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Report to Congressional Requesters

June 1989

DRUG SMUGGLING

Capabilities for Interdicting Private Aircraft Are Limited and Costly

GAO/GGD-89-93

GAO

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General Government Division

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Congressional Requesters:

The National Defense Authorization Act for Fiscal Years 1988 and 1989 requires us to review the capabilities of the federal government to deter drug smuggling.

This is the last of three reports in response to that requirement. This report discusses several aspects of federal efforts to interdict drug smugglers using private aircraft to bring drugs into the United States.

We are sending copies of this report to the Director, Office of Management and Budget; the Director of National Drug Control Policy; the Attorney General; the Secretaries of Defense, Treasury, Transportation; and other agencies involved in drug enforcement programs. We will make copies available to others upon request.

The major contributors to this report are listed in the appendix. If you have any questions on this report, please call me on 275-8389.

Arnold P. Jones
Director
Administration of Justice Issues

List of Requesters

The Honorable Robert C. Byrd
Chairman, Committee on Appropriations
United States Senate

The Honorable Sam Nunn
Chairman, Committee on Armed Services
United States Senate

The Honorable Joseph R. Biden, Jr.
Chairman, Committee on the Judiciary
United States Senate

The Honorable Claiborne Pell
Chairman, Committee on Foreign Relations
United States Senate

The Honorable Joseph R. Biden, Jr., Chairman
The Honorable Alfonse M. D'Amato, Co-Chairman
The Honorable Dennis Deconcini
The Honorable Alan J. Dixon
The Honorable Bob Graham
The Honorable Frank H. Murkowski
The Honorable Pete Wilson
Caucus on International Narcotics Control
United States Senate

The Honorable Jamie L. Whitten
Chairman, Committee on Appropriations
House of Representatives

The Honorable Les Aspin
Chairman, Committee on Armed Services
House of Representatives

The Honorable Dante B. Fascell
Chairman, Committee on Foreign Affairs
House of Representatives

B-230748

The Honorable Jack Brooks
Chairman, Committee on the Judiciary
House of Representatives

The Honorable Charles B. Rangel
Chairman, Select Committee on
Narcotics Abuse and Control
House of Representatives

Executive Summary

Purpose

Federal efforts to control airborne drug smuggling have increased dramatically during the 1980s. These efforts, known as air interdiction programs, are aimed at smugglers using private aircraft to transport illegal drugs from foreign countries (primarily cocaine and marijuana from Latin America and the Caribbean) into the United States. Federal spending on air interdiction programs increased from about $18 million in 1982, to an estimated $200 million in fiscal year 1989. As required by Section 1241 of the National Defense Authorization Act for Fiscal Years 1988 and 1989 (Public Law 100-180), GAO assessed federal capabilities for controlling airborne drug smuggling into the United States. (See pp. 10-11 and 22-23.)

Background

When GAO did this review, Customs and Coast Guard shared responsibility for detecting, identifying, and pursuing airborne drug smugglers; Customs had primary authority for apprehending these smugglers and seizing their drug loads. The Department of Defense (DOD) supported Customs and Coast Guard by providing airborne radar coverage of drug smuggling routes. The National Defense Authorization Act, Fiscal Year 1989 (Public Law 100-456), enacted on September 29, 1988, designated DOD as the single lead agency for detecting and monitoring aerial and maritime transit of drugs into the United States. The act also required the President to submit plans for DOD's integration of a communications network for drug interdiction efforts and for the operation of this network. (See p. 11.)

Customs and Coast Guard attempt to interdict airborne drug smugglers through a four-step process: (1) using radar to detect suspicious aircraft; (2) dispatching an interceptor aircraft to confirm suspicions that an aircraft is involved in drug smuggling; (3) employing tracker aircraft to follow the suspect aircraft to its destination; and (4) using a helicopter or other aircraft staffed with law enforcement officers to stop the suspect aircraft when it lands, detain the crew, search the aircraft, and, if appropriate, arrest the suspect(s) for drug smuggling and seize any illegal drugs. Customs and Coast Guard frequently use intelligence from informants and investigations to plan interdiction operations in advance. (See pp. 19-21.)

Results in Brief

Air interdiction programs have resulted in the seizure of substantial amounts of drugs. For example, about 28 tons of cocaine were seized through these programs in 1987. However, these seizures and those

from other interdiction programs are small compared to the amounts successfully smuggled into the United States. (See pp. 23-25.)

Gaps exist in the radar coverage that the present air interdiction detection network provides. In addition, all radar detection systems have inherent technical constraints that limit their ability to detect the small aircraft typically used to smuggle drugs. Drug smugglers can exploit these vulnerabilities, although the extent to which they can is unclear. Customs and Coast Guard have been able to respond to most radar detections of suspected air smugglers, but most aircraft they pursue turn out not to be engaged in smuggling. GAO's analysis of Customs data shows that about 10 percent of air interdiction missions in fiscal years 1987 and 1988 resulted in seizures. (See pp. 26-29, 38-42, 45-49, and 55.)

Planned deployments of additional radar systems will improve detection capabilities. However, even if fully implemented, the planned systems would not provide constant coverage due to downtime caused by maintenance and weather. Improvements in command, control, communications, and intelligence systems (C3I) may also enhance the effectiveness of the air interdiction detection network. The impact of DOD's new responsibilities for detection and C3I integration is not yet known. (See pp. 42-44 and 50-52.)

Previous GAO reports have noted the need to address the Nation's drug abuse problem through a centralized and comprehensive approach. Such an approach should address both the supply of illegal drugs and the demand for them. To date, neither the administration nor Congress have been able to commit sufficient funds to adequately deal with both aspects of the drug problem. Consequently, it is critical that resources be allocated on the basis of where they will be most effective. Because of insufficient data, these decisions will not be easy. Nevertheless, GAO is not convinced that spending additional millions of dollars on air interdiction programs is the most effective use of the limited additional resources Congress and the administration want to put into the war on drugs. (See pp. 11-12 and 55.)

GAO's Analysis

Air and Other Interdiction Programs Have Not Reduced Drug Supply

Customs averaged about five interdictions of drug smuggling aircraft a month over the fiscal year period 1983-1987. In 1987, about 55,000 pounds of cocaine and 175,000 pounds of marijuana were seized from private aircraft. Many of these seizures, however, were by-products of undercover law enforcement operations in which federal agents allowed drug smuggling operations to take place to arrest key drug traffickers and disrupt the operations of drug trafficking networks. In fiscal year 1988, about 54 percent of the cocaine and 41 percent of the marijuana seized by Customs' Miami Aviation Branch came from aircraft involved in deliveries controlled by federal agents. (See pp. 23-25 and 38.)

Despite substantial seizures from air and other interdiction programs, the availability of cocaine has not been reduced. According to the Drug Enforcement Administration, cocaine prices in recent years have declined significantly while cocaine purity has remained high, indicating increased availability. (See pp. 24-25.)

Current and Planned Air Interdiction Radars

All radars have inherent limitations that restrict their ability to detect and identify airborne drug smugglers. Each radar has advantages and disadvantages in terms of size of the area it can cover, its ability to identify suspect smugglers, and its susceptibility to weather. (See pp. 26-37.)

The principal radar networks currently used to detect airborne smugglers are five radars attached to tethered balloons (known as aerostats) located in South Florida, the Bahamas, and on the U.S.-Mexican border. A single aerostat costs between $11.8 million and $22.8 million. Aerostats must be taken down for maintenance and also cannot operate in severe weather. Consequently, current aerostats are operational only about half of the time. (See pp. 30-31, 38-39 and 44.)

Radar coverage provided by these networks is augmented by radar aircraft and other radars operated by Coast Guard, Customs, and the military; land-based military defense radars located on Caribbean islands; and Federal Aviation Administration air traffic control and military defense radars along the U.S. border. Despite the extent of these radars, there are currently gaps in radar coverage. (See pp. 31 and 39-42.)

The current federal air interdiction strategy includes plans to expand the existing aerostat detection network to 16 aerostats, providing some radar coverage for most of the U.S. southern border. The strategy also includes plans to acquire two more long-range radar aircraft (Customs and Coast Guard currently operate nine radar aircraft dedicated to drug interdiction). The estimated cost of acquiring the six aerostats not already funded and two long-range radar aircraft is at least $124 million. (See pp. 42-45.)

Customs and Coast Guard have plans for coordinating air interdiction detection activities. Customs is developing a C3I system to coordinate radar detections and intelligence on drug smuggling activities with air interdiction response aircraft. The system, which is still evolving, will cost over $50 million, and its impact cannot yet be determined. As of May 1989, DOD was beginning to carry out new air interdiction responsibilities designated under the National Defense Authorization Act, Fiscal Year 1989. (See pp. 50-52.)

Matters for Congressional Consideration

Decisions about providing funds for additional air interdiction efforts should not be made without considering whether these funds could be put to more effective use on some other aspect of the Nation's war on drugs. GAO is not convinced that spending more on air interdiction is the best use for additional funds. There are insufficient data, however, to draw a definitive conclusion as to how funds can best be spent fighting the war on drugs. Accordingly, the appropriate congressional committees may want to pursue the issue further with key administration officials before deciding on specific authorization and appropriation levels for all aspects of the war on drugs. (See p. 55.)

Agency Comments

GAO did not obtain written comments on this report. However, GAO discussed the information contained in the report with Customs, Coast Guard, and DOD officials and included their comments and clarifications in the report where appropriate. Customs said that this report inferred that air interdiction is not cost effective. Although the cost effectiveness of air interdiction programs cannot be established due to insufficient data, GAO believes that sufficient data are available to raise questions as to the amount of funds that should be spent on such programs in relation to other drug control efforts. (See pp. 14 and 55-56.)

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Figures

Abbreviations

AEW	Airborne Early Warning
AOR	Aviation Operations Report
AWACS	Airborne Warning and Control System
C3I	Command, Control, Communications, and Intelligence
CRS	Central Radar System
DEA	Drug Enforcement Administration
DOD	Department of Defense
EPIC	El Paso Intelligence Center
FAA	Federal Aviation Administration
IFF	Identification Friend or Foe
JSS	Joint Surveillance System
NNBIS	National Narcotics Border Interdiction System
NNICC	National Narcotics Intelligence Consumers Committee
NORAD	North American Air Defense
OTA	Office of Technology Assessment
OTH	Over-the-Horizon
OTH-B	Over-the-Horizon Backscatter
R-OTH	Relocatable Over-the-Horizon

Introduction

This report discusses our assessment of the federal government's capabilities to control airborne drug smuggling. It is the third and last in a series of reports responding to the requirements of section 1241 of the National Defense Authorization Act for Fiscal Years 1988 and 1989 (Public Law 100-180). Section 1241 required us to review the smuggling of illegal drugs into the United States and the capabilities of federal agencies to deter such smuggling. Two previous reports that we issued pursuant to section 1241 dealt with the role of the military in controlling drug smuggling.[1]

Air Interdiction

Air interdiction is one of several drug interdiction programs with a principal objective of controlling illegal drug smuggling into the United States. The primary goal of all interdiction programs is to deter drug smuggling, and thereby reduce the availability of imported drugs by intercepting and seizing (interdicting) illegal drug shipments coming into the United States. During fiscal year 1988, about $1 billion of the approximately $3.8 billion spent by the federal government on anti-drug abuse efforts was used for interdiction programs.

Air interdiction programs are aimed at smugglers using aircraft to bring drugs into the United States. Air interdiction efforts focus on small, privately owned aircraft (also known as general aviation aircraft) as opposed to aircraft operated by commercial passenger and cargo airlines. Smugglers also use commercial airlines to smuggle drugs into this country through airports. The principal method of interdicting drugs smuggled through airports into the United States on commercial airlines is the Customs Service inspection of the aircraft and its passengers and cargo when the aircraft enters a U.S. airport.

According to the former National Drug Policy Board (Policy Board), there are several advantages to using private aircraft as smuggling vehicles. Smugglers can choose several routes to bring drugs to the United States and, because of the lack of radar coverage, avoid detection for most of the trip. Airborne smugglers can also enter the United States generally unobserved by exploiting gaps in radar coverage or physical factors, such as mountains that limit the detection capabilities of radars. Law enforcement agencies have developed air interdiction programs to combat drug smuggling by private aircraft.

[1] Issues Surrounding Increased Use of the Military in Drug Interdiction (GAO/NSIAD-88-156, April 29, 1988); Operation Autumn Harvest: A National Guard-Customs Anti-Smuggling Effort (GAO/GGD-88-86, June 2, 1988).

Before 1987, Customs Service was the principal federal agency involved in air interdiction efforts; the Department of Defense (DOD) assisted Customs in detecting airborne drug smugglers by providing airborne radar surveillance of areas thought to be air smuggling routes. On May 22, 1987, the Policy Board assigned Coast Guard joint responsibility with Customs for air interdiction efforts. Title XI of the National Defense Authorization Act, Fiscal Year 1989 (Public Law 100-456), enacted on September 29, 1988, designated DOD as the "single lead agency of the Federal Government for the detection and monitoring of aerial and maritime transit of illegal drugs into the United States." Title XI went on to mandate "that command, control, communications, and technical intelligence assets of the United States that are dedicated to the interdiction of illegal drugs be integrated by the Secretary of Defense into an effective communications network." The act did not assign any police powers to DOD. Thus, DOD's role is still limited to providing support for civilian law enforcement functions. The federal government spent $269.5 million on air interdiction efforts in fiscal year 1987, $179.2 million in fiscal year 1988, and estimates spending $204.2 million in fiscal year 1989. These amounts do not include the costs of DOD support for drug interdiction activities.

Transition Report on Justice Issues Suggested More Emphasis on Demand

In November 1988, we issued a report on the major issues involving the Department of Justice.[2] This report was one of a series that addressed major policy, management, and program issues facing Congress and the new administration. One of the issues we believed should be included in the agenda for Congress and the Attorney General was reassessing the effectiveness of drug abuse control programs. If we measure the success of the current federal drug abuse control strategy by looking at the number of drug users and amounts of drugs entering the country, we must conclude that our present strategy—which emphasizes supply reduction—is not very effective. The dilemma is that no one knows which drug control programs are the most effective.

An increasing number of drug experts believe that the root cause of our national drug problem is the demand for illegal drugs. It is time to consider assigning more resources to activities aimed at reducing demand: treatment, prevention, education, and research on the causes and extent of drug abuse. This does not mean that efforts to control the supply of illegal drugs should be reduced. They play an important role in the overall drug abuse control strategy. However, further emphasis on supply

[2]Justice Issues (GAO/OCG-89-13TR, Nov. 1988).

reduction programs will probably not solve the drug problem in this country.

Recognizing the need to redirect the federal drug abuse control strategy, Congress passed the Anti-Drug Abuse Act of 1988, which was enacted into law on November 18, 1988. The legislation, among other things, established in the Executive Office of the President an Office of National Drug Control Policy to establish and coordinate policies, objectives, and priorities for federal anti-drug abuse efforts. The legislation also provides for greater emphasis to programs aimed at reducing the demand for drugs.

Objective, Scope, and Methodology

Section 1241 of the National Defense Authorization Act for Fiscal Years 1988 and 1989 (Public Law 100-180) required us to review several aspects of the federal government's efforts to control drug smuggling into the United States. The objective of this report is to evaluate the federal government's present and future air interdiction capabilities. Specifically, the scope of our review included assessments of (1) the technical capabilities of radars now in use or under consideration for use in detecting airborne drug smugglers (detection assets); (2) the overall capabilities of both existing and planned air interdiction detection networks; (3) the availability and effectiveness of interceptor, tracking, and apprehension aircraft (response assets); and (4) agency plans to coordinate the use of air interdiction assets. The requirement also stated that we should include any comments and recommendations that we considered appropriate.

To meet our objective, we interviewed headquarters and field officials in 24 locations involved in air interdiction efforts from Customs, Coast Guard, and DOD (including the Air Force, Army, and Navy). We examined such documents as operations manuals, strategies, drug threat assessments, and intelligence reports provided by agency officials. We also reviewed air interdiction case files, radar logs, and aircraft maintenance reports at the headquarters and field locations we visited. We interviewed officials and reviewed documentation at the National Narcotics Border Interdiction System (NNBIS), the Drug Enforcement Administration (DEA), and the Federal Aviation Administration (FAA). At private sector organizations that develop radar surveillance equipment or provide consulting services relating to such equipment, we interviewed officials and obtained and examined documentation relating to radar systems. A list of the headquarters and field locations we visited is presented in table 1.1.

Table 1.1: Offices Visited, March 1988 - January 1989

Department of Defense
Office of the Assistant Secretary (FM&P)(DP&E), Washington, DC
Headquarters, U.S. Air Force, XOORC, Washington, DC
Naval Air Test Center, Patuxent River, MD
L.G. Hanscom Air Force Base, Bedford, MA
Vint Hill Farms Station, U.S. Army, Warrenton. VA

Federal Aviation Administration
Headquarters, Washington, DC

National Narcotics Border Interdiction System
Southeast Region, Miami, FL

U.S. Coast Guard
Headquarters, Washington, DC
7th Coast Guard District, Miami, FL
Coast Guard Air Facility, Norfolk, VA
Coast Guard Air Station, Opa Locka, FL

U.S. Customs Service
Headquarters, Washington, DC
Aviation Operations Branch, Homestead (Miami), FL
Aviation Operations Branch, San Diego, CA
Aviation Operations Branch, Tucson, AZ
Aviation Operations Unit, Riverside, CA
Aviation Operations Unit, Phoenix, AZ
Aerostat Site Fort Huachuca, Sierra Vista, AZ
Office of Enforcement, Miami, FL
Office of Enforcement, Riverside, CA
Office of Enforcement, San Diego, CA
Office of Enforcement, Phoenix, AZ
Office of Enforcement, Tucson, AZ
C3 Center, Miami, FL
C3I Center, Riverside, CA
Surveillance Support Center, Corpus Christi, TX

Lockheed California Company, Burbank, CA

Westinghouse Electric Corporation, Baltimore, MD

The Mitre Corporation, Burlington, MA

In addition, we analyzed a computerized Customs data base to determine how well Customs was able to react when radar surveillance equipment detected possible air smugglers. We also analyzed the data base to determine the availability and capability of Customs response aircraft to follow through with interception, tracking, and apprehension of suspect

aircraft. This data base contains data from Customs Aviation Operations Reports (AOR), prepared by Customs aviation branches, that provide information on Customs detection and response aircraft operations and air interdiction program enforcement results.[3]

We also gathered and analyzed data on Coast Guard and DOD air interdiction activities. However, the primary focus of our work was Customs Service activities since it was the federal law enforcement agency primarily involved in air interdiction until mid-1987.

Our work was done between March 1988 and January 1989 and in accordance with generally accepted government auditing standards. We did not obtain formal written comments from the agencies. However, we discussed the information in the report with Customs Service, Coast Guard, and DOD officials, who generally agreed with the facts as presented. We included their comments and clarifications where appropriate. General comments on the report are discussed on page 55.

[3]In June 1988, Customs Service's Office of Internal Affairs issued an audit report of the Customs air program. Part of this audit assessed the reliability of the AOR data base. The Office found errors in the data base due to the lack of controls on the data, such as pilot errors in inputting data; not updating information; and no supervisory review. However, we analyzed the Internal Affairs audit team's work papers and determined that the information we used in this report was not substantially affected by data input errors.

Airborne Drug Smuggling and Air Interdiction Programs

Significant amounts of cocaine and marijuana are smuggled into the United States by private aircraft, although a large volume of both drugs enters the country by other means. Smugglers have adapted to increased federal anti-smuggling efforts by adopting new methods that exploit vulnerabilities in the air interdiction system. The organization of federal air interdiction efforts is currently changing. Customs and Coast Guard are the principal civilian agencies involved in air interdiction, but in late 1988 the National Defense Authorization Act, Fiscal Year 1989 (Public Law 100-456), significantly expanded DOD's role in air interdiction. Air interdiction programs are costly. Budget authorizations for air interdiction programs are about $204 million in fiscal year 1989.[1] These programs have resulted in the seizure of substantial amounts of drugs, but they and other interdiction programs have not been successful in reducing the overall availability of illegal drugs to consumers.

The Air Smuggling Threat

Illegal drugs are produced in countries throughout the world and smuggled into the United States through a complex, clandestine distribution chain. Generally, cocaine is produced in South America. Most of the marijuana available in the United States is produced in South and Central America, Mexico, and the Caribbean. However, an increasing amount, about 25 percent in 1988, of the marijuana available in this country is produced domestically, according to the National Narcotics Intelligence Consumers Committee (NNICC). Cocaine and marijuana are normally smuggled across the southern tier of the United States from Florida to California. Most heroin is produced in Southeast and Southwest Asia and Mexico and is smuggled into the United States through Atlantic and Pacific coast ports and across the southwest border. Hashish is produced primarily in the Middle East and Southwest Asia and is smuggled through South Asian ports to the northeast coast of the United States.

Air interdiction programs focus on only a portion of the drug smuggling traffic. Large quantities of drugs are smuggled into the United States by other conveyances, including marine vessels, commercial aircraft, and land vehicles. According to Customs' Office of Intelligence estimates, private aircraft transported about 19 percent of the cocaine, about 16 percent of the marijuana, and less than 1 percent of the heroin and hashish smuggled into the United States in 1986 (the last year for which estimates were done). Customs stopped making these estimates because

[1]These amounts do not include DOD support for Customs and Coast Guard air interdiction efforts.

of flaws in the methodology it was using. However, the estimates do provide a sense of the dimensions of the air smuggling threat. Recent drug seizure data, which, according to a recent Office of Technology Assessment (OTA) report, give some indication of drug smuggling trends, show that private aircraft account for only a portion of cocaine smuggler traffic. However, more cocaine was seized from private aircraft in 1986 (48 percent) than from any other conveyance.

Small amounts of cocaine are valuable, and private aircraft present an attractive mode of transportation because large cargo areas are not required. Private aircraft are also used to smuggle cocaine into this country because of the relatively short distance between Colombia, the primary staging point for cocaine smuggling operations, and the United States. Some marijuana is smuggled into this country in private aircraft, but most marijuana is smuggled in by sea, on private and commercial marine vessels, or overland in vehicles or on pedestrians. Marijuana produced in Mexico is usually smuggled across the border in land vehicles and private aircraft. Recently, both cocaine and marijuana have been flown by private aircraft from Colombia to Mexico via Central America and unloaded at various points inside Mexico. These drugs are then shipped into the United States in aircraft and land vehicles. According to an intelligence report by DEA's El Paso Intelligence Center (EPIC), most cocaine brought into the United States from Mexico is transported in land vehicles. Private air smuggling into Mexico increased in 1988. In particular, the amount of Colombian cocaine seized en route to the United States through Mexico increased 51 percent, and drug-related aircraft crashes (an indicator of drug smuggling activity) in this area have doubled since 1987.

As interdiction capabilities have increased, particularly in the southeastern United States where there has been a major build-up of radar surveillance equipment and coverage, it appears that airborne drug smugglers have modified their smuggling methods and routes to avoid detection and apprehension. According to a recent EPIC report, drug smugglers flying drugs destined for the United States have used such methods as switching to different airports, mixing transportation modes, air dropping, or shifting to other smuggling methods. Thus, it appears that air interdiction efforts have disrupted drug smugglers' operations. However, as will be discussed on page 24, these efforts have not reduced the availability of cocaine in the United States.

An official at the Customs Miami Aviation Operations Branch stated that before the increased air interdiction efforts in the Southeast, there

was more private air smuggling activity. Recent intelligence from EPIC indicates that drug smugglers are using alternative routes and innovative methods of transporting their drugs instead of flying directly into the United States illegally. Examples of various methods include: (1) flying into the Bahamas or Mexico and then bringing the drugs into the United States aboard small marine vessels or land vehicles; (2) obtaining intelligence on air interdiction capabilities and activities, such as gaps in radar coverage, and flying around the coverage; (3) adding extra fuel tanks to the aircraft, which could enable smugglers to fly from South America to the United States or nearby island nations without refueling; (4) making airdrops near or in U.S. territory, and then flying away without ever entering U.S. law enforcement jurisdiction; (5) entering the United States legally by following proper flight procedures and then attempting to bypass Customs' inspection process; (6) switching to different conveyances to avoid air interdiction efforts; (7) switching air smuggling routes to avoid the southeast area; and (8) filing a flight plan for a U.S. airport and, at the last minute, deviating from the plan to quickly unload the drugs.

Organization of the Air Interdiction Program

As of March 1989, the organization of federal air interdiction efforts was in flux. Title XI of the National Defense Authorization Act, Fiscal Year 1989 (Public Law 100-456), significantly expanded DOD's role in air interdiction. The act, which became law on September 29, 1988, designated DOD as the single lead agency of the federal government for the detection and monitoring of aerial and maritime transit of illegal drugs into the United States. It also required the President to direct DOD to integrate into an effective communications network the command, control, communications, and technical intelligence (C3I) assets of the United States, dedicated to the interdiction of illegal drugs. As of May 1989, DOD was about to issue a report on its final plans for integrating C3I assets.

Before the enactment of Public Law 100-456, Customs and Coast Guard were jointly responsible for air interdiction efforts. DOD played a support role, including providing aerial surveillance of drug smuggling routes. In the East, Coast Guard was the lead agency for surveillance and detection; Customs was the lead for intercepting and tracking suspected airborne smugglers, with both Customs and Coast Guard furnishing interceptor and tracker assets; and Customs was the lead agency for apprehending airborne smugglers. In the West and Southwest, Customs was responsible for all phases of the air interdiction process.

Customs initiated its C3I system program because of perceived shortcomings in the command and control of its own air interdiction assets.[2] In 1986, Congress authorized funding for Customs to develop a command, control, communications, and intelligence program. Congress also required Customs to coordinate the development of its C3I program with Coast Guard and other relevant agencies.

As envisioned by Customs, the C3I system would be used to: (1) detect and identify suspected smugglers by using radar surveillance equipment and prior intelligence; (2) control and coordinate interdiction operations aimed at intercepting, tracking, and apprehending suspected air smugglers; (3) communicate among drug law enforcement agencies; and (4) develop anti-drug smuggling intelligence. Construction of the C3I center near Miami, Florida, (C3I East) and the C3I center at March Air Force Base, California, (C3I West) has been completed. The C3I East center is responsible for air interdiction efforts in the eastern half of the United States and the C3I West center for the western half. Customs is also constructing a national aviation center near Oklahoma City, Oklahoma, which it plans to incorporate into its national C3I system.

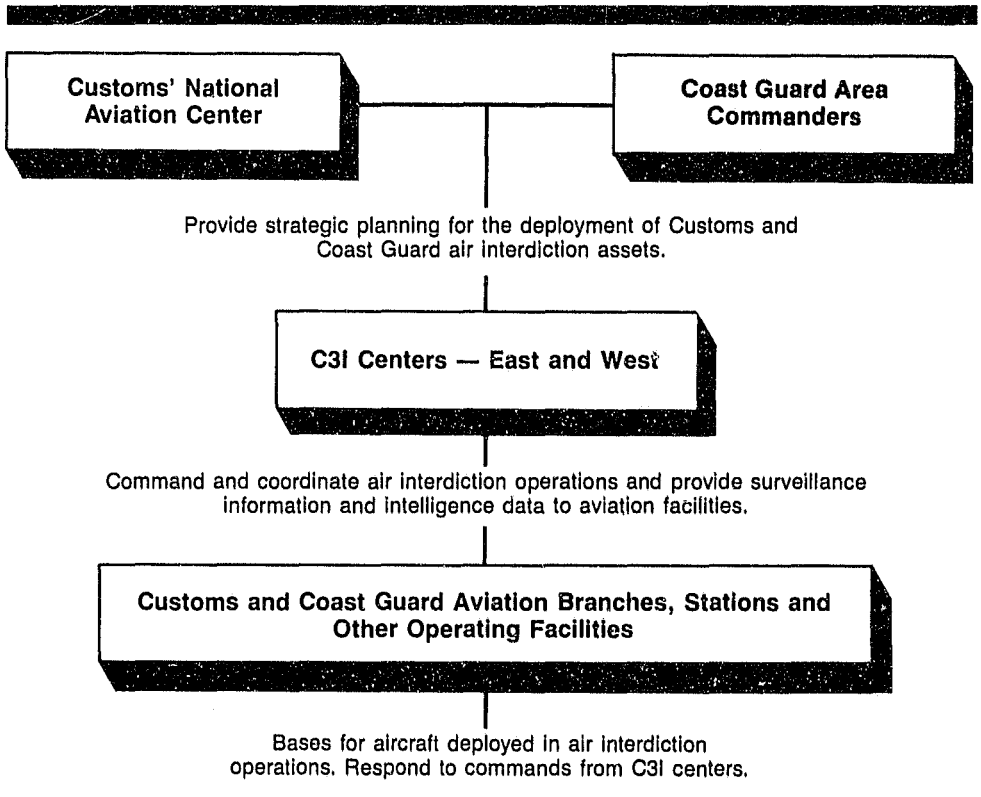
Previously, in Miami, Customs and Coast Guard operated a temporary command, control, and communications center (C3) until the C3I East center was completed in April 1989. This C3 center was to remain operational until the performance of the new C3I was assured. The March Air Force Base C3I West center is fully operational, although the amount of radar data feeding into it is limited. Customs and Coast Guard had planned to rotate the direction of the C3I East center between the two agencies by having the Director and Deputy Director positions alternate every 2 years between the two agencies. (The C3I West center is to be operated by Customs.) This plan may be modified depending upon the outcome of the DOD plan for C3I system integration and the President's decision about who should operate the C3I system. As of March 21, 1988, Customs anticipated the three centers would cost $50 million.

The current organization of federal air interdiction efforts is depicted in figure 2.1. Customs' National Aviation Center and Coast Guard's Area Commanders develop air interdiction operation plans, assess the drug smuggling threat, and coordinate the use of air interdiction resources. The C3I centers command and coordinate air interdiction operations and

[2]Drug Interdiction: Should the Customs Command and Control Program be Continued as Currently Evolving? (GAO/GGD-88-123, July 1988).

provide radar detection information and intelligence data to the facilities where response (interception, tracking, and apprehension) aircraft are stationed. Response aircraft are stationed at Customs and Coast Guard aviation branches and stations. They respond to commands from the C3I centers, which notify them when suspect aircraft are spotted by radar detection equipment, or when prior intelligence indicates that a smuggling operation is about to take place.

Figure 2.1: Organization of Air Interdiction Program



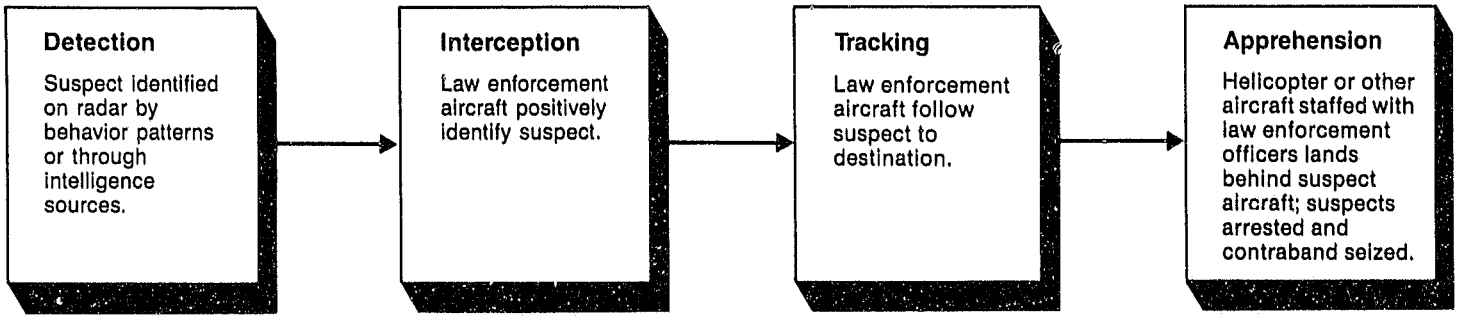
Air Interdiction Process

Figure 2.2 shows the sequential steps involved in the ideal air interdiction operation, although several variations of the steps can occur.

Theoretically, air interdiction missions begin with the detection of an aircraft suspected of smuggling drugs destined for the United States. Interdiction agencies use radar surveillance equipment or, in some cases, visual sightings by patrol aircraft, to detect aircraft heading toward the United States and then use various criteria to determine if a particular

aircraft is carrying illegal drugs. As discussed on pages 25 and 26, many air interdictions involve smuggling operations that interdiction agencies knew about in advance. Interdiction agencies may, for example, decide that an aircraft is suspicious if it does not respond (using a radio receiving/transmitting device known as a transponder) to a query from a device attached to the radar surveillance equipment or if the aircraft responds with an improper transmission code (these codes help identify an aircraft). Interdiction agencies may also consider an aircraft suspicious if its flight pattern is out of the ordinary or matches that typically used by smugglers (for example, night flights in the Bahamas without a flight plan). Aircraft are also considered suspicious if the pilot has not filed a flight plan with FAA, or if the aircraft deviates from its flight plan.

Figure 2.2: Air Interdiction Sequence



The detection phase is followed by a series of activities that can be grouped together and called the "response" phase. After an aircraft is determined to be suspicious, radar surveillance equipment is used to monitor the movements of the suspect aircraft and help direct an interceptor aircraft to physically locate the suspect aircraft. The interceptor uses information from the radar surveillance system as well as its own on-board radars and other electronic sensors to locate the plane. If the interceptor succeeds in finding the suspect aircraft, the interceptor attempts to identify the aircraft's registration number. The registration number is checked through various law enforcement data bases to determine if the suspect aircraft has been involved in previous illegal activities. If these checks confirm the initial suspicion that the aircraft is

potentially carrying drugs, the interceptor or a tracker aircraft covertly follows (tracks) the suspect, watches for suspicious or illegal flight movements, and follows the aircraft to its landing or airdrop site.

The final stage in the interdiction process is apprehension. A helicopter staffed with a law enforcement arrest team eventually joins the operation. When the suspect is on approach for landing, the helicopter will follow and also land. (In some situations a fixed-wing aircraft performs this function.) The arrest team will search the aircraft and, if appropriate, arrest the suspect(s) for drug smuggling and seize any contraband found.

Air interdiction efforts are aided by intelligence, which ranges from information on smuggling patterns and routes to timely tactical intelligence from informants on individual shipments. Prior information on drug deliveries plays an important role in air interdiction efforts.

According to the Policy Board's 1987 drug law enforcement strategy,[3] information on smuggling routes, modes of operation, activities in transshipment countries, and points of entry into the United States allow resources to be applied more effectively and efficiently. This type of information is developed by Customs investigators, located at the Customs air branches, and DEA agents. United States intelligence agencies also supply some intelligence pertaining to air smuggling. EPIC stores, analyzes, and disseminates information on drug smuggling activities. Prior information is particularly important in areas where there is little or no radar coverage to monitor aircraft activities, such as along the U.S.-Mexican border. In 1987, we reported that 53 percent of the total cocaine seized by Customs in 1986 resulted from cases based on prior intelligence.

Customs agents also covertly install electronic transmitting devices on suspect aircraft. These devices help to identify suspect smugglers even if they are following legitimate flight patterns. Customs currently relies on this method less than in the past, partly because smugglers search their aircraft for these devices before setting out on a smuggling operation.

[3]National and International Drug Law Enforcement Strategy, National Drug Policy Board, January 1987.

Air Interdiction Budget

The air interdiction budget has increased significantly over the past decade, as shown in table 2.1. The jump in spending for fiscal year 1987 reflects an authorization of funds for the procurement of radar detection systems and surveillance aircraft. These systems are still in the implementation phase, and the fiscal year 1987 authorization has not yet been fully spent.

Table 2.1: Air Interdiction Funding: 1982 - 1989

Dollars in millions

Fiscal year	Customs Service	Coast Guard	Total
1982	$17.8		**$17.8**
1983	26.2		**26.2**
1984	64.8		**64.8**
1985	67.2		**67.2**
1986	91.4		**91.4**
1987	200.2[a]	$69.3[b]	**269.5**
1988	173.2	6.0	**179.2**
1989	182.5	21.7[c]	**204.2**

[a]Reflects the additional funding authorized by the Anti-Drug Abuse Act of 1986.

[b]Includes $29.7 million for Falcon interceptor jets used in air interdiction (Coastal Defense Augmentation Account FY 1987). Also includes $23 million for Falcon interceptor jets used in air interdiction (Anti-Drug Abuse Act of 1986, DOD funding).

[c]Includes $2.6 million for the southeast U.S. air interdiction facility.

Source: Customs and Coast Guard Budget Offices.

DOD does not prepare separate budget figures for the various types of interdiction support it provides, such as marine and air interdiction assistance. However, DOD's assistance to air interdiction agencies is substantial. For example, in fiscal year 1987, DOD was authorized about $330 million for air interdiction assets, including aerostats, E-2C radar aircraft, and helicopters that it procured for, or transferred to, air interdiction agencies.

The federal government has separate interdiction programs to deal with other smuggling modes, including private and commercial vessels, commercial aircraft, overland vehicles, cargo containers, and passengers or pedestrians. The federal government spent about $1.1 billion on all forms of interdiction in both fiscal years 1987 and 1988. Approximately $1.5 billion is authorized for fiscal year 1989. This $1.5 billion is about 28 percent of the $5.3 billion authorized for drug control programs in fiscal year 1989. Air interdiction composes about 13.3 percent of the authorized interdiction budget in fiscal year 1989. However, in fiscal year 1987, the proportion of total interdiction spending devoted to air

interdiction was about 42 percent when DOD appropriations for large equipment acquisitions, such as aerostats, are included.

Air Interdiction Results

Programs aimed at interdicting drugs smuggled in private and commercial aircraft, vessels, commercial cargo, and over land have resulted in the seizure of substantial amounts of illegal drugs in recent years, but the seizures are small compared to the amounts successfully smuggled into the United States.

Interdiction efforts have not succeeded in reducing the overall availability of cocaine, marijuana, or other illegal drugs to U.S. consumers. DEA data indicate that the amount of cocaine entering the United States remains at high levels. Tables 2.2 and 2.3 show the amounts of drugs seized from private aircraft compared to seizures from other conveyances.

Table 2.2: Cocaine Seizures by Type of Conveyance, 1986-1987

In pounds

	1986		1987	
Type of conveyance	**Amount seized**	**Percent of total**	**Amount seized**	**Percent of total**
Aircraft				
Private	44,564	48	55,346	36
Commercial	9,945	11	7,765	5
Vessel				
Private	21,638	23	33,750	22
Commercial	12,557	13	32,595	21
Land Vehicles	5,044	5	22,661	15
Totals	**93,748**	**100**	**152,117**	**99[a]**

[a]EPIC data did not total to 100 percent.

Source: Drug Enforcement Administration EPIC Intelligence Report.

Table 2.3: Marijuana Seizures by Type of Conveyance, 1986-1987

In pounds

	1986		1987	
Type of conveyance	Amount seized	Percent of total	Amount seized	Percent of total
Aircraft				
Private	105,510	5	175,649	7
Commercial	40,565	2	22,485	1
Vessel				
Private	1,930,130	83	1,687,895	72
Commercial	89,939	4	149,606	6
Land Vehicles	146,855	6	322,557	14
Totals	**2,312,999**	**100**	**2,358,192**	**100**

Source: Drug Enforcement Administration EPIC Intelligence Report.

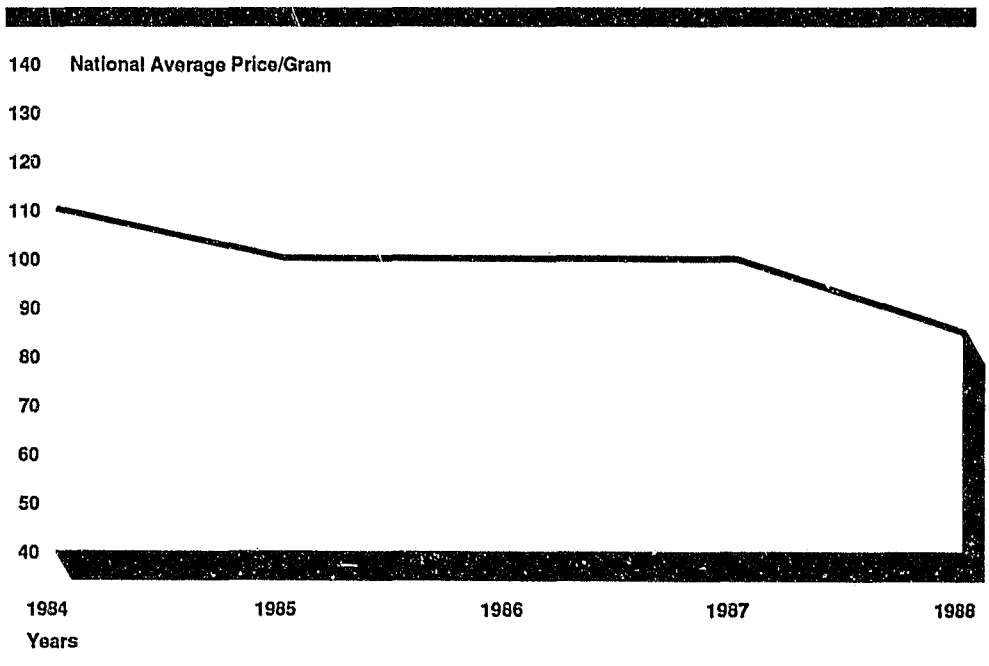
A large portion of Customs' air interdiction efforts involves the support of law enforcement efforts in which Customs and DEA agents make so-called "controlled deliveries" of illegal drugs. In a controlled delivery, Customs or DEA agents obtain information, usually from informants, on drug shipments destined for the United States. These shipments are then allowed to proceed. The ultimate objective is to arrest key participants in a drug smuggling organization and thereby disrupt drug trafficking networks. Controlled deliveries may not require radars to detect a smuggler's movements, since federal authorities may already be aware of the details of the smuggling operation. Seizures made during the course of controlled deliveries are included in the results of interdiction efforts reported by federal agencies. The significance of this reporting practice is reflected in the seizure statistics reported by the Miami Aviation Operations Branch for fiscal year 1988. According to a Customs official, the Miami Aviation Operations Branch was involved in seizing about 70 percent of all the cocaine seized by Customs' air interdiction programs in fiscal year 1988. In fiscal year 1988, the Miami Aviation Operations Branch reported that it participated in 57 cases that involved marijuana or cocaine seizures—38 cocaine seizures totaling 33,783 pounds and 19 marijuana seizures totaling 39,396 pounds.

According to data obtained from the Miami Aviation Operations Branch, controlled deliveries accounted for over 54 percent of the cocaine seized and 41 percent of the marijuana seized. After controlled deliveries are accounted for, the impact of air interdiction may be less than reported.

Although air and other interdiction efforts have resulted in substantial seizures, they have not been successful in reducing the availability of

illegal drugs to consumers. DEA estimates that the price of cocaine has decreased over the last 5 years, while the purity of cocaine being sold to consumers has remained high. According to DEA, recent trends indicate an overall increase in the availability of cocaine. Figure 2.3 illustrates price trends for cocaine.

Figure 2.3: Cocaine Price/Gram 1984-1988



Source: Drug Enforcement Administration Office of Intelligence

Radar Technical Capabilities and Costs

Radar detection systems have inherent constraints that limit their ability to detect the small aircraft typically used to smuggle drugs. This chapter discusses the factors that limit the detection capabilities of radar systems and the technical capabilities and costs of individual radar systems for detecting airborne drug smugglers. We found wide variations in the technical capabilities and costs of the radar systems we reviewed. We also determined that no one radar system is best overall for air interdiction.

Technical Factors That Limit the Capabilities of Radar Detection Systems

Radars detect objects by transmitting radio waves that reflect off objects and then return to a receiving antenna. The returning radio signals are known as "echoes" and are processed through the radar receiver and displayed on a radar screen. Radar signals reflect off targets of interest, such as aircraft or ships, as well as objects that are not intended targets, including trees, mountains, and sea waves. Nontarget echoes displayed on a radar screen that add confusion to the presentation are known as "clutter," and distinguishing objects of interest from clutter is one of the principal concerns in designing an effective radar system.

For radar systems used to detect airborne drug smugglers, the amount of clutter depends primarily on the geographic characteristics of the background environment through which aircraft are flying. Mountainous terrain and high seas produce large amounts of clutter, while flat land and calm bodies of water produce less clutter. Radars, to some extent, are able to distinguish echoes produced by moving objects (such as aircraft) from background clutter produced by stationary objects (such as mountains). Fast-moving objects such as jet aircraft are easier to distinguish from stationary objects than relatively slower-moving objects such as the low-speed private aircraft typically used to smuggle drugs. Aircraft flying at high altitudes are also easier to distinguish from background clutter than aircraft flying at low altitudes—which is characteristic of airborne drug smugglers. A particular problem for radar systems is losing a target aircraft when it passes from a low clutter area to higher clutter areas. The type and directional orientation of the radar also affect the amount of clutter received. Airborne radars that look almost directly down at the ground or sea receive more echoes from clutter than land- or sea-based radars looking upward or parallel to the surface.

Modern radar systems use computers to process radar signals, and this processed information helps radar operators to more easily track

targets. The computers use an effect known as the "doppler shift" to separate echoes produced by moving objects from echoes produced by stationary objects, as well as to determine the speed and direction of the moving object. The doppler shift is the change in the frequency of the radar echo returning to the radar system that is caused by the movement of an object within the radio wave transmitted by the radar. If an aircraft is moving toward the radar, the radar echo returns at a higher frequency than the outbound signal transmitted by the radar. If an aircraft is moving away from the radar, the radar echo returns at a lower frequency than the outbound radar signal. The difference between the frequency of the transmitted signal and the echo increases as the speed of the aircraft increases, enabling a radar to determine how fast the aircraft is flying and differentiate between aircraft flying at different speeds. In the case of air interdiction detection systems, the doppler shift may enable the radar operator to distinguish aircraft from stationary background clutter. It also allows the operator to distinguish between aircraft moving toward and away from the radar, and between aircraft flying at different speeds. Nevertheless, radar system computers with enhanced data analysis capabilities are not always successful at separating slow, low-flying aircraft from high clutter background.

A radar's maximum detection range is usually indicated as the maximum distance a given size target can be detected within a specified probability (e.g., 90 percent). The range of powerful long-range radars (not including over-the-horizon radars, see p. 34) is usually limited to the distance at which objects are directly visible by the radar antenna (line-of-sight). If the radar is located in mountainous terrain, its line-of-sight in some directions may be less than its maximum theoretical range. The higher the radar antenna, the greater the radar's line-of-sight. Radars are put on towers and on airborne platforms (aircraft and balloons [aerostats]) to extend their line-of-sight and thus increase their range.

The detection capability of radar systems is also limited by how much the direction of the transmitted radar signal can be changed. Different radar systems can change the direction of the radar signal by varying degrees. For example, some radar systems can rotate their antenna to scan a 360-degree circle around the radar system, without physically moving the radar itself. Other radar systems, such as the one used on Customs P-3A (see p. 33) only rotate their antenna to see the area in a 120-degree arc in front of the aircraft, and the aircraft must change its direction for the system to see areas outside this arc. These differences affect the size of the area that a radar detection system can cover.

Technical Characteristics of Radar Systems Limit Their Ability to Detect Airborne Drug Smugglers

The technical characteristics of radar systems place major constraints on the usefulness of radar in identifying airborne drug smugglers. These constraints provide numerous opportunities for drug smugglers to avoid detection. Radar systems have trouble detecting small aircraft flying slowly at low altitudes. This is because the radar echoes from these small aircraft may not be as strong as those returned by environmental background clutter, thus making these aircraft difficult to distinguish from the environment. Drug smugglers could take advantage of this fact by flying slowly at low altitudes over rough terrain.

Drug smugglers can also detect radars by equipping their aircraft with radar detectors that will alert them if they are spotted by interdiction agency radars and allow them to determine when radars are in operation. If smugglers find they might have been detected, they can attempt to avoid the radar or change course and return home without being apprehended. If smugglers find gaps in radar coverage where interdiction radars are not providing coverage or are not operating, they can fly through the gaps and avoid detection.

Even if radar systems are able to physically detect an aircraft, this is only the first step in identifying those aircraft that are involved in drug smuggling. The vast majority of air traffic en route to the United States is legitimate. Radars can be used to distinguish suspect drug smuggling aircraft from legitimate aircraft if the smugglers behave suspiciously or if law enforcement data indicate that the aircraft has been engaged in smuggling. However, radars are of limited help in identifying aircraft involved in smuggling that are operating under proper flight procedures.

One of the methods used to distinguish smugglers from legitimate aircraft involves the use of radio communications equipment. Aircraft can be equipped with a receiving-transmitting device known as a transponder. Some radar detection systems have equipment known as interrogators, which transmit a radio signal to aircraft detected by the radar system. If the aircraft is equipped with a transponder, the transponder is supposed to automatically respond to the signal from the interrogator by transmitting a coded signal of its own, which returns to the interrogator's receiver and can be displayed on a radar scope. This display makes it possible for radar operators to distinguish the transmitting aircraft from others appearing on their scopes. Some transponders also transmit signals that indicate the aircraft's altitude.

If an aircraft is detected by an air interdiction radar system but does not transmit a reply when interrogated, it may be involved in drug smuggling. If the aircraft does respond, but a check with FAA indicates no record showing that the aircraft has filed a flight plan, the aircraft is considered suspect. This method is useful in detecting drug smugglers because all civilian aircraft flying from other countries to the United States are required to file FAA flight plans as well as to provide Customs with advance notification of their arrival. However, this method has limitations.

For example, private aircraft flying inter-island flights within the Bahamas are not required to file flight plans with FAA. Also, smugglers traveling from Mexico may file a legitimate flight plan, but after crossing the U.S. border and having the air interdiction C3I Center confirm that the aircraft is following its flight plan, may drop down out of radar coverage. A radar operator at the C3I center then might assume that the aircraft was following a normal landing pattern. However, the aircraft might actually proceed to a different destination to deliver its drug load.

Radars can also monitor flight movements that may indicate if an aircraft is involved in drug smuggling. For example, an aircraft that is detected by radar and found by the C3I Center to be on a legal flight plan might, while still within radar coverage, change its destination. Moreover, an aircraft on a legal flight plan might pass its designated airport, proceed on to air-drop its load of drugs to accomplices waiting in boats or on the ground, and then turn around and fly back to its designated airport. The movements of aircraft in these instances would raise a radar operator's suspicion.

Radar systems are also used to identify smuggling aircraft that are covertly equipped with a transponder. This method of detection, however, has become less effective, partly because smugglers have acquired electronic devices that can identify covert transponders in their aircraft.

Capabilities and Costs of Existing and Planned Radars for Detecting Airborne Smugglers

Several radars are currently used or could be used in the future to detect airborne drug smugglers. These radars can be grouped into three main categories: radars on board airborne platforms, such as balloons or aircraft; ground-based radars; and over-the-horizon radars. The following section describes 1) these radars' capabilities for detecting airborne drug smugglers and 2) their acquisition costs.

Radars Based on Airborne Platforms

Radar line-of-sight, and consequently radar coverage, is increased by placing the radar on an airborne platform and operating the radar at a high altitude above the surface. The U.S. military relies on airborne radar systems to provide air defense against enemy aircraft and, in some instances, ships. They also control U.S. fighter/interceptor aircraft. The two main types of airborne platforms are balloons and aircraft.

Radar Balloons

Aerostats are the principal radar balloons that Customs and Coast Guard use for the detection of suspect airborne drug smugglers. Also under consideration for use as a possible airborne radar platform is a lighter-than-air airship, which is a self-propelled balloon.

Aerostats. Aerostats are radars mounted on balloons that are tethered to land bases or ships. One of the aerostats we reviewed is designed to float at altitudes as high as 15,000 feet for long periods of time. However, aerostats must be reeled in during severe weather conditions and, periodically, for routine and emergency maintenance. The higher the aerostat's altitude, the further its radar can see aircraft flying at low altitudes.

Aerostats tethered to land bases extended to an altitude of 10,000 feet are able to detect aircraft flying at low altitudes up to distances of 145 miles from the aerostat. Current land-tethered aerostats are equipped with beacon radar for interrogating aircraft transponders, which as previously discussed, are used to distinguish suspect drug smuggling aircraft from legitimate air traffic.

Many airborne drug smugglers fly at slow speeds and at altitudes as low as the 500-foot altitude at which aerostat radar capabilities deteriorate. When aerostat radars are looking down at low, slow-flying aircraft, they have difficulty distinguishing such aircraft at these low altitudes from surface clutter, particularly when airplanes are flying over mountainous land rather than calm seas. Aerostats, because they are stationary, also cannot detect targets that are shielded from the aerostat's line-of-sight by high land masses, such as mountains. An aerostat radar we reviewed had performance features intended to improve its capability for distinguishing aircraft from surface clutter. This aerostat, located at Fort Huachuca, Arizona, was designed to detect small targets at a minimum range of 80 miles in a mountainous (high clutter) environment within a 75-percent probability. Aerostat systems intended for interdiction are projected to cost between $11.8 million and $22.8 million per system.

Customs attributes the variation in costs to expenses related to site preparation.

Coast Guard's interdiction asset inventory includes five aerostats that are tethered to ships. Four of these aerostats are currently operational while the fifth is in the final stages of development. The ships are or will be deployed in the waters of the Caribbean, the Gulf of Mexico, and the Atlantic Ocean near the Bahamas. Coast Guard's ship-tethered aerostats all have marine surveillance capabilities, and these aerostats are or will be equipped also to detect aircraft, according to Coast Guard. Information obtained from Coast Guard indicates that these ship-tethered aerostats have a maximum elevation of 2,500 feet. This gives them a line-of-sight detection range of about 70 miles, although they may not achieve this range against small aircraft. The U.S. Army is developing a ship-tethered weather surveillance aerostat system that is designed to stay aloft at a height of 2,500 feet in winds as high as 90 knots. The Army system potentially could be used for air interdiction detection purposes. Coast Guard ship-tethered aerostats are not currently equipped with aircraft transponder interrogators, but Coast Guard says it is planning to eventually install this equipment on its aerostats. According to Coast Guard, the acquisition cost of its ship-tethered aerostats is $50 million.

One of the principal limitations on the detection capabilities of all aerostats is their sensitivity to adverse weather conditions. Aerostats must be reeled back to their base in the event of such conditions. In addition, scheduled maintenance for these systems can be frequent. According to Customs records, the down time for maintenance of the aerostat located at Patrick Air Force Base, Florida, for example, was 37 percent in fiscal year 1988. Overall, the aerostats located at Patrick Air Force Base and Cudjoe Key, Florida, and in the Bahamas were operational an average of about 53 percent of the time in fiscal years 1987 and 1988. Finally, aerostats in operation are easily observed by smugglers or their lookouts.

Airships. Lighter-than-air airships have been considered as possible airborne platforms for air interdiction radar detection systems. Airships, like the well-known blimps, are balloons that can move under their own power. Unlike aerostats, airships are not tethered to land bases or ships.

The Policy Board's Long-Range Surveillance Subcommittee considered a prospective lighter-than-air airship that would have the same radar used on Navy E-2C radar surveillance aircraft. Theoretically, an airship radar system operating at a height of 10,000 feet would be capable of detecting small aircraft flying at 500 feet at a distance of about 170

miles. The airship detection system considered by the Policy Board's Subcommittee could remain airborne from 2 to 5 days without refueling, and for up to 4 weeks with in-flight refueling. However, like aerostats, airships could not operate in extreme weather conditions. The acquisition cost of the airship detection system that the Policy Board's Subcommittee considered is estimated at $75 million.

Radar Aircraft

Radar aircraft that Customs and Coast Guard currently use as airborne detection platforms include P-3As, P-3B AEWs, and E-2Cs. Air Force E-3 AWACS and Navy E-2Cs also provide detection support. These aircraft-based radar detection systems are described below beginning with the two military airborne early warning systems, which provide a useful basis for understanding the capabilities of radar aircraft.

E-3 AWACS. The E-3 AWACS is the Air Force airborne warning and control system. It is a Boeing 707 aircraft that contains a powerful and highly sophisticated surveillance radar and command and control center. The AWACS radar can detect small aircraft up to distances of about 250 miles, according to the manufacturer. This radar's capability for detecting airborne smuggling profile targets is at least as good as the P-3B AEW's radar, which has been recently tested against these targets. (See p. 33.) The AWACS radar antenna system can scan 360 degrees and has several different detection modes. The radar mode that provides surveillance from the AWACS down to the surface is the most effective in detecting potential drug smuggling aircraft. The AWACS radar, when looking down at airborne targets, takes advantage of the doppler shift to distinguish between radar echoes reflected from the moving aircraft and background clutter reflected from the earth's surface. The radar's computer automatically adjusts to compensate for variations in background clutter to help operators see targets of interest on their radar screens. The AWACS also uses a military "Identification Friend or Foe" (IFF) interrogator to signal transponders on aircraft identified by its radar system. This device helps the AWACS to identify hostile or friendly aircraft.

According to the Air Force, the E-3 can remain airborne for about 9.5 to 11 hours without refueling and has an operational distance of about 1,150 miles from its base.

E-2C. Customs, Coast Guard, and Navy all use E-2C aircraft as airborne radar platforms for radar detection of drug smugglers. Customs and Coast Guard each operate two E-2C aircraft full-time as air interdiction detection systems. The Navy has also provided Customs and Coast

Guard with radar detection data obtained in the course of Navy E-2C flights.

The E-2C is a two-engine turboprop aircraft that serves as the Navy's airborne surveillance and control system. The E-2C is smaller than the E-3 AWACS and is designed to operate from aircraft carriers. It has a maximum mission endurance of 6.5 hours. Like the AWACS, the E-2C radars use computers to analyze the doppler shift effect and help screen out background clutter. The E-2C radar scans an area of 360 degrees. According to its manufacturer, the version of this radar used on most Navy E-2Cs can detect small targets, such as cruise missiles, at a range of more than 125 miles and targets such as fighter aircraft at over 200 miles. The E-2Cs that Customs and Coast Guard operate have an earlier version of the E-2C radar system, which is the same radar used on one of Customs' P-3B AEWs. Both the newer and older versions of the E-2C radars should have detection capabilities similar to those of the P-3B AEW. (See below.) The E-2C system, like the AWACS, uses a military IFF interrogator to signal and automatically obtain identification information from transponders on aircraft detected by its radar system.

Modified P-3A Aircraft. Customs currently operates four converted Navy P-3A aircraft equipped with the interceptor radar used on the Air Force F-15 jet fighter plane. The F-15 radar is capable of scanning a 120-degree arc (plus or minus 60 degrees) directly in front of the aircraft. This limits the P-3A's radar coverage area, because the radar can only detect targets flying ahead of the P-3A. Customs plans to phase out some of these aircraft as they acquire more AEW aircraft, which are discussed below.

P-3B Airborne Early Warning (AEW) Aircraft. In 1988, Customs began using its own P-3B airborne early warning system for drug interdiction. The aircraft is known as the P-3B AEW and is equipped with the airborne early warning radar used on some of the Navy's E-2C aircraft.

The P-3B AEW is a four-engine turboprop aircraft that is larger than the Navy E-2C. Customs' tests of the first P-3B AEW radar indicate that it could detect a relatively small aircraft at 144 miles and a larger twin-engine aircraft at over 200 miles. The detection capabilities of the first P-3B AEW radar are similar to those of the E-2C, which uses the same radar, but the P-3B AEW has a mission endurance of up to 14 hours (compared to the E-2C's 6.5 hours). Like the E-2C and AWACS, the P-3B AEW is equipped with an IFF interrogator system.

The first P-3B AEW cost the federal government about $27.2 million to develop. The second P-3B AEW was put into operation by Customs in April 1989. This aircraft is equipped with the more advanced radar that is used on newer Navy E-2Cs and costs about $31 million. Customs plans to acquire two more AEW aircraft, depending on the availability of funding.

Ground-Based Radars

The principal ground-based radar system used to detect airborne drug smugglers is comprised of FAA's air traffic control network and DOD's North American Air Defense (NORAD) system and is known as the Joint Surveillance System (JSS). In addition to the JSS network, a number of land-based, fixed-site radars provide coverage of air smuggling routes in the Southeast Caribbean area. The detection ranges of ground-based radars are limited to their line-of-sight, the distances of which vary among ground-based systems, depending on the height of their antennas. For example, one of the Caribbean radars can detect aircraft flying at 500 feet up to 50 miles. FAA terminal approach radars have similar detection capabilities. FAA commercial air traffic control radars are used primarily for higher altitude coverage, where their detection ranges are substantially greater. NORAD uses the JSS system to identify potential air threats to the United States.

Over-The-Horizon (OTH) Radars

OTH radars are radar systems that are designed to look over the horizon created by the curvature of the earth's surface and thus overcome the line-of-sight problem. OTH radars transmit signals at an upward angle toward the ionosphere, which refracts the radar signal back down to the earth. Because the refracted radar signal comes from a point very high above the earth, it is able to look down and detect objects within a very large area of the earth's surface. The signals then reflect back (backscatter) to a receiving antenna. One of the OTH radar systems currently under development is able to achieve ranges over 2,000 miles.

DOD is currently developing OTH radar systems to provide long-range defense surveillance. Because OTH radars are potentially capable of detecting aircraft at long ranges and over large areas, they have been identified for possible air interdiction applications.

DOD is currently developing two OTH systems, the Air Force's Over-the-Horizon Backscatter (OTH-B) radar and the Navy's Relocatable-Over-the-Horizon (R-OTH) radar. The Air Force system, if completed, will consist of

four separate systems. The systems are intended to provide radar coverage beyond eastern, western, and southern borders of the United States, and an area surrounding Alaska. The coverage will extend from a minimum of 575 miles from the radar antenna to distances over 2,000 miles. Currently, the system covering areas off the East Coast is the only one that is operational, although at limited capability. The system that would provide coverage of the Gulf of Mexico and portions of the Caribbean Sea, known as the Central Radar System (CRS), would be the most useful for air interdiction purposes. However, this system has not yet been built. The Air Force plans to request procurement funds for this system beginning in fiscal year 1991.

The Navy R-OTH is a tactical radar system designed to provide wide-area radar coverage in order to monitor aircraft and ship targets in areas of interest. The R-OTH is land-based and can be moved to different locations. The R-OTH prototype is currently located in Virginia, but the Navy plans to move this system to a site in Alaska.

OTH radars have several characteristics that limit their potential capability as air interdiction detection systems. OTH systems currently being tested do not have beacon transponder interrogation capability, nor do they have the ability to determine aircraft altitude. They also have limited capabilities for detecting the relatively slow-moving aircraft normally used by smugglers. Other limitations primarily stem from the frequency of OTH radar signals. OTH radars transmit in the high-frequency part of the electromagnetic energy spectrum. In general, the greater the distance a transmitted radar signal travels, the lower the strength of the return signal, and the greater the difficulty in detecting and interpreting the return signal. Weak high-frequency return signals are more likely than strong return signals to be masked by normal atmospheric conditions, such as lightning. The instability of the ionosphere, which refracts OTH signals, also distorts them and limits OTH detection capabilities.

Because OTH radars can provide long-range coverage of large areas, the Policy Board has considered using them to augment or replace all or part of the existing air interdiction radar detection network. We do not believe that OTH radars can or should be used as a stand-alone detection system for drug interdiction. As discussed above, the long range and wide geographic coverage of OTH radar systems is counterbalanced by both the vulnerability of OTH radar signals to atmospheric conditions and the difficulty of equipping OTH systems with transponder interrogators that can communicate with civilian aircraft. OTH radars possibly

could be used as an early warning system in conjunction with airborne radar systems. OTH radars could make an initial and relatively general identification of possible drug smuggling activity in a particular geographic area. Surveillance aircraft would then follow up on the initial OTH detection and obtain more specific data on location and identification of the suspected smugglers.

The OTH-B system that would provide the best coverage for air interdiction purposes, the CRS, is not scheduled for procurement until fiscal year 1991. In a recent report, we recommended that OTH-B system performance be adequately demonstrated before the Secretary of Defense makes commitments to CRS.[1] Moreover, the Navy has decided to move its R-OTH system to an area in Alaska as initially programmed.

Table 3.1 summarizes the detection capabilities of the radars we reviewed, as well as their acquisition cost.

Table 3.1: Radar Systems' Detection Capabilities and Costs

System	Detection range[a] (miles)	Coverage[b] (square miles)	Endurance (if applicable)	Acquisition cost (in millions)
Land-tethered aerostats	170	66,019	[c]	$11.8 to $22.8[d]
Ship-tethered aerostat	60	11,310	[c]	10.0[e]
Lighter-than-air airship[f]	173	93,978	2-5 days (without refueling)	75.0[g]
P-3B AEW (from small to medium size target)	166 to to 207	65,111 to over 125,600	14 hours	27.2[h]
E-3 AWACS	Similar to P-3B AEW	Similar to P-3B AEW	9.5 to 11 hours	200.0[i]
E-2C	Similar to P-3B AEW	Similar to P-3B AEW	6.5 hours	49.0[i]
Modified P-3A	40 to 80	1,675 to 6,699	12 hours	5.9[j]
Ground-based radars	46[k]	6,644[k]	NA	NA
Air Force OTH-B system	Over 2,000	[l]	NA	2700.00[m]

[1] Early Warning: DOD's Plans for Continuing Over-the-Horizon Radar Production (GAO/C-NSIAD-89-08, March 1989).

NA - Not applicable.

[a]Detection ranges for low-flying targets.

[b]Based on Area = Pi (i.e., range) x Radius^2.

[c]Aerostats cannot operate in unstable weather conditions and require frequent maintenance. Our analysis of Customs records shows that aerostats typically operated about 53 percent of the year.

[d]Costs of aerostat systems vary. A system currently being built in the Bahamas is projected to cost $22.8 million. This figure includes extensive site preparation costs, according to Customs.

[e]Our estimate based on Coast Guard acquisition costs of $50 million for five ship-tethered aerostats.

[f]Planned or future systems.

[g]Estimated in 1987 report by the Long-Range Surveillance Subcommittee of the National Drug Policy Board.

[h]Existing aircraft retrofitted with a new radar system.

[i]DOD cost estimate for procuring a new aircraft.

[j]Cost of modifying one P-3A with F-15 radar. Radar and aircraft provided by DOD.

[k]Range depends on the height of these radars' antennas, and the height of the target. This is the range of a typical ground-based radar operating at about 100 feet above mean sea level against a target at an altitude of about 500 feet.

[l]If fully implemented, OTH-B will provide wide area-coverage well beyond the eastern, western, and southern U.S. borders.

[m]Amount includes cost of complete OTH-B system including research, development, testing, evaluation, procurement, and military construction funds.

Conclusions

The radar systems we reviewed, which were not designed specifically to detect and identify airborne drug smugglers, have technical characteristics that limit their ability to perform this mission. These limitations make it possible for smugglers to avoid detection. No one radar system that we examined is best for detecting airborne drug smugglers.

Each radar system has advantages and limitations in terms of area of coverage, ability to extract targets from clutter, susceptibility to weather, and maximum operating time. The radars we examined have varying acquisition costs. In selecting radar systems for use in drug interdiction, all of these factors, as well as the geographic characteristics of the covered area and the drug smuggling threat in that area, must be considered.

Current and Future Capabilities for Detecting and Apprehending Air Smugglers Are Limited and Costly

Gaps exist in the radar coverage provided by the existing air interdiction detection network. Planned additions to the detection network would reduce these gaps but would be costly, and gaps in radar coverage would still exist. Customs has been able to respond to most radar detections of suspected airborne drug smugglers and over the 5-year period, fiscal year 1983 through fiscal year 1987, Customs' air program averaged about five drug seizures per month. Customs, however, believes this is only a small percentage of the private aircraft actually engaged in smuggling. Customs also believes that air interdiction programs deter some smugglers from participating in smuggling, and cause others to abort air smuggling operations. However, these deterrent effects cannot be quantified.

Customs is developing a C3I system to coordinate detection activities with Customs and Coast Guard units that operate interceptor, tracker, and apprehension aircraft. The C3I system is still evolving so its impact cannot yet be determined. The National Defense Authorization Act, Fiscal Year 1989 (Public Law 100-456) directs the President to submit a plan for the integration of drug interdiction command, control, communications, and intelligence assets by DOD. As of May 1989, DOD had not yet issued this plan and we were therefore unable to evaluate it.

Gaps in radar coverage and the technical limitations of radar detection systems provide many opportunities for airborne drug smugglers to avoid detection. Drug smugglers have displayed great skill in exploiting these vulnerabilities. An OTA analysis of 1984 drug seizure data estimated that 1,300 to 3,500 drug smuggling flights bring drugs into the United States each year. This is compared to the 65,367 private aircraft that entered the United States legally that year, according to Customs. Customs reports that private aircraft entries increased to 132,137 in 1988.

Existing Radar Surveillance Coverage

The principal radar systems currently used to detect airborne drug smugglers are the aerostats located in south Florida, the Bahamas, and on the U.S.-Mexican border. Air interdiction radar surveillance by aerostats is augmented by airborne and ship-based radar surveillance systems operated by Customs, Coast Guard, and DOD. Several land-based radars, located in the Caribbean islands and used primarily for military purposes, also provide radar detection data used in air interdiction efforts. These systems are supplemented by FAA and NORAD system radars, which make up the JSS.

Existing Fixed-Base Radars

The locations of existing aerostats and ground-based radars used for detection of airborne drug smugglers, and the areas for which they provide coverage, are shown in figure 4.1. As indicated in figure 4.1, most of the radar coverage currently provided by fixed-base radars is concentrated on or near the south Florida coast. JSS and airport approach radars are not shown on the map, but they provide coverage along most of the U.S. border. Many of these radars transmit data to the C3I East and West centers. JSS radars provide high-altitude coverage for controlling commercial aircraft and early warning of potential air threats to the United States, thus having limited capabilities for detecting air smugglers. Conversely, airport approach radars provide low-level coverage needed to detect smugglers but only around airports to control aircraft takeoffs and landings.

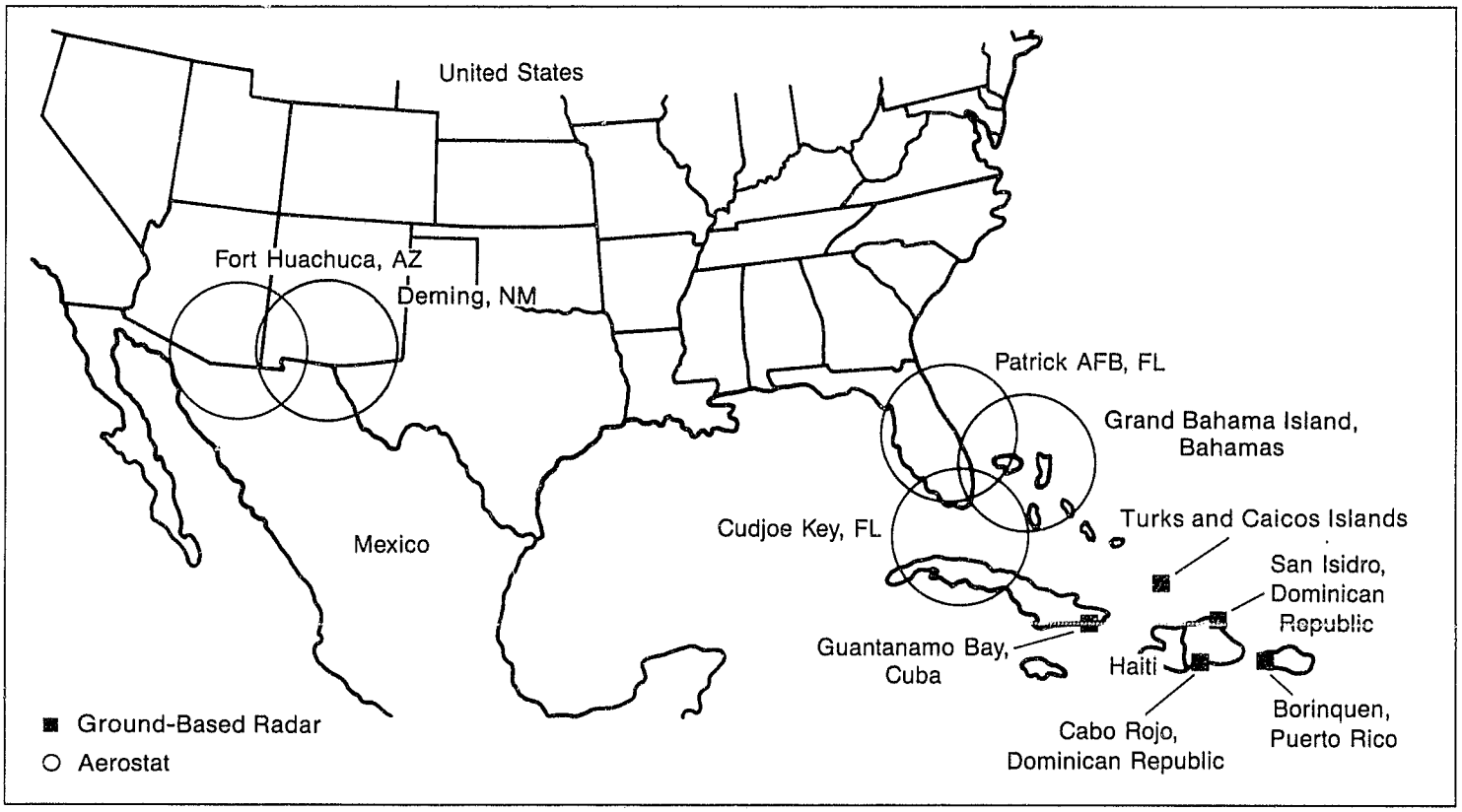
The three aerostats located in or near south Florida are the principal radar detection systems used by air interdiction agencies in the Southeast. They include two U.S. Air Force aerostats located at Patrick Air Force Base, Florida, and Cudjoe Key, Florida. The third aerostat is located on Grand Bahama Island in the Bahamas and is operated by Coast Guard. As shown in figure 4.1, several ground-based radars are located on Caribbean islands over which airborne smugglers must fly when taking the most direct routes from drug source countries in South America to the United States. The radar located at Guantanamo Bay, Cuba, is a U.S. Navy ground-based air defense radar. The radars based in the Dominican Republic and the Turks and Caicos Islands are operated by U.S. military personnel. The radar in Puerto Rico is operated by the Air National Guard. The aerostats transmit radar detection data directly to the radar scopes at C3I East. At C3I East, Customs and Coast Guard personnel decide whether to launch interceptor aircraft to locate and obtain more information on suspected drug smuggling aircraft. Personnel at the ground-based radar sites relay information to C3I East via radio or telephone.

As shown in figure 4.1, there are currently only two radars for detecting airborne smugglers attempting to fly into the United States from Mexico. These aerostats are located at Fort Huachuca, Arizona, and Deming, New Mexico, and transmit radar detection data to C3I West in Riverside, California.

Existing Aircraft-Based Radars

Customs, Coast Guard, and DOD operate radar surveillance aircraft to fill gaps in the fixed-base radar coverage along the U.S. border and to provide long-range detection of airborne drug smugglers departing from

Figure 4.1: Locations of Existing Aerostats and and Ground-Based Radars



South America. Until recently, Customs and Coast Guard each operated two E-2C aircraft, on loan from the Navy. However, Customs is planning to return its E-2Cs to the Navy, which in turn, plans to provide two additional E-2Cs to Coast Guard. In addition, Customs has acquired two new radar surveillance aircraft known as P-3B AEWs. Both the E-2C and P-3B AEW aircraft are equipped with basically the same wide-area coverage radar systems. Customs also operates four P-3A aircraft that are on loan from the Navy and equipped with an Air Force F-15 fighter aircraft radar, as airborne radar platforms. However, these P-3As have limited detection capabilities.

Coast Guard's E-2Cs are currently based at the Norfolk Naval Air Station, Virginia. However, they are usually deployed to bases, such as Key West, Florida, that are closer to air smuggling routes. This maximizes the effective operating time of the E-2Cs, which can remain airborne for approximately 4 to 6.5 hours. Coast Guard is planning to relocate its

E-2Cs to a base in northern Florida to be closer to drug smuggling routes.

Customs' radar surveillance aircraft are based at the Customs Surveillance Support Center at the Naval Air Station in Corpus Christi, Texas. Their primary objective is to supplement aerostat and other fixed-base radar coverage along the southern U.S. border and to extend that coverage into the Caribbean Sea and the Gulf of Mexico. Customs also deploys its radar aircraft off the Caribbean coast of South America to detect air smugglers when they depart from source countries. Coast Guard E-2Cs also provide some coverage of this area.

DOD radar surveillance aircraft have provided substantial amounts of airborne radar coverage of air and marine smuggling routes in support of Customs and Coast Guard drug interdiction efforts. Air Force AWACS aircraft and Navy E-2Cs have flown numerous missions that provide drug interdiction surveillance as a by-product of military training. Navy E-2C and Air Force AWACS missions designated for drug interdiction surveillance are scheduled quarterly at meetings attended by Customs, Coast Guard, and DOD officials. Due to cracks in the wings of its E-2C aircraft, the Navy has not been able to contribute as many E-2C flights for drug interdiction surveillance during the past year as it had previously.

When Customs and Coast Guard radar surveillance aircraft detect potential air smugglers, they report the detections to the C3I East or C3I West Centers. If a C3I determines, on the basis of available data, that a target is suspect, it then determines when, where, and which aircraft will respond to intercept this target.

Table 4.1 shows the number of flight hours dedicated to drug interdiction detection by Customs, Coast Guard, and DOD radar surveillance aircraft. Radar surveillance aircraft are used to provide radar coverage of both air and marine smuggling routes.

Table 4.1: Flight Hours of Radar-Equipped Aircraft Used for Drug Interdiction Detection, FY 1988

Type of aircraft	Number of aircraft used for air interdiction (at the time of our review)	Total number of flight hours
Customs		
P-3A	4	4,786
P-3B AEW	1[a]	308
E-2C	2	667
Coast Guard		
E-2C	2	1,447
DOD		
Navy E-2C	Not available	604
Air Force E-3 AWACS	Not available	4,967

[a]Customs' first P-3B AEW became operational in June 1988. A second P-3B AEW was put into operation by Customs in April 1989. Flight hours listed are those of the first aircraft.

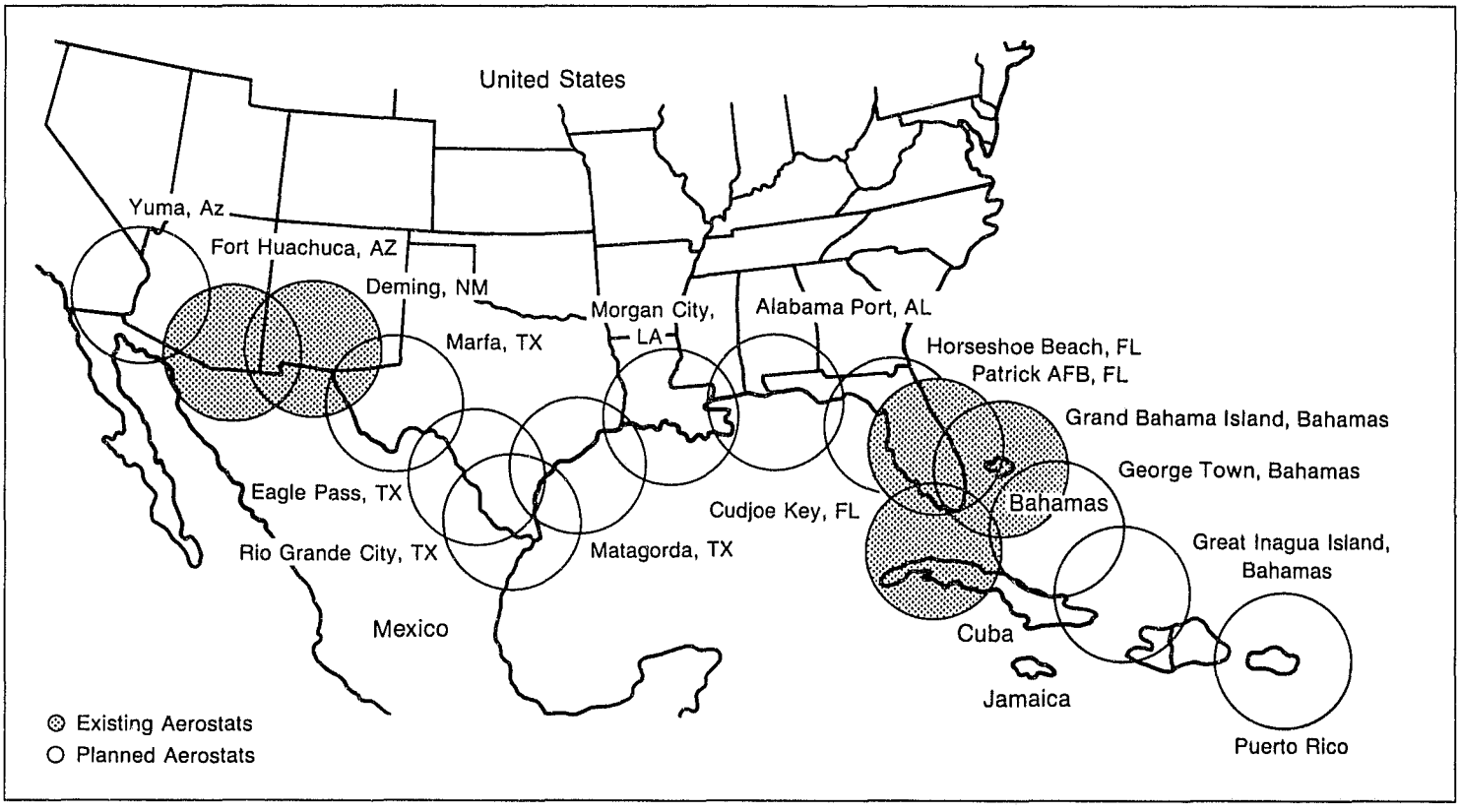
Planned Radar Detection Network Will Be Costly and Will Not Provide Complete Coverage

The federal government's current strategy for detecting airborne drug smugglers, outlined in a 1988 report by the Policy Board, calls for the development of a network of aerostats along the southern U.S. border and in the Caribbean aimed at detecting air smugglers flying north from Latin America and the Caribbean to the United States. The strategy also calls for the deployment of airborne and ship-based radar systems, which can supplement the network and provide mobile surveillance of air smuggling routes from drug source countries.

The backbone of the planned air interdiction detection network is a group of 16 aerostats that would provide radar coverage for most of the southern U.S. border; the Bahamas; and parts of the Caribbean, including Puerto Rico. In addition to the five aerostats currently operating, four additional aerostats are scheduled to become operational by the end of 1989. Three of these aerostats are to be located in the southwestern United States along the U.S.-Mexican border, and the fourth is to be located in the Bahamas. Current Customs plans call for adding seven more aerostats to the network: four along the Gulf Coast, one in Puerto Rico, one along the southwest border, and another in the Bahamas. Customs' plans are dependent on decisions by DOD, which is now the lead agency for interdiction detection. The planned aerostat network and the geographic areas it would cover are shown in figure 4.2.

Customs would like to acquire two more AEW aircraft, which would be used to detect airborne drug smugglers as they depart from source countries in South America. Customs recently acquired a second AEW aircraft at a cost of $31 million. This aircraft became operational in April 1989.

Figure 4.2: Planned Aerostat Network



Funding for the other two AEWs that Customs would like to acquire has not yet been authorized. As part of their mission, the additional AEW aircraft would be deployed off the Caribbean coast of South America and would attempt to detect airborne smugglers soon after takeoff and track their movements as they fly north toward the United States.

In addition to Customs' planned expansion of the aerostat network and acquisition of additional AEW aircraft, DOD is currently installing additional radars in the Caribbean for defense purposes. Existing DOD radars in the Caribbean are already used to a limited extent to detect airborne drug smugglers. The Air Force is responsible for expanding the DOD radar network in the Caribbean, which is known as the Caribbean Basin Radar Network. When fully implemented, the expanded DOD radar network would increase radar surveillance coverage of the Caribbean Basin.

Customs believes that implementation of the planned aerostat network and acquisition of additional AEW aircraft would greatly increase the probability of detecting airborne drug smugglers. However, acquisition of six additional aerostats and two additional AEW aircraft would be costly. We estimate that this would total at least $124 million.

In addition, as discussed in chapter 3, aerostats cannot operate during adverse weather conditions, and they require substantial downtime for regular maintenance and repairs. In fiscal years 1987 and 1988, the aerostats employed in air interdiction operated an average of 4,654 hours per year, which means that the aerostats operated 53 percent of the total 8,760 hours in a year. Because their large size makes aerostats conspicuous, lookouts for drug smugglers can readily tell when aerostats are down. The planned complement of aircraft-based radar systems, because of limited flight times, would provide only a small fraction of the radar coverage needed to fill the gaps in the proposed aerostat network. Thus, gaps would remain in the planned air interdiction detection system, and airborne drug smugglers can be expected to exploit these gaps.

As discussed in chapter 3, there have been proposals to fill gaps in the air interdiction detection system with OTH radar systems that DOD is currently developing. However, OTH systems are still being developed and full use of OTH systems for drug interdiction is not expected to occur until the 1990s. Moreover, OTH systems currently being developed have limited capabilities for detecting the relatively slow-moving aircraft normally used by drug smugglers.

The Air Force is currently developing an OTH-B system based in Maine that provides coverage off the East Coast of the United States. The initial operational test and evaluation of this system is not scheduled to begin until October 1989. The Air Force also plans to place another OTH-B system in one of the North Central states. This system, called the Central Radar System (CRS), would provide radar coverage of the Gulf of Mexico and parts of the Caribbean Sea, but the Air Force does not plan to request procurement funds for this system until fiscal year 1991. We recently recommended that the Secretary of Defense ensure that OTH-B performance be adequately demonstrated through operational testing before making commitments to this system. (See p. 36.)

The Navy R-OTH system is still in the developmental stage and is scheduled to be deployed in the early 1990s. Although the experimental R-OTH system is currently based in Virginia, where it can provide some radar

coverage of southeastern air smuggling routes, the Navy plans to move the system to Alaska in the near future.

Air Interdiction System Response Capabilities

We found that Customs air interdiction units have been able to respond to most radar detections of suspected airborne smugglers, but few air pursuits have resulted in drug seizures and arrests of smugglers. Because Coast Guard has only been involved in air interdiction since 1987, we did not review their activities in detail. We found several reasons for this lack of success. Many aircraft that appear suspicious when detected by radar are later determined to be legitimate air traffic by Customs response aircraft. Also, response aircraft may not be able to locate suspect aircraft identified on radar or may lose the aircraft while attempting to track its movements. Finally, there is some indication that few private aircraft flights are actually needed to supply cocaine to the United States. OTA estimates that an average of 3.5 to 10 drug smuggling flights enter the United States each day. Such a small number of flights reduces the possibilities for air interdictions.

Our analysis was based on information from Customs' computerized Aviation Operations Reporting System, Coast Guard's C3I monthly air drug interdiction reports, activity logs maintained at air interdiction command and control centers, and interviews with Customs and Coast Guard officials.

Customs and Coast Guard Air Interdiction Response Resources

Customs and Coast Guard interceptor, tracker, and apprehension aircraft are located at several different aviation facilities. Customs has eight aviation branches and nine smaller aviation units; Coast Guard operates its air interdiction program primarily from three aviation facilities. The locations of Customs and Coast Guard air interdiction facilities are shown in figure 4.3.

Table 4.2 shows the type and deployment of Customs and Coast Guard air interdiction response aircraft. A total of 28 response aircraft (interceptors, trackers, and Blackhawk helicopters) were located at Customs aviation branches and units as of February 1989. Coast Guard has five HU-25C Falcon interceptor jets at Opa Locka Air Station near Miami and four in Mobile, Alabama.

Figure 4.3: Locations of Customs and Coast Guard Air Interdiction Facilities

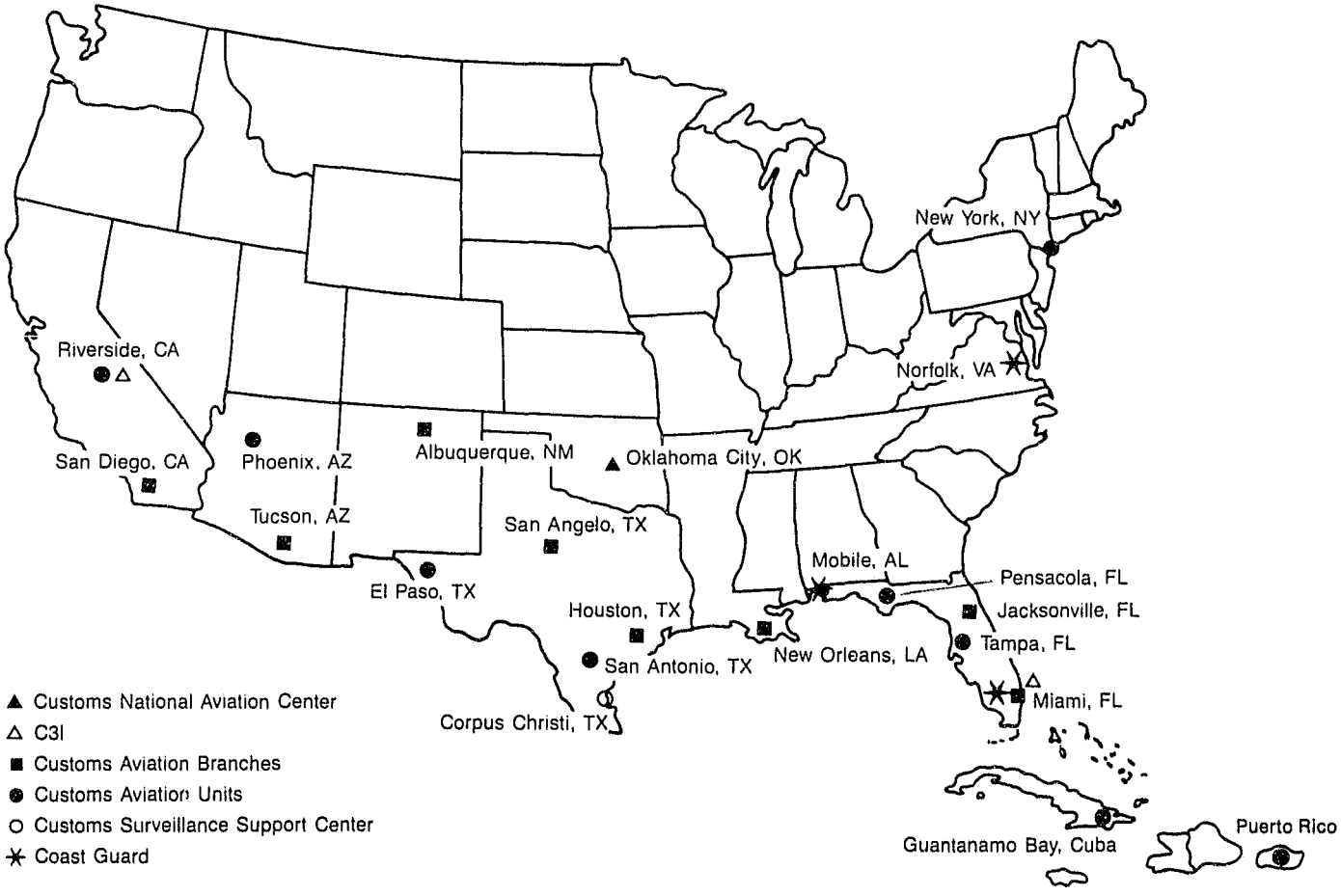


Table 4.2: Type and Deployment of Air Interdiction Aircraft

	Interceptors	Trackers	Blackhawk helicopters	Support aircraft	Total
Customs Aviation Branches[a]					
Miami	2	2	2	7	13
Jacksonville		1	2	11	14
New Orleans	2		2	5	9
San Angelo	1	1	2	5	9
Houston		1	1	5	7
Albuquerque		1	2	6	9
Tucson	1	1	2	5	9
San Diego		1	1	7	9
Totals	**6**	**8**	**14**	**51**	**79**
Coast Guard air facilities					
Miami	5				5
Mobile	4				4
Totals	**9**				**9**

[a]Includes aviation units.

The number of possible targets to which air interdiction units can respond depends on available radar coverage and current smuggling patterns. Radar coverage in the southeastern United States is more extensive than in the Southwest and West. Customs officials believe that smuggling flights occur in the Southwest and West but are undetected because of the lack of radar coverage. As a result, air interdiction units in the Southeast have more potential targets than do interdiction units in the Southwest and West. Our analysis of Customs data indicated that during fiscal years 1987 and 1988, over 60 percent of the 1,335 launches for interdiction missions were made from Customs air units in the East. Over half of the launches in the East were from Customs' Miami Air Branch. Customs officials at air branches in the Southwest and West said that due to the lack of radar coverage in their areas, most air interdiction cases are made in response to airborne smuggling attempts discovered by Customs agent investigations or from intelligence sources.

Customs has two aerostats in the Southwest. The first of these aerostats, in full operation since August 1988, is credited by Customs as providing information that led to four individual enforcement actions. Customs believes that this aerostat has also caused smugglers to divert

to air routes outside its coverage area, which is about a 300-mile segment of the border in New Mexico and Arizona. This aerostat was damaged by high winds in May 1989 and will not be operational for several months.

Response Capabilities of Customs Air Units

Our analysis of Customs aircraft maintenance records indicates that its interceptors, trackers, and apprehension aircraft have relatively high availability rates. In fiscal year 1988, Customs' fleet of interceptors was available 76 percent of the time, trackers 79 percent of the time, and apprehension helicopters 66 percent. These availability rates are for aircraft only and do not reflect whether these aircrafts' radar and other sensor systems were also operational. As a result, Customs aircraft were available to respond to most requests for interdiction missions.

According to our analysis of Customs data, Customs units were able to launch aircraft in more than 90 percent of the 1,443 instances in which they were requested for an interdiction mission during fiscal years 1987 and 1988. In the few instances when aircraft were not launched on interdiction missions when requested, our analysis of available Customs data indicated that the primary reasons were that 1) the target was lost or there was insufficient time to respond or 2) the aircraft was out of service due to maintenance.

Our analysis of data from Customs' aviation reporting system indicated that about 53 percent of the 1,155 suspect aircraft on which Customs aircraft were launched were intercepted. By Customs' definition, an intercept occurs when a Customs aircraft finds a suspect aircraft visually or with its on-board sensors. If the Customs aircraft is able to get close enough to identify the registration number, the number is checked with law enforcement data systems for indications of prior illegal activity involving the aircraft. Forty-seven percent of the attempted intercepts were not completed. The main reasons were that the target aircraft were determined to be legal before the Customs aircraft arrived (38 percent) or ground radar lost the target before the Customs aircraft could be guided to it (23 percent).

Following a suspect aircraft until it lands or makes an airdrop of drugs can be a long and difficult process. We found that for about 40 percent of the 718 suspect aircraft that Customs aircraft attempted to track during air interdiction missions in fiscal years 1987 and 1988, the track was terminated or the target lost. Termination of the tracking operation or loss of the suspect aircraft during tracking occurred for several reasons.

The most frequent reason for ending a tracking operation was that the suspect aircraft was subsequently identified as legal. Other reasons were that the tracker aircraft lacked endurance or was too slow, or the aircraft's sensors were inadequate.

Our analysis of Customs data shows that during fiscal years 1987 and 1988, Customs aviation branches attempted 1,443 air interdiction missions. In 335 of these missions, an enforcement action occurred when a Customs apprehension aircraft, i.e., a Blackhawk helicopter, landed near a suspect aircraft and Customs law enforcement officials confronted the crew. Of the 335 enforcement actions, 134, or about 10 percent of total missions, resulted in a drug seizure, plane seizure, arrest, or some combination of the three.

Response Capabilities of Coast Guard Air Units

Coast Guard was first assigned responsibilities in air interdiction in 1987. Since then, its activities have been limited to the southeastern United States. Coast Guard is developing a system for reporting its air interdiction activities, but we found insufficient data upon which to base a detailed analysis of Coast Guard's capabilities for intercepting and tracking suspected airborne smugglers. According to a Coast Guard official, the overall availability rate for its Falcon jet aircraft was 64 percent in fiscal year 1988. The availability rate of the Falcon jets used for air interdiction in Miami was 88 percent for February 1989. Coast Guard's limited records of its air interdiction activities show that during the period of January through September 1988, its aircraft attempted 234 intercepts, 206 of which resulted in interception of the suspect aircraft.

Planned Expansion of Air Interdiction Response Capabilities

Customs plans to increase its fleet of response aircraft. It has a project underway to add 10 Citations to its fleet. Four of these aircraft were operational as of May 30, 1989, giving Customs a fleet of 10 of these aircraft as of this date. Customs plans to acquire 10 additional Citations in the future but has not been authorized funds for these aircraft. Customs reports that acquiring six of the Citations in the ongoing project will cost $39 million. (Four of the 10 Citations involved in this project are aircraft previously owned by Customs and have been modified to carry sensor systems.) Customs reports that acquiring 10 more Citations will cost $65 million. Coast Guard currently has no plans to add to its current fleet of nine Falcon jet interceptor/tracker aircraft.

Coordination of Air Interdiction Activities

Coordination of detection activities with the activities of the Customs and Coast Guard units that operate interceptor, tracker, and apprehension aircraft is essential to the success of air interdiction efforts. Federal air interdiction plans provide for such coordination. Customs is developing a C3I system to coordinate the air interdiction process. The planned C3I system is still evolving, so its impact cannot yet be determined. As required by the National Defense Authorization Act, Fiscal Year 1989, DOD has developed plans for integrating C3I into a communication network. The final report on these plans had not been issued as of May 30, 1989. DOD officials said that this report had been approved by the Secretary of Defense and had been sent to the Director, National Drug Control Policy for coordination. The act also requires the President to develop a plan for assigning responsibility for operating this communications network. DOD officials said that this report will be submitted to Congress in July 1989.

Customs and Coast Guard Plans for Coordination

Part of the study requirement in the National Defense Authorization Act for Fiscal Years 1988 and 1989 directs us to assess Customs' current plan for the coordinated use of assets to detect airborne drug smugglers. In addition to examining Customs' coordination plans, we also reviewed Coast Guard's coordination plans because of its involvement in air interdiction. Our assessment of Customs and Coast Guard coordination plans was limited to determining whether they provide for the coordinated use of detection assets. Because of the limited amount of information available, we did not assess the extent to which the coordination of these assets is actually taking place.

Air interdiction strategies include the Air Interdiction Strategy issued by the Policy Board,[1] as well as strategies prepared jointly and individually by Customs and Coast Guard. All of the strategies we reviewed provide for the coordination of air interdiction assets and operations. The Policy Board's air interdiction strategy implementation plan states that "[the air interdiction] mission . . . emphasis is on multiagency national and international operations, making maximum joint use of all available assets from the Customs Service, Coast Guard, and supporting agencies." The air interdiction operations plan jointly developed and issued by Customs National Aviation Center and Coast Guard's Atlantic Area Commander also emphasizes the coordination of assets. For example, the joint Customs/Coast Guard plan notes that Coast Guard is the lead

[1]The Air Interdiction Strategy is part of the 1988 Policy Board report, Toward a Drug-Free America: The National Drug Strategy and Implementation Plans.

agency for providing detection assets to areas covered by the C3I Center East and that "inherent in this responsibility is the coordination and utilization of all surveillance assets capable of detecting airborne smugglers." The plan also states that one of its objectives is "to continue and improve coordination and cooperation between Coast Guard, Customs and other federal law enforcement agencies." The plan also requires Customs and Coast Guard officials in charge of the C3I East Center to prepare strategies for implementing the operating plans that coordinate preliminary resource requirements, including assets from other agencies and assets allocated by Coast Guard and Customs.

Customs and Coast Guard have also developed individual air interdiction strategies. These strategies contain provisions for agency coordination of air interdiction assets. Customs' strategy emphasizes the need to integrate the contributions of other agencies on a routine basis and the need for interagency cooperation. Coast Guard's strategy also provides for inter-agency coordination with various federal law enforcement agencies.

Although the Policy Board, Customs, and Coast Guard provide for the coordination of air interdiction assets in strategies and operating procedures, it is not clear how well this coordination is actually taking place. Customs and Coast Guard officials involved in air interdiction operations in the Southeast note that rivalries have existed between Customs and Coast Guard air interdiction personnel since Coast Guard became involved in the air interdiction program in 1987. Before that time, Customs was almost exclusively responsible for air interdiction efforts. Customs and Coast Guard officials told us that these rivalries may have affected coordination and cooperation efforts between the agencies, but these officials believe that such coordination and cooperation is nevertheless good.

Command and Control Capacity Required for Air Interdiction

The C3I system is intended to aid in detecting and identifying suspected smugglers, controlling and coordinating intercept operations, improving communication among drug law enforcement agencies, and developing anti-drug smuggling intelligence.

Customs has established two C3I centers, C3I West at March Air Force Base in Southern California and C3I East near Miami. Customs and Coast Guard are now jointly responsible for operating the C3I East Center. In

July 1988, we issued a report on Customs' development of the C3I centers.[2] We concluded that the C3I program should enhance Customs' command and control capabilities and lead to better coordination and use of the resources involved in drug interdiction because of better communications between agencies. However, we also concluded that the effectiveness of the program remains to be seen.

At the time we issued our report, Congress had passed—but the President had not signed—legislation that directed DOD to integrate all drug interdiction-related C3I assets into an effective communication network. In view of this legislation and the number of changes that Customs had made during the course of its C3I program, we recommended that Congress review the C3I program's direction before approving additional upgrades to the system. Subsequently, the President vetoed the bill, objecting to the provisions on strategic defense and arms control.

The National Defense Authorization Act, Fiscal Year 1989 (Public Law 100-456), signed by the President on September 29, 1988, required the President to submit to Congress reports setting forth plans for integrating C3I assets into a communications network, as well as assigning responsibility for operating this communications network. This requirement was identical to that contained in the vetoed bill. As of May 30, 1989, the President had not yet submitted his final reports to Congress on these matters, although indications were that he would soon. C3I East only became operational in April 1989. Given these recent developments, we believe that the effectiveness of the C3I program will not be known for some time.

Drug Traffickers Can Use Different Smuggling Routes and Methods

Drug smugglers have proven their ability in the past to respond successfully to changes in the interdiction system, and it appears that they may be adapting to improvements in the air interdiction programs. According to EPIC intelligence reports, traffickers have been flying their drug loads around the air interdiction net, or they are using such other smuggling methods as cargo shipments.

EPIC intelligence reports also indicate that air smugglers are increasingly shifting their operations away from the air interdiction radar network in the southeastern United States. Smuggling flights are now going further south in the Bahamas chain, many to avoid increased U.S.-Bahamian air interdiction efforts. Smugglers are also airdropping drugs in the vicinity

[2]GAO/GGD-88-113, July 1988.

of Cuba, Jamaica, the Dominican Republic, and Puerto Rico. Air interdiction plans call for the deployment of fixed-base and airborne radars in these areas, which could reduce their vulnerability to drug smuggling operations.

EPIC intelligence reports also indicate that air smugglers are making more use of smuggling routes from South America through Central America and landing in Mexico. Once the drugs are landed in Mexico, they are then smuggled into the United States across the U.S.-Mexican land border in small aircraft and land vehicles. Land vehicles crossing the U.S.-Mexican border at authorized ports of entry are subject to inspection by Customs or the Immigration and Naturalization Service's Border Patrol, but the volume of vehicle and pedestrian traffic coming across the border at ports of entry makes it extremely difficult to seize drugs smuggled in land vehicles or on persons. Land vehicles and pedestrians are also able to make illegal crossings of the long and sparsely guarded land border between border ports of entry with little risk of discovery.

According to EPIC reports, most smugglers bring cocaine into the United States from Mexico by crossing the border in land vehicles. However, EPIC intelligence reports indicate that another route is emerging in the northwestern United States. Drug flights have passed through Mexico on their way to off-load sites in Washington, Oregon, and Northern California.

EPIC intelligence reports also indicate that smugglers are making more use of private and commercial marine vessels and commercial aircraft to smuggle cocaine and other drugs into the United States. We were unable to determine whether the increased use of other transportation methods was caused by the buildup in air interdiction resources. However, it is clear that there are other smuggling options besides air smuggling available to drug traffickers, and they are exploiting these options. As discussed earlier, the availability of cocaine has increased despite increased air and other interdiction efforts.

Conclusions

The federal air interdiction system has produced significant seizures of drugs and might have caused some smugglers to alter their smuggling methods or switch to other transportation modes. Nevertheless, the smuggling of drugs into the United States using private aircraft continues. While more improvements in detection and response capabilities may further deter air smuggling, gaps will remain in the air interdiction

system, and other smuggling avenues will still be available, all of which smugglers will no doubt continue to exploit. Thus, air interdiction by itself cannot be expected to significantly affect the flow of drugs into this country.

Gaps in radar surveillance coverage and the technical limitations of radar detection systems provide opportunities for airborne drug smugglers to avoid detection. Drug smugglers have been able to exploit these vulnerabilities. Fixed-base radar systems under construction or planned will fill some of the gaps in radar coverage, as will planned deployments of additional airborne and ship-based radar systems. Improvements in radar system detection capabilities and in command, control, communications, and intelligence systems may also enhance the effectiveness of the air interdiction detection network. However, closing gaps in radar coverage and improving radar system detection capabilities is costly. Even if planned additions and improvements to the current air interdiction detection system are implemented, remaining gaps in radar coverage and the technical limitations of radar equipment will continue to limit capabilities for identifying airborne drug smugglers through radar surveillance.

We found that Customs has been able to respond to most radar detections of suspected airborne drug smugglers. However, many aircraft that radars indicate are suspicious are later found not to be involved in drug smuggling.

Detecting and apprehending airborne drug smugglers is difficult because the overwhelming majority of aircraft traffic enters the United States legally and only a very small number of private aircraft flights are necessary to smuggle large amounts of cocaine into the United States. Our analysis of Customs data on air interdiction operations indicates that about 10 percent of air interdiction missions result in a seizure.

Air interdiction programs are aimed primarily at only one aspect of the drug smuggling threat to the United States—private aircraft carrying illegal drugs. Smugglers also get drugs into the United States through the use of commercial aircraft, cargo containers, private and commercial vessels and vehicles, and/or pedestrians. The federal government has separate interdiction programs designed to counter each of these smuggling threats. In fiscal year 1989, $204 million was authorized for air interdiction, about 13 percent of the entire drug interdiction budget. In fiscal year 1987, the proportion of total drug interdiction spending on

air interdiction programs was even greater (about 42 percent), due to appropriations for large equipment acquisitions such as aerostats.

EPIC intelligence estimates and statements by drug interdiction agency officials indicate that drug smugglers are making increased use of conveyances other than private aircraft. Whether this trend can be attributed to the buildup of the air interdiction system is unclear. However, the trend does suggest that the administration should consider the impact of any changes to air interdiction programs on other interdiction programs.

In our recent report to the new administration and Congress on the major policy, management, and program issues involving the Department of Justice, we said it is time to consider assigning more resources to activities aimed at reducing the demand for drugs. These include treatment, prevention, education, and research on the causes and extent of drug abuse. This does not mean that efforts to reduce the supply of drugs, such as air interdiction, should be reduced. However, further emphasis on such supply reduction programs will probably not solve the drug problem in this country.

Matters for Congressional Consideration

Decisions about providing funds for additional air interdiction efforts should not be made without considering whether these funds could be put to more effective use on some other aspect of the Nation's war on drugs. We are not convinced that spending more on air interdiction is the best use for additional funds. There are insufficient data, however, to draw a definitive conclusion as to how funds can best be spent fighting the war on drugs. Accordingly, the appropriate congressional committees may want to pursue the issue further with key administration officials before deciding on specific authorization and appropriation levels for all aspects of the war on drugs.

Agency Comments

We discussed the facts contained in this report with Customs Service, Coast Guard, and DOD officials who generally agreed with the facts as presented. Customs Service said that our report inferred that the air interdiction effort was not cost effective. Customs noted that, according to a consultant's study done for them, every dollar spent on intercepting drug shipments before they entered the country resulted in the seizure of $7.05 worth of cocaine and marijuana. We do not believe that the value of drugs seized by itself is an accurate measure of the success of

drug law enforcement programs. A primary measure, for example, should be the availability of illegal drugs in the country.

Although the cost effectiveness of air interdiction programs cannot be established due to insufficient data, we believe that sufficient data are available to raise questions as to the amount of funds that should be spent on such programs in relation to other drug control efforts.

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