

QC
959
.U6
N281
1987

U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration

OFCM



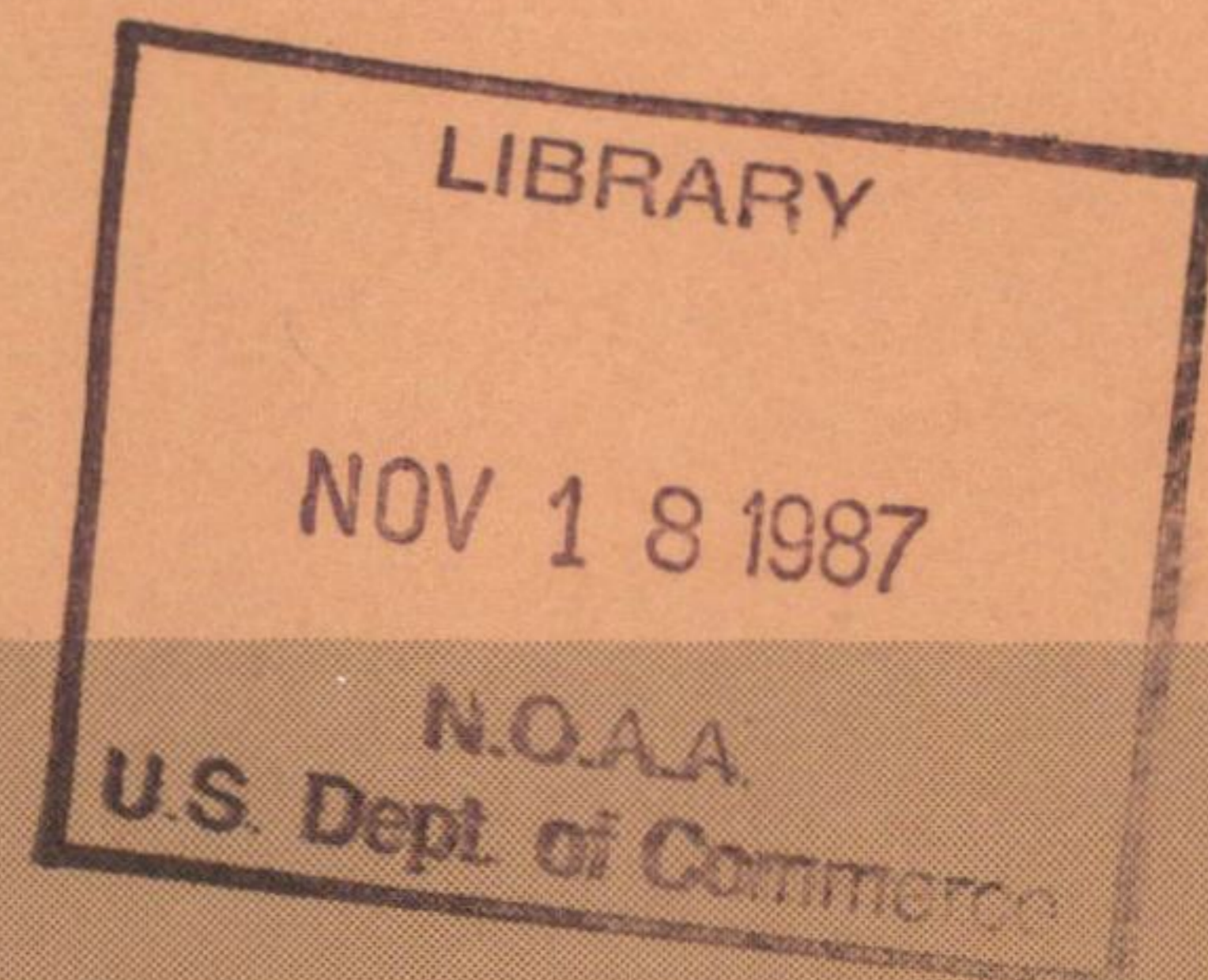
OFFICE OF THE FEDERAL COORDINATOR FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

National Winter Storms Operations Plan

FCM-P13-1987



WASHINGTON D.C.
OCTOBER 1987



THE FEDERAL COMMITTEE FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (FCMSSR)

DR. ANTHONY J. CALIO, Chairman
Department of Commerce

MR. EWEN M. WILSON
Department of Agriculture

DR. RONALD L. KERBER
Department of Defense

MR. DAVID SLADE
Department of Energy

MR. JOSEPH T. FINDARO
Department of Interior

DR. LISLE A. ROSE
Department of State

MR. NEAL A. BLAKE
Department of Transportation

DR. COURTNEY RIORDAN
Environmental Protection Agency

MR. ROBERT H. MORRIS
Federal Emergency Management Agency

DR. LENNARD A. FISK
National Aeronautics and Space
Administration

DR. ROBERT W. CORELL
National Science Foundation

MR. WILLIAM G. LAYNOR
National Transportation Safety
Board

DR. DENWOOD F. ROSS
U.S. Nuclear Regulatory Commission

MS. ADELE FASANO
Office of Management and Budget

MR. ROBERT L. CARNAHAN
Federal Coordinator for Meteorology

DR. JAMES A. ALMAZAN, Executive Secretary
Office of the Federal Coordinator for
Meteorological Services and Supporting Research

THE INTERDEPARTMENTAL COMMITTEE FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (ICMSSR)

MR. ROBERT L. CARNAHAN, Chairman
Federal Coordinator

DR. NORTON D. STROMMEN
Department of Agriculture

DR. ELBERT W. FRIDAY, JR
Department of Commerce

COL TED S. CRESS, USAF
Department of Defense

DR. HARRY MOSES
Department of Energy

MR. LEWIS T. MOORE
Department of Interior

DR. LISLE A. ROSE
Department of State

MR. JAMES C. DZUIK
Federal Aviation Administration
Department of Transportation

MR. RICHARD HAYES
U.S. Coast Guard
Department of Transportation

MR. WILLIAM H. KEITH
Environmental Protection Agency

MR. ROBERT T. JASKE
Federal Emergency Management Agency

DR. SHELBY TILFORD
National Aeronautics and Space
Administration

DR. RICHARD S. GREENFIELD
National Science Foundation

MR. JAMES C. McLEAN, JR
National Transportation Safety Board

MR. ROBERT A. KORNASIEWICZ
U.S. Nuclear Regulatory Commission

MS. ADELE FASANO
Office of Management and Budget

DR. JAMES A. ALMAZAN, Executive Secretary
Office of the Federal Coordinator for
Meteorological Services and Supporting Research

H
QC
85959
WUG
N381
1987

FEDERAL COORDINATOR
FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH
11426 Rockville Pike, Suite 300
Rockville, Maryland 20852

NATIONAL WINTER STORMS
OPERATIONS PLAN

FCM-P13-1987

F/13257

Washington, D.C.
October 1987

LIBRARY
MAR 27 1989
NOAA
U.S. Dept. of Commerce

CHANGE AND REVIEW LOG

Use this page to record changes and notices of reviews.

Change Number	Page Numbers	Date Posted	Initial
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Changes are indicated by a vertical line in the margin next to the change.

=====

Review Date	Comments	Initial

FOREWORD

The Working Group for Hurricanes and Winter Storms Operations, under the Committee for Basic Services, is responsible for maintaining the National Winter Storms Operations Plan. This plan was developed to coordinate the Nation's weather services' efforts to furnish weather observations used in predicting and providing adequate and timely warnings of severe and crippling winter storms along the east and gulf coasts of the United States.

The Plan covers the period from November 1 to April 15--that time of year having a relatively high incidence of winter storms. This version is the sixteenth edition of the Plan and represents a general update of information published in previous editions. Reconnaissance tracks have been updated to better align them with Federal Aviation Administration air traffic control points. Sections on satellites and data buoys have been updated, also. This edition of the Plan is in a new format, designed for easier reading and reference.

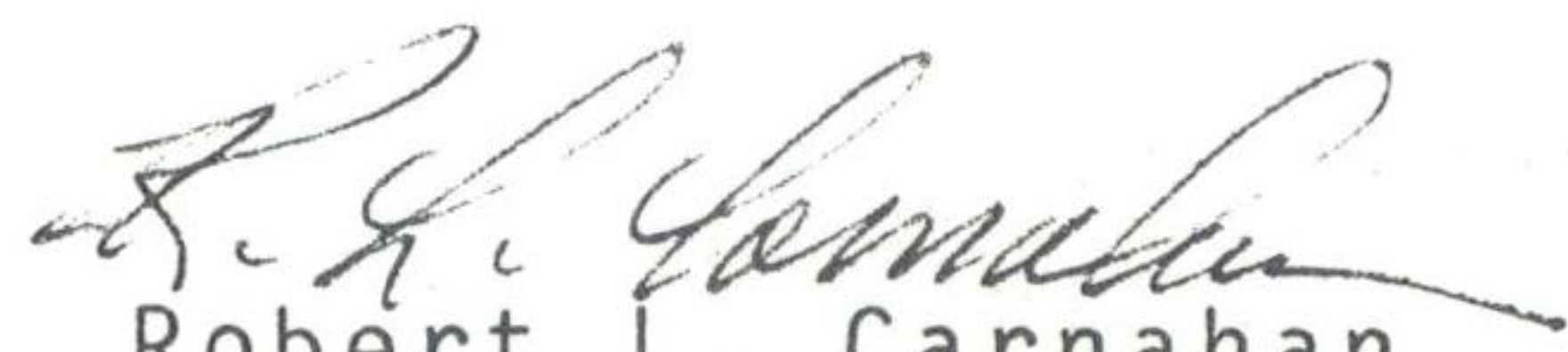

Robert L. Carnahan
Federal Coordinator for
Meteorological Services
and Supporting Research

TABLE OF CONTENTS

	Page
CHANGE AND REVIEW LOG	ii
FOREWORD	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES AND TABLES	v
CHAPTER 1. RESPONSIBILITIES OF COOPERATING AGENCIES	
1.1. General	1-1
1.2. Responsibilities	1-1
CHAPTER 2. AIRCRAFT RECONNAISSANCE	
2.1. General	2-1
2.2. Responsibilities	2-1
2.3. Operational Control of Aircraft	2-1
2.4. Reconnaissance Planning and Flight Notification	2-1
2.5. Reconnaissance Flights	2-4
CHAPTER 3. OTHER OBSERVATIONS	
3.1. General	3-1
3.2. Satellite Observations	3-2
3.3. Automated Environmental Observations	3-4
CHAPTER 4. COMMUNICATIONS	
4.1. Department of Commerce	4-1
4.2. Department of Defense (DOD)	4-1
4.3. U.S. Coast Guard	4-2
CHAPTER 5. PUBLICITY	
5.1. General	5-1
5.2. Distribution	5-1
APPENDIX A. ABBREVIATIONS	A-1
APPENDIX B. DISTRIBUTION	B-1
APPENDIX C. DEFINITIONS	C-1
APPENDIX D. FORM 6--RECCO RECORDING FORM	D-1
APPENDIX E. DROPWINDSONDE/DROPSONDE CODE BREAKDOWN	E-1

LIST OF FIGURES AND TABLES

Number		Page
	Figures	
1-1.	U.S. Air Force WC-130 weather reconnaissance aircraft .	1-4
2-1.	Winter Storm Plan of the Day format	2-4
2-2.	Sample mission evaluation form	2-5
2-3.	National Winter Storms Operations Plan coordination request	2-7
2-4-1.	Air Force track 01	2-11
2-4-2.	Air Force track 02	2-12
2-4-3.	Air Force track 03	2-13
2-4-4.	Air Force track 04	2-14
2-4-5.	Air Force track 05	2-15
2-4-6.	Air Force track 06	2-16
2-4-7.	Air Force track 07	2-17
2-4-8.	Air Force track 08	2-18
2-4-9.	Air Force track 09	2-19
2-4-10.	Air Force track 10	2-20
2-4-11.	Air Force track 11	2-21
2-4-12.	Air Force track 12	2-22
2-4-13.	Air Force track 13	2-23
2-4-14.	Air Force track 14	2-24
2-4-15.	Air Force track 15	2-25

2-4-16.	Air Force track 16	2-26
2-4-17.	Air Force track 17	2-27
2-4-18.	Air Force track 18	2-28
2-4-19.	Air Force track 19	2-29
2-4-20.	Air Force track 20	2-30
3-1.	NDBC buoy locations	3-6
3-2.	C-MAN sites	3-7
4-1.	Search and rescue circuit (SARLANT) GT 7990	4-3
5-1.	Results of a strong winter storm--Albany, New York	5-2

Tables

2-1.	Requirement for aircraft reconnaissance data	2-9
3-1.	Satellites and satellite data availability for the National Winter Storms Operations Plan	3-3
3-2.	Typical moored buoy payload data	3-8
4-1.	Reconnaissance organization communications capabilities	4-4

CHAPTER 1

RESPONSIBILITIES OF COOPERATING AGENCIES

1.1. General.

1.1.1. National Weather Service (NWS). The National Weather Service is responsible for issuing winter weather forecasts, watches, and warnings to the public and various special user groups. Its responsibilities are documented in National Weather Service Operations Manual, Chapter A-02, "Weather Service Mission," and in Chapter C-42, "Winter Weather Warnings."

1.1.2. U.S. Navy. The U.S. Navy, through the Naval Oceanography Command (NAVOCEANCOM) is responsible for issuing gale, storm, and high seas warnings for fleet operations and Navy shore installations, as elaborated in the NAVOCEANCOM Instruction 3140.1 series.

1.1.3. U.S. Air Force (USAF). The U.S. Air Force, through the Air Weather Service (AWS), is responsible for issuing military weather warning advisories and point warnings to all Air Force and Army (including Reserve and National Guard) installations, facilities, and operations related to winter storms for those hazardous phenomena specified in Air Weather Service Regulation 105-8, "Meteorological Watch Program."

1.2. Responsibilities.

1.2.1. The Department of Commerce (DOC). The DOC will

1.2.1.1. Provide basic surface, upper air, and radar observations from its network of stations making such observations.

1.2.1.2. Provide additional observations, when required, making available all reports to any requesting agency.

1.2.1.3. Provide basic analyses and forecasts through the National Meteorological Center (NMC), Camp Springs, Maryland.

1.2.1.4. Provide statements and warnings through Weather Service Forecast Offices (WSFO) and local Weather Service Offices (WSO) along the eastern seaboard and the Gulf of Mexico coast.

1.2.1.5. Provide advice on aircraft reconnaissance requirements forwarded through the National Hurricane Center (NHC) to the Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH), from NMC. The NMC is the central coordinating office for this program for all reconnaissance requirements.

1.2.1.6. Operate satellite systems capable of providing coverage of the east coast of the United States and the Gulf of Mexico during the winter storms season.

1.2.1.7. Coordinate with the National Aeronautics and Space Administration (NASA) to obtain pertinent meteorological data from NASA research and development experimental satellites.

1.2.1.8. Coordinate with the Department of Defense (DOD) to obtain pertinent meteorological data from the Defense Meteorological Satellite Program.

1.2.1.9. Provide data in the form of satellite pictures for selected situations to authorized research facilities.

1.2.1.10. Furnish aircraft from the Office of Aircraft Operations to support the operational reconnaissance objectives of the National Winter Storms Program.

1.2.1.10.1. The primary objective is to participate and provide additional real-time meteorological data to operational forecasters in an attempt to improve the quality of forecasts associated with winter coastal storms.

1.2.1.10.2. The secondary objective is to provide data that will permit analyses and a better understanding of the structure and dynamics of these winter storm systems.

1.2.1.11. Provide oceanographic and meteorological surface data obtained from offshore buoy deployment, if possible, within existing facilities.

1.2.1.12. Provide dissemination of weather observation data to appropriate agencies.

1.2.2. The Department of Defense will

1.2.2.1. Make available to the National Oceanic and Atmospheric Administration (NOAA) agencies, through the Automated Digital Weather System (ADWS), basic surface, upper air, and radar observations from those DOD stations making such observations and pilot reports (PIREP) that become available.

1.2.2.2. Furnish to the NWS aircraft reconnaissance observations that are within its capabilities and in accordance with established reconnaissance priorities established in 23d Air Force Regulation 55-8, "Special Operations, Rescue, and Weather Reconnaissance Support Planning" and special observations detailed in Chapter 3 of this plan.

1.2.2.3. Designate CARCAH as the point of contact for coordination with NMC and the Miami WFSO for aircraft reconnaissance required in support of this plan.

1.2.2.4. Provide weather reconnaissance data monitor services to evaluate and disseminate reconnaissance reports.

1.2.2.5. Provide USAF aeronautical station communications to relay reconnaissance reports from the aircraft to the weather reconnaissance data monitors.

1.2.2.6. Provide warnings to all DOD facilities and military units of weather that threatens to inhibit their operations or to damage their installations.

1.2.3. Department of Transportation (DOT).

1.2.3.1. The Federal Aviation Administration (FAA) will provide for

- Air traffic control (ATC) services as appropriate to support this plan.
- Dissemination of PIREPs.
- Hourly and special weather observations at selected terminal and flight service station locations.

1.2.3.2. The U.S. Coast Guard will

- Provide surface observations to NWS from its coastal facilities and vessels.
- Interrogate surface ships of opportunity for special weather observations through the Automated Mutual Assistance Vessel Rescue (AMVER) system.
- Provide personnel, vessel, and communication support to the NOAA Data Buoy Office for development, deployment, and operation of environmental data buoy systems.

- Provide communication circuits for relay of weather observations to NWS.

- Provide coastal broadcast facilities at selected locations for dissemination of forecasts and warnings.



Figure 1-1. U.S. Air Force WC-130 weather reconnaissance aircraft.

CHAPTER 2

AIRCRAFT RECONNAISSANCE

2.1. General. All Department of Commerce (DOC) winter storm reconnaissance needs will be requested and provided in accordance with the procedures of this chapter. As outlined in the U.S. Air Force (USAF)/National Oceanic and Atmospheric Administration (NOAA) Memorandum of Understanding dated March 16, 1976, DOC has identified and the Department of Defense (DOD) maintains aircraft to support up to one reconnaissance sortie per day. In times of National emergency, war, or higher priority tasking, some or all DOD reconnaissance resources may not be available to fulfill DOC needs.

2.2. Responsibilities.

2.2.1. DOD. The DOD is responsible for providing operational aircraft for winter storm synoptic tracks in response to DOC needs.

2.2.2. DOC. The DOC is responsible for aircraft operation that will be used when available on request for a storm or storm threat and will be used when available as backup for USAF aircraft reconnaissance. Additionally, they may be flown on storms of research interest as desired by the Environmental Research Laboratories. All such flights will be assigned by the Chief, Aerial Reconnaissance Coordinator, All Hurricanes (CARCAH) in the Winter Storm Plan of the Day (WSPOD).

2.3. Operational Control of Aircraft. Operational control of aircraft flying winter storm reconnaissance missions will remain with the operating agencies of DOC or DOD, as appropriate.

2.4. Reconnaissance Planning and Flight Notification.

2.4.1. Requirements. The National Meteorological Center (NMC) will forward sortie and alert needs to CARCAH through the Weather Service Forecast Office (WSFO), Miami for tasking in the WSPOD within the responsibilities stated above. The CARCAH will advise NMC of mission availability or nonavailability and expected responsiveness of DOD and DOC assets. The NMC will be responsible for requesting all reconnaissance flights and will provide information as specified in paragraph 2.4.5. The NMC will forward

NWS mission requirements for the next 24-hr period (0500 UTC to 0500 UTC) and an outlook for the succeeding 24 hr to CARCAH not later than 1430Z each day. Vertical observation positions will be identified by NMC through CARCAH and the WSPOD.

2.4.2. Change to Requirements. Changes to mission requirements will be accepted by CARCAH based on the following guidelines:

2.4.2.1. Early departures will not be requested.

2.4.2.2. When notification is received more than 2.5 hr prior to scheduled aircraft departure:

- Changes to tracks normally will be limited to substitution of one track for another.

- Departure delays will be accepted provided the delay plus the flight plan time does not exceed 13.5 hr. Delays exceeding 13.5 hr may be accepted in extraordinary circumstances.

2.4.2.3. When notification is received more than 4 hr prior to scheduled aircraft departure time, departure delay requests will be evaluated in accordance with appropriate flight management directives.

2.4.2.4. Coordination of meteorological data requirements will be accomplished prior to each flight over the Gulf of Mexico. The flight meteorologist responsible for the mission will contact the lead forecaster at the WFSO, New Orleans (telephone 504-525-0823) approximately 2.5 hr prior to the scheduled aircraft departure time. Any changes to the WSPOD must be made through CARCAH.

2.4.3. Cancellation of Requirements. Missions should be cancelled prior to aircraft departure and as much in advance as possible to allow maximum resource conservation. Cancellation after departure may result in degradation of follow-on mission capability.

2.4.4. Satisfaction of Requirements.

2.4.4.1. Requirements are considered satisfied when an observation is or could have been taken (as in the case where aircraft are diverted from original track) at the specified location (control point) within the interval from 30 min prior to 30 min after scheduled time.

2.4.4.2. Requirements will be considered as satisfied "late" when an observation is or could have been taken at the specified location (control point) more than 30 min after the scheduled time but prior to the requirement expiration time.

2.4.4.3. Normally, no credit will be given for early missions.

2.4.4.4. The requesting agency, NMC and/or a WFSO, will provide CARCAH a written assessment (Figure 2-1) of the weather reconnaissance mission any time its timeliness and quality are outstanding or substandard. Requirements levied as "resources permitting" will not be assessed for timeliness. These assessments should be mailed to CARACH at

OL-G, Hq AWS
National Hurricane Center
Gables One Tower, Room 631
Coral Gables, FL 33146

2.4.4.5. The CARCAH will maintain monthly and seasonal reconnaissance summaries detailing missions actually flown to satisfy levied requirements.

2.4.5. Reconnaissance Winter Storm Plan of the Day.

2.4.5.1. Coordination. The NMC will coordinate with the appropriate National Weather Service (NWS) field offices as needed and provide WSPOD information (Figure 2-2) to CARCAH through the WFSO, Miami by 1430 UTC. Direct discussion in weather situations is also encouraged between the Navy and NMC with respect to storms or storm threats. The Navy point of contact is the Naval Eastern Oceanography Center (NAVEASTOCEANCEN) through the Norfolk Command Duty Officer. The optimum time of contact is 1:30 p.m. local time. The following data will be provided to CARCAH when applicable.

- Track and flight level desired. Specify an alternate altitude to be flown in case the level desired is not feasible due to probable icing or other operational constraints.

- Selected trackpoint (control point) and time the aircraft is required at the point.

- Special observations or dropsonde release points.

- Expiration time of requirement (time the mission is regarded as dropped).

DATE:

TO: OL-G HQ AWS/CARCAH

FROM:

SUBJECT: MISSION _____ EVALUATION
(MISSION IDENTIFIER)

I. PUBLISHED REQUIREMENTS

1. CONTROL POINT AND TIME _____
2. FLIGHT TRACK _____
3. EXPIRATION TIME OF REQUIREMENT _____
4. MISCELLANEOUS (DROP PSNS, ALTITUDES, ETC.) _____

II. RECONNAISSANCE MISSION PERFORMANCE

1. CONTROL PT TIME: _____ ON TIME _____ LATE _____ EARLY _____ MISSED
2. FLIGHT TRACK FLOWN: _____ COMPLETELY _____ PARTIALLY _____ OTHER
3. HORIZONTAL DATE COVERAGE: COMPLETE _____ TIMELY _____ ACCURATE _____
INCOMPLETE _____ UNTIMELY _____ INACCURATE _____
4. VERTICAL DATA COVERAGE: COMPLETE _____ TIMELY _____ ACCURATE _____
INCOMPLETE _____ UNTIMELY _____ INACCURATE _____

III. OVERALL MISSION EVALUATION

OUTSTANDING _____

UNSATISFACTORY _____ FOR: COMPLETENESS _____ ACCURACY _____ TIMELINESS _____
EQUIPMENT _____ PROCEDURES _____ OTHER _____

IV. REMARKS (BRIEF BUT SPECIFIC) _____

V. REPLY BY INDORSEMENT _____ YES _____ NO

(Forecaster's Signature)

Figure 2-1. Sample mission evaluation form.

I. NMC REQUEST (ACCOMPLISH ITEMS 1 AND 3 OR 2 AND 3 AND FILL IN APPROPRIATE SPACES)

 1. FLIGHT IS DESIRED

A. CONTROL POINT AND CONTROL POINT TIME

B. TRACK NUMBER AND ALTITUDE

C. EXPIRATION TIME OF FLIGHT REQUEST

D. SPECIAL INSTRUCTIONS (SUCH AS DROPSONDE POSITIONS)

 2. NO FLIGHT IS DESIRED OR PREVIOUSLY REQUESTED FLIGHT IS CANCELLED

 3. SUCCEEDING DAY OUTLOOK

A. ANTICIPATED TRACK NUMBER _____

B. CONTROL POINT AND CONTROL POINT TIME _____

II. SCC MIAMI/CARCAH COORDINATION

1. SCC MIAMI FORECASTER INITIALS _____

2. NMC FORECASTER INITIALS _____

3. CARCAH DUTY OFFICER INITIALS _____

4. DATE AND TIME _____

III. SCC MIAMI DISTRIBUTION: PASS ALL AIRCRAFT RECON REQUESTS, CHANGES OR CANCELLATIONS TO CARCAH IMMEDIATELY.

Figure 2-2. National Winter Storms Operations Plan coordination request.

● Succeeding day outlook (anticipated track, control point, control point time--not earlier than).

2.4.5.2. Preparation. Using requirements stated by NMC, CARCAH will prepare the WSPOD as required throughout the season in coordination with the DOD and DOC to effect maximum useful data from available resources. Format for the WSPOD is shown in Figure 2-3.

2.4.5.3. Dissemination. The WSPOD will be made available in message form to all appropriate agencies that provide support or control reconnaissance aircraft. The CARCAH will be responsible for disseminating the WSPOD as soon as possible after the DOC requirements, including changes, are received. Negative WSPODs will not be disseminated except to cancel a previously published requirement or outlook.

2.4.5.4. Responsiveness.

2.4.5.4.1. Notification of reconnaissance requirements should be made early enough to allow 16 hr plus enroute flying time to the control point.

2.4.5.4.2. The succeeding day outlook portion of the WSPOD is designed to allow advance notification.

2.4.5.4.3. When circumstances do not allow the appropriate notification lead time, the mission will be levied as "resource permitting."

2.5. Reconnaissance Flights.

2.5.1. General Storm Tracks.

2.5.1.1. Air Force tracks 01 through 20 (Figures 2-4-1 through 2-4-20) normally will be flown during a storm or storm threat. NOTE: Due to current equipment limitations, it may not be possible to complete all dropsonde requirements.

2.5.1.2. Within operational limitations and with prior Air Route Traffic Control Center (ARTCC) approval, airborne diversions deemed advisable by the airborne meteorologist may be made from these tracks.

2.5.1.3. Permanent changes to winter storm reconnaissance tracks must be coordinated with DOD and DOC and approved by the appropriate Federal Aviation Administration (FAA) ARTCCs at least 30 days in advance of the implementation date.

O/R _____ (DTG)

FM OLG HQ AWS CORAL GABLES FL/CARCAH

TO (MAC/NOAA APPROVED ADDRESSEES)

BT

UNCLAS

SUBJECT RECONNAISSANCE WSPOD FM (DTG) _____ TO (DTG) _____
FOLLOWS:

1. FLIGHT NR ONE

- A. _____ (CONTROL POINT/TIME)
- B. _____ (MISSION IDENTIFIER)
- C. _____ (ETD)
- D. _____ (DEPARTURE POINT)
- E. _____ (ENROUTE ALTITUDE)
- F. _____ (TRACK)
- G. _____ (EXPIRATION TIME OF REQUIREMENT)
- H. _____ (DROPSONDE POSITIONS)
- I. _____ (REMARKS)

2. OUTLOOK FOR SUCCEEDING DAY

- A. _____ (ANTICIPATED TRACK)
- B. _____ (CONTROL POINT)
- C. _____ (CONTROL POINT TIME)

BT

NNNN

Figure 2-3. Winter Storm Plan of the Day format.

2.5.2. Flight Plans. Flight plans for reconnaissance flights will be filed with the FAA as soon as practicable before departure time.

2.5.3. Flight Levels. Reconnaissance aircraft will fly only at ARTCC assigned altitudes and will accept flight level changes when requested by FAA.

2.5.4. Dropsonde Releases. Dropsonde instrument releases will be coordinated with the appropriate ARTCC at least 10 min before drop time except for those outside of controlled airspace that do not require coordination.

2.5.5. Air Traffic Control.

2.5.5.1. Air traffic control (ATC) will provide air traffic control separation between all aircraft operating on storm missions and between storm mission aircraft and nonparticipating aircraft operating on Instrument Flight Rules (IFR) within controlled airspace. Mission commanders should be aware that nonparticipating aircraft may be operating near storm areas; thus adherence to an ATC clearance is mandatory for safety purposes.

2.5.5.2. When storm aircraft cannot maintain assigned altitudes due to turbulence, ATC should be advised. Normal vertical separation of 1000 ft at flight level (FL) 290 and below and 2000 ft above FL 290 will be provided by ATC to aircraft operating in the storm area. Unless otherwise coordinated with ATC, the altitudes between storm-mission aircraft may be used by ATC for nonparticipating aircraft.

2.5.5.3. The U.S. Navy through Commander in Chief, Atlantic Fleet Oceanic Aircraft Coordinator (CINCLANTFLT OAC) will review the WSPOD for each proposed flight to determine if clearance into a particular area will be required. The reconnaissance unit flying the mission will contact the appropriate clearance agencies prior to entry into any restricted airspace.

2.5.5.4. Any procedure desired by storm-mission commanders that is outside the above parameters must be coordinated with the appropriate ATC center.

2.5.6. Data Requirements. Data requirements are defined in Table 2-1. Data will be coded and transmitted in standard reconnaissance code (RECCO) for flight level observations (Appendix D) or World Meteorological Organization temporary dropsonde (WMO TEMP DROP) format for dropsonde soundings (Appendix E).

Table 2-1. Requirement for aircraft reconnaissance data.

Data required	Altitudes at which data are required	Areal portion of cyclone or environment in which data are needed	Time and frequency of observations	Accuracy required
Synoptic data --pressure (heights), temperature, moisture, and winds--for national weather prediction and medium-range forecasting.	At altitudes indicated in the WSPOD.	Throughout the marine portion of area as defined in Chapter 1.	**Dropsondes as specified in Plan of the Day (drop interval approximately 200 nmi (370 km)). Horizontal observations are specified on the tracks. Intermediate observations will be appended to each horizontal observation. (No intermediate observations required on tracks 01-08.)	+ 5 kt (2.5 m/s) (wind speed) + 10° (wind direction) + 1°C + 20 m + 2 mb (200 Pa) Position within 20 nmi
Location and strength of radar echoes.	Any level.	All sectors	When available.	Position within 20 nmi (37 km)
*Ocean wave heights and wave lengths, sea surface wind estimates	Sea surface.	All quadrants.	Every horizontal observation at or below 700 mb (70 kPa).	+ 10% (Wave height) + 10 ft (3 m) (wave length) 5 kt (2.5 m/s) (wind speed) 10° (wind direction)

* Ocean wave heights and wave lengths will not be reported by USAF aircraft.

**Includes dropwindsondes. If a sonde fails or vertical data are otherwise unobtainable at a specified position, make another release as soon as possible.

2.5.6.1. A plain language remark stating the departure station (International Civil Aviation Organization (ICAO) four letter identifier), time of departure, and estimated time of arrival (ETA) at the control point will be appended to the first observation.

EXAMPLE: AF987 TRACK 01 OB01
97779 ... 93/// DPTD KBIX 10/0845Z ETA 37.3N 72.3W
10/1210Z

2.5.6.2. A plain language remark stating ETA and intended arrival station (ICAO four letter identifier), number of observations, and monitor that copied observations will be appended to the last observation.

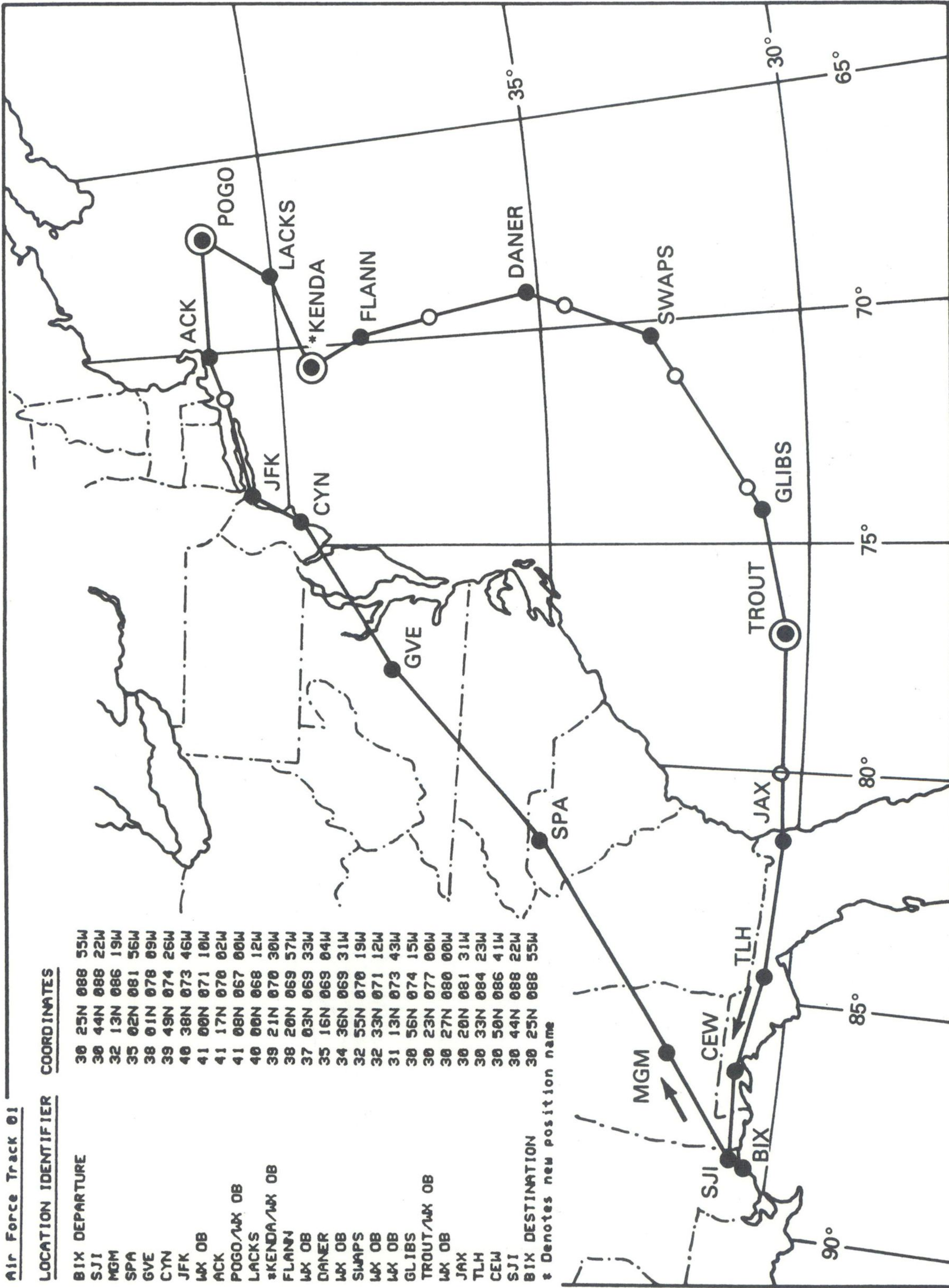
EXAMPLE: NOAA2 TRACK 05 OB06
97779 ... 91///
95559 ... ETA KMIA 17/2300Z OBS 01 THRU 06 TO KMIA

Air Force Track 01

LOCATION IDENTIFIER COORDINATES

LOCATION IDENTIFIER	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SJI	30 44N 088 22W
MGM	32 13N 086 19W
SPA	35 02N 081 56W
GVE	38 01N 078 09W
CYN	39 49N 074 26W
JFK	40 38N 073 46W
LAX OB	41 00N 071 10W
ACK	41 17N 070 02W
POGO/LAX OB	41 08N 067 00W
LACKS	40 00N 068 12W
*KENDA/LAX OB	39 21N 070 30W
FLANN	38 20N 069 57W
LAX OB	37 03N 069 33W
DANER	35 16N 069 04W
LAX OB	34 36N 069 31W
SWAPS	32 55N 070 19W
LAX OB	32 33N 071 12W
LAX OB	31 13N 073 43W
GLIBS	30 56N 074 15W
TROUT/LAX OB	30 23N 077 00W
LAX OB	30 27N 080 00W
JAX	30 20N 081 31W
TLH	30 33N 084 23W
CEW	30 50N 086 41W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

* Denotes new position name



LEGEND

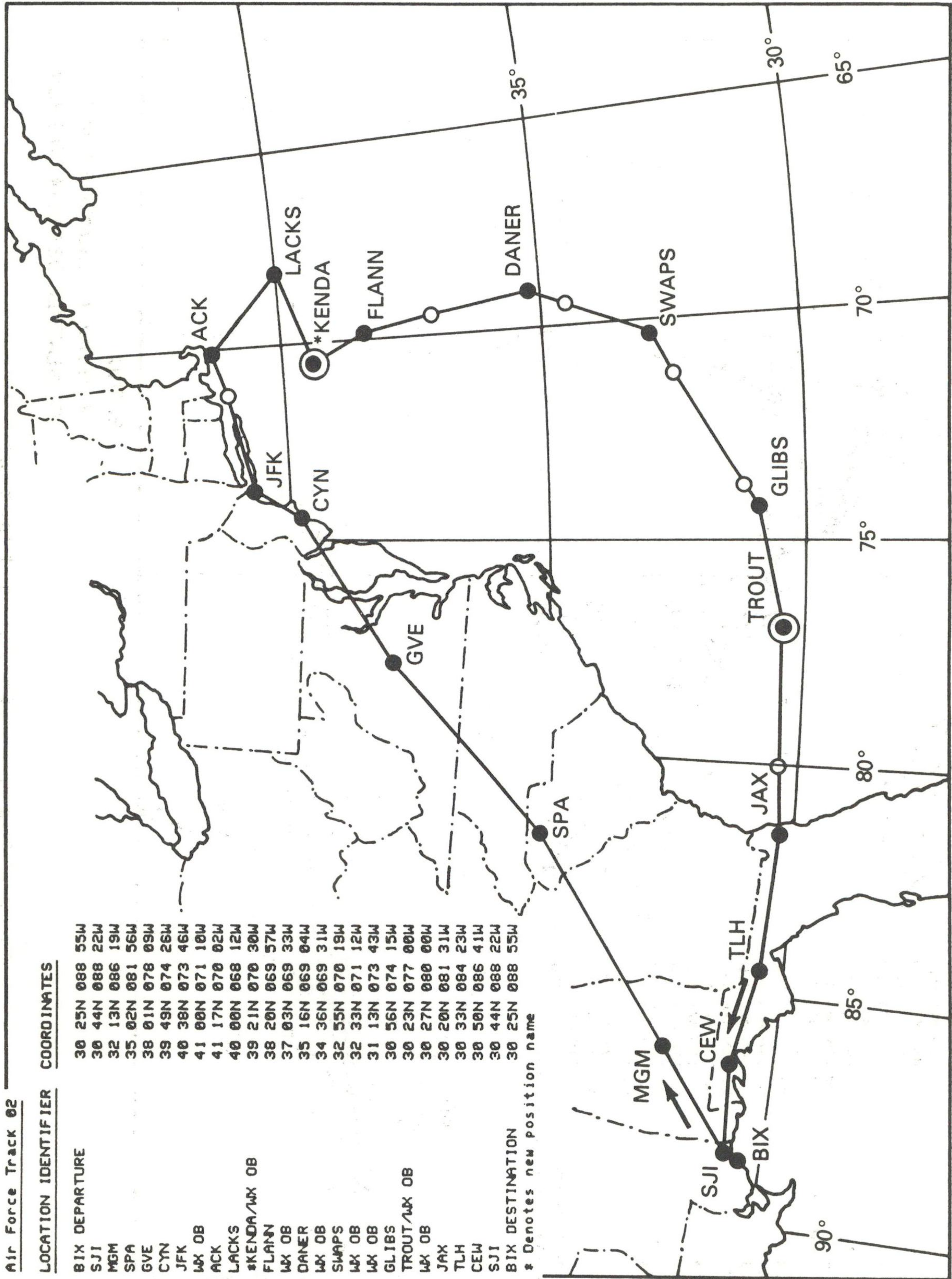
- TRACK COORDINATE POINT
- WEATHER OBSERVATION POINT

Figure 2-4-1. Air Force track 01.

Air Force Track 02

LOCATION IDENTIFIER	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SJI	30 44N 088 22W
MGM	32 13N 086 19W
SPA	35 02N 081 56W
GVE	38 01N 078 09W
CYN	39 49N 074 26W
JFK	40 38N 073 46W
WAX OB	41 00N 071 10W
ACK	41 17N 070 02W
LACKS	40 00N 068 12W
*KENDA/WAX OB	39 21N 070 30W
FLANN	38 20N 069 57W
WAX OB	37 03N 069 33W
DANER	35 16N 069 04W
WAX OB	34 36N 069 31W
SWAPS	32 55N 070 19W
WAX OB	32 33N 071 12W
WAX OB	31 13N 073 43W
GLIBS	30 56N 074 15W
TROUT/WAX OB	30 23N 077 00W
WAX OB	30 27N 080 00W
JAX	30 20N 081 31W
TLH	30 33N 084 23W
CEW	30 50N 086 41W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

* Denotes new position name



LEGEND
 ● TRACK COORDINATE POINT
 ○ WEATHER OBSERVATION POINT

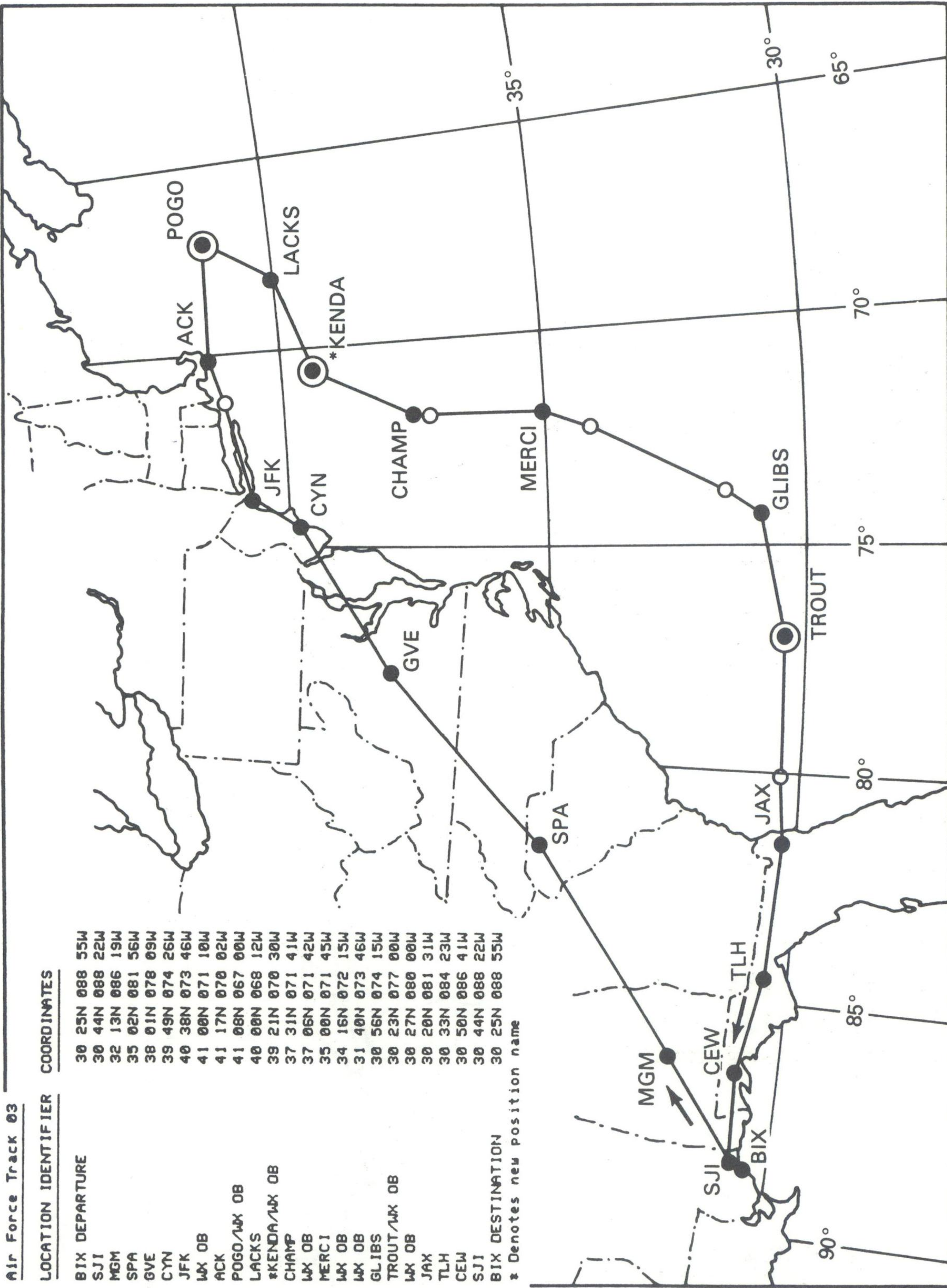
Figure 2-4-2. Air Force track 02.

Air Force Track 03

LOCATION IDENTIFIER COORDINATES

BIX DEPARTURE	30 25N 088 55W
SJI	30 44N 088 22W
MGM	32 13N 086 19W
SPA	35 02N 081 56W
GVE	38 01N 078 09W
CYN	39 49N 074 26W
JFK	40 38N 073 46W
WAX OB	41 00N 071 10W
ACK	41 17N 070 02W
POGO/WAX OB	41 08N 067 00W
LACKS	40 00N 068 12W
*KENDA/WAX OB	39 21N 070 30W
CHAMP	37 31N 071 41W
WAX OB	37 06N 071 42W
MERCI	35 00N 071 45W
WAX OB	34 16N 072 15W
WAX OB	31 40N 073 46W
GLIBS	30 56N 074 15W
TROUT/WAX OB	30 23N 077 00W
WAX OB	30 27N 080 00W
JAX	30 20N 081 31W
TLH	30 33N 084 23W
CEW	30 50N 086 41W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

* Denotes new position name



LEGEND

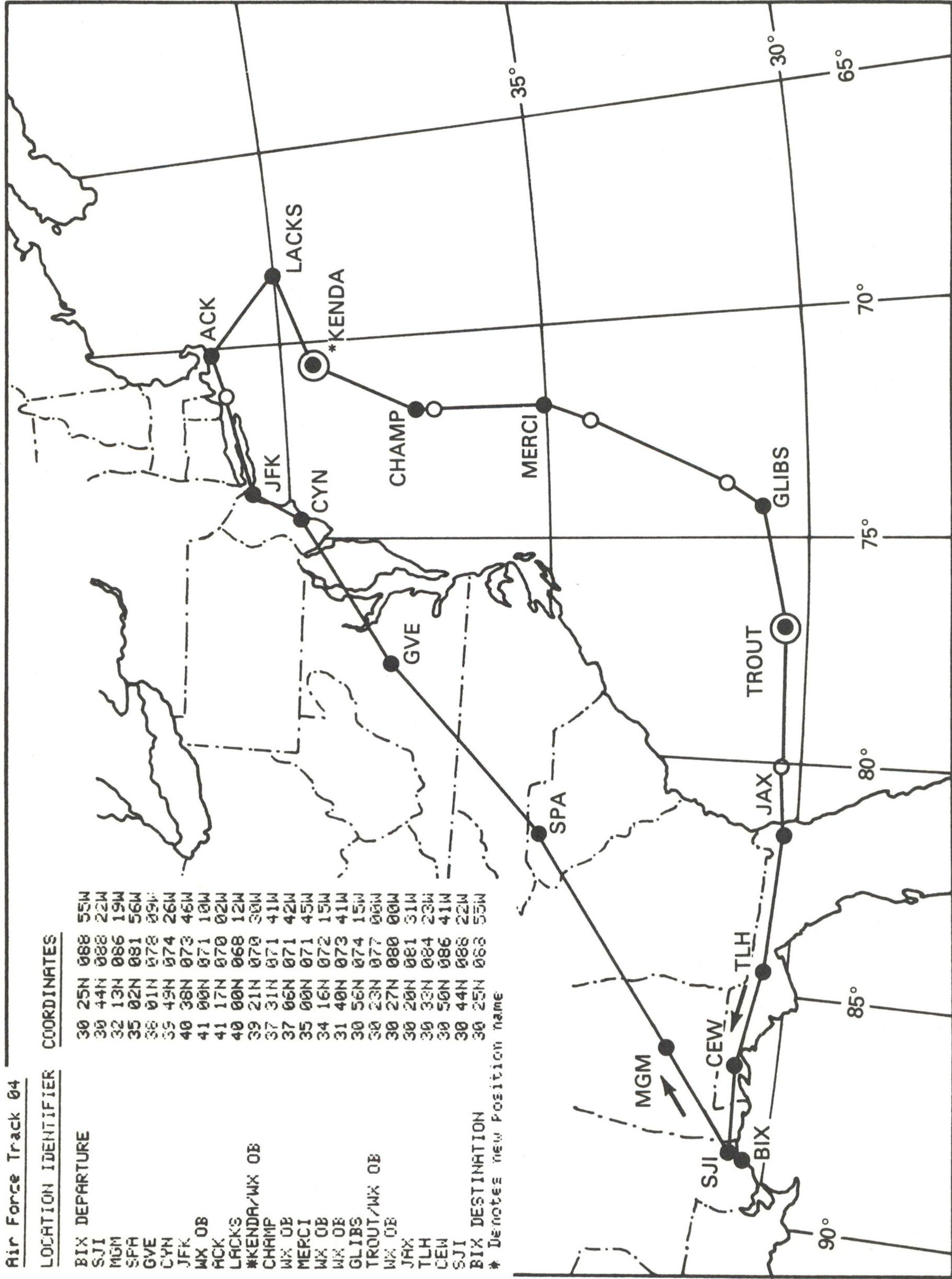
- TRACK COORDINATE POINT
- WEATHER OBSERVATION POINT

Figure 2-4-3. Air Force track 03.

Air Force Track 04

LOCATION IDENTIFIER	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SJI	30 44N 088 22W
MGM	32 13N 086 19W
SFA	35 02N 081 56W
GVE	38 01N 078 09W
CYN	35 49N 074 26W
JFK	40 38N 073 46W
WX OB	41 00N 071 10W
ACK	41 17N 070 02W
LACKS	40 00N 068 12W
*KENDA/WX OB	39 21N 070 30W
CHAMP	37 31N 071 41W
WX OB	37 06N 071 42W
MERCI	35 00N 071 45W
WX OB	34 16N 072 15W
GLIBS	31 40N 073 41W
TROUT/WX OB	30 56N 074 15W
WX OB	30 23N 077 00W
JAX	30 27N 080 00W
TLH	30 20N 081 31W
CEW	30 33N 084 23W
SJI	30 50N 086 41W
BIX DESTINATION	30 44N 088 22W
	30 25N 088 55W

* Denotes new position name



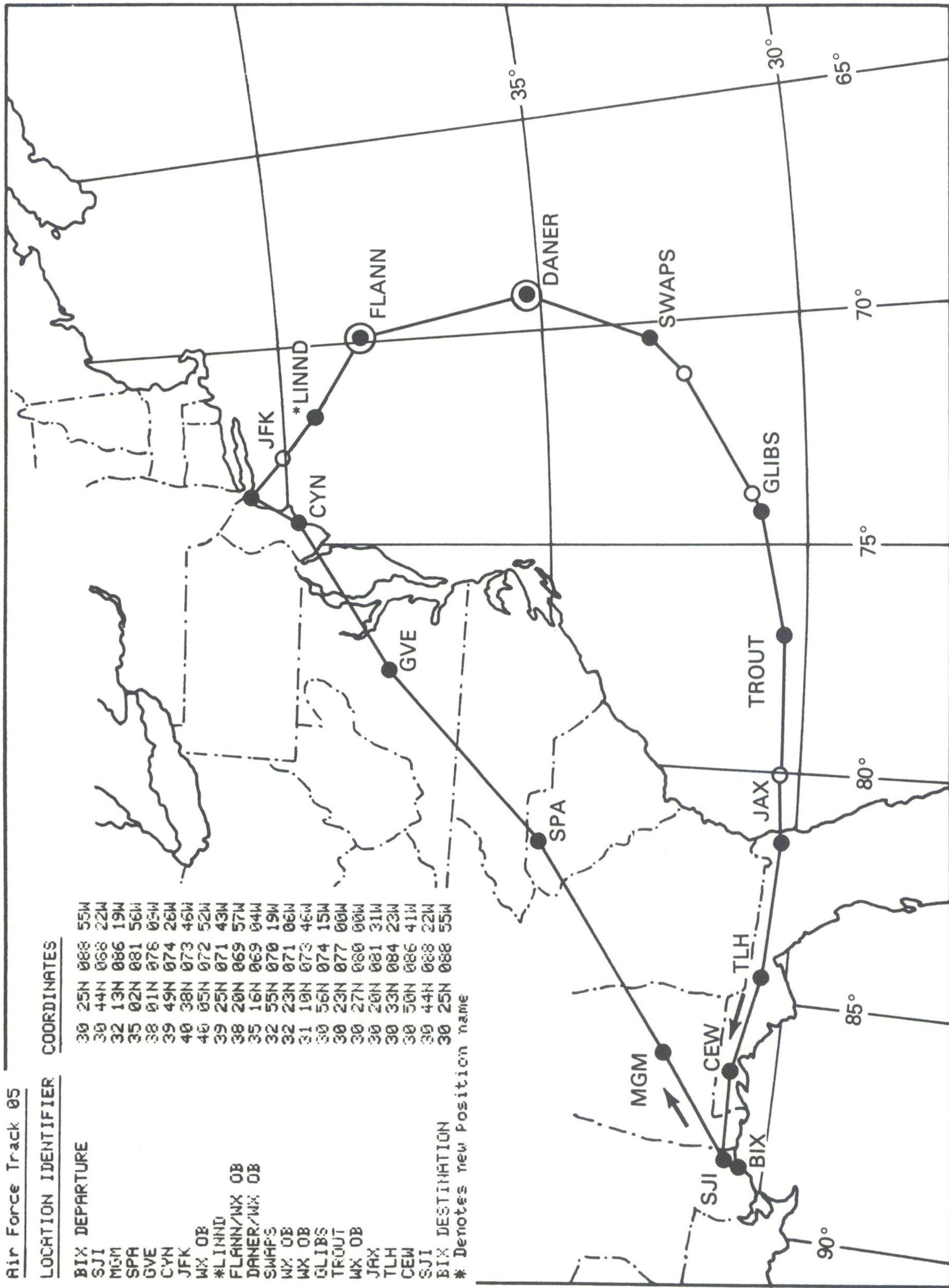
LEGEND
 ● TRACK COORDINATE POINT
 ○ WEATHER OBSERVATION POINT

Figure 2-4-4. Air Force track 04.

Air Force Track 05

LOCATION IDENTIFIER	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SJI	30 44N 088 22W
MGM	32 13N 086 19W
SPA	35 02N 081 56W
GVE	38 01N 076 05W
CYN	39 49N 074 26W
JFK	40 38N 073 46W
WX OB	40 05N 072 52W
*LINND	39 25N 071 43W
FLANN/WX OB	38 20N 069 57W
DANER/WX OB	35 16N 069 04W
SWAPS	32 55N 070 19W
WX OB	32 23N 071 06W
WX OB	31 19N 073 46W
GLIBS	30 56N 074 15W
TROUT	30 23N 077 00W
WX OB	30 27N 080 00W
JAX	30 20N 081 31W
TLH	30 33N 084 23W
CEW	30 50N 086 41W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

* Denotes new position name



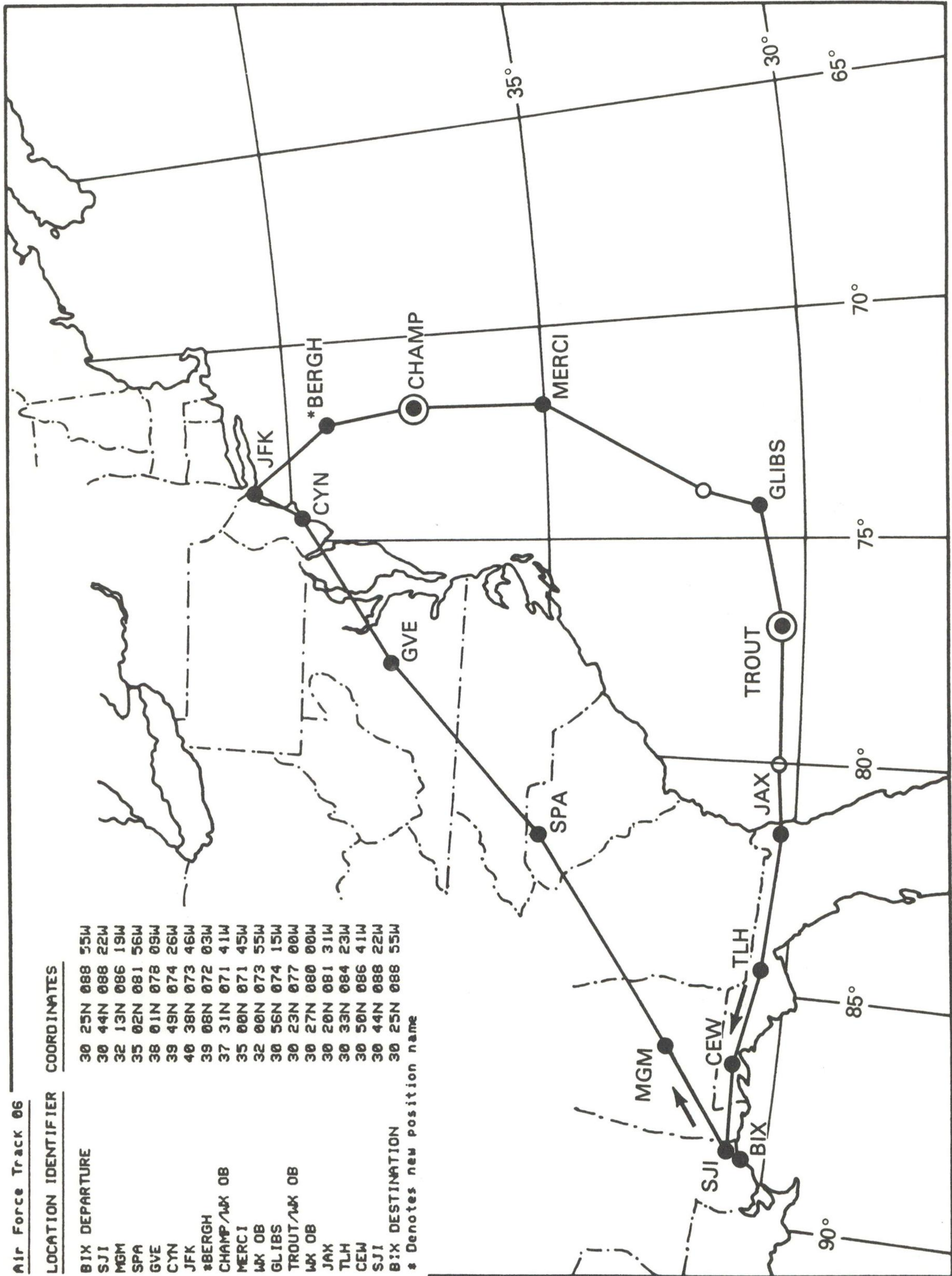
LEGEND
 ● TRACK COORDINATE POINT
 ○ WEATHER OBSERVATION POINT

Figure 2-4-5. Air Force track 05.

Air Force Track 06

LOCATION IDENTIFIER	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SJI	30 44N 088 22W
MGM	32 13N 086 19W
SPA	35 02N 081 56W
GVE	38 01N 078 09W
CYN	39 49N 074 26W
JFK	40 38N 073 46W
*BERGH	39 08N 072 03W
CHAMP/WX OB	37 31N 071 41W
MERCI	35 00N 071 45W
WX OB	32 00N 073 55W
GLIBS	30 56N 074 15W
TROUT/WX OB	30 23N 077 00W
WX OB	30 27N 080 00W
JAX	30 20N 081 31W
TLH	30 33N 084 23W
CEW	30 50N 086 41W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

* Denotes new position name



LEGEND

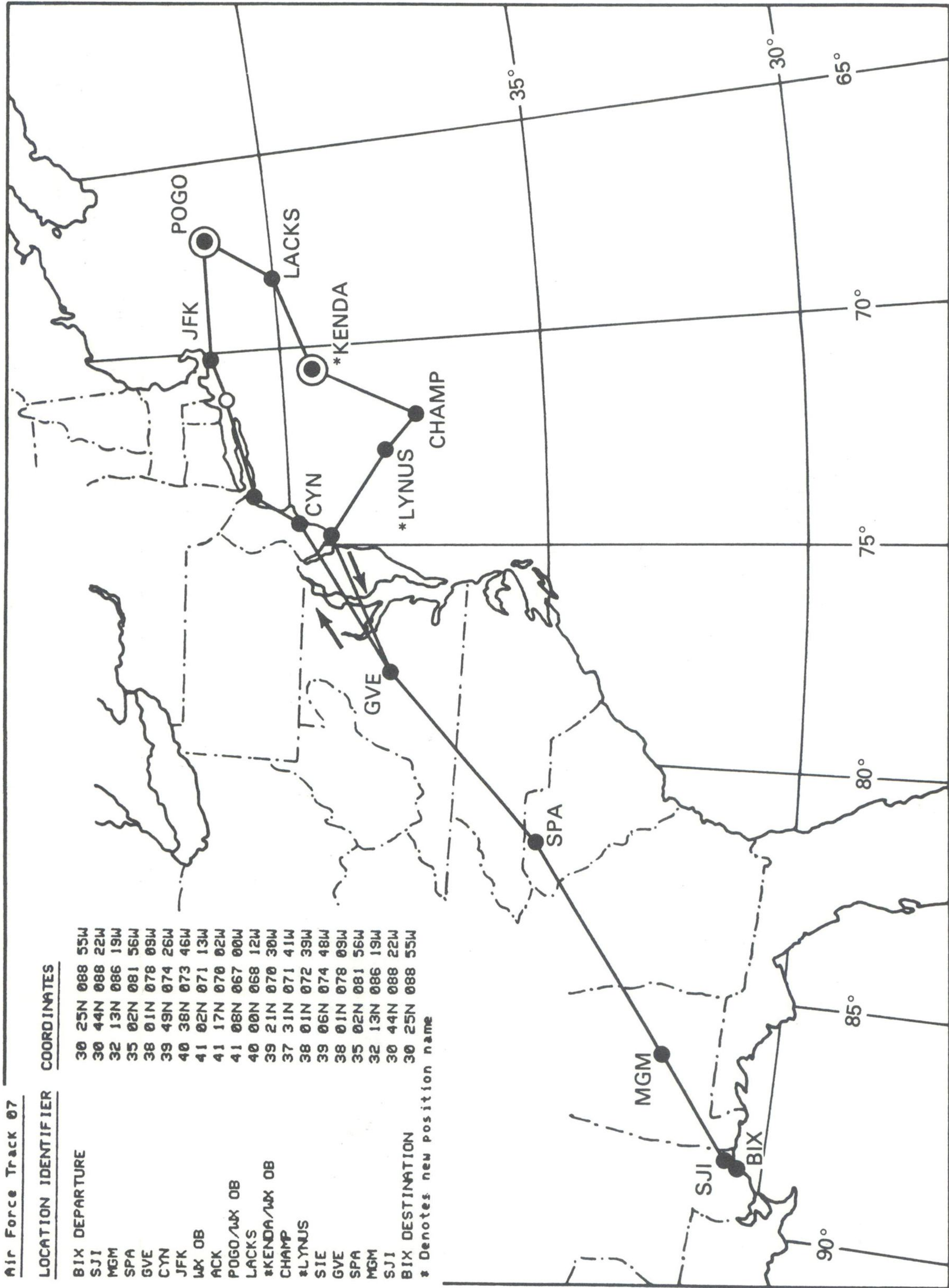
- TRACK COORDINATE POINT
- WEATHER OBSERVATION POINT

Figure 2-4-6. Air Force track 06.

Air Force Track 07

LOCATION IDENTIFIER	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SJI	30 44N 088 22W
MGM	32 13N 086 19W
SPA	35 02N 081 56W
GVE	38 01N 078 09W
CYN	39 49N 074 26W
JFK	40 38N 073 46W
WX OB	41 02N 071 13W
ACK	41 17N 070 02W
POGO/WX OB	41 08N 067 00W
LACKS	40 00N 068 12W
*KENDA/WX OB	39 21N 070 30W
CHAMP	37 31N 071 41W
*LYNUS	38 01N 072 39W
SIE	39 06N 074 48W
GVE	38 01N 078 09W
SPA	35 02N 081 56W
MGM	32 13N 086 19W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

* Denotes new position name



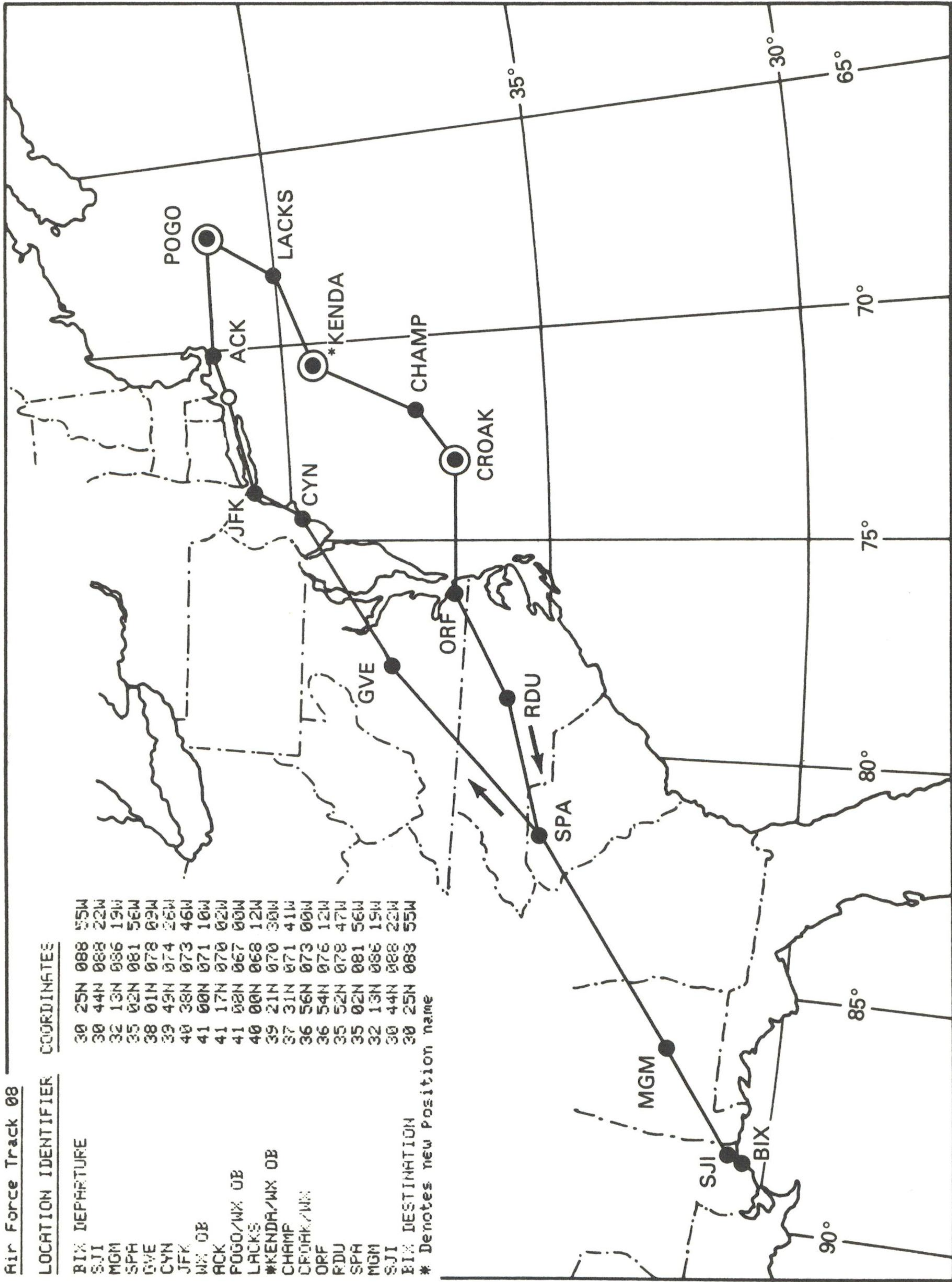
LEGEND
 ● TRACK COORDINATE POINT
 ○ WEATHER OBSERVATION POINT

Figure 2-4-7. Air Force track 07.

Air Force Track 08

LOCATION IDENTIFIER	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SJI	30 44N 088 22W
MGM	32 13N 086 19W
SPA	35 02N 081 56W
GVE	38 01N 078 09W
CYN	39 49N 074 26W
JFK	40 38N 073 46W
WX OB	41 00N 071 10W
ACK	41 17N 070 02W
POGO/WX OB	41 02N 067 00W
LACKS	40 00N 068 12W
*KENDA/WX OB	39 21N 070 30W
CHAMP	37 31N 071 41W
CROAK/WX	36 56N 073 00W
ORF	36 54N 076 12W
RDU	35 52N 078 47W
SPA	35 02N 081 56W
MGM	32 13N 086 19W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

* Denotes new position name



LEGEND
 ● TRACK COORDINATE POINT
 ○ WEATHER OBSERVATION POINT

Figure 2-4-8. Air Force track 08.

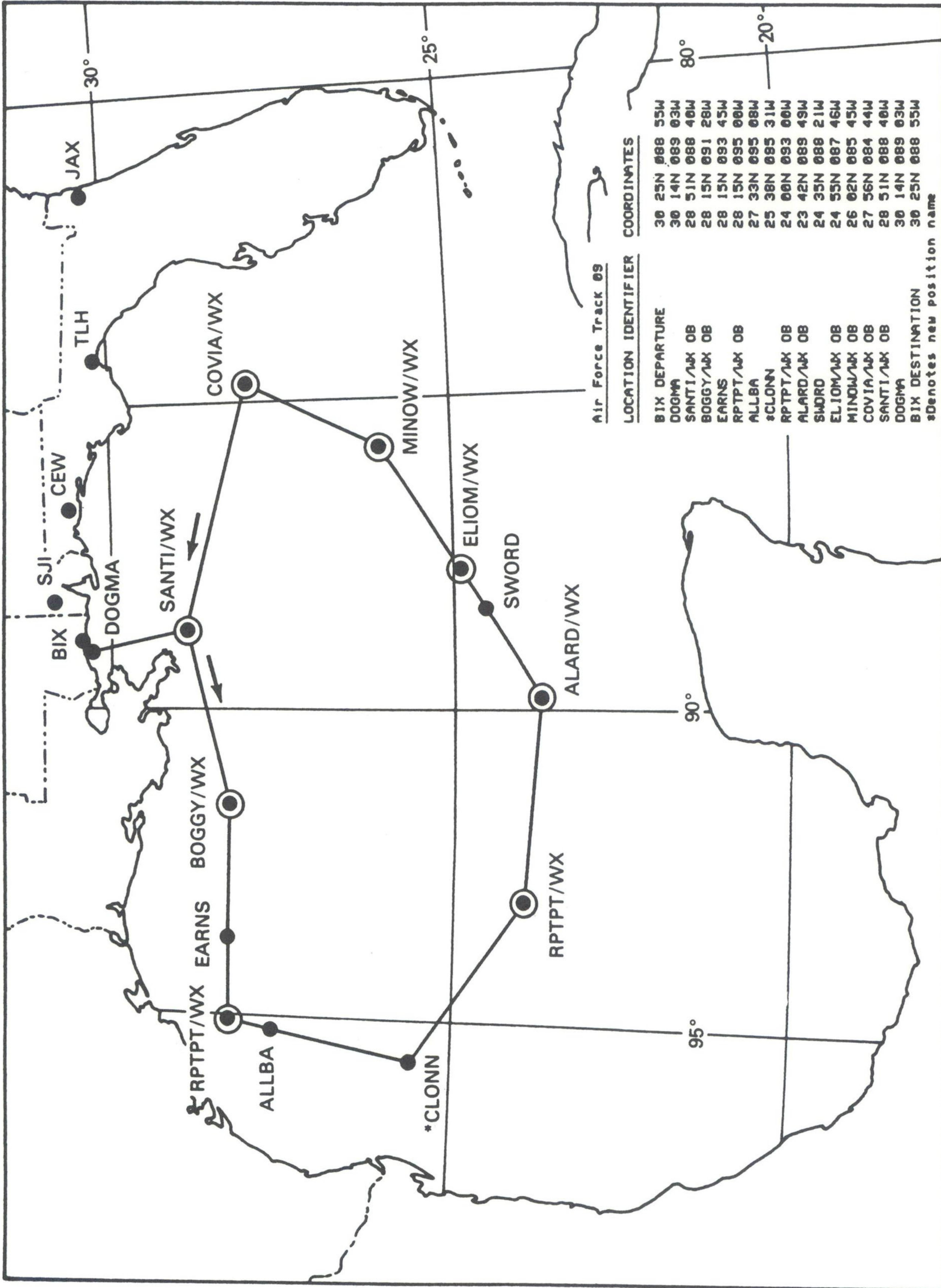
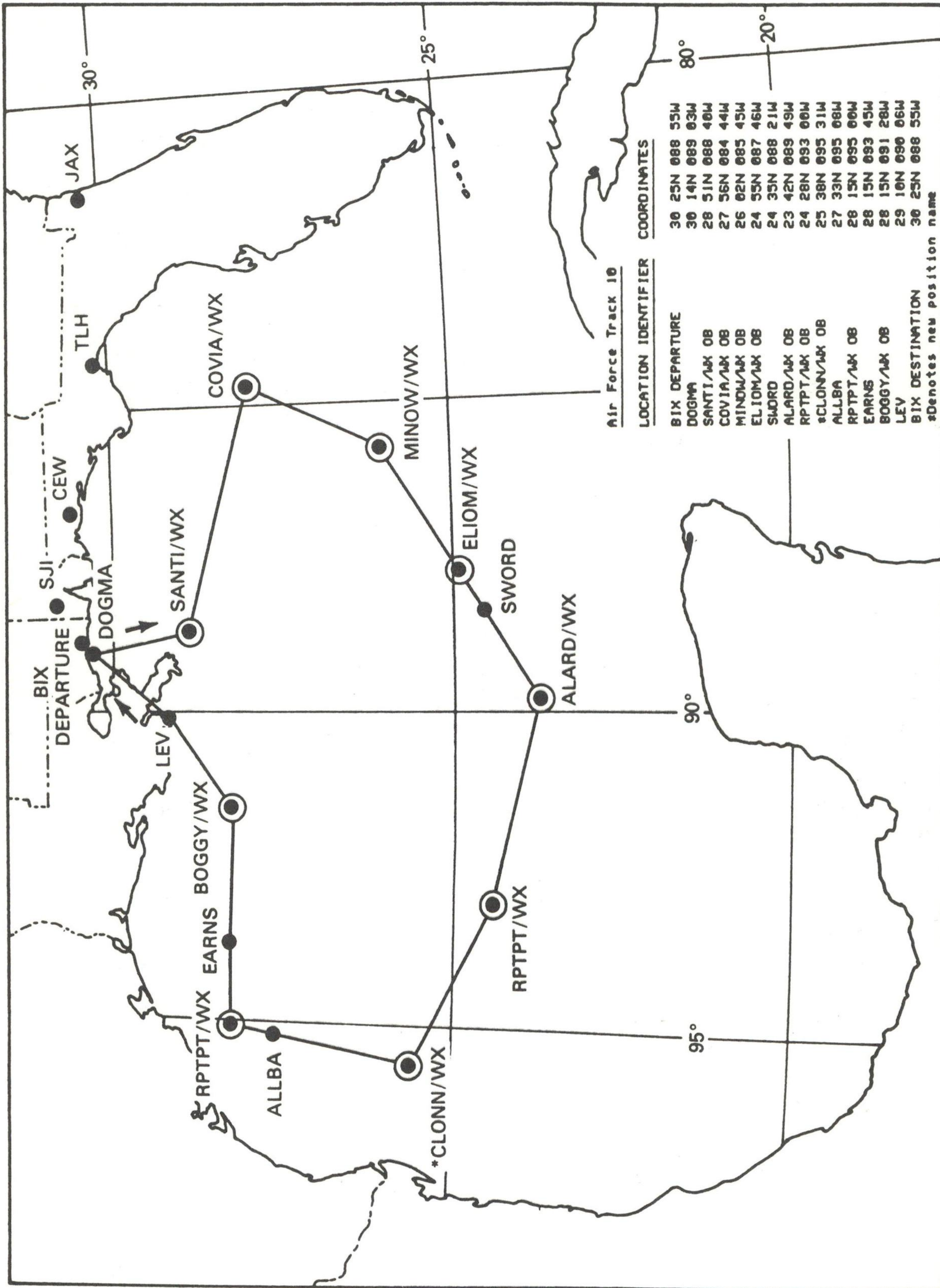
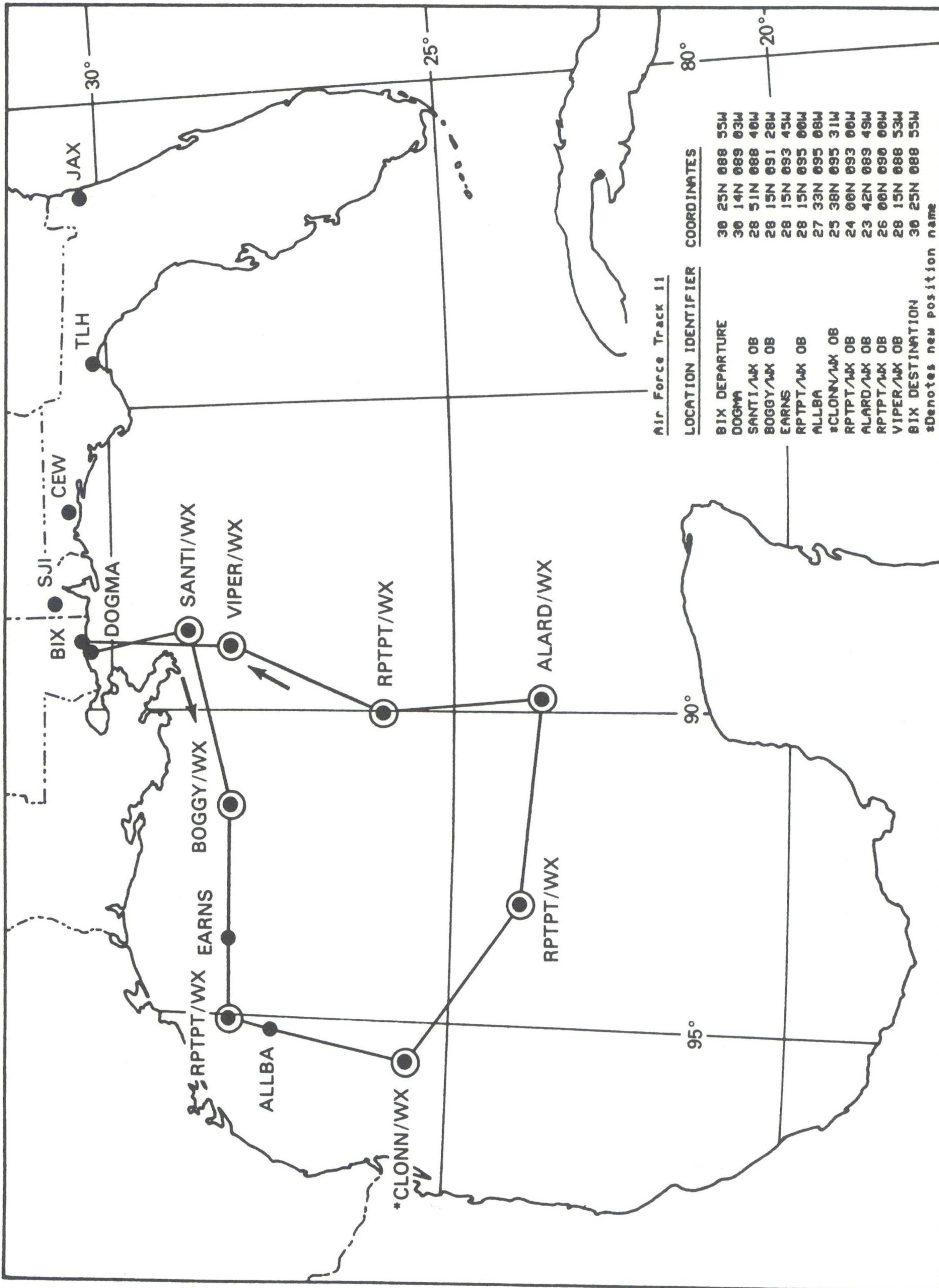


Figure 2-4-9. Air Force track 09.



LEGEND
 ● TRACK COORDINATE POINT
 ○ WEATHER OBSERVATION POINT

Figure 2-4-10. Air Force track 10.



Air Force Track 11

LOCATION IDENTIFIER	COORDINATES
BIX DEPARTURE	30 25N 088 55W
DOGMA	30 14N 089 03W
SANTI/WX OB	28 51N 088 40W
BOGGY/WX OB	28 15N 091 28W
EARN	28 15N 093 45W
RPTPT/WX OB	28 15N 095 00W
ALLBA	27 33N 095 08W
*CLONN/WX OB	25 38N 095 31W
RPTPT/WX OB	24 00N 093 00W
ALARD/WX OB	23 42N 089 49W
RPTPT/WX OB	26 00N 090 00W
VIPER/WX OB	28 15N 088 53W
BIX DESTINATION	30 25N 088 55W

LEGEND

- TRACK COORDINATE POINT
- WEATHER OBSERVATION POINT

Figure 2-4-11. Air Force track 11.

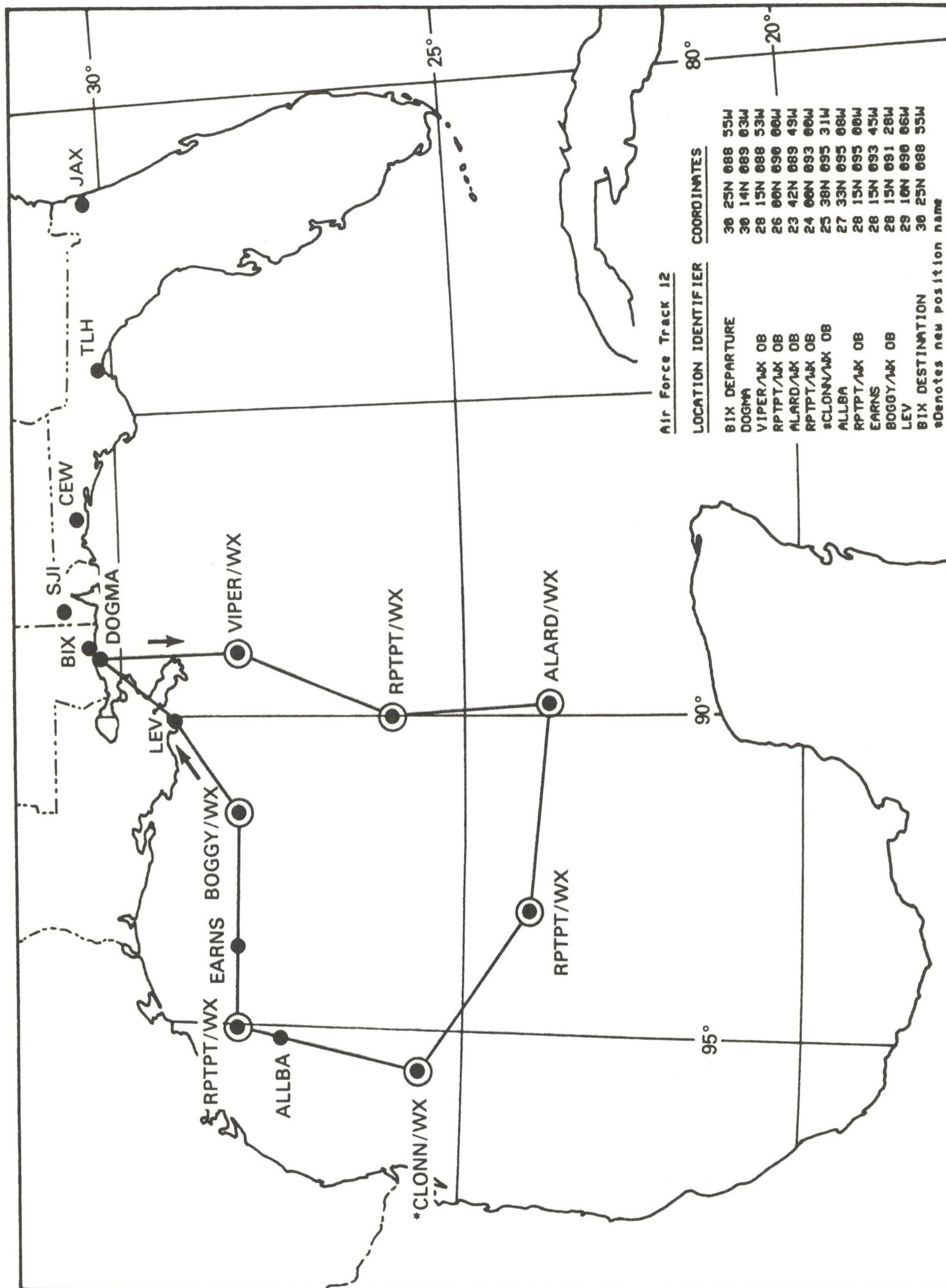
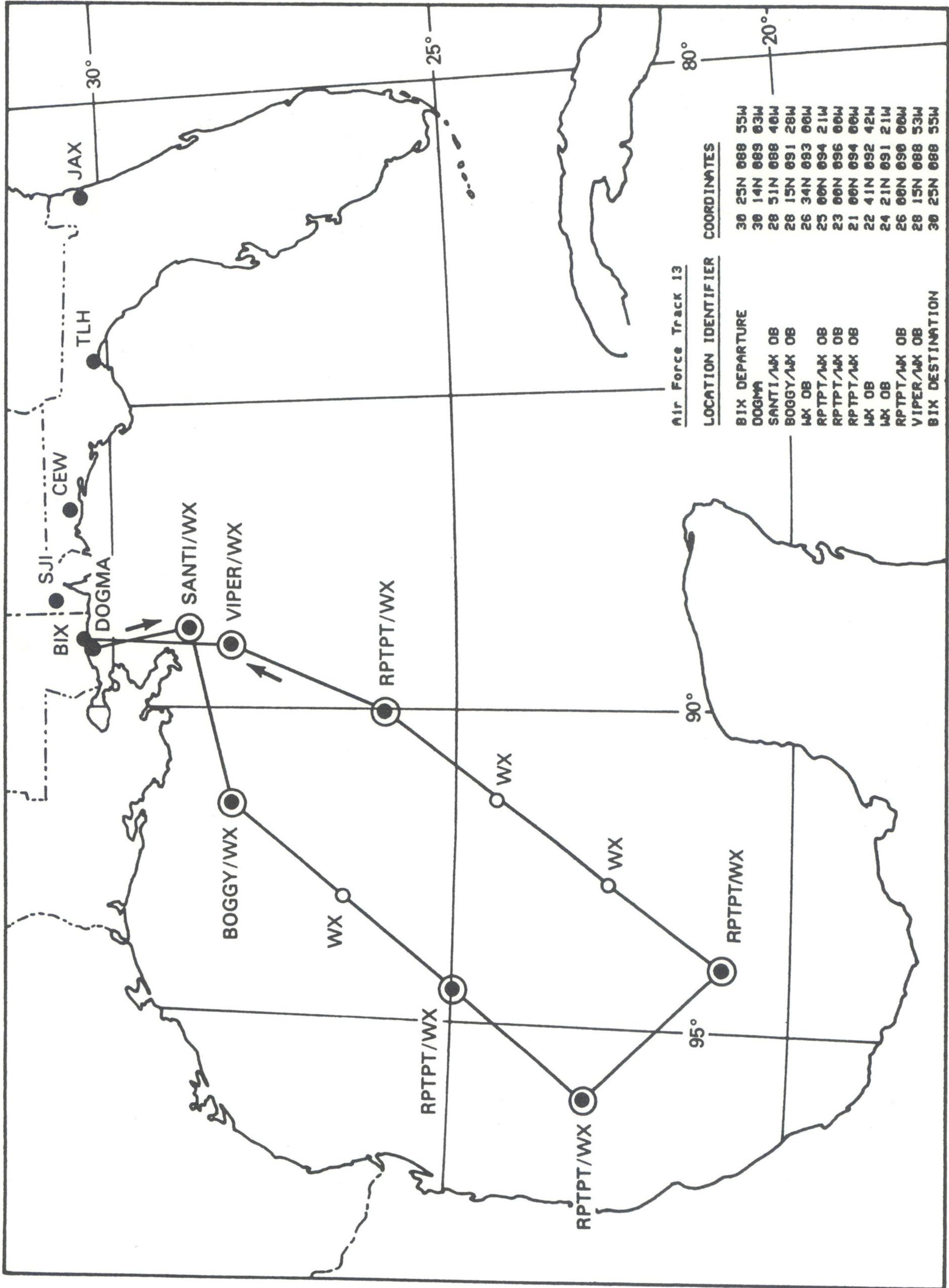


Figure 2-4-12. Air Force track 12.



LEGEND
 ● TRACK COORDINATE POINT
 ○ WEATHER OBSERVATION POINT

Figure 2-4-13. Air Force track 13.

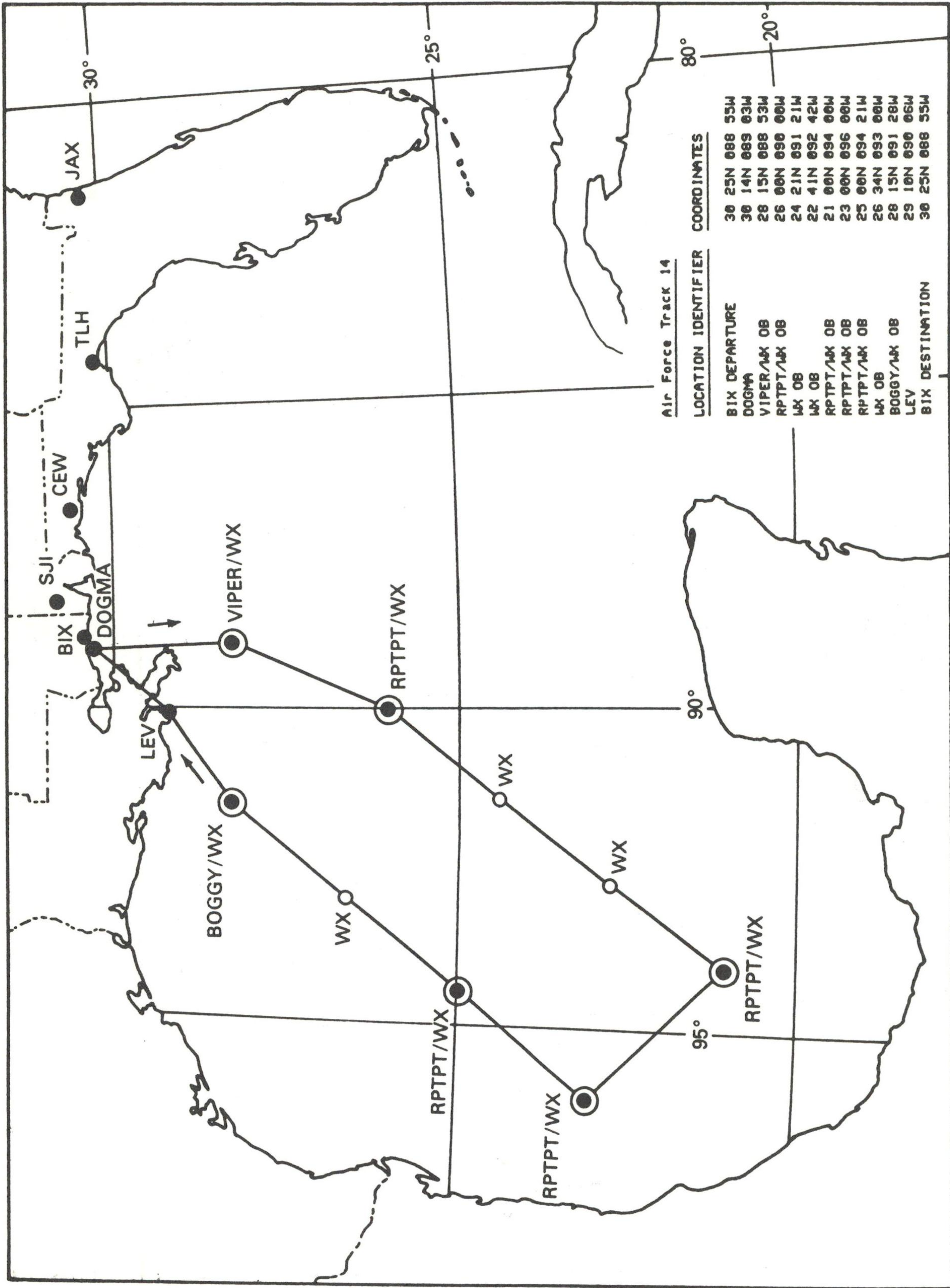


Figure 2-4-14. Air Force track 14.

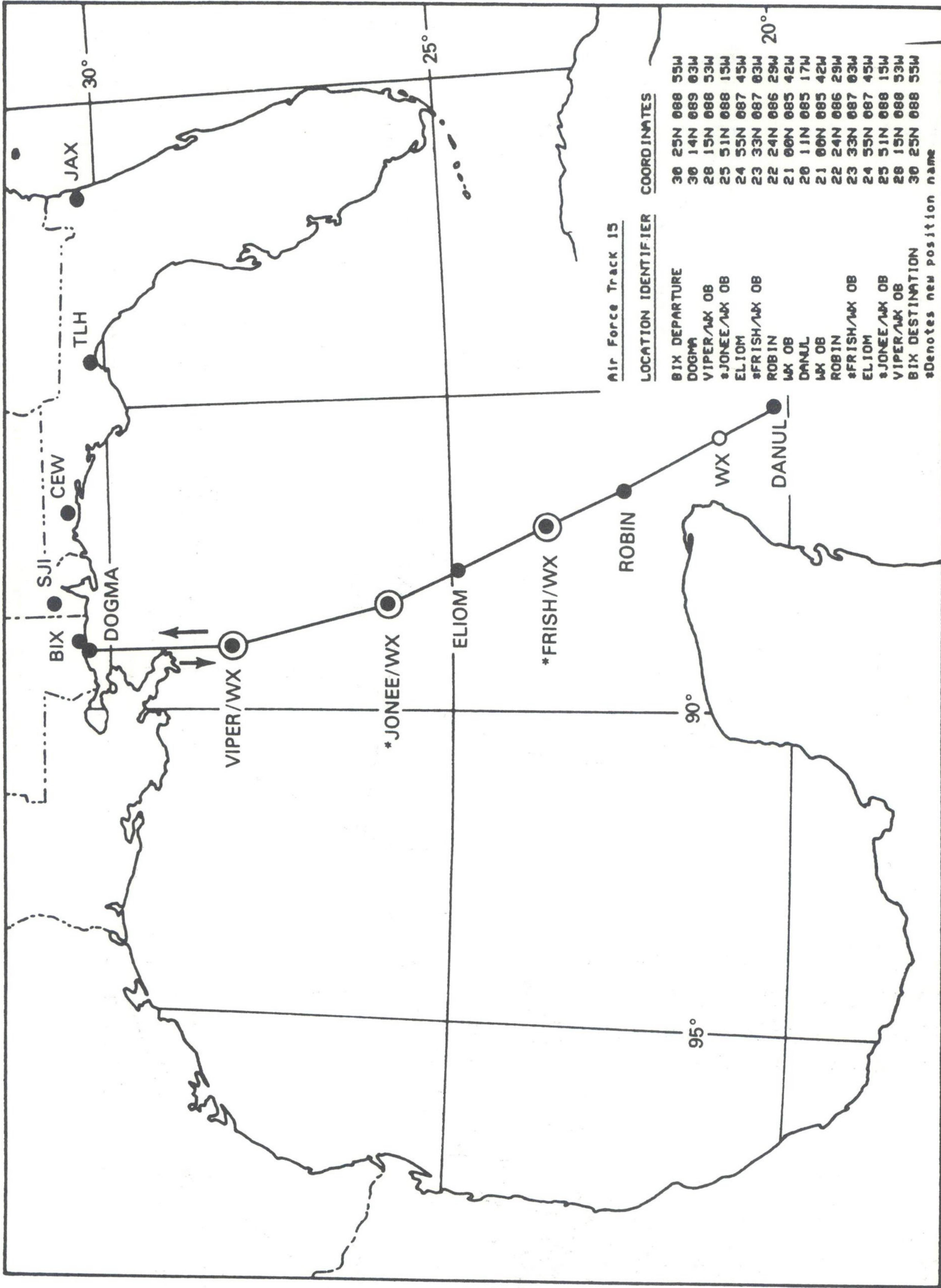


Figure 2-4-15. Air Force track 15.

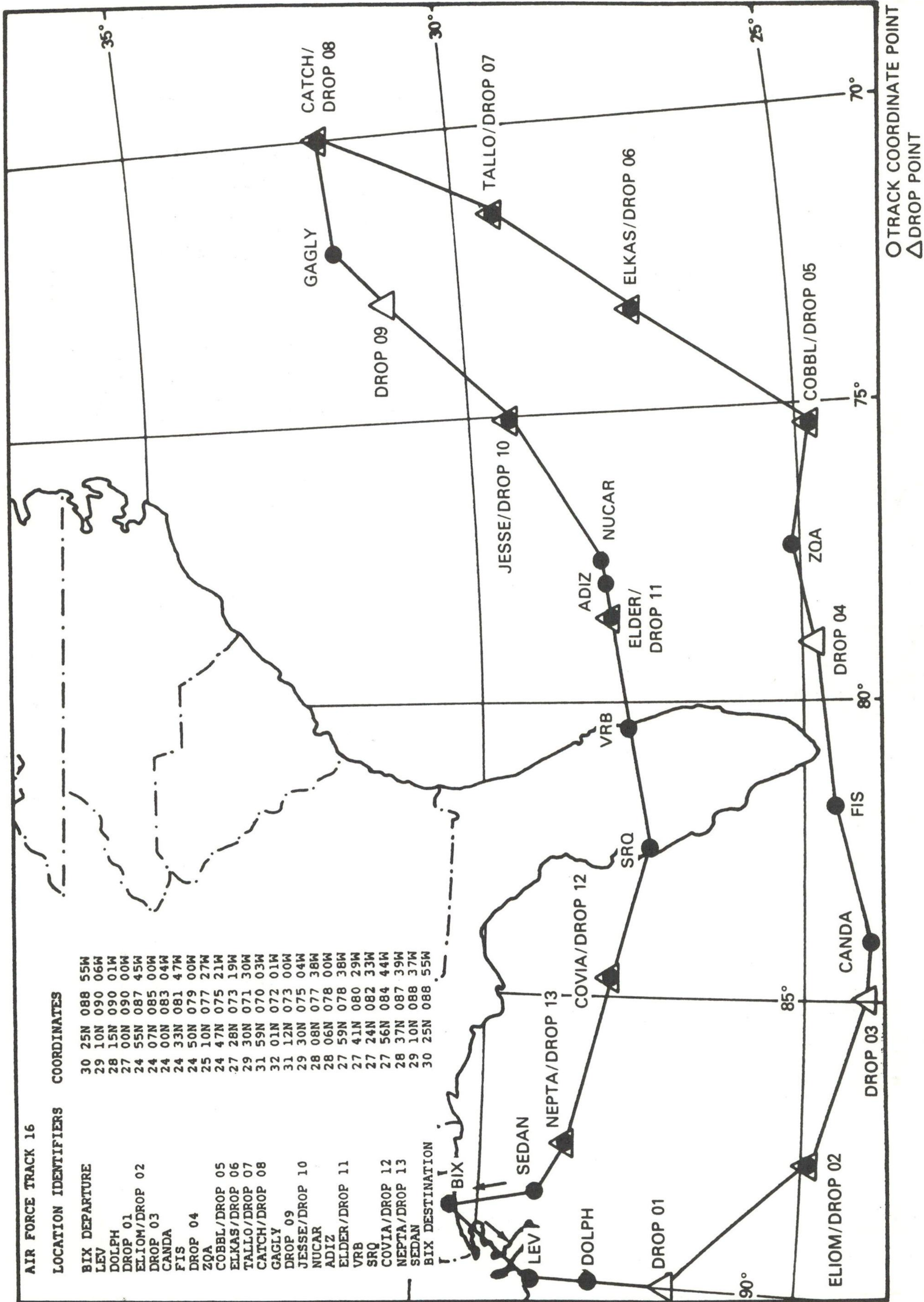
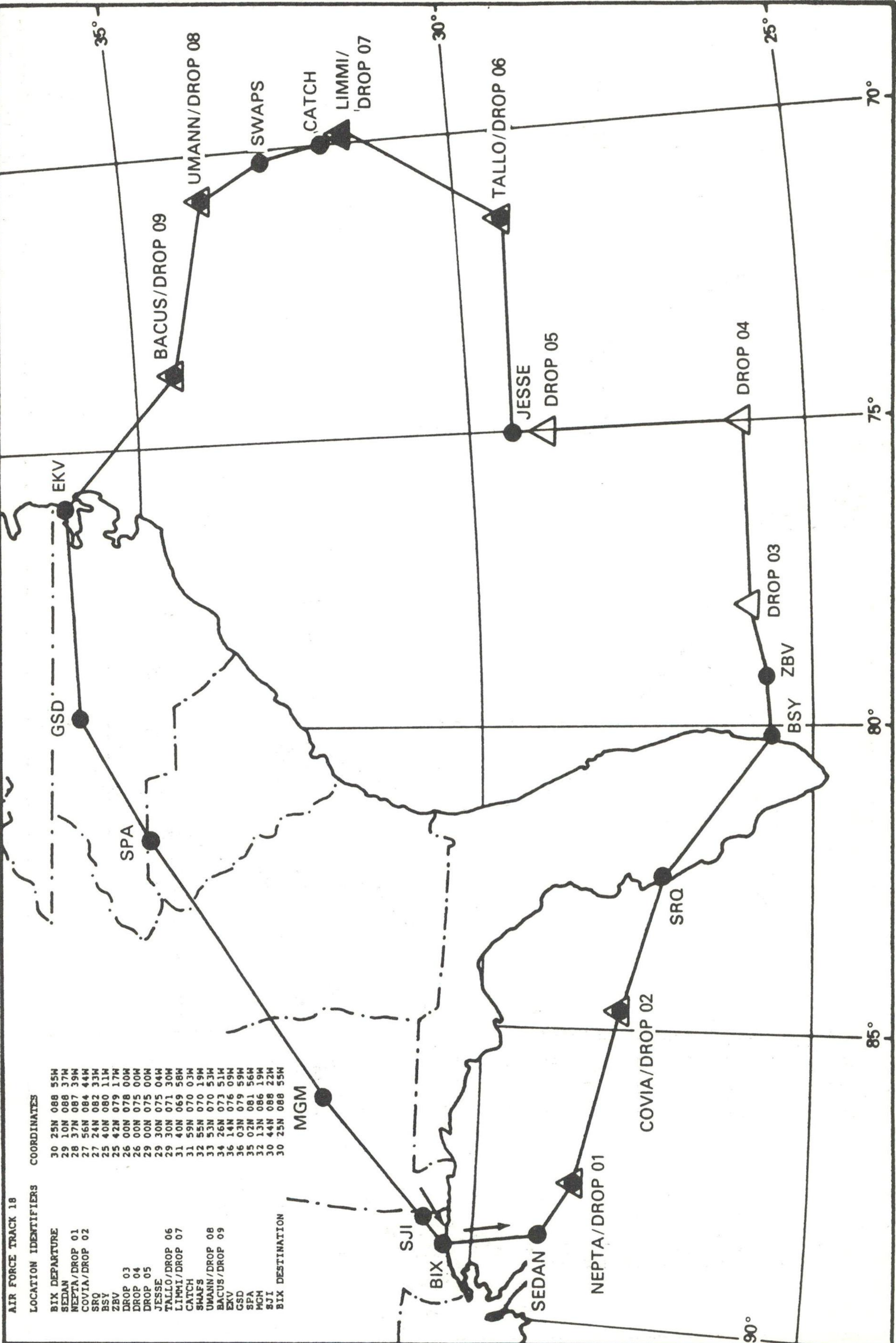


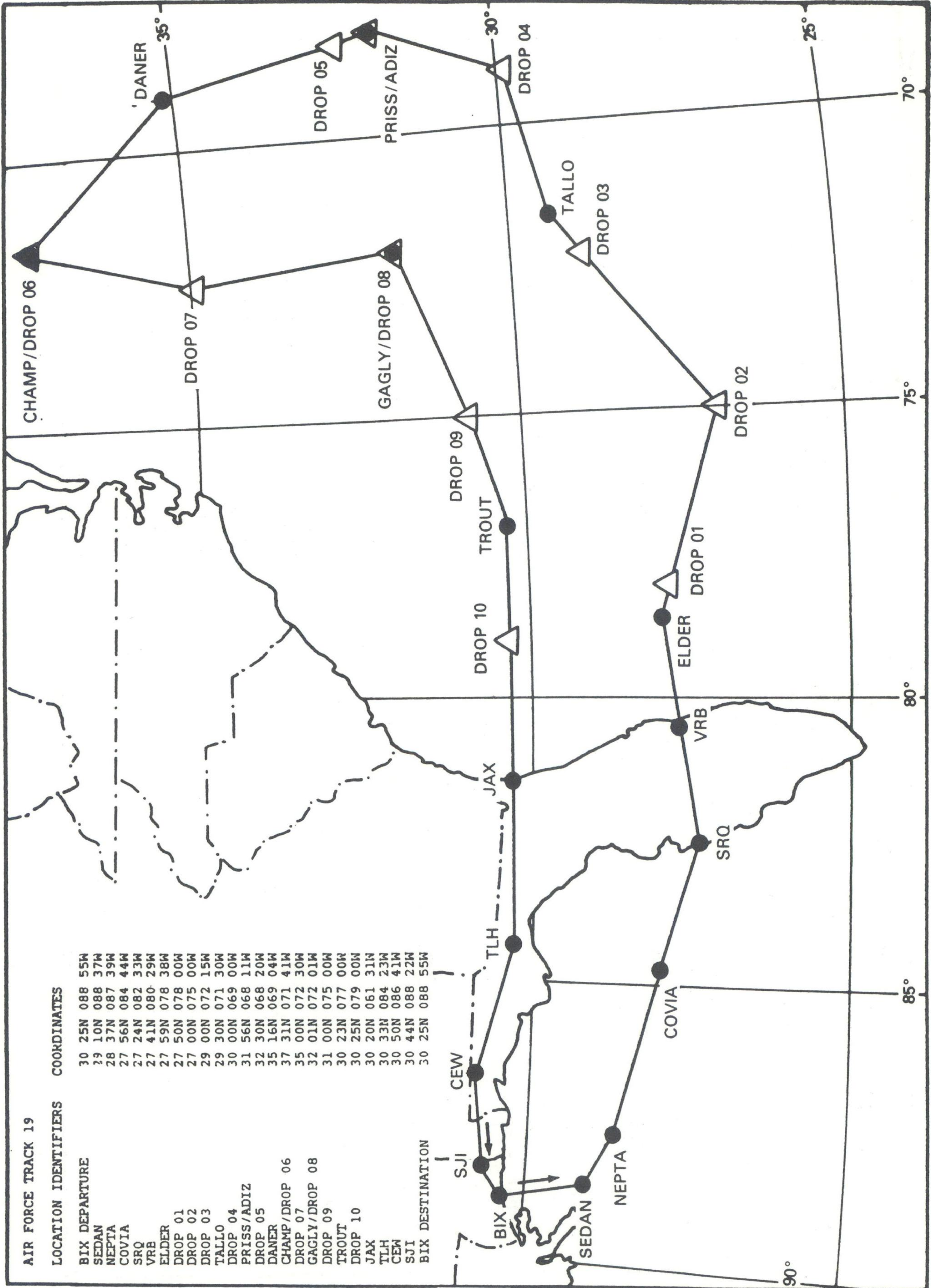
Figure 2-4-16. Air Force track 16.



○ TRACK COORDINATE POINT
 △ DROP POINT

Figure 2-4-18. Air Force track 18.

LOCATION IDENTIFIERS	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SEDAN	29 10N 088 37W
NEPTA/DROP 01	28 37N 087 39W
COVIA/DROP 02	27 56N 084 44W
SRQ	27 24N 082 33W
BSY	25 40N 080 11W
ZBV	25 42N 079 17W
DROP 03	26 00N 078 00W
DROP 04	26 00N 075 00W
DROP 05	29 00N 075 00W
JESSE	29 30N 075 04W
TALLO/DROP 06	29 30N 071 30W
LIMMI/DROP 07	31 40N 069 58W
CATCH	31 59N 070 03W
SWAPS	32 55N 070 19W
UMANN/DROP 08	33 53N 070 53W
BACUS/DROP 09	34 26N 073 51W
EKV	36 14N 076 05W
GSD	36 03N 079 59W
SPA	35 02N 081 56W
MGM	32 13N 086 19W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

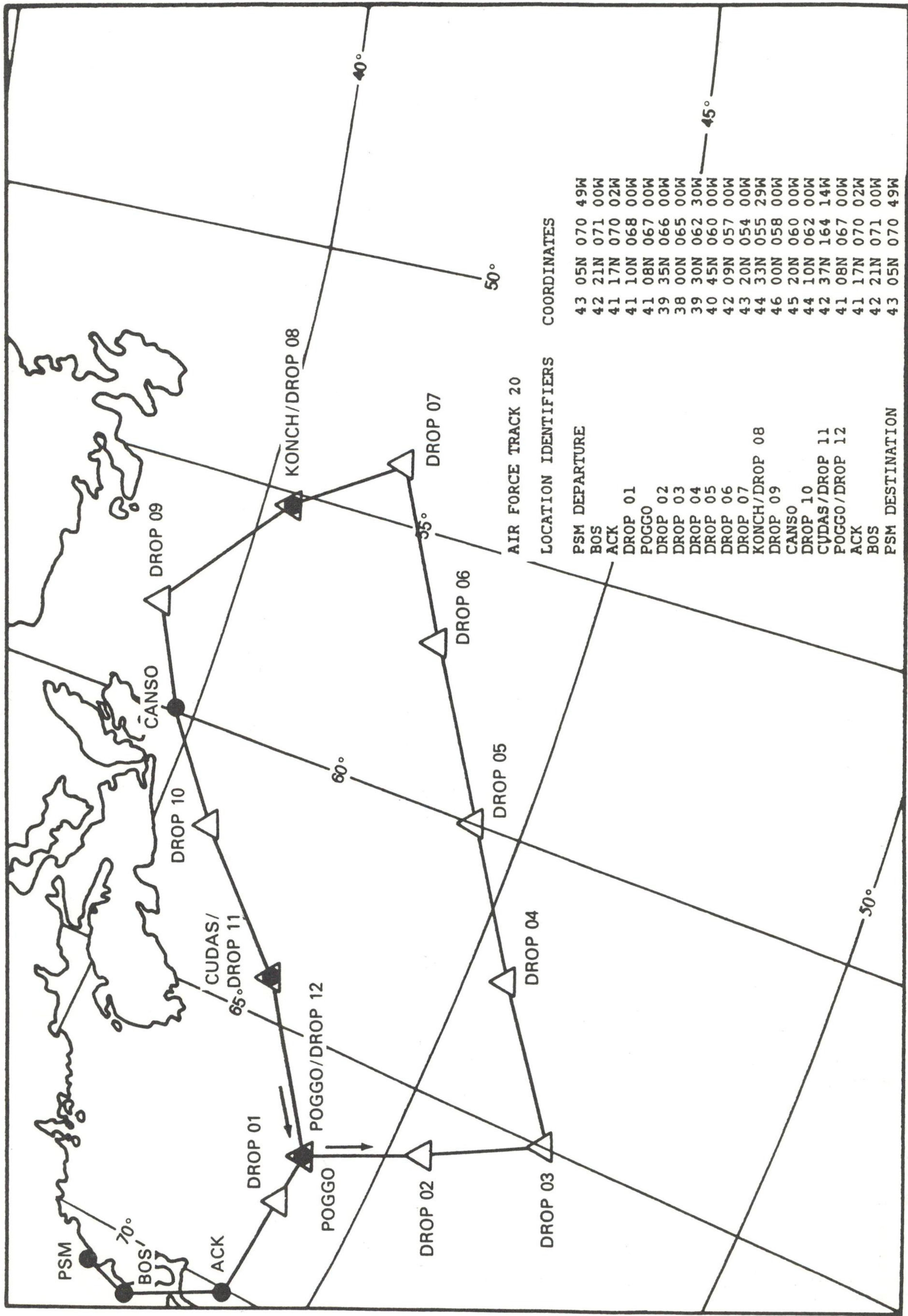


AIR FORCE TRACK 19

LOCATION IDENTIFIERS	COORDINATES
BIX DEPARTURE	30 25N 088 55W
SEDAN	29 10N 088 37W
NEPTA	28 37N 087 39W
COVIA	27 56N 084 44W
SRQ	27 24N 082 33W
VRB	27 41N 080 29W
ELDER	27 59N 078 38W
DROP 01	27 50N 078 00W
DROP 02	27 00N 075 00W
DROP 03	29 00N 072 15W
TALLO	29 30N 071 30W
DROP 04	30 00N 069 00W
PRISS/ADIZ	31 56N 068 11W
DROP 05	32 30N 068 20W
DANER	35 16N 069 04W
CHAMP/DROP 06	37 31N 071 41W
DROP 07	35 00N 072 30W
GAGLY/DROP 08	32 01N 072 01W
DROP 09	31 00N 075 00W
TROUT	30 23N 077 00W
DROP 10	30 25N 079 00W
JAX	30 20N 061 31W
TLH	30 33N 084 23W
CEW	30 50N 086 41W
SJI	30 44N 088 22W
BIX DESTINATION	30 25N 088 55W

○ TRACK COORDINATE POINT
 △ DROP POINT

Figure 2-4-19. Air Force track 19.



PSM DEPARTURE	LOCATION IDENTIFIERS	COORDINATES
BOS		43 05N 070 49W
ACK		42 21N 071 00W
DROP 01		41 17N 070 02W
POGGO		41 10N 068 00W
DROP 02		41 08N 067 00W
DROP 03		39 35N 066 00W
DROP 04		38 00N 065 00W
DROP 05		39 30N 062 30W
DROP 06		40 45N 060 00W
DROP 07		42 09N 057 00W
KONCH/DROP 08		43 20N 054 00W
DROP 09		44 33N 055 29W
CANSO		46 00N 058 00W
DROP 10		45 20N 060 00W
CUDAS/DROP 11		44 10N 062 00W
POGGO/DROP 12		42 37N 164 14W
ACK		41 08N 067 00W
BOS		41 17N 070 02W
PSM DESTINATION		42 21N 071 00W
		43 05N 070 49W

○ TRACK COORDINATE POINT
 △ DROP POINT

Figure 2-4-20. Air Force track 20.

CHAPTER 3

OTHER OBSERVATIONS

3.1. General. In addition to aerial reconnaissance data, the observational system used in support of the National Winter Storms Operations Plan includes land surface, ship, radar, buoy, upper air, and satellite data. The routine operations of these various data sources are detailed in the following Federal Meteorological Handbooks and plans:

- o Federal Meteorological Handbook No. 1, Surface Observations
- o Federal Meteorological Handbook No. 2, Synoptic Observations
- o Federal Meteorological Handbook No. 4, Radiosonde Code
- o Federal Meteorological Handbook No. 7, Weather Radar Observations
- o Operations of the National Weather Service
- o Federal Plan for Environmental Data Buoys
- o The GOES User's Guide and operational amendments
- o National Operations Plan for Drifting Data Buoys

Procedures for obtaining special or nonroutine observations required in support of winter storm detection and forecasting, while covered to some extent in these documents, are described in detail in National Weather Service Operations Manual, Chapter B-90, "Special Warning Program Observations." The chapter covers observational programs of several agencies involved. The only two observational programs that will be covered in any detail here are the two data sources that are still considered somewhat unique and were established particularly to help in the winter storm analysis and forecast problems.

3.2. Satellite Observations.

3.2.1. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), and the National Environmental Satellite, Data, and Information Service (NESDIS).

3.2.1.1. Geostationary Operational Environmental Satellite (GOES). The GOES system consists of two operational satellites located over the equator at 75° W (GOES EAST) and 135° W (GOES WEST). The principal GOES products (see Table 3-1) are one-half hourly pictures with implanted grids automatically applied to all sectors. During the daylight hours, 1/2, 1, and 2 mi (0.9, 1.8, and 3.7 km) resolution fixed standard sectors are produced, and during the night, equivalent 1 and 2 mi (1.8 and 3.7 km) infrared (IR) standard sectors are produced. Additionally, certain IR pictures are enhanced at specific times to emphasize various features, and floating sectors at 1/2, 1, and 2 mi (0.9, 1.8, and 3.7 km) resolution may be produced as desired to augment standard sector coverage.

3.2.1.2. NOAA Polar-Orbiting Satellites. NOAA-9 and NOAA-10 provide data for direct readout (Automatic Picture Transmission (APT)). These two NOAA satellites also provide data that are received, processed and disseminated via the NWS facsimile circuits. In some instances, the GOES distribution system will be used to disseminate data via the Satellite Field Service Stations (SFSS) to the Weather Service Field Offices (WFSO).

3.2.1.3. SFSSs and the Synoptic Analysis Branch (SAB). Under the NESDIS support concept, satellite imagery in support of the National Winter Storms Operations Plan is distributed by the Central Data Distribution Facility at Camp Springs, Maryland, to the SFSSs, the SAB, and the WFSOs.

3.2.1.3.1. The NESDIS SAB operates 24 hr/day to provide satellite data support to the National Meteorological Center (NMC). The SAB meteorologists provide satellite information to the NMC meteorologists concerning present locations and intensities of winter storms and the projected speed, direction, and future intensities of these storms. The possibility of turbulence, icing, and precipitation amounts are also discussed. Special satellite precipitation estimates are transmitted via the Automation of Field Operations and Services (AFOS) system to all WFSOs and River Forecast Centers in the conterminous United States.

3.2.1.3.1. Satellite support to the NWS field offices is provided by the Miami SFSS, Kansas City SFSS, and the Washington, D.C. SFSS. In addition, the following support products are available to the meteorological community:

3.2.1.3.1.1. Satellite Interpretation Messages (SIM) are available through the NWS AFOS communications system and the Federal Aviation Administration's (FAA) leased

Table 3-1

Satellites and Satellite Data Availability for the
National Winter Storms Operations Plan

SATELLITE	TYPE OF DATA	LOCAL TIME*	REMARKS
GOES-WEST (GOES-6)	VISSR/VAS	Every 30 min 24 hr/day (Limited scan for short interval viewing available)	<ol style="list-style-type: none"> 1. 1, 2, and 4 km resolution visible standard sectors covering Western U.S. and E. Pacific Ocean (daylight) 2. 9 km resolution equivalent IR standard sectors for entire U.S. (night). 3. Equivalent IR-enhanced imagery 4. Floating sectors at 1, 2, and 4 km resolution 5. Full disc IR (day/night) 6. Animated imagery 7. Wind analysis 8. Cloud top heights 9. Rainfall/snowfall estimates 10. Satellite information messages 11. VAS soundings 12. 14 km resolution water vapor imagery
GOES-EAST (GOES-7)			
2 spacecraft on standby limited operational capability (no VISSR)			
NOAA-10	AVHRR GAC and LAC (recorded) HRPT and APT (direct) TOVS	0740/1940	<ol style="list-style-type: none"> 1. Mapped digitized data (cloud cover) 2. Unmapped imagery (all data types) at DMSP sites 3. Sea-surface temperature analysis 4. Moisture analysis 5. Soundings
NOAA-9		1430/0230	
DMSP F-7	Variable	0948 DA	1. Unmapped imagery (LF only)
F-8	Variable	0605 DA	2. Mapped imagery (none) 3. F-8 has SSM/I

*Local time/equatorial crossing time

Service A and Radar Report and Warning Coordination (RAWARC) teletype circuits. All WFSOs receive these automatically as transmitted from the SFSSs. The heading and issue times for the SIMs are listed below. Times are subject to change and SIMs may be updated as required by changing weather.

NWS	FAA	ISSUE TIME (UTC)
WBCSIMWBC	TBXX6 KWBC	0100, 0700, 1300, 1900
MKCSIMMKC	TBSS6 KMKC	0030, 0530, 1230, 1830
MIASIMMIA	TBXX7 KMIA	0300, 0900, 1500, 2030

3.2.1.3.1.2. Satellite cloudtop and tropopause (SCAT) messages are prepared by the Washington, D.C. SFSS and contain information on cloudtop heights and temperatures and tropopause heights over area of interest throughout the eastern region. The headings for SCAT messages are WBCSIMSCT (NWS AFOS) and TBXX10 KWBC (FAA). Issue times are 1030 UTC and 2200 UTC

3.2.1.4. Points of contact 24 hr/day.

- o Miami SFSS 305-350-4460
 FTS 350-4460
- o Kansas City 816-374-7395/7396
 SFSS FTS 758-7395/7396
- o Washington 301-763-8119/8425
 SFSS FTS 763-8119/8425
- o SAB 301-763-8444
 FTS 763-8444

3.2.2. Department of Defense (DOD) Defense Meteorological Satellite Program (DMSP). The DMSP routinely has two satellites collecting meteorological imagery and vertical temperature profile data. One satellite is in an early morning-early evening orbit with approximately 0700/1900 local equator crossing time. The second is in a near-noon orbit with approximately 1000/2200 local equator crossing time. The DMSP data capabilities in the area of concern are provided in Table 3-1. Special requests for DMSP support will be addressed to OL-G, Hq AWS (Chief, Aerial Reconnaissance Coordination, All Hurricanes (CARCAH)).

3.3. Automated Environmental Observations.

3.3.1. General. Moored buoys in the Atlantic and Pacific Oceans, Gulf of Mexico, and Great Lakes obtain data on meteorological and oceanographic parameters for operational and

research purposes. See Figure 3-1 for the location of moored buoys. Coastal Marine Automated Network (C-MAN) stations provide additional marine observations. See Figure 3-2 for locations of C-MAN sites. The status and capability of data buoys can be obtained from the Data Systems Division, National Data Buoy Center (NDBC), NSTL Station, MS 39529; telephone 601-688-2836 or FTS 494-2836.

3.3.2. Moored Data Buoys and Coastal Marine Automated Network.

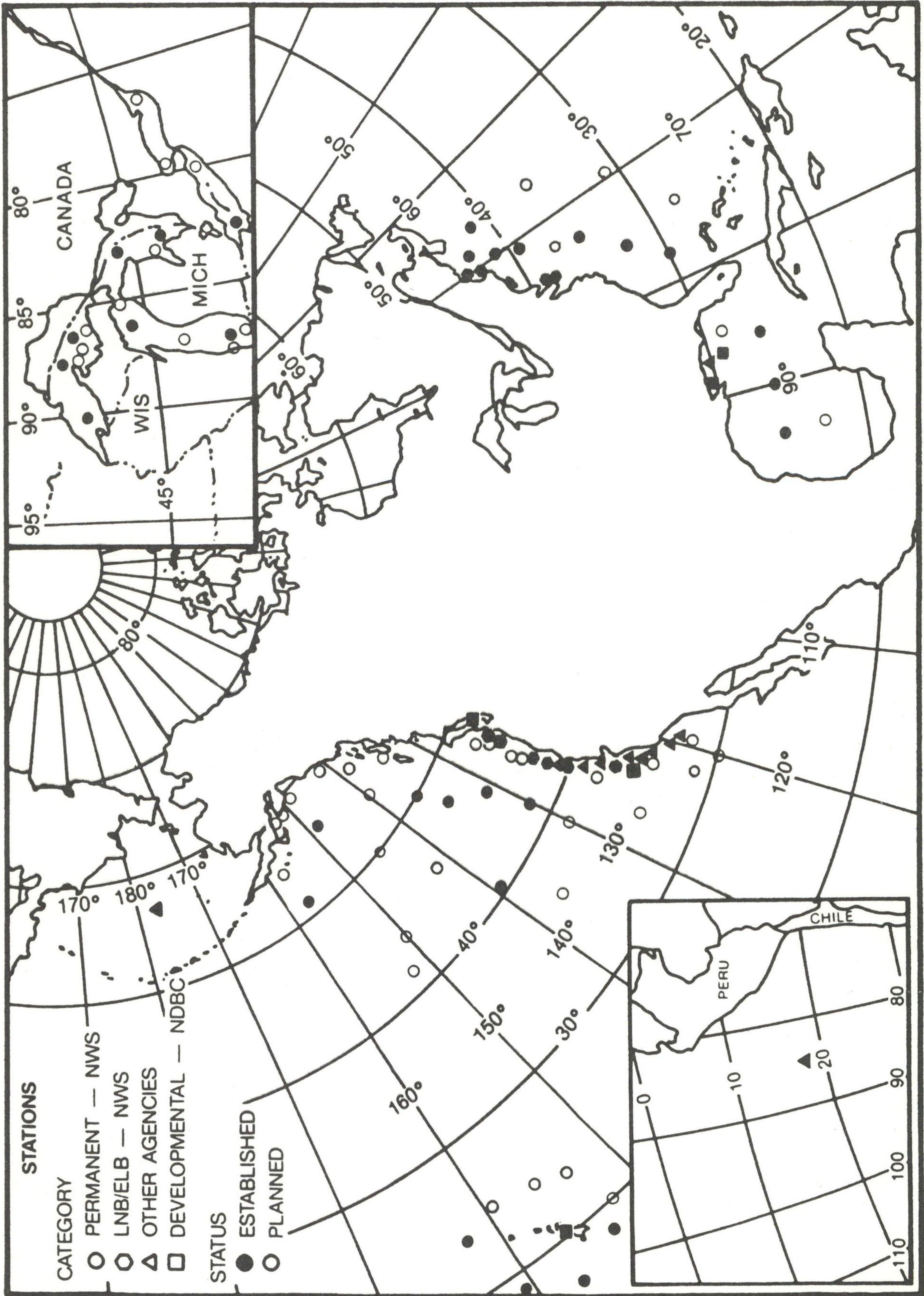
3.3.2.1. Procedures. Moored buoy and C-MAN stations routinely acquire and transmit data every hour. Buoy observations include sea-level pressure, wind speed and direction, air temperature, sea-surface temperature, significant wave height and period, and wave spectral data. Reports from C-MAN locations typically include sea-level pressure, wind speed and direction, and air temperature. Some C-MAN stations measure sea-surface temperature, tide level, significant wave height and period, and wave spectral data. A description of the data from a typical moored buoy payload is provided in Table 3-2.

3.3.2.2. Communications. Data are transmitted by ultra high frequency (UHF) communications via the GOES satellite to NESDIS and then are relayed on to NMC for processing and dissemination. Data from buoys are formatted into World Meteorological Organization (WMO) FM13-VII ship code and from C-MAN sites in FM12-VII synoptic code.

3.3.3. Drifting Data Buoys.

3.3.3.1. Procedures. These buoys are deployed by ship or aircraft in data-sparse areas. Their movements are largely dependent upon ocean currents. The buoys routinely acquire and transmit data via NOAA polar-orbiting satellites. Data obtained can include position, sea-level pressure, wind speed and direction, air temperature, and sea-surface and subsurface temperature.

3.3.3.2. Communications. Data are transmitted by UHF communications via the NOAA polar-orbiting satellites to NESDIS ground receiving stations and then relayed to the U.S. Argos Processing Center in Landover, Maryland for processing and dissemination to NMC. Data from drifting buoys are formatted into WMO FM14-VIII DRIBU code.



GDH-2 (2) Rev. 1
6/87

Figure 3-1. NDCD buoy locations.

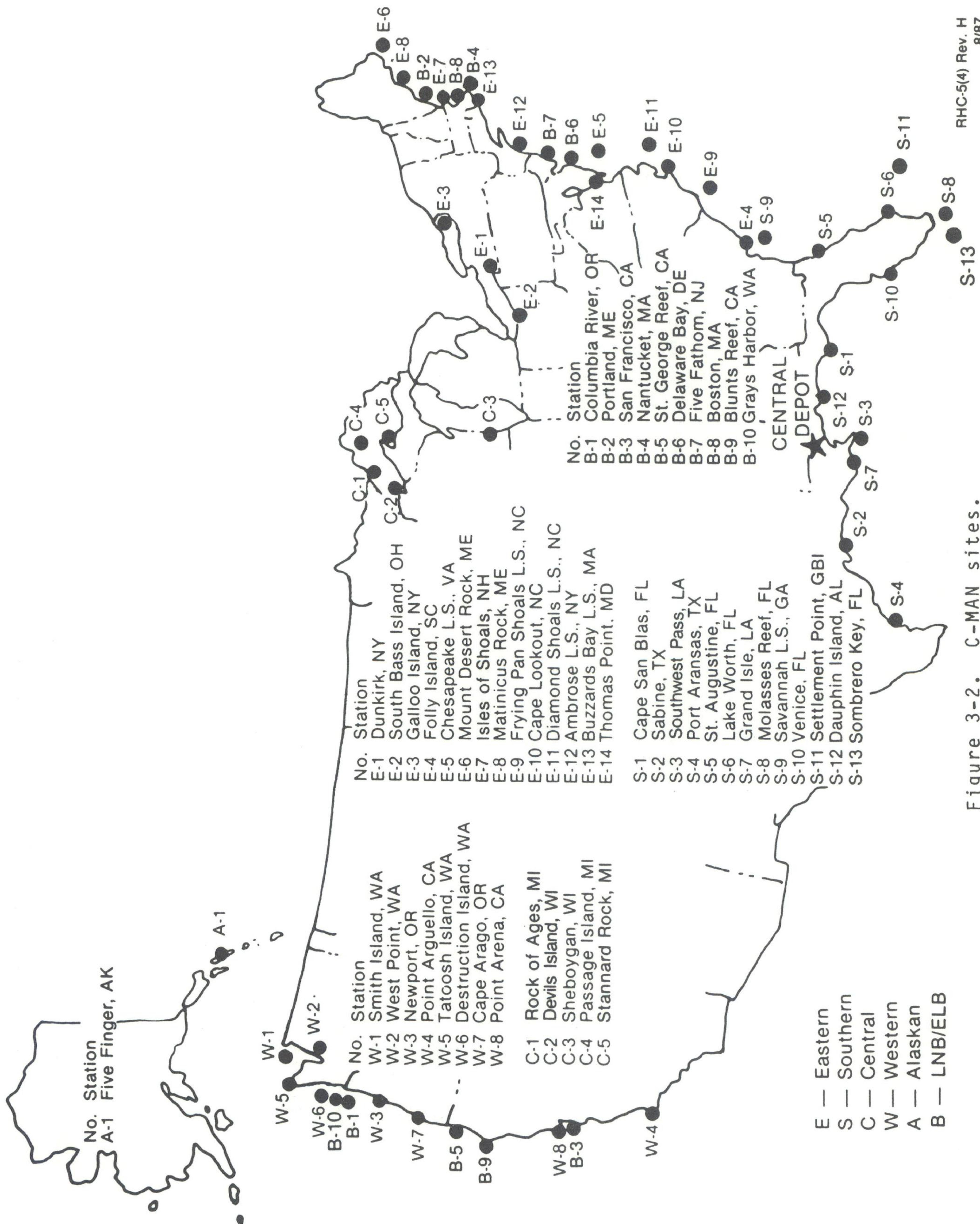


Figure 3-2. C-MAN sites.

Table 3-2. Typical moored buoy payload data.

<u>Parameter</u>	<u>Reporting Range</u>	<u>Reporting Resolution</u>	<u>Sample Interval</u>	<u>Sample Period</u>	<u>Total System Accuracy</u>
Wind Speed	0 to 80 m/s	1 m/s	1 s	8.5 min	± 1 m/s or 10%
Wind Direction	0 to 360°	10°	1 s	8.5 min	± 10°
Wind Gust	0 to 80 m/s	1 m/s	1 s	8.5 min*	± 1 m/s or 10%
Air Temperature	-15° to 50°C	0.1°C	90 s	90 s	± 1°C
Barometric Pressure	900 to 1100 mb	0.1 hPa	4 s	8.5 min	± 1 hPa
Significant Wave Height	0 to 20 m	0.1 m	0.67 s	20 min	± 0.5 m
Wave Period	2 to 30 s	1 s	0.67 s	20 min	± 1 s
Wave Spectra	0.01 to 0.5 Hz	0.005 Hz	0.67 s	20 min	-----
Surface Water Temperature	-15° to 50°C	0.1°C	1 s	1 s	± 1°C

*Highest 8-second window average retained.

CHAPTER 4

COMMUNICATIONS

4.1. Department of Commerce.

4.1.1. National Weather Service (NWS). All communication systems of the NWS are used in support of the data collection and warning program given in the plan. These communication systems are described in the publication, Operations of the National Weather Service.

4.1.2. Office of Aircraft Operations (OAO). The OAO may use the communications facilities of the Air Force described in Paragraphs 4.2.2 and 4.2.3.

4.2. Department of Defense (DOD).

4.2.1. Air Force. The Air Force's CONUS Meteorological Data System (COMEDS) circuit will be used for collection and dissemination of east coast winter storms information received from the Weather Service Forecast Office, Washington. The Air Force's Automated Digital Weather System (ADWS) will be used for the exchange of data between the National Oceanic and Atmospheric Administration and DOD.

4.2.2. Weather Reconnaissance Observations. Except for aircraft-to-satellite data link equipped aircraft, weather reconnaissance observations will be transmitted using high frequency (HF) single sideband radio through the U.S. Air Force (USAF) (Air Force Communication Command (AFCC)) Global Command and Control System (GCCS) to the appropriate weather reconnaissance data monitor. Weather monitors will evaluate these reports and disseminate them.

4.2.3. Air-Ground Communications. The GCCS selected will depend upon aircraft location and radio propagation conditions. Initial frequencies are as published in appropriate enroute flight publications. After initial contact, aeronautical stations will provide a discrete frequency for mission use if possible. Aircrew relay of weather reconnaissance data will be by direct phone patch to the weather monitor. Specific radio procedures and terminology will be as described in Allied Communications Publication 125, Communications Instructions, Radio and Telephone Procedures.

The USAF has authorized the use of "Immediate" precedence for transmission of winter storm reconnaissance data as follows:

PRIMARY

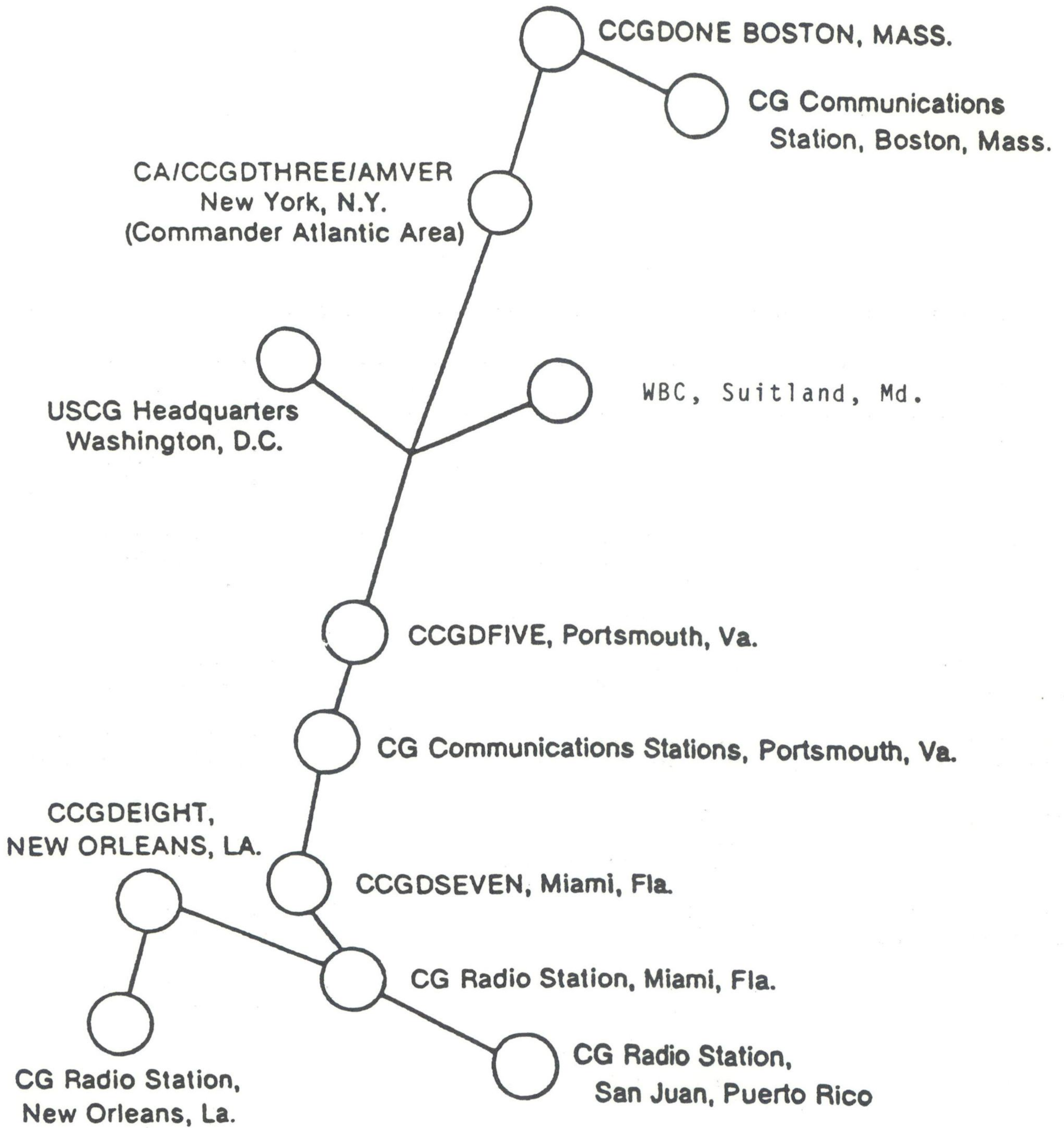
Direct phone patch between aircraft and the Miami weather monitor through any GCCS station.

SECONDARY

Direct phone patch between aircraft and any weather monitor through any GCCS station.

4.2.4. Common Communications. The common communications capabilities of DOD and NOAA are contained in Table 4-1.

4.3. U.S. Coast Guard. The Coast Guard operates numerous activities that routinely report or collect meteorological data. Those units that will provide data inputs for this program are Coast Guard communications facilities at Boston, Massachusetts; Portsmouth, Virginia; Miami, Florida; New Orleans, Louisiana; and San Juan, Puerto Rico. These facilities collect Automated Mutual Assistance Vessel Rescue (AMVER) and METEO messages from merchant vessels on a routine basis. The METEO data are then passed directly to the NMC over various teletypewriter circuits such as GT7990. Figure 4-1 shows the applicable east coast commands that have terminations on this circuit.



All stations except WBC have send and receive capability.

Figure 4-1. Search and rescue circuit.
(Operational Digital Network ADT 64941)

Table 4-1

Reconnaissance organization communications capabilities.

STATION	ADDRESS	TELETYPE	TELEPHONE
Federal Coordinator for Meteorology (OFCM)	Suite 300, 11426 Rockville Pike Rockville, MD		AV 851-1460 FTS 443-8704 301-770-3464
CARCAH/ Miami Monitor	OL-G, Hq AWS Gables One Tower 1320 S. Dixie Hiway Coral Gables, FL	A B C	AV 894-3430 FTS 350-5547 305-666-4612
Mather Weather Monitor	Det 7, 24 WS Mather AFB, CA	A	AV 828-4377 916-364-4377
Hickam Weather Monitor	Det 4, 1WW Hickam AFB, HI	A	AV 315-449-1279/6283 808-449-1279/6283
National Hurricane Center	Gables One Tower 1320 S. Dixie Hiway Coral Gables, FL	A B C	FTS 350-5547 305-667-3108
Alternate National Hurricane Center	WSFO Washington, DC	A B C	FTS 763-8088 301-899-3152
	WFSO New Orleans, LA	B C	FTS 682-6891 504-522-7330
Eastern Pacific Hurricane Center	WSFO Redwood City, CA	C	FTS 466-7767 415-364-4610
Central Pacific Hurricane Center	P.O. Box 29879 Honolulu, HI	C	FTS 546-2853 808-836-1831
Naval Eastern Oceanography Center	NAVEASTOCEANCEN Norfolk, VA	A	AV 564-7750/3770 FTS 954-7750/3770 804-444-7750/3770
Naval Western Oceanography Center	NAVWESTOCEANCEN Pearl Harbor, HI	A	AV 315-430-0111 (Ask for 471-0004) 808-741-0363
Office of Aircraft Operations	OAO Miami, FL		AV 894-1600 FTS 350-2936 305-526-2936

Det 1, 7WW	Det 1, 7WW Keesler AFB, MS	AV 868-2544 601-377-2544
AF Global Weather Central	AFGWC Offutt AFB, NE	AV 271-2586 FTS 866-2586 402-291-2586
CINCLANTFLT OAC	CINCLANTFLT OAC Oceana, VA	AV 433-2851 ex233 804-433-2851 ex233
53 WRS	53 WRS Keesler AFB, MS	AV 868-4540 601-377-4540
815 WRS	815 WRS Keesler AFB, MS	A AV 868-4318 601-377-4318

A - COMEDS
B - AFTN
C - AFOS

CHAPTER 5

PUBLICITY

5.1. General. News media releases that concern the cooperative efforts in severe winter storms activities of the Department of Defense, the National Oceanic and Atmospheric Administration, Federal Aviation Administration, and the U.S. Coast Guard should reflect the joint nature of these efforts by giving due credit to participating agencies.

5.2. Distribution. Forward copies of releases to the following organizations:

- o OJCS/J-3/ESD
The Pentagon
Washington, DC 20301-5000
- o Department of the Army
ATTN: DEMI/ISP
The Pentagon
Washington, DC 20310
- o Department of the Air Force (SAF/PA)
Washington, DC 20330
- o Commander, Naval Oceanography Command
NSTL Station, MS 39529
- o Military Airlift Command/PA
Scott AFB, IL 62225-5001
- o Office of Public Affairs
National Oceanic and Atmospheric Administration
Washington, DC 20230
- o Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, DC 20590
- o Commandant (G-BPA)
Headquarters, U.S. Coast Guard
Washington, DC 20593

- o Commandant, Marine Corps
Headquarters, U.S. Marine Corps
Washington, DC 20380
- o 23d Air Force (23AF/DO)
Hurlburt Fld, FL 32544-5000
- o Headquarters, Air Force Reserve
AFRES/DO
Robins, AFB, GA 31098
- o AWS/DO/PA
Scott AFB, IL 62225-5008
- o OFCM
Suite 300, 11426 Rockville Pike
Rockville, MD 20852



Figure 5-1. Results of a strong winter storm--Albany, New York.

APPENDIX A

ABBREVIATIONS

-A-

ADWS	Automated Digital Weather Switch/System
AF	Air Force (U.S. Air Force)
AFB	Air Force Base
AFCC	Air Force Communications Command
AFGWC	Air Force Global Weather Central
AFOS	Automation of Field Operations and Services
AFTN	Aeronautical Fixed Telecommunications Network
A/G	Air to Ground
AIRMET	Airmen's Meteorological Information Bulletin
AMVER	Automated Mutual Assistance Vessel Rescue System
APT	Automatic Picture Transmission
ARINC	Aeronautical Radio, Incorporated
ARRS	Aerospace Rescue and Recovery Service
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
AUTODIN	Automated Digital Network (DOD)
AUTOVON	Automated Voice Network (DOD)
AV	AUTOVON

-C-

CA	Commander, Atlantic Area (USCG)
CARCAH	Chief, Aerial Reconnaissance Coordinator, All Hurricanes
CBS	Committee for Basic Services (OFCM)
CCGD	Commander, Coast Guard District
CG	Coast Guard
COMEDS	CONUS Meteorological Data System (USAF)
CONUS	Continental United States

-D-

DMSP	Defense Meteorological Satellite Program
DOC	Department of Commerce
DOD	Department of Defense
DOT	Department of Transportation
DRSR	Direct Readout Scanning Radiometer

-E-

ESSA Environmental Science Services
Administration (now NOAA)
ETA Estimated Time of Arrival
ETD Estimated Time of Departure

-F-

FAA Federal Aviation Administration
FSS Flight Service Station
FTS Federal Telecommunications System

-G-

GCCS Global Command and Control System (USAF)
GOES Geostationary Operational Environmental
Satellite

-H-

HF High Frequency

-I-

ICMS Interdepartmental Committee for
Meteorological Services

-K-

kPa Kilopascal

-M-

METEO Cable Address for Ships
MSB Meteorological Services Division

-N-

NASA National Space and Aeronautics
Administration
NAVEASTOCEANCEN Naval Eastern Oceanography Center
NAVOCEANOCOM Naval Oceanography Command
NAWAS National Warning System
NDBC National Data Buoy Center
NDBO National Data Buoy Office
NESDIS National Environmental Satellite, Data,
and Information Service

NHC	National Hurricane Center
NMC	National Meteorological Center
NOAA	National Oceanic and Atmospheric Administration
NSSFC	National Severe Storms Forecast Center
NSSL	National Severe Storms Laboratory (NOAA)
NSTL	National Space Technology Laboratory (NASA)

-0-

OAC	Oceanic Aircraft Coordinator (USN)
OAO	Office of Aircraft Operations (NOAA)
OFCM	Office of the Federal Coordinator for Meteorological Services and Supporting Research
OSV	Ocean Station Vessel

-P-

Pa	Pascal
PIREP	Pilot Report

-R-

RAREP	Radar Report
RECCO	Reconnaissance Code

-S-

SAR	Search and Rescue
SARLANT	Search and Rescue Atlantic Circuit
SFSS	Satellite Field Service Station
SIGMET	Significant Meteorological Information Bulletin
SSB	Single Sideband

-U-

USAF	United States Air Force
USCG	United States Coast Guard
USN	United States Navy
UTC	Universal Coordinated Time (Z)

-W-

WBC	Identifier for NMC
WG	Working Group
WG/HWSO	Working Group for Hurricane/Winter Storms Operations (OFCM)

WMO	World Meteorological Organization
WRS	Weather Reconnaissance Squadron
WS	Weather Squadron (USAF)
WSFO	Weather Service Forecast Office
WSO	Weather Service Office
WSPOD	Weather Storm Plan of the Day
WW	Weather Wing (USAF)

-Z-

Z	Zulu Time (UTC)
---	-----------------

APPENDIX B

DISTRIBUTION

DEPARTMENT OF COMMERCE

Mr John Bunting, Regional Office of Audits 1

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Asst Administrator for Ocean Services and Coastal
Zone Management 1
Director, Office of Public Affairs, NOAA 2
Director, Office of Meteorology 1
Chief, Warning and Forecast Branch 20
Director, National Climate Program 1
Director, Office of Climate and Atmospheric Research 1
Director, Office of NOAA Corps 1
Director, Program Development and Coordination Staff 1
NOAA Library 4
Director, National Meteorological Center 5
Chief, Development Division, NMC 1
Chief, Satellite Services Division, NESDIS 1
Director, National Data Buoy Center 3
Director, National Hurricane Center 5
Director, NWS Eastern Region 20
Director, NWS Central Region 2
Director, NWS Southern Region 5
Director, NWS Western Region 2
WFSO, Boston, MA 1
WFSO, San Jaun, PR 1
WFSO, San Francisco, CA 1
WFSO, New Orleans, LA 5
Director, Office of Aircraft Operations 5
Director, Environmental Research Laboratories 4
Director, National Climatic Data Center 2
Deputy Asst Administrator for Information Services 10
Asst Admin for Environmental Satellite, Data, and
Information Services 1
NOAA Budget Officer, Office of Management and Budget 1

DEPARTMENT OF DEFENSE

DEPARTMENT OF THE AIR FORCE

HQ USAF/XOOR	3
HQ MAC/DOOS/XPPT	2
HQ AWS/CSE	6
Det 2, AWS	1
OL-G, Hq AWS	10
AWS Technical Library	1
1WW/DO	1
20WS/DO	1
Det 4, 20WS	1
2WW/DN	1
3WW/DO	1
24WS/DO	1
Det 7, 24 WS	1
4WW/DO	1
2WS/DO	1
Det 11, 2WS	1
5WW/DO	1
AFGWC/DO	5
Det 7, AFGWC	1
7WW/DO	1
Det 1, 7WW	1
OL-A, 7WW	1
23AF/DOX/DOO	2
53 WRS/DO	25
HQ AFRES/DO	3
HQ 4AF/DO	3
403RWRW/DO	5
815 WRS/DO	25
3350 TCHTG/TTMU	1
AFGL/LY	1

DEPARTMENT OF THE ARMY

Hq Department of the Army/DAMI-IS	2
-----------------------------------	---

DEPARTMENT OF THE NAVY

Commandant of the Marine Corps (DC/S Aviation)	5
Oceanographer of the Navy	2
Commander, Naval Oceanography Command	4
CINCLANTFLT OAC	1
Commander, Naval Air Systems Command	1
Commander, Tactical Wing Atlantic	1
Commanding Officer, NAVEASTOCEANCEN	5
Commanding Officer, NAVOCEANCOMFAC, Jacksonville	2

Officer in Charge, NAVOCEANCOMDET, Bermuda	1
Officer in Charge, NAVOCEANCOMDET, FPO Miami, FL	1
Commanding Officer, NAVOCEANCOMFAC, NSTL, MS	60
Mr William F. Cross, ONR	1

OFFICE OF THE JOINT CHIEF OF STAFF

OJCS/J3/ESD	6
-------------	---

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

ATR-150	25
Mr Glen Goodman, ATR-134	1

U.S. COAST GUARD

Mr Richard Hayes, USCG Headquarters	1
Commandant, USCG Headquarters (G-010)	10
Commandant, USCG (G-TGC-1) (FLAGPLOT)	1
Commander, Atlantic Area, USCG	1
Commander, First Coast Guard District	1
Commander, Third Coast Guard District	2
Commander, Fifth Coast Guard District	2
Commander, Seventh Coast Guard District	2
Commander, Eighth Coast Guard District	1
Commanding Officer, USCG Reserve Training Center	1
Commanding Officer, USCG Aviation Training Center	1
Commanding Officer, USCG Air Station, Otis AFB, MA	1
Commanding Officer, USCG Air Station, Opa Locka, FL	1
Commanding Officer, USCG Air Station, Floyd Bennett Field, Brooklyn, NY	1
Commanding Officer, USCG Air Station, New Orleans, LA	1
Commanding Officer, USCG Air Station, Elizabeth City, NJ	1

DEPARTMENT OF AGRICULTURE

Dr Thomas J. Jackson, USDA/ARS	1
--------------------------------	---

DEPARTMENT OF STATE

Dr Lisle A. Rose, Office of Advanced Technology	1
---	---

DEPARTMENT OF THE INTERIOR

Chief, Science and Technology Staff	1
Mr Lewis T. Moore, Bureau of Reclamation	1

FEDERAL EMERGENCY MANAGEMENT AGENCY

National Preparedness Programs 1

NATIONAL SCIENCE FOUNDATION

Head, Atmospheric Research Section 1

Dr Ronald C. Taylor, Director, Meteorology Program 1

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr John W. Kaufman, Atmospheric Sciences Division, MSFC 1

OTHER U.S.

Dr Richard A. Dirks, GALE Project Office, NCAR 1

Dr Carl W. Kreitzberg, ERICA Project Office, Drexell 2

Roddenbery Memorial Library, Cairo, GA 1

Dr Robert E. Morrison, Congressional Research Service, 1

Library of Congress

University of Chicago Library, The Joseph 1

Regenstein Library

Natural Hazards Research & Applications Information 1

Center, University of Colorado

GOVERNMENT OF CANADA

Officer in Charge, METOC Centre, Maritime Command 1

Headquarters, Halifax, NS

Regional Director, Atlantic Region, AES 1

Director, Canadian Meteorological Centre, Dorval, PQ 1

Director, Canadian Meteorological Centre, Downsview, ON

Base Meteorological Officer, CFB Greenwood, NS 1

Base Meteorological Officer, CFB Summerside, PE

Base Meteorological Officer, CFB Shearwater, NS 1

UNITED KINGDOM

Dr S.J. Caughey, Assistant Director, Head of Defence 1

Services, Meteorological Office

APPENDIX C

DEFINITIONS

Area of Concern. The geographic area of concern for the National Winter Storms Operations Plan covers the Gulf of Mexico extending about 150 mi inland along the U.S. Gulf Coast. In the Atlantic, the area of concern ranges from latitudes 25°N to 48°N, west of longitude 55°W, extending about 150 mi inland along the eastern coast of the United States.

Blizzard Warning. A blizzard warning is a headline carried in NWS forecasts and special weather statements that serves notice to the public of a high probability for the occurrence of blizzard conditions (sustained or gust wind speeds of 35 mph or more, considerable falling and/or blowing snow causing poor visibilities frequently less than one-fourth mile).

Freezing Rain (or Drizzle). The freezing of rain or drizzle on objects as it strikes them. Winter storm warnings should be reserved for occasions when significant, and possibly damaging, accumulations of ice are expected. However, even small amounts are extremely dangerous to traffic when encountered unexpectedly, and these conditions frequently require the issuance of a travelers' advisory.

Heavy Snow Warning. A heavy snow warning, carried in NWS forecast and special weather statements, serves notice to the public of a high probability for the occurrence of heavy snow (four inches or more accumulation in 12 hours or six or more accumulation in 24 hours in most areas of the country, but some variation in the snowfall criterion is allowable on a regional basis).

Mission Identifier. The nomenclature assigned to winter storm aircraft reconnaissance missions for weather data identification. It comprises an agency-aircraft indicator followed by a CARCAH-assigned mission-system indicator.

Reconnaissance Aircraft Sortie. A flight that meets the requirements of the winter storm plan of the day.

Sleet. One form of ice pellet. Generally, solid grains of ice that form from the freezing of raindrops or the refreezing of largely melted snowflakes. Sleet, like small hail, usually bounces when hitting a hard surface. Heavy sleet is a fairly rare event in which the ground is covered to a depth of significance to motorists and others.

Winter Storm Plan of the Day. A coordinated mission plan that tasks operational weather reconnaissance requirements during the next 0500Z to 0500Z day; describes reconnaissance flights committed to satisfy operational requirements and identifies possible reconnaissance requirements for the succeeding 24-hour period.

Winter Storm Warning. A winter storm warning is a headline carried in NWS forecast and special weather statements that serves notice to the public of a high probability for the occurrence of severe winter weather. The warning is issued for the same events (except for blizzard conditions) that serve as a basis for the issuance of a winter storm watch. An exception may be made in two special situations: one is the heavy snowfall that often occurs along the lee of the Great Lakes; the other is locally heavy orographic snowfall in mountainous terrain. When these conditions cannot be directly connected to a synoptic-scale winter storm, the term "Heavy Snow Warning" may be used as a headline in forecasts. The term "Winter Storm Warning" will still be used in these areas for heavy snows produced by synoptic-scale storm systems.

Winter Storm Watch. A winter storm watch is a headline carried in NWS forecasts and special weather statements to cover the possible occurrence of the following weather elements, either separately or in combination: blizzard conditions, heavy snow (or light in areas where snow is relatively rare), accumulations of freezing rain or freezing drizzle, and/or heavy sleet.

Winter Weather Advisories. Event-specific advisories are used to describe conditions that do not constitute a serious enough hazard to warrant a warning for the general public but; nevertheless, pose a significant threat to specified users. They are highlighted in forecasts and statements. These types of advisories include snow (less than 4 in), blowing snow, wind chill, freezing rain, dense fog, etc.

FORM 6--RECCO RECORDING FORM--CODE TABLES.

<p>TABLE 1 XXX</p> <p>222 Sec One Observation without radar capability 555 Sec Three (Intermediate) observation with or without radar capability 777 Sec One Observation with radar capability</p> <p>TABLE 2 i_d</p> <p>0 No dew point capability/acft below 10,000 meters 1 No dew point capability/acft at or above 10,000 meters 2 No dew point capability/acft below 10,000 meters and flight lvl temp -50°C or colder 3 No dew point capability/acft at or above 10,000 meters and flight lvl temp -50°C or colder 4 Dew point capability/acft below 10,000 meters 5 Dew point capability/acft at or above 10,000 meters 6 Dew point capability/acft below 10,000 meters and flight lvl temp -50°C or colder 7 Dew point capability/acft at or above 10,000 meters and flight lvl temp -50°C or colder</p>	<p>TABLE 6 d₁</p> <p>0 Spot Wind 1 Average Wind / No wind reported</p> <p>TABLE 7 d₀</p> <p>0 Winds obtained using doppler radar or inertial systems 1 Winds obtained using other navigation equipment and/or techniques / Navigator unable to determine wind or wind not compatible</p> <p>TABLE 8 w</p> <p>0 Clear 1 Scattered (trace to 4/8 cloud coverage) 2 Broken (5/8 to 7/8 cloud coverage) 3 Overcast/undercast 4 Fog, thick dust or haze 5 Drizzle 6 Rain (continous or intermittent precip - from stratiform clouds) 7 Snow or rain and snow mixed 8 Shower(s) (continous or intermittent precip - from cumuliform clouds) 9 Thunderstorm(s) / Unknown for any cause including darkness</p>	<p>TABLE 11 C</p> <p>0 Cirrus (Ci) 1 Cirrocumulus (Cc) 2 Cirrostratus (Cs) 3 Altcumulus (Ac) 4 Altostratus (As) 5 Nimbostratus (Ns) 6 Stratocumulus (Sc) 7 Stratus (St) 8 Cumulus (Cu) 9 Cumulonimbus (Cb) / Cloud type unknown due to darkness or other analogous phenomena</p> <p>TABLE 12 h_sh₁h₂h₃h₄h₅h₆h₇h₈h₉</p> <p>00 Less than 100 01 100 ft 02 200 ft 03 300 ft etc, etc 49 4,900 ft 50 5,000 ft 51-55 Not used 56 6,000 ft 57 7,000 ft etc, etc 79 29,000ft 80 30,000 ft 81 35,000 ft 82 40,000 ft etc, etc 89 Greater than 70,000 ft // Unknown</p>																																
<p>TABLE 3 Q</p> <table border="0"> <tr><td>0 0° - 90° W</td><td>Northern</td></tr> <tr><td>1 90° W - 180° W</td><td>Northern</td></tr> <tr><td>2 180° - 90° E</td><td>Northern</td></tr> <tr><td>3 90° - 0° E</td><td>Northern</td></tr> <tr><td>4 Not Used</td><td></td></tr> <tr><td>5 0° - 90° W</td><td>Southern</td></tr> <tr><td>6 90° - 180° W</td><td>Southern</td></tr> <tr><td>7 180° - 90° E</td><td>Southern</td></tr> <tr><td>8 90° - 0° E</td><td>Southern</td></tr> </table>	0 0° - 90° W	Northern	1 90° W - 180° W	Northern	2 180° - 90° E	Northern	3 90° - 0° E	Northern	4 Not Used		5 0° - 90° W	Southern	6 90° - 180° W	Southern	7 180° - 90° E	Southern	8 90° - 0° E	Southern	<p>TABLE 9 j</p> <p>0 Sea level pressure in whole millibars (thousands fig if any omitted) 1 Altitude 200 mb surface in geopotential decameters (thousands fig if any omitted) 2 Altitude 850 mb surface in geopotential meters (thousands fig omitted) 3 Altitude 700 mb surface in geopotential meters (thousands fig omitted) 4 Altitude 500 mb surface in geopotential decameters 5 Altitude 400 mb surface in geopotential decameters 6 Altitude 300 mb surface in geopotential decameters 7 Altitude 250 mb surface in geopotential decameters (thousands fig if any omitted) 8 D - Value in geopotential decameters; if negative 500 is added to HHH 9 No absolute altitude available or geopotential data not within ± 30 meters/4 mb accuracy requirements.</p>	<p>TABLE 13 d_w</p> <table border="0"> <tr><td>0 No report</td><td></td></tr> <tr><td>1 NE</td><td>7 NW</td></tr> <tr><td>2 E</td><td>8 N</td></tr> <tr><td>3 SE</td><td>9 all directions</td></tr> <tr><td>4 S</td><td></td></tr> <tr><td>5 SW</td><td></td></tr> <tr><td>6 W</td><td></td></tr> </table>	0 No report		1 NE	7 NW	2 E	8 N	3 SE	9 all directions	4 S		5 SW		6 W	
0 0° - 90° W	Northern																																	
1 90° W - 180° W	Northern																																	
2 180° - 90° E	Northern																																	
3 90° - 0° E	Northern																																	
4 Not Used																																		
5 0° - 90° W	Southern																																	
6 90° - 180° W	Southern																																	
7 180° - 90° E	Southern																																	
8 90° - 0° E	Southern																																	
0 No report																																		
1 NE	7 NW																																	
2 E	8 N																																	
3 SE	9 all directions																																	
4 S																																		
5 SW																																		
6 W																																		
<p>TABLE 4 B</p> <p>0 None 1 Light turbulence 2 Moderate turbulence in clear air, infrequent 3 Moderate turbulence in clear air, frequent 4 Moderate turbulence in cloud, infrequent 5 Moderate turbulence in cloud, frequent 6 Severe turbulence in clear air, infrequent 7 Severe turbulence in clear air, frequent 8 Severe turbulence in cloud, infrequent 9 Severe turbulence in cloud frequent</p>	<p>TABLE 10 N_s</p> <p>0 No additional cloud layers (place holder) i 1 oktas or less, but not zero (1/8 or less sky covered) 2 2 oktas (or 2/8 of sky covered) 3 3 oktas (or 3/8 sky covered) 4 4 oktas (or 4/8 of sky covered) 5 5 oktas (or 5/8 of sky covered) 6 6 oktas (or 6/8 of sky covered) 7 7 oktas or more but not 8 oktas 8 8 oktas or sky completely covered 9 Sky obscured (place holder)</p>	<p>TABLE 14 W_s</p> <p>0 No change 1 Marked wind shift 2 Beginning or ending of marked turbulence 3 Marked temperature change (not with altitude) 4 Precipitation begins or ends 5 Change in cloud forms 6 Fog or ice fog bank begins or ends 7 Warm front 8 Cold front 9 Front, type not specified</p>																																
<p>TABLE 5 f_c</p> <p>0 In the clear 8 In and out of clouds 9 In clouds all the time (continous IMC) / Impossible to determine due to darkness or other cause</p>		<p>TABLE 15 S_bS₀S_s</p> <p>0 No report 1 Previous position 2 Present position 3 30 nautical miles 4 60 nautical miles 5 90 nautical miles 6 120 nautical miles 7 150 nautical miles 8 180 nautical miles 9 More than 180 nautical miles / Unknown (not used for S_s)</p>																																

TABLE 16 w_d

- 0 No report
- 1 Signs of a tropical cyclone
- 2 Ugly threatening sky
- 3 Duststorm or sandstorm
- 4 Fog or ice fog
- 5 Waterspout
- 6 Cirrostratus shield or bank
- 7 Altostratus or altocumulus shield or bank
- 8 Line of heavy cumulus
- 9 Cumulonimbus heads or thunderstorms

TABLE 17 I_r

- 7 Light
- 8 Moderate
- 9 Severe
- / Unknown or contrails

TABLE 18 I_i

- 0 None
- 1 Rime ice in clouds
- 2 Clear ice in clouds
- 3 Combination rime and clear ice in clouds
- 4 Rime ice in precipitation
- 5 Clear ice in precipitation
- 6 Combination rime and clear ice in precip
- 7 Frost (icing in clear air)
- 8 Nonpersistent contrails (less than 1/4 nautical miles long)
- 9 Persistent contrails

TABLE 19 S_r, E_w, E_i

- | | |
|--------|----------------------|
| 0 ONM | 5 50NM |
| 1 10NM | 6 60-80NM |
| 2 20NM | 7 80-100NM |
| 3 30NM | 8 100-150NM |
| 4 40NM | 9 Greater than 150NM |
| | / Unknown |

TABLE 20 O_o

- 0 Circular
- 1 NNE - SSW
- 2 NE - SW
- 3 ENE - WSW
- 4 E - W
- 5 ESE - WNW
- 6 SE - NW
- 7 SSE - NNW
- 8 S - N
- / Unknown

TABLE 21 c_e

- 1 Scattered Area
- 2 Solid Area
- 3 Scattered Line
- 4 Solid Line
- 5 Scattered, all quadrants
- 6 Solid, all quadrants
- / Unknown

TABLE 22 i_e

- 2 Weak
- 5 Moderate
- 8 Strong
- / Unknown

TABLE 23 V_i

- 1 Inflight visibility 0 to and including 1 nautical mile
- 2 Inflight visibility greater than 1 and not exceeding 3 nautical miles
- 3 Inflight visibility greater than 3 nautical miles

RECCO SYMBOLIC FORM

SECTION ONE (MANDATORY)

9XXX9 GGggi_d YQL_cL_oL_o L_oL_oL_oBf_c h_oh_oh_od_rd_o
 ddfi TTT_dT_dw /iHHH

SECTION TWO (ADDITIONAL)

lk_nN_sN_sN_s Ch_sh_sH_sH_s ddfi
 6W_sS_sW_dd_w 7I_rI_rS_bS_o 7h_ih_i H_iH_i 8d_rd_rS_rO_o
 8E_wE_ic_oi_o 9V_iT_wT_wT_w

SECTION THREE (INTERMEDIATE)

9XXX9 GGggi_d YQL_cL_oL_o L_oL_oL_oBf_c h_oh_oh_od_rd_o
 ddfi TTT_dT_dw /iHHH

FORM 6--RECCO RECORDING FORM--NOTES.

1. At the time of the observation the aircraft observing platform is considered to be located on the axis of a right vertical cylinder with a radius of 30 nautical miles bounded by the earth's surface and the top of the atmosphere. Present weather, cloud amount and type, turbulence, and other subjective elements are reported as occurring within the cylinder. Flight level winds, temperature, dew point, and geopotential values are sensed or computed and reported as occurring at the center of the observation circle. Radar echoes, significant weather changes, distant weather, and icing are phenomena that may also be observed/ reported. Code groups identifying these phenomena may be reported as necessary to adequately describe met conditions observed.

2. The intermediate observation (Section Three) is reported following Section One (or Section Two if appended to Section One) in the order that it was taken.

3. Plain language remarks may be added as appropriate. These remarks follow the last encoded portion of the horizontal or vertical observation and will clearly convey the intended message. Vertical observations will not include meteorological remarks. These remarks must begin with a letter or word—E.G. "FL TEMP" vice "700 MB FL TEMP". The last report plain language remarks are mandatory, i.e., "LAST REPORT. OBS 01 thru 08 to RJTY, OBS 09 and 10 to RPMK".

4. The hundreds digit of longitude is omitted for longitudes from 100° to 180°.

5. Describe conditions along the route of flight actually experienced at flight level by aircraft.

6. TT, T_dT_d. When encoding negative temperatures, 50 is added to the absolute value of the temperature with the hundreds figure, if any, being omitted. A temperature of -52°C is given as 02, the distinction between -52°C and 2°C being made from id. Missing unknown temperatures are reported as //. When the dew point is colder than -49.4°C, Code T_dT_d as // and report the actual value as a plain language remark — E.G. DEW POINT -52°C.

7. When two or more types of w co-exist, the type with the higher code figure will be reported. Code Figure 1, 2 and 3 are reported based on the total cloud amount through a given altitude, above or below the aircraft, and when other figures are inappropriate. The summation principle applies only when two or more cloud types share a given altitude.

8. When j is reported as a 9, MMH is encoded as ///.

9. If the number of cloud layers reported exceeds 3, k_n in the first 1-group reports the total number of cloud layers. The second 1-group reports the additional number of layers being reported exclusive of those previously reported. In those cases where a cloud layer(s) is discernible, but a descriptive cloud picture of the observation circle is not possible, use appropriate remarks such as "clouds blo" or "As blo" to indicate the presence of lclouds. In such cases, coded entries are not made for group 9. The sequence in which cloud amounts are encoded depends upon type of cloud, cloud base, and vertical extent of the cloud. The cloud with the largest numerical value of cloud type code (C) is reported first, regardless of coverage, base, or vertical extent. Among clouds of the same cloud type code sharing a common base, the cloud of greatest vertical extent is reported first. The summation principle is not used; each layer is treated as though no other clouds were present. The total amount of clouds through one altitude shared by several clouds will not exceed 8 oktas. Only use code figure 0 as a place holder when you can determine that no additional cloud layers exist. In case of undercast, overcast, etc., use code figure 9 as a placeholder.

10. Due to limitations in the ability to distinguish sea state features representative of wind speeds above 130 knots, surface wind speeds in excess of 130 knots will not be encoded. Wind speeds of 100 to 130 knots inclusive will be encoded by deleting the hundreds figure and adding 50 to dd. For wind speeds above 130 knots, dd is reported without adding 50 and ff is encoded as // with a plain language remark added, i.e., -sfc wind above 130 knots.

11. Significant weather changes which have occurred since the last observation along the track are reported for Ws.

12. When aircraft encounters icing in level flight, the height at which the icing occurred will be reported for h_ih_i. The H_iH_i will be reported as //.

APPENDIX E

DROPWINDSONDE/DROPSONDE CODE BREAKDOWN--PART A

1	2	3	4	5	6	7
XXAA	YYGGI _d	99L _a L _a L _a	Q _c L _o L _o L _o L _o	MMMU _{1a} U _{1o}	99PPP	TTTT _a DD
8	9	10	11	12	13	14
ddfff	PPhhh	TTT _a DD	ddfff	.....	88999	77999

GP	IND	MEANING
1	XX	Dropsonde observation follows.
	AA	Part A follows.
2	YY	Day of the month (GMT), with 01 indicating the first day, 02 the second day, etc. YY is used to indicate the unit of wind speed in addition to indicating the day of the month. When wind speeds are given (Dropwindsonde observation), they will be in knots and 50 is added to YY. That is, day 01 will be 51, day 02 will be 52, etc.
	GG	Actual time of observation, to the nearest whole hour (GMT).
	I _d	Highest level for which wind is available. 7=700mbs, 5=500mbs, 4=400mbs, etc. On a standard Dropsonde observation, I _d will be encoded as a "/" and no winds will be reported in any part of the message.
3	L _a L _a L _a	Latitude, in tenths of a degree.
4	Q _c	Quadrant of the globe. 7=NW, 1=NE, 3=SW, 5=SE.
	L _o L _o L _o L _o	Longitude, in tenths of a degree.
5	MMM	Marsden square.
	U _{1a}	Units digit in the reported latitude.
	U _{1o}	Units digit in the reported longitude.
6	99	Indicator for surface.
	PPP	Pressure, in whole millibars. If PPP is less than 800, add 1000 to PPP.
7	TT	Tens and units digits of the air temperature at the surface.
	T _a	Approximate tenths value and sign (plus or minus) of the air temperature. Even = plus. Odd = minus.
	DD	Depression of the dew point. 00-54 is in degrees and tenths. 60-80 is in whole degrees after subtracting 50. 55-59 is not used.
8	dd	True direction of the wind in tens of degrees (Dropwindsonde only).
	fff	Wind speed measured in the units specified in group 2 (Dropwindsonde only).
9	PP	Pressure level indicator of the mandatory level. 11=1000mbs, 85=850mbs, 70=700mbs, etc.
	hhh	Height of the mandatory pressure level in geopotential meters or decameters above the surface. In meters up to 501mbs; in decameters above 501mbs. If the height of the 1000mb level is negative, 500 is added to hhh.
10	TT	See group 7.
	T _a	See group 7.
	DD	See group 7.
11	dd	See group 8.
	fff	See group 8.
12	.....	Groups 9-11 are repeated for each mandatory level, except only groups 9 and 10 will be added for the standard Dropsonde observation.
13	88999	The tropopause data is missing.
14	77999	The maximum wind data is missing (reported on both Dropsonde and Dropwindsonde observations).

DROPWINDSONDE/DROPSONDE CODE BREAKDOWN--PART B

1	2	3	4	5	6	7	8	
XXBB	YYGG/	99L _a L _a L _a	Q _c L _o L _o L _o L _o	MMMU _{l_a} U _{l_o}	OOPPP	T _o T _o T _a DD	ddfff	
9	10	11	12	13	14	15	16	17
NNPPP	TTT _a DD	ddfff	.....	21212	NNPPP	ddfff	51515	101A _{df} A _{df}

GP IND

MEANING

1 XX See Part A.
 BB Part B follows.
 GROUPS 2-5 are repeats of Part A.
 6 OO Indicator for the surface level.
 PPP See Part A.
 7 TTT See Part A.
 T_a See Part A.
 DD See Part A.
 8 dd See Part A.
 fff See Part A.
 9 NN Significant level indicator. 11-99 and then repeats. OO is not used as it is reserved for surface.
 PPP See group 6.
 10 TT See Part A.
 Ta See Part A.
 DD See Part A.
 11 dd See Part A.
 fff See Part A.
 12 See Part A.
 13 21212 Significant wind data follows. Significant wind data will not be sent on standard Dropsonde observation.
 14 NN Same as group 9.
 PPP Same as group 9.
 15 dd See Part A.
 fff See Part A.
 16 51515 Additional data follows.
 17 101 Indicator.
 A_{df}A_{df} Coded number. 66=hgts doubtful. 90=extrapolated mandatory level. 91=extrapolated SLP.

NOTE: Any missing data will be reported with a diagonal (/).

COMMITTEE FOR BASIC SERVICES

DR. JAMES L. RASSMUSSEN, Chairman
National Weather Service
Department of Commerce

VACANT
U.S. Coast Guard
Department of Transportation

DR. THOMAS J. JACKSON
Department of Agriculture

MR. GLEN GOODMAN
Federal Aviation Administration
Department of Transportation

MAJ JERRE W. WILSON, USA
Department of Defense

MR. JOHN W. KAUFMAN
National Aeronautics and Space
Administration

DR. LISLE A. ROSE
Department of State

DR. RONALD C. TAYLOR
National Science Foundation

MR. ROBERT A. KORNASIEWICZ
U.S. Nuclear Regulatory
Commission

DR. LEWIS T. MOORE
Department of Interior

MR. DONALD R. CARVER
Office of the Federal Coordinator for Meteorology
Executive Secretary

WORKING GROUP FOR HURRICANE AND
WINTER STORMS OPERATIONS

MR. DONALD WERNLY, Chairman
National Weather Service
Department of Commerce

MR. GLEN GOODMAN
Federal Aviation Administration
Department of Transportation

MAJ JERRY W. WILSON, USA
Department of Defense

DR. LISLE A. ROSE
Department of State

COL ROBERT E. BLACK, USAF
Office of the Federal Coordinator for Meteorology
Secretary