS. Unlike the GPS civil user segment, the GLONASS civil user segment is not well developed, with relatively few receiver manufacturers in the former Soviet Union.[48] Most of the existing receivers were designed for specific military purposes and are too large and heavy to have useful civil applications.

Comparison with other positioning/navigation systems. GPS, like GLONASS, provides three-dimensional positioning, both horizontally and vertically. Current navigational systems, on the other hand, provide only horizontal positioning (i.e., two

[48] "GLONASS Nears Full Operation," (October 9, 1995) *Aviation Week & Space Technology*, at 52.

dimensional), and at an accuracy much less than that provided by GPS. The following chart[49] shows some comparisons:

System	Position Accuracy
GPS/PPS	8 m
GPS/SPS	40 m
LORAN-C*	180 m
Omega	2,200 m
STD INS**	1,500 m
TACAN***	400 m
Transit	200 m

NOTES: *(Long-Range Aids to Navigation) Range of operation is U.S. coast, most of continental U.S. and selected overseas areas.
**(Standard Inertial Navigation System) Maximum accuracy after first hour.
***(Tactical Air Navigation System) Range of operation is line of sight.

The LORAN-C and Omega systems are terrestrial-based systems with transmitting stations located around the world. The U.S. Coast Guard maintains overall control of

[49] The figures are taken from *GPS NAVSTAR User's Overview*, supra note 10, at 9. The accuracy values are given in terms of circular error probable, which is defined as the radius of a horizontal circle containing 50% of all possible position fixes.

these systems, except for LORAN-C stations in the Far East, Northern Europe and the Mediterranean, which have recently been turned over to their respective hosts when the requirement for LORAN-C was terminated in 1994.[50] A series of bilateral agreements between the U.S. and host countries govern the operation of LORAN-C and Omega, and a significant number of state aeronautical authorities have certified these systems for use in their airspace and over international waters.[51]

Chapter III. The Users

Users of GPS fall into two overall categories: military and civilian. The P-code or PPS is the service normally associated with military use, while the C/A-code or SPS is designated the civilian service. This chapter discusses the various military and civilian applications of GPS.

A. Military Uses

Prior to the nineteenth century, a nation's military power was defined predominantly by the size and equipment of its standing ground forces. With few exceptions, notably the American revolution against the British, the larger and better-equipped Army would prevail in any military conflict. The nineteenth century, however, saw sea power emerge as a more dominant force in defining a state's military power. In the twentieth century, the emergence of air power came to define military prowess and

[50] See Department of Defense and Department of Transportation, *Federal Radionavigation Plan*, 1994.

[51] *Id.*, at 3-13.

strength. It is not surprising then that some view space as the next military highground for defining a nation's power in the twenty-first century.[52]

Recognizing the above, GPS has already become an integral component of U.S. military forces and some of its allies, proving itself as a significant force multiplier for all the services. GPS provides navigation for aircraft, ships, land vehicles, troops, missiles and munitions, in addition to providing highly accurate targeting information. Because a GPS position is referenced to a common coordinate grid, all aspects of joint and coalition operations are improved with better battlefield management and command-control-communications-computer-intelligence (C4I) operations. In essence, GPS reduced what Clausewitz referred to as the fog and friction of war, something every commander and military force must do to be successful in battle. The following list shows the breadth of GPS applications to military operations:

- •Enroute Navigation
- •Low-Level Navigation
- •Nonprecision Approach
- •Target Acquisition
- •Missile Guidance
- •Command and Control
- •All-Weather Air Drop
- •Precision Survey
- •Rendezvous
- •Coordinate Bombing
- •Remotely Piloted Vehicle Operations
- •Search and Rescue
- •Photoreconnaissance
- •Range Instrumentation
- •Space Navigation
- •Mine Emplacement and Countermeasure

[52] According former Air Force Chief of Staff General Merrill McPeak, space assets will be the primary measure of a nation's strength in the next century. J.T. Correll, "Slipping in Space" (October 1993) 76 *Air Force Magazine*, at 2.

•Time Synchronization •Sensor Placement[53]

As the above shows, there are a myriad of military applications of GPS. Generally however, it is useful to categorize them in four broad areas of operations: air, ground, sea and joint operations.

1. Air Operations

GPS can improve the guidance capabilities of both aircraft and missiles. By using PPS, and to a lesser extent SPS, aircraft can reduce flight time and fuel consumption during enroute, terminal and approach navigation. The benefits here are the same as for civil aviation. However, it is missile delivery and bombing accuracy in combat-related applications that makes GPS indispensable to military operations. Because PPS minimizes self-location errors to virtually zero, aircraft can determine strategic and tactical target points more accurately to significantly reduce collateral damage. In addition, a small GPS receiver can be placed aboard a conventional weapon to create a so-called "smart bomb" or "smart munition" that can guide itself to a target with tremendous accuracy.[54] A recent study has reported that if GPS information is combined with sophisticated radars and targeting algorithms that can compensate for ballistic errors and wind effects, bomb accuracy can begin to approach 10 meters or less, which is the accuracy level of precision-guided weapons.[55]

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[53] *GPS NAVSTAR User's Overview*, supra note 10, at 11.

[54] "The GPS Dilemma," supra note 5, at 134.

[55] *RAND Study*, supra note 10, at 58.

The benefits of GPS to allied military forces, of course, translate to risks when employed by hostile forces. Of particular concern to the United States and its allies is the application of GPS in guiding ballistic missiles. The proliferation of ballistic missiles in developing countries, coupled with the proliferation of GPS technology, means an obvious increase in the threat to national security. Recent figures show that the application of GPS technology in short- to medium-range ballistic missiles will increase their accuracy 20 to 25 percent.[56] Long-range ballistic missiles can achieve an even greater accuracy with GPS than short- and medium-range missiles since GPS can correct two types of errors: downrange errors caused by velocity measurement uncertainties and errors caused by initial azimuth alignment uncertainties at the launch site.[57]

2. Ground Operations

Like with air operations, PPS[58] provides similar advantages to ground operations and land forces. GPS allows ground troops to better answer the three basic questions of land operations: where am I now, where am I going, and how do I get there? Because GPS enhances self-location accuracy (the "where am I now?" question), artillery, rocket launchers and mobile missiles become that much more effective once the point of launch is known exactly. Real-time self-location accuracy can also reduce unintentional attacks on

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[56] *Id.*, at 63. The *RAND Study* examined the Scud B, developed in the former Soviet Union, and the No Dong 1, developed by North Korea. The Scud B is considered a short-range missile with a nominal range of 300 kilometers. It can deliver a 1000 kilogram payload with an accuracy of 500 to 1000 meters. The No Dong 1 is a medium-range missile with a longer range but poorer accuracy.

[57] *Id.*, at 64.

[58] Even though SPS is also accessible to military forces, and has been used in the past, PPS is generally associated as the service used by the military. As an example of the former point, it has been widely published that during the Gulf War, the Department of Defense, because of a shortage of receivers capable of reading the PPS signal, purchased receivers on the commercial market and used SPS.

friendly forces, also known as fratricide, since troops can instantaneously report their location using C4I capabilities. Not only can troops better determine where they are using GPS satellite signals, they do so passively without compromising their position to an enemy.

Next, ground troops can benefit from PPS for navigational purposes (the "how do I get there?" question) just as airborne platforms do. The speed at which mechanized troops maneuver in the modern age makes GPS invaluable for battlefield navigation. As the Gulf War demonstrated, GPS allowed troops to navigate in an environment virtually devoid of any unique natural features. Such a terrain would have made navigation based on traditional terrestrial methods difficult if not impossible. In fact, Army and Marine troops used GPS to navigate through the desert during some of the worst sandstorms in the area's history.[59] GPS also aided the Army in minesweeping operations, allowing troops to follow or draw maps through mine fields using GPS navigational signals.[60]

Finally, the benefits GPS provides in answering the "where am I going?" question are similar those provided in answering the self-location question, the only difference is the focus is on the target location or destination. Just as exact self-position location is a crucial element in launching projectile weapons, accurate information concerning target location provides the other key element of the equation. For mobile targets, a GPS receiver can provide this information, but only if a receiver can be located near the

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[59] B.D. Nordwall, "Imagination Only Limit to Military Commercial Applications of GPS" (October 14, 1991) *Aviation Technology*, at 60.

[60] N.E. Rice, "Space Assets: Key to Joint Force Success" *Concepts in Airpower for the Campaign Planner* (Air Command and Staff College, Maxwell Air Force Base, Alabama: 1993), at 108.

potential target. Otherwise, GPS can enhance a technique called relative ranging, where the target is fixed relative to a landmark or some other known location.[61] Fixed military targets, such as airfields, shipyards and industrial facilities, may be pre-targeted or located exactly using GPS, thereby enhancing the value of standing operations plans.

3. Sea Operations

Naval forces benefit from PPS for the same reasons as mentioned above for air and ground forces, in addition to the following. Harbor navigation operations, which tend to require more precision, are greatly improved. Coastal surveys and mine emplacement and countermeasure operations can be conducted with greater speed and safety. Also, submarine crews can passively pinpoint their position and update their inertial systems while keeping antenna exposure time to a minimum.[62] During the Gulf War, GPS allowed the Navy to accurately position Marines on shore during nighttime operations, in addition to increasing the lethality of their standoff land attack missiles (SLAMs) and Tomahawk cruise missiles.[63]

4. Joint Operations

Because GPS position is referenced to a common coordinate grid, known as the World Geodetic System of 1984 or WGS-84, the interoperability of forces can be greatly improved. The interoperability applications include not only U.S. air, ground and sea forces, but also coalition and multinational forces, in both combat and noncombat spheres

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[61] "The GPS Dilemma," supra note 5, at 134.

[62] *GPS NAVSTAR User's Overview*, supra note 10, at 10.

[63] Rice, supra note 60, at 108.

of operations. In the combat sphere for example, the structure of the allied forces during the Persian Gulf War (comprised of joint U.S. and other joint coalition forces) made maneuvering extremely complicated. The common grid that GPS provided overcame these complications and allowed the opening attack of Desert Storm to be coordinated to the exact minute, using weapons platforms from all U.S. forces simultaneously.[64] In one example during the initial phases of Desert Storm, Air Force Pave Low MH-53J helicopters equipped with GPS led non-equipped Army Apache helicopters to their initial position for the first attack on Iraqi early warning radar sites.[65]

In the sphere of noncombatant operations, GPS accuracy can support more efficient off-road navigation for supply distribution, vehicle recovery, rendezvous, reconnaissance, cargo drop, and search/rescue/evacuation operations.[66] By using GPS to rapidly locate vehicles and troops, inter- and intra-service logistic delays were alleviated during the war, thereby contributing directly to the unprecedented speed at which the coalition forces maneuvered throughout the campaign. Army cooks even used GPS to quickly locate front line troops to deliver food directly to them.[67] Just as GPS is a significant force multiplier for the individual services, its significance is exponentially multiplied in joint operations.

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[64] R. Atkinson, *Crusade: The Untold Story of the Persian Gulf War* (Boston: Houghton Mifflin, 1993), at 15-19.

[65] Rice, supra note 60, at 110.

[66] *GPS NAVSTAR User's Overview*, supra note 10, at 10.

[67] Rice, supra note 60, at 109.

B. Civilian Uses

GPS has been described as a dual-use technology, having applications equally beneficial to both military and civilian users. While the benefits to the military are and will remain substantial, as the above discussion demonstrates, civilian use will eventually eclipse military use to a stage where few people will even remember that GPS had its origins in the military. Like the Internet and satellite telecommunications, both military inventions, GPS will soon become a fact of and use in daily life with no military connotation whatsoever. Based upon sheer number of users in the near future, it may make more sense to describe GPS as a civilian-use technology rather than a dual-use one.

The list of examples of new uses of GPS literally grows daily. The United States Department of Transportation recently compiled the following to show the areas in which GPS has been used:

- Aviation
- Maritime and Waterways
- Highway and Construction
- Public Transportation
- Railroads
- Communications
- Emergency Response (e.g., ambulance and fire)
- Surveying
- Weather, Scientific and Space
- Environmental Protection

•Recreation (e.g., sports)

•Law Enforcement and Legal Services

•Agriculture and Forestry[68]

Hundreds of pages would be needed to describe the actual uses within these different categories. Instead, after discussion of the overall market, only selected examples will be discussed. From a potential liability standpoint, the most important are those in the fields of aviation and maritime navigation.

1. GPS Market

Taking a broad view of the industry spurred on by GPS, one has to include the manufacturers of GPS equipment such as receivers, suppliers of GPS-related support equipment such as antennas and digital displays, and GPS-related service providers such as mappers and surveyors. The vast commercial market created has been described as "an economic 'food chain' beginning with government contracts to build the satellites, to commercial firms building GPS receivers, to firms using those receivers to provide services, and value-added firms that use GPS to enhance other commercial products."[69]

In 1991, an industry association of GPS satellite and equipment manufacturers in the United States, the USGIC, was formed. USGIC continues today and includes Ashtech, Interstate Electronics, Magellan Systems, Martin Marietta Astro Space (now Lockheed Martin), Motorola, Rockwell, and Trimble Navigation.[70] Magellan seems to be dominant in the hand-held and recreational market, while Trimble is perceived as the

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[68] U.S. Department of Transportation, Office of the Secretary, "Civil Uses of GPS," September 1994.

[69] *RAND Study*, supra note 10, at 102.

[70] *Id.*, at 103.

overall technology leader in business and industry applications ranging from mapping to vehicle navigation. Motorola is also in the vehicle navigation market along with Rockwell, who is the leader in military sales.[71] In addition to these equipment manufacturers, there are a slew of companies providing value-added services using GPS. For instance, in the field of providing Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) services, the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA), in a joint publication, listed eighteen separate CNS/ATM service providers and manufacturers, all of which are using or plan to use GPS in its product.[72]

Coming up with a dollar figure on the value of the GPS market is difficult, given the several intangibles such as the value-added market. However, the USGIC has been able to project future sales of GPS equipment alone through the year 2000 based on 1993 sales. Worldwide sales in 1993 were $510 million and are expected to total $8.47 billion by the year 2000.[73] The big winners in the market in year 2000 are projected to be car navigation and consumer/cellular applications (such as GPS-equipped mobile phones and personal computers), accounting for $3 billion and $2.25 billion respectively.[74] According

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[71] J. Markoff, "Finding Profit in Aiding the Lost" *The New York Times* (March 5, 1996) D7.

[72] ICAO and IATA, *FANS CNS/ATM Starter Kit* (1995), §4. Included are several U.S. firms, Airport Systems International, Allied Signal Aerospace, ARINC, CAE Electronics, GEC-Marconi Inflight Systems, Honeywell, Interstate Electronics, JcAIR, Litton Aero Products and M/A-COM Antenna & Cable. Non-U.S. firms include Alenia (Italy), CAE Electronics, Canadian Marconi, and SITA (Canada), CAP Gemini Sogeti (Belgium), Daimler-Benz Aerospace (German), Intergraph (Netherlands), Skyphone and Smiths Industry Aerospace (United Kingdom).

[73] *RAND Study*, supra note 10, at 104, citing "GPS in the Year 2000: $8 Billion" *GPS World Newsletter* (April 11, 1995) 1.

[74] GPS receivers are likely to become standard equipment in many personal vehicles by the year 2000, just as airbags are now. Ford offers a GPS navigation system option in its Lincoln-Continental line for $350-$500. *RAND Study*, supra note 10, at 105.

to the White House and U.S. Department of Transportation, this $8 billion industry is expected to create 100,000 new, high-tech jobs in the United States alone, 50,000 of which will be in California.[75]

As public demand for GPS receivers rises, their price should continue to fall thereby creating an increased demand with new applications. In a span of six years, the cost of a handheld GPS receiver fell to just 6% of its original market price. When Magellan introduced its first commercial handheld receiver in 1989, it sold for $3000. In 1992, increased competition caused the price to drop to $1800. Today, the cost is as low as $200.[76] Even if the cost of a GPS receiver declines no further, it is now at a level which, at marginal additional cost, enables GPS to be incorporated into many new technologies and products. Nevertheless, USGIC foresees a continued fall in prices due to an annual thirty percent decline in the cost of receiver hardware components.[77]

2. Civil Aviation

Although the civil aviation industry is unlikely to be the largest user of GPS or comprise the largest market segment in terms of dollars, no other industry is likely to benefit more by integrating GPS in its present navigation system. Concerning the safety of

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[75] The White House, Office of the Press Secretary, "President Opens Door to Commercial GPS Markets: Move Could Add 100,000 New Jobs to Economy by Year 2000," March 29, 1996. See also, Department of Transportation, "Vice President Gore, Transportation Secretary Peña Usher in New Era for Travel, Time Savings and Communications with Global Positioning Satellite System," DOT 62-96, March 29, 1996.

[76] B.D. Nordwall, "GPS Technology Ripens for Consumer Market" (October 9, 1995) *Aviation Week & Space Technology*, at 50. The cost is reflective of a simple GPS receiver. A high quality, multi-channel receiver costs about $400.

[77] *Id.*.

the United States' current airspace system, the Administrator of the FAA has recently pointed out:

> Our current system, which is founded on a ground-based system of radars and navigational devices, is being pushed to the limit. Without modification, it will not be able to meet the challenges of increased aviation growth that is expected into the next century.
>
> To meet these challenges, the [FAA] is embarked on an ambitious modernization program. The pillars of that program are increased automation, widespread use of digital telecommunications, and, most essential, heavy reliance on a satellite-based navigational system. The Global Positioning System will play a key part in providing early benefits to the civil aviation community in both navigation and landing.[78]

Ultimately, GPS should make redundant current and planned navigational aids such as Omega, LORAN, INS, ILS, VOR, DME, ADF and MLS.[79]

The FAA's planned system has two main parts: first, a wide area network covering the entire country and second, a local area DGPS for landings at major airports.

WAAS. The FAA's plan to implement GPS within the U.S. National Airspace System (NAS) will be done in an evolutionary manner in three consecutive stages. The first, called the multisensor stage, allows GPS to be used by an aircraft for navigation, but only after its data has been compared with another approved navigation system onboard the aircraft. The next stage, called the supplemental stage, will allow the use of GPS, as augmented, for navigation itself without comparison to another system. Finally, in the

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[78] U.S. Department of Transportation, Federal Aviation Administration, *GPS Implementation Plan for Air Navigation and Landing* (hereinafter *GPS Implementation Plan*), August 1994, in an open letter introducing the Implementation Plan dated November 4, 1994.

[79] Long-Range Radio Aids to Navigation System (LORAN), Inertial Navigation System (INS), Instrument Landing System (ILS), VHF Omni-Directional Radio Range (VOR), Distance Measuring Equipment (DME), Automatic Direction-Finding Equipment (ADF), and Microwave Landing System (MLS).

primary stage, GPS, as augmented, will meet all the requirements for navigation without the need for any other navigation system aboard the aircraft. However, if desired, other navigational sensors may be used along with GPS as the primary.[80]

The three stages are themselves being implemented in stages for different phases of flight. In 1991,[81] the FAA approved the use of GPS as a multisensor in oceanic and domestic en route airspace. The following year, GPS was approved for non-precision approaches. At the end of 1993, the use of GPS as a supplemental means of navigation was initiated during all phases of flight except precision approach. After the Defense Department declared that GPS had reached its initial operational capability in 1994, the FAA announced that GPS was an integral part of the NAS. In 1995, GPS was approved as a primary means of navigation in oceanic airspace. By 1997, the FAA plans to begin operation of the Wide Area Augmentation System (WAAS) discussed earlier[82] to augment the integrity, availability and accuracy of the basic GPS radionavigation signals, enabling GPS to be used as a primary means of navigation in all areas except precision approach. By 1998, it is hoped WAAS will enable the use of GPS for Category I precision approaches.[83]

The WAAS will contain up to 33 base stations, comprised of a primary unit and two redundant backups. The base stations will collect positioning data from the GPS satellites for relay to six master control stations. The master control stations will transmit

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[80] *GPS Implementation Plan*, supra note 78, at 1.

[81] All of the following dates are fiscal, not calendar, year.

[82] See previous discussion, supra, Chapter II, Section E.

[83] *GPS Implementation Plan*, supra note 78, at 1.

DGPS corrections up to nine GSO satellites for broadcasting to users. The FAA predicts that the system should provide horizontal accuracies of three meters and vertical accuracies of five. Further, the system is designed to be available 99.999 percent of the time and provide notice of an error in the signal within 6 seconds. The total cost of the system is estimated at $500 million.[84]

LADGPS. The planned local area DGPS will consist of hundreds of base stations to provide greater position accuracies for Category I, II, and III precision landings at major airports. Under this concept, corrections to improve the accuracy of the basic GPS SPS signal are broadcast to aircraft within line of sight of a ground station. Because it is line of sight, the range of the service will be 20-25 nautical miles. FAA officials estimate the cost of each LADGPS to be about $1 million, to be financed by the local airport authority.[85]

One final GPS augmentation used by the FAA should be noted. GPS receivers installed in aircraft have a receiver autonomous integrity monitoring (RAIM) capability, allowing the receiver to monitor the basic SPS signal continuously to determine its integrity. RAIM provides sufficient reliability to allow the use of GPS in oceanic en route airspace without any additional augmentation.[86]

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[84] General Accounting Office, *Global Positioning Technology: Opportunities for Greater Federal Agency Joint Development and Use*, GAO/RCED-94-280, September 1994, at 22. See also, supra, note 42.

[85] *Id.*.

[86] *GPS Implementation Plan*, supra note 78, at 4-5.

The airlines view the use of GPS as an opportunity to improve precision, safety, access to airports and efficiency. One airline forwarded the following scenario as the vision of the future for air travel:

> An aircraft parked at the gate in heavy fog boards its passengers on time. The cockpit crew, after inspecting the aircraft, boards and loads a laser disc into the flight management system. Receiving taxi instructions from the tower, the aircraft is pushed back, and taxis in zero visibility to the end of the active runway using precise position information. Takeoff is accomplished using the same system and the aircraft begins to climb out under autopilot control; the laser disc program initiating a fuel conserving climb to the most desirable altitude, given known winds and destination. The flight path is direct to the destination. The aircraft climbs, descends or ascends to the most fuel efficient flight level. Encountering a slower flight on the same path, the aircraft moves to a different course to avoid it and pass it by, still maintaining an optimal flight profile. Upon reaching its destination, the aircraft begins to descend and enters the local control system. Landing in Category III conditions, the aircraft promptly clears the runway and taxis to its gate. The passengers on this 1300-mile flight arrived on time. The air traffic controllers knew where it was at every step of the way. The airline saved money. The environment was unaffected by the additional fuel that would have been burned. The aircraft is now available for another flight some 10% sooner than today.[87]

The same airline has estimated that GPS can provide this type of operation and would save the industry $2.6 to $6.7 billion in one time costs, with an additional $524 million annually.[88] The one-time costs savings are associated with GPS' ability to replace the

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[87] Statement of Jeff Ariens, Director of Flight Operations Technology, Continental Airlines, Before the Subcommittee on Technology, Environment and Aviation of the Committee on Science, Space, and Technology, U.S. House of Representatives, "The Global Positioning System: What Can't It Do?" 103d Cong., 2d Sess. (1994), at 28.

[88] *Id.*, at 30-31.

presently planned Microwave Landing System (MLS).[89] Most of the estimated annual savings are a result of more direct routing, with a $122.4 million in fuel savings for ten major airlines, $30 million in variable maintenance costs, and $30 million in crew costs.[90] On some longer flights, GPS navigation can shave as much as one hour off flying time.[91]

3. Maritime

As mentioned previously in the discussion on the technique of using differential GPS (DGPS) to increase the accuracy of the SPS signal,[92] the U.S. Coast Guard's DGPS augmentation, when completed, is likely to make redundant existing radionavigation systems such as LORAN-C, Omega, and radio-beacons.[93] The network is expected to have an expected useful life of 25 years, with equipment costs estimated at about $18 million. Thereafter, operations and maintenance costs are expected to be $5 million annually.[94]

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[89] *Id.*. Continental estimates a $4 billion savings to the government since ground equipment for MLS will cost $4.4 billion vice $440 million for GPS equipment. Citing a Trimble Navigation study, Continental estimates a savings to the airlines of $100,000 per aircraft if GPS were adopted instead of MLS.

[90] *Id.*.

[91] Specially-equipped Boeing 747-400s can now fly over newly opened air routes over Siberia. Using GPS to attain more direct routing, Northwest, on its Seattle to Hong Kong flight, reduced flight time to 11 hours, one hour less than before. United has begun a 16 hour, nonstop service from Chicago to Hong Kong using the same air route. D. Field, "Taking the Shortcut, Satellite Navigation Shaves Time Off Flights" *The Washington Times* (June 5, 1996) B-7.

[92] See previous discussion, supra, Chapter II, Section E.

[93] Department of Commerce, *A Technical Report to the Secretary of Transportation on a National Approach to Augmented GPS Services*, NTIA 94-30, December 1994, at 22.

[94] General Accounting Office, *Global Positioning Technology: Opportunities for Greater Federal Agency Joint Development and Use*, GAO/RCED-94-280, September 1994, at 24.

The system will work in somewhat similar fashion to the FAA's WAAS, continuously monitoring the accuracy and integrity of the basic GPS signal. At the 50 or so DGPS sites around the country, the Coast Guard will employ a dual frequency receiver to record positioning information from the GPS satellites. The base stations will then broadcast corrected data via radiobeacons to maritime users. A second DGPS station will be located at each site and will monitor system accuracy and integrity with continuous integrity checks. Two regional DGPS stations, one on the east coast and one on the west coast, will remotely monitor the individual base stations 24 hours a day. The control stations will also record all DGPS data, assess the system's ability to meet operational requirements, detect system errors and provide a record of operational conditions at all stations. Procedures have also been established to allow the national command authority to control the entire system in the event of national emergency.[95]

Other Coast Guard programs include: (1) a Navigation Information Service for distributing information on GPS and other electronic navigation systems on an electronic bulletin board; (2) an Automatic Dependent Surveillance System employing DGPS for tankers navigating through Prince William Sound, Alaska; (3) a Coast Guard vessel equipped with advanced electronic chart equipment and DGPS to test computerized display charts; (4) a Laptop Automatic Aid Positioning System employing DGPS to position and check buoys; (5) a modified carriage requirement that allows vessels to carry

[95] *Id.*.

GPS in lieu of other electronic positioning devices; and (6) the use of DGPS for icebreaking and search and rescue operations.[96]

4. Road Transport

Since the largest projected segment of civilian GPS users is the automobile market, it is not surprising that the Federal Highway Administration, through the Intelligent Vehicle and Highway System project, has committed $659 million to fund several projects over the next six years. These projects include: (1) vehicle-based collision avoidance systems; (2) bus tracking systems; (3) Automated Vehicle Identification/Automated Vehicle Location systems for improved fleet management, especially in cases involving the transportation of certain hazardous materials; (4) emergency distress systems; and (5) vehicle navigation and route guidance computer systems.[97] The last use listed will be the most visible to the public, with both U.S. and Japanese automakers rushing to make car navigation systems available in new cars.[98] Another system currently in design will link a GPS receiver to the car's airbag and cellular phone. In the event of an airbag-deploying accident, the location of the automobile will be automatically and instantly transmitted.[99]

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[96] J. Epstein, "Global Positioning System (GPS): Defining the Legal Issues of its Expanding Civil Use" (1995) 61:1 *Journal of Air Law and Commerce* 243, at 253.

[97] Department of Commerce, *A Technical Report to the Secretary of Transportation on a National Approach to Augmented GPS Services*, NTIA 94-30, December 1994, at 8.

[98] *RAND Study*, supra note 10, at 113. A typical car navigation unit will consist of a GPS receiver and antenna, integrated with a CD-ROM player and display screen. The CD-ROM will access a map from the databases for display to the driver. The GPS receiver will calculate the position of the vehicle and display it on the map. The driver is able to locate potential destinations from the database while viewing his or her own position.

[99] Markoff, supra note 71, at D7.

5. Other Uses

The above discussion barely scratches the surface of the potential for the use of GPS in those areas, not to mention the endless list of applications in other areas that is growing daily. Senator Exon, Chairman of the Subcommittee on Strategic Forces and Nuclear Deterrence of the Senate Armed Services Committee, stated in 1993:

> I am astonished almost daily at news of some new advance in GPS navigation technology or its application to civil and commercial uses. It appears to me that GPS is rapidly becoming a key element of the basic infrastructure of the world's economy and holds the promise for dramatic increases in productivity.[100]

Today, three years later, the list continues to grow at an even more rapid pace. In mapping and surveying operations, difficult terrain and short time frames no longer pose the constraints typical of conventional surveying methods. At the height of the California drought in 1990, GPS was used to locate drilling locations for eight shafts intended to intersect a 12-foot wide water tunnel 320 feet below the surface of the American River Canyon in the Sierra Nevada Mountain Range.[101] Also, to aid in earthquake prediction, geologists can measure slight shifts in the earth's crust, measurable in only a few millimeters, that show the motion of the planet's tectonic plate.[102] Meteorologists, by analyzing disturbances in GPS signals as they pass through the ionosphere and troposphere, can measure the atmospheric water content.[103] New systems are being

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[100] *GPS World*, July 1993, at 44.

[101] B. McGarigle, "Innovation and GPS Put Small Firm on Success Track" (February 1996) *Earth Observation Magazine*, at 30.

[102] Herring, supra note 12, at 44.

[103] *Id.*, at 47.

designed to allow a blind person to navigate and to locate patients of Alzheimer's in emergency situations, and even some golf courses have installed systems in golf carts that provide precise distance from the hole, complete with software recommending which club to use.[104]

Finally, the value of GPS as a precision timing device and its use in information-driven activities is worth noting. Because it can facilitate the synchronizing of signals on digital networks on landlines and over the airwaves, GPS allows for more effective exploitation of limited bandwidths for communications and provides a mechanism for time-stamping data requiring security and authentication. For example, GPS supports wide area communications networks such as the Internet to manage the flow of information packets, thereby reducing congestion. GPS also provides a precise timing mechanism to those electronic transaction systems that rely on timing to provide security for secure or sensitive financial information.[105]

If the preceding discussion does nothing else, it highlights an amazing explosion in civil applications of a government-provided service traditionally reserved for military use. The legal question this new use begs then is what are the liability implications for the United States government in providing this new service, particularly in the context of aiding navigation, to the public? Part II outlines the government's traditional role in providing navigational assistance to the public, the domestic bases of liability for providing such a service, and existing international law concerning liability.

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[104] Markoff, supra note 71, at D7.

[105] *RAND Study*, supra note 10, at 100-101.

Part II: Liability Ramifications

Chapter IV. The Role of the United States Government

For over 200 years, the federal government has taken an active role in providing navigation assistance to the public.[106] Today, navigation assistance is provided by several federal agencies, generally depending on the particular navigational function and medium -- water, air or land. The Coast Guard is responsible for water navigation and the Federal Aviation Administration (FAA) for air navigation, while no agency is specifically assigned the task to regulate and provide navigation assistance over land.[107] The Department of Defense (DoD) also provides navigation assistance, but generally for its own particular use. The following highlights the general statutory bases of the Coast Guard and FAA in regulating the navigation of vessels and aircraft.

The federal government was involved in providing maritime navigation assistance as early as 1789.[108] Meeting the concerns of both the military and commerce, federal control over how coastal waterways would be navigated provided the unified authority and responsibility necessary for safety, national security and fiscal responsibility through the collection revenue. Today, the United States Coast Guard has the responsibility to establish aids to navigation in the navigable waters of the United States:

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[106] 33 U.S.C. § 711-715, Historical Note.

[107] Even though no agency presently exists to regulate land navigational services, the most likely candidate for regulating a highway navigation system, should one develop, would be the Federal Highway Administration within the Department of Transportation.

[108] An Act for the Establishment and Support of Lighthouses, Beacons, Buoys, and Public Piers, 1 Stat. 53 (1789).

> In order to aid navigation and to prevent disasters, collisions, and wrecks of vessels and aircraft, the Coast Guard may establish, maintain, and operate: (1) aids to maritime navigation required to serve the needs of the armed forces or of the commerce of the United States. . . . (3) electronic aids to navigation systems (a) required to serve the needs of the armed forces . . . ; (b) required to serve the needs of the maritime commerce of the United States; or (c) required to serve the air commerce of the United States as requested by the Administrator of the Federal Aviation Administration.[109]

The history of government involvement in air navigation is of course much shorter than that of maritime navigation. However, since the inception of flight, aviation has been one of the most heavily regulated activities in the world, with governments justifying their involvement in civil aviation for reasons of safety, economics, or both. Today, while regulation in the United States no longer focuses on economic concerns, regulation for safety reasons is surely not in decline. Virtually every aspect of civil aviation concerning safety is regulated in some manner, predominantly by the FAA.

The FAA receives its statutory mandate from the Federal Aviation Act of 1958.[110] This Act replaced the Civil Aeronautics Act of 1938,[111] which replaced the Air Commerce Act of 1926[112] before it. When the 1958 Act was passed, the FAA, then known as the Federal Aviation Agency,[113] assumed certain functions of the Civil Aeronautics Board (CAB), an agency created under the 1938 Act to operate within the Department of

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[109] 14 U.S.C. § 81.

[110] 49 U.S.C. §§ 40101 *et seq.*.

[111] 28 U.S.C. §§ 1346 *et seq.*.

[112] Pub. L. No. 254, 44 Stat. 568 (1926).

[113] Pub. L. No. 85-726, 72 Stat. 740 (1958).

Commerce. These functions encompassed all aspects of aviation safety, to include promulgating safety rules, inspecting and certifying aircraft, certifying pilots, regulating owners, and operating air traffic control functions.[114] The FAA operated as an independent agency until 1966, when the Department of Transportation Act created the agency of the same name and placed the FAA under its auspices.[115] The Department of Transportation Act also created the National Transportation Safety Board (NTSB), whose primary function is to investigate civil aircraft accidents.[116]

Pursuant to the Federal Aviation Act, the FAA promulgates Federal Aviation Regulations (FARs),[117] its principle mechanism for regulating civil aviation. Based on the United States adherence to the Chicago Convention,[118] the FAA ensures the FARs are in conformity with the provisions of the Convention and the International Standards and Recommended Practices found in the annexes to the Convention.[119]

The FARs constitute the basic standard of care to be used by all involved in civil aviation, including employees of the government functioning in a regulatory or operating capacity. The following parts of the FARs are illustrative of their breadth: Parts 25 through 35 of the FARs establish basis criteria for aircraft airworthiness; Part 91 deals

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[114] L.S. Kreindler, *Aviation Accident Law* (New York: Matthew Bender Co., 1992), at 10-2.

[115] Pub. L. No. 89-670, 80 Stat. 931 (1966).

[116] 49 U.S.C. §§ 1441-1443.

[117] The FARs are found in title 14, *Code of Federal Regulations.*

[118] *Convention on International Civil Aviation (Chicago Convention, 1944).* Opened for Signature December 7, 1944, Entered into Force April 4, 1947. ICAO Doc. 7300/6; 15 U.N.T.S. 6605.

[119] Most provisions in the FARs concerning air safety and air traffic control find their parallel provisions in the following annexes to the Chicago Convention: Annex 2 (Rules of the Air); Annex 8 (Airworthiness of Aircraft); Annex 10 (Aeronautical Services); and Annex 11 (Air Traffic Services).

with general operating rules such as maintenance records, pilot certification and rating, and medical certification; Part 93 covers special air traffic rules and airport traffic patterns; Part 95, altitudes for instrument flight rules (IFR); Part 97, standard instrument approach procedures; Part 121, standards for U.S. domestic carriers; and Part 129, standards for foreign carriers operating in the United States. Further detailed regulations are elaborated in such publications as the Air Traffic Control Manual.[120] Needless to say, virtually every aspect of navigating the airspace is covered by some rule, regulation or directive, and the various aspects of GPS navigation will be no exception.

Chapter V. The Applicable Domestic Law

A. Liability Under the Federal Tort Claims Act

Extensive governmental involvement in civil aviation and maritime navigation has invariably meant extensive litigation against the U.S. government. This should come as no surprise, since once any government embarks on a policy of providing a service to the public or regulating an aspect of that service, that government assumes a duty to provide those services in accordance with a certain standard of care and should generally be held accountable when that duty or standard of care is breached. When an actionable breach happens, the Federal Tort Claims Act provides one of the mechanisms for seeking redress for torts committed by government employees in the scope of their employment.

[120] FAA Air Traffic Control Order 7110.65C (1982).

1. The Federal Tort Claims Act Generally

"With us every official, from the Prime Minister down to a constable or collector of taxes, is under the same responsibility for every act done without legal justification as any other citizen."

-A.V. Dicey, 19th Century[121]

"It would be inconsistent with the very idea of supreme executive power, and would endanger the performance of the public duties of the sovereign, to subject him to repeated suits as a matter of right, at the will of any citizen, and to submit to the judicial tribunals the control and distribution of his public property, his instruments and means of carrying on the government in war and in peace, and the money in his treasury."

-a Massachusetts court, 1865[122]

And so went the debate during the nineteenth century, a debate which carried over into the twentieth century albeit in more modern vernacular, concerning the extent to which a government should be held liable under the law as would any private citizen. The debate questioned the validity of the concept of sovereign immunity, a legal principle recognized in one form or another in virtually every modern legal system in the world. Whether the legal system is based on civil law principles where the distinction between private law and public law is a central feature of the of the structure of the law, or the legal system is based on common law principles which makes no such distinction and assumes that the ordinary law of tort applies to both private citizens and public authorities alike, both recognize a government's immunity to suit without its consent. Today, virtually no legal system provides for a total immunity of government officials and public authorities from the ordinary torts applicable to private individuals; yet conversely, no system provides for the complete subjection of itself or its officials to ordinary private law.[123] The only real difference between states involves their choice of what types of suits

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[121] A.V. Dicey, *The Law of the Constitution,* 10th Ed. (London: E.C.S. Wade, 1959), at 193.

[122] *Briggs v. Light Boats* (1865) 11 Allen 157,162 (Mass.).

[123] G. Samuels, "Governmental Liability in Tort and the Public and Private Law Distinction" (1988) 8 *Legal Studies* 277 (1988).

are allowed to be brought against it, i.e., the extent to which each waives its sovereign immunity.

The doctrine of sovereign immunity can be stated quite simply -- a sovereign government may not be sued by one of its subjects unless the government itself consents to the suit. Under American common law, the doctrine is based on the English maxim that "The King can do no wrong."[124] Although the monarchical sovereign has since been replaced with the representative government, the concept that the sovereign may not be sued absent its consent still required a waiver of the sovereign's immunity before a suit could be brought. For general tort claims against the United States for the acts or omissions of its employees, the first broad waiver did not occur until 1946 with the passage of the Federal Tort Claims Act (FTCA).[125] As will be discussed below, this waiver was hardly complete, and the law recognized several statutory exceptions to suits against the United States.

The enactment of the FTCA was not novel since it was not the first time the United States allowed itself to be sued in tort. Prior to 1946, a number of more restrictive waivers of sovereign immunity had been enacted such as the Tucker Act[126] in 1877 to handle claims against the government arising from contracts with the United States and the Suits in Admiralty Act[127] in 1920 to provide redress for maritime torts involving

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[124] Prosser, *et al.*, *Prosser and Keeton on Torts,* 5th Ed. (Minnesota: West Publishing Co., 1984), at 1032.

[125] 28 U.S.C. §§1346, 2402, 2671, 2672, 2674-2680(a)-(n) (hereinafter "FTCA").

[126] *Id.*. See also *Hearings Before the House Committee on the Judiciary on H.R. 5373 and 6463,* 77th Cong., 2nd Sess. 24 (1955).

[127] *Id.*, 49 U.S.C.A. 741 et. seq.. Discussed in detail in Section B of this chapter.

vessels belonging to the federal government. However, the more prevalent practice in the United States was to settle tort claims through the passage of private bills introduced to Congress on behalf of individuals to redress the individual's particular problem.[128] It was the proliferation of these private bills and the inefficacy of legislating on a case-by-case basis that helped move Congress to consider a comprehensive legislative scheme to address such tort claims.[129]

Today the FTCA has become the primary means of asserting tort liability against the United States, including suits involving aviation torts. In fact, it was an aviation case that probably led to the ultimate passage of the FTCA after nearly thirty years of Congressional debate. On July 28, 1945, the harshness of the principle of sovereign immunity was highlighted when a military aircraft crashed into the Empire State Building in New York City, leaving the victims and their families without any judicial recourse against the government despite the apparent negligence of government employees.[130] Recognizing that there are instances when "The King could have been wrong," the FTCA was to provide judicial recourse and waive governmental immunity in claims for money damages arising from a loss of property, personal injury, or death:

> ...caused by the negligent or wrongful act or omission of any employee of the Government while acting in the scope of his office or employment under circumstances where the United States, if a private person, would be liable to the

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[128] H.R. Rep. No. 1287, 97th Cong., 1st Sess., p. 2, *reprinted in U.S. Code Cong. & Ad. News* (1946), at 807.

[129] *Id.*. For example, approximately 2,200 separate bills were introduced in the 68th Congress, of which 250 became law. The 70th Congress saw 2,268 private bills, of which 336 were enacted, and the 77th Congress had 1,829 private bills with 593 enactments.

[130] Brydges & Fagan, "The Federal Tort Claims Act as It Relates to Aviation Accidents" (1981) 48 *Ins. Counsel J.* 244.

> claimant in accordance with the law of the place where the act or omission occurred.[131]

Simply stated, the FTCA makes the United States liable for traditional common law torts committed by its employees while acting in the scope of their duties. Kreindler provides a useful elemental breakdown of the above waiver provision, describing a waiver of sovereign immunity for (1) negligent or wrongful acts, (2) committed by government employees, (3) while in the scope of employment, (4) if a private person would be liable under like circumstances, (5) according to the law of the place of the wrong.[132]

Before turning to the statutory exceptions to the FTCA, a few features of these elements and the general waiver of immunity are worth noting. First, while the federal courts will have exclusive jurisdiction over FTCA claims, the law of the state where the act or omission occurred will govern, applying to the federal government as it would to any private citizen of that state.[133] Second, the FTCA does not create a new cause of action in and of itself, but merely accepts liability under circumstances that would impose liability on private individuals under similar circumstances in accordance with state law.[134] Third, a claimant's cause of action must be based in negligence, not strict liability, requiring proof of the ordinarily recognized elements a negligence action: (a) that the government owed a duty of care to the plaintiff; (b) that the government breached this duty; (c) that the plaintiff suffered damage; and (d) that the breach proximately caused the

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[131] 28 U.S.C.A. §1346(b).

[132] L.S. Kreindler, *Aviation Accident Law* (New York: Matthew Bender Co., 1992) at 5-2.

[133] 28 U.S.C.A. §1346(b).

[134] *Feres v. United States*, 340 U.S. 135 (1950).

damage.[135] Finally, government immunity is waived only when an employee is acting within the scope of employment. While the scope of employment requirement has usually been broadly interpreted by judicial bodies, it is nevertheless an issue that the government must address when deciding whether it will substitute the United States as the sole defendant in a tort suit brought against one of its employees.

The broad waiver of governmental immunity outlined above is not absolute and is qualified by several statutory exceptions. As Congress wrestled with the issue of which areas the United States should remain exempt from tort liability, it focused on three objectives: (1) ensuring that certain governmental activities not be disrupted by the threat of damage suits; (2) avoiding exposure of the United States to liability for excessive or fraudulent claims; and (3) not extending the coverage of the Act to suits for which adequate remedies were already available.[136] With these objectives in mind, subject matter jurisdiction was granted for suit in federal court subject to the following exceptions enumerated in §2680 of Title 28 of the United States Code:

> (a) Any claim based upon an act or omission of an employee of the Government, exercising due care, in the execution of a statute or regulation, whether or not such statute or regulation be valid, or based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of a federal agency or an employee of the Government, whether or not the discretion involved be abused.

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[135] Restatement (Second) of Torts, American Law Institute Publishers, §281 (1965). In *Laird v. Nelms,* 406 U.S. 797, 801 (1972), the United States Supreme Court specifically held that the "Act did not authorize the imposition of strict liability of any sort upon the government," imposing liability "only when conduct is negligent or involves some other form of misfeasance or nonfeasance."

[136] *Kosak v. United States*, 465 U.S. 848, 858 (1984). See also *Molzof v. United Sates,* 502 U.S. 301 (1992), where the Court recently stated that "Congress' primary concern in enumerating the §2860 exceptions was to retain sovereign immunity with respect to certain governmental functions that might otherwise be disrupted by FTCA lawsuits."

(b) Any claim arising out of the loss, miscarriage, or negligent transmission of letters or postal matter.

(c) Any claim arising in respect of the assessment or collection of any tax or custom duty, or the detention of any goods or merchandise by any officer or customs or excise or any other law enforcement officer.

(d) Any claim for which a remedy is provided by sections 741-752, 781-790 of Title 46, relating to claims or suits in admiralty against the United States.

(e) Any claim arising out of an act or omission of any employee of the Government in administering the provisions of sections 1-31 of Title 50, Appendix.

(f) Any claim for damages caused by the imposition or establishment of a quarantine by the United States.

(g) Repealed.

(h) Any claim arising out of assault, battery, false imprisonment, false arrest, malicious prosecution, abuse of process, libel, slander, misrepresentation, deceit, or interference with contract rights: Provided, that, with regard to acts or omissions of investigative or law enforcement officers of the United States Government, the provisions of the chapter and section 1346(b) of this Title shall apply to any claims arising, on or after the date of enactment, of this proviso, out of assault battery, false imprisonment, false arrest, abuse of process, or malicious prosecution. For the purpose of this subsection, "investigative or law enforcement officer" means any officer of the United States who is empowered by the law to execute searches, to seize evidence, or to make arrests for violations of Federal Law.

(i) Any claim for damages caused by the fiscal operations of the Treasury or by the regulation of the monetary system.

(j) Any claim arising out of the combatant activities of the military or naval forces, or the Coast Guard, during time of war.

(k) Any claim arising in a foreign country.

> (l) Any claim arising from the activities of the Tennessee Valley Authority.
>
> (m) Any claim arising from the activities of the Panama Canal Company.
>
> (n) Any claim arising from the activities of a federal land bank, a federal intermediate credit bank, or a bank for cooperatives.[137]

It is important to note that if any of these exceptions apply, the courts lack subject matter jurisdiction since sovereign immunity has not been waived in these cases, and if the suit can not find its basis under the FTCA, the action is barred altogether.[138] Thus, the FTCA is only a limited waiver of sovereign immunity, leaving considerable room in certain circumstances for "the king" to operate quite freely without the threat of judicial consequences.

In the context of aviation tort cases and the FTCA's extension to cover GPS activities, the following of the above exceptions are relevant: (a) the discretionary function exception; (h) the misrepresentation function; (j) the exception for claims arising in a foreign country; and (k) the exception for injuries arising form combat activities during time of war. The following subsections discuss these exceptions by outlining the caselaw in the areas. The most important exception for GPS-related cases is likely to be the discretionary function exception. Therefore, the Supreme Court cases shaping the exception are discussed, followed by a discussion of the exception's traditional application in the context of aviation tort cases against the United States.

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[137] 28 U.S.C.A. §2680.

[138] 28 U.S.C. §2679(a). See also *Moody v. United States*, 753 F.Supp. 1042 (N.D.N.Y. 1990).

2. The Discretionary Function Exception

The framers of the FTCA must have preconceived that the discretionary function exception would become the most significant exception when they listed it as the very first limit on the general waiver of sovereign immunity. No other exception has been more litigated in the United States, with the Supreme Court itself addressing the Congress' intent on several occasions over the last forty years. Despite the subsequent confusion surrounding the exception's scope and application, especially in aviation cases, the legislative history of the provision at least shows an attempt by Congress clearly define which types of discretionary acts of the government it wished to exclude:

> "The first subsection is . . . designed to preclude application of the bill to a claim against a regulatory agency, such as the Federal Trade Commission, or the Securities and Exchange Commission, based on the alleged abuse of discretionary authority by an officer or employee, whether or not negligence is alleged to have been involved. To take another example, claims based upon an allegedly negligent exercise by the Treasury Department of the blacklisting or freezing powers are also intended to be excepted. The bill is not intended to authorize a suit for damages to such discretionary acts *even though negligently performed and involving an abuse of discretion* (emphasis added). Nor is it desirable that the constitutionality of legislation, or the legality of a rule or regulation should be tested through the medium of a damage suit for tort. However, the common law torts of employees of regulatory agencies would be included within the scope of the bill to the same extent as torts of nonregulatory agencies."[139]

There are thousands of cases in the U.S. that have found the courts attempting to decipher exactly what Congress meant in interpreting the above passage. However, this section will be limited to Supreme Court pronouncements. The Court's first decision

[139] H.R. Rep. No. 2245, 77th Cong., 2d Sess., at 10.

came in 1953 in *Dalehite v. United States.*[140] Since then, the Court has revisited its holding in *Dalehite* on several occasions, most recently in 1991 in *Gaubert v. United States.*[141] From *Dalehite* to *Gaubert* provides an interesting story of judicial interpretation.

Early on after the FTCA was enacted, the Supreme Court issued two decisions concerning the discretionary function exception, *Dalehite* in 1953 and *Indian Towing v. United States*[142] in 1955. These decisions formed the basis for what became known as the "planning/operation test" used to determine the applicability of the discretionary function exception to bar claims based upon regulatory activity.[143] *Dalehite* arose out of a series of explosions that leveled the port city of Texas City, Texas, killing and injuring several people. The explosion was caused by a ship loaded with fertilizer intended to be shipped to Europe pursuant to a post-war fertilizer export program. The fertilizer contained ammonium nitrate, a basic ingredient used to make explosives, which the government manufactured at deactivated ordnance plants and purchased from private suppliers. The risks associated with the fertilizer were well known, yet it was bagged in highly combustible paper containers without warning labels. After longshoremen loaded some

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[140] 346 U.S. 15 (1953) (hereinafter "*Dalehite*").

[141] 499 U.S. 315 (1991) (hereinafter "*Gaubert*").

[142] 350 U.S. 61 (1955) (hereinafter "*Indian Towing*").

[143] The planning/operation distinction was actually articulated as early as 1886 by the Supreme Court in *Johnston v. District of Columbia*, 118 U.S. 19 (1886), when the Court found that the decisions of a municipal authority concerning a general plan of drainage and location of sewers were discretionary decisions pertaining to public health. On the other hand, the negligent physical construction and maintenance of the sewers was held to be actionable.

fertilizer onto two French steamers also carrying explosives, the fertilizer caught fire and the two ships exploded.[144]

The Court found that the claims, irrespective of any negligence on the part of the government, were not actionable under the FTCA by virtue of the discretionary function exception. It found the decision to institute the fertilizer export program and forego packaging and labeling precautions involved serious policy-level judgments and discretion at the highest levels of government.[145] The Court extended the exception by holding that "[I]t necessarily follows that acts of subordinates in carrying out the operations of government in accordance with official directions cannot be actionable."[146]

If *Dalehite* defined the "planning" side of the "planning/operation" distinction, then *Indian Towing* defined the "operation" side. In *Indian Towing*, suit was brought under the FTCA after a barge ran aground allegedly due to the negligent operation of a light house by the Coast Guard.[147] The Court, in rejecting the government's argument that the exception should apply to all uniquely governmental functions such as in this case the operation of a lighthouse,[148] found that "once [the government] exercised its discretion to operate a lighthouse . . . and engendered reliance on the guidance afforded by the light, it was obligated to use due care to make certain that the light was kept in good working

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[144] *Dalehite*, supra note 140, at 20.

[145] *Id.*, at 35-41.

[146] *Id.*, at 36.

[147] *Indian Towing*, supra note 142, at 62.

[148] The government defended the case by focusing not on the discretionary function exception, but by arguing that the language of the FTCA imposing liability "in the manner and to the same extent as private individuals under like circumstances" should be read broadly to exclude activities that private persons do not perform, in this case operating a lighthouse for navigational purposes. *Id.*, at 64.

order . . . ."[149] In other words, once the government made the discretionary decision to operate the lighthouse, it had to operate that service with due care or be held liable just as any private individual would. For the next thirty years, this decision would be instrumental to aiding lower courts in their efforts to define the scope of the exception. Unfortunately, the line between the planning/operation distinction was never really that bright, and courts subsequently struggled with the distinction until the Supreme Court revisited the issue again in *United States v. Varig Airlines*[150] in 1984.

Varig was a consolidation of two separate cases, one which alleged that the FAA negligently certified the design of an aircraft as safe (*United States v. Varig Airlines*), and the second which alleged the FAA negligently issued a supplemental-type certificate for installation of a heater contrary to FAA regulations (*United States v. United Scottish Insurance Co.*). The facts in *Varig* involved a spot check system implemented under FAA regulations whereby an inspector would weigh a variety of factors before choosing which aircraft to inspect prior to issuing a certificate. In this case, the inspector, based on the manufacturer's reports and past performance, issued the certificate without an inspection. After the plane caught fire and killed 124 people on board, plaintiffs brought suit against the FAA for certifying the aircraft as safe.[151] *United Scottish*, on the other hand, involved a defective heater that was actually inspected by the FAA prior to the issuance of supplemental type certificate. After the heater caused the plane to catch fire and kill all

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[149] *Id.*, at 69.

[150] 467 U.S. 797 (1984) (hereinafter "*Varig*").

[151] *Id.*, at 797-80.

four people aboard, plaintiffs brought suit against the FAA for negligently certifying the heater as safe.[152]

The Court found that the discretionary function exception applied to both cases, holding that "when an agency determines the extent to which it will supervise the safety procedures of private individuals, it is exercising discretionary regulatory authority of the most basic kind."[153] Even though the Court inexplicably made no attempt to distinguish the facts in the two cases, it reiterated two important factors in defining the limits of the exception. First, "it is the nature of the conduct rather than the status of the actor, that governs whether the discretionary function applies in a given case."[154] This dispelled any notion that discretion was only to be exercised at the highest levels of government since "the basic inquiry . . . is whether the challenged acts of a Government employee--whatever his or her rank--are of the nature and quality that Congress intended to shield from tort liability."[155] Second, "[the exception] plainly was intended to encompass the discretionary acts of the Government acting in its role *as a regulator* (emphasis added) of the conduct of private individuals . . . to prevent judicial 'second-guessing' of legislative and administrative decisions grounded in social, economic, and political policy through the medium of an action in tort."[156] At least in the context of FAA certification and inspection

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[152] *Id.*, at 780-81.

[153] *Id.*, at 819-20.

[154] *Id.*, at 813.

[155] *Id.*.

[156] *Id.*.

procedures, *Varig* brought these government regulatory procedures under the protection of the discretionary function exception.

The Court issued two rulings in 1988 concerning the exception, rendering the exception inapplicable to situations where a federal employee failed to follow specific agency regulations in *Berkovitz v. United States*,[157] yet continuing its broad interpretation in *Boyle v. United States.*[158] In *Berkovitz*, the Court considered whether the Food and Drug Administration and National Institute of Health's wrongful licensing of a polio vaccine manufacturer and approving the release of some of the vaccine was a discretionary act protected by the exception. Because those agencies acted contrary to specific and detailed agency procedures mandated in federal regulations, the Court refused to apply the exception since agency employees had no discretion to choose whether or not they would follow a specific mandatory agency directives.[159] In summation, the Court stated that "the exception will not apply when a federal statute, regulation or policy specifically prescribes a course of action for an employee to follow . . . with no rightful option but to adhere to the directive." In contrast, where "the challenged conduct involves an element of judgment . . . and decisions [are] based on considerations of public policy," the discretionary function exception applies.[160]

In *Boyle*, the Court held the exception barred a suit against the U.S. alleging that a helicopter hatch had been negligently designed in accordance with government

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[157] 486 U.S. 531 (1988) (hereinafter "*Berkovitz*").

[158] 487 U.S. 500 (1988) (hereinafter "*Boyle*").

[159] *Berkovitz*, supra note 157, at 544.

[160] *Id.*, at 536-37.

specifications.[161] In interpreting Congressional intent, the Court stated that the "selection of the appropriate design for military equipment to be used by our Armed Forces is assuredly a discretionary function . . . [i]t often involves not merely engineering analysis but judgment as to the balancing of many technical, military, and even social considerations, including specifically the trade-off between greater safety and greater combat effectiveness."[162]

The Court's most recent pronouncement on the discretionary function exception came in 1991 with *Gaubert v. United States,*[163] and did much to summarize its rulings over the past forty years and articulate the exception's scope. *Gaubert* involved an FTCA suit against the Federal Home Loan Bank Board (FHLBB). The FHLBB, in accordance with its regulatory function, began to oversee certain day-to-day operations of the Independent American Savings Association (IASA), which included recommending the hiring of consultants, advising when subsidiaries should be placed in bankruptcy, reviewing draft pleadings to be used in litigation, and mediating salary disputes. After the Federal Savings and Loan Insurance Corporation subsequently assumed receivership of the failing IASA, the chairman of the board and IASA's largest stockholder brought suit against the FHLBB, alleging that it had negligently carried out its supervisory activities.[164]

The Court held the FHLBB's regulatory activities were protected by the exception, finding that such acts or omissions involved the exercise of discretion *in*

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[161] *Boyle*, supra note 158, at 511.

[162] *Id.*.

[163] *Gaubert*, supra note 141.

[164] *Id.*, at 315-16.

furtherance of public policy goals (emphasis added), and reaffirming the principle stated in *Varig* that "it is the nature of the conduct, rather than the status of the actor, that governs whether the [exception] applies in a given case."[165] The Court addressed plaintiff's reliance on the principles of *Indian Towing*, i.e., that once the FHLBB made the discretionary decision to supervise the activities of IASA it had no discretion to do so in a negligent manner, by explaining its decision in *Indian Towing* as such:

> "The United States was held liable, not because the negligence occurred at the operational level but because making sure the light was operational "did not involve any permissible exercise of policy judgment" (citing *Berkovitz* at 538)."[166]

This passage can only be construed to effectively dispel any notion of the utility of a "planning/operation" distinction, a product of the *Dalehite* and *Indian Towing* decisions mentioned earlier. In fact, the Court observed that the reference to operational matters in *Dalehite* "was merely description of the level at which the challenged conduct occurred. There was no suggestion that decisions made at an operational level could not also be based on policy."[167] Stated another way, the level of the act is immaterial, as is "the routine or frequent nature of a decision"[168] -- what matters is whether the decision is grounded in some social, economic or political policy which Congress intended to exempt from tort liability.

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[165] *Id.*, at 325.

[166] *Id.*.

[167] *Id.*.

[168] *Id.*, at 329-30.

What has emerged from these Supreme Court pronouncements to replace the planning/operation distinction is a two-tiered analysis which makes considerably more sense. When determining the applicability of the exception, a court must first decide if the governmental action involves an element of judgment or choice.[169] The Fourth Circuit Court of Appeals has aptly interpreted this to merely question whether the conduct is subject to any mandatory federal statute, regulation, or policy prescribing a specific course of action as articulated in *Berkovitz.*[170] If such a mandatory directive exists, the conduct is taken outside the scope of the discretionary function exception. As set forth in *Gaubert,* the second tier of the analysis is whether the choice or judgment is based on considerations of public policy and grounded in specific decisions. Undoubtedly, this second tier of the analysis will continue to be the more difficult one to decipher. Further, because general rules applicable to all cases are virtually impossible to articulate beyond that stated above, future cases involving the discretionary function exception will have to be settled on a case-by case basis depending on the particular facts presented.

a. Applicability in Aviation Tort Cases

For several reasons, including concerns over safety, economics and national security, the aviation industry has historically been one of the most heavily regulated industries in the United States. Although the Airline Deregulation Act of 1978[171] has eliminated much of the economic regulation, virtually every other aspect of the industry remains regulated by the federal government, predominately through Federal Aviation

[169] *Berkovitz*, supra note 157, at 536, and *Gaubert*, supra note 141, at 325.

[170] *Baum v. United States*, 986 F.2d 716, 720 (4th Cir. 1993).

[171] 49 U.S.C. App. §40101 *et seq.*

Administration. Thus, it should come as no surprise that the discretionary function exception has been raised in many aviation cases, with the government invoking the defense in cases arising out of its conduct while performing regulatory-type functions.

While this section does not attempt to discuss every aviation case discussing or applying the exception,[172] several broad categories of cases may be outlined. These include allegations involving an agency's: failure to adopt regulations or its failure to consider certain factors, appropriately weigh relevant factors, or thoroughly investigate the situation prior to promulgating regulations; negligence in certifying aircraft and air personnel; negligence in preparing and publishing navigational aids; negligence in the design, equipping and staffing of air navigation facilities; and liability for the actions of air traffic controllers and flight service station employees in the performance of their duties. Generally, and allowing for some permutations depending on the specific facts of the case, cases in the first four categories have traditionally enjoyed the protection of the discretionary function exception while cases in the last category have not. Also, one must be careful in evaluating many of the following decisions that were issued before the Supreme Court's clarification of the contours of the exception in *Varig, Berkovitz, and Gaubert*. Some prior holdings relied on the now defunct planning/operation distinction discussed above.

b. Negligence in Promulgating Regulations

Allegations that a federal agency failed to adopt appropriate regulations, failed to conduct an appropriate investigation of matters prior to promulgating regulations, or

[172] For a more detailed and comprehensive discussion of aviation cases involving the discretionary function exception, see Kreindler, supra note 132, §§ 5.01[10][d], 5.02 and 5.03.

failed to properly consider (or consider at all) certain factors are the classic types of agency discretion that will find protection under the discretionary function exception. Simply stated, how an agency decides it will regulate in accordance with its statutory mandate is exactly the type of regulatory or quasi-legislative activity the exception was envisioned to protect, since it would operate to avoid any second-guessing of discretionary decisions via the Federal Tort Claims Act. For example, in *George v. United States*,[173] plaintiff brought suit against the Federal Aviation Administration for failing to promulgate regulations banning the use of coterminous dissimilar materials (brass and steel) in a fuel system because the corrosive effect of the combination was foreseeably hazardous. In applying the discretionary function exception, the court found the applicable regulations advised against the use of coterminous metals whenever possible, but did not ban their use altogether.[174] The decision not to ban their use was held to be precisely the type of policy determination for which the government is protected from liability.[175]

The following cases further illustrate the exception's applicability to allegations of an agency's failure to adopt or failure to properly promulgate regulations: *Miller v. United States*,[176] holding that the FAA's failure to promulgate more stringent air safety regulations is not actionable under the FTCA; *Garbarino v. United States*,[177] barring a

[173] 703 F.2d 90 (4th Cir. 1983).

[174] *Id.*, at 91.

[175] *Id.*, at 92.

[176] 522 F.2d 386, 387 (6th Cir. 1975).

[177] 666 F.2d 1061 (6th Cir. 1981).

claim that the government failed to consider the crashworthiness doctrine before promulgating airworthiness regulations; *Baxley v. United States*,[178] similarly barring a claim challenging a decision of the FAA not to immediately regulate "ultralight" aircraft but postpone the decision to accept comments on the proposed rules; and *West v. United States*,[179] finding the acts of FAA employees in designing departure procedures for planes taking off from an airport and the decision not to conduct night test flights of the visual climb aspects of the procedure because of the associated costs of doing so fell within the discretionary function exception.

It is important to note that in none of the above cases did a statute or regulation exist that mandated a specific course of action or conduct that a government employee failed to perform or performed in a negligent manner. If such a statute or regulation does exist, there is no room for the exercise of discretion. Thus, in *Taylor v. United States*,[180] applying the principles enunciated by the Supreme Court in *Berkovitz*, the district court found that the FAA inspectors had no discretion to choose to carry out certain mandated duties relating to maintenance and execution of weight and balance procedures, as those procedures were required by the *Airworthiness Inspector's Handbook* Order 8300.9.[181]

One final type of case in this category is worth mentioning. Although not necessarily an attack on the government's negligence in *promulgating* regulations, plaintiffs often file suit under the FTCA alleging an agency's negligence in *interpreting* its

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[178] 767 F.2d 1095, 1098 (4th Cir. 1985).

[179] 830 F.2d 1044, 1048 (9th Cir. 1987).

[180] 23 Av. Cas. (CCH) 17,348 (E.D. Ark. 1991).

[181] *Id.*.

own regulations or the underlying statute which serves as the basis for the agency's existence. These cases usually involve allegations of constitutional torts,[182] and were not envisioned as an "ordinary tort" actionable under the FTCA. In short, the United States cannot be sued under the FTCA on the theory that there has been a violation of plaintiff's constitutional rights. Thus, in the recent case of *Roundtree v. United States*,[183] a plaintiff's claim that (1) the FAA and its employees negligently construed the Federal Aviation Act to permit them to revoke or suspend certificates and (2) that these actions amounted to an unconstitutional assumption of legislative power were barred by the discretionary function exception.[184] Concerning the issuance and revocation of certificates, the court stated "it is difficult to imagine a more policy-driven mission or more policy-driven set of actions by an agency. . . . Plaintiff seeks to attack the whole underlying basis of the FAA's authority to issue and enforce rules and regulations which affect certifications. By no stretch of the imagination could this broad attack on the underlying power and discretion of a federal agency to carry out its mandate be within the scope of FTCA liability. Were it otherwise, the whole of our public and administrative law would be subsumed within the FTCA."[185]

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[182] See e.g., *Bivens v. Six Unknown Named Agents of the Federal Bureau of Narcotics*, 403 U.S. 388 (1971).

[183] 40 F.3d 1036 (9th Cir. 1994).

[184] *Id.*, at 1036-37.

[185] *Id.*, at 1039. See also *Foster v. United States*, 70 F.3d 1084 (9th Cir. 1995), involving a constitutional challenge to FAA authority.

c. Negligence in Certifying Aircraft and Air Personnel

Since the Supreme Court has specifically addressed the issue of the applicability of the discretionary function exception to the certification of aircraft with its decision in *Varig*, there should be little doubt about the scope of the exception in certification or licensing cases. As further defined in the *Berkovitz* and *Gaubert* holdings mentioned earlier, the necessary analysis should be conducted in two tiers: first, does the action involve an element of judgment or choice or is it mandated by some type of federal regulation; and second, if an element of judgment or choice exists, is it grounded in public policy considerations. Applying this two-tiered analysis to the facts in *Varig* retrospectively still leads to the same conclusion (albeit in somewhat different order of analysis). First, decisions by FAA inspectors involving which aircraft to inspect or which parts to inspect will involve an element of policy or choice in the absence of mandatory regulations prescribing specific inspection which leave no room for discretion as to what to inspect. Second, the type of inspection method, on-spot and limited inspections, were grounded in public policy considerations of manpower and cost. In fact, the inspector's regulations called for this type of limited inspection method, and for the inspector to use his or her discretion in deciding when to physically inspect and exactly what to inspect. Plaintiff's claim in *Varig* therefore was tantamount to an attack on the inspection scheme itself as outlined in the regulations, exactly the type of action Congress wished to preclude under the FTCA. Thus, one can only conclude that cases with facts similar to *Varig* will continue to be protected under the discretionary function exception.

Cases involving the licensing of air personnel have produced a substantial body of law, and the courts subsequent to the *Varig, Berkovitz and Gaubert* progeny have had little difficulty applying the two-tiered framework in a variety of cases. For instance, in *Redmon v. United States*,[186] the FAA issued new regulations requiring all pilots rated under single-engine instrument flight rules (IFR) who were seeking a multi-engine IFR rating to demonstrate IFR flight skills. However, the new rules provided a "grace period" for pilots who commenced multi-engine training prior to implementation of the new rule. Plaintiff's husband was accorded this grace period and the FAA certified him to fly multi-engine aircraft without any restriction and without having to demonstrate IFR flight skills. After plaintiff's husband was killed in a crash, plaintiff brought suit for the FAA's negligent certification of her husband.[187] Citing *Varig* and *Gaubert*, the 10th Circuit Court of Appeals held that the FAA inspector in this case merely followed a clear FAA directive allowing for the grant of a grace period to airmen such as plaintiff's husband, and the actions of agency employees in furtherance of agency directives are shielded from tort liability when the directive itself is grounded in policy considerations. Like the decision to implement a spot-check system in *Varig*, the decision to grant a grace period to those who were caught in the midst of a rule change was a discretionary decision by the FAA when promulgating the regulation. The Court went on to distinguish *Berkovitz*, finding that the present case did not involve the "specific mandatory statutory or regulatory directives" of the type violated by the inspector in *Berkovitz*.[188] On the contrary, the inspector in

[186] 934 F.2d 1151 (10th Cir. 1991).

[187] *Id.*, at 1152-53.

[188] *Id.*, at 1156.

Redmon did exactly what the regulation called for (i.e., granting a waiver to those fell into a certain category) whereas the inspector in *Berkovitz* did not (i.e., granting a license without conducting the procedures mandated by regulation).

Because pilots and other aviation personnel undergo regular medical monitoring, cases involving the issuance or denial of medical certification and the discretionary function arise quite frequently. In *Foster v. United States*,[189] the plaintiffs of a decedent who was killed in a helicopter crash brought suit for negligently issuing a special medical certificate to the pilot. Applying the two-step analysis, the Ninth Circuit dismissed the action under the discretionary function exception; first finding that a federal flight surgeon's action in issuing the certificate was clearly discretionary because of the medical judgment involved, and then finding that the decision was inherently policy-driven based on the FAA's public safety policies which required considerations of social and economic policies.[190] On the other hand, examinations conducted by aviation medical examiners in accordance with clearly articulated medical standards may not allow for the exercise of judgment of a policy nature. Thus, in *Leone v. United States*,[191] an aviation medical examiner was negligent for certifying a pilot with a heart problem when it was found that the examiner failed to follow clearly articulated medical standards during the physical examination.[192]

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[189] 923 F.2d 765 (9th Cir. 1991).

[190] *Id.*, at 768-69.

[191] 690 F. Supp. 1182 (E.D.N.Y. 1988).

[192] *Id.*, at 1188.

d. Negligence in Preparing and Publishing Navigational Aids

Quite often, governmental agencies will prepare and publish flight information materials used in aviation such as aeronautical charts and airport layout diagrams. Liability under the FTCA will depend on a variety of factors, but generally, decisions to publish these materials and exactly what information to provide will be protected as a discretionary act, while the negligent dissemination or depiction of erroneous information will not be protected.[193] In essence, cases involving the negligent publication of flight information or aeronautical charts are really just a subset of a more general body of cases alleging a negligent failure of the government to warn of a particular danger when it had the duty to do so. These types of suits will be barred by the discretionary function exception so long as the decision to warn, or the failure to warn, is discretionary and grounded in social, economic or political judgments.

For example, in *Daigle v. United States*,[194] plaintiff's suit alleging that the Army failed to give adequate warnings of toxic air emissions was barred since the complaint questioned the Army's decision involving the planning and dissemination of information regarding the hazards, which was "infused with policy implications of prompt and cost-effective yet safe cleanup of hazardous waste."[195] Similarly, in *Johnson v. United States Department of the Interior*,[196] the court found that the National Park Service decisions considering the number of climb warnings on a particular range were part of an overall

[193] See Kreindler, supra note 132, at 5-76.

[194] 972 F.2d 1527 (10th Cir. 1992).

[195] *Id.*, at 1534.

[196] 949 F.2d 332 (10th Cir. 1991).

policy decision that considered minimizing regulation of backcountry climbing and preserving the scenery and natural character of the park in question.[197]

If however, a failure to warn is unconnected to any policy-type decision, the discretionary function exception may not apply. Thus, in *Summers v. United States*,[198] the Park Service's failure to warn of hot coals on a public beach was "inadvertent -- not the product of a choice rooted in 'social, economic, or political policy.'"[199] Likewise, in *Andrulonis v. United States*,[200] a suit alleging a Center for Disease Control (CDC) scientist's negligent failure to warn of dangers presented by rabies research involved no discretion since the court found:

> ". . . neither a regulatory framework nor a defined policy that could serve as the basis for infusing all decisions of CDC employees with policy implications. Indeed, it is hardly conceivable that the CDC would ever have a policy to keep silent about obvious, easily-correctable dangers in experiments using drugs supplied by the CDC."[201]

In the context of aviation, two Tenth Circuit Court of Appeals cases are illustrative of the applicability of the discretionary function exception in this category. In *Murray v.*

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[197] *Id.*, at 337-38. See also, *Kiehn v. United States*, 984 F.2d 1100, 1105 (10th Cir. 1993) (decisions of whether and where to post warning signs involved policy considerations of resource allocation, visitor safety and scenic preservation) and *Layton v. United States*, 984 F.2d 1496 (8th Cir. 1993) (similar holding).

[198] 894 F.2d 325 (9th Cir. 1990).

[199] *Id.*, at 328.

[200] 952 F.2d 652 (2d Cir. 1991).

[201] *Id.*, at 655. Contrast this with *In re Korean Air Lines Disaster*, 597 F. Supp. 613 (D.D.C. 1984), dismissing claims that the failure of the military to adopt a policy to use available equipment and procedures to warn a civilian airliner of danger since such decisions are basic policy decisions relating to national security.

United States,[202] the United States was found negligent for publishing and disseminating erroneous aeronautical charts indicating the availability of runway lighting throughout the night when it was not. Alternatively, in *Weiss v. United States*,[203] an agency's decision not to depict (warn of) a 150-foot aerial tramway cable as an obstruction on an aeronautical chart was a discretionary act protected by the discretionary function exception. These two cases highlight the general rule that the exception will protect policy decisions such as what and how much information to depict on aeronautical charts, but will not protect the erroneous depiction of such information after the decision is made to depict the data.[204] Thus, in a scenario where an object such as a new 800-foot radio tower may potentially interfere with aviation in a given area, the decision to publish new aeronautical charts to depict the tower may very well be a discretionary one and preempted from liability under the FTCA. However, once the decision is made to publish new charts and include the tower, liability will follow if the 800-foot tower is depicted as only being 500-feet and proximately causes an accident.

e. Negligence in Design, Equipping and Staffing of Air Navigation Facilities

The discretionary function exception has been applied quite broadly in suits alleging that the government negligently designed, equipped or staffed air navigation facilities. Like initial decisions concerning the operation of a particular control tower in a particular area,[205] these decisions are inextricably grounded in policy-type determinations

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[202] 327 F. Supp. 835 (D. Utah 1971), *aff'd*, 463 F.2d 208 (10th Cir. 1972).

[203] 889 F.2d 937 (10th Cir. 1989).

[204] See Kreindler, supra note 132, at 5-76.

[205] See *United States v. Union Trust*, 350 U.S. 907 (1955).

which weigh such competing factors as safety and costs, and cases falling in this category are unlikely to survive after application of the exception. Thus, in *Colorado Flying Academy Inc. v. United States*,[206] plaintiff's claim that the design and configuration of a terminal control area was negligent was barred by the exception, as was the FAA's decision to permit a television tower's construction in a community despite its potential danger in *Reminga v. United States*.[207]

f. Negligence of Air Traffic Controllers and Flight Service Station Employees

In contrast to the discussion above, the decisions made by air traffic controllers (ATCs) and flight service station (FSS) employees during their day-to-day duties are generally not grounded in policy and therefore are not protected by the discretionary function exception. The government rarely defends claims alleging negligence on the part of air traffic controllers or flight service station employees by asserting that their acts were discretionary; rather, most cases turn on the elements of negligence (i.e., duty, breach, damage and proximate cause). It is not surprising then that many of these cases pit pilot versus controller in the quest to determine who was at fault.

The regulations covering ATC and FSS activities are very detailed to say the least. Guided predominantly by the FARs, the Air Traffic Control Manual (ATCM), and Federal Aviation Flight Assistance Service Handbook, virtually every duty is covered and is prescribed a specific course of action in nearly all circumstances. Therefore, applying the Supreme Court's two-tier analysis discussed earlier, it will be difficult for the government

[206] 724 F.2d 871 (10th Cir. 1984).

[207] 631 F.2d 449 (6th Cir. 1980).

to show either the first or second tier in many cases, since so many of the duties are spelled out in mandatory fashion with rare cases of policy-grounded discretion.

Many of the early ATC cases were decided based on the now-defunct planning/operation distinction, with ATC activities forming the operational-type activity not encompassed in the discretionary function exception. The Supreme Court, in affirming the appellate court's decision in *Eastern Airlines v. Union Trust Co.*[208] implicitly paved the way for courts to conclude that actions of ATCs and FSS employees were operational in nature and not protected by the exception. In *Eastern*, the ATC cleared two airplanes to land on the same runway at approximately the same time, resulting in a crash and the death of 55 people. In rejecting the government's claim that tower operators perform governmental functions of a regulatory nature and that no private individual has such power, the court stated:

> "[I]f a government towerman negligently clears two planes to land on the same runway at the same time . . . the government is liable in the same manner and for the same reason that it is liable for injury done by a driver of a mail truck who, in exercising discretion on how to drive, negligently runs through a red traffic light."[209]

Several courts subsequently interpreted the 1955 decision in *Eastern* to apply a planning/operation test to reach the conclusion that ATC activities are not protected by the discretionary function exception, and although this approach has been outrightly rejected by *Varig* and its progeny, it is doubtful that the result in *Eastern* would change under today's analysis. Again, the analysis must look first to whether the controller has

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[208] 221 F.2d 62 (D.C. Cir. 1955), *aff'd sub nom., United States v. Union Trust Co.*, 350 U.S. 907 (1955).

[209] *Id.*, at 73, 78.

discretion in taking a particular action. This answer is likely to be found in the ATC Manual. If freedom of discretion can be found among the specific directives, the next question must be whether the discretion is grounded in a public policy choice. A similar analysis will be conducted for activities of FSS employees, but as stated previously, the exception's applicability will be rare since these cases will likely be defended on the traditional elements of negligence.[210]

3. The Misrepresentation Exception

Tucked away in subsection (h) of §2860 of the FTCA, between exceptions based on slanderous and deceitful acts of government employees, lies the exception to tort liability based on negligent misrepresentations.[211] Somewhat similar to the discretionary function exception, the often-articulated rationale behind the misrepresentation exception has been that finding the government liable for injuries suffered as a consequence of inaccurate information provided by a government employee would discourage the government from performing many important functions.[212] The exception has been applied generally in cases involving government inspection and certification activities, including those involving inspection and certification of aircraft and aviation equipment. Also, the defense has been raised, usually unsuccessfully, in cases where air traffic controllers have provided erroneous information to pilots.

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[210] See, e.g., *Davis v. United States*, 824 F.2d 549 (7th Cir. 1987) (holding the United States not liable for the alleged negligence of an FAA weather briefer given the negligence of the pilot and other intervening causes for the accident); and *Largent v. United States*, 910 F.2d 497 (8th Cir. 1990) (pilot's negligence contributed to accident relieving FSS employees and United States from liability).

[211] 28 U.S.C.A. §2860(h).

[212] *Ramirez v. United States*, 567 F.2d 854, 856 (9th Cir. 1977).

Before reviewing the caselaw, a couple of features are worth noting concerning the exception. First, courts have held that general federal law, not state law, will define misrepresentations, thereby avoiding conflicts caused by different definitions amongst the states.[213] Second, general federal law has defined the term according to the traditional and commonly understood definition of the term. Generally, the elements are: (1) the supplying of false information in the course of business, profession or employment on which the supplier of information has a pecuniary interest and he fails to exercise reasonable care in obtaining or communicating the information; (2) justifiable reliance upon the information by the person receiving the information; and (3) pecuniary loss suffered by the person receiving the information through reliance.[214]

One of the leading Supreme Court cases dealing with the exception is *United States v. Neustadt*[215] which involved suit under the FTCA by the purchaser of a home, who claimed he relied upon a negligent inspection and appraisal by the Federal Housing Administration and was induced to pay more for the property than it was worth. The Court held that the misrepresentation exception bars suit for negligent as well as intentional misrepresentations and cannot be circumvented by stating that the gist of the claim lies in "negligence" rather than in "misrepresentation"[216] Specifically, any economic

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[213] *United States v. Neustadt*, 366 U.S. 696, 705 (1961) (hereinafter "*Neustadt*").

[214] *Id.*, at 706. The Court in *Neustadt* relied on the elemental definition as stated in the Restatement (Second) of Torts 552 (1965).

[215] *Id.*.

[216] *Id.*, at 702.

loss suffered in reliance upon a negligent government inspection and appraisal is not actionable under the FTCA.[217]

The difficult question raised by the *Neustadt* holding is how does one distinguish between a misrepresentation, which is excepted from suit under the FTCA, and an underlying negligent act performed during the process of an inspection, which is not excepted (assuming the negligent act is not protected by the discretionary function exception discussed above). The Supreme Court tried to answer this question in 1983 in *Block v. Neal*,[218] by stating that the government is not protected by the misrepresentation exception if the court finds the inspection was the negligent performance of an operational task.

The claim in *Neal* arose out of a suit against Farmers Home Administration (FmHA) for negligent inspection and supervision during construction of plaintiff's home. Following inspection and receipt of a rural housing loan from the FmHA, plaintiff discovered several construction defects in the house and brought suit against the government.[219] In its holding, the Court reviewed its decision in *Neustadt*, stating that *Neustadt* restricted the application of the misrepresentation exception to cases of economic loss which are "wholly attributable" to the plaintiff's reliance on a negligent misrepresentation. There, "the gravaman of the action . . . was that the plaintiff was misled by a 'Statement of the FHA Appraisal' prepared by the Government," and the

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[217] *Id.*, at 706. The British courts follow a similar line of reasoning for purely economic loss due to negligent governmental inspection. See *Murphy v. Brentwood District Council*, 2 All ER 908 [1990].

[218] 460 U.S. 289 (1983) (hereinafter "*Neal*").

[219] *Id.*, at 290.

government's breach was in negligently relaying that information to the plaintiff.[220] Thus, because plaintiff's suit in *Neustadt* focused on reliance on an erroneous representation, the misrepresentation exception barred the action. Conversely, the action in *Neal* was based on the negligent conduct of the government in carrying out the operational tasks of inspection and supervision, not in negligently representing certain facts to the plaintiff.[221] The distinction, albeit a subtle one, is that a plaintiff must plead and prove negligent conduct in carrying out specific duties such as in performing an inspection to be successful[222] -- allegations that a plaintiff relied on a negligent misrepresentation (a better term may be "misinformation") of the government will be barred by the exception.

In the context of aviation cases, the misrepresentation exception has fallen into a state of disuse in recent years, usually appearing only as an ancillary issue or by happenstance in a case whose facts happen to deal with aviation and its regulators. The defense is still raised quite frequently by the government in claims against other federal agencies alleging detrimental reliance on representation of a government employee, just not in the context of cases alleging negligence of air traffic controllers, flight service station employees, certification or inspection of aircraft, or other traditional aviation tort

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[220] *Id.*, at 296.

[221] *Id.*, at 297.

[222] As discussed above, it should be noted that the government may still raise the discretionary function exception for allegations of negligent inspections and the negligent issuing of certificates and licenses. The analysis then would be the two-tiered test outlined in *Gaubert;* i.e., (1) did the inspection governmental action involve an element of judgment or choice or was it performed pursuant to some mandatory directive, and (2) was the judgment or choice based on public policy considerations. In *Neal,* it is unclear why the government did not raise the discretionary function exception, but the Court notes in its opinion that the limited question before it involves the misrepresentation exception and not "whether recovery is barred by any other provision of the Tort Claims Act, including the exception for . . . discretionary functions." *Neal,* supra note 218, at 294.

cases against the federal government.[223] However, some of the older cases dealing with the exception warrant review since the defense could return in cases of GPS-related liability.

Historically, the defense has been used generally in air traffic control and certification of aircraft cases, and their disposition somewhat parallels cases applying the discretionary function exception. To take the former type first, unless plaintiff's attorney is foolish enough to plead his or her case under the traditional elements of a misrepresentation, claims alleging a failure to warn or provide correct information are generally not deemed misrepresentations. For instance, in *Ingham v. United States*,[224] the failure of air traffic controllers to warn of bad weather was not considered a misrepresentation for the purposes of the exception, nor was the failure of the Air Force to warn pilots of the dangers of collision because of a failure to study commercial passenger traffic around an Air Force base in *United Air Lines v. Weiner*.[225] Since the gravaman of the complaints were in the negligent performance of operational tasks as discussed in *Neal, supra*,[226] the misrepresentation exception was not applicable.

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[223] When the defense has been raised in recent aviation cases, the courts have summarily disposed of misrepresentation issues in rather short fashion with virtually no legal analysis. See, e.g., *Atorie Air, Inc. v. FAA*, 942 F.2d 954 (5th Cir. 1991) (finding that the misrepresentation exception barred an air cargo company's claim that FAA officials made misrepresentations upon which plaintiff's relied to their detriment) and *Midland National Bank v. Conlogue*, 720 F. Supp. 878 (D. Kan. 1989) (finding plaintiff's claims of the Government's failure to use due care in the use and maintenance of a plane separate and independent of any communications or representations).

[224] 373 F.2d 227 (2d Cir. 1967), *cert. denied*, 389 U.S. 301 (1967).

[225] 335 F.2d 379 (9th Cir. 1964), *cert. denied*, 379 U.S. 951 (1964).

[226] Supra note 218.

Cases involving inspection and certification of aircraft have seen the exception applied more successfully. In *Mirival Inc. v. Planes Inc.*,[227] after a buyer sued defendant vendor for selling him a defective aircraft, the vendor brought a third-party complaint against the United States based upon the FAA's certification of the aircraft and the vendor's reliance on that certification. The court acknowledged the difficulty of drawing the line between negligent conduct and negligent misrepresentation since an element of misrepresentation runs through most forms of negligent conduct, but found the consequential injuries, if any resulted from the government, resulted from representations made by the FAA in issuing an airworthiness certificate and not from its negligent conduct.[228] The court found the case a "classic example of detrimental reliance upon an allegedly negligent misrepresentation in a commercial transaction,"[229] with the gravaman of the complaint focusing on the vendor's reliance on what the certification represented as to the condition of the aircraft. The negligent conduct or inspection by the FAA was "purely secondary" to the claim involving "direct reliance on governmental communication of facts."[230]

On the other hand, some courts have come to opposite conclusions in factually-similar cases, finding the misrepresentation and reliance secondary to the negligent performance of inspection or certification duties. In *In re Air Crash Disaster near Silver*

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[227] 306 F. Supp. 855 (N.D. Ga. 1969).

[228] *Id.*, at 860.

[229] *Id.*

[230] *Id.*, at 859-60. See also, *Lloyd v. Cessna Aircraft Co.*, 429 F. Supp. 181 (E.D. Tenn. 1977) (applying the exception to cases involving personal injury as well as purely economic loss); *Summers v. United States*, 480 F. Supp. 347 (D. Md. 1979); and *Knudsen v. United States*, 500 F. Supp. 90 (S.E.N.Y. 1980).

Plume, Colorado,[231] and *Fireman's Fund Insurance Co. v. United States*,[232] both involving FAA certifications, the respective courts found that the essence of the claims involved the negligent performance of inspection functions contrary to government directives, which were not barred by the misrepresentation exception.

As the above discussion shows, cases involving the misrepresentation function are difficult to reconcile. Quite often the issue turns on how the case is pled -- detrimental reliance on whatever form of governmental representation vice negligence in carrying out specific functions which underlie the misrepresentation. In the context of aviation cases and the misrepresentation exception, it appears that plaintiffs have recognized this subtle nuance by pleading and attempting to prove negligent conduct of government employees rather than detrimental reliance on government-provided information. This explains the waning of the exception in aviation cases in recent years. Perhaps this waning is a reflection of where the legal discussion in most of these cases should be -- under the discretionary function exception of the FTCA and the two-tiered analysis enunciated by the Supreme Court in *Varig*, *Berkovitz* and *Gaubert*.

4. Exception for Claims Arising in a Foreign Country

A fundamental principle of the Federal Tort Claims Act is that governmental liability is determined "in accordance with the law of the place where the act or omission occurred."[233] As mentioned earlier, this means that the law of the state where the tort

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[231] 445 F. Supp. 384 (D. Kan. 1977).

[232] 527 F. Supp. 328 (E.D. Mich. 1981).

[233] 28 U.S.C. § 1346(b).

occurred will govern all substantive issues of liability.[234] In *Richards v. United States*,[235] the Supreme Court interpreted this provision to mean that when Congress decided to treat the government as a private person under the law of the place of the wrong, it intended for the entire substantive law of the state where the wrongful act or omission occurred, including that state's choice-of-law rules.

Since the law of the place of the negligence governs, it is not surprising that Congress chose to exclude claims arising in a foreign country from FTCA application.[236] The rationale behind the foreign claims exception reflects two general concerns of Congress: first, to limit the application of foreign law to define U.S. liability; and second, to limit the extraterritorial application of U.S. law in foreign jurisdictions. Two Supreme Court pronouncements are indicative.

In *United States v. Spelar*,[237] the administratrix of the estate of the deceased sued under the FTCA for the death of her son, a flight engineer with American Overseas Airlines, after he was killed in an airplane crash at Harmon Field, Newfoundland. The airfield was leased from Great Britain by the United States for a term of 99 years. The

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[234] See discussion, supra, in Section A, Subsection 1, of this Chapter. Federal law, namely the Federal Rules of Civil Procedure, will be used to address only the procedural aspects of FTCA claims. In addition, federal law will apply to control judicial interpretation of the FTCA itself, especially in determining questions of Congressional intent behind the statutory exceptions to the Act. Outside of these areas however, federal courts are bound to apply the state law where the act or omission occurred.

[235] 369 U.S. 1 (1962).

[236] 28 U.S.C. § 2680(k).

[237] 338 U.S. 217 (1949).

suit was brought under Newfoundland's wrongful death statute, alleging that the United States negligently operated the airfield causing the crash.[238]

The Court held that the claim fell within the exception as arising in a foreign country. In defining the term "foreign country" as used in the Act, the Court stated:

> We know of no more accurate phrase in common English usage than "foreign country" to denote territory subject to the sovereignty of another nation. By the exclusion of claims arising in a foreign country, the coverage of the Federal Tort Claims Act was geared towards the sovereignty of the United States.[239]

The territory of the alleged negligent act was subject to the sovereignty of another nation, namely Great Britain, and applied foreign law, namely Newfoundland's wrongful death statute. While the lease in question allowed only certain use rights to the United States, in no way did it serve as a transfer of sovereignty from Great Britain to the United States. Thus, the court concluded that in waiving sovereign immunity and assessing Congressional intent for excepting claims arising in a foreign country, Congress was unwilling to subject the United States to liability based on the laws of a foreign power.[240]

Recently, the Court again addressed the foreign claims exception in *Smith v. United States*,[241] which dealt with the anomaly presented by FTCA claims arising in Antarctica. The suit was brought by the widow of a carpenter killed in Antarctica while working on a government contract with the National Science Foundation. The Court

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[238] *Id.*, at 218.

[239] *Id.*, at 219.

[240] *Id.*, at 221.

[241] 507 U.S. 197 (1993) (hereinafter "Smith").

found the claim to fall within the exception to the FTCA based on the language of the statute and the presumption against extraterritorial application of Acts of Congress in waivers of sovereign immunity.[242]

The Court reasoned that the ordinary meaning of "foreign country" as used in the FTCA must include Antarctica, even though it has no recognized government. Alluding to the existing sovereignty claims by seven states and the freezing of those claims under the 1959 Antarctic Treaty, the Court described the continent as a "sovereignless territory" without civil tort law of its own.[243] Therefore, the provision under 28 U.S.C. § 1346(b) that requires liability be determined in accordance with the place of the tort would have bizarre results since there is no actual civil law of Antarctica to determine U.S. liability. Moreover, the statute's venue provision,[244] which provides that FTCA claims be brought "only in the judicial district where the plaintiff resides or wherein the act or omission occurred," would produce another anomalous result. Since no federal judicial district encompasses Antarctica, the Court found that petitioner's interpretation of the exception would establish jurisdiction for all tort claims against the U.S. arising in Antarctica, but no venue would exist unless the claimant happened to reside in the United States or a territory of U.S. federal jurisdiction. In effect, this interpretation would deny relief to foreign residents in circumstances where U.S. residents could recover -- a potential circumstance specifically discussed and rejected by Congress when it enacted the

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[242] *Id.*, at 204.

[243] *Id.*, at 198.

[244] 28 U.S.C. § 1402(b).

FTCA.[245] Finally, placing great weight on the presumption against extraterritorial application of United States law, the Court found that any "lingering doubt regarding the reach of the Federal Tort Claims Act be resolved against it encompassing torts committed in Antarctica."[246]

Other cases indicate that the applicability of the exception must be assessed individually depending on the facts of the case. The islands of Kwajalein[247] and Okinawa[248] have been held to be foreign countries covered by the exception since both were subject to the civil law jurisdiction of another country and not subject to the jurisdiction of the United States. On the other hand, the Federal Tort Claims Act applied to claims arising on the island of Guam[249] since Guam is a territory of the United States subject to its sovereignty and the jurisdiction of its courts.

Generally then, based on the above discussion, claims arising in a foreign country (i.e., a territory subject to the sovereignty of another nation) will be barred from suit under the FTCA. Claims arising in a territory not subject to the sovereignty of another nation (with the exception of Antarctica) will remain actionable under the FTCA absent any other statutory exceptions. Thus, claims arising in international waters, international airspace,

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[245] *Smith*, supra note 241, at 201-204.

[246] *Id.*, at 203-04. Justice Stevens dissent in the case is compelling. He criticizes the majority for ignoring the parallels in outer space as our astronauts continue space exploration and subject the U.S. to liability under the FTCA outside the applicability of the foreign country exception. More compelling is his argument that the majority completely ignores the jurisprudence relating to the negligence of federal agents on the "sovereignless high seas." *Id.*, at 204. Perhaps an overly-simplistic conclusion, this author views the debate as a classic example of conservative versus liberal judicial interpretation and law making.

[247] *Callas v. United States*, 253 F.2d 838 (2d Cir. 1958), *cert. denied*, 357 U.S. 936 (1958).

[248] *Buma v. United States*, 142 F. Supp. 623 (E.D. Va. 1956), *aff'd*, 240 F.2d 720 (4th Cir. 1957).

[249] *Orken v. United States*, 239 F.2d 850 (6th Cir. 1956).

or outer space should not be barred by the foreign country exception. Finally, care must be taken when interpreting the language "arising in" a foreign country as used in §2680(k). The general consensus is that the tort claim "arises" in the place where the negligent act or omission occurs, not necessarily at the site of the injury or the place where the injury has its "operational effect."[250] This principle will remain important in GPS-related cases since injuries sustained in a foreign country may still be actionable under the FTCA if the claimant can show the negligent act or omission with regard to the providing of the GPS signal occurred in the United States or in a place not subject to the sovereignty of a foreign state.

5. Exception for Claims Arising as a Result of Combat Activities

The Federal Tort Claims Act, under 28 U.S.C. § 2680(j), excepts from suit "any claim arising out of the combatant activities of the military or naval forces, or the Coast Guard, during time of war." This exception has been rather limited in its application, engendering relatively little caselaw when compared to that of other FTCA exceptions. What does exist, however, is interesting.

The rationale behind the exception was aptly discussed in the recent Ninth Circuit

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[250] *Cominotto v. United States*, 802 F.2d 1127 (9th Cir. 1986). See also, *Sami v. United States*, 617 F.2d 755, 762 (D.C. Cir. 1979) and *Roberts v. United States*, 498 F.2d 520, 522 (9th Cir.), *cert. denied*, 419 U.S. 1070 (1974). As Kreindler points out, despite the seeming simplicity of the FTCA's choice-of-law rule, aviation cases pose difficult problems based on the wide dispersement of alleged negligence across different states. Kreindler, supra, note 132, at 5-31. The Circuits are not in complete uniformity when deciding questions of which state law governs. The First and Sixth Circuits, for example, have applied the *Restatement (Second) of Conflicts* "significant contacts" test in *Bonn v. Puerto Rico International Airlines, Inc.*, 518 F.2d 89 (1st Cir. 1975) and *Reminga v. United States*, 448 F. Supp. 445 (N.D. Mich. 1978), *aff'd*, 631 F.2d 449 (6th Cir. 1980), while the Seventh Circuit rejected the significant contacts test and instead concluded that the law of "the place of the act or omission having the most significant causal affect" on the injury should control. *Bowen v. United States*, 570 F.2d 1311, 1318 (7th Cir. 1978).

decision of *Koohi v. United States*.[251] Generally, the exception reflects a realization that waiving sovereign immunity in cases arising out of combatant activities is somewhat at odds with the traditional principles of tort law. Specifically, there are at least three goals of tort law that are simply not furthered by holding a state liable for damage occurring in combat. First, tort law is based on the theory that the prospect of liability makes an actor more careful; however, military forces cannot be overly concerned with the threat of tort liability when trying to overcome enemy forces so as to stifle their efforts. Second, tort law is based on a desire to secure justice and provide a remedy to the innocent victim of wrongful conduct; however, war produces innumerable victims who cannot all be compensated, making little sense in singling out a few for compensation out of the "overwhelming and pervasive violence which each side intentionally inflicts on the other."[252] Third, the punitive aspect of tort law requires the tortfeasors to suffer for their sins; however, it is unlikely society would wish to punish its service members for actions taken to protect themselves in furtherance of protecting that society as a whole.[253]

Although the holding in *Koohi* must be read as limited to its facts (although no more limited than other cases of this type), the court's comprehensive treatment of the combatant activities exception should prove useful in analyzing the exception's applicability to GPS-related claims that may arise in time of war. The court in *Koohi* was faced with several issues, including: the justiciability of political questions; the combatant activities exception itself and its applicability not only to the FTCA but to other federal

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[251] 976 F.2d 1328 (9th Cir. 1992), *cert. denied*, 508 U.S. 960 (1993) (hereinafter "*Koohi*").

[252] *Id.*, at 1335.

[253] *Id.*.

legislation waiving sovereign immunity; the meaning of "in time of war" and "combatant activities" as used in the FTCA; and the preemption of common law tort actions against defense contractors by virtue of FTCA exceptions applicable to the government.

The incident involved in the *Koohi* case is known world-wide. Suit was brought by the heirs of some of the passengers and crew of an Iranian airbus shot down in 1988 by a U.S. warship, the *U.S.S. Vincennes*, during an undeclared "tanker war" that was part of the larger hostilities between Iran and Iraq. After Iran began targeting Kuwaiti tankers on the premise that they were carrying Iraqi oil, Kuwait appealed to the United States to help protect Kuwaiti shipping. The U.S. responded by allowing Kuwaiti tankers to re-register under an American flag and by providing protection by American naval forces. Iran viewed this action by the United States as a hostile act and a series of significant combat engagements ensued,[254] leading up to the events of 3 July 1988 which ultimately led to the accidental downing of the airbus. On that date, a reconnaissance helicopter from the *Vincennes* was fired on by Iranian gunboats, prompting an exchange of fire from the *Vincennes*. Moments later, a civilian airbus took off from a joint commercial/military airport at Bandar Abbas in Iran, which the *Vincennes* mistook for an Iranian F-14, shooting it down and killing all 290 people aboard. Plaintiffs sued the United States for negligence and the defense contractors of the Aegis Air Defense System for design defects in the system.[255]

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[254] The court identifies some of the engagements as follows: 8 October 1987, Iranian gunboats fire on a U.S. Navy helicopter resulting in the subsequent destruction of an Iranian gunboat; 16 October 1987, U.S. Navy destroys an Iranian oil platform; 21 October 1987, two U.S. Navy helicopters fire on an Iranian landing craft; 14 April 1988, a U.S. Navy guided missile frigate hits an Iranian mine, for which the U.S. retaliated by destroying three Iranian oil platforms and sinking or destroying six naval vessels. *Id.*, at 1330.

[255] *Id.*, at 1329-30.

Before turning to the application of the combatant activities exception, the court first addressed the argument forwarded by the United States that the matter was a nonjusticiable political question beyond the power of the federal courts. Referring to the Supreme Court's ruling in the *Paquete Habana* case,[256] which involved the seizure of two Spanish fishing boats by U.S. naval forces during the Spanish-American war, the court found these types of claims involving military decisions justiciable, particularly when damage to civilians results.[257] Also referring to the Supreme Court's ruling in *Scheuer v. Rhodes*,[258] which involved a civil suit against the National Guard during the incident at Kent State, the court found the claim justicially manageable, stating:

> "When presented with claims of judicially cognizable injury resulting from military intrusions into the civilian sector, federal courts are fully empowered to consider claims asserting such injury."[259]

The fact that the claim in *Koohi* was for monetary and not injunctive relief was also relevant to the court, since the former type of damages is deemed to be less intrusive on executive power.[260]

Finding that the claim was justiciable (i.e., not a non-justiciable political or military matter), the court then turned to the question of whether sovereign immunity had been waived for these particular types of claims. Specifically, the question involved the application of the combatant activities exception to the statutory bases for suit before the

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[256] 175 U.S. 677 (1900).

[257] *Koohi*, supra note 251, at 1331.

[258] 416 U.S. 232 (1974).

[259] *Koohi*, supra note 251, at 1332, citing *Laird v. Tatum*, 408 U.S. 1 (1972).

[260] *Id.*.

court, the FTCA and the Public Vessels Act.[261] To answer this question, the court had to define the meanings of "combatant activities" and "during time of war" as used in §2680(j). In short, the court concluded that the *Vincennes* was engaged in combatant activities during time of war. How the court reached that conclusion is important.

There is less debate over the question whether the *Vincennes* was engaged in "combatant activities" than the question whether a "time of war" existed. Citing *Johnson v. United States*,[262] the court defined combatant activities to include not only physical violence, but activities both necessary to and in direct connection with actual hostilities. The action of the *Vincennes*, however erroneous, involved the tracking, identification, and destruction of an aircraft appearing to pose a threat to the safety of the ship. The firing of a missile was the "quintessential" combatant activity.[263]

The court concluded that "during time of war" meant during periods of significant armed conflict irrespective of whether a formal declaration of war was made. Recognizing the express language of the exception and that the power to declare war rests with Congress, the court stressed that "time of war" could not be read so narrowly so as to

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[261] 46 U.S.C. App. § 781 et. seq.. Plaintiffs also brought suit under the Alien Tort Act, 28 U.S.C. § 1350; the International Civil Aviation Convention; General Federal Admiralty Jurisdiction, 28 U.S.C. § 1333; the Death on the High Seas Act, 46 U.S.C. App. §761 et. seq.; and the Suits in Admiralty Act, 46 U.S.C. App. § 741 et. seq.. Only the Suits in Admiralty Act constitutes a waiver of sovereign immunity, so all other claims were dismissed on those grounds. The claim brought under the Suits in Admiralty Act was also dismissed since that Act is generally inapplicable to suits involving public vessels, which fall under the Public Vessels Act. *United States v. United Continental Tuna Corp.*, 425 U.S. 164, 169 (1976).

[262] 170 F.2d 767 (9th Cir. 1948).

[263] *Koohi*, supra note 251, at 1333.

include only formal declarations of war.[264] Moreover, modern hostilities have occurred more often than not without a formal declaration of war (e.g., Korea, Vietnam, Panama, Grenada, and Iraq), yet it is undisputed that a state of war or time of war existed for purposes of domestic tort liability of the U.S. and the combatant activities exception.[265] Here, the undeclared tanker war consisted of U.S. forces defending reflagged Kuwaiti tankers, conducting operations against Iranian gunboats and oil platforms, and defending against attacks by Iranian forces. Further, the civilian airbus was operating "during time of war" both temporally and spatially since it was operating from a dual-use airport, in a flight path in the general area of hostilities that had been ongoing for over a year, after the United States had issued repeated warnings to civilian aircraft operating in the region, and immediately after an exchange of fire between U.S. and Iranian naval forces.[266]

Two final points about *Koohi* that may be of some relevance to GPS-related claims are worth noting. First, the court found that the combatant activity exception of the FTCA applied to suits brought under the Public Vessels Act, even though the latter listed no specific exception for combat activities. However, the court found no difficulty incorporating an exception of the FTCA into the Public Vessels Act, citing examples from

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[264] *Id.*. "The notion that because the words of a statute are plain, its meaning is also plain, is merely pernicious oversimplification." *United States v. Monia*, 317 U.S. 424, 431 (1943) (Frankfurter, J., dissenting). "There is no surer way to misread any document than to read it literally." *Guiseppi v. Walling*, 144 F.2d 608, 624 (2d Cir. 1944) (L. Hand, concurring), *aff'd*, 324 U.S. 244 (1945).

[265] *Id.*, at 1334.

[266] *Id.*, at 1335.

other Circuits.[267] Finally, citing *Boyle v. United Technologies*,[268] the court held the common law tort actions brought against the defense contractors for negligent design of the Aegis system were preempted by the application of the combatant activities exception.[269]

B. Liability Under Admiralty Law

In addition to the Federal Tort Claims Act, a second broad waiver of sovereign immunity which could apply in GPS-related cases is found in the Suits in Admiralty Act (SIAA) and Public Vessels Act (PVA). These two acts subject the United States to suit when the government causes property damage, personal injury or death in the navigable waters of the United States or on the high seas. This chapter reviews the historical background of the maritime tort waiver statutes, then discusses the scope of the SIAA, the primary statute establishing U.S. liability, by reviewing the relevant caselaw. Next, the Admiralty Jurisdiction Extension Act (AJEA), which extended admiralty jurisdiction for ship to shore damages, is discussed along with its unique administrative claim prerequisites. Finally, because of their parallel application in a GPS context, some pertinent cases involving the Coast Guard and the establishment of aids to navigation are discussed.

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[267] *Id.*, at 1336. See *B & F Travelers, Inc. v. United States*, 841 F.2d 626, 28-29, 32 (5th Cir. 1988) (incorporating the discretionary function exception of the FTCA into the Public Vessels Act), and *Canadian Transport Co. v. United States*, 663 F.2d 1081, 86 (D.C. Cir. 1980) (incorporating the discretionary function exception into the Suits in Admiralty Act).

[268] 487 U.S. 500, 511 (1988).

[269] *Id.*. See also *McKay v. Rockwell International Corp.*, 704 F.2d 444 (9th Cir. 1983) (holding that the discretionary function exception to the FTCA preempts an action against defense contractors brought under the Death on the High Seas Act).

1. Historical Background

The Suits in Admiralty Act (SIAA), which waives the sovereign immunity of the United States for damages involving government merchant vessels or cargoes, predates the Federal Tort Claims Act by twenty-five years. Passed in 1920, the SIAA was actually a response to a waiver of sovereign immunity four years earlier under the Shipping Board Act of 1916. The Shipping Board Act created the United States Shipping Board, which was given the mandate to purchase and requisition merchant vessels that were in short supply as a result of two years of World War. The Shipping Board Act made such vessels subject to the same liabilities as other merchant vessels while employed solely as merchant vessels in service of the United States Government.[270] What this meant to the Government, as held in *The Lake Monroe* case,[271] was that these vessels were subject to arrest and attachment as any other merchant vessel. Because seizure of the vessel was really unnecessary in suits against the United States, Congress responded with the SIAA, substituting an *in personam* right against the Government instead of an *in rem* right of seizing merchant ships carrying government cargo.[272]

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[270] As discussed previously in the history of the FTCA, damage caused by government negligence in admiralty cases were handled in similar fashion, on a case-by-case basis via private bills in Congress. For a more detailed discussion of the history of the SIAA, see *Canadian Aviator v. United States*, 324 U.S. 215 (1945).

[271] 250 U.S. 246 (1919).

[272] *Eastern Transportation Company v. United States*, 272 U.S. 675, 689-92 (1927) (holding that the "main purpose of the Act was to exempt from seizure and arrest merchant vessels of the United States operated by it and its subordinate shipping corporations and to substitute for a suit *in rem* one *in personam* attended with the incidents of a proceeding *in rem* in which the personal liability of the United States took the place of the vessel").

Because the language used in the SIAA only applied to "merchant" vessels, torts committed by other "public" vessels such as warships still remained immune from suit under the doctrine of sovereign immunity. Congress then responded with the Public Vessels Act (PVA) in 1925, which allowed suits *in personam* against the United States for torts committed by public vessels, including warships.[273] However, this disjointed and piecemeal approach to waiving sovereign immunity still barred certain cases from suit -- a ship under federal control which was neither a "merchant vessel" or a "public vessel" did not come within the waiver of immunity of either statute.[274] The enactment of the Federal Tort Claims Act in 1946 somewhat alleviated this problem, with the courts allowing maritime tort claims against the United States which were not caused by either "merchant" or "public" vessels to be brought under the FTCA.[275] Since these cases were not covered by the SIAA or PVA, the exception in the FTCA disallowing claims cognizable under admiralty jurisdiction was rendered inapplicable.[276] Thus, between 1946 and 1960, claimants used the FTCA to sue the United States for certain maritime torts.

A 1960 amendment to the SIAA effectively removed all maritime tort claims against the federal government from the FTCA, bringing them under the SIAA or PVA.[277]

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[273] 46 U.S.C. § 2101(24) defines a public vessel as one that "(A) is owned or demise chartered and operated by the United States government or a government of a foreign country; and (B) is not engaged in commercial service."

[274] F.L. Maraist, *Admiralty in a Nutshell,* 2nd Ed. (Minnesota: West Publishing Co., 1988) at 301.

[275] *Id.*, at 303.

[276] 28 U.S.C. § 2860(d).

[277] 46 U.S.C. § 742. The 1960 amendment also deleted the requirement of a "merchant vessel" from the SIAA, arguably eliminating the need for the PVA. However, both statutes continue to exist in overlapping fashion and a suit involving public vessels should be brought under the PVA and not the SIAA. For the purposes of the remaining discussion, both admiralty statutes for suing the United States will be collectively referred to as the "SIAA" since that statute will likely be used in GPS-related claims.

It is now generally accepted that the SIAA (and PVA) preempts the FTCA in all maritime torts cognizable against the United States, rendering the FTCA inapplicable to admiralty claims.[278] Stated another way, the SIAA or PVA are exclusive.

2. The Scope of the Suits in Admiralty Act

The SIAA extends to the whole reach of admiralty jurisdiction, extending government liability to any maritime claim where a private wrongdoer would be amenable to suit. The statute provides as follows:

> In cases where if such vessel were privately owned or operated, or if such cargo were privately owned or possessed, or if a private person or property were involved, a proceeding in admiralty could be maintained, any appropriate nonjury proceeding in personam may be brought against the United States . . . .[279]

Thus, the waiver under the SIAA is very similar to that under the FTCA, and as stated previously, the two are mutually exclusive in jurisdiction. Schoenbaum defines the bright line distinction between jurisdiction under the SIAA and the FTCA as predicated on traditional concepts of admiralty jurisdiction: where admiralty jurisdiction exists, the suit must be brought under the SIAA; where it does not, the FTCA is the basis. If admiralty jurisdiction is unclear, both acts can be forwarded, at least initially in the pleading stage.[280]

A tort will be considered maritime and within federal admiralty jurisdiction if it meets the "locality plus" test enunciated by the Supreme Court in *Executive Jet Aviation,*

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[278] *Kelly v. United States*, 531 F.2d 1144 (2d Cir. 1976); *McCormick v. United States*, 680 F.2d 345 (5th Cir. 1982); and *Williams v. United States*, 711 F.2d 893 (9th Cir. 1983).

[279] 47 U.S.C. § 742.

[280] T.J. Schoenbaum, *Admiralty and Maritime Law,* Vol. 2, 2nd Ed. (Minnesota: West Publishing Co., 1994) at 447.

Inc. v. City of Cleveland.[281] The two-prong test defines a tort as maritime if it: (1) occurs on navigable waters or the high seas (the locality prong); and (2) bears a significant relationship to traditional maritime activity (the nexus prong).

In *Executive Jet*, the petitioners attempted to invoke admiralty jurisdiction under 28 U.S.C. § 1331(1) to bring a negligence action against a Cleveland airport. The plane, en route to Portland, Maine, then White Plains, New York, crash landed in navigable waters on Lake Erie after striking a flock of birds.[282] While the crash occurred on navigable waters and therefore met the locality alone rule,[283] the Court stated an additional prong (the nexus prong) that must be met for admiralty jurisdiction to be found:

> . . . there has existed over the years a judicial, legislative, and scholarly recognition that, in determining whether there is admiralty jurisdiction over a particular tort or class of torts, reliance on the relationship of the wrong to traditional maritime activity is often more sensible and more consonant with the purposes of maritime law than is a purely mechanical application of the locality test.[284]

Since no significant relationship existed between flying from one point in the United States to another (primarily over land) and traditional maritime activity involving navigation and commerce on navigable waters, the Court precluded the invocation of admiralty jurisdiction in cases where it was "wholly fortuitous" that a craft crashes into navigable

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[281] 409 U.S. 249 (1972).

[282] *Id.*, at 249-51.

[283] In determining whether a tort is maritime, the Court recognized that courts have traditionally depended upon the locality of the wrong -- if on navigable waters, then within admiralty jurisdiction, if on land, then not within admiralty jurisdiction. *Id.*, at 253.

[284] *Id.*, at 261.

waters rather than on land.[285] The Court, however, did recognize there may be cases where a significant relationship to maritime activity could be found and admiralty jurisdiction could apply, such as where a plane flying from New York to London crashed in the mid-Atlantic.[286]

The SIAA has a two year statute of limitations, construed to run from the date of the injury.[287] Generally, courts have held that the two year limit is jurisdictional and cannot be waived.[288] With the exception of the Fifth Circuit case of *McCormick v. United States*,[289] which held that the two-year statute of limitations under the SIAA can be tolled under appropriate circumstances so long as to do so would not violate the purpose of the provision, courts have steadfastly refused to toll the statute even for equitable considerations such as pursuing the claim through administrative channels under the FTCA.

This was the case in *Williams v. United States*,[290] which involved a plane crash on

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[285] *Id.*, at 272-73.

[286] *Id.*, at 270. For example, in *Roberts v. United States*, 498 F.2d 520 (9th Cir.) *cert. denied*, 419 U.S. 1070 (1974), which involved the crash of a private cargo plane en route from Los Angeles to Viet Nam in the navigable waters near Okinawa, Japan, the court held that the SIAA not the FTCA provided the requisite waiver of sovereign immunity since the alleged negligence of Air Force personnel constituted a common law maritime tort. Later, the Fifth Circuit listed factors to consider in determining maritime nexus as: "the function and roles of the parties; the types of vehicles and instrumentalities involved; the causation and the type of injury; and traditional concepts of the role of admiralty law." *McCormick v. United States*, supra note 278, at 347.

[287] 46 U.S.C. § 745. *Williams v. United States*, 711 F.2d 893 (9th Cir. 1983).

[288] *T.J. Falgout Boats, Inc. v. United States*, 508 F.2d 855 (9th Cir. 1974), *cert. denied* 421 U.S. 1000; *Szyka v. United States Secretary of Defense*, 525 F.2d 62 (2d Cir. 1975); and *Bovell v. United States Department of Defense*, 735 F.2d 755 (3d Cir. 1984).

[289] Supra, note 278.

[290] Supra, note 287.

a flight between California and Hawaii. After filing an administrative claim with the FAA, plaintiff filed suit under the FTCA, or in the alternative the SIAA, against the "United States of America Federal Aviation Administration." The complaint was timely filed under the FTCA, but not within two years of the date of the injury as prescribed under the SIAA.[291] Applying the test set out in *Executive Jet*, the court found that the SIAA provided the exclusive basis for jurisdiction, because (1) the alleged negligence "took effect" in navigable waters, and (2) transoceanic air travel has a significant relationship to maritime law since such travel has historically been performed by waterborne vessels.[292] Because the SIAA provided exclusive jurisdiction over the complaint and plaintiff had not met its procedural requirements, the court dismissed the suit stating:

> The FTCA requires submission of an administrative claim prior to suit. 28 U.S.C. § 2675(a). The SAA does not. It was the appellant's responsibility to follow the procedural requirements of both statutes.[293]

Thus, as Schoenbaum correctly notes, the attorney who fails to recognize that a claim is properly in admiralty and who delays bringing suit or presses the suit under the FTCA, risks the more stringent time bar of the SIAA's statute of limitations.[294]

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[291] *Id.*, at 894.

[292] *Id.*, at 895-96. See also, *Roberts v. United States*, supra note 286.

[293] *Id.*, at 899. In contrast to the SIAA, the FTCA expressly extends the statute of limitations until six months after the denial of the claim by the agency. 28 U.S.C. §§ 1346(b) and 2401(b).

[294] See Schoenbaum, supra note 280, at 448-49. Schoenbaum describes the time bar in the SIAA as a "trap for the unwary", and advocates an amendment of the Act to toll the statute if a plaintiff is trying in good faith to pursue an administrative claim with a government agency. With due respect to this opinion, perhaps the answer is that plaintiffs' attorneys should become "a little more wary" of the law before pursuing their client's claim. Given the size of the federal government and the fact that each agency has its own administrative claims procedure, the filing of an administrative claim with any agency can not be considered adequate notice to the responsible agency or the United States itself. Further, as was the case in *Williams*, supra note 287, an agency should not be obligated to help a plaintiff amend a claim or complaint to allege the proper statutory basis for suit.

A few other aspects of the SIAA are worth mentioning.[295] First, actions cannot be filed in state court since exclusive jurisdiction is in federal district court pursuant to 46 U.S.C. § 742.[296] Second, under the same section, venue is generally in the district where the government vessel or cargo is found, or in the district where the claimant resides or has a place of business. Third, the Act requires that suit be brought against the United States as the named defendant and not a government employee or agency.[297] Where the SIAA or the PVA provides the exclusive remedy against the United States, there is no recourse against the government agent whose alleged actions engendered the lawsuit.[298] Government contractors will usually not be considered agents of the United States unless the agency is considered to manage the day-to-day activities of the contractor's work.[299] Finally, the service of process provisions found in 46 U.S.C. § 742 requires that the "libelant" shall "forthwith" serve a copy of the complaint on the United States Attorney for the district in which suit is brought in addition to sending a copy by registered mail to the Attorney General of the United States. Failure to meet these strict requirements has

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[295] For a more complete discussion of the SIAA and the PVA, see Schoenbaum, supra, note 280, at Chapter 20.

[296] Federal admiralty and maritime jurisdiction is established by Article III of the United States Constitution and implemented by acts of Congress. See 28 U.S.C. § 1333. For discussion, see also, *Guidry v. Durkin*, 834 F.2d 1465 (9th Cir. 1987).

[297] See *Szyka*, supra note 288, and *Williams*, supra note 287.

[298] *Manuel v. United States*, 50 F.3d 1253, 1255 (4th Cir. 1995).

[299] *Servis v. Hiller Systems, Inc.*, 54 F.3d 203 (4th Cir. 1995). For similar results regarding agency relationships in FTCA claims, see *Leone v. United States*, 910 F.2d 46,50 (2d Cir. 1990) (finding no government liability under the FTCA because, although the United States acted generally as an overseer, it did not manage the details nor supervise the daily activities of the alleged tortfeasors) *cert. denied*, 499 U.S. 905 (1991); and *Williams v. United States*, 50 F.3d 299,306 (4th Cir. 1995) (finding the United States not liable under the FTCA by virtue of entering into contracts and demanding compliance with federal standards in the absence of actual supervision of day-to-day operations of a contractor's work.

been found to be a jurisdictional defect, leading to dismissal for lack of subject matter jurisdiction in many cases. For example, the Ninth Circuit in *Amella v. United States*[300] dismissed an action since service on the United States 63 days after an action was filed was not considered forthwith. On the other hand, the Third Circuit in *Jones & Laughlin Steel, Inc. v. Mon River Towing, Inc. and United States of America*[301] interpreted the forthwith requirement in the SIAA as procedural and not jurisdictional, and found that service within the 120 days as prescribed in Rule 4 of the Federal Rules of Civil Procedure was sufficient.

3. The Admiralty Jurisdiction Extension Act

The Admiralty Jurisdiction Extension Act (AJEA),[302] although not an independent waiver of sovereign immunity like the SIAA and PVA, extends admiralty jurisdiction under those acts for vessel-caused damages done or consummated on land. The AJEA is important for suits brought under the SIAA and PVA for primarily two reasons: (1) it enlarges the range of possible claims against the United States under the two waiver statutes for maritime torts, and (2) in contrast to the SIAA and PVA, the AJEA requires that an administrative claim be filed with the responsible federal agency before commencing a lawsuit.

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[300] 732 F.2d 711 (9th Cir. 1984). In addition to the Ninth Circuit, the Second, Fifth and Eleventh Circuits have held that the SIAA's forthwith requirement is jurisdictional in nature, and that failure to comply will lead to dismissal for lack of jurisdiction. *Henderson v. United States*, 51 F.3d 574 (5th Cir. 1995); *Libby v. United States*, 840 F.2d 818 (11th Cir. 1988); and *City of New York v McCallister Bros., Inc.*, 278 F.2d 708 (2d Cir. 1960).

[301] 772 F.2d 62 (3d Cir. 1985).

[302] 46 U.S.C. App. § 740.

The AJEA extends government liability under the SIAA and PVA in only limited situations -- for vessel-caused damage done or consummated on land -- as follows:

> . . . that as to any suit against the United States for damage or injury done or consummated on land by a vessel on navigable waters, the Public Vessels Act or the Suits in Admiralty Act, as appropriate, shall constitute the exclusive remedy.[303]

Thus, the SIAA and PVA continue to be the exclusive remedy for maritime torts against the government, with the AJEA extending maritime jurisdiction for injuries or property damage occurring on land provided they were caused by a vessel.

Enacted in 1948, the AJEA was a Congressional response to the narrowly construed locality prong of the admiralty jurisdiction test discussed earlier.[304] This narrow construction resulted in maritime torts occurring not where the negligent act was committed, but where the impact of the act produced the injury (the locality). The infamous case of *The Plymouth*[305] is reflective of the narrowly-read locality rule. In *The Plymouth*, in deciding whether a claim for damage to a wharf caused by a fire from a vessel was cognizable in admiralty, the Supreme Court ruled that no tort was maritime unless the substance and consummation of the tort both occurred on navigable waters:

> "The jurisdiction of the admiralty does not depend upon the fact that the injury was inflicted by the vessel, but upon the locality - the high seas or navigable waters - where it occurred."[306]

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[303] *Id.*.

[304] See previous discussion in Subsection 2 of this Section.

[305] *Hough v. Western Transportation Co. (The Plymouth)*, 70 U.S. 20 (1866).

[306] *Id.*, at 36.

Prior to the enactment of the AJEA, this ruling led to some strange jurisdictional anomalies. While standing on a pier, a man struck by a ship's sling and knocked into the water was not within admiralty jurisdiction since the tort occurred on land when the victim stood on the pier. On the other hand, while standing on the deck of a vessel, a man struck by a hoist and knocked onto a pier was within admiralty jurisdiction since the tort occurred on a vessel in navigable waters. Also, in cases where a vessel struck a pier, strict application of the locality rule caused the claim for damage to the vessel to be in admiralty, and the claim for damage to the pier, an extension of the land, to be outside admiralty jurisdiction.[307] The AJEA worked to apply admiralty jurisdiction in these cases and statutorily overruled *The Plymouth's* narrow locality test in ship-to-shore torts. Today, all shoreside damage claims arising from ship collisions, groundings, pollution discharges, or vessel wakes will be found within admiralty jurisdiction by virtue of the AJEA.[308]

If negligence in land-based activities of the United States could give rise to suits under SIAA and PVA for damage occurring on navigable waters, then the AJEA is likely to confer admiralty jurisdiction to damages extending to the shore. This point is important for GPS-related cases. As one writer recently pointed out:

> Difficult questions concerning application of the AJEA to suits against the United States where the United States is not the owner or operator of any involved vessel, but its land-based activities allegedly caused or contributed to the casualty. . . . The key issue in such a case is whether the cause of action against the [Coast Guard] will be

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[307] See Maraist, supra note 274, citing *In re T. Smith & Son v. Taylor*, 276 U.S. 179 (1928) and *Minnie v. Port Huron Terminal Co.*, 295 U.S. 647 (1935).

[308] *Louisiana ex rel. Guste v. M/V Testbank*, 752 F.2d 1019, 1031 (5th Cir. 1985), *cert. denied*, 477 U.S. 903 (1986); *In re Oil Spill by Amoco Cadiz off the Coast of France*, 699 F.2d 909, 913 (7th Cir), *cert. denied*, 464 U.S. 864 (1983).

> bootstrapped into the AJEA by the fact that the damage upon which the suit is based was "caused by the vessel."[309]

The importance of AJEA applicability here is not only in the substantive differences of the statutory bases for liability of the United States, but also in deciding whether a plaintiff will have to first file an administrative claim against the government before pursuing the lawsuit. Stated simply, a claimant who has a cause of action cognizable under the AJEA or FTCA must first meet the administrative claim prerequisites under those statutes or risk having the action dismissed for lack of subject matter jurisdiction.[310] On the other hand, if the claim arises under the SIAA or PVA, without application of the AJEA, the filing of an administrative claim is not mandatory.

The importance of the distinction between jurisdiction under the SIAA alone, for example, or jurisdiction under the SIAA via the AJEA then will be in those cases where the claim is properly under AJEA jurisdiction but the claimant neglects to file a timely administrative claim. This distinction sometimes results in plaintiffs taking a narrow construction of the phrase "caused by a vessel" as used in the AJEA to keep their claim out of the AJEA and its mandatory administrative claim requirement. The courts have read "caused by a vessel" much more broadly, as was the case in *J.W. Peterson Coal &*

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[309] C.H. Allen, "The Administrative Claim Prerequisite to Suit Against the United States Under the Admiralty Jurisdiction Extension Act" (October 1993) 24:4 *Journal of Maritime Law and Commerce*, 719, at 728. The author uses the example of alleged negligence of the Coast Guard in contributing to the damage by virtue of wrongly inspecting the vessel or licensing its crew. The scenario is similar to the cases involving negligent certification by the FAA discussed earlier.

[310] The AJEA, 46 U.S.C. app. § 740, states that "no suit shall be filed against the United States until there has expired a period of six months after a claim has been presented in writing to the Federal agency owning or operating the vessel causing the injury or damage." The FTCA, 28 U.S.C. § 2675(a), states similar language.

Oil v. United States.[311] There, the United States was sued for damages to plaintiff's dock caused during dredging operations, primarily because the government negligently provided the dredging contractor with maps and information regarding river depths or dredging specifications. Plaintiff neglected to file a timely administrative claim so argued that the AJEA was inapplicable since the negligence and damage occurred entirely on land. Instead, plaintiff argued the claim arose under the FTCA, which at the time had no administrative claim requirement. The court held otherwise, found jurisdiction under the AJEA, and dismissed the suit for failing to file a timely administrative claim, concluding that any negligence stemmed from the government allegedly misdirecting the dredging vessel which caused the damage to the dock.[312]

Four years later, in the *Pacific-Carrier* case, the Fifth Circuit extended admiralty jurisdiction to a suit against the owner of a smokestack whose emissions interfered with navigation and caused a vessel to strike a bridge. The court held that claims by the bridge owner against the vessel were within admiralty jurisdiction under the AJEA, then found that admiralty jurisdiction extended to third party claims by the vessel against the smokestack owner since the injury was to a vessel then underway on navigable waters.[313] Based on the holdings in *Pacific Carrier* and *Peterson* then, it is likely that actions against the government for vessel-caused damages on land that may have been caused wholly or partially by governmental negligence committed on land will fall within the AJEA. If this

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[311] 323 F. Supp. 1198 (N.D. Ill. 1970).

[312] *Id.*, at 1201-03. In a pre-AJEA case, the Supreme Court interpreted damage "caused by a vessel" of the United States as that resulting from the negligence by a public vessel's officers in directing another vessel which ultimately caused the damage. *Canadian Aviator v. United States*, supra note 270.

[313] *In re Gypsum Carrier, Inc. (The Pacific Carrier)*, 489 F.2d 152 (5th Cir.) *cert. denied*, 417 U.S. 931 (1974).

is the case, plaintiffs must properly file a timely administrative claim before proceeding with their lawsuit. Otherwise, their claim will be dismissed for lack of subject matter jurisdiction.[314] A plaintiff may subsequently refile the action only after compliance with administrative claims procedures, and only if done within the two-year statutory time limit.

4. Aids to Navigation Cases

Similar to the cases involving allegations against the government (primarily the FAA) for negligently providing air navigation services, there exists a body of cases (primarily against the Coast Guard) alleging similar negligence in providing water navigation services. This body of caselaw is part of a larger body that exposes the United States to liability for maritime tort actions for activities such as the marking of wrecks, salvage operations, search and rescue operations, and collisions of public vessels. Although those cases could prove relevant in analyzing potential GPS-related claims, the discussion here will be limited to selected aids to navigation cases since those most closely parallel the situations the Air Force may find itself in when providing GPS navigational services to admiralty users.

The United States Coast Guard has the traditional and exclusive mandate to establish aids to navigation in the navigable waters of the United States to serve the needs of the armed forces and maritime commerce.[315] The mandate goes beyond the placing of buoys in navigable waters to direct vessels. Included is a mandate over electronic aids to navigation for commercial use both on the water and in the air (in the air only when

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[314] *Loeber v. Bay Tankers, Inc.*, 924 F.2d 1340 (5th Cir.), *cert. denied*, 502 U.S. 819 (1991); *Keene Corp. v. United States*, 700 F.2d 836 (2d Cir.), *cert. denied*, 464 U.S. 864 (1983); and *Plyer v. United States*, 900 F.2d 41 (1990).

[315] For the relevant text of 14 U.S.C. § 81, see *Chapter IV*, supra note 109.

requested by the FAA). As mentioned previously, the number of potential users of GPS, both seagoing ships and planes, is staggering. Thus, the potential for liability is also staggering, calling for a close symbiotic relationship between the two responsible executive departments, Defense and Transportation.[316]

The use of the term "may" in the above passage is a good indicator that much of the caselaw concerning aids to navigation cases involves application of a discretionary function exception to suits under the SIAA and PVA. Unlike the FTCA however, neither the SIAA or the PVA contain a specific reference to a discretionary function exception in the maritime waivers of sovereign immunity.[317] Therefore, courts have had to decide whether the exception should be judicially read into the SIAA and PVA. From the late 1970's through the early 1990's all but one Circuit Court of Appeals, the Fourth Circuit, has specifically held that the discretionary function exception is implied in suits against the United States for maritime torts under the SIAA or PVA. In 1975, the Fourth Circuit in *Lane v. United States*,[318] found no immunity from liability when the Coast Guard abused its discretion by failing to mark sunken barges.[319] *Lane* is not the prevailing view however, and although the case has not been specifically overturned, the Fourth Circuit seems to have retreated from this position eight years later in *Faust v. South Carolina*

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[316] As discussed in *Chapter VI*, Section B, the Departments of Defense and Transportation have already formed a joint task force concerning the civil use of GPS.

[317] For a detailed discussion of the discretionary function exception, see Section A, Subsection 2 of this Chapter.

[318] 529 F.2d 175 (4th Cir. 1975).

[319] *Id.*, at 179.

State Hwy. Dept.[320] by reading the exception into the SIAA.[321] Therefore, it is safe to assume the exception is available in suits brought against the United States in admiralty.[322]

Because the language of 14 U.S.C. § 81 does use the term "may," courts have held that the United States, through the Coast Guard, has no statutory mandate to "ensure" the navigable waterways of the United States. Therefore, it has no duty to mark all obstructions to ensure that the waters are navigable.[323] However, as the Second Circuit defined the Coast Guard's duty in *Eklof v. United States*,[324] once the Coast Guard acts and causes others to justifiably rely on such action, a duty arises to act reasonably and with due care to prevent a navigational aid from becoming "a trap for the ignorant or unwary rather than a warning to danger."[325]

The cause of action in *Eklof* arose after the tanker *M/V Reliable* ran aground in the Hudson River. The owner of the tanker alleged the Coast Guard was negligent for

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[320] 721 F.2d 934 (4th Cir. 1983), *cert. denied*, 467 U.S. 1226 (1984).

[321] *Id.*, at 938-39.

[322] See *Bearce v. United States*, 614 F.2d 556 (7th Cir.) (finding that the discretionary function of the FTCA is implied in the SIAA and that the government's failure to erect a light at the end of a breakwater extending into a harbor was under the discretionary authority of the Coast Guard to establish aids to navigation) *cert. denied*, 449 U.S. 837 (1980); *Gercey v. United States*, 540 F.2d 536, 539 (1st Cir. 1976) (Coast Guard immune from liability for failure to adopt policies designed to protect the public from decertified public vessels) *cert. denied*, 430 U.S. 954 (1977); *Canadian Transport v. United States*, 663 F.2d 1081, 1085 (D.C. Cir. 1980) (Coast Guard immune from liability for refusing to permit a vessel from entering port); *Sea-Land Service, Inc. v. United States*, 919 F.2d 888 (3d Cir. 1990) (SIAA construed to implicitly contain a discretionary function exception to waiver of sovereign immunity, although only a general waiver was explicitly contained in the SIAA). For similar results, see also, *Earles v. United States*, 935 F.2d 1028 (9th Cir. 1990) and *Gordon v. Lykes Brothers Steamship Co., Inc.*, 835 F.2d 96, 98 (5th Cir. 1988).

[323] *Indian Towing*, supra note 142, at 69, and *Transorient Navigators Co. v. M/S Southwind*, 714 F.2d 1358, 1367 (5th Cir. 1983).

[324] 762 F.2d 200 (2d Cir. 1985).

[325] *Id.*, at 203.

improperly marking a reef. The reef was marked on its south end by a single red and black buoy, put in place several years earlier.[326] The court stated that if the Coast Guard left the reef entirely unmarked, there would be no basis for liability. In that case, mariners would have to rely on navigational charts. However, once the Coast Guard affirmatively acted to mark an obstruction, it had do so in such a way as to not create a new hazard, since it is reasonable to assume mariners rely on the action.[327] Since the precise manner of marking the reef was not a discretionary act, the court declined to address the applicability of the discretionary function exception.[328]

Cases similarly finding the United States liable are *Whitney Steamship Co. v. United States*[329] and *Sheridan Transportation Co. v. United States*.[330] In *Whitney*, the court found the Coast Guard 20% negligent for failing to properly maintain a traffic buoy in Buffalo Harbor which had slipped its moorings and had drifted. The court reached this conclusion despite arguments by the government that reliance on the buoys was unjustified because mariners had been warned to use other navigational aids, including charts.[331] In *Sheridan*, the owners of a barge brought action after the barge struck a submerged wreck. The court held that the government exercised discretion when it initially positioned a wreck buoy 60 feet from the wreck and issued a Notice to Mariners reflecting such, but

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[326] *Id.*, at 201.

[327] *Id.*, at 202-203.

[328] *Id.*, at 204-205.

[329] 747 F.2d 69 (2d Cir. 1984).

[330] 834 F.2d 467 (5th Cir. 1987).

[331] *Whitney*, supra note 329, at 73-74.

found the government did not have the discretion to subsequently move the buoy 250 feet without any notice. Once the Coast Guard exercised a duty to mark the wreck, it assumed a duty to do so with due care.

Other cases have barred suits based on the discretionary function exception. In *Bearce v. United States*,[332] the Seventh Circuit held that the Coast Guard could not be held negligent as a matter of law for failing to mark the end of a submerged breakwater. In a passage that has been often cited, the court distinguished cases involving the negligent positioning or maintenance of a navigational aid, and held that the decision to establish the aid in the first place was discretionary and not reviewable.[333]

In *Chute v. United States*,[334] the First Circuit similarly found unreviewable a decision of the Coast Guard to mark a sunken wreck with a single, three-and-one-half-foot buoy placed three hundred feet from the obstruction. The court stated:

> Courts have neither the expertise, the information, nor the authority to allocate the finite resources available to the Secretary [of Transportation] among competing priorities.[335]

In a subsequent case, the court summarized its holding in *Chute*:

> The rationale of *Chute* was that although the Coast Guard is known to have undertaken marking dangers to navigation, the extent to which it will do so is a discretionary function. There can be no justified reliance upon, or expectation of, any particular degree of performance; something more is needed to establish liability.[336]

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[332] *Bearce*, supra note 322.

[333] *Id.*, at 560-61.

[334] 610 F.2d 7 (1st Cir. 1979), *cert. denied*, 446 U.S. 936 (1980).

[335] *Id.*, at 12.

[336] *Brown v. United States*, 790 F.2d 199 (1st Cir.), *cert. denied*, 479 U.S. 1058 (1987).

The holding in *Chute* does seem to be in direct conflict with the Second Circuit's decision in *Eklof* and the Fourth's in *Lane*. In fact, the Second Circuit in *Eklof* went to great lengths discussing *Lane* and *Chute*, choosing to follow the rationale of the Fourth Circuit in the former rather than the First Circuit in latter. The *Eklof* court distinguished *Chute* holding on three grounds: (1) since *Chute* involved a sunken vessel, the language of 14 U.S.C. § 86 operated to grant the Coast Guard specific discretion not found in the applicable statute in *Eklof*, which involved the marking of a reef; (2) the court disagreed with the First Circuit that a jury could not determine such a complex issue involving the placement of maritime markings; and (3) the court felt it not improper judicial interference to review the Coast Guard's allocation of finite resources.[337]

As the above discussion shows, the Circuits seem to have had more difficulty reconciling aids to navigation cases and the discretionary function exception than cases involving the exception under the FTCA. In fact, when the Supreme Court denied a petition for a writ of certiorari in 1987 in *Brown v. United States*,[338] Justice White filed a dissenting opinion favoring a grant of the petition to resolve the conflict among the circuits as to whether the discretionary function exception to liability encompasses governmental decisions involving allocation of resources. Perhaps the reason for the confusion is that almost all aids to navigation cases discussed above predate the Supreme Court holdings in *Varig*, *Berkovitz* and *Gaubert* which, as discussed in *Chapter V*,

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[337] *Eklof*, supra note 324, at 204.

[338] *Brown*, supra note 336.

established the two-tier analysis for applying the exception. Justice White's concern then is probably now moot.

The above cases represent more rudimentary forms of government-provided aids to navigation, but still may provide the necessary link to admiralty jurisdiction when evaluating potential GPS cases. The factual scenarios that may give rise to U.S. liability in GPS-related claims are endless, and the application of the appropriate waiver statute (SIAA and/or PVA, with possible extension of those acts by the AJEA) will of course depend on the facts presented. However, similar to claims under the FTCA, claimants will still have to prove the traditional elements of basic negligence law, with the defenses available to the government under the FTCA also available in maritime tort actions. This is so even though the SIAA or PVA do not contain a list of exceptions like the FTCA. Therefore, liability under the FTCA should not be much different than under the appropriate admiralty statute, unless for instance a case falls under the SIAA via the AJEA and a claimant has failed to timely file an administrative claim. In that case, the case may be barred as untimely whereas under the FTCA it would not.

C. Administrative Remedies

Two additional pieces of legislation, the Foreign Claims Act[339] and the Military Claims Act,[340] provide an avenue for individuals to file claims against the United States for damages caused by the armed forces. Neither statute constitutes a waiver of sovereign immunity as found in the FTCA or SIAA. Rather, the Foreign Claims Act and Military

[339] 10 U.S.C. § 2734.

[340] 10 U.S.C. § 2733.

Claims Act provide an administrative remedy against the government agency allegedly responsible for the damage.

1. The Foreign Claims Act

The Foreign Claims Act (FCA) allows the government agency concerned to settle claims caused by the noncombatant activities of military members or civilian employees of the armed forces in a foreign country which result in property loss, personal injury or death. The FCA is applicable only to inhabitants of a foreign country and in a sense fills the gap created by the exception to the FTCA disallowing claims arising in a foreign country. Whether the military member or civilian employee is acting within the scope of employment is irrelevant under the FCA, and generally the government has been very liberal in its policy of paying claimants for damage caused by U.S. personnel abroad. This includes actions that are negligent, willful, or merely simple mistakes in judgment.

Even though the United States maintains a liberal payment policy under the FCA for meritorious claims, it is not, as previously mentioned, a waiver of sovereign immunity. Apart from filing an administrative claim against the responsible agency, a claimant's rights are limited. Claimants cannot pursue their claim in the federal courts since those courts lack subject matter jurisdiction under the FCA to hear such cases. Therefore, payments made under the Act are at the discretion of the agency and are *ex gratia*, i.e., not based on any legal obligation.

2. The Military Claims Act

The Military Claims Act (MCA) is similar to the FCA in that it provides recourse for the same types of damages caused by military members and civilian employees of the

armed forces. Proper claimants under the MCA are limited to those who do not fall under the FTCA or FCA. For example, the case of an American tourist injured in Germany by the alleged negligent act of a United States military member does not fall under the FTCA because the claim arose in a foreign country,[341] nor does it fall under the FCA because the claimant is not an inhabitant of a foreign country. Like the FCA, payments made under the MCA are *ex gratia*, pursuant to the administrative procedures of the agency involved and within its total discretion to grant or deny.

The MCA differs from the FCA in many respects, and more resembles the substantive requirements a claimant must meet under the FTCA. First, the MCA requires that the military member or civilian employee who allegedly causes the damage to be acting within his or her scope of employment. Next, claimants are required to show that the U.S. personnel was actually negligent. Finally, the MCA applies several exceptions to liability such as those found under the FTCA, which includes a discretionary function exception.[342]

Chapter VI. The Applicable International Law

As the size of preceding chapter indicates, there is an ample body of caselaw to establish the domestic legal framework to apply to GPS-related claims against the United States. Conversely, unless one strains to include claims arising from state-provided navigation services under the existing space law conventions, the present state of

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[341] 28 U.S.C. § 2680(k).

[342] K.K. Spradling, "The International Liability Ramifications of the U.S.' NAVSTAR Global Positioning System" (1990) *Proceedings of the Thirty-Third Colloquium on the Law of Outer Space* 93, at 97.

international law is inadequate to address GPS-related claims. This chapter reviews the existing international law in this area, the current U.S. policy, and the future of international law with regard to U.S.-provided GPS services. In short, existing international treaty law seems insufficient to handle liability claims, leaving the future of international law in this area to be shaped by the political concerns in the U.S. and in other countries. The prospect of establishing a multilateral legal framework to govern a global navigation satellite system based on GPS is doubtful at the present, and the inevitable result points to system of bilateral agreements with states wishing to use GPS.

A. Liability Under Current International Law

Shortly after the inhabitants of this planet decided to permanently enter the realm of space with the launch of the first artificial satellite in 1957, the United Nations began developing a basic legal framework to regulate the expansion of human activity into outerspace. In 1959, on the basis of a proposal made by the United States and 19 other countries, the General Assembly of the United Nations passed a resolution establishing what would later come to be known as the Committee on the Peaceful Uses of Outer Space (COPUOS).[343] The work in COPUOS has been largely responsible for establishing the existing, multilateral international space law, mainly through the drafting of five international agreements: the 1967 *Outer Space Treaty*,[344] the 1968 *Rescue Agreement*,[345]

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[343] U.N.G.A. Res. 1472 (XIV), 1959.

[344] *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, Done January 27, 1967, Entered into Force October 10, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347; 610 U.N.T.S. 205 (hereinafter "*Outer Space Treaty*").

[345] *Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space*, Done April 22, 1968, Entered into Force December 3, 1968, 19 U.S.T. 7570, T.I.A.S. No. 6599, 672 U.N.T.S. 119.

the 1972 *Liability Convention*,[346] the 1975 *Registration Convention*[347] and the 1979 *Moon Agreement*.[348] Of importance here to the discussion of state responsibility for providing satellite navigation services are the *Outer Space Treaty* and the *Liability Convention*, both of which the United States is a party.

The 1967 *Outer Space Treaty*, which forms the basis of subsequent space treaty law, was built on the 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space.[349] For purposes of this discussion, the relevant liability provisions are found in Articles VI and VII, which provide:

> States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by government agencies or by non-government entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.[350]

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[346] *Convention on International Liability for Damage Caused by Space Objects*, Done March 29, 1972, Entered into Force September 1, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S. 187 (hereinafter "*Liability Convention*").

[347] *Convention on the Registration of Objects Launched into Outer Space*, Opened for Signature January 14, 1975, Entered into Force September 15, 1979, 28 U.S.T. 695, T.I.A.S. No. 8480, 1023 U.N.T.S. 15.

[348] *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, adopted by the United Nations General Assembly December 5, 1979, Opened for Signature December 18, 1979, Entered into Force July 11, 1984, U.N.G.A. Res. 34/68 (1979).

[349] U.N.G.A. Res. 1962 (XVIII), 1963.

[350] *Outer Space Treaty*, supra note 344, Article VI.

> Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the moon and other celestial bodies.[351]

The 1972 *Liability Convention* elaborated on the liability provisions of the *Outer Space Treaty*. Articles II and III provide:

> A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft in flight.[352]
>
> In the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible.[353]

Thus, the regime of liability under the *Liability Convention* will depend on where the space object inflicts the damage. If on the ground or to an aircraft in flight in the airspace, then the launching State will be held absolutely liable. If in outer space or to another space craft in flight, then liability will exist if the launching State was negligent based on principles of fault.

While the above-cited provisions seem clear in creating a regime of liability based on the situs of the damage, the convention on its face has never been clear on the type of

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[351] *Id.*, Article VII.

[352] *Liability Convention*, supra note 346, Article II.

[353] *Id.*, Article III.

damages recoverable. Article I defines damage as:

> loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international governmental organizations.[354]

Reading Articles I, II and III together, it is clear that these damages are recoverable if they directly result from the physical impact of a space object. What is unclear is whether damages that allegedly flow from a space object absent any direct or physical causation are recoverable. Stated another way, was the *Liability Convention* meant to cover *consequential*, *economic* or *indirect* damages arising from the use of navigational satellite services provided by a State Party to the agreement?

With regard to GPS-provided services, surely the United States could be considered a "launching State"[355] and the GPS satellites in the constellation "space object(s)"[356] according to the definitions found in Article I of the *Liability Convention.* As such, if when launching a space object, say a replacement GPS Block II R satellite, the rocket goes awry and crash lands causing property damage, the provisions of the convention should apply to hold the launching State liable (in this case absolutely). Likewise, if the rocket negligently strays from its projected flight path and collides with an orbiting communications satellite, the convention could also apply to hold the launching

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[354] *Id.*, Article I(a).

[355] Article I(c) defines "launching State" as "(i) a State which launches or procures the launching of a space object" or "(ii) a State whose territory or facility a space object is launched."

[356] Article I(d) defines "space object" to include "component parts of a space object as well as its launch vehicle and parts thereof."

State liable (in this case based on fault). These are the direct damages envisioned under the definition of damage.

On the other hand, indirect damages must be distinguished. The convention is unlikely to apply in cases where the damage arises, not directly because of the physical impact of a space object, but indirectly because a space object such as a GPS satellite may have transmitted an erroneous or improper navigation signal causing an aircraft to crash. Neither the language of the convention, the negotiations leading to its passage, or state practice would support a claim for damages sustained in the context of an alleged negligently-provided GPS signal. Rather, the deliberations leading to the treaty and the treaty itself indicate a clear concern for the hazardous nature of lobbing tons of metal into space using highly explosive rockets and subsequently retrieving these chunks of metal. This is evidenced by the provision in the convention holding the launching State absolutely liable for terrestrial damage when engaging in such a hazardous activity. While the pre-Treaty deliberations did raise the issue of indirect damages, the discussions seemed to focus on the consequential damage resulting after the *crash* of a space object. One commentator has stated that it is doubtful these deliberations fathomed damage caused by a space object still functioning in space.[357]

Other evidence supports this position. First, in Congressional documents prepared for ratification hearings before the U.S. Senate, indirect damages were raised in the context of electronic interference from an orbiting satellite. The Senate indicated that liability for space activities did not include recovery for nonphysical damages, and that the

[357] C.Q. Christol, *The Modern International Law of Outer Space*, (New York: Pergamon Press, 1982), at 95-100.

U.S. position before the United Nations, stated as early as 1971, was that indirect damages were not covered by the *Liability Convention*.[358] Second, in the COSMOS 954 incident,[359] which was the only claim for damages made under the *Liability Convention*, much of the debate was over the damages cognizable under the convention, specifically the extent to which consequential damages to the environment could be recovered. This called into question the extent of damages payable as defined in Article I, leading some to conclude the convention applies to only direct physical damage to persons or property, not other kinds of damage such as to the environments of Earth and space.[360] Ultimately, the claim was resolved without adjudication, with the Soviets paying Canada approximately one-half of the $6 million claimed. Finally, another author has recently expressed doubts that the *Liability Convention* would apply to similar cases of economic damages caused by direct broadcast or remote sensing satellites.[361]

In short, it is unlikely that the United States would recognize the validity of a claim for indirect damages arising out of GPS-provided services under the existing treaty law. The issue of indirect damages has never been resolved on the international level,[362] and the

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[358] Spradling, supra note 342, at 98.

[359] In January 1978, a Soviet satellite malfunctioned and re-entered the earth's atmosphere, spreading radioactive debris over a large portion of northern Canada.

[360] M. Bourély, "Quelques Particularités du Régime de la Responsabilité du Fait des Activités Spatiales" (1990) XV *Annals of Air & Space Law*, at 251.

[361] B.A. Hurwitz, *State Liability for Outer Space Activities in Accordance with the 1972 Convention on International Liability for Damage Caused by Space Objects* (Dordrecht: Kluwer Academic Publishers, 1992), as cited in Epstein, supra note 93, at 253-55.

[362] Some argue that claimants should be able proceed under the convention for indirect damages arising out of the use of satellite navigation services if they can show causation. P.B. Larsen, "Legal Liability for Global Navigation Satellite Systems" (1993) *Proceedings of the Thirty-Sixth Colloquium on the Law of Outer Space* 69, at 70. See also, W.F Foster, "The Convention on the International Liability for Damage Caused by Space Objects" (1972) *The Canadian Yearbook of International Law*, at 137.

United States has consistently taken the position that indirect damages are not cognizable under the *Liability Convention*. Therefore, a legal framework under existing international treaty law does not presently exist to handle claims related to States providing satellite navigation services.[363]

B. Policy Concerns

This section briefly highlights the ongoing policy debate within the United States leading to a presidential decision directive issued earlier this year regarding the civil and commercial use of GPS. As the only state presently able to provide world-wide satellite navigation services, the United States is clearly a state "whose interests are specially affected."[364] Thus, an understanding of U.S. policy on the matter will be important to any developing international law concerning satellite navigation services, especially with regard to state responsibility and liability.

The civilianization of GPS raises many policy issues, both in the United States and abroad. The explosion of GPS use has already made it a national and international resource, raising questions for U.S. policymakers concerning the national interests of defense, economics and foreign policy. Much of the recent policy debate over GPS revolves around the inherent conflict between defense and economic goals on this issue, and the need to define a policy that integrates the competing interests of the two. Answers to these policy questions, of course, require corollary answers to questions

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[363] See also, M.A. Ghonaim, *The Legal and Institutional Aspects of Communication, Navigation and Air Traffic Management Systems for Civil Aviation*, (D.C.L. Thesis, McGill University, 1995), at 345.

[364] *North Sea Continental Shelf Cases (Federal Republic of Germany v. Denmark) (Federal Republic of Germany v. Netherlands)*, International Court of Justice, 8 Int'l Leg. Mat'ls 340 (1969), at ¶74.

concerning the U.S. position toward international cooperation and competition in global systems and governance of those systems. Since 1993, the U.S. Government has sponsored several major studies to examine issues relating to GPS. The following discussion outlines the findings of some of these studies, culminating with a presidential decision directive concerning the civil use of GPS, released in March 1996.

In January 1993, the Departments of Defense and Transportation formed a joint task force to study the management and operation of GPS as a dual use (military and civilian) system. The joint task force highlighted the competing interests associated with the civil use of a strategically-important military asset. The task force examined seven major issues concerning: (1) who should manage the system; (2) how it should be funded; (3) the accuracy of the SPS signal; (4) user concerns of continued integrity and availability of the signal; (5) regulation of GPS augmentation systems; (6) international acceptance of GPS as a global standard; and (7) spoofing and jamming risks to the signal.[365] While the task force report identified several issues requiring further study, it made at least three important recommendations: (1) that a joint executive board comprised of members of the DoD and DoT Positioning/Navigation Executive Committees be established to resolve management and policy issues by consensus; (2) that DoD continue funding the existing system and DoT fund any augmenting systems; and (3) that a study of all differential GPS (DGPS) augmentations be conducted to meet the needs of civil navigation applications.

Based on the third DoD/DoT task force recommendation above, the DoT sponsored a study to evaluate the needs of the various civil users of a DGPS

[365] *Joint Task Force Report*, supra note 1.

augmentation. Finding that an unaugmented GPS signal was insufficient to meet the needs of some users, the study looked at six augmentation architectures such as the Coast Guard's DGPS and FAA's WAAS discussed earlier. While the study did not recommend a specific architecture, it did recommend that the FAA and Coast Guard continue to develop their systems.[366]

Two other recent studies have focused on the military applications of GPS augmentations and the potential threat to national security.[367] The Defense Science Board, co-sponsored by the Director, Tactical Warfare Programs, and the Deputy Under Secretary of Defense for Advanced Technology was tasked to review and recommend options to improve GPS jam resistance and electronic countermeasures with particular emphasis on improving GPS use by U.S. and allied forces in tactical weapon applications such as missiles and precision munitions. The other study, conducted by Overlook Systems Technologies for the DoD, focused on the use and exploitation of a Global Navigation Satellite System (GNSS) by hostile forces.[368] This study examined the potential misuse of GPS by hostile forces in delivery systems such as ballistic missiles, cruise missiles, precision-guided munitions and conventional strategic aircraft.

The U.S. Congress, as part of the National Defense Authorization Act for fiscal year 1994, requested a study of the future funding and management options for GPS. The study, conducted by the National Academy of Public Administration (NAPA), found that

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[366] Department of Commerce, Institute for Telecommunications Sciences, *A Technical Report to the Secretary of Transportation on a National Approach to Augmented GPS Services*, NTIA Special Publication 94-30, December 1994, at 7-16.

[367] As reported in the *RAND Study*, supra note 10, at 5.

[368] *Id.*, citing Overlook Systems Technologies, *The Feasibility of a GNSS Exploitation Threat* (National Air Intelligence Center, Foreign Space Systems Analysis, TAG 07-02, April 25, 1995).

most aspects of GPS funding and management were sound. NAPA recommended that DoD continue funding and operating the system, but recognized the public service and safety applications to other civil agencies such as the DoT. They also recommended that Selective Availability (SA), the technique employed by the DoD to degrade the GPS signal, be turned off based on its added costs to commercial market use and its effect on international confidence in relying on the GPS as the global standard.[369]

On 31 January 1996, RAND Corporation's Critical Technologies Institute released its report, which was commissioned by the White House Office of Science and Technology.[370] The *RAND Study* highlighted the need for a clear policy directive on GPS, the lack of which has contributed to the ongoing debate on GPS-related issues such as the balancing of national security and economic interests, the funding and governance of the system, and the concerns of foreign users. Specifically, in addition to calling for the issuance of a statement of national policy, the *RAND Study* concluded that the system should be operated and funded solely by the U.S. government.[371] Direct user fees would not be charged for several reasons, namely, to discourage the development of foreign competing systems, to foster the adoption of the U.S. system as a global standard, and to

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[369] *Id.*, at 7. See National Academy of Public Administration, National Research Council, *The Global Positioning System-Charting the Future, Summary Report* (Washington, D.C., May 1995).

[370] *RAND Study*, supra note 10.

[371] The *RAND Study* identified the six different GPS institutional options as: (1) the present U.S. military system; (2) a U.S. civilian agency; (3) a privatized U.S. entity; (4) a privatized international entity; (5) an augmented system made up of civil, private and foreign elements; and (6) a private system totally displacing GPS. There were five institutional conditions identified as necessary for continued operation of GPS: (1) frequency allocations from the International Telecommunication Union; (2) continued ground station sites in the U.S., U.K. and Marshall Islands; (3) skilled operators; (4) funding; and (5) procedural disciplines, especially in times of crisis for security reasons. Only the military institutional option could meet all five conditions at present.

maintain the system under U.S. control rather than under the control of a potential adversary or international civil organization. At any rate, the study recognized that a mechanism for levying user fees would be difficult if not impossible to implement.

The study also recommended that the military reduce its reliance on civilian GPS equipment, develop and field more anti-jam receivers, and ensure adequate countermeasures to deny GPS signals to an adversary in hostile situations. Contrary to the study conducted by NAPA, the *RAND Study* further found that selective availability should be retained as a military option and, against the wishes of many commercial users, not be turned off in the immediate future. Finally, the study recommended that the U.S. engage in discussions with Japan and Europe on regional security and economic issues with an eye towards reaching international agreements. One of the goals of these discussions would be to discourage the proliferation of wide-area augmentations to the GPS signal until appropriate mechanisms are in place to avoid misuse of the system.[372]

On March 29th of this year, the White House issued a formal policy in the form of a presidential decision directive concerning the civil and commercial use of GPS.[373] The directive sets policy goals and guidelines, in addition to setting out the roles and responsibilities of involved U.S. government agencies. The policy goals seek to: (1) strengthen and maintain national security; (2) encourage acceptance and integration of GPS into peaceful civil, commercial and scientific applications worldwide;[374] (3)

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[372] *Id.*, at xxv-xxvii.

[373] The White House, Office of Science and Technology Policy, National Security Council, "U.S. Global Positioning System Policy," March 29, 1996.

[374] Prior to the 1996 directive, the United States made written offers to ICAO to make GPS SPS available on a continuous, worldwide basis, and free of direct user fees, in 1991, 1992, 1994 and 1995. *RAND Study*, supra note 10, Appendix B.

encourage private sector investment in and use of U.S. GPS technologies and services; (4) promote safety and efficiency in transportation and other fields; (5) promote international cooperation in using GPS for peaceful purposes; and (6) advance U.S. scientific and technical capabilities.

The more specific policy guidelines concerning the management and operation of GPS to meet these policy goals call for the U.S. to: (1) continue to provide the GPS SPS for peaceful purposes on a continuous and global basis free of direct user fees; (2) discontinue the use of selective availability (SA) within a decade, and beginning in the year 2000, make an annual determination of the use of SA; (3) ensure GPS and U.S. Government augmentations remain responsive to the National Command Authority; (4) cooperate with other governments and international organizations to ensure that the interests of both the international civil users community and international security interests are met; (5) advocate that GPS and U.S. Government augmentations be accepted as standards for international use; (6) to the fullest extent feasible, purchase commercially available GPS products and services and not deter commercial GPS activities; and (7) manage GPS and GPS augmentations through a permanent interagency GPS Executive Board chaired jointly by the Departments of Defense and Transportation. The Executive Board will be responsible for consulting with other U.S. Government agencies, private industry and foreign governments involved in satellite navigation systems.[375]

Based on these guidelines, the DoD will continue to be responsible for maintaining and operating the basic GPS and providing the SPS signal on a continuous, worldwide

[375] The White House, Office of Science and Technology Policy, National Security Council, "U.S. Global Positioning System Policy," March 29, 1996.

basis. In addition, DoD will continue to assess the national security implications of the civil use of GPS and develop measures to prevent its hostile use without unduly disrupting or degrading civil uses. The DoT will serve as lead agency for all federal civil GPS matters and continue to develop government augmentations for transportation applications. DoT will also promote the acceptance of GPS as the standard in the national and international transportation systems. The State Department will maintain overall responsibility for developing bilateral and multilateral guidelines and agreements on the use of GPS.[376]

C. The Evolving International Legal Framework

All this policy review boils down to one revelation, albeit not a surprising one, with regard to the future of international law regarding a global satellite navigation system. That is: no single international organization exists to address the wide range of issues associated with the international use of GPS. Competing domestic interests concerning national security and economic issues within the United States are only amplified when they become international security and economic concerns in international fora. While an organization like the International Civil Aviation Organization (ICAO) has the necessary expertise in technical matters such as the integration of aviation safety standards worldwide, it is asking too much of the organization to try to balance national and international security concerns, along with states' highly politicized commercial concerns, to craft a workable multilateral legal framework. Most states will have difficulty forging their own competing national security and economic interests into a common policy on a

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[376] *Id.*.

global satellite navigation system. Placing this debate on the floor of ICAO compounds the problem by 183-fold.[377] Quite simply, national and international political concerns make the prospect of a multilateral legal framework, of which liability provisions would be a part, difficult if not impossible at the present time. Like with liability for air traffic control services, GPS liability will be relegated to governance by national law.[378]

What then does the future of international law look like when it comes to GPS? Although political concerns make a multilateral framework in the near future look bleak, bilateral and regional agreements remain an option. These agreements can address the issues raised in the policy debates concerning issues such as availability, reliability and liability, in addition to addressing potential hostile use of the system and management in times of emergency or war. In response to the latter concern, for example, international SCATANA[379]-type procedures may be worked out to provide military control of DGPS augmentations during time of war. Several existing agreements with other countries concerning the use of LORAN-C and Omega navigational systems may prove useful in

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[377] Membership in ICAO as of February 1994. For the past several years, the establishment of a legal framework with regard to a global navigation satellite system (GNSS) has been a top priority of ICAO. See e.g., R.D. Van Dam, "ICAO" (1994) XIX, Part II *Annals of Air & Space Law* 653-73, outlining the work of the ICAO Legal Committee. The work in ICAO has engendered much publication on the matter recently, and aside from the above editorializing comments, it was not the purpose of this thesis to delve too deeply into this area.

[378] Since the early 1960's, ICAO has actively studied the question of air traffic control liability and the feasibility of establishing an international convention to regulate the matter. After years of debate through the 1970's and 1980's, the international community simply could not agree on a framework based on fundamental sovereignty principles concerning control over airspace. Given this history, the injection of GPS into the debate is unlikely to accelerate the process towards an international convention.

[379] SCATANA stands for "security control of air traffic and air navigation aids." During times of war, the SCATANA plan places all air traffic control and other air navigation aids under military control. 32 C.F.R. § 245.

crafting those agreements.[380] Surprisingly, with regard to liability issues, there seem to be no damage claims challenging the accuracy of the signal under these agreements despite the fact that these systems have been in use for several decades. Although a few cases mention the LORAN system,[381] none have challenged the reliability of the signal itself.

There already exists at least fifteen international agreements (other than treaties) relating or referring to GPS,[382] and there are no legal barriers preventing States from entering into agreements with the United States to use GPS services. In the field of air navigation, for example, Article 28 of the *Chicago Convention* provides that States undertake, so far as it may find practicable, to

> (a) Provide, in its territory, airports, radio services, meteorological services and other air navigation facilities to facilitate international air navigation, in accordance with the standards and practices recommended or established from time to time, pursuant to this Convention;
>
> (b) Adopt and put into operation the appropriate standard systems of communication procedure, codes, markings signals, lighting and other operational practices and rules which may be recommended or established from time to time, pursuant to this Convention.[383]

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[380] For instance, concerning the use or establishment of Omega systems, the United States has signed bilateral agreements or memoranda of understanding with Argentina, Australia, Canada, Chile, Egypt, France, Germany, Japan, Liberia, New Zealand, Norway and South Africa. Epstein, supra note 93, at 272.

[381] *Tringali Brothers v. United States*, 630 F.2d 1089 (5th Cir. 1980); *United States v. Sandra & Dennis Fishing Corp.*, 372 F.2d 189 (1st Cir. 1967); *Universe Tankships, Inc. v. United States*, 336 F.Supp. 282 (E.D. Pa., 1972).

[382] As of March 1995. *RAND Study*, supra note 10, at Appendix D. The agreements fall into five categories: (1) basic exchange and cooperative agreements between at least 10 countries and the Defense Mapping Agency; (2) similar agreements with DoD (Poland and Hungary); (3) an agreement with New Zealand for installation, operation and maintenance of Global Sea Level Data Collection Stations; (4) a memorandum of understanding with Germany for a maritime control aircraft program; and (5) memoranda of agreement with Australia and New Zealand specifically concerning the NAVSTAR GPS.

[383] *Chicago Convention*, supra note 118.

These provisions place the duty of providing air navigation services on the Contracting States, protecting each State's sovereign right to do so "so far as it may find practicable." If a State wishes to provide air navigation services by employing the services of another State or adopting its system, the convention does not prohibit this.[384] Nothing in the convention "prevents the States from delegating their functions to a specific entity, public or private, within their jurisdictional limits,"[385] and "nothing legally prevents several States from entering into arrangements or agreements under which one of the States or an entity created by the States or designated by them would provide certain aeronautical facilities and services to the collectivity of the States concerned."[386] Thus, given the absence of any legal barriers, bilateral agreements will likely be the future of international law with regard to GPS-provided service.

Chapter VII. Conclusion

Navigation by satellite is a remarkable feat of modern technology -- a true testament of the human abilities of original invention and ingenuity in further applying that invention. The obvious benefits of a system that provides precise time, position and velocity information to the military easily translate to the civilian and commercial world. The veritable explosion of civil applications of this military technology is unprecedented,

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[384] M. Milde, "Legal Aspects of Future Air Navigation Systems," (1987) XII *Annals of Air & Space Law* 87.

[385] *Id.*, at 92.

[386] *Id.*, at 95. Examples of cooperative agreements regarding navigation include the Denmark/Iceland joint financing agreements, the Africa/Madagascar Agency for Air Navigation Safety, the Central American Air Navigation Services Corporation, and the Societe Internationale de Telecommunications Aeronautiques.

with new uses emerging every day in countless areas such as aviation, maritime and highway navigation, public transportation, railroads, communications, emergency response, surveying, meteorology, science, environmental protection, recreation, law enforcement, and agriculture and forestry. Undoubtedly, the world with all its talent promises to make this list even longer.

In the areas of aviation and maritime navigation especially, the Department of Defense now finds itself in a position somewhat similar to that of the Federal Aviation Administration (FAA) and Coast Guard as GPS continues to be integrated into civil navigation systems traditionally under the auspices of those agencies. In essence, DoD is now an active player in providing routine navigation services to the world, and as such a player, DoD of course must assume responsibility for the service it provides. The inevitable result is that the Air Force may also find itself in another position similar to the FAA and Coast Guard -- as a named defendant in a civil suit alleging reliance on a navigational aid negligently provided by the government.

Thus, the primary goal of this thesis was to establish a legal framework to handle most tort claims against the United States for GPS-related activities. Most of the caselaw was compiled with an eye towards the traditional types of cases brought against the government for negligently providing services relating to travel in the air and on and over the sea. These are the areas that pose the greatest liability, with the cases generally turning on the whether or not the government was exercising a discretionary function which would bar suit. Excluded from the analysis are cases involving land use of GPS, such as those of economic damage stemming from a surveying project gone awry because

the government allegedly provided inaccurate positioning data. Although the framework established herein could apply to these types of cases, they do not pose the greatest risk of liability. Also excluded are non-tort issues that may arise based on the civilianization of GPS, such as disputes concerning contract matters, export control and patent infringement. While these cases are inevitable with GPS, they are not so novel so as to represent totally uncharted territory for the Defense Department when dealing with issues over military assets. Also included in this work are cases involving exceptions to liability which do not have an aviation or maritime tort flavor per se, but may arise in GPS-related cases. These involve application of three other exceptions, for claims: based on misrepresentations; arising in a foreign country; and arising as a result of combat activities. Finally, this thesis also analyzed existing international law and the future of international law regarding GPS issues of liability.

What then can be said of liability cases and GPS while the first lawsuit is no more than a mere twinkle in some attorney's eye. Given the existing statutory framework and established body of caselaw, some general conclusions may be made concerning U.S. liability in future GPS-related cases.[387] First, there is nothing preventing the use of the existing statutes waiving the sovereign immunity of the United States (the Federal Tort Claims Act, the Suits in Admiralty Act and the Public Vessels Act) to handle cases

[387] As of 30 July 1996, a search of the Westlaw database containing all federal cases revealed a dozen or so which mention GPS. None of the these are navigational in nature or challenge the accuracy of the signal. Instead, the cases involve contract disputes, patent infringements, requests under the Freedom of Information Act, and export control violations of GPS technology. The only case addressing the use of GPS was *Connaghan v. Maxus Exploration Co.*, 5 F.3d 1363 (10th Cir. 1993), which involved a contract dispute between some owners of working and revenue interests in an oil well against other owners and managers after the latter settled a matter in litigation without the plaintiff's approval. The facts below indicate that GPS was used to compute geographic positions and determine true north, but was not used to locate the well in question itself, leading the court make findings of fact that GPS was used only as "an aid in mapping." 1992 WL 535618, *6 (D. Wyo. Feb. 4, 1992).

concerning public reliance on the GPS SPS signal. Like any government-provided service, the duty of the United States must be legally defined by certain established standards, in this case primarily by the specifications set forth in the current Federal Radionavigation Plan. Based on these specifications, issues of liability will turn on three general factors concerning the GPS signal: (1) its accuracy (the system's ability to provide positioning levels in accordance with the stated specifications); (2) its availability (the system's ability to provide continuity of function); and (3) its integrity (the system's ability to provide timely warning to users when the system should not be used).

The FTCA. As with traditional aviation and maritime tort cases involving aids to navigation, the most significant issues are likely to focus on the applicability of the discretionary function exception to the government activity in question. The appropriate analysis will be the two-tiered approach developed recently in a series of Supreme Court cases culminating with the 1991 decision in *Gaubert v. United States.* First, does the governmental action involve an element of judgment or choice, or conversely, is it taken contrary to a mandatory federal statute, regulation, or policy prescribing a specific course of action? Second, if the governmental action did involve an element of judgment or choice, is it based on considerations of public policy? As the caselaw suggests, this second tier of the analysis will continue to be the more difficult one to decipher.

The applicability of the discretionary function exception in GPS cases is likely to parallel its application in traditional aviation and maritime tort cases. Generally, this means that decisions of the government regarding the design and overall implementation of GPS into the existing civil air and sea navigation systems, the certification of GPS

equipment and operators, the promulgation of regulations relating to GPS, and the methods chosen for publishing GPS information will likely be considered discretionary acts and protected by the exception. As the recent policy directive issued by the White House confirms, also included are actions of the government in denying civil users access to PPS and employing selective availability with SPS. On the other hand, the negligence of employees in the daily operation of the system or in disseminating erroneous information, like in cases involving ATCs and FSS employees, may not be considered discretionary acts grounded in policy judgments. Instead, these cases will likely turn on establishing the traditional elements of negligence and issues of contributory negligence of the other parties involved, i.e., failure to employ a reliable back-up navigational system or a required receiver autonomous integrity monitoring (RAIM) capability, or simply pilot error.

The above invokes an important procedural point. Application of the discretionary function exception, or any of the other exceptions for that matter, means that the court lacks subject matter jurisdiction and must dismiss the case. Of course, the inapplicability of any of the exceptions does not automatically translate to a plaintiff prevailing on the merits. The traditional elements of a negligence action (duty, breach, proximate cause and damage) must still be met. Depending on the facts presented in a particular case, this could prove difficult for many claimants since the Air Force is somewhat more removed from the causal chain of events than in traditional cases of government-provided navigation assistance. For instance, unlike the air traffic controller whose erroneous information directs the unknowing pilot into harm's way, the United States should not be

held responsible in situations where the user may not have read a notice to airmen (NOTAM) advising of a system outage. Liability in these cases will turn on whether the responsible agencies followed proper procedure for timely notifying users of scheduled or unscheduled outages.

The misrepresentation exception could see a resurgence in GPS-related cases. Since GPS information ultimately reaches the user via a series of complex and technical processes not easily understood by the average plaintiff's attorney, pleadings are apt to allege a reliance on a representation of the FAA, Coast Guard, or Air Force when using the GPS signal. If claimants pursue this type of action rather than attempt to discover and allege exactly where an employee of the government negligently performed or failed to perform a specific duty, the action will be barred by the misrepresentation exception.

The important points to remember concerning application of the exception for claims arising in a foreign country are definitional. Under the FTCA, "arising in" has generally been interpreted as the place of the alleged negligent act or omission, not necessarily the place the injury is sustained. "Foreign country" will generally be deemed a territory subject to the sovereignty of another nation (with the exception of Antarctica). Given these definitions, claims arising in international waters, international airspace, or outer space should not be barred by the foreign country exception. However, interesting issues could arise if the negligence somehow occurs at one of the GPS monitor stations on territory under the jurisdiction of the United Kingdom or the Republic of the Marshall Islands.[388] In that case, the exception could be interpreted to bar a claim since those

[388] The 1958 case of *Callas v. United States*, supra note 247, held that the island of Kwajalein, the site of a GPS monitor station and ground antenna, was considered a foreign country for purposes of the exception.

territories are under the sovereignty of another nation. In order for a plaintiff to defeat application of the exception where the injuries are sustained in a foreign country, he or she must show the negligent act or omission with regard to the GPS signal occurred in the United States or in a place not subject to the sovereignty of a foreign state.

Application of the exception for claims arising as a result of combatant activities will turn on the definitions of "combatant activities" and "time of war." The courts have read both terms rather broadly, defining "combatant activities" to include not only physical violence, but activities both necessary to and in direct connection with actual hostilities. "Time of war" has been interpreted to include more than just declared wars. The exception could prove relevant during periods of declared war or other crises, since denying the SPS signal during combatant activities, and conducting jamming, spoofing or countermeasure operations remain a distinct possibility. As stated in the March 1996 decision directive, GPS augmentations must remain responsive to the National Command Authorities.

SIAA. Other than the FTCA, the other broad waivers of sovereign immunity for tort actions against the United States are found in the SIAA and PVA, as extended by the AJEA. The FTCA is generally considered mutually exclusive of the admiralty statutes, as it has a specific exception for suits against the United States cognizable in admiralty. Basically, if the tort meets the two-prong locality plus rule (i.e., first, occurs on navigable waters or the high seas [the locality prong]; and second, bears a significant relationship to traditional maritime activity [the nexus prong]), it will be considered maritime and under the jurisdiction of one of the admiralty statutes. Otherwise, the FTCA will apply. For

instance, in the case of an aircraft accident allegedly caused by government negligence, the SIAA may apply if the craft goes down in the ocean on a transatlantic flight, whereas the FTCA would apply on a transcontinental flight. Cases involving the use of GPS by maritime vessels more clearly fall within admiralty jurisdiction, and the caselaw concerning Coast Guard-provided aids to navigation may prove useful in their disposition.

Aside from a few strange jurisdictional anomalies, application of either the FTCA or SIAA should, for the most part, be of little substantive consequence. The exceptions to liability applicable under the FTCA, although not specifically enumerated in the SIAA, have been judicially read into the latter Act and applied similarly. There are, however, important procedural differences in the statutes. For example, under the FTCA a claimant is required to file an administrative claim with the responsible agency before filing suit or risk having the suit dismissed for failure to exhaust administrative remedies. Under the SIAA, a claimant may proceed directly to federal court. On the other hand, in cases where the AJEA applies to extend the SIAA for damages on land caused by a government vessel, the claimant must first file an administrative claim. Needless to say, filing suit under the correct statute and following its procedural requirements will be crucial in these cases.

Administrative Statutes. The administrative remedies provided for in the Foreign Claims Act and the Military Claims Act will be of little use to handle GPS-related claims. Payments under these statutes have been made for more traditional-type tort cases such as vehicle accidents, with payments made *ex gratia* and without a traditional judicial finding of legal liability. Overall, payments per claim have been at relatively low-dollar amounts.

A claim based on GPS, however, is likely to be for a much greater amount, with underlying issues of negligence much less clear and much more tenuous.

International Law. Little international law presently exists to handle GPS-related claims. The *1972 Convention on Liability for Damage Caused by Space Objects* makes launching states liable for damages caused by their space objects, but is unlikely to apply to indirect damages arising from the use of navigational satellite services provided by a State Party to the agreement. The prospect of establishing a multilateral legal framework to govern a global navigation satellite system based on GPS is doubtful at the present time, based on the conflicting national security and economic concerns endemic to the global civil use of a strategic military asset. However, bilateral agreements with states wishing to use GPS should prove adequate to address these concerns, including liability concerns.

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