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U.S. Department
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**Federal Aviation
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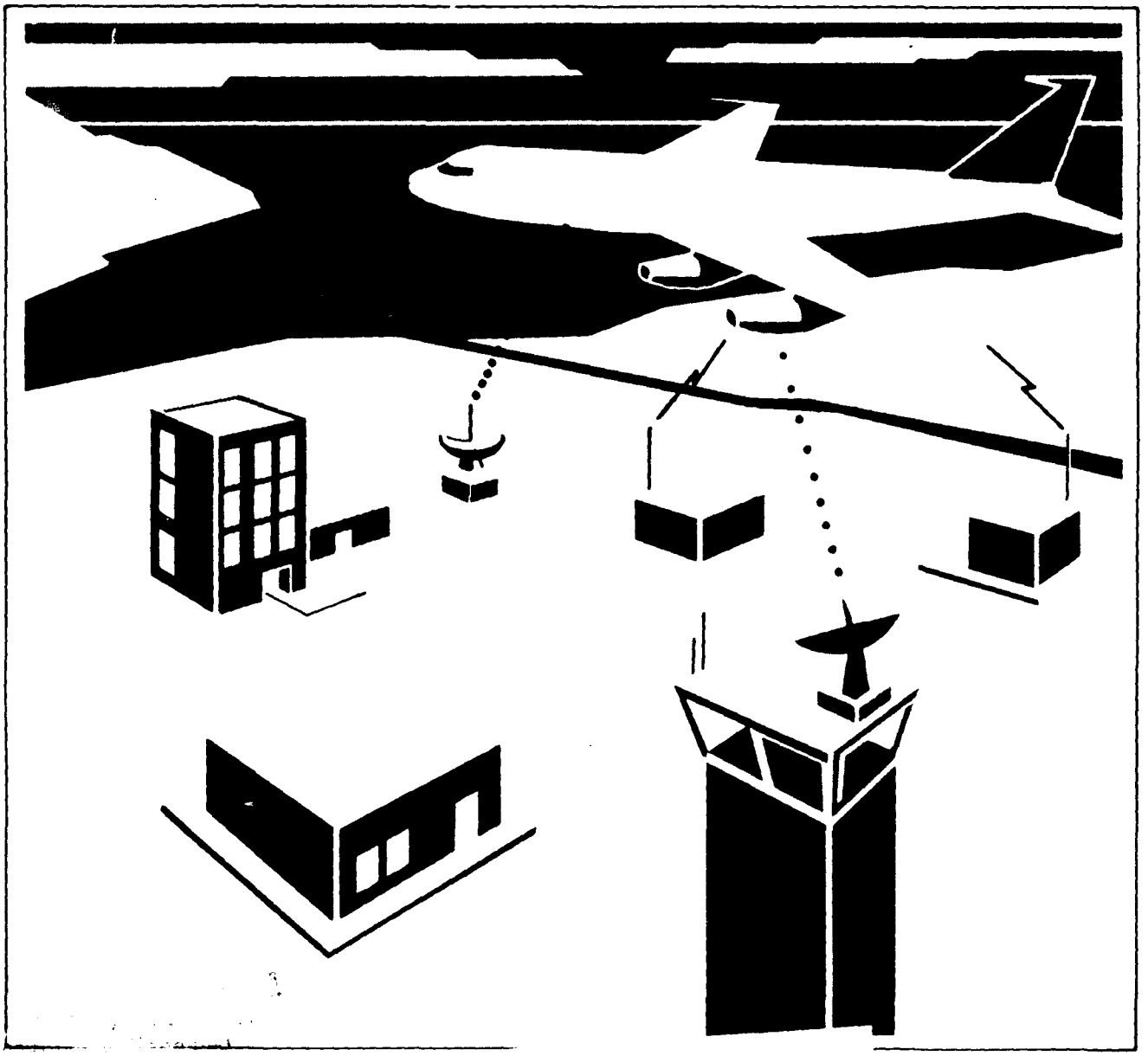
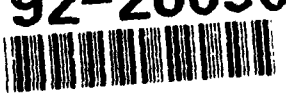
National Airspace System

Air Defense and Law Enforcement Surveillance Operational Concept NAS-SR-135





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16. Abstract

This operational concept describes the Air Defense and Law Enforcement Surveillance system which will be in place upon implementation of the Federal Aviation Administration (FAA) National Airspace System (NAS) Plan. Air Defense and Law Enforcement Surveillance includes those activities necessary to provide for the detection of aircraft throughout an Air Defense Identification Zone and Distant Early Warning Identification Zone, as well as to ascertain aircraft position, velocity, and identity of unauthorized intruders.

The objective of this document is to describe the relationship between subsystems, facilities, information, and operators/users involved in requirements stated in the National Airspace System System Requirement Specification (NAS-SR-1000). Several types of block diagrams are used to illustrate systems connectivity and operational flow. Scenarios are also derived to describe the process from a user's perspective.

This concept, and the other seven operational concepts, will complete the description of the system requirements as described in the NASSRS.

The eight operational concepts are: Communications (NAS-SR-136); Navigation (NAS-SR-134); Monitoring (NAS-SR-133); Maintenance and Support (NAS-SR-137); System Effectiveness (NAS-SR-138): Air Defense and Law Enforcement Surveillance (NAS-SR-135); Flight Planning (NAS-SR-131); and Traffic Control and Airspace Management (NAS-SR-132).

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1.0 INTRODUCTION

1.1 Background

The National Airspace System (NAS) shall provide for the detection of any aircraft throughout an Air Defense Identification Zone (ADIZ), Distant Early Warning Identification Zone (DEWIZ), and all other airspace for which the NAS has responsibility.

1.2 Objective

The objective of this operational concept, which is based upon the National Airspace System System Requirements Specification (NASSRS) paragraph 3.5, is to describe how air defense and law enforcement surveillance requirements are met in the future NAS.

More specifically, the purpose of this document is to accomplish the following:

a. Provide a common operational perspective across those subsystems, operators, and users that provide air defense and law enforcement support.

b. Show the interrelationship between subsystems, facilities, information, and operators/users.

1.3 Scope

This operational concept describes air defense and law enforcement surveillance capability provided in the NAS as outlined in Section 3.5 of the NASSRS. The operations described are limited to those associated solely with air defense and law enforcement surveillance.

The specific paragraphs in the NASSRS Section 3.5 are as follows:

3.5.1 Aircraft Detection and Identification

- 3.5.1.A Detection of Aircraft Entry to ADIZ/DEWIZ
- 3.5.1.B Position, Velocity and Altitude of All Aircraft
- 3.5.1.C Identification of Aircraft Entering ADIZ/DEWIZ
- 3.5.1.D Detection and Identification Available Continuously
- 3.5.1.E Exchange of Flight Plan Data
- 3.5.1.F Communication between NAS and Military/Law Enforcement Officials

1.4 Methodology

The methodology employed to develop this operational concept is similar to the methods and tools used for system development in that successive levels of decomposition of the air defense and law enforcement surveillance functions are represented. This document starts with the overall concept and proceeds to its most elemental levels of support, diagrammatic tools, and techniques that constitute air defense and law enforcement surveillance within the NAS. These analytical tools are:

1. Operational Block Diagram/Description. The operational block diagram illustrates the connectivity between major elements of the NAS, i.e., processors, specialists/controllers, and the user for those elements that support the service. The operational block diagram in this operational concept is extracted from the overall

NAS operational block diagram. An example of such a diagram appears in Figure 2-2. Principal features of the operational block diagram/description include the following:

a. Each specialist/controller is indicated by a number. This number remains the same in every NASSRS operational concept.

b. Dotted lines segregate facilities.

c. Solid lines show digital data flow, and voice data flow is also shown. Each type of data flow is appropriately labeled.

d. The blocks within each facility are the major processors.

2. Operational Flow Diagrams/Descriptions. An operational flow diagram and associated description for each specialist provides detail about the inputs, processes, outputs, and interfaces for each operator; thus, the operational flow diagram provides an expansion of each element of the NAS shown in the air defense and law enforcement surveillance master block diagram. Operational flow diagrams are used to functionally describe the products and services of individual specialists. An example of such a diagram appears in Figure 2-3. Principal features of the Operational Flow Diagram include the following:

a. Dotted lines segregate facilities.

b. Larger white boxes at the center of each diagram indicate specialist/controller/user functions. Shaded boxes indicate supporting systems.

c. The functions listed by lower case alphabetic characters in the white and shaded boxes are explained in the text.

3. Operational Sequence Diagrams/Descriptions. The operational sequence diagram and associated description show a typical sequence of steps taken by operators/users in supporting air defense and law enforcement surveillance operations. An example of such a diagram appears in Figure 2-5. Principal features of an operation sequence diagram include the following:

a. Users, specialists, and computer systems involved with providing air defense and law enforcement surveillance functions are listed along the vertical axis. When required for clarity, other FAA facilities may also be listed on the vertical axis.

b. The horizontal axis represents time. Sequential events or functions performed are indicated within separate boxes. Events which may occur simultaneously or near-simultaneously are shown vertically.

c. Decision points or points where alternate paths may be followed are indicated by a diamond shape.

d. Circles, if used, are connectors and indicate exit to, or entry from, another diagram. Circles with a lower case alphabetic character reference an operator function described in the figure listed below the circle. Circles connect either to another sheet of the same diagram or to another diagram; the relevant figure number is listed underneath if connection is to a

different diagram. Thus, the relationship between operator/user interactions and relevant NAS subsystems can be depicted.

4. Operational Scenario Diagrams/Descriptions The operational scenario diagram and associated descriptions depict a specific predefined situation and illustrates a particular subset of the generalized operational sequence or unusual situation not covered by the operational sequence diagrams. An example of an Operational Scenario Diagram appears in Figure 2-7. Principal features of operational scenario diagrams include the following:

   a. Users and specialists/controllers involved with providing the service are listed along the vertical axis.

   b. The horizontal axis represents time. Sequential events or functions performed by an operator/user are indicated within separate boxes. The numbers on the right side of the blocks refer to numbers in the text.

1.5 Document Organization

The remainder of this document (Section 2, Air Defense and Law Enforcement Surveillance Operations) is divided into six subsections:

Section 2.1 Support provides an overview description of the Air Defense and Law Enforcement Surveillance functions and introduces (identifies) the personnel complement and physical entities (facilities and computer systems), which provide the required support.

Section 2.2 Information describes the information used to provide Air Defense and Law Enforcement Surveillance support.

Section 2.3 Functions provides descriptions of the functional decomposition of Air Defense and Law Enforcement Surveillance services. (Sections 2.1, 2.2, and 2.3 reference related NASSRS 3.5 subsystems.)

Section 2.4 Correlation of Operational Requirements correlates the Air Defense and Law Enforcement Surveillance requirements paragraphs of NAS-SR-1000 with the paragraphs that describe the functions being performed by the specialists/controllers.

Section 2.5 Operational Sequences illustrates the interactions between NAS personnel and systems (Computer-Human Interface, CHI) during the planning and the implementational phases of Air Defense and Law Enforcement Surveillance services.

Section 2.6 Operational Scenarios describes operational scenarios for hypothetical interactions between users and operators/specialists for specific cases.

A-1

2.0 AIR DEFENSE AND LAW ENFORCEMENT SURVEILLANCE OPERATIONS

2.1 Support

The National Airspace System (NAS) shall provide for the detection of any aircraft throughout an Air Defense Identification Zone (ADIZ), Distant Early Warning Identification Zone (DEWIZ), and all other airspace for which the NAS has responsibility. The NAS is required to ascertain the position, velocity, and altitude of aircraft in such airspace and to identify unauthorized intruders.

All aircraft entering an ADIZ or the DEWIZ shall be under surveillance at all times. The NAS shall be required to provide the current and expected location, altitude, speed, and course of each aircraft. National security and law enforcement interests require a method to determine whether the aircraft is authorized or unauthorized. This capability must be available at all times. The NAS must provide a means of communication to support these requirements.

The following paragraphs describe these functions as required in paragraph 3.5 of the NASSRS.

2.1.1 Positions/Systems/Functions

Figure 2-1 is an overview of NAS/user interfaces for air defense and law enforcement surveillance and illustrates the NAS facilities and systems involved. Figure 2-2 is an operational block diagram showing the inter-relationships between equipment, facilities, operators/users and the information necessary to support air defense and law enforcement surveillance within the NAS.

Position 2: Automated Flight Service Station - Preflight Specialist
Function: Coordinates with law enforcement officials
Description: Screens the Flight Service Data Processing System (FSDPS) data base for stolen or illegal aircraft. Coordinates with law enforcement officials on reports of stolen aircraft.

Procedures: FAA Handbook 7110.10J, Flight Services

Projects: Capital Investment Plan, Chapter 2, Section 3: Flight Service and Weather: Project 23-01, Flight Service Automation System (FSAS); Project 23-13 Integrated Communications Switching System (ICSS); Project 43-04, FSAS Computer Replacement. .

Position 3: Automated Flight Service Station - In-Flight Specialist
Function: Handles DVFR flight plans and coordinates with law enforcement officials.
Description: In-Flight Specialists handle the activation, position reporting, and closure of certain aircraft on DVFR flight plans (e.g., helicopters transiting to/from oil platforms/fishing boats). Shares responsibility with Preflight Specialist to coordinates with law enforcement officials on reports of stolen aircraft.

Procedures: FAA Handbook 7110.10J, Flight Services

Projects: Capital Investment Plan, Chapter 2, Section 3: Flight Service and Weather: Project 23-01, Flight Service Automation System (FSAS); Project 23-13 Integrated

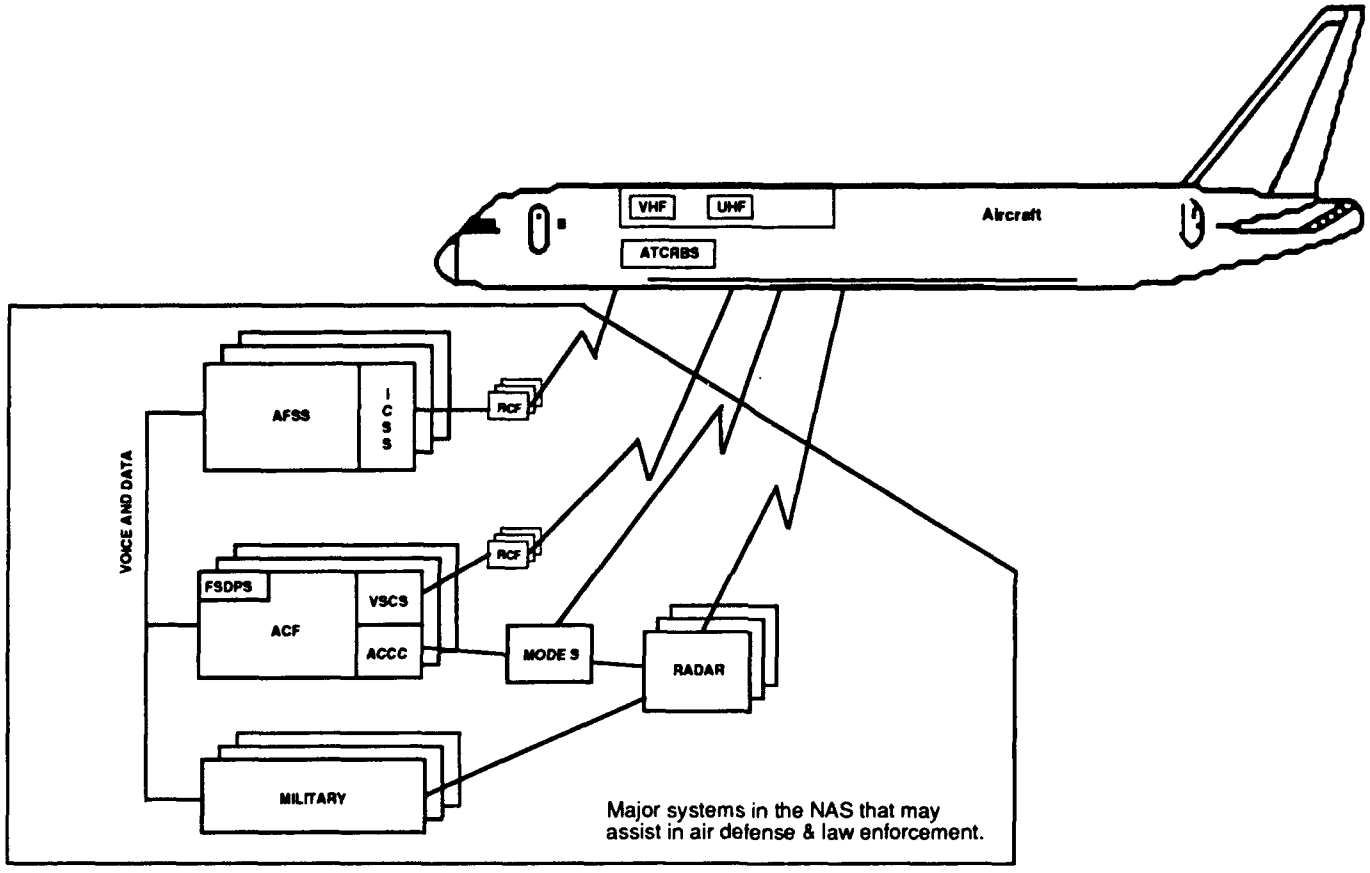

FIGURE 2-1
OVERVIEW OF NAS/USER INTERFACES
FOR AIR DEFENSE & LAW ENFORCEMENT SURVEILLANCE

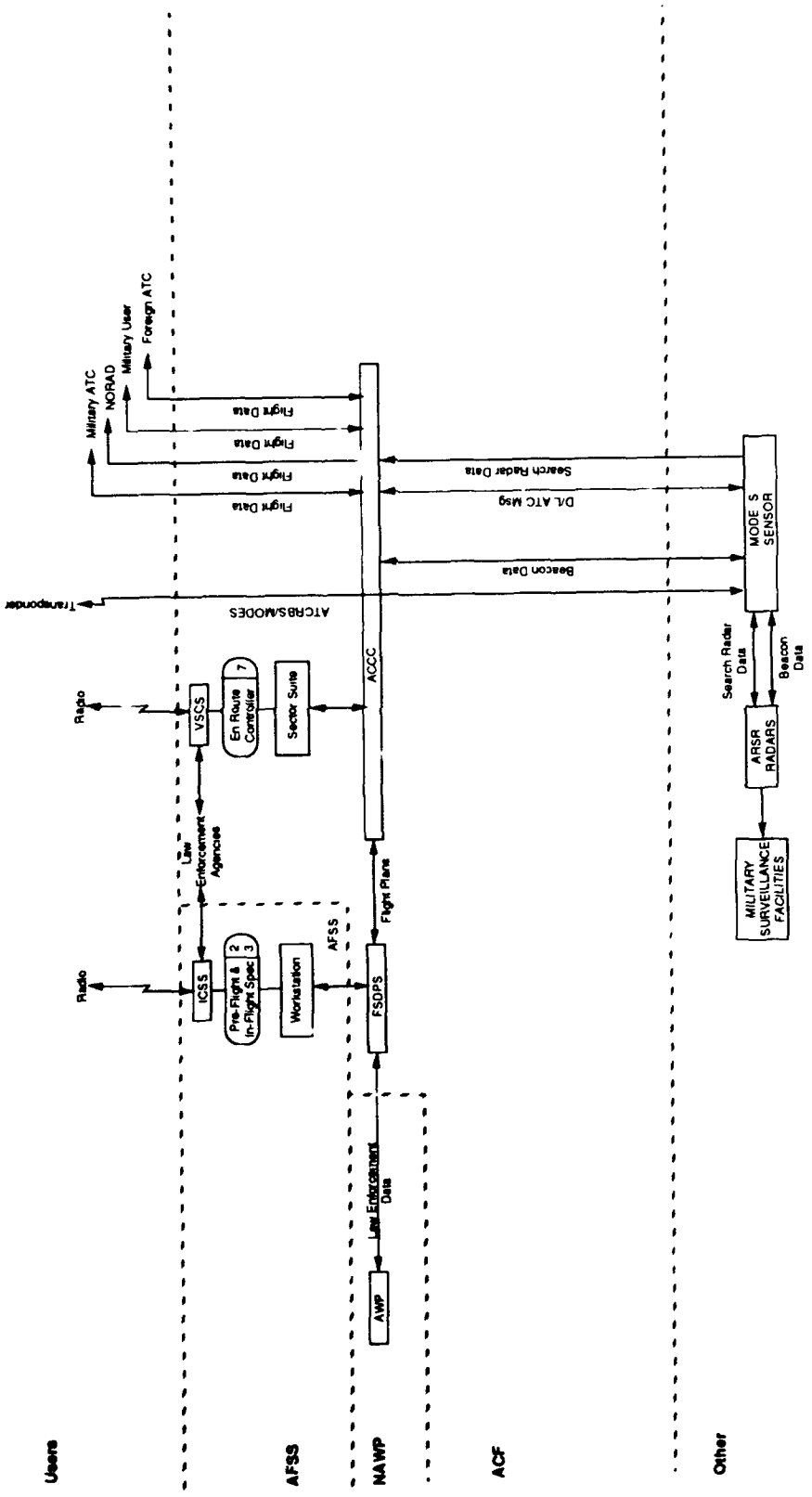

FIGURE 2-2
AIR DEFENSE AND LAW ENFORCEMENT SURVEILLANCE OPERATIONAL BLOCK DIAGRAM

Communications Switching System (ICSS); Project 43-04, FSAS Computer Replacement.

Position 7: ACF En Route Controller
Function: Radar En Route Control
Description: These controllers control air traffic using surveillance radar systems and coordinate with North American Aerospace Defense Command (NORAD) on suspect aircraft entering the ADIZ/DEWIZ.

Procedures: FAA Handbook 7110.65G, Air Traffic Control

Projects: Capital Investment Plan, Chapter 2, Section 1: Project 21-11, Voice Switching and Control System (VSCS); Project 21-15, Area Control Facilities (ACF); Section 4: Project 24-12, Mode S Sensor; Project 24-15, Long Range Radar Program

2.2 Information

In order for the NAS to support air defense and law enforcement officials, surveillance and flight plan information must be available and exchanged with all facilities involved.

The following paragraphs describe the information related to and passed by various facilities. Each paragraph relates directly to their corresponding paragraphs in section 3.5 of the NASSRS.

2.2.1 Surveillance Information

In order to detect all aircraft entering an ADIZ/DEWIZ within 13 seconds of penetration, the NAS must have a surveillance system capable of detecting these aircraft. The Air Route Surveillance Radars (ARSR) provide en route search coverage for air traffic control, as well as surveillance for air sovereignty and law enforcement within the ADIZ and DEWIZ areas. The ARSR provides positional information and height data on aircraft within its coverage area. This data is provided to the appropriate FAA ACFs and to USAF air defense facilities and USN area control facilities.

The ARSR is a three-dimensional, long range primary radar with height finder capability. When used in conjunction with a beacon surveillance system and MODE S sensor this system will provide radar coverage in controlled airspace. The primary function of the ARSR is to detect and report the presence and location of a target in a specified volume of airspace.

The ARSR detects any aircraft entering an ADIZ/DEWIZ to a maximum altitude of 100,000 feet MSL to a maximum range of 250 nm. The ARSR also detects the position of an aircraft entering an ADIZ/DEWIZ to within a range of 0.125 nm and azimuth of 0.176 degrees of the aircraft's actual position. Additionally, the ARSR detects the velocity of an aircraft to within 20 knots of the aircraft's actual speed in level-constant-speed flight and course accuracy to within 5 degrees of the actual course. For an aircraft without an operating Mode C altitude encoding altimeter, the ARSR is capable of detecting its altitude within 5,000 feet of the aircraft's actual altitude.

The ARSR interfaces with the Mode S sensor, the Area Control Computer Complex (ACCC), the U.S. Air Force Sector Operations Control Center (SOCC) and Military Radar Units (MRU), and the U.S. Navy Fleet Area Control and Surveillance Facility (FACSFAC) to pass surveillance information.

The Mode S Sensor is a combined beacon interrogator and ground-air-ground data system which are part of the surveillance facilities. The purpose of the Mode S sensor is to provide beacon surveillance coverage in conjunction with search radar coverage and to provide a means for automated data communications between the aircraft and the various ground-based processors.

The air traffic control radar beacon system (ATCRBS) consists of airborne transponders, ground interrogator receiver, processing equipment and an antenna system. Pilots flying within an ADIZ are required to operate the radar beacon transponder, including the altitude encoder, and reply on the appropriate transponder code as assigned by ATC.

2.2.2 Flight Data Information

The NAS provides the capability to exchange flight plan data with military air defense facilities and law enforcement officials (e.g., NORAD, FBI, DEA, INS). This capability is provided by voice grade and/or automated equipment through NAS systems such as Voice Switching and Control System (VSCS) and the Area Control Computer Complex (ACCC). Within the AFSS this information can be passed from the Flight Service Data Processing System (FSDPS) to the ACCC within the appropriate ACF.

Flight plan data provided by the NAS includes such information as:

- Aircraft call sign
- Aircraft type
- Position
- Altitude
- Route of Flight
- Airspeed
- Remarks

All pilots that operate an aircraft into, within, or across an ADIZ are required to file a flight plan with an appropriate facility. These include IFR flight plans and Defense VFR flight (DVFR) plans for VFR aircraft intending to fly within an ADIZ. The pilot of an aircraft entering the United States through an ADIZ shall make position reports in accordance with the filed flight plan.

The NAS assists military specialists in identifying aircraft entering an ADIZ/DEWIZ by forwarding flight plan data to NORAD for those aircraft that will penetrate these areas. Aircraft movement messages are automatically transmitted to the appropriate NORAD Centers when inbound aircraft cross ADIZ boundaries. Additionally, the NAS also assists law enforcement officials in identifying and following aircraft of special interest.

The NAS provides the capability to alert specialists within one minute after detection of an aircraft that is operating in NAS airspace using the registration number of a reportedly stolen aircraft. The ACCC alerts the specialist of aircraft identifications that match identification on a suspect aircraft list within one minute of detection. The ACCC compares aircraft identification of all IFR and VFR flight plans against a list of suspect aircraft identifications, beacon codes, or selected Mode S addresses.

2.2.3 Communications

The NAS provides communications between specialists and appropriate military and law enforcement officials. These communications systems include both cooperative communications capability and protected communications to alert military and law enforcement officials.

Within the Area Control Facility (ACF) the VSCS provides the voice connectivity between the ACF controller and NORAD for the coordination of flight plan information. VSCS also provides voice communications connectivity with a Private Branch Exchange (PABX) for the exchange of information and to allow accessing of the DOD network.

The Integrated Communications Switching System (ICSS) provides the communication capability to pass law enforcement data (such as reports of stolen aircraft or aircraft attempting illegal entry) between specialists in an AFSS and law enforcement officials.

2.3 Functions

The following paragraphs describe in more detail the functions provided by the specialist positions introduced in Section 2.1. The operational flow diagrams associated with each paragraph illustrate the information flow between the specialist within their respective facility and the user, and between the specialist and data processing equipment. The functions performed by the NAS are explicitly covered by requirements specified in the NASSRS. The pertinent NASSRS paragraphs that specify the function being performed by the NAS are referenced in each of the paragraphs that follow.

2.3.1 AFSS Preflight/In Flight Specialists

Figure 2-3 is an operational flow diagram describing air defense and law enforcement surveillance functions. The functions performed by equipment and specialists within the AFSS are lettered within each block and are described in the corresponding paragraphs below.

a. FSDPS Processing. The Flight Service Data Processing System (FSDPS), which is located within the ACF, provides the capability to enter, process, and transfer flight plan data for aircraft entering or operating within an ADIZ. The FSDPS also maintains law enforcement data, such as reports of stolen aircraft. The FSDPS receives flight plan data from other FSDPSs, ICAO flight plans from foreign ATCs, and ACCCs with responsibility for the airspace where the proposed flight will penetrate the ADIZ or DEWIZ.

   NASSRS Requirement 3.5.1.E

b. AFSS Workstation The Automated Flight Service Station (AFSS) work station provides position console equipment and a limited processing capability to support the operational flight services performed by the designated specialists. The AFSS work station provides the computer-human interface between the AFSS specialist and the centralized flight service data base maintained in the FSDPS at the associated ACF. Law enforcement data (including reports of stolen aircraft and aircraft attempting illegal entry) are exchanged between specialists and the FSDPS through the AFSS workstation.

   NASSRS Requirement 3.5.1.E

c. Integrated Communication and Control System (ICSS) The ICSS provides the communication capability between AFSS specialists and law enforcement officials to coordinate law enforcement data (such as reports of stolen aircraft or aircraft attempting illegal entry).

   NASSRS Requirement 3.5.1.D, F

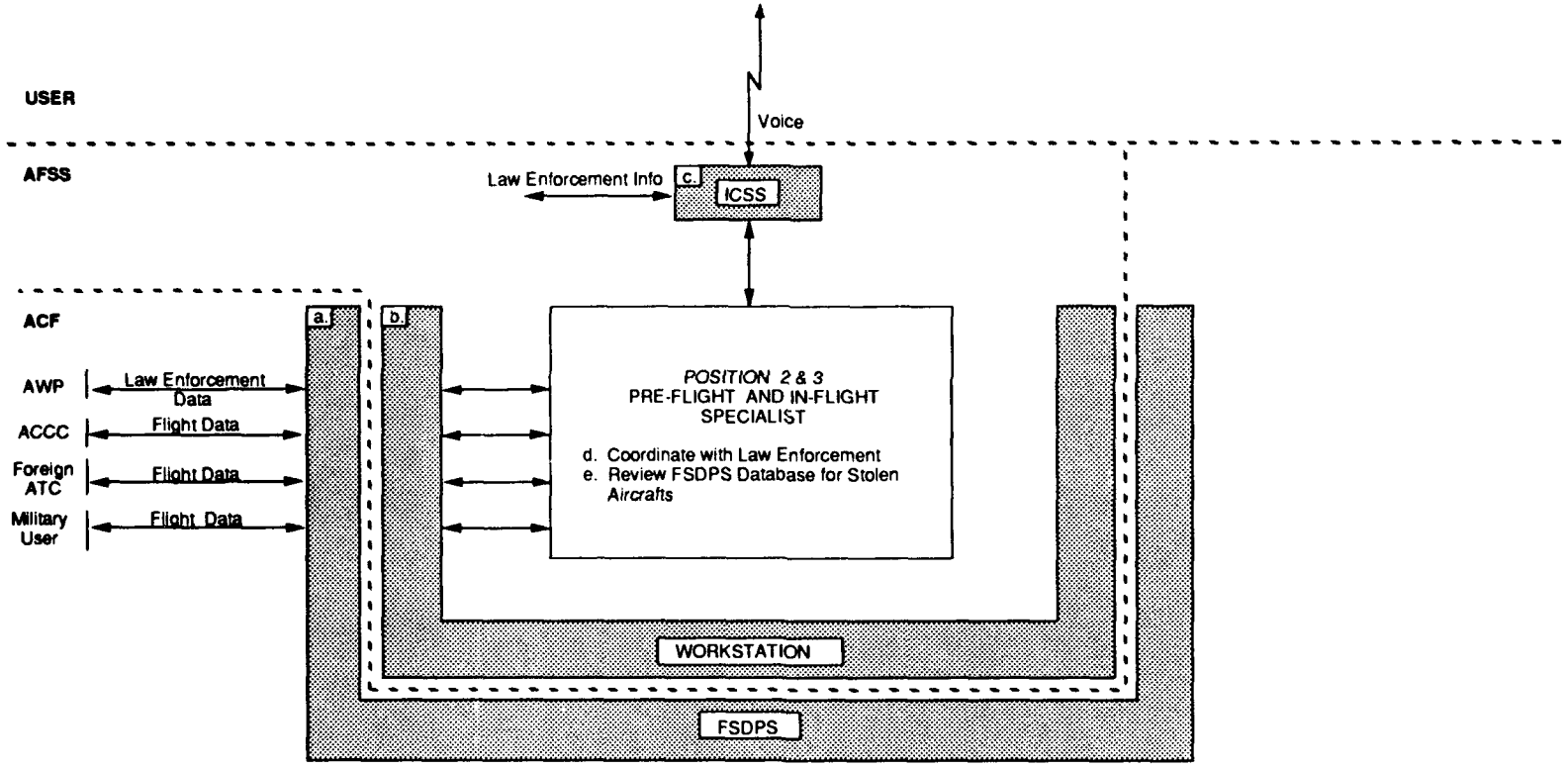

FIGURE 2-3
POSITION 2 & 3 AFSS PRE-FLIGHT AND IN-FLIGHT SPECIALISTS AIR DEFENSE AND LAW ENFORCEMENT SURVEILLANCE OPERATIONAL FLOW DIAGRAM

d. Coordinate with Law Enforcement Officials AFSS specialists coordinate reports of stolen aircraft or aircraft attempting illegal entry with law enforcement officials.

NASSRS Requirement 3.5.1.E

e. Review FSDPS Database for Stolen Aircraft The FSDPS notifies the Preflight/In Flight Specialist whenever their is a Law Enforcement Alert Message match to a stolen aircraft inquiry.

NASSRS Requirement 3.5.1.E

2.3.2 ACF En Route Controllers

Figure 2-4 is an operational flow diagram describing air defense and law enforcement surveillance functions performed by En Route Controllers within an ACF. Functions performed by the equipment and these specialists are lettered within each block and are described in the corresponding paragraphs below.

a. Area Control Computer Complex (ACCC) Processing. The ACCC receives and processes surveillance messages from Mode S radar beacon system sites. This information includes target data processing, surveillance data processing, and primary (search) target classification. The ACCC also performs automatic tracking for all tracks initiated (Mode S and ATCRBS). This process involves target-to-target correlation, track initiation, track-to-flight plan pairing, flight plan association, and track data updating. Another major function that the ACCC provides in this concept is flight plan processing. Included in this process is route processing consisting of a flight's trajectory that is used for all subsequent flight plan processing and surveillance. The ACCC provides the capability to compare the aircraft identification of all flight plans being processed against a list of suspect aircraft identifications and provides an alert message if a match is found. IFR and DVFR flight plans for aircraft whose proposed route crosses the US border will also cause an alert. The ACCC forwards flight plan data to NORAD on flight plans that will penetrate an ADIZ or DEWIZ.

NASSRS Requirement 3.5.1.A, B, C, D, E

b. Sector Suite The Sector Suite provides the computer-human interface for ACF controllers to receive surveillance and flight plan information from the ACCC.

NASSRS Requirement 3.5.1.A, B, C, D, E

c. Voice Switching and Control System (VSCS) The VSCS provides ACF controllers with ground-ground voice communications interconnectivity with NORAD for the coordination of flight plan information. VSCS also provides voice communications connectivity with a PABX for accessing the DOD Network. ACF controllers receive information concerning appropriate military flight activity from military offices and relay this information to AFSS specialists by way of the VSCS.

NASSRS Requirement 3.5.1.D, E

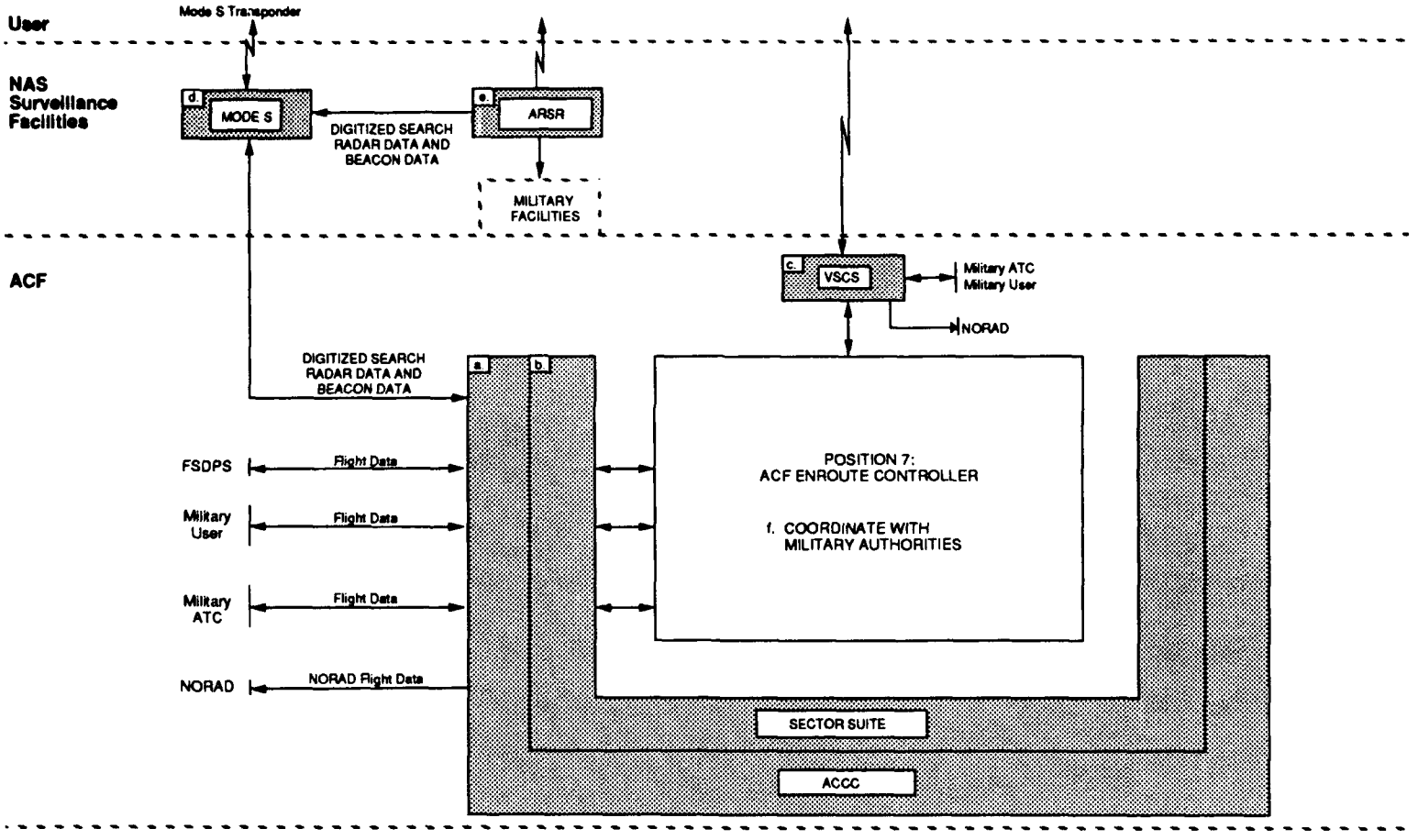

FIGURE 2-4
POSITION 7: ACF ENROUTE CONTROLLERS AIR DEFENSE AND LAW ENFORCEMENT SURVEILLANCE OPERATIONAL FLOW DIAGRAM

d. Mode S Sensor The Mode S sensor provides beacon surveillance coverage in conjunction with search radar coverage as part of a nationwide surveillance network. The Mode S sensors detect and report the presence and location of a transponder-equipped aircraft. In addition, the Mode S processor performs surveillance processing, including ATCRBS/Mode S/radar and radar/beacon correlation. The Mode S sensor interfaces with the ACCC and provides a combined surveillance data stream. This data stream consists of digitized beacon data and digitized search radar data.

NASSRS Requirement 3.5.1.A. B, C

e. Air Route Surveillance Radar (ARSR) The ARSR radar is a three-dimensional, long range primary radar with height finder capability. The purpose of the ARSR is to provide search radar surveillance coverage in controlled airspace. The ARSR interfaces with the Mode S Sensor, the ACCC, the USAF Sector Operations Control Center (SOCC) and Military Radar Units (MRU), and the USN Fleet Area Control and Surveillance Facility (FACSFAC). The ARSR provides the SOCC, MRU, and FACSFAC with a surveillance data stream containing digitized beacon, search, beacon/search merged, and height information.

NASSRS Requirement 3.5.1.A, B, D

f. Coordinate with Military Authorities ACF Specialists coordinate with military authorities (NORAD) on those flights detected penetrating NAS airspace.

NASSRS Requirement 3.5.1.E, F

2.4 Correlation with Operational Requirements

Table 2-1 summarizes the correlation of the air defense and law enforcement surveillance requirements graph of NAS-SR-1000 with the paragraphs describing these functions being performed by specialists/controllers. All air defense and law enforcement paragraph numbers of NAS-SR-1000 are listed; paragraphs which are introductory in nature, do not state an explicit operational requirement, or which reference other portions of NAS-SR-1000 are indicated with a dash. The fact that a correlation is shown between a requirements paragraph and a paragraph describing the specialist/controller functions should not be construed as indicating that the requirement is completely fulfilled.

TABLE 2-1
AIR DEFENSE AND LAW ENFORCEMENT SURVEILLANCE OPERATIONAL REQUIREMENTS CORRELATION

NAS-SR-1000 PARAGRAPH / POSITION	AFSS PRE-FLIGHT AND IN-FLIGHT SPECIALIST					ACF ENROUTE CONTROLLER					
	2.3.1.a	2.3.1.b	2.3.1.c	2.3.1.d	2.3.1.e	2.3.2.a	2.3.2.b	2.3.2.c	2.3.2.d	2.3.2.e	2.3.2.f
3.5 AIR DEFENSE AND LAW ENFORCEMENT SURVEILLANCE											
3.5.1 AIRCRAFT DETECTION AND IDENTIFICATION	–	–	–	–	–	–	–	–	–	–	–
3.5.1.A Detection of Aircraft Entry to ADIZ/DEWIZ	x					x	x		x	x	
3.5.1.B Position, Velocity & Altitude of All Aircraft						x	x		x	x	
3.5.1.C Identification of Aircraft Entering ADIZ/DEWIZ	x					x	x		x		
3.5.1.D Detection & Identification Available Continuously			x			x	x	x		x	
3.5.1.E *Exchange of Flight Plan Data*	x	x		x	x	x	x	x			x
3.5.1.F Comm Between NAS & Military/Law Enf Officials			x								x

2.5 Operational Sequences

Operational sequence diagrams have been developed to illustrate the interactions of those specialists involved with air defense and law enforcement surveillance. These diagrams are general in nature and no effort has been made to depict a specific situation.

2.5.1 AFSS Law Enforcement Surveillance Operational Sequence

Figure 2-5 illustrates a general sequence of operator/user interactions between pilots and AFSS specialists. In this sequence a Law Enforcement Alert Message (LEAM) that an aircraft has been stolen (1) is forwarded to the Aviation Weather Processor (AWP) (2) by a law enforcement agency. The AWP forwards the LEAM message (3) to the FSDPS which forwards the message to the appropriate AFSS (5). The AFSS specialist receives the LEAM message (6) and checks the FSDPS flight service data base for aircraft contact information (7). The FSDPS notifies the specialist when the program recognizes any aircraft registration number in the history file that matches one in the LEAM (8). The specialist then notifies the requesting facility or office of the match (9).

2.5.2 ACF Air Defense Operational Sequence

In Figure 2-6 the ARSR detects an aircraft penetrating an ADIZ (1). Since the aircraft is equipped with an operating transponder its beacon code is detected by the Mode S Sensor which is collocated with the ARSR. The target's position, velocity, and altitude are passed (2) to the Mode S sensor (3) which, in turn, passes the information to the ACCC at the ACF (4). The information is then forwarded to the appropriate sector suite (5). The beacon data relayed to the ACF specialist indicates that the aircraft is suspected of drug activity. The controller then notifies the appropriate authorities (6) via VSCS.

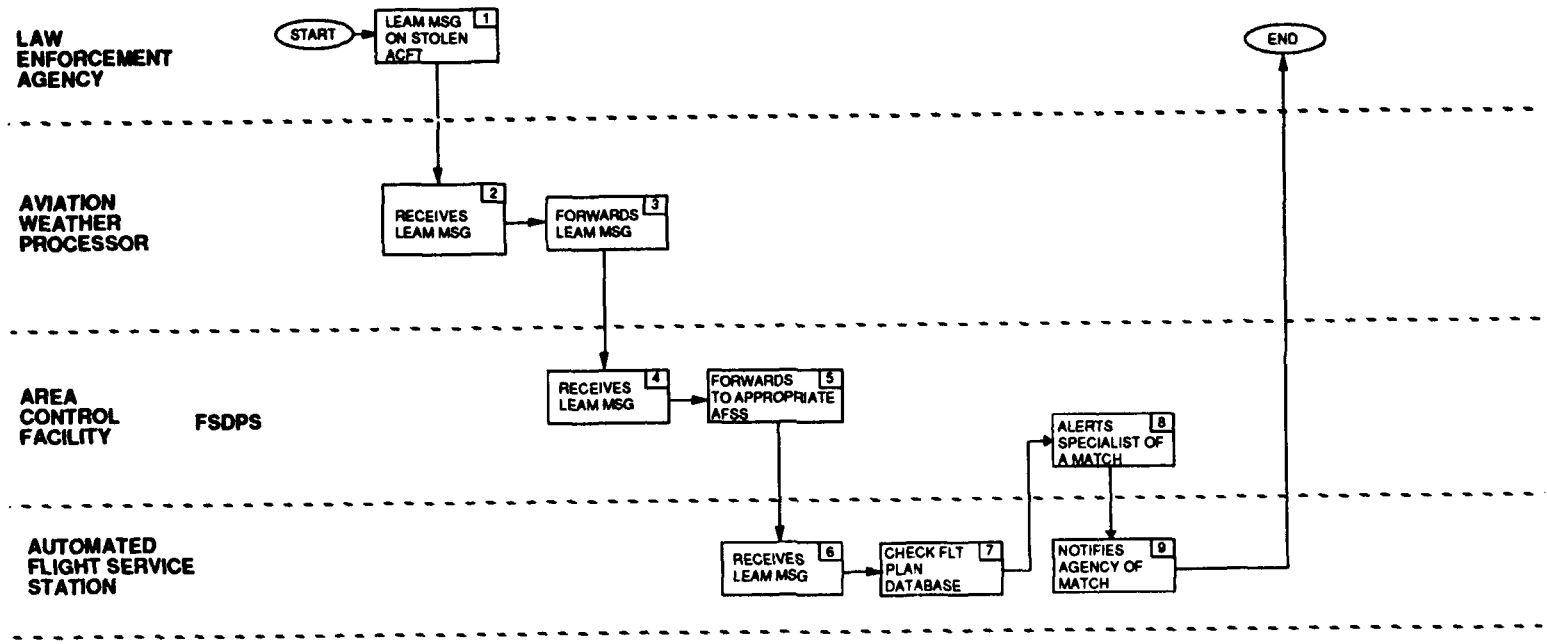

FIGURE 2-5
AFSS LAW ENFORCEMENT SURVEILLANCE
OPERATIONAL SEQUENCE DIAGRAM

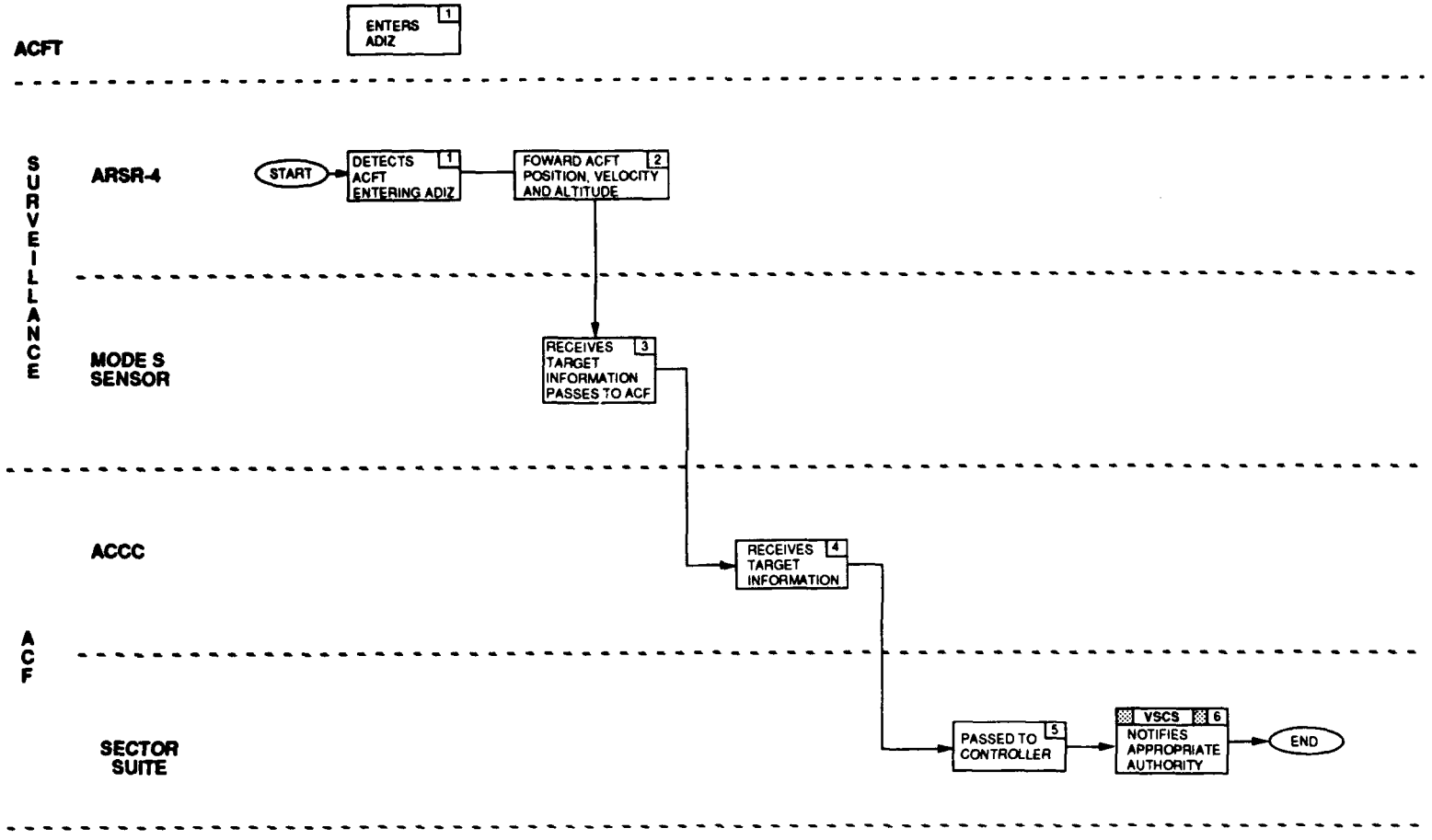

FIGURE 2-6
ACF AIR DEFENSE
OPERATIONAL SEQUENCE DIAGRAM

2.6 Operational Scenarios

Specific hypothetical situations illustrating communications capability within the NAS are presented in the following paragraphs.

2.6.1 AFSS Law Enforcement Operational Scenario Diagram

Figure 2-7 presents an operational scenario for an AFSS specialist communicating with a law enforcement agency on a stolen aircraft. In this scenario a law enforcement agency sends a stolen aircraft message (1) to the National Aviation Weather Processing Facility through the Aviation Weather Processor (AWP) (2). The message includes the call sign, type aircraft, color, and departure airport of a stolen aircraft. The AWP forwards the message to the appropriate FSDPS (3) in the ACF (4) for relay to the appropriate AFSS specialist (5). The AFSS specialist forwards the information through the ICSS (6) to all air traffic control towers (7) through the TCS and Flight Standards District Offices within its area of jurisdiction (8) through the Private Branch Automated Exchange (PABX). These facilities will then take appropriate action.

2.6.2 ACF ADIZ NORAD Coordination Operational Scenario Diagram

Figure 2-8 describes the interaction between NORAD and an ACF concerning an aircraft within the ADIZ. In this scenario the ARSR at Oceana, VA detects an aircraft in the ADIZ 180 miles east of Norfolk, VA (1) and presents the target on the NORAD specialists' display (2). The aircraft is west bound and appears to be heading for Atlantic Route 9 (AR-9) for Norfolk and has a transponder code of 2122 displayed. The NORAD Identification Technician reviews the flight plans passed to NORAD by the FAA to attempt to correlate the aircraft with its associated flight plan (3). The transponder code correlates with a flight plan on an aircraft from Bermuda, Atlantic Route B-24 DANER intersection direct ZIBUT intersection AR-9 to Norfolk. The aircraft is off course but is in the general area of its last position report. The Identification Technician contacts the New York ACF Oceanic controller (4) responsible for the area and confirms the flight identification. The New York Oceanic controller confirms the call sign and identification of the aircraft (5).

In the next scenario, Figure 2-9, the Tyndall, FL ARSR detects an aircraft 200 miles west-southwest of St. Petersburg FL (1) and presents the target on the NORAD Surveillance Technicians' display (2). The Identification Technician attempts to correlate the aircraft with a flight plan (3). The aircraft does not have its transponder turned on so there is no code displayed. There are also no flight plans in the NORAD data base for traffic in this area (4). The Identification Technician contacts Houston ACF (5) for further clarification. The Houston ACF controller advises that he has no traffic or flight plans on any aircraft in this area (6). It is then determined by NORAD that the aircraft is a potential drug smuggler and the Customs Operations Center (7) is notified for further action.

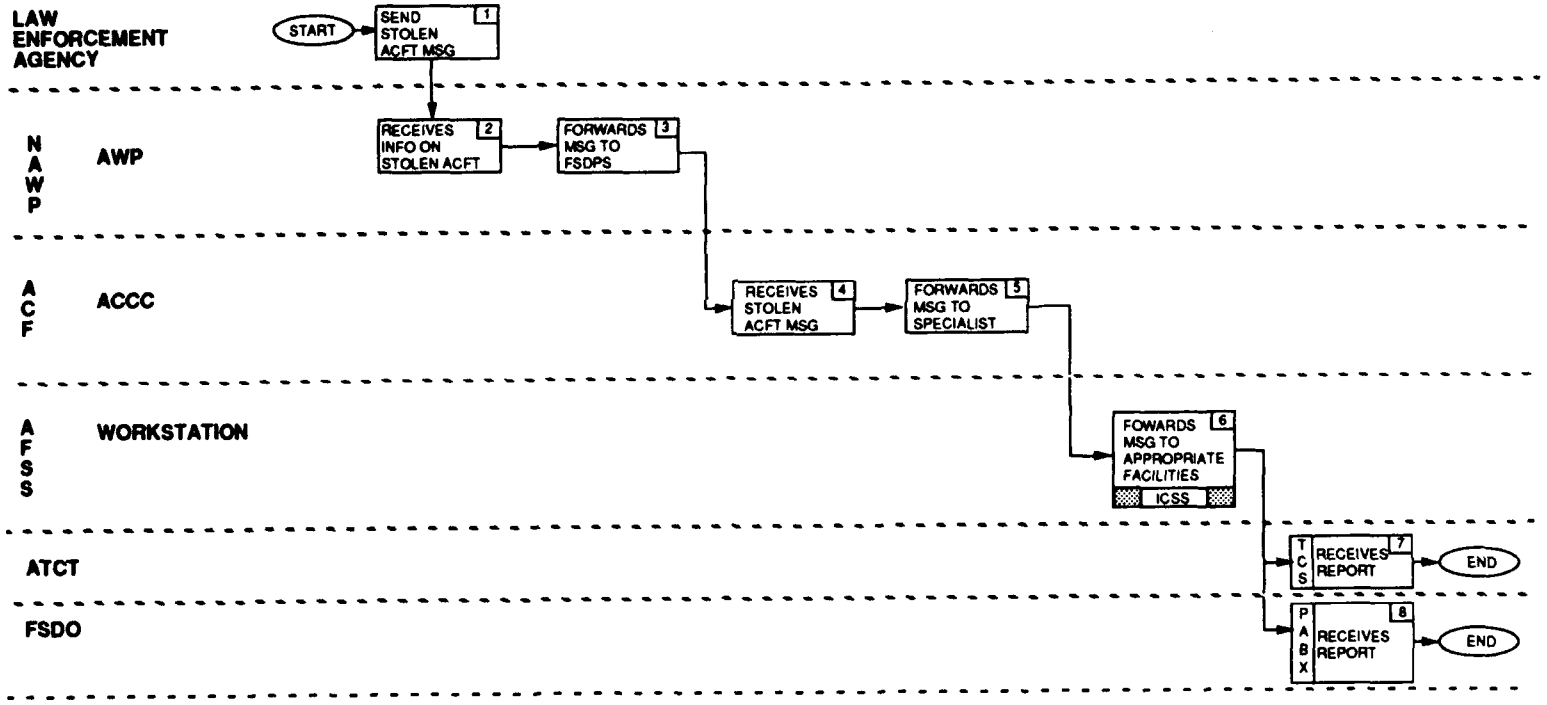

FIGURE 2-7
AFSS LAW ENFORCEMENT
OPERATIONAL SCENARIO DIAGRAM

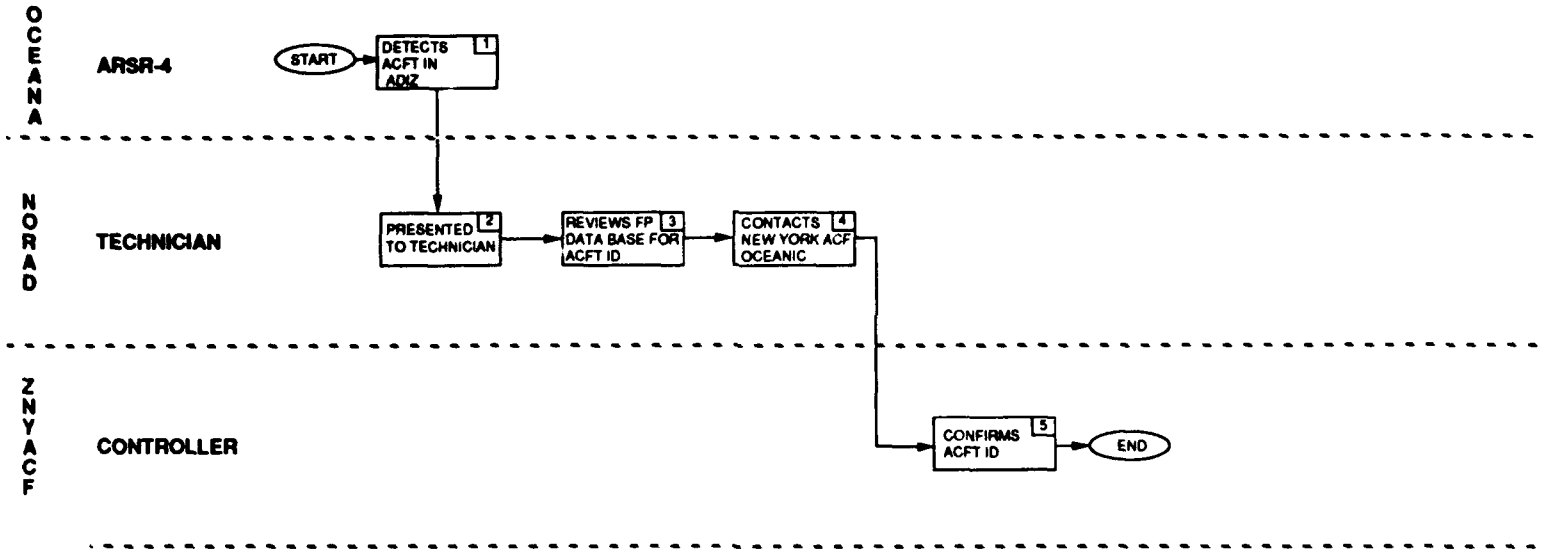

FIGURE 2-8
ACF ADIZ NORAD COORDINATION
OPERATIONAL SCENARIO DIAGRAM

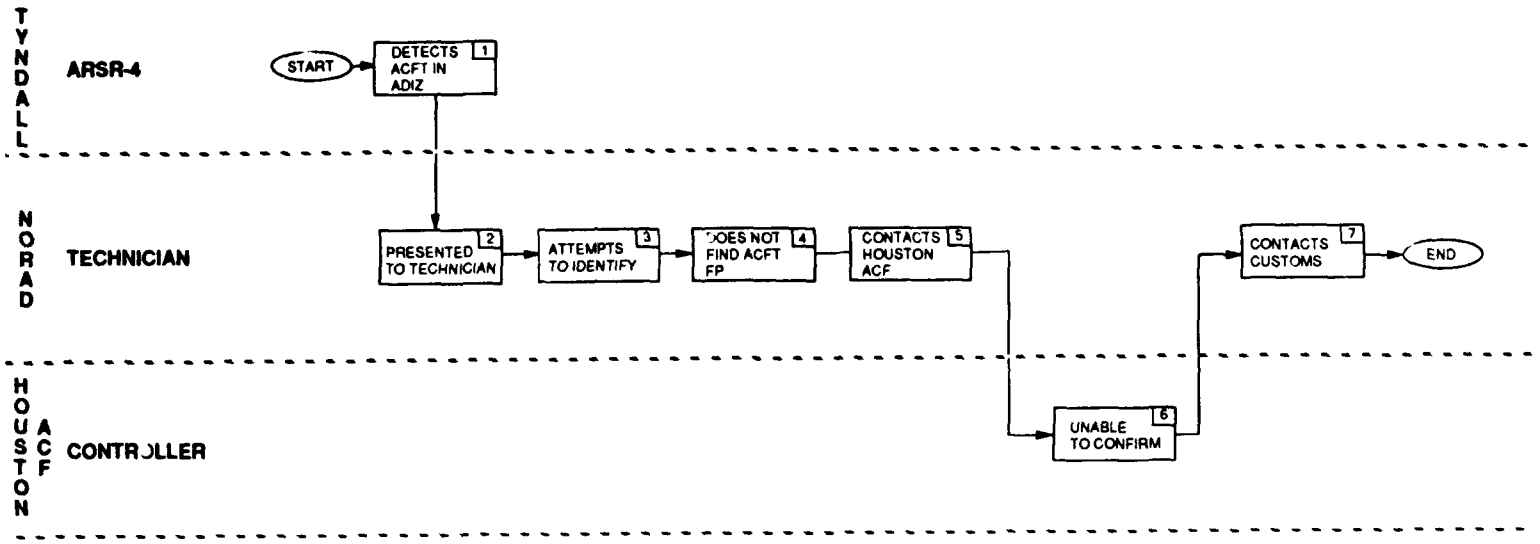

FIGURE 2-9
ACF LAW ENFORCEMENT INTERDICTION SURVEILLANCE
OPERATIONAL SCENARIO DIAGRAM

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GLOSSARY

AIRCRAFT - Device/s that are used or intended to be used for flight in the air; when used in air traffic control terminology may include the flight crew.

AIR DEFENSE IDENTIFICATION ZONE (ADIZ) - The area of airspace over land or water, extending upward from the surface, within which the ready identification, the location, and the control of aircraft are required in the interest of national security.
1. Domestic Air Defense Identification Zone. An ADIZ within the United States along an international boundary of the United States.
2. Coastal Air Defense Identification Zone. An ADIZ over the coastal waters of the United States.
3. Distant Early Warning Identification Zone (DEWIZ). An ADIZ over the coastal waters of the State of Alaska.

AIR ROUTE SURVEILLANCE RADAR (ARSR) - A three-dimensional, long-range primary radar with height finder capability, which is part of the NAS surveillance facilities. The ARSR provides search radar surveillance coverage in controlled airspace.

AREA CONTROL FACILITY (ACF) - A facility established to provide air traffic control service to aircraft principally during the en route phase of flight.

DEFENSE VFR FLIGHT PLAN - VFR flight plans for flight into coastal or domestic ADIZ/DEWIZ areas.

FLEET AREA CONTROL AND SURVEILLANCE FACILITY (FACSFAC) - A U.S. Navy fixed ground facility that manages offshore and inland operating areas including warning areas, restricted areas, and other assigned airspace.

FLIGHT PLAN - Specified information relating to the intended flight of an aircraft that is filed orally or in writing with an ATC facility.

IFR AIRCRAFT/IFR FLIGHT - An aircraft conducting flight in accordance with instrument flight rules.

INSTRUMENT FLIGHT RULES (IFR) - Rules governing the procedures for conducting instrument flight. Also a term used by pilots and controllers to indicate type of flight plan.

MODE S SENSOR - The Mode S Sensor is a combined beacon interrogator and ground-air-ground data link system that is part of the surveillance facilities. The purpose of Mode S is to provide beacon surveillance coverage in conjunction with search radar coverage and to provide automated data communications between the aircraft and various ground-based processors.

NATIONAL AIRSPACE SYSTEM (NAS) - The NAS as used herein describes the FAA facilities, hardware, software, and the personnel who operate and maintain that equipment to provide services to the user.

NORTH AMERICAN AEROSPACE DEFENSE COMMAND (NORAD) - NORAD is responsible for defending the North American continent against air attack. There are four air defense sectors within the continental United States which form the Continental NORAD Region. A fifth sector over Alaska makes up the Alaskan NORAD Region. Additionally, two air defense sectors over Canada make up the Canadian NORAD Region.

SECTOR OPERATIONS CONTROL CENTER (SOCC) - A USAF radar facility which has the capability to control air defense operations in a designated area.

SPECIALIST - The internal individual or group who provide service through the NAS (e.g., controllers, engineers, maintenance and management personnel).

VOICE SWITCHING AND CONTROL SYSTEM (VSCS) - A system which provides voice communications services and performs the intercom, interphone, and air-ground voice connectivity and control function needed for air traffic control operations in ARTCCs and ACFs.

ACRONYMS/ABBREVIATIONS

ACRONYM	MEANING
ACCC	Area Control Computer Complex
ACF	Area Control Facility
ADIZ	Air Defense Identification Zone
AFSS	Automated Flight Service Station
ARSR	Air Route Surveillance Radar
ATC	Air Traffic Control
ATCRBS	Air Traffic Control Radar Beacon System
ACFT	Aircraft
AWP	Aviation Weather Processor
CHI	Computer Human Interface
DEA	Drug Enforcement Agency
DEWIZ	Distant Early Warning Identification Zone
DoD	Department of Defense
DVFR	Defense Visual Flight Rules
FAA	Federal Aviation Administration
FACSFAC	Fleet Area Control Surveillance Control Facility
FBI	Federal Bureau of Investigation
FSDPS	Flight Service Data Processing System
FSAS	Flight Service Automation System
FLT	Flight
IFR	Instrument Flight Rules
ICAO	International Civil Aviation Organization
ICSS	Integrated Communication Switching System
INS	Immigration and Naturalization Service
LEAM	Law Enforcement Message
MRU	Military Radar Unit
NAS	National Airspace System
NASSRS	National Airspace System-System Requirements Specification
NORAD	North American Aerospace Defense Command
NM	Nautical Mile
PABX	Private Automated Branch Exchange
RCF	Remote Communication Facility
SOCC	Sector Operations Control Center
TCS	Tower Communication System
UHF	Ultra High Frequency
USAF	United States Air Force
USN	United States Navy
VFR	Visual Flight Rules
VHF	Very High Frequency
VSCS	Voice Switching and Control System