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

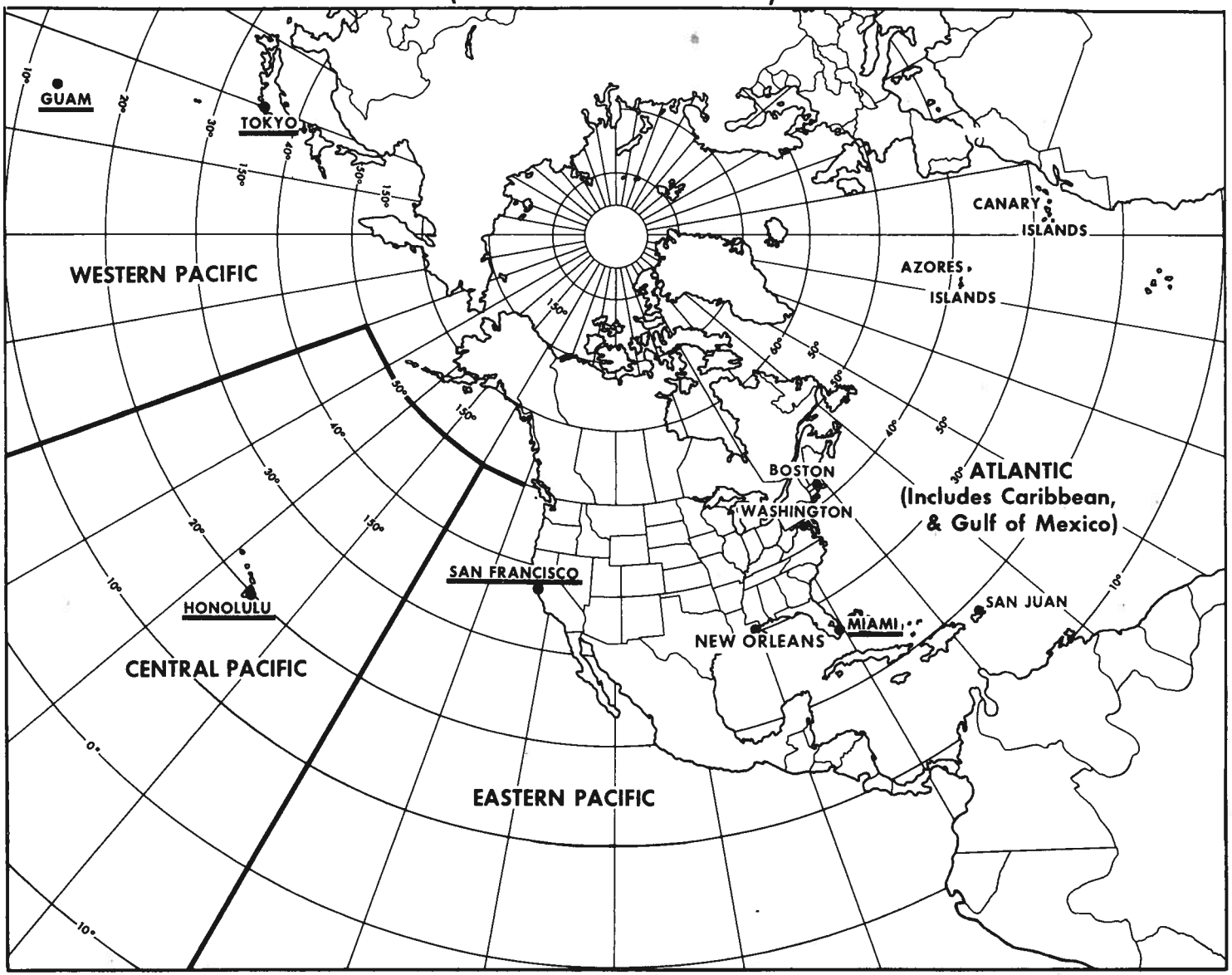
FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

NATIONAL HURRICANE OPERATIONS PLAN

1971

NATIONAL HURRICANE OPERATIONS PLAN

(AREA OF RESPONSIBILITY)



U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
FEDERAL COORDINATOR FOR METEOROLOGICAL
SERVICES AND SUPPORTING RESEARCH

NATIONAL HURRICANE OPERATIONS PLAN

FCM 71-6

Washington, D. C.
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NATIONAL HURRICANE OPERATIONS PLAN

(ATLANTIC, EASTERN PACIFIC, AND CENTRAL PACIFIC)

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PREAMBLE

This Plan presents the procedures and agreements reached at the annual Interdepartmental Hurricane Warning Conference (combined Atlantic and Pacific). This Conference is sponsored annually by the Subcommittee on Basic Meteorological Services (SC/BMS), Interdepartmental Committee for Meteorological Services (ICMS), to bring together cognizant Federal agencies to resolve problems of mutual concern related to the Atlantic and Pacific hurricane warning services.

The following National Oceanic and Atmospheric Administration (NOAA) National Weather Service officials shall provide the designated representatives of the Air Weather Service (AWS) and Naval Weather Service (NWS) with the basic meteorological decisions and associated prognostic reasoning concerning location, intensity, and forecast positions of tropical cyclones:

1. The Director, National Hurricane Center (NHC), National Weather Service, Miami, Fla., is responsible for the North Atlantic Ocean, the Caribbean Sea, the Gulf of Mexico, and for the States and possessions of the United States adjacent to these maritime areas.

2. The Meteorologist-in-Charge (MIC), Eastern Pacific Hurricane Center (EPHC), National Weather Service, San Francisco, Calif., is responsible for the Eastern Pacific Ocean east of longitude 140°W. and north of the Equator.

3. The MIC, Central Pacific Hurricane Center (CPHC), National Weather Service, Honolulu, Hawaii, is responsible for the Central Pacific Ocean from longitude 140°W. to the 180th meridian and north of the Equator.

The National Weather Service shall:

1. Make the necessary analyses and prepare basic forecasts of tropical cyclones for the use of all Department of Defense interests.

2. Supply tropical cyclone forecasts to Department of Defense weather services in accordance with published interdepartmental agreements.

The Department of Defense shall furnish to the National Weather Service aircraft reconnaissance observations and other special observations which are required to support the provisions of chapter 3 of this Plan.

1. The Department of Defense shall designate a Chief, Aerial Reconnaissance Coordination, Atlantic Hurricanes (CARCAH), to NHC. The CARCAH will be responsible for the coordination and final preparation of the Tropical Cyclone Plan of the Day (TCPOD) and for the scheduling of aircraft required to meet the provisions of chapter 3 of this Plan. An Alternate CARCAH will be designated for the Alternate Hurricane Warning Office (HWO) in support of chapter 8 of this Plan.

2. The Commanding Officer, 9th Weather Reconnaissance Wing (9 WRWg), McClellan Air Force Base (AFB), Calif., as Tropical Cyclone Reconnaissance Coordinator (TCRC), will be responsible for effecting necessary coordination and liaison with MIC, EPHC San Francisco, and MIC, CPHC Honolulu, with respect to arrangements for aircraft reconnaissance and/or other special observations which are required to support the provisions of this Plan. The Commanding Officer, Detachment 8, 17th Weather Squadron (Det 8, 17 WSq) McClellan AFB, will provide the functions of the McClellan Weather Monitor.

The Federal Aviation Administration (FAA) shall provide air traffic control, communications, and flight assistance services as appropriate in support of this Plan.

The chapters specify in further detail the responsibilities and functions of the several agencies cooperating in support of the tropical cyclone warning service.

RESPONSIBILITIES OF COOPERATING AGENCIES

1. The National Weather Service through the Director, National Hurricane Center, Miami (NHC-MIA); MIC, Eastern Pacific Hurricane Center, San Francisco (EPHC-SFO); and MIC, Central Pacific Hurricane Center, Honolulu (CPHC-HNL) shall:

a. Provide tropical cyclone forecasts and attendant advice for the general public, marine, and aviation interests.

b. Provide basic tropical cyclone forecasts and attendant advice to the Department of Defense in accordance with the detailed instructions in chapter 3.

c. Provide the Department of Defense timely access to all significant tropical cyclone reports.

d. Consult as necessary with the Department of Defense regarding day-to-day requirements for tropical cyclone advice and arrange to meet these requirements within the capabilities of the Hurricane Warning Offices (HWO).

e. Advise the CARCAH and Tropical Cyclone Reconnaissance Coordinator (TCRC)--Eastern and Central North Pacific--of aircraft reconnaissance and other observational requirements of the respective HWOs.

f. Through EPHC SFO coordinate with the Fleet Weather Center (FWC) Alameda, Calif., and through CPHC HNL coordinate with FWC Pearl Harbor, Hawaii, and the Central Pacific Forecast Center (CENPAC FC) Hickam AFB Hawaii before issuing Tropical Cyclone Advisories in the Eastern and Central Pacific areas, respectively.

2. The NOAA National Environmental Satellite Service (NESS) shall:

a. Operate environmental satellite systems capable of providing coverage of meteorological conditions in the tropics during the tropical cyclone season.

b. Coordinate with the National Aeronautics and Space Administration (NASA) on providing data from its research and development satellites to NOAA operational units for their use on a routine basis.

c. Receive requirements from NHC for areas and times for which specific coverage is desired.

d. Process and transmit available data to meet the requirements of NHC.

e. Monitor all tropical regions by means of satellite data and communicate interpretations therefrom of disturbed areas as specified in chapter 9 of this Plan.

3. The Department of Defense shall:

a. Provide up-to-date information to NHC-MIA, EPHC-SFO, and CPHC-HNL concerning requirements for tropical cyclone advice and pertinent information.

b. Meet the requirements for aircraft reconnaissance and other observations noted in chapter 4 within the limits of service capabilities.

c. Provide access to Air Defense Command (ADC) radar sites under conditions specified in chapter 5, paragraph 6.

4. The Department of Defense will meet from its own resources any military requirements that are in excess of the common tropical cyclone requirements as stated in appendix G, chapter 4, of this Plan.

5. The Federal Aviation Administration (FAA) will:

a. Provide air traffic control, communication, and flight assistance services as appropriate in support of this Plan.

b. Make the necessary arrangements for accommodations and access to appropriate communication and radar facilities to allow the observation and transmission of hurricane radar data from Air Route Traffic Control Centers (ARTCC).

6. National Weather Service and the Department of Defense will cooperate in arranging an annual trip to the Caribbean and Gulf of Mexico area to carry out a continuing and effective liaison on the warning service with the Directors of Meteorological Services and disaster prevention agencies of those nations.

DEFINITIONS

The following definitions will apply for the purposes of this Plan and its appendixes:

CYCLONE: An atmospheric closed circulation rotating counterclockwise in the Northern Hemisphere.

EYE FIX: A fix by means other than reconnaissance aircraft penetration (aircraft, ship, or land-based radar; satellite).

HURRICANE/TYPHOON: A warm-core tropical cyclone in which the maximum sustained surface wind (1 minute mean) is 64 knots or greater.

HURRICANE SEASON: The portion of the year having a relatively high incidence of hurricanes. In the North Atlantic, it is usually regarded as the period from June through November; in the East Pacific June through November 15; and Central Pacific, it is usually regarded as the period from June through October.

PRESENT MOVEMENT: The best estimate of movement of the center of the tropical cyclone at the time of position indicated in the advisory. (In advisories, remarks will be used to amplify significant changes between present movement and forecast movement.)

TROPICAL CYCLONE: A nonfrontal cyclone of synoptic scale, developing over tropical or subtropical waters and having a definite organized circulation.

TROPICAL DEPRESSION: A tropical cyclone in which the maximum sustained surface wind (1 minute mean) is 33 knots or less.

TROPICAL DISTURBANCE: A descrete system of apparently organized convection--generally 100 to 300 miles in diameter--originating in the tropics or subtropics, having a nonfrontal migratory character, and having maintained its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field. As such, it is the basic generic designation which, in successive stages of intensification, may be subsequently classified as a tropical wave, depression, storm, or hurricane.

TROPICAL STORM: A warm-core tropical cyclone in which the maximum sustained surface wind (1 minute mean) is in the range 34 to 63 knots inclusive.

TROPICAL WAVE: A trough or cyclonic curvature maximum in the trade wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere, or may be the reflection of an upper troposphere cold low or equatorward extension of the middle latitude trough.

VORTEX FIX: A fix made by reconnaissance aircraft penetration into the vortex of the tropical cyclone.

TROPICAL CYCLONE FORECASTS AND INFORMATION TO BE FURNISHED BY THE NATIONAL WEATHER SERVICE TO THE DEPARTMENT OF DEFENSE

1. Reports. The National Hurricane Center, Miami, (NHC-MIA), the Eastern Pacific Hurricane Center, San Francisco (EPHC-SFO), and the Central Pacific Hurricane Center, Honolulu (CPHC-HNL) in their respective areas of responsibility will make available to the Department of Defense all significant tropical cyclone reports which they receive.

2. Advisories. The NHC-MIA, EPHC-SFO, and CPHC-HNL will issue and provide to the Department of Defense basic tropical cyclone forecasts and related information for tropical cyclones of storm or hurricane intensity. Basic tropical cyclone forecasts will include advice as to location, movement, intensity, and dimensions of tropical cyclones. These forecasts and related information will be provided in the form of Military Advisories (Form 1 of this chapter--WS Form C-13).

The NHC will provide this information through the CARCAH. Such material provided to the CARCAH will be in tape form for further relay to the Department of Defense offices. The release time of such material by CARCAH will not be earlier than 30 minutes before the scheduled warning time of the material.

a. Time and Circumstances of Issue of Advisories for Department of Defense.

(1) Initial Advisory. The first advisory will normally be issued when surface observations of wind speeds in a closed tropical cyclone system reach sustained values of 34 knots. Consideration will be given to issuing the first advisory before winds reach these values if the wind system is closed and speeds are expected to increase to 34 knots within 24 hours.

(2) Scheduled Advisories. Atlantic: After the Initial Advisory is issued, advisories will be issued for the hours 0400, 1000, 1600, and 2200Z (Greenwich Mean Time--GMT). The 12-, 24-, 48-, and 72-hour forecasts will be based on the latest 6-hourly synoptic time for the hours 0000, 0600, 1200, and 1800Z. Advisories will continue to be issued as long as the hurricane or tropical cyclone exists.

Pacific: After the Initial Advisory is issued, advisories will be issued for the hours of 0300, 0900, 1500, and 2100Z, and for synoptic positions at hours 0000, 0600, 1200, and 1800Z.

(3) Special Advisories. Scheduled Advisories will be supplemented by Special Advisories issued at intervening hours as required by receipt of new information showing important changes in the cyclone.

Eastern Pacific: Special Advisories will carry the word "amended," "corrected," or "relocated," as appropriate, immediately following the advisory number. This will not change the advisory number. (See Form 1 of this chapter.)

Central Pacific: The term Special Advisory or Bulletin will be reserved for amending information in the previous advisory or relocation of the storm due to later data. This information is generally obtained after the valid time of the original advisory, and a Special Advisory will be issued with a new number and a later valid time (0330 or 0400 GMT) for these cases. A corrected advisory will retain the same number as the original and will not require a Special Advisory.

The term "relocated" may be used whenever a vector drawn from the preceding Tropical Cyclone Advisory position to the latest known position is not necessarily a reasonable representation of the cyclone's movement.

(4) Amended Military Advisory

(a) Last minute changes of hurricane position, direction of motion, and intensity included in a public advisory require an issuance of an amended Military Advisory. The number used for the amended advisory will be the same as for the advisory being amended. For example, if Military Advisory number 21 is amended, it will be Military Advisory number 21 (Amended).

(b) The National Weather Service will be permitted to make changes of 15 knots or less in the maximum sustained winds in the public bulletins so long as this does not change the category (depression/storm/hurricane) of the system. If the NHC determines an amendment to the Military Advisory is necessary because of a change in winds only, an amendment to the last Military Advisory will be issued which contains only this change in wind speed. This amendment will have the same number as the Advisory being amended and will also contain the amendment number. For example, if Military Advisory number 21 is being amended for the wind speed, it becomes the First Amendment to Military Advisory number 21. If the wind speed is changed again prior to normal advisory time it becomes the Second Amendment to Military Advisory number 21.

b. Content of Advisories. Advisories provided the Department of Defense will contain the following information:

(1) Time of issue.

(2) Heading, advisory number, kind and name, and hour and day.

(3) Warnings in effect.

(4) Position, in degrees and tenths.

(5) Time of position in GMT.

(6) Accuracy and basis for position.

(7) Present movement (not used in Central Pacific).

(8) Present winds:

(a) Maximum sustained winds.

(b) Maximum sustained winds over inland areas--more than 10 miles from the coast--(Atlantic only).

(c) Radius of 65-, 50-, and 30-knot sustained winds (Atlantic only).

(d) Radius of 100-, 50-, and 30-knot sustained winds (Pacific only).

(9) Repeat center location and time.

(10) Forecasts:

(a) Twelve-hour forecast position:

1) Maximum sustained winds in 12 hours.

2) Maximum sustained winds over inland areas (Atlantic only).

3) Radius of 50-knot sustained winds in 12 hours.

(b) Twenty-four-hour forecast position:

1) Maximum sustained winds in 24 hours.

2) Maximum sustained winds over inland areas (Atlantic only).

3) Radius of 50-knot sustained winds in 24 hours.

(11) Heavy precipitation forecast (not used in Central Pacific).

(12) Storm-tide forecast (not used in Central Pacific).

(13) Extended outlooks:

(a) Forty-eight-hour outlook position:

1) Maximum sustained winds in 48 hours.

2) Maximum sustained winds over inland areas (Atlantic only).

3) Radius of 50-knot sustained winds in 48 hours.

(b) Seventy-two-hour outlook position:

1) Maximum sustained winds.

2) Maximum sustained winds over inland areas (Atlantic only).

(14) Reconnaissance plans including scheduled fixes (Central Pacific only).

(15) Time of issuance for next Military Advisory.

c. Format. The format of advisories furnished the Department of Defense will be as shown in Form 1 of this chapter.

3. Tropical Cyclone Issuances--Pacific. The EPHC-SFO and CPHC-HNL will issue and provide to the Department of Defense basic tropical cyclone forecasts and related information. Basic tropical cyclone forecasts will include advice as to location, movement, intensity, and dimensions of tropical cyclones. These forecasts and related information will be provided as shown on Form 1 (WS Form C-13, formerly WB 656-6) of this chapter.

a. Time and Circumstances of Issue of Bulletin for the Department of Defense. Initial Bulletins, Scheduled Bulletins, and Special Bulletins will be issued for existing tropical depressions in the same manner as advisories.

b. Contents of Bulletins. Bulletins provided the Department of Defense will contain the following information from WS Form C-13.

(1) Time of issue.

(2) Heading, bulletin, tropical depression, tropical depression number (spelled out), and hour and day.

(a) Numbers to be furnished EPHC-SFO by the U.S. Navy at Alameda and CPHC-HNL by the U.S. Navy at Guam.

(b) Bulletin issuances will not be numbered sequentially by NHC-MIA and EPHC-SFO.

(c) In the Central Pacific, both bulletins and advisories will be numbered sequentially, that is, Bulletin Number 1 Tropical Depression ONE; Bulletin Number 2 Tropical Depression ONE; Advisory Number 3 Tropical Storm Anita; Advisory Number 4 Hurricane Anita; Bulletin Number 5 Tropical Depression ONE; etc. WHPN1 PHNL (Tropical Depression Bulletins on WS Form C-13) and WHPN3 PHNL (Tropical Storm or Hurricane Advisories on WS Form C-13) will be numbered sequentially as indicated, but the first issuance of WHPN2 PHNL (issuance in public format) will contain the advisory number assigned to concurrently issued WHPN3 PHNL or WHPN1 PHNL.

(3) Position, in degrees and tenths.

(4) Time of position in GMT.

(5) Accuracy and basis for position.

(6) Present movement (not used in Central Pacific).

(7) Present winds:

(a) Maximum sustained winds.

(8) Forecast:

(a) Twelve- and 24-hour forecast position:

1) Maximum sustained winds in 12 and 24 hours.

(9) Reconnaissance plans including scheduled fixes (Central Pacific).

(10) Time of issuance for next Military Bulletin.

4. Tropical Cyclone Discussions--Atlantic. The NHC will issue Tropical Cyclone Discussions at 0300, 0900, 1500, and 2100Z daily whenever advisories are being issued. These Discussions, with preliminary prognostic positions up to 72 hours, will be for intragovernment use only, and dissemination will be in the same manner as the Military Advisory.

The Discussion will cover 24-hour forecasts, 24- to 48-hour forecasts, and 48- to 72-hour outlook as related to such items as synoptic features, objective techniques employed, and climatology. They will give reasons for intensity or track changes and include plans for warnings display.

The Marine/Aviation/Military Advisory will give the final forecast positions and will serve as the amendment to the preliminary forecast position in the Tropical Cyclone Discussion.

5. Tropical Weather Outlook. The NHC will issue a Tropical Weather Outlook three times a day during the period from June 1 through November 30. These will be issued at 0930, 1530, and 2130 GMT and distributed on all Radar Report (RAREP) and Warning Coordination (RAWARC) circuits and Circuit 7072. The Outlook will provide the general public and other user groups with: (1) assurance to areas in the main hurricane belt when conditions are stable, and (2) an additional 1- or 2-day notice in areas where conditions are becoming unstable and favorable to tropical inception.

6. Hourly Tropical Cyclone Position Estimates--Atlantic. The National Weather Service Hurricane Warning Office (HWO) that issues the public advisory will also issue hourly Tropical Cyclone Position Estimates when the tropical cyclone is under effective surveillance by land-based radar and within 200 nautical miles of the conterminous United States. These estimates will be distributed on Circuits 23421, 23420, and 7072 a short time before each hour, except for hours when advisories and bulletins are issued. The Position Estimates will be available to the public and to other agencies for relay to their own communications systems.

7. Marine Bulletins Broadcast by Radio Stations.

a. NSS, Washington, D.C. Formal Tropical Storm and Hurricane Advisories issued at 0400, 1000, 1600, and 2200Z will be edited by the Weather Service Forecast Office (WSFO) Washington and included in Marine Bulletins broadcast by radio station NSS.

b. San Francisco, Los Angeles, and San Pedro, Calif. Formal Tropical Storm and Hurricane Advisories issued at 0300, 0900, 1500, and 2100Z will be edited by WSFO San Francisco and included in Marine Bulletins broadcast by radio stations KPH, KMI, KFS, KOK, NMQ, KOU, and WWD.

c. Honolulu and Kahuku, Hawaii. Formal Tropical Storm and Hurricane Advisories issued at 0300, 0900, 1500, and 2100Z will be edited by WSFO Honolulu and included in Marine Bulletins broadcast in continuous wave (CW) by radio stations KHK (Kahuku) and NMO (Coast Guard Honolulu) and in frequently scheduled voice broadcasts by stations NMO, KBP, and KOM.

8. Bulletins. The NHC-MIA, EPHC-SFO, and CPHC-HNL will make available to the Department of Defense any public bulletins issued by the National Weather Service regarding suspicious areas, tropical disturbances, tropical depressions, tropical storms, or hurricanes.

9. Distribution of Forecasts and Information. The National Weather Service will distribute tropical cyclone advice to the public. In the public advisory, wind speed and speed of translation will be given in miles per hour and distances in statute miles. Each of the other agencies will arrange for its own internal distribution and will take appropriate action to insure that tropical cyclone advice issued for its internal use is not disseminated to the public.

10. Bulletins on Tropical Cyclones After Discontinuance of Advisories. The storm name will be retained until all bulletins have been discontinued on a tropical cyclone.

11. Definition of Position Reliability (Form 1 of this Chapter, WS Form C-13).

Excellent: Position accurate to within 10 miles.
Good: Position accurate to within 20 miles.
Fair: Position accurate to within 40 miles.

When the position accuracy is greater than 40 miles, it will be expressed as:

Position accurate within_____miles.

Military advisory will use nautical miles as the measure of distance for the preceding definitions.

WS Form C-13 (4-71)

NATIONAL HURRICANE CENTER MARINE/AVIATION/MILITARY
or
_____PACIFIC HURRICANE CENTER

*BULLETIN ADVISORY NUMBER ___ AMENDED CORRECTED RELOCATED TROPICAL DEPRESSION TROPICAL STORM HURRICANE

_____ _____Z _____
(NAME/NUMBER*) (MONTH) (DAY) (YEAR)

(WARNINGS)

The Eastern and Central Pacific have made minor changes to the heading of this form for their use. The following indicates the second line of their heading:

+ [corrected / amended / relocated] _____ (Name/Number) upgraded to / downgraded from tropical depression / tropical storm / hurricane _____ (Name/Number) _____ (Time/Date

DEPRESSION/STORM/HURRICANE CENTER LOCATED NEAR LATITUDE _____ NORTH LONGITUDE_____WEST AT __/_____Z.

POSITION EXCELLENT/GOOD/FAIR/ACCURATE WITHIN_____MILES BASED ON DOD/RFF RECONNAISSANCE/

LAND BASED RADAR/ACFT RADAR/SATELLITE/SHIPS/SYNOPTIC REPORTS/EXTRAPOLATION FIX.

PRESENT MOVEMENT TOWARD THE _____ OR _____ DEGREES AT _____KT.

MAX SUSTAINED WINDS OF ___KT NEAR CENTER AND WITHIN RADIUS OF___NM NE__NM SE___NM SW___NM NW QUAD.

MAX WINDS OVER INLAND AREAS _____ KT.

* RAD OF 100 KT-WINDS _____ NE _____ SE _____ SW _____ NW QUAD.

\# RAD OF 65 KT-WINDS _____ NE _____ SE _____ SW _____ NW QUAD.

RAD OF 50 KT-WINDS _____ NE _____ SE _____ SW _____ NW QUAD.

RAD OF 30 KT-WINDS _____ NE _____ SE _____ SW _____ NW QUAD.

REPEAT CENTER LOCATED _____ N _____W AT ____/_____Z.

12-HOUR FORECAST VALID ____/_____Z LATITUDE _____N LONGITUDE _____W.

MAX WINDS OF ____KT NEAR CENTER AND WITHIN RADIUS OF _____NE _____ SE _____ SW _____ NW QUAD.

MAX WINDS OVER INLAND AREAS _____KT.

RADIUS OF 50-KT WINDS _____NE _____SE _____SW _____NW QUAD.

24-HOUR FORECAST VALID_____/_____Z LATITUDE_____N LONGITUDE_____W.

MAX WINDS OF ____KT NEAR CENTER AND WITHIN RADIUS OF _____NE _____ SE _____ SW _____NW QUAD.

MAX WINDS OVER INLAND AREAS _____KT.

RADIUS OF 50-KT WINDS _____NE _____SE _____SW _____NW QUAD.

HEAVY PRECIPITATION (Not used in Central Pacific)

(AVIATION ADVISORY ENDS HERE)

STORM-TIDE OF (Not used in Central Pacific)

(MARINE ADVISORY ENDS HERE)

48-HOUR OUTLOOK VALID ____/_____Z LATITUDE _____N LONGITUDE _____W.

MAX WINDS OF ____KT NEAR CENTER AND WITHIN RADIUS OF _____NE _____SE _____SW _____NW QUAD.

MAX WINDS OVER INLAND AREAS _____KT.

RADIUS OF 50-KT WINDS _____NE _____SE _____SW _____NW QUAD.

72-HOUR OUTLOOK VALID ____/_____Z LATITUDE _____N LONGITUDE _____W.

MAX WINDS OF ____KT NEAR CENTER AND WITHIN RADIUS OF _____NE _____SE _____SW _____NW QUAD.

MAX WINDS OVER INLAND AREAS _____KT.

RADIUS OF 50-KT WINDS _____NE _____SE _____SW _____NW QUAD.

+ RECONNAISSANCE PLANS INCLUDING SCHEDULED FIXES _____

NEXT ADVISORY AT ____/_____Z. (FORECASTER _____)

(* FOR USE IN PACIFIC ONLY) (# FOR USE IN ATLANTIC ONLY) (+ CENTRAL PACIFIC ONLY)
(INLAND AREAS --MORE THAN 10 MILES FROM COAST)
Note: Use of quadrants is optional in the Pacific.

CHAPTER 3
Form 2

DIGITAL TROPICAL WEATHER WARNING

(WORKSHEET)

INSTRUCTIONS

Group	
1	Tropical weather warning indicator.
2	Up to six letters of name/number.
3	t_p – storm type. 1 – hurricane 2 – typhoon 3 – tropical storm 4 – tropical depression. NN – advisory number F – fix quality. 1 – excellent 2 – good 3 – fair 4 – greater than 40 n.m. t_f – fix type 1 – reconnaissance 2 – land-based radar 3 – aircraft radar 4 – satellite 5 – ships 6 – synoptic reports 7 – extrapolation
4	Date-time (GMT) of initial position reported.
5 and similar groups	99 – WMO indicator. $L_aL_aL_a$ – Latitude *(tenth of degree).*
6, 33, 45, 57, 69	Q_c – WMO quadrant. 1 – 0–180° E } North 7 – 0–180° W } 3 – 0–180° E } South 5 – 0–180° W } $L_oL_oL_oL_o$ – Longitude *(tenth of degree)*
7, 34, 46, 58, 70	O – initial position report. 1 – 12-hour prognosis 2 – 24-hour prognosis 4 – 48-hour prognosis 7 – 72-hour prognosis WWW – max wind (kts) RR – min radius of max wind *(tens of n.m.)* *(00 = near center)*
8 and similar groups	O – same as 7. Q1 – NE quadrant Q2 – SE quadrant Q3 – SW quadrant Q4 – NW quadrant RR – radius if reported wind *(tens of n.m.)*
12, 17, 22, 27, 39, 51, 63, 75	O – same as 7. WWW– Wind speed required by local directive (100, 65, 50, 30 kt) RR – same as 7.
80	Clarifying remarks deemed necessary by issuing agency.

FORMAT NOTES

1. *( ) Enclosed group number. Use group as required by regional directive.*
2. *◯ Encircled group number. Use group if appropriate.*
3. *Line out unneeded groups.*

Bulletin ID	1. HH	2. AAAAAA	(3) t_p NN F t_f	4. dd tttt			
	HH						
ANALYSIS	5. 99LaLaLa 99	6. Q_c LoLoLoLo	7. OWWWRR 0	(8) OQ1RR ONE	(9) OQ2RR OSE	(10) OQ3RR OSW	(11) OQ4RR ONW
	(12) OWWWRR 0100	(13) OQ1RR ONE	(14) OQ2RR OSE	(15) OQ3RR OSW	(16) OQ4RR ONW		
	(17) OWWWRR 0065	(18) OQ1RR ONE	(19) OQ2RR OSE	(20) OQ3RR OSW	(21) OQ4RR ONW		
	(22) OWWWRR 0050	(23) OQ1RR ONE	(24) OQ2RR OSE	(25) OQ3RR OSW	(26) OQ4RR CNW		
	(27) OWWWRR 0030	(28) OQ1RR ONE	(29) OQ2RR OSE	(30) OQ3RR OSW	(31) OQ4RR ONW		
12-hr Prog	32. 99LaLaLa 99	33. Q_c LoLoLoLo	34. 1WWWRR 1	(35) 1Q1RR 1NE	(36) 1Q2RR 1SE	(37) 1Q3RR 1SW	(38) 1Q4RR 1NW
	(39) 1WWWRR 1050	(40) 1Q1RR 1NE	(41) 1Q2RR 1SE	(42) 1Q3RR 1SW	(43) 1Q4RR 1NW		
24-hr Prog	44. 99LaLaLa 99	45. Q_c LoLoLoLo	46. 2WWWRR 2	(47) 2Q1RR 2NE	(48) 2Q2RR 2SE	(49) 2Q3RR 2SW	(50) 2Q4RR 2NW
	(51) 2WWWRR 2050	(52) 2Q1RR 2NE	(53) 2Q2RR 2SE	(54) 2Q3RR 2SW	(55) 2Q4RR 2NW		
48-hr Prog	56. 99LaLaLa 99	57. Q_c LoLoLoLo	58. 4WWWRR 4	(59) 4Q1RR 4NE	(60) 4Q2RR 4SE	(61) 4Q3RR 4SW	(62) 4Q4RR 4NW
	(63) 4WWWRR 4050	(64) 4Q1RR 4NE	(65) 4Q2RR 4SE	(66) 4Q3RR 4SW	(67) 4Q4RR 4NW		
72-hr Prog	(68) 99LaLaLa 99	(69) Q_c LoLoLoLo	(70) 7WWWRR 7	(71) 7Q1RR 7NE	(72) 7Q2RR 7SE	(73) 7Q3RR 7SW	(74) 7Q4RR 7NW
	(75) 7WWWRR 7050	(76) 7Q1RR 7NE	(77) 7Q2RR 7SE	(78) 7Q3RR 7SW	(79) 7Q4RR 7NW		

REMARKS

This form is included for informational purposes. It may be used by Air Weather Service in the development of a system for converting Military Advisories (from WS Form C-13) to digital format for computer consumption. Should digital advisories be transmitted, receipt by nonusers will be minimal.

AIRCRAFT RECONNAISSANCE

1. Responsibility.

a. Atlantic: The Department of Defense will have the operational reconnaissance responsibility for providing fixes and investigative flights on tropical cyclones in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. In addition, the Research Flight Facility (RFF) of the National Oceanic and Atmospheric Administration (NOAA) will supply backup operational support in accordance with the following:

(1) Reconnaissance will be on a flight pattern coordinated and specified in the Tropical Cyclone Plan of the Day (TCPOD).

(2) When the RFF is requested to fly operational missions, the specified flight pattern will be flown. When RFF research flight patterns preclude operational flights into the storm area (radius 80 nautical miles of center), the RFF will make the vortex fix and Department of Defense aircraft will provide peripheral data.

(3) The resolution of conflicts will be made by the Chief, Aerial Reconnaissance Coordination, Atlantic Hurricanes (CARCAH).

(4) The U.S. Air Force Gull Hotel Track will have higher priority than the Gull India Track during the period from June 1 through November 30. The outward leg of the Gull Hotel Track should be flown at 700 millibars (10,000 ft.) (see appendix H).

(5) Special flights may be scheduled through CARCAH to fill specific National Hurricane Center (NHC) requirements. Priority for these special tracks will be higher than standard tracks (Gull Hotel) and lower than investigative/tropical cyclone missions. The weather mission identifier will be Gull or Navy Special.

(6) The following 500-millibar (19,000 ft.) Navy Synoptic Tracks have been developed as requested by NHC to better utilize the capabilities of the WP3A aircraft:

1 PAPA JACK

Departure Point--Jacksonville, Fla., Roosevelt Roads, P.R., or Bermuda.
Route--via 21° 05'N., 65° 11'W. and 28° 00'N., 15° 30'W.
Terminate--Las Palmas, Canary Islands.

2 PAPA CHARLIE

Departure Point--Roosevelt Roads.
Route--via 13°N., 60°W. rhumb line to 13°N., 20°W.
Terminate--Dakar, Senegal, or Sal, Cape Verde Islands.

3 PAPA PAUL

Departure Point--Roosevelt Roads.
Route--via 13°N., 60°W. to 13°N., 80°W. to 25°N., 90°W. to 29°N., 84°W.
Terminate--Jacksonville.

b. Eastern and Central Pacific: The Department of Defense will be responsible for providing tropical cyclone aircraft reconnaissance in both the Eastern Pacific Hurricane Center's (EPHC) and the Central Pacific Hurricane Center's (CPHC) areas of responsibility subject to the capabilities of available aircraft.

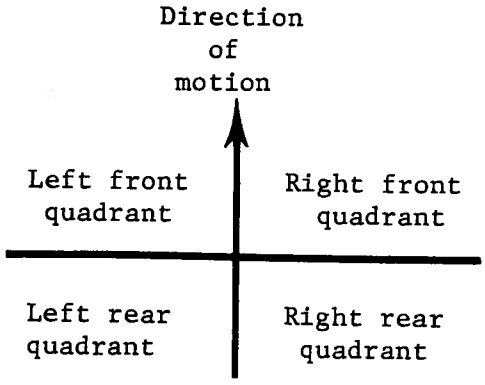
c. Investigative Reconnaissance: An investigative reconnaissance flight is a special mission to investigate the stage of development of a known tropical disturbance, specifically to determine: (a) whether a pressure center exists near the surface, and (b) the maximum low-level winds associated with the disturbance. Whenever possible, these flights shall be scheduled with on-station time during daylight hours.

2. Operational Control of Aircraft. Operational control of aircraft engaged in tropical cyclone reconnaissance will be exercised by the respective services which operate them.

3. Reconnaissance Requirements.

a. Atlantic:

(1) Standard Flight Patterns. Operational hurricane reconnaissance flights will fly the flight pattern (as shown and described in appendix A of this chapter) designated in the TCPOD. The flight tracks will use a quadrant system (see diagram below) based upon predicted direction of motion of the storm center in the last Military Advisory before departure. Altitudes indicated in flight patterns are pressure altitudes, except those 5,500 feet and below. Any tasked pattern can be adjusted (without prior NHC approval) to match the capabilities or operational limitations of the aircraft or service concerned.



(a) Pattern A will be used for a steady state or quasi-steady state hurricane. Its objective is to provide a means for obtaining two 6-hour center fixes and vortex data.

(b) Pattern B will be used to acquire a center fix and vortex data on a tropical cyclone too distant to make two center fixes.

(c) Pattern C will be used for tropical cyclones in the decay or rapid intensification stage to provide two 6-hour center fixes, with a special requirement for equivalent potential temperature data at 27,000 feet or sea-surface temperature data at 1,500 feet.

(d) Pattern D will be used for investigative missions to obtain pressure center, maximum winds, and peripheral data at 1,500 feet. Deviation will be permitted from the forecast coordinates contained in the TCPOD to that position which the on-board weather officer determines to be the center of the disturbance he has been tasked to investigate. After the location of the disturbance center is determined, the pattern designated in the TCPOD will be flown. The size of the pattern flown will be adjusted as remaining aircraft capabilities allow.

These flight patterns will be flown and vortex data obtained at specified flight altitudes within the limits of operational safety.

(2) Vortex or Eye Fixes. Hurricane reconnaissance flights assigned operational responsibility for obtaining vortex fixes and profile data of this storm area (80-nautical-miles radius of center) by quadrant have the highest NHC priority. All vortex fixes will be made at 700 millibars (10,000 ft.) or below, except as indicated in Patterns C and D, and within aircraft safety limits. The flights should be planned so that vortex fixes are obtained at the specified times indicated below or as near those times as operational conditions permit. The legs of the tracks to obtain vortex peripheral data may be adjusted, as shown in Pattern A, to enable the aircraft to return to the vortex in sufficient time for the second 6-hour fix. The frequency of these fixes may be augmented as required by NHC and as specified in the TCPOD.

1200Z (0700 EST) for forenoon reconnaissance.
1800Z (1300 EST) for afternoon reconnaissance.
0000Z (1900 EST) for evening reconnaissance.
0600Z (0100 EST) for night reconnaissance.

Flexibility for fix requirements is necessary. Whenever possible, flights should be planned to provide first and last light fixes in addition to synoptic time fixes. Three-hourly fixes should be scheduled only when a storm is in close proximity to landmasses or operating forces and when additional data are required to fix and forecast the storm movement accurately.

All observed vortex or eye fix information will be included in the Detailed Eye/Vortex Data Message (Form 2 of this chapter). A plain text

message (Form 1 of this chapter) will be sent on all fixes of the eye or vortex for each flight. This message will be transmitted as soon as possible in the interest of reducing time delay for delivery to NHC. All radar fix reports will be made in plain text (Form 3 of this chapter). The method of obtaining the location of the vortex should always be included in eye position reports from reconnaissance aircraft.

The vortex should be located according to the following priority:

(a) Pressure vortex. This is obtained by proper flight patterns to locate the position of the lowest surface pressure.

(b) Wind vortex. If practical, this is to be used to obtain accurate observations of spot winds.

(c) Cloud vortex. This is obtained within the eye by visual and/or radar observations.

(d) Radar eye. This is obtained by coverage of the storm from outside the eye.

All aircraft eye or vortex fixes will be reported in degrees and minutes.

Quality of the aircraft reconnaissance fix will be based upon the observation of the following critical data items:

Central pressure (Item G, form 2 of this chapter);
Maximum surface wind (Item I, form 2 of this chapter);
Maximum flight level winds (Item K, form 2 of this chapter).

Fix quality is as follows:

CLASS I FIX: Time and location of tropical cyclone vortex plus observation of central pressure, maximum surface within the eye, and flight level winds.

CLASS II FIX: Time and location of tropical cyclone vortex plus observation of central pressure within the eye and maximum flight level winds.

CLASS III FIX: Time and location of tropical cyclone vortex with observation of the central pressure.

CLASS IV FIX: Time and location of tropical cyclone vortex without observation of the central pressure.

CLASS V FIX: Time and location of tropical cyclone vortex without aircraft penetration of the eye.

(3) Vortex Profile Data. Penetration and collection of vortex data (see below) will normally start at 700 millibars (10,000 ft.) and at a radius of 80 nautical miles from the center as indicated by aircraft radar. Patterns will be flown and data collected as indicated in appendix A to this chapter.

The storm vortex profile data to be collected are:

(a) Central Pressure. When reconnaissance aircraft have entered the eye, central pressure should be obtained by dropsonde observations at the center while height observations should be obtained at and in close proximity of the center at 700 millibars (10,000 ft.) or lower so that the central pressure at the surface may be accurately calculated. As a minimum, these data should be obtained at 6-hour intervals whenever a storm (tropical cyclone) is within 30 hours of landfall.

(b) Wind Profile. The flight level wind speed profile should be obtained from 80 nautical miles radius to the center at the designated flight pattern altitude. The radial distance from the center of the maximum 63-, 50-, and 30-knot values should be observed in each quadrant. Surface wind-speed profile, when observed, should be included in the Remarks section of the Supplementary Vortex Data/Message (Form 4 of this chapter).

(c) Maximum D-Value Profile. During the transit of all quadrants, the D-value (in feet) radial profile will be reported at the center, and at 15-, 30-, 45-, and 80-nautical-miles radius from the center.

(d) Temperature and Dew-Point Profile. During the transit of all quadrants, a temperature and dew-point profile will be made at the center, and at 15-, 30-, 45-, and 80-nautical-miles radius from the center.

(e) Height of Eye Wall. The height of the eye wall will be reported by quadrant.

These data will be transmitted in the Supplementary Vortex Data/ Message, Form 4 of this chapter.

(4) Vortex Peripheral Data. After the vortex fix, the reconnaissance aircraft will proceed along the prescribed flight pattern at 1,500 feet, except flight Pattern C will be at either 1,500 or 27,00 feet to collect data for operational forecasts. Observations will be made at each alphabetic point on the tracks. (See appendix A of this chapter.) Three or four intermediate observations will be made at equidistant intervals (60 to 80 nautical miles) along each leg of the track. Because the length of these legs are flexible, the intermediate observation points should be determined before departure on each leg. The data to be collected are: wind, temperature, dew point, D-value, and sea-surface temperature. The data will be transmitted as soon as practicable after each standard observation point in the standard reconnaissance code (RECCO) (see Form 5 of this chapter).

(5) Inflight Summary. An inflight transmission of a summary of the pertinent meteorological data observed whenever sufficient data for a vortex message cannot be collected. The reason for the nonavailability of the vortex data message should be included. This report will contain all significant additional information not previously transmitted in RECCO reports of detailed eye data messages and will be transmitted as soon as feasible.

(6) Research Flight Facility (RFF). When RFF is requested to fly operational missions, the standard operation patterns listed in appendix A of this chapter will be flown and operational data will be supplied.

The RFF will be conducting research flights in both seeded and unseeded storms on standard research patterns as shown in appendix B of this chapter. In addition, some nonstandard research patterns may occasionally be flown. The research pattern or nonstandard pattern by geographical coordinates will be specified in the TCPOD.

The RFF will conduct research or operational flights under one of the following four conditions after coordination with CARCAH and with the Director NHC and the Director NHRL as appropriate. When more than one aircraft is in the storm separation will be as defined in paragraph 4a(1)(d) this chapter. In all cases safety of flight is of paramount importance.

(a) The RFF may fly research patterns in the storm between completion of one operational pattern tasked to DOD and the start of the next complete pattern. The RFF aircraft will enter late enough and depart early enough from the storm area to insure required separation.

(b) The RFF may be tasked to provide vortex and peripheral data with no DOD participation required.

(c) The RFF may be tasked to provide vortex data with DOD tasked to provide peripheral data. Aircraft separation will be as defined in paragraph 4a(1)(d) of the chapter.

(d) The DOD may be tasked to provide vortex and peripheral data with RFF aircraft concurrently satisfying requirements of research pattern Zebra. Aircraft separation will be as defined in paragraph 4a(1)(d) of this chapter.

b. Eastern Pacific:

Center Fixes. One daily flight of up to 2,500 nautical miles June 1 through November 15, will be made whenever tropical cyclones are in the EPHC-SFO area of responsibility. Within the limits of operational safety, all possible efforts will be made to obtain an observed fix on the center as near 1800Z as possible; except that when a tropical cyclone is within 600 nautical miles of the west coast of the United States or within 300 nautical miles of Baja California, Mexico, the single flight will provide two center fixes at least 6 hours apart (preferably at 1500Z and 2100Z) and peripheral data as specified by the flight pattern. Operational hurricane reconnaissance flights will fly the flight pattern (as shown in appendix A) designated in the TCPOD. A plain text message will be sent on the initial fix of the eye of

each flight. This message will be transmitted separately and as soon as possible in the interest of reducing time delay for delivery to EPHC-SFO. All radar fix reports will be made in plain text. The method of obtaining the location of the center should always be included in eye position reports from reconnaissance aircraft. The vortex should be located according to the priority in paragraph 3.a. (2), (a) through (d) of this chapter.

c. Atlantic and Eastern Pacific:

Cumulonimbus "Blowoffs." Direction of blowoffs from the tops of cumulonimbus clouds should be reported by flights operating below 25,000 feet. In the Atlantic, there is an additional requirement for this information east of longitude 60°W. as an aid in determining upper tropospheric winds.

4. Reconnaissance Planning and Flight Notification.

a. Reconnaissance Tropical Cyclone Plan of the Day (TCPOD)--Atlantic:

(1) Preparation. Plans for aircraft reconnaissance to meet requests for data shall be prepared by CARCAH in consultation with the Director of NHC. When flights by RFF are to be made, the Chief of RFF shall participate. Plans for reconnaissance flights will reflect the coordinated requirements as determined by the Director of NHC with respect to flights into tropical cyclones or suspicious areas. Daily reconnaissance requirements of NHC will be provided to CARCAH as early as possible each day, and in no case later than 1630Z for use in preparation of the TCPOD. The format of the TCPOD is given in Form 6 of this chapter. In preparation of the Reconnaissance TCPOD, full consideration will be given to the following:

(a) The data gathering efforts of the available reconnaissance aircraft will be coordinated so as to effect procurement of the maximum amount of reconnaissance data.

(b) Although requirements for operational data are primary, every possible effort should be made to meet requirements for research data.

(c) The FAA has directed that reconnaissance flights operating in support of NHC into an area where a named storm exists shall be provided an Altitude Reservation (ALTRV) in accordance with FAA Handbook 7610.4A-Part 500.

Each reconnaissance flight qualifying for Order of Precedence will be so designated by the TCPOD by the inclusion of the statement "REQ" ALTRV CLASS THREE." The Remarks section of the aircraft FLIGHT PLAN should contain this same statement.

(d) Within an ALTRV, aircraft of more than one agency may operate simultaneously in the storm and the aircraft having responsibility for obtaining the vortex fix will have priority for air traffic clearance. This aircraft will be designated on-the-scene coordinator, and as such will insure that:

1. If a positive method of maintaining lateral separation is available, when two or more aircraft are operating in the vicinity of a storm, a vertical separation of 2,000 feet and/or a lateral separation of 30 nautical miles will be maintained.

2. If a positive method of maintaining lateral separation is not available, a vertical separation of 5,000 feet will be maintained.

3. Within the radius of the 50-knot wind (into the center of the storm), a 5,000-foot vertical separation will always be maintained when U.S. Air Force aircraft are involved.

4. Climb and/or descent will be made under Visual Meteorological Conditions (VMC) unless positive voice contact exists along with the means to determine lateral separation; that is, radar, Tactical Air Navigation (TACAN), etc.

5. Common ultrahigh frequency (UHF) or very high frequency (VHF) exist between aircraft.

6. The aircraft Reconnaissance TCPOD as coordinated and disseminated by CARCAH assumes no responsibility for either vertical or horizontal separation of aircraft. The TCPOD involves aircraft used for both research purposes and operational missions in connection with storm reconnaissance. The Remarks section of the TCPOD will include appropriate comments when research and operational flights overlap.

(e) Amendments to the TCPOD will be prepared and disseminated in accordance with the foregoing procedures.

(f) The TCPOD will be prepared and disseminated daily during the period from June 1 through November 30.

(g) To satisfy Department of Defense needs in the storm environment, NHC patterns may be revised with NHC concurrence on a sortie-by-sortie basis. All flights solely in support of Department of Defense requirements performed by VW-4 and the 9th Weather Reconnaissance Wing (9 WRWg) in the Atlantic area will be coordinated with CARCAH, included in the TCPOD, and specifically identified as Navy- or Air Force-required sorties.

Flight plans of reconnaissance aircraft flying in support of NHC into or through Warning Areas W-151, W-470, and W-497 controlled by Missile Test Ranges at Patrick AFB, Fla. (Air Force Eastern Test Range), and Eglin AFB, Fla. (Eglin Gulf Test Range), will be coordinated by CARCAH. When these areas are designated by Notices to Airmen (NOTAMS) as being closed, CARCAH will contact the controlling agency and attempt to obtain permission for reconnaissance aircraft to enter the closed areas; however, final clearance

responsibility rests with the aircraft commander and/or the agency or unit operating the aircraft. Such coordination effected by CARCAH for an aircraft to enter a closed area constitutes permission only, and does not provide for a positive clearance. Therefore, risk caused by missile or rocket flight in the area is assumed by the aircraft commander and/or the agency operating the aircraft.

After coordination has been effected and there is no potential conflict, the TCPOD will contain the statement "FLIGHT PLAN COORDINATED WITH MISSILE TEST RANGE." This statement will serve to notify the appropriate Air Route Traffic Control Center (ARTCC) of the Federal Aviation Administration (FAA) that the flight has permission to enter the closed warning area. This statement should also be contained in the Remarks section of the aircraft flight plan to further confirm that the flight has permission to enter the closed warning area.

In the event there is a potential conflict, coordination will be effected between CARCAH and NHC to adjust the requirements by either altering fix times, routes, or alternates whereby the required margin of safety is provided. In the event a warning area is closed after coordination of the TCPOD, or an area is closed without a NOTAM, then the respective aircraft commanders, upon being denied entry to one of these warning areas, should contact the CARCAH by Autovon phone patch immediately and request assistance. Every attempt will be made by CARCAH to resolve the conflict with the appropriate controlling agency and FAA.

(h) Weather reconnaissance organizations will be responsible for notifying CARCAH of any weather reconnaissance aircraft under their control that are anticipating flights into or near storm areas so that these flights may be coordinated in the TCPOD.

(2) Dissemination of the Reconnaissance Tropical Cyclone Plan of the Day. The TCPOD will be made available to all appropriate agencies that provide support to and/or exercise control of the missions. The CARCAH will be responsible for disseminating the TCPOD by 1800Z on the day preceding the planned missions to the Department of Defense, NHC, and FAA. The CARCAH will be advised immediately by the appropriate agency of any changes in the status of the missions scheduled in the TCPOD; for example, delayed takeoffs or aborts.

The ARTCC representative at Miami will assume responsibility for notifying appropriate ARTCCs of the TCPOD immediately upon receipt.

b. Tropical Cyclone Plan of the Day (TCPOD)--Eastern Pacific:

(1) Preparation: Plans for aircraft reconnaissance to meet requests for data shall be prepared by the Tropical Cyclone Reconnaissance Coordinator (TCRC), in consultation with the EPHC-SFO. Plans for reconnaissance flights will reflect the requirements as determined by EPHC with respect to flights into tropical cyclones. The EPHC will telephone requirements for reconnaissance flights to TCRC with confirmation by message over the hurricane coordination net. The requirements will be provided TCRC as early as possible each day, but not later than 1930Z for use in preparation of the TCPOD. The format for the TCPOD is appended as Form 5 to this chapter. In preparation of the TCPOD, full consideration will be given to the following:

(a) Same consideration as listed in paragraph 4.a. (1), (a) through (e) of this chapter.

(b) The TCPOD will be prepared and disseminated daily during the period from June 1 through November 15. In the event no reconnaissance requirements exist for a particular day, the TCPOD will merely contain a notation to that effect.

(c) Flight plans for reconnaissance aircraft flying in support of the EPHC through controlled airspace, warning areas, etc., will be coordinated by the service responsible for the aircraft involved through the agencies or services controlling the airspace. Detailed procedures on flight planning, clearance, and reporting will be outlined in appropriate local Operations (OP)-Order or Letter of Instruction (LOI).

c. Central Pacific--Request for Reconnaissance. The CPHC-HNL will coordinate, through a conference call with responsible authorities of the U.S. Air Force, reconnaissance requirements for tropical cyclones north of the Equator between longitude 140°W. and the 180th meridian. The TCRC will levy tropical cyclone reconnaissance requirements on appropriate military units. Requests for aerial reconnaissance will be by message, but precoordination by telephone is encouraged.

d. Flight Patterns--Atlantic. Any additional operational and RFF research flight patterns will be filed with FAA for information.

e. Flight Plans. The flight plans for hurricane reconnaissance flights will be filed with FAA as soon as practicable (at least 2 hours in advance is desirable) before departure time. In the interest of standardization and clarification, U.S. Navy reconnaissance aircraft (TCPOD-assigned flights) when filing flight plans with FAA facilities will use the letters NAVH followed by the last three digits of the bureau number of the aircraft. In no case will more than seven digits appear in the call sign; for example,

"NAVH789," In the Atlantic, the NHC will be included as an information addressee (KMIAYM). Flight plans for flights which quality will include the statement in remarks:

"REQ ALTRV CLASS THREE."

f. Daily Synoptic Reconnaissance Flights--Atlantic:

(1) Flight Tracks. The U.S. Air Force will advise FAA of changes in routine Gull flight tracks by forwarding planned changes as appropriate to the following ARTCCs: Houston, Tex.; Miami, Fla.; Jacksonville, Fla.; Washington, D.C.; New York, N.Y.; Boston, Mass.; and San Juan, P.R., allowing 30 days' notice before implementation of the changes.

(2) Flight Level Changes. Gull flights will accept flight level changes when requested by FAA.

(3) Flight Levels. Only ARTCC assigned flight levels will be flown. Block altitudes to permit flight exactly at a standard pressure level will not be requested.

(4) Dropsondes. Dropsonde release will be coordinated with the appropriate ARTCC at least 10 minutes before droptime.

5. Aircraft Reconnaissance Communications.

a. Atlantic:

(1) Meteorological reports from reconnaissance flights will be coded and transmitted in reconnaissance code (RECCO) to include all mandatory groups plus optional groups 4ddff and/or $5DFSD_k$, and 99999 GGggi ddfff TTT_dT_dw mjHHH as shown in appendix A of this chapter. Plain language will be appended to include a brief description of significant or unusual features observed since the last observation, including radar patterns indicative of organization. Any evidence of tornadoes, water spouts, or funnel clouds within 200 nautical miles of land should also be reported in this manner. Supplementary hurricane reconnaissance data taken along the peripheral legs will be appended to the routine reports. The sea-surface temperature (SST) will be reported in degrees and tenths Celcius following the mandatory RECCO groups and optional groups as shown in appendix A, attachment 1a of this chapter. The U.S. Navy will report SST as the first Remarks group when flying other than standard hurricane flight patterns. Following the last group of the RECCO report, the coded latitude and longitude groups and flight level and/or surface wind groups will be repeated. These groups will be repeated or read back for confirmation. Each participating agency will effect distribution of pertinent portions of its intraservice operating instructions and procedures to all other participating agencies.

(2) Appropriate Joint Army, Navy, Air Force Procedures (JANAP), and Allied Communication Procedures (ACP) will be used when contacting Air/Ground (A/G) stations. All activities will comply with procedures outlined in ACP 121 US Supp. 2 with respect to message headings, date-time groups, and monitoring systems which are external to the message text in formatting messages for transmission to applicable ground stations.

(3) U.S. Air Force flights will use communications procedures as shown in appendix C of this chapter; U.S. Navy communications procedures are shown in appendix D of this chapter.

(4) The A/G communications arrangements for RFF aircraft will be the same as for U.S. Navy aircraft as shown in appendix D of this chapter. RFF aircraft may utilize U.S. Air Force Aeronautical Station facilities as shown in appendix C of this chapter when contact cannot be established with the U.S. Navy.

(5) When two or more reconnaissance aircraft are operating in the storm center, the aircraft at lower flight level will make the dropsonde to obtain the central pressure.

(6) When two or more reconnaissance aircraft are operating in the storm area, voice communications between the aircraft will be established and conducted on:

VHF frequency 123.05 MHz
UHF frequency 304.8 MHz
HF frequency 4701 kHz.

If initial contact fails on these frequencies, the following will be used to establish communications:

UHF Guard frequency 243.0 MHz
VHF Guard frequency 121.5 MHz.

Prefix GULL will be used for contacting U.S. Air Force aircraft, Navy for U.S. Navy, and NOAA for RFF. As the aircraft approaches the storm area, calls will be made on the hour and every 15 minutes thereafter until contact is established.

(7) A uniform system of identification and continuity of weather/hurricane reconnaissance reports will be followed. The identifiers will be a part and constitute the opening text of each message. Regular weather/hurricane reconnaissance missions will include the unit indicator--AIR FORCE GULL for U.S. Air Force, NAVY for U.S. Navy, and NOAA for NOAA--followed by the numerical mission number for a particular storm (ONE), the storm/track/investigative name (BETSY, INDIA, etc.) and the numerical sequence of the

report during the flights (ONE--end of flight). See appendixes C and D of this chapter for examples. The Number ONE report of each flight will be an "out" report. Hereafter, weather reports will be sent at least hourly until the aircraft is within 200 nautical mile radius of the storm. When the aircraft is within 200 nautical mile radius of the center, weather reports will be sent at least every 30 minutes.

b. Eastern Pacific:

(1) Meteorological reports from reconnaissance flights will be coded and transmitted in RECCO. Plain language will be appended to include a brief description of significant or unusual features observed since the last observation, including radar patterns indicative of organization. Any evidence of tornadoes, water spouts, or funnel clouds within 200 nautical miles of land should also be reported in this manner. A system of numbering will be used to identify individual reports.

(2) Appropriate JANAP and ACP will be used when contacting A/G stations. All activities will comply with procedures outlined in ACP 121 US Supp. 2 with respect to message headings, date-time groups, and numbering systems which are external to the message text in formatting messages for transmission to applicable ground stations.

(3) Air Traffic Control (ATC) Communications. Normal ATC procedures will be followed. Should it be necessary to use other A/G communications, appropriate relay instructions will be included in the message.

(4) All hurricane aircraft reconnaissance reports received by the McClellan Monitor will be expeditiously transmitted to EPHC-SFO by means of the hurricane circuit--West Coast Hurricane Coordination Net.

6. Navy ATC Communications--Atlantic. The ATC A/G communications by U.S. Navy aircraft operating within the San Juan, Houston, and Miami Flight Information Regions (FIR) areas of responsibility will be conducted in accordance with the following priorities:

a. U.S. Navy Single Sideband (SSB) Stations--6723 kHz (primary), 4711 kHz (secondary).

b. U.S. Air Force Aeronautical Station.

c. 6568 kHz (FAA).

d. ARINC (Aeronautical Radio, Inc.).

7. U.S. Air Force ATC Communications--Atlantic. U.S. Air Force aircraft operating within the San Juan, Houston, and Miami FIR areas will conduct ATC A/G communications with the following facilities in priority as listed:

a. U.S. Air Force Aeronautical Stations--(MacDill AFB, Fla., Albrook AFB, C.Z., and Loring AFB, Maine).

b. FAA Stations--6568 kHz (Miami, New Orleans, New York, San Juan).

c. U.S. Navy SSB Stations--6723 kHz (primary), 4711 kHz (secondary).

d. ARINC Stations as contained in current DOD Flight Information Publication Enroute--Supplement.

8. Air-Ground Communications with FAA Stations--Atlantic. If the primary A/G communications outlined in appendixes C and D fail, reconnaissance aircraft may transmit their hurricane data in plain language by voice to WBR (Miami), WSY (New York), MSY (New Orleans), or WRW (San Juan) in that order of priority. Such messages should be addressed to KMIAYM. The appropriate FAA stations will relay the data to NHC.

INITIAL TROPICAL CYCLONE EYE/VORTEX REPORT

UH AIR FORCE GULL / NAVY / *NOAA _____ _____ _____ EYE/VORTEX LOCATED BY _____

AT _____ DEGREES _____ MINUTES NORTH _____ DEGREES _____

MINUTES WEST AT _____ _____ _____ _____ ZULU

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*NOAA participates only in the Atlantic area.

1. The first center fix obtained on each flight will be dispatched as rapidly as possible using Form 1.

2. This form is used in the Atlantic and Eastern Pacific areas.

DETAILED EYE/VORTEX DATA MESSAGE			ADDRESSEE(S)
MISSION NUMBER	DATE	SCHEDULE FIX TIME Z	
AIRCRAFT COMMANDER	AIRCRAFT NUMBER	ARWO	
SIMULTANEOUS FIX WITH OTHER AIRCRAFT /__/ Yes /__/ No	TRANSMISSION TIME Z	GROUND STATION RECEIPT TIME Z	PRECEDENCE: IMMEDIATE
MESSAGE HEADING			

A	SQUADRON CALL SIGN	MISSION NUMBER	CYCLONE/STORM NAME	OBS NUMBER

B	Z	B. DATE AND TIME OF FIX (Zulu)
C	DEG Min N S	C. LATITUDE VORTEX/EYE FIX (Degrees/Minutes) (Circle N or S)
D	DEG Min E W	D. LONGITUDE VORTEX/EYE FIX (Degrees/Minutes) (Circle E or W)
E		E. CENTER DETERMINED BY: (Enter appropriate number) 1 - Penetration; 2 - Radar (indicate aircraft position and wall cloud data in Sec. S, REMARKS); 3 - Wind; 4 - Pressure; 5 - Other.
F	NMi	F. NAVIGATION FIX ACCURACY (in nautical miles).
G	MB	G. MINIMUM SEA-LEVEL PRESSURE (in millibars). (Computed, unless otherwise stated).
H	MB M	H. MINIMUM HEIGHT AT STANDARD LEVEL (millibars/meters).
I	K	I. ESTIMATE OF MAXIMUM SURFACE WIND OBSERVED (in knots).
J	° / NMi	J. BEARING AND RANGE FROM CENTER OF MAXIMUM SURFACE WINDS (Degrees, nautical miles).
K	DEG K	K. MAXIMUM FLIGHT LEVEL WINDS NEAR CENTER (degrees and knots).
L	° / NMi	L. BEARING AND RANGE OF MAXIMUM OBSERVED FLIGHT LEVEL WINDS FROM CENTER (Degrees and Nautical Miles).
M	°	M. MAXIMUM FLIGHT LEVEL TEMP INSIDE THE EYE (degrees Celsius)
N	°	N. MAXIMUM FLIGHT LEVEL TEMP OUTSIDE THE EYE (degrees Celsius).
O	M / M	O. ABSOLUTE ALTITUDE OUTSIDE/INSIDE EYE (meters)
P	°/ Min N S : °/ Min E W : Z	P. CONFIRMATION OF FIX. Position (Degrees/Minutes); Date and Time (Zulu)
Q		Q. EYE SHAPE/ORIENTATION/DIAMETER. Code eye shape as: C - Circular; CO - Concentric; E - Elliptical. Transmit orientation of major axis in tens of degrees, i.e., 01-010 to 190; 17-170 to 350. Transmit diameter in nautical miles. Examples: C8 - Circular eye 8 miles in diameter. E09/15/5 - Elliptical eye, major axis 090-270, length of major axis 15 NMi, length of minor axis 5 NMi. CO8-14 - Concentric eye, diameter inner eye 8 NMi, outer eye 14 NMi.
R		R. EYE CHARACTER: Closed Wall, Poorly Defined, Open SW, etc.
S		S. REMARKS (Storm movement data should not be included in this section).
T	°/ Min N S °/ Min E W	T. AIRCRAFT POSITION IF RADAR FIX (Degrees/Minutes).

INSTRUCTIONS: Make every effort to eliminate ambiguous or misleading statements. Use authorized contractions. Transmit in flight only that portion beginning with 'Message Heading." Significant clouds observed in the Eye/Center should be reported under "Remarks" or be summarized in the written Post-Flight Report. Enter 'N/A" for items that are not available.

FORMAT TO BE USED WHEN REPORTING RADAR EYE
FROM OUTSIDE EYE APPENDED TO RECCO CODE

UH AIR FORCE GULL / NAVY / *NOAA _____ 97779 11304 10189 68466 -----etc.-----X

(RADAR EYE)
(RADAR EYE BY HOLE IN SEA RETURN) (Note 1) CNTRD (AT) (NEAR) (Note 2)_____

DEGREES _____MINUTES NORTH _____DEGREES _____ MINUTES WEST X

CNTR SELECTION (POSITIVE) (GOOD) (FAIR) (Note 3) X LOCATION (POSITIVE) (GOOD) (FAIR) (Note 4) X

NAV (Note 5) ACCURATE WITHIN _____ MI BY (LORAN)

(CELESTIAL) (RADAR) (TACAN#) (DOPPLER) (DEAD RECKONING) _____

(RADAR WEATHER REMARKS) (NOTE 6)

*NOAA participates only in the Atlantic.
#Tactical Air Navigation (Radio).

1. This form is used in the Atlantic and Eastern Pacific.areas.

AMPLIFYING NOTES

1. a. "RADAR EYE" is obtained by coverage of the storm from outside the eye.

   b. "HOLE IN SEA RETURN" is used only when the eye is detected in this manner. Experience has shown that a well-organized tropical storm or hurricane traveling at slow or moderate speeds in the open ocean presents a field of intense and widespread surface clutter or sea return. The sea return is primarily wave face reflection, but may include hydrometeor reflection from airborne spray in the higher velocity wind areas. Depending upon the aircraft altitude, range to the center, and antenna tilt, the eye of the storm can usually be revealed as a circular area of comparatively light or no sea return. This is interpreted as a function of the circulation and may vary slightly in position with the apparent center of the precipitation pattern.

2. The word "AT" or "NEAR" will be used to indicate the overall reliability of the present solution of the center report problem; that is, the report represents a summation of the individual accuracies applicable to identification and location solutions which may or may not include the aircraft navigation. When all considerations indicate the center target to be significant and conservative and its reported position to be accurate to within 10 nautical miles, "AT" will be used, otherwise "NEAR."

   "AT" will be used with "SELECTION POSITIVE," "LOCATION POSITIVE."
   "AT" may be used with "SELECTION POSITIVE," "LOCATION GOOD."
   "AT" may be used with "SELECTION GOOD," "LOCATION POSITIVE."
   "AT" could possibly be used with "SELECTION GOOD," "LOCATION GOOD."

3. The reliability of the selection of a center target will be indicated in three categories. In every case, interpretation of a storm center will be based on a continuous scope observation during which the aircraft altitude, antenna tilt, and other principal factors have been duly considered.

   a. Selection "POSITIVE" will be used:

      (1) For all cases where a "HOLE IN SEA RETURN" is reported.

      (2) For persistent characteristic precipitation patterns detected with an inner periphery comprising at least half a complete circle and the radius of curvature is 10 nautical miles or less.

   b. Selection "GOOD" will be used for persistent characteristic precipitation patterns composed of arcs, crescents, curved bands, or spirals whose inner periphery comprises less than half a complete circle and/or the radius of curvature is greater than 10 nautical miles.

c. Selection "FAIR" will be used:

(1) For those cases where through aircraft probing or other means the observer is confident that a given area involves a storm center but the precipitation patterns on radar are weak, poorly organized, or define such a large eye area that center selection with a 10-nautical-mile accuracy cannot be accomplished with confidence.

(2) When the characteristic precipitation target lacks reasonable persistence or loses continuity by evolution of its defining elements.

(3) When continuous observation of the eye target is seriously hampered by severe ground clutter interference, partial electronic failure, or unusually adverse maneuvering requirements.

4. An evaluation of the accuracy of the center target location computation will be indicated in one of three categories. When the radar scope presentation includes two or more usable terrain targets as well as the storm center target, location of the latter can be accomplished accurately and independently of the aircraft navigation.

a. Location "POSITIVE" will be used:

(1) When a combination of three or more ranges and/or bearings from terrain targets fall within a mutual tolerance of 4 nautical miles.

(2) When center target range and bearing from the aircraft are plotted from a simultaneous ground-wave loran fix, and when this position agrees with a radar line of position plotted from a terrain target.

b. Location "GOOD" will be used:

(1) When center target range and bearing from the aircraft are plotted from a simultaneous ground-wave loran or three-star celestial fix.

(2) When center target location is determined by radar range and bearing data from a single terrain target.

c. Location "FAIR" will be used:

(1) When center target lines of position by radar from terrain features fail to fall within a mutual tolerance of 10 nautical miles.

(2) When center target location is relative to the aircraft position determined by dead reckoning, substandard loran, or radio direction-finding.

5. Navigation accuracy will be reported only when it enters directly into the center target location problem.

6. Description of radar precipitation targets: Character (stratiform or cumuliform), shape, intensity, location, extent, height of major cells in various regions, etc.

7. Air space reservation, operational information, etc.

8. Plain language remarks should be used to the maximum when appropriate. However, observers must pay particular attention to the avoidance of any statement which might be construed to be of a forecast nature.

SUPPLEMENTARY VORTEX DATA/MESSAGE

Date | Time Z to Z

Acft Type | Unit | Observer

Message Heading

DTG

Mission Identifier | Ob. No.

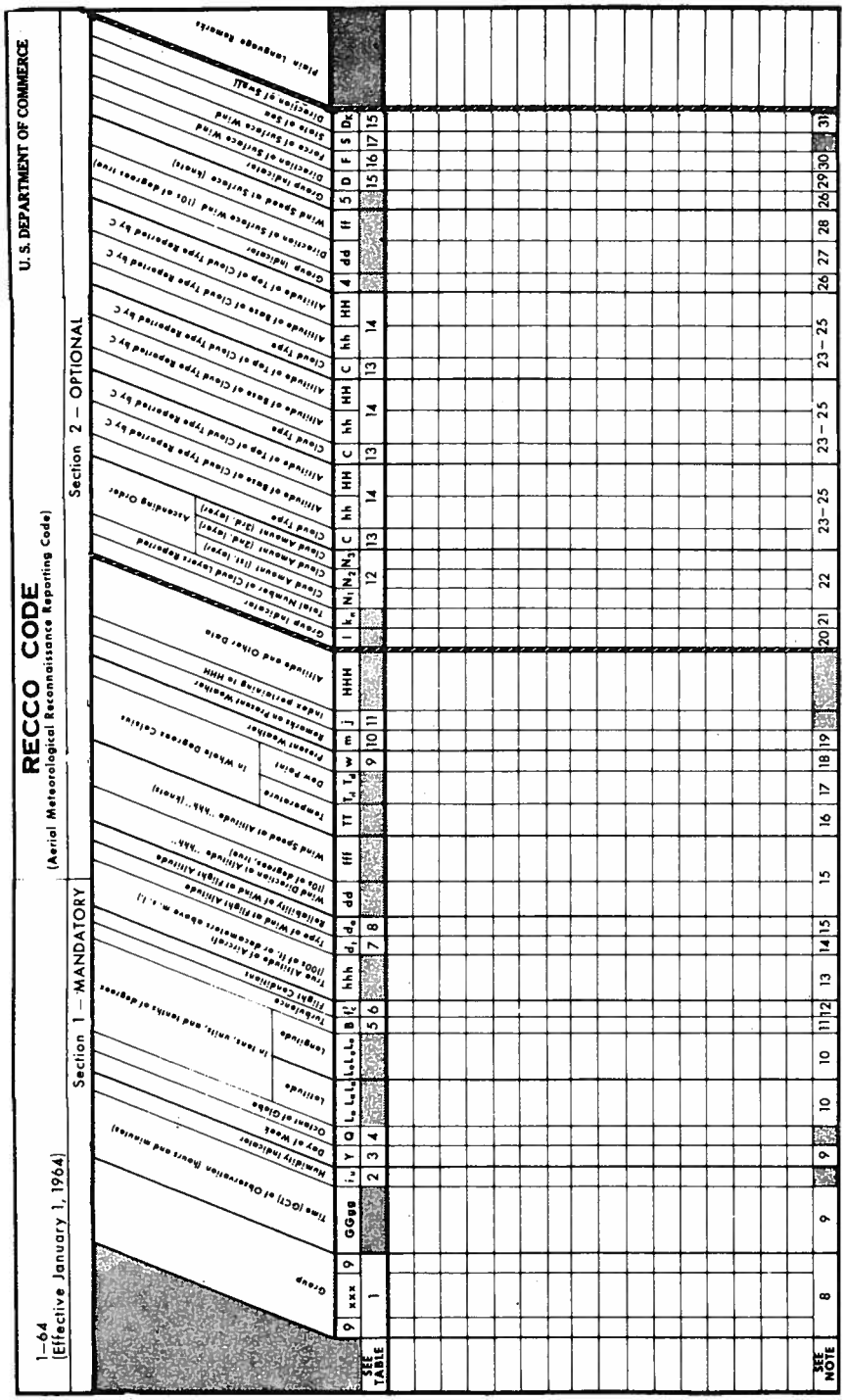
VORTEX DATA PROFILE | AZIMUTH

1 LEFT	2 REAR	3 QUAD	4 IWALL	5
6 80	7 45	8 30	9 15	10 00
11 8	12 4	13 3	14 1	15 0
16 MX	17	18 63	19 50	20 30
21 RIGHT	22 FRONT	23 QUAD	24 IWALL	25
26 80	27 45	28 30	29 15	30 00
31 8	32 4	33 3	34 1	35 0
36 MX	37	38 63	39 50	40 30
41 LEFT	42 FRONT	43 QUAD	44 IWALL	45
46 80	47 45	48 30	49 15	50 00
51 8	52 4	53 3	54 1	55 0
56 MX	57	58 63	59 50	60 30
61 RIGHT	62 REAR	63 QUAD	64 IWALL	65
66 80	67 45	68 30	69 15	70 00
71 8	72 4	73 3	74 1	75 0
76 MX	77	78 63	79 50	80 30

REMARKS:

NOTES: Groups 5, 25, 45, and 65 are height of eyewall. Report to nearest 1,000 ft. in a five-digit group. ///// indicates hgt. unk.
Groups 6-10, 26-30, 46-50, and 66-70 are "D" values. Indicator is distance from eye. Report in tens of feet. Add 500 for negative values.
Groups 11-15, 31-35, 51-55, and 71-75 are temp. and dew point. Distances from eye are the same as "D" values. Report to nearest degree celsius. Add 50 for negative values.
Groups 16-20, 36-40, 56-60, and 76-80 are wind data. Indicator MX will be followed by the max. wind. Report to the nearest knot in 3 digits. Next block is radial and distance of max. wind from the eye. Report as five-digit group in degrees and nautical miles. Indicator 63, 50, and 30 will be followed by three digits representing the distance of the indicated wind speed from the eye.
If data unobtainable, slashes will be reported.

Monitor TOR



RECCO CODE
(Aerial Meteorological Reconnaissance Reporting Code)
1–64
(Effective January 1, 1964)
U.S. DEPARTMENT OF COMMERCE
Section 1 – MANDATORY
Section 2 – OPTIONAL

STANDARD RECONNAISSANCE CODE

TROPICAL CYCLONE PLAN OF THE DAY FORMAT--ATLANTIC AND EASTERN PACIFIC

FM: OL/G HQ AWS CARCAH/RUCLEFA CORAL GABLES FLA.*

TO: HOMESTEAD AFB FLA DIAL TWX #305-248-0151 (AIG #8227)*
GT22117
30GT2352
7072

UNCLAS CARCAH SENDS _____

AMENDMENT NO. _____ TO

TROPICAL CYCLONE
RECON POD FROM _____Z_____ (MO/YR) TO _____Z_____ (MO/YR) FOLLOWS

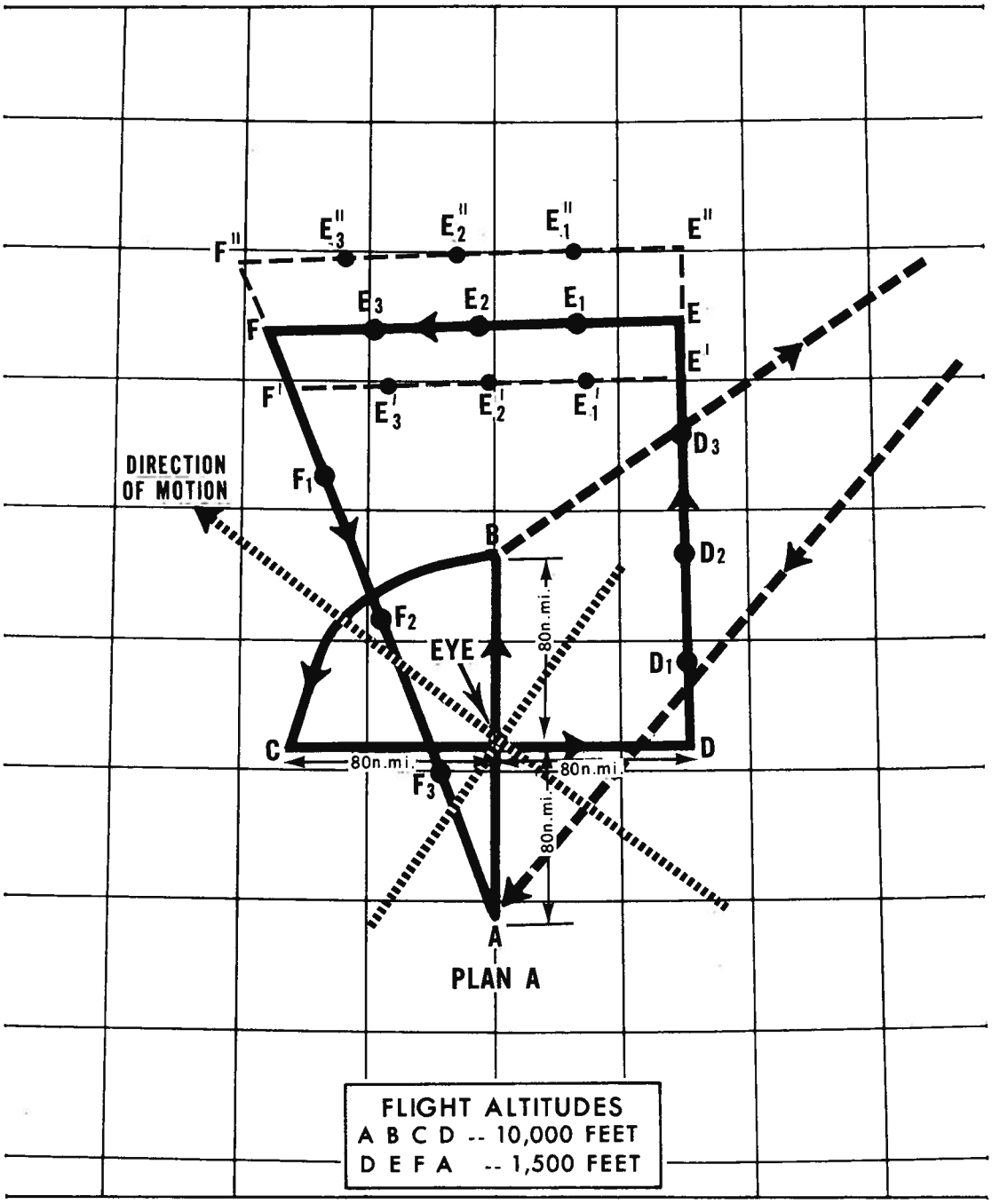
	1. (STORM NAME-TD #)	2. (STORM NAME-#)	3. (STORM NAME-#)	4. (STORM NAME-#)
FIX TIMES or ON-STATION TIME	A. ___/___Z	___/___Z	___/___Z	___/___Z
	___/___Z	___/___Z	___/___Z	___/___Z
CALL SIGN	B.			
ETD	C. ___/___Z	___/___Z	___/___Z	___/___Z
DEPARTURE PT	D.			
ENROUTE ALT	E.			
FCST PSN	F. ___N___W	___N___W	___N___W	___N___W
DESTINATION	G.			
FLT PATTERN	H.			
FCST MOVEMENT	I.			
SUCCEEDING DAY	J.			
REMARKS	K.			

REMARKS: ALTITUDE RESERVATIONS, WARNING AREA CLEARANCES, MOVEMENT FOR INVESTIGATIVE FLIGHTS, ETC.

*For Eastern Pacific dissemination, see appendix F, paragraph 5 of this chapter.

CHAPTER 4
APPENDIX A
ATTACHMENT 1

OPERATIONAL FLIGHT PATTERN "A"



OBSERVATION DETAILS FOR OPERATIONAL FLIGHT PATTERN "A"

ALPHABETIC POINT	OBSERVATION DATA	TRANSMIT ASAP AFTER
A	First 8 groups RECCO code.	A
Eye	Eye/vortex and dropsonde.	Eye (initial eye)--Dropsonde may be appended to Point B Message.
B	First 8 groups RECCO code.	B--Detailed Eye/Vortex Data Message.
C	First 8 groups RECCO code.	C
Eye	Eye/vortex and dropsonde.	Eye (initial eye)--Dropsonde may be appended to Point D Message.
D	First 8 groups RECCO code.	D--Add new Detailed Eye/Vortex Data Message if any significant changes.
D_1	99999 GGggi ddfff TTT_dT_dw mjHHH SST (see note 4).	E--Data for Point E transmitted first, then data for D_1, D_2, and D_3 in chronological order, followed by SST for E, D_1, D_2, and D_3. See example below.
D_2	Same as D_1, except omit 99999.	
D_3	Same as D_2.	
E	First 8 groups RECCO code and SST (see note 4).	
E_1	99999 GGggi ddfff TTT_dT_dw mjHHH SST (see note 4).	F--Data for Point F transmitted first, then data for E_1, E_2, and E_3 in chronological order, followed by SST for F, E_1, E_2, and E_3. See example below.
E_2	Same as E_1, except omit 99999.	
E_3	Same as E_2.	
F	First 8 groups RECCO code and SST (see note 4).	
VORTEX	Vortex data	Supplementary Vortex Data/Message transmitted between Points F and A.
F_1	99999 GGggi ddfff TTT_dT_dw mjHHH SST (see note 4).	A--Data for Point A transmitted first, then data for F_1, F_2, F_3, and F_4 in chronological order, followed by SST for A, F_1, F_2, F_3, and F_4. See example below.
F_2	Same as F_1, except omit 99999.	
F_3	Same as F_2.	
F_4	Same as F_2.	
A	First 8 groups RECCO code and SST (see note 4).	
Eye	Eye/vortex and dropsonde.	Eye (initial eye)--Dropsonde may by appended to Point B Message.
B	First 8 groups RECCO code.	B--Detailed Eye/Vortex Data Message.
VORTEX	VORTEX data for last penetration	B

EXAMPLE OF RECON MESSAGE TRANSMITTED AT POINT E:

9xxx9 GGggi YQLaLaLa(1) LoLoLoBf(1) hhhdtda ddfff TTTdtdw mjHHH 99999 GGggi(2) ddfff TTT_dT_dw mjHHH GGggi(3) ddfff TTT_dT_dw mjHHH GGggi(4) ddfff TTT_dT_dw mjHHH SST(5) 287 265 270 280

(1) Latitude and longitude of Point E.

(2) Time at Point D_1.

(3) Time at Point D_2.

(4) Time at Point D_3.

(5) Sea-Surface Temperature at:

	E	D_1	D_2	D_3
SST	28.7°C	26.5°C	27.0°C	28.0°C

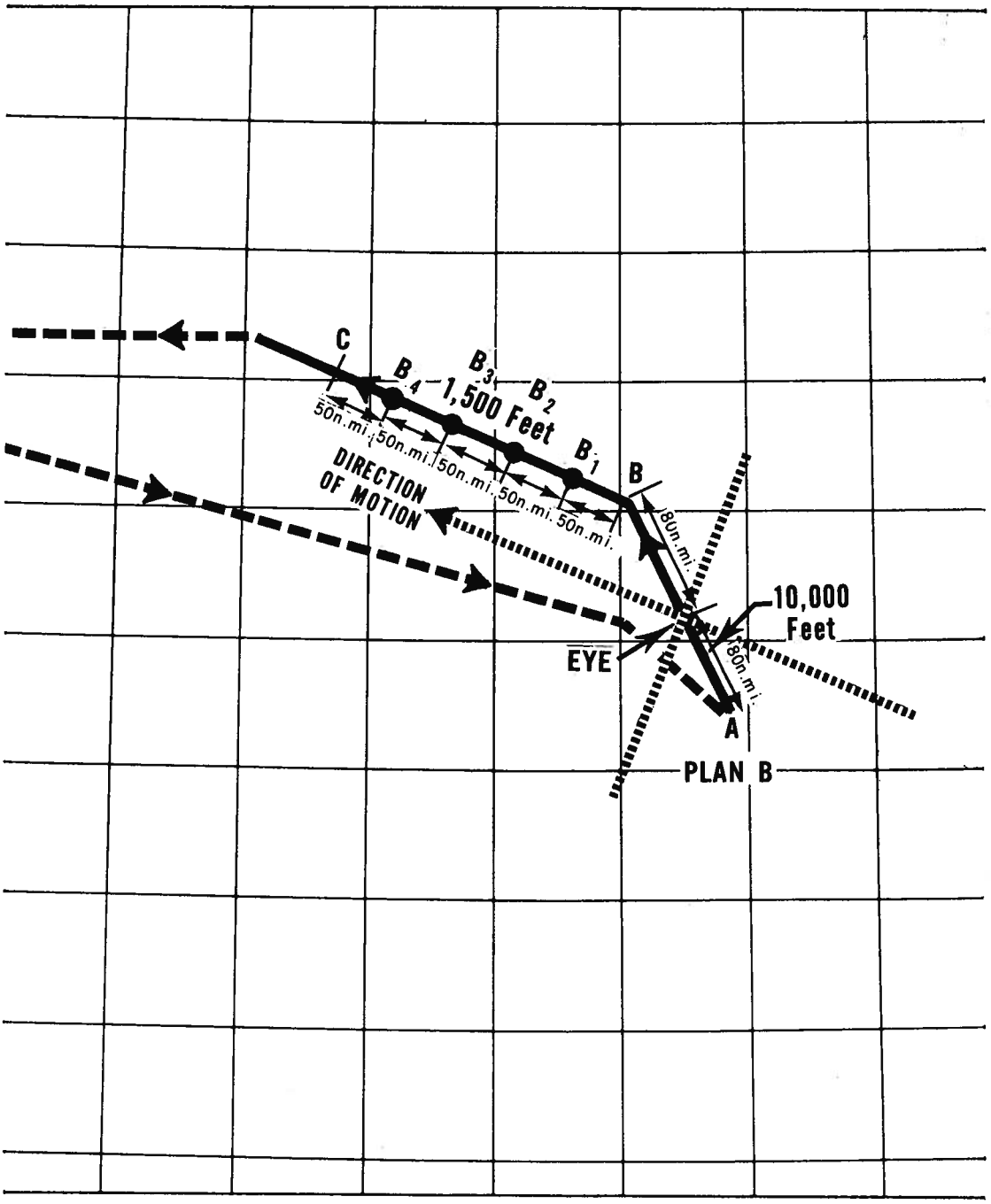
NOTES: (1) The track and altitude to observation Point A is unspecified as is the track home from the last observation point.

(2) En route to and return from storm area, the first 8 groups of the RECCO code should be observed and transmitted every 30 minutes.

(3) The lengths of the vortex pattern legs (DE, EF, FA) may be adjusted to permit the aircraft to return to Point A in time for a fix 6 hours after the first penetration. Because of this adjustment, the supplemental observation points (D_1, D_2, D_3, E_1, etc.) will be selected before departure on each leg. The points should be equidistant (approximately 60 nautical miles apart) on each leg.

(4) Sea-surface temperatures should be reported only when measured at 1,500 feet or lower. Otherwise, slants should be reported.

OPERATIONAL FLIGHT PATTERN "B"



OBSERVATION DETAILS FOR

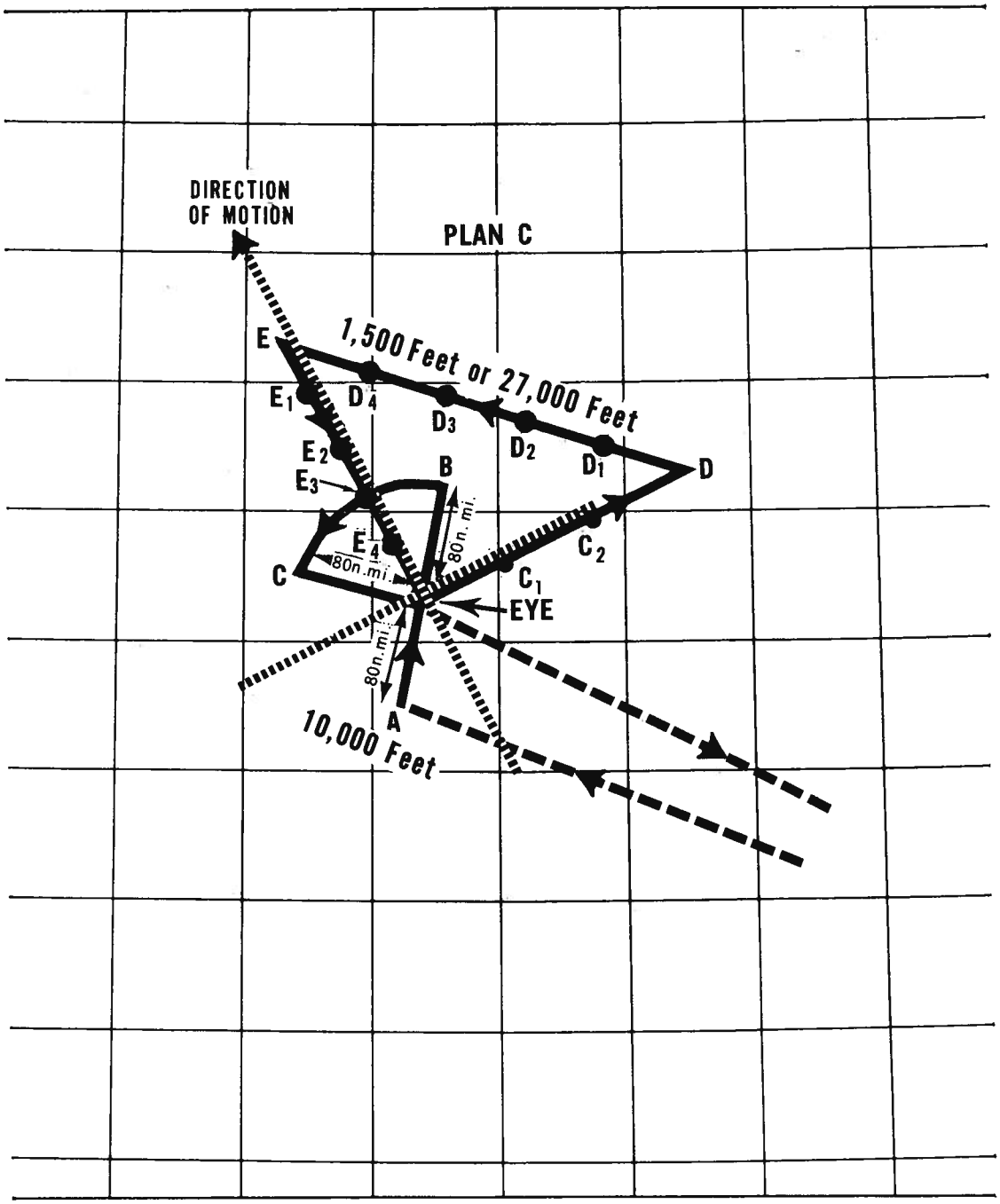
OPERATIONAL FLIGHT PATTERN "B"

ALPHABETIC POINT	OBSERVATION DATA	TRANSMIT ASAP AFTER
A	First 8 groups RECCO code.	A
Eye	Eye/vortex and dropsonde.	Eye (initial eye)--dropsonde may be appended to Point B Message.
B	First 8 groups RECCO code.	B--Detailed Eye/Vortex Data Message.
VORTEX	Vortex data	Supplementary Vortex Data/ Message transmitted between Points Band C.
B_1	99999 GGggi ddfff TTT_dT_dw mjHHH SST (see note 1)	C--Data for Point C transmitted first, then data for B_1, B_2, B_3, and B_4 in chronological order, followed by SST for C, B_1, B_2, B_3, and B_4. See example, appendix A, attachment 1a.
B_2	Same as B_1, except omit 99999	
B_3	Same as B_2.	
B_4	Same as B_2.	
C	First 8 groups RECCO code and SST (see note 1).	

NOTE: (1) Notes 1, 2, and 4 of appendix A, attachment 1a, Observation Details for Operational Flight Pattern "A" are applicable to Pattern "B."

(2) Point C is 250 nautical miles from Point B. The four Intermediate Points--B_1, B_2, B_3, and B_4--are about 50 nautical miles apart.

OPERATIONAL FLIGHT PATTERN "C"



OBSERVATION DETAILS FOR OPERATIONAL FLIGHT PATTERN "C"

ALPHABETIC POINT	OBSERVATION DATA	TRANSMIT ASAP AFTER
A	First 8 groups RECCO code.	A
Eye	Eye/vortex and dropsonde.	Eye (initial eye)--dropsonde may by appended to Point B Message.
B	First 8 groups RECCO code.	B--Detailed Eye/Vortex Data Message.
C	First 8 groups RECCO code.	C
Eye	Eye/vortex and dropsonde.	Eye (initial eye)--dropsonde. New Detailed Eye/Vortex Data Message if any significant changes.
C_1	99999 GGggi ddfff TTT_dT_dw mjHHH and SST (see notes 1 and 2).	D--Data for Point D transmitted first, then data for C_1 and C_2 in chronological order, followed by SST for D, C_1, and C_2. See example, appendix A, attachment 1a.
C_2	Same as C_1, except omit 99999 (see note 3).	
D	First 8 groups RECCO code and SST (see note 1).	
D_1	99999 GGggi ddfff TTT_dT_dw mjHHH and SST (see note 1).	E--Data for Point E transmitted first, then data for D_1, D_2, D_3, and D_4 in chronological order, followed by SST for E, D_1, D_2, D_3, and D_4. See example, appendix A, attachment 1a.
D_2	Same as D_1 except omit 99999.	
D_3	Same as D_2.	
D_4	Same as D_2.	
E	First 8 groups RECCO code and SST (see note 1).	
VORTEX	Vortex data	Supplementary Vortex Data/Message transmitted between Point E and Eye.
E_1	99999 GGggi ddfff TTT_dT_dw mjHHH and SST (see note 1).	Eye (initial eye)--Initial Eye/Vortex Data Message transmitted first, then data for E_1, E_2, E_3, and E_4 in chronological order, followed by SST for E_1, E_2, E_3, and E_4. See example appendix A, attachment 1a.
E_2	Same as E_1 except omit 99999.	
E_3	Same as E_2.	
E_4	Same as E_2.	
Eye	Eye/vortex and dropsonde.	Detailed Eye/Vortex Data Message and dropsonde.
VORTEX	Vortex data for last penetration.	Eye

NOTES: (1) Notes 1 through 4 of appendix A, attachment 1a, Observation Details for Operational Flight Pattern "A" are applicable to Pattern "C."

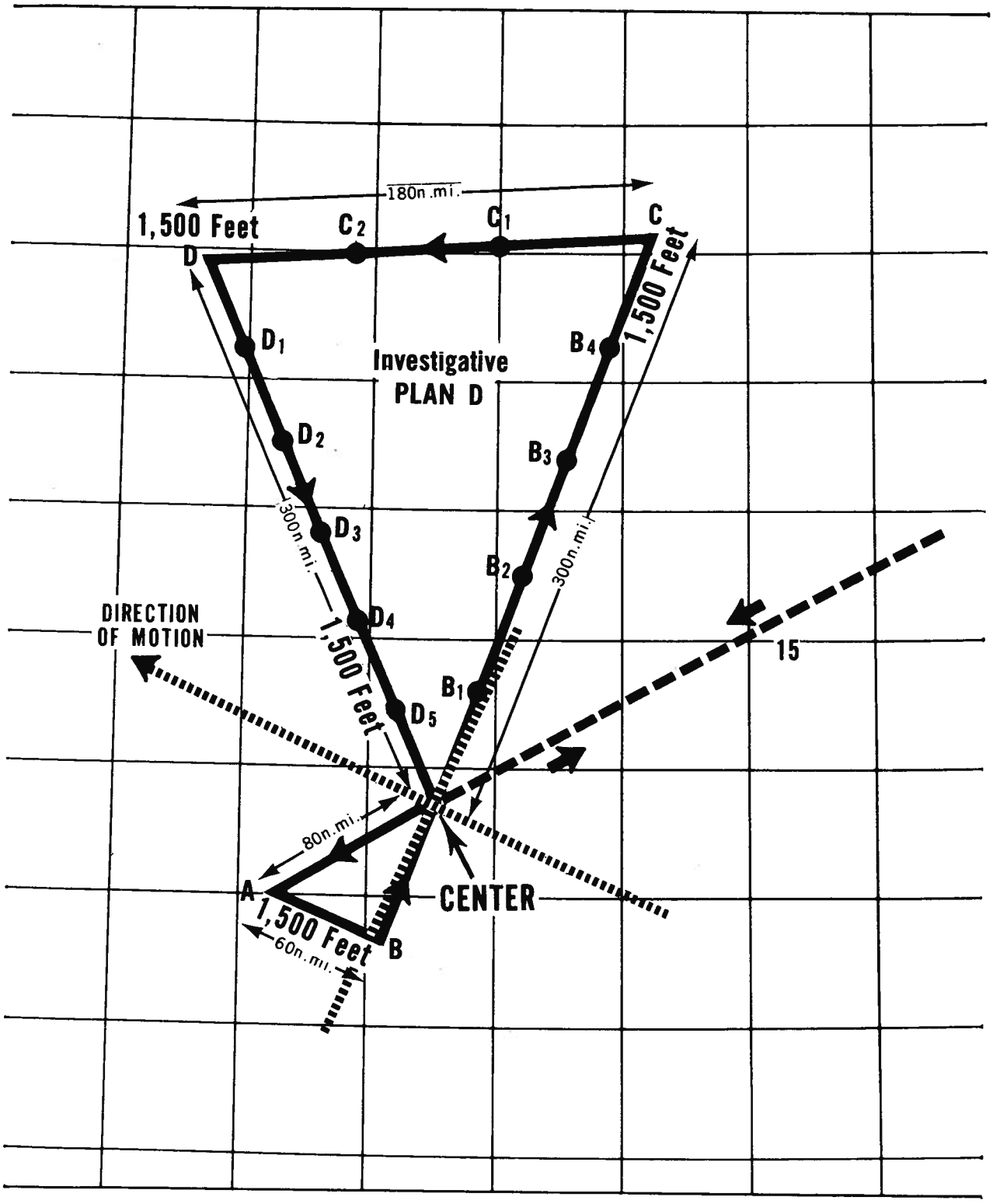
(2) Intermediate Points C_1 and C_2 are between center and Point D.

(3) Flight altitude from C_2 for peripheral data is either 1,500 feet for sea-surface temperature or 27,000 feet for equivalent potential temperature, but dependent upon flight safety and aircraft endurance. Because equivalent potential temperature will not be computed onboard the aircraft, temperature, dew point, and pressure will be transmitted for each observation point.

(4) If the flight altitude for peripheral data is 27,000 feet, dropsonde observations will be made at Points D and E. Approval of dropsonde release will be requested from ARTCC concerned at least 10 minutes before the drop point.

(5) Dropsonde releases in the eye do not require prior coordination with ARTCC.

OPERATIONAL FLIGHT PATTERN "D"



OBSERVATION DETAILS FOR
OPERATIONAL FLIGHT PATTERN "D"

ALPHABETIC POINT	OBSERVATION DATA	TRANSMIT ASAP AFTER
A	First 8 groups RECCO code and SST.	A
B	Same as A.	B
Center	Center	Center (Initial Center Data Message when applicable).
B_1	99999 GGggi ddfff TTT_dT_dw mjHHH SST	C--Data for Point C transmitted first, then data for B_1, B_2, B_3, and B_4 in chronological order, followed by SST for C, B_1, B_2, B_3, and B_4. See example, appendix A, attachment 1a.
B_2	Same as B_1, except omit 99999.	
B_3	Same as B_2.	
B_4	Same as B_2.	
C	First 8 groups RECCO code and SST.	
C_1	99999 GGggi ddfff TTT_dT_dw mjHHH SST	D--Data for Point D transmitted first, then data for C_1 and C_2 in chronological order, followed by SST for D, C_1, and C_2. See example, appendix A, attachment 1a.
C_2	Same as C_1, except omit 99999.	
D	First 8 groups RECCO code and SST.	
D_1	99999 GGggi ddfff TTT_dT_dw mjHHH SST	Center or D_5.--If Center Data Message applicable, send first, then data for the intermediate points. If no Center Data Message, send D_5 data first, then data for D_1, D_2, D_3, and D_4 in chronological order, followed by SST for-D_5, D_1, D_2, D_3 and D_4.
D_2	Same as D_1, except omit 99999.	
D_3	Same as D_2.	
D_4	Same as D_2.	
D_5 or Center	First 8 groups RECCO code and SST or center data, if applicable.	
VORTEX	Vortex data (if applicable).	Supplementary Vortex Data/Message transmitted ASAP after last observation.

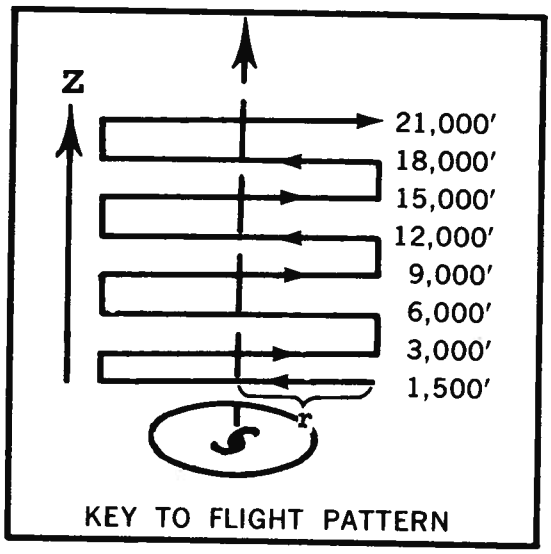
NOTES: (1) Notes 1 through 4 of appendix A, attachment 1a, Observation Details for operational Flight Pattern "A" are applicable to Pattern "D."

(2) No dropsondes because entire flight pattern will be flown at 1,500 feet.

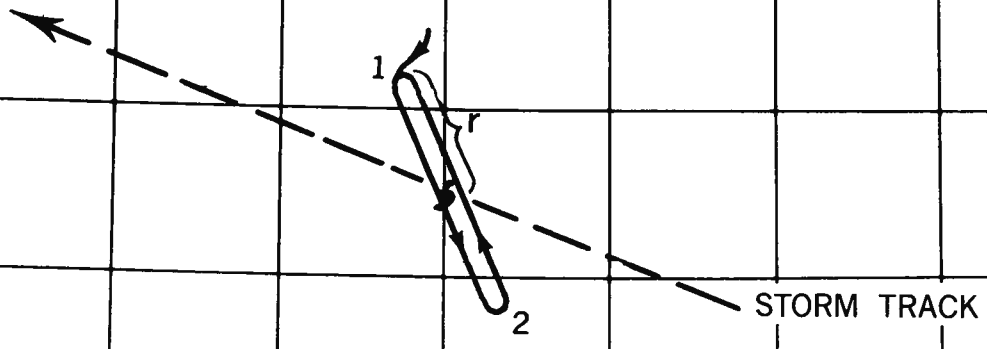
(3) If Leg B to C is along or parallel to an easterly wave, this leg should be flown parallel to the wave on either side. The side of wave (easterly) should be reported in Remarks.

RESEARCH FLIGHT FACILITY FLIGHT PATTERN

PLAN V (VICTORY)
STAIRSTEP RESEARCH PATTERN



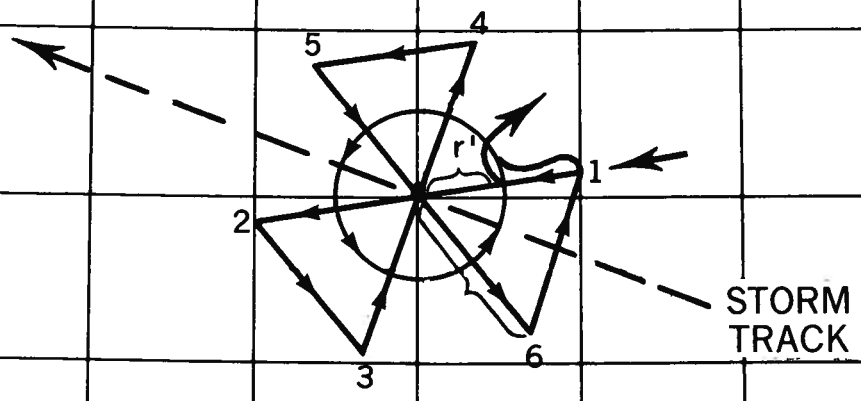
Preferred azimuth is through right front quadrant of the storm. Radial distance, r, from the eye is variable, i.e., 50 to 100 n.mi. Total pattern = 16r n.mi.



RESEARCH FLIGHT FACILITY FLIGHT PATTERN

PLAN W (WHISKEY)
RESEARCH CLOVERLEAF PLUS CIRCUMNAVIGATION

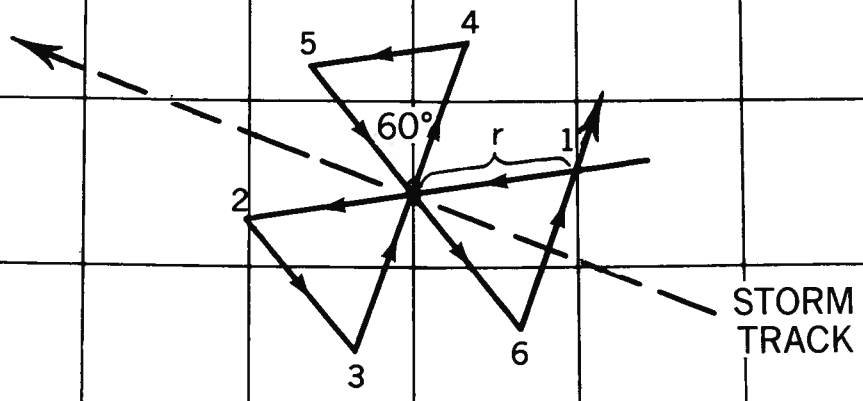
Both r, the leg of the triangle, and r′, the radius of the circle, are variable. (r has been drawn for 60 n.mi. and r′ for 30 n.mi. Total pattern distance $= 9r + 6.28r'$.) Preferred flight altitudes 1,500, 7,000, 13,000, 18,000 ft.



RESEARCH FLIGHT FACILITY FLIGHT PATTERN

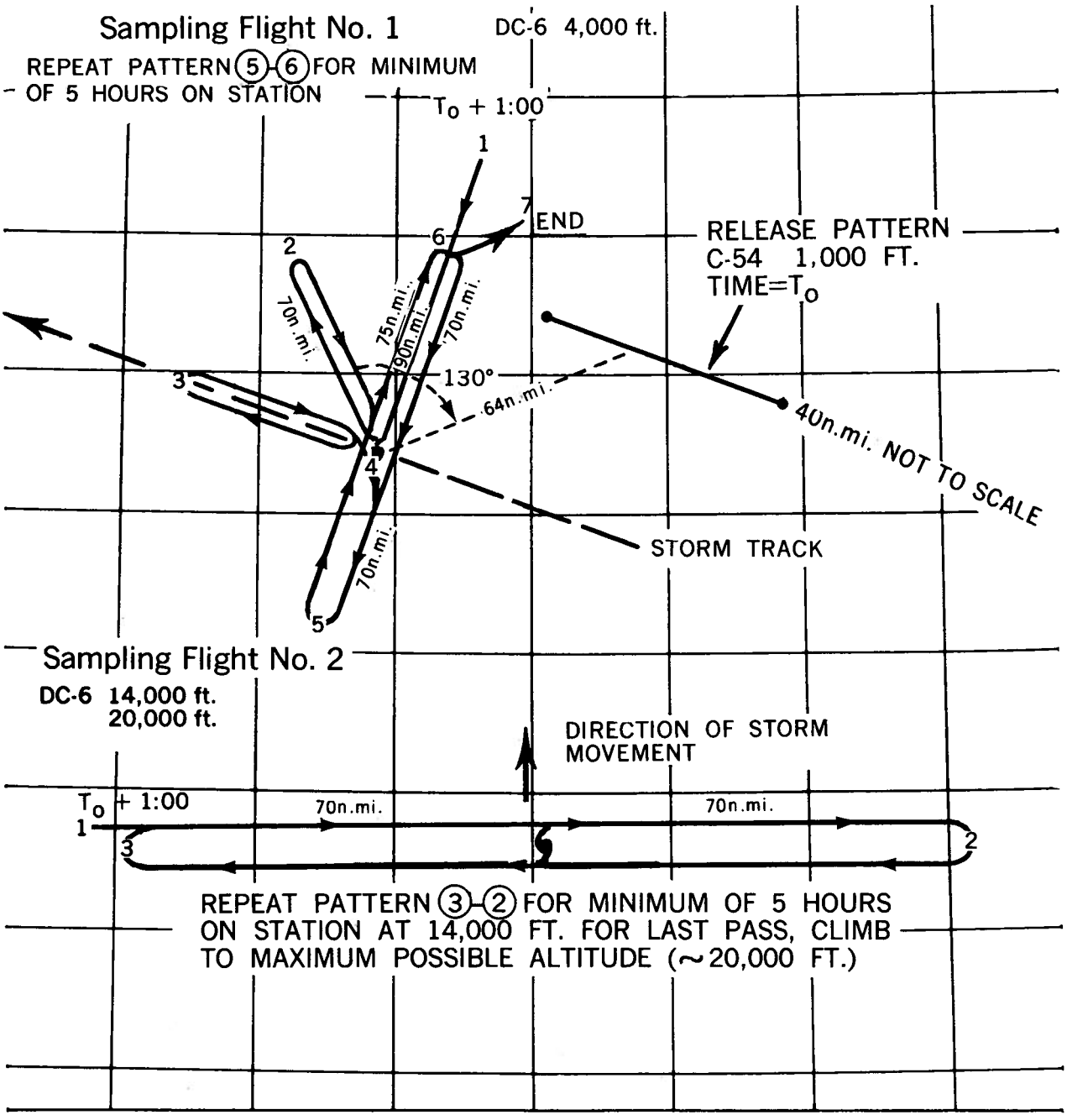
PLAN X (X-RAY) RESEARCH PATTERN CLOVERLEAF

The distance r is variable and will be specified in the TCPOD. It will depend on distance from base, storm size, etc., and may vary from 50 to 100 n.mi. Total flight pattern = 9r n.mi. Preferred flight altitudes, 1,500, 7,000, 13,000, 18,000 ft.



RESEARCH FLIGHT FACILITY FLIGHT PATTERN

PLAN Y (YANKEE)
TRACER EXPERIMENT (SF)



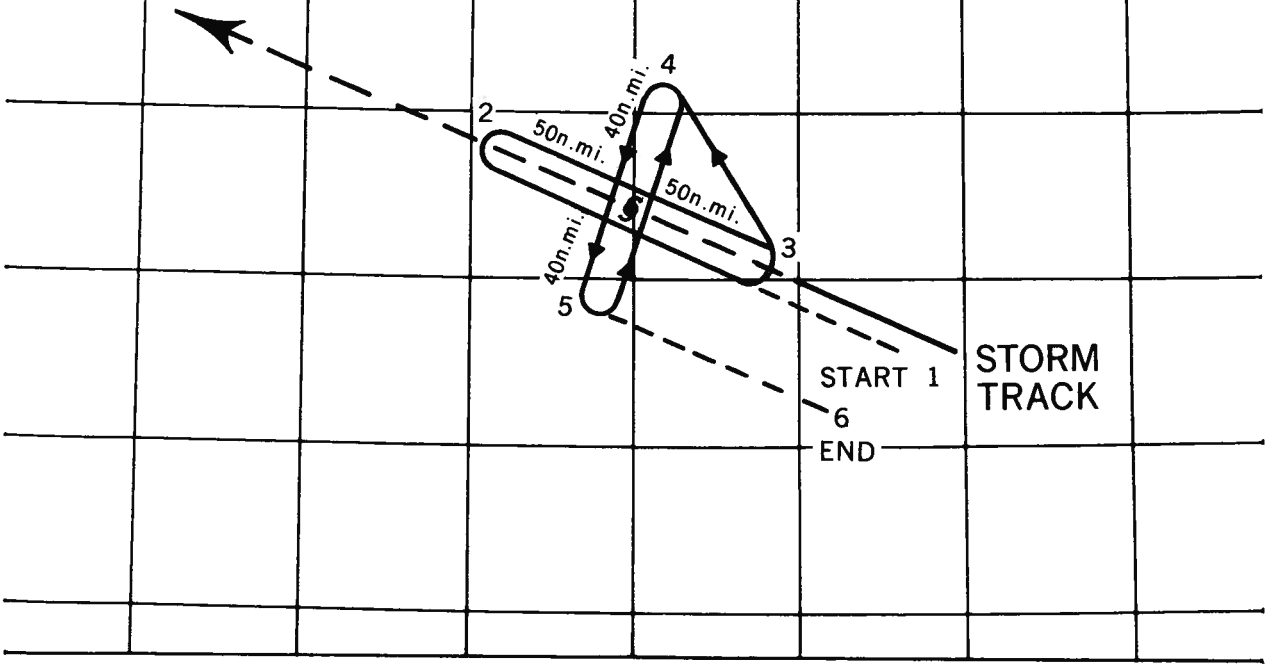
RESEARCH FLIGHT FACILITY FLIGHT PATTERN

PLAN Z (ZEBRA)
WIND SPEED MONITORING

ALTITUDE 5,000 FT.

FLY TO POINTS 1-2-3-4

THEN:
REPEAT TRACK 4 TO 5
UNTIL END OF ON-
STATION TIME



ATLANTIC

U.S. AIR FORCE COMMUNICATIONS SUPPORT PLAN

FOR

U.S. AIR FORCE HURRICANE RECONNAISSANCE

1. General. WC-130B-type aircraft of the 53d Weather Reconnaissance Squadron (53 WRS) of the Air Weather Service (AWS) will operate from Ramey AFB, P.R., during the hurricane season. Reconnaissance observations initiated by these aircraft will be transmitted by voice by means of high frequency single sideband (HF/SSB) radio through the U.S. Air Force Aeronautical Station complex to a weather monitor at Charleston AFB, S.C. The Charleston Weather Monitor will evaluate and edit the reports to insure meteorological and technical accuracy. The monitor will relay the edited reports by land-line teletypewriter facilities to the Chief, Aerial Reconnaissance Coordination, Atlantic Hurricanes (CARCAH) collocated with the National Hurricane Center (NHC) at the University of Miami, Coral Gables, Fla. The monitor will also relay these reports to the Carswell Automated Digital Weather Switch (KAWN) at Carswell AFB, Tex., using the U.S. Air Force COMET II circuit for further distribution over military weather communication systems as required. The CARCAH will provide these reconnaissance reports to NHC for use in developing advisories and warnings. The NHC will provide CARCAH with teletypewriter tape and page copies of hurricane advisories. The CARCAH will relay these advisories by way of the U.S. Air Force COMET II circuit to KAWN for introduction and distribution over the military weather communications system. Teletypewriter facilities will also be provided for coordinating the Tropical Cyclone Plan of the Day (TCPOD) and other aspects of the reconnaissance activities. A diagram of the U.S. Air Force hurricane communications network is included as attachment 1 to this appendix.

2. Air/Ground (A/G) Communications.

a. Whenever possible, U.S. Air Force hurricane reconnaissance aircraft will relay reconnaissance reports, through the U.S. Air Force Aeronautical Stations at MacDill, Albrook, or Loring AFBs. The specific station contacted will depend upon aircraft location and radio propagation conditions. The HF/SSB frequencies to be used for initial contact with each Aeronautical Station are listed in DOD Flight Information Publication Enroute--Supplement. Subsequent to initial contact, the Aeronautical Station will assign a primary and secondary frequency for use by hurricane reconnaissance aircraft during each mission. Frequencies assigned may or may not be the same as frequencies published in the Enroute Supplement for the contacted Stations. Whenever possible, frequencies will be assigned to reduce interference and congestion from other high frequency air/ground (HF A/G) traffic. When specifically requested by the aircrew and circuit conditions will permit, a direct voice-phone patch between the aircraft and the Charleston Weather Monitor will be

provided by the Aeronautical Station. The U.S. Air Force has authorized the use of "Immediate" precedence for transmission of hurricane reconnaissance reports. To further facilitate such voice patching, direct Automatic Voice Network (AUTOVON) access lines have been provided. Specific methods for handling hurricane reconnaissance messages are listed below for each station:

PRIMARY METHOD	FIRST ALTERNATE	SECOND ALTERNATE
	MACDILL AERONAUTICAL STATION	
Direct phone patch between recon aircraft and Charleston Weather Monitor via AUTOVON.	A/G operator copy transmission from aircraft; relay by voice to Charleston via AUTOVON.	A/G operator copy from aircraft; relay to Charleston using commercial long-distance phone or direct teletypewriter Circuit GT 22117, whichever is faster.
	ALBROOK AERONAUTICAL STATION	
Direct phone patch between recon aircraft and Charleston Weather Monitor via AUTOVON.	A/G operator copy from aircraft; relay to Charleston via AUTOVON or other available voice circuits.	A/G operator copy from aircraft; pass to MacDill via AUTOVON for further relay to Charleston by most expeditious means.
	LORING AERONAUTICAL STATION	
Direct phone patch between recon aircraft and Charleston Weather Monitor via AUTOVON.	A/G operator copy transmission from aircraft; relay to Charleston via AUTOVON.	A/G operator copy from aircraft; relay to Charleston using commercial long-distance phone or teletypewriter Circuit GT 22117, whichever is faster.

b. The following is a typical sequence of actions required for passing an observation message from the aircraft, through the MacDill Aeronautical Station, to the receiving facility at Charleston AFB:

(1) MACDILL - THIS IS GULL ONE - ON FOUR SEVEN - OVER.

(2) GULL ONE - MACDILL - GO AHEAD.

(3) MACDILL - GULL ONE - REQUEST IMMEDIATE PHONE PATCH TO CHARLESTON WEATHER MONITOR - OVER.

(4) GULL ONE - MACDILL - STAND BY.

(5) The A/G operator conditions his console for a ground subscriber call, selects the line associated with the station's AUTOVON line, and calls the Charleston addressee using the direct AUTOVON number. When the Charleston party answers, the operator advises:

(6) THIS IS MACDILL - STAND BY FOR PHONE PATCH FROM GULL ONE - OVER.

(7) ROGER - STANDING BY.

(8) The A/G operator then conditions his console for phone patch and advises the aircraft:

(9) GULL ONE - THIS IS MACDILL - YOUR PATCH TO CHARLESTON IS READY - GO AHEAD.

(10) CHARLESTON - THIS IS GULL ONE - MESSAGE FOLLOWS - BREAK BREAK - AIR FORCE GULL ONE BETSY FOUR TEXT TEXT TEXT - OVER.

(11) GULL ONE - CHARLESTON - ROGER - OUT.

(12) GULL ONE - OUT.

(13) The MacDill A/G operator then breaks the patch.

c. If at item (11) above, Charleston has any question or comment on the observation message, it will be resolved before discontinuation of the patch. If, at item (3) above, phone patch cannot be provided, the following sequence of actions would be typical:

(1), (2) and (3) See paragraph 2.b. above.

(4) GULL ONE - MACDILL - UNABLE TO PROVIDE PATCH AT THIS TIME - YOUR SIGNAL IS NOT PATCH QUALITY - I CAN PROVIDE RELAY TO ADDRESSEE - OVER.

(5) MACDILL - GULL ONE - PASS TO CHARLESTON MONITOR - BREAK BREAK - AIR FORCE GULL ONE BETSY FOUR TEXT TEXT TEXT - OVER.

(6) MACDILL.

(7) The A/G operator then passes the copied message to the Coordinator for relay to Charleston Weather Monitor over AUTOVON or teletypewriter Circuit GT 22117 as appropriate.

d. Regular hurricane mission messages will include the unit indicator (AIR FORCE GULL), followed by the numerical mission number (ONE), the name of the tropical cyclone (ANN), and the numerical sequence of the reports during the flight (ONE--end of flight).

Examples:

First tropical cyclone, first mission, first report:
AIR FORCE GULL ONE ANN ONE.

First tropical cyclone, second mission, tenth report:
AIR FORCE GULL TWO ANN TEN.

Second tropical cyclone, first mission, fifth report:
AIR FORCE GULL ONE BABS FIVE.

e. Diverted hurricane search missions will append a plain language explanatory message to the last scheduled position message; for example:

GULL NECTAR DIVERTED NEXT MSG AIR FORCE GULL ONE CYCLONE,

or

GULL NECTAR DIVERTED NEXT MSG AIR FORCE GULL ONE ANN.

f. Reconnaissance messages from suspicious areas will read:

AIR FORCE GULL ONE CYCLONE, etc.

Reconnaissance mission messages into suspicious areas will be numbered consecutively without regard to the tropical cyclone itself; for example, first reconnaissance of a suspicious area during the season will be AIR FORCE GULL ONE CYCLONE, etc., with the next suspicious area investigated identified as AIR FORCE GULL TWO CYCLONE, etc.

3. Point-to-Point Teletypewriter Communications Capability.

a. Circuit GT 22117 (JOGCU 304) will be configured as shown in attachment 1, appendix E of this chapter. The NHC will have a receive-only reperforator on this Circuit to provide it with the hurricane reconnaissance reports for further relay over the FAA weather networks. The Charleston Weather Monitor will act as network control station and maintain circuit discipline. Authorized uses of this Circuit are:

(1) Relay of aircraft hurricane traffic to CARCAH/NHC.

(2) Coordination of the TCPOD and other related matters.

(3) Aeronautical Stations to pass reports received from reconnaissance aircraft to Charleston whenever they cannot be handled by primary or first alternate means.

(4) Essential coordination between CARCAH and Alternate CARCAH concerning transfer of responsibility and similar matters will be handled over this Circuit.

(5) In the event responsibility is transferred from NHC to Alternate National Hurricane Center (ALT NHC), National Weather Service, Washington Hurricane Warning Office (HWO), traffic received at Charleston by means of AUTOVON will be relayed to the Alternate CARCAH over this Circuit. The Alternate CARCAH will arrange for the relay of these data to ALT NHC by the most expeditious means available. Circuit GT 22117 to FWF Suitland may be used for this purpose.

(6) Dissemination of Air Force Storm Reconnaissance Aircraft "Departure" and "Arrival" messages from the 53d Weather Reconnaissance Squadron Mission Control Center (53 WRSMC) in the following format:

10 LTRS
AA CR 4LF
00 URXX RMCS DTG
TEXT CR 4LF
NNNN
10 LTRS.

(7) Command/control traffic between the 9th Weather Reconnaissance Wing Command Post (9 WRWCP) and 53 WRSMC.

(8) Coordination on hurricane matters by the Fleet Weather Facility (FWF) Jacksonville Alternate.

b. A COMET II drop is installed at CARCAH and will be used to transmit hurricane advisories to Carswell Automated Digital Weather Switch (KAWN) for further distribution to military customers, as required.

4. Miscellaneous Communications Services and Support.

a. Routine communications between weather reconnaissance aircraft and Aeronautical Stations for normal air traffic control (ATC) services will be handled in accordance with standard procedures. Where contact cannot be made with Aeronautical Stations, ATC communications may be conducted in accordance with paragraph 7 of this chapter.

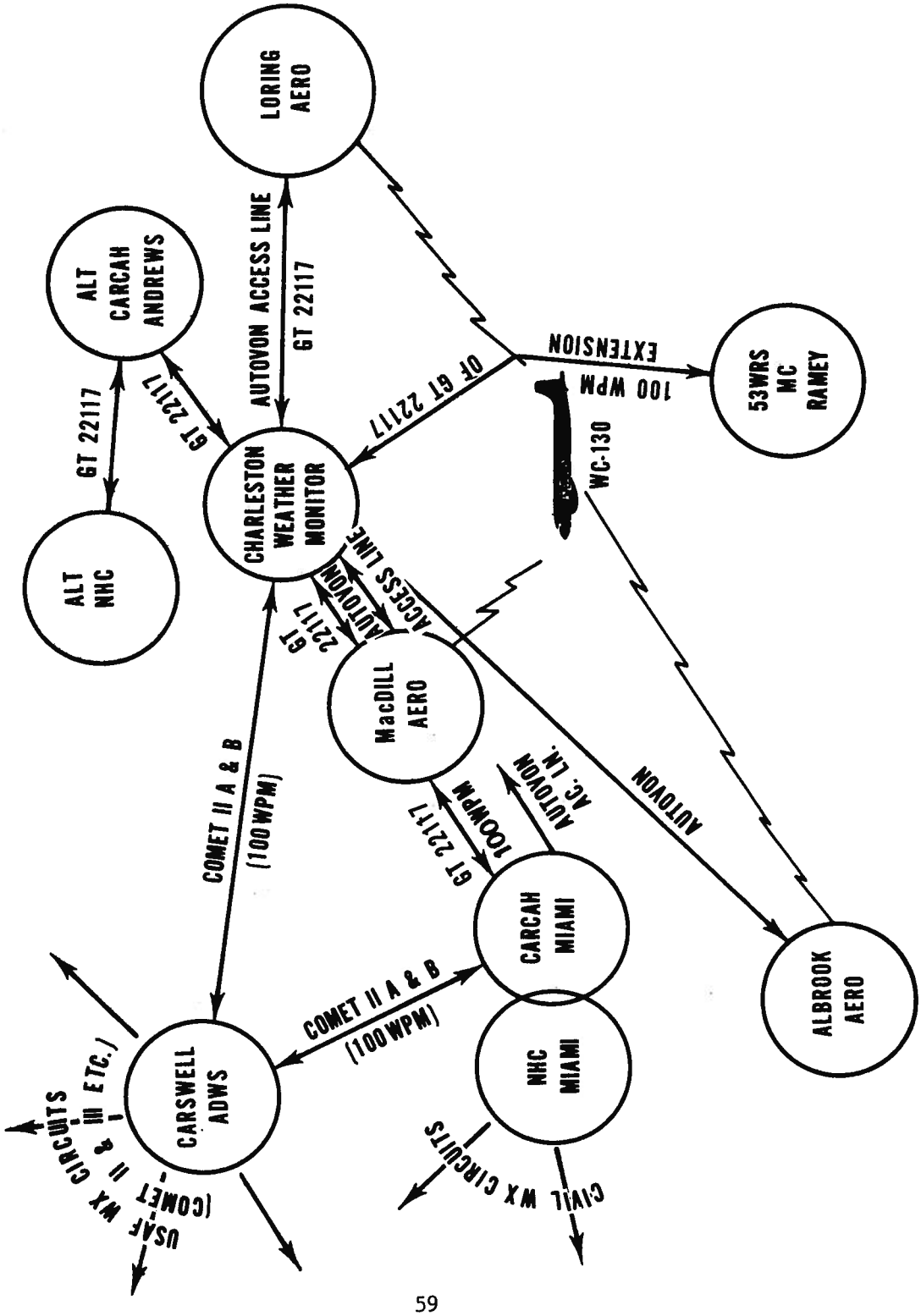
b. When U.S. Air Force hurricane reconnaissance are unable to communicate through Aeronautical Stations, contact will be made with the SSB radio facilities of FWF at Jacksonville Naval Air Station (NAS) or Roosevelt Roads. Frequencies are listed in paragraph 2.a.(1)(b) and (c), appendix D, of this chapter. U.S. Air Force reconnaissance reports relayed in this manner will be forwarded by the U.S. Navy to CARCAH/NHC by the most expeditious means available. The SSB radio facility of FWF at Jacksonville NAS has direct phone patch capability. The U.S. Air Force aircraft contacting this facility will request a phone patch to the Charleston Weather Monitor, AUTOVON number 630-1940.

c. The U.S. Navy and Research Flight Facility (RFF) hurricane aircraft are authorized to utilize the facilities of the U.S. Air Force Aeronautical Stations for relay of hurricane reconnaissance reports. A direct voice patch

can be provided from these aircraft to FWF at Jacksonville NAS by requesting the MacDill, Albrook, or Loring Aeronautical Stations to contact AUTOVON number 434-3740. In the event that the signal is not of patch quality, ground operator will copy message and relay to FWF Jacksonville.

d. Commercial dial teletypewriter system messages for CARCAH in Coral Gables should be addressed in the heading of the message as follows: RUCLEFA/CARCAH HOMESTEAD AFB, FLA.

USAF ATLANTIC HURRICANE COMM SYSTEM



ATLANTIC U.S. NAVY COMMUNICATIONS PLAN

1. General. Weather Reconnaissance Squadron Four (VW-4), an element of the Atlantic Fleet, will operate WP-3A and WC-121 aircraft from the Jacksonville Naval Air Station (NAS). Alternate staging of aircraft is normally from Naval Station (NAVSTA) Roosevelt Roads. The VW-4 provides reconnaissance in support of Atlantic Fleet requirements and the National Hurricane Center (NHC) as indicated in the preceding chapters. Reconnaissance code (RECCO) reports are normally relayed by means of the high frequency/single sideband (HF/SSB) circuit to Fleet Weather Facility (FWF) at Jacksonville. The FWF Jacksonville will validate or otherwise coordinate reports with the aircraft, where possible, and expeditiously relay reports to NHC and other intended agencies as set forth in this Plan. The NHC will provide FWF Jacksonville with all hurricane warnings and advisories. The following plan outlines the communications Resources and Operations procedures for providing essential air/ground (A/G) communications and the subsequent relay of perishable reports.

2. Resources.

a. Air-to-Ground (A/G) Communications Circuits.

(1) Primary A/G Circuit: Joint Army, Navy, Air Force Procedures (JANAP) 195 lists circuits authorized for use by primary A/G communications. VW-4 aircraft will transmit aircraft reports, weather and other pertinent information while conducting tropical cyclone reconnaissance missions to FWF Jacksonville (Net Control), FWF Suitland, and NAVSTA Roosevelt Roads as follows:

(a) HF/SSB Voice with alternate CW:

1. ALPHA, 4701.5 kHz

2. BRAVO, 9011.5 kHz

3. CHARLIE, 13222.5 kHz

4. DELTA, 15082.5 kHz

5. ECHO, 23228.5 kHz

6. LIMA, 18000.5 kHz

(b) HF/SSB voice, radioteletypewriter, and simultaneous voice/radioteletypewriter for DATS transmission:

1. FOXTROT, 4708.5 kHz

2. GEORGE, 8973.5 kHz

3. HOTEL, 13232.5 kHz

4. INDIA, 15072.5 kHz

5. JULIET, 17980.5 kHz

6. KING, 23201.5 kHz

(c) HF/SSB radioteletypewriter (RTTY)*:

1. MIKE, 3096.5 kHz

2. NOVEMBER, 11192.5 kHz

3. OBOE, 18010.5 kHz

*Note: SSB-suppressed carrier frequencies located 1.5 kHz below indicated frequency.

(2) Secondary A/G Circuit:

(a) U.S. Air Force Aeronautical Stations, using HF/SSB voice frequencies listed in latest DOD Flight Instruction Publication Enroute--Supplement, will provide secondary A/G communications. Recommended Stations listed in order of preference:

1. MacDill Aeronautical Station

2. Loring Aeronautical Station

3. Albrook Aeronautical Station

(3) Backup and Emergency A/G Circuits:

(a) The Air Route Traffic Control Center (ARTCC) communications of the Federal Aviation Administration (FAA) may be used to relay reconnaissance reports when the primary and secondary means have failed.

1. FAA Stations--6568 kHz (Miami, San Juan, New York)

(b) Navy Universal Air-to-Ground (CW) Circuit

(c) Emergency and Distress Frequencies:

FREQUENCY	EMISSION	USE
500.0 kHz	CW	International Distress and Calling Frequency
2182.0 kHz	V	International Distress and Calling Frequency
2678.0 kHz	V	Coast Guard Calling and Working Frequency
5680.0 kHz	V	Search and Rescue (SAR) Control (Coast Guard)
5695.0 kHz	V/CW	SAR Control (U.S. Navy)
8364.0 kHz	CW	International Lifeboat, Liferaft, and Survival; Craft Frequency
121.5 MHz	V	Emergency and Distress for Aircraft and Ships SAR and VHF/DF Primary
243.0 MHz	V	Military Common Emergency Frequency, UHF.

b. Point-to-Point (Surface) Relay

(1) The FWF Jacksonville will use the following means of distributing hurricane traffic:

(a) Automatic Digital Network (AUTODIN). This online encrypted duplex teletypewriter circuit will be utilized to distribute warnings, intermediate position estimates, and Tropical Weather Summaries to military addressees and to Naval Communications Stations (NAVCOMMSTA) for transmission on Atlantic Fleet broadcasts.

(b) GT 22117 East Coast Reconnaissance Circuit. This circuit will be the primary circuit for relaying of reconnaissance reports and coordination of TCPOD. Refer to paragraph 3 of appendix C for details concerning Circuit operation.

(c) 30 GT 2352, Direct Line Teletypewriter. This circuit consists of International Flight Service Station (IFSS) Miami, NHC Miami, RFF Miami, VW-4 and FWF Jacksonville.. Reconnaissance TCPOD will be transmitted on this circuit by CARCAH. This circuit will be the secondary circuit for the relay of reconnaissance reports received at FWF Jacksonville. The NHC will be responsible for entering these reports on the Hurricane Circuit 23421.

(d) COMET II. This circuit will be a back up circuit for relaying of reconnaissance reports received at FWF Jacksonville by SSB. Reports will be transmitted on COMET II subsequent to transmission on GT 22117 or initially if GT 22117 is inoperative.

(e) 30 GP 2901, Direct Line Telephone. This circuit connects VW-4, FWF Jacksonville and NHC. This telephone is utilized to coordinate the TCPOD with CARCAH at NHC and to permit discussion of hurricane data with NHC Miami.

(f) Navy Environmental Data Network (NEDN). DALS information will be collected at FWF Jacksonville and relayed at periodic scheduled intervals at high speed by means of the NEDN to FWC Norfolk. FWC Norfolk will process DALS information for further use within the Navy.

(g) FWF Jacksonville, Roosevelt Roads, and FWF Suitland Reconnaissance Circuit (SSB). This circuit is utilized for operational messages from and to VW-4 at Roosevelt Roads and for communications with the hurricane reconnaissance aircraft. The FWF Jacksonville will use the voice call sign "JACKSONVILLE HURRECO CONTROL" for communications on this circuit. U.S. Navy reconnaissance aircraft will use "NAVY HURRECO," followed by the last three digits of the bureau number. Voice procedures and circuit logs will be as outlined in Allied Communication Procedures--ACP 125. Hard copies will be made of all operational and administrative messages.

3. Operations.

a. Hurricane Reconnaissance Reports.

(1) Reports:

(a) Reconnaissance reports will be encoded in the currently effective RECCO code in accordance with the National Hurricane Operations Plan. At the end of each RECCO message, the coded longitude, latitude, flight level, and surface wind groups will be repeated for confirmation.

(b) Data Acquisition and Logging System (DALS). To the maximum extent possible, DALS will be employed as a means of providing meteorological, oceanographic, and operational position reports.

(c) Oceanographic data will be coded in accordance with Atlantic Fleet instructions as required by Fleet Weather Central (FWC) Norfolk, Va.

(d) Radar Reports may be transmitted in plain text.

(e) Instructions:

1. Message texts (reports) shall be preceded by "UR" or "UH" (indicating routine or storm surveillance), unit identification (for example, "Navy"), mission number (for missions other than synoptic tracks), type of mission (CYCLONE NAME, "INVEST" or "TRACK NAME"), and message number (ONE, TWO, etc.), with "ONE" assigned to the departure report. The sequence will be continuous for all messages on each particular flight, regardless of whether messages are transmitted in RECCO code, plain language text, or a combination of the two. The arrival report shall be the final one of the series.

(2) Communications Procedures. In formatting messages for transmission to ground stations, all activities shall use procedures outlined in ACP 121 US Supp. 2, with respect to message headings, date-time groups, and numbering systems external to the message text. Appropriate JANAP and ACP will be used in contacting A/G stations.

(3) Precedence.

MESSAGE	PRECEDENCE
Conditions less than indicated below	- Priority (P)
RECCO reporting conditions of:	
Surface wind 33 knots or greater	- Immediate (O)
Seas 12 feet or greater	- Immediate (O)
Moderate or heavy precipitation	- Immediate (O)
Moderate or severe icing	- Immediate (O)
Moderate or severe turbulence	- Immediate (O)
Significant changes in meteorological conditions as determined by flight meteorological officer (METRO)	- Immediate (O)

(4) Classification. All meteorological and oceanographic reports shall be unclassified.

(a) Primary Guard.

1. Net Operation and Control:

a. This Circuit will operate as a free net unless otherwise directed by Net Control (FWF Jacksonville) and will be the primary circuit for passing reconnaissance data.

b. The FWF Jacksonville shall act as the Primary Guard ground-monitoring station.

c. The FWF Suitland shall act as the secondary (backup) ground-monitoring station.

d. The aircraft shall notify the ground-monitoring station before leaving the circuit, except in case of emergency.

e. The aircraft will give its call sign at the beginning of each transmission to facilitate High Frequency Direction Finding (HFDF) identification. Each radio check shall contain one full count if no other traffic is passed.

f. The aircraft and ground-monitoring station shall return to the last frequency on which contact was made, if, after a frequency shift is made, no contact is made within 15 minutes.

g. The net control station or ground-monitoring station will request a "Test Transmission" on another frequency to determine if another circuit (frequency) will provide better communications. For example, upon the command "TEST CIRCUIT ALPHA" from the ground-monitoring station, the aircraft shall shift to Circuit ALPHA, give three long counts, and return to the circuit upon which the command was given.

h. In-flight position reports, requests for clearances, and other communications with ARTCC can be relayed on Primary Guard only if normal means of communicating with ARTCC have failed.

2. Radio Checks:

a. Periodic radio checks between Roosevelt Roads, FWF Jacksonville, and FWF Suitland will be initiated by FWF Jacksonville or the station exercising ground-monitoring responsibility. The periodicity of these checks shall not exceed 1 hour.

b. Radio checks will be initiated by the aircraft before takeoff and at 30-minute intervals while airborne. Check times will be on the hour and half hour.

c. An attempt will be made on the next lower frequency if contact on a given frequency cannot be established within 15 minutes of the designated time. If this 15-minute attempt on the lower frequency is not successful, another attempt will be made on the next higher frequency. If, at this point, contact is not made, the aircraft shall return to the primary frequency.

d. DALS transmissions with channels 00, 01, 02, and 03 functional will be considered as being valid radio checks.

3. Frequency Assignments:

a. Utilization of Frequencies. Frequencies assigned in JANAP 195 ( ), will be utilized as follows:

1) FWF Jacksonville will guard circuits as follows:

a) Primary: Circuit CHARLIE (13222.5 kHz).

b) Secondary: Circuit ALPHA (4701.5 kHz).

c) DALS: Authorized frequencies according to propagation conditions.

2) FWF Suitland will guard backup circuits as follows:

a) Primary: Circuit CHARLIE (13222.5 kHz).

b) Secondary: Circuit ECHO (23228.5 kHz).

c) DALS: Authorized frequencies according to propagation conditions.

3) Roosevelt Roads will guard backup circuits as follows:

a) Primary: Circuit CHARLIE (13222.5 kHz).

b) Secondary: Circuit DELTA (15082.5 kHz).

4) Other assigned frequencies may be utilized if required.

*NOTE: SSB-suppressed carrier frequencies located 1.5 kHz below indicated frequency.

4. Transmission Mode:

a. Voice. A/G transmissions using frequencies ALPHA through ECHO will serve as means to transmit plain language reports other than DALS.

b. RTTY/DALS. Plain language, RTTY, and DALS transmissions between the aircraft and ground-monitoring stations are primary communications modes. FWF Jacksonville and FWF Suitland are equipped to receive and relay A/G RTTY, including DALS.

c. CW. Radiotelegraph communications shall be used only when other communications modes fail to effect satisfactory contact.

5. Relay of Traffic:

a. The FWF Jacksonville (primary station) will relay reports by means of:

1) AUTODIN to addressees indicated in aircraft message.

2) NHC (CARCAH) on East Coast Reconnaissance Coordination Circuit (GT 22117 or GT 2352).

3) DALS reports by NEDN to FWC Norfolk.

b. The FWF Suitland (secondary station) will relay reports by means of:

1) AUTODIN to addressess indicated in aircraft message.

2) NHC (CARCAH) on East Coast Reconnaissance Coordination Circuit (GT 22117).

3) DALS reports manually to NMC Suitland and by NEDN to FWC Norfolk.

c. Roosevelt Roads (backup station) will relay reports by means of:

1) AUTODIN to addressees indicated in aircraft message.

2) Ramey AFB for further relay into the COMET network.

(b) Secondary Guard.

1. Air/Ground (A/G) Voice U.S. Air Force Aeronautical Stations (HF/SSB):

a. If communications cannot be established by the aircraft and maintained on the primary circuit, the A/G voice communications, as outlined in the "U.S. Air Force Communications Support Plan for U.S. Air Force Hurricane Reconnaissance," appendix C of this chapter will be used.

b. Reports not phone-patched directly through the U.S. Air Force A/G stations can be further relayed (delivered) by:

1) AUOTVON/other voice circuits.

2) GT 22117.

3) AUTODIN.

(c) Backup Guard.

1. Navy Universal Air-to-Ground (CW) Circuit.

a. If communications cannot be established and maintained on circuits as outlined above, the Navy Universal Air-to-Ground (CW) Circuit will be utilized.

b. When communications cannot be established through any of the above circuits, naval reconnaissance aircraft may contact any U.S. Navy A/G station.

c. When alternate ground stations must be contacted, weather messages must be addressed with proper "Tango" instructions to ensure that ground stations will be responsible for immediate relay of such messages to FWF Suitland.

(d) Message Addressing Instructions.

1. Example of a Hurricane RECCO Message:

0 181902Z

FM NAVY HURRECO 896
TO NHC MIAMI
FWF JACKSONVILLE

INFO WEARECONRON (VW-4)
GR30
BT
UNCLAS

UH NAVY ONE BETSY TWO 97779....etc.
(Second message from U.S. Navy mission on named storm BETSY.)

UR NAVY ONE INVEST TWO 97779....etc.
(Second message from U.S. Navy mission to investigate a suspicious area.)

NOTE: In the event a reconnaissance aircraft is diverted from a standard-named track to investigate a suspicious area, a mission number will be assigned and message numbers will continue sequentially. For instance, the first message from a KILO flight, diverted after message number four to investigate a suspicious area, would read:

UR NAVY ONE INVEST FIVE 97779....etc.

4. Miscellaneous Communications Services and Support.

a. AUTODIN messages for NHC Miami and/or CARCAH Coral Gables should be addressed in the heading of the message as follows:

RUCLEFA/NHC/MIAMI
RUCLEFA/CARCAH HOMESTEAD AFB, FLA.

Data Acquisition and Logging System (DALS) data is available from Navy aircraft (100 w.p.m. HF/SSB RATT) for selected parameters at 5-second intervals or for all 30 channels at intervals of 30 seconds, 1 minute, 5 minutes, or 10 minutes in the following format:

Channel	Parameter	Recorded Increment	Input
00	Date	Mo., Day, Year	M
01	Time (Z)	Hrs., Min., Sec.	A
02	Latitude/quadrant	Deg., Min., Quad.	A
03	Longitude	Deg., Min.	A
04	Absolute altitude	10 feet	A
05	Pressure altitude	10 feet	A
06	Ambient pressure	.1 millibar	A
07	Ambient temperature	.01°C.	A
08	Dew point	.1°C.	A
09	FLT LVL wind direction	1 degree	A/M
10	FLT LVL wind speed	1 knot	A/M
11	Sea-surface temperature	.1°C.	A
12	Sea-level pressure	.1 millibar	M
13	Surface wind (ddfff)	Tens of deg./whole knots	M
14	True air speed	1 knot	A
15	True heading	1 degree	A
16	Ground speed	1 knot	A
17	Drift angle	1 degree	A
18	Future use for "n" or wave PD/HGT or ice accretion		
19	Weather ($wwWBf_c$) ww = WMO Code/WBf_c = RECCO		M
20	1 $K_nN_1N_2N_3$	RECCO Code	M
21	Lowest cloud	RECCO Code	M
22	Second cloud layer	RECCO Code	M
23	Third cloud layer	RECCO Code	M
24	GMT time of last Lat/Long DALS update	Tens of seconds	M
25	Navigation latitude	Quad./1 minute	M
26	Navigation longitude	1 minute	M
27	Reserved		
28	Reserved		
29	Bathythermograph	.1°F/10 feet	A

NOTE: (1) Channel 20 19999 = in clouds.
(2) Channel 21 = lowest cloud visible from aircraft.
(3) Channel 22 = first layer above channel 21.
(4) Channel 23 = first layer above channel 22.
(5) Channels 09 and 10 are normally automatic input from inertial navigation system and Doppler; however, manual input can be selected.
(6) If the Flight Meteorologist determines (from separate instruments) a specific channel to be providing incorrect data, that channel will be deleted and only the channel identifier will be transmitted.
(7) Sea and swell conditions, together with other significant data, including data for deleted channels will be provided in plain language.
(8) Input - A = Automatic/M = Manual.

This page displays examples of teletypewriter copy as received from U.S. Navy reconnaissance aircraft.

Teletype Display	Explanation of Data
00 04051	00=Date ID, 04=April, 05=the 5th, 1=1971
01 12345	01=Time ID, 12=Hour, 34=Min., 5=50 Sec
02 30143	02=Lat/Quad ID, 30=Deg, 14=Min, 3=North of Equator between 0° and 180° Long.
03 08141	03=Long ID, 081=Deg, 41=Min
04 25140	04=Absolute altitude ID, 25140=25,140 Ft
05 24140	05=Pressure altitude ID, 24140=24,140 Ft
06 03781	06=Ambient pressure ID, 03781=378.1 Mb
07 92663	07=Ambient temp ID, 9=Minus, 2663=26.63°C.
08 9271	08=Dew point ID, 9=Minus, 271=27.1°C.
09 252	09=FL wind direction ID, 252=Wind from 252 Deg
10 046	10=FL wind speed ID, 046=46 Knots
11 0109	11=Sea-surface temp ID, 0=Positive, 109=10.9°C.
12 10278	12=Sea-level pressure ID, 10278=1027.8 Mb (99876 would = 987.6 Mb)
13 14125	13=Surface wind ID, 14=from 140 Deg, 125=125 Kts
14 315	14=True air speed ID, 315=315 Knots
15 103	15=True heading ID, 103=True heading of aircraft
16 350	16=Ground speed ID, 350=Acft ground speed 350 Kts
17 956	17=Drift angle ID, 9=Left drift, 56=4°drift (Left drift value taken from 60, 0=right drift)
18	18=Future use
19 13845	19=Weather ID, 13=Lightning, 8=Past shower, 4=Mod Turb in clouds infreq, 5=Chaotic sky
20 13438	20=Cloud amount ID, 1=Indicator, 3=Three layers, 4=5/10 lowest, 3=4/10 second, 8=10/10 third
21 65658	21=Lowest cloud ID, 6=SC, 56=Base 6000 Ft, 58=Tops 8000 Ft
22 46567	22=Second cloud layer ID, 4=AS, 65=Base 15,000 ft 67=Tops 17,000 Ft
24 18000	24=ID of time of channels 25 and 26, 18=Hours, 00=Min, 0=Tens of sec.
25 33047	25=ID for Lat of channel 24 time, 3=Quad - North of Equator between 0° and 180°, 30=30°, 47=47 Min
26 08820	26=ID for Long of channel 24 time, 088=88°, 20=20 Min
27	27=Reserved
28	28=Reserved
29 01598	29=Bathythermograph ID, 01=10 Ft, 598=59.8°F.

NOTE: (1) ID--Identifier

COMMON COMMUNICATIONS CAPABILITIES--ATLANTIC

STATIONS	AUTODIN	GT22117#	7072	COMET	GT2352	AUTOVON	30GP2901
FWF Jacksonville	RHCJAAA	X		X	X	X	X
FWF Suitland	RUEBEGA	X				X	
NAVSTA Roosevelt Roads	RULGANA					X	
CARCAH Miami	RUCLEFA	X		X		X	X
ALT CARCAH Andrews	RUEBBAA	X		X		X	
NHC Miami	RUCLEFA	X(RO)	X	X(RO)	X	X	X
NMC Washington	RUEOLMA		X	X(RO)			
Weather Service Washington	RUEOLMA		X				
Charleston Weather Monitor	RUEBAIA	X		X		X	
MacDill Aeronautical	RUCJBBB	X				X	
Albrook Aeronautical	RUEOEFA					X	
Loring Aeronautical	RUEDLDA	X				X	
FLEWEACEN Norfolk	RUEBJNA	X(RO)		X		X	
FWF Quonset Point	RUEDDDA	X(RO)		X		X	
VW-4 Jacksonville	RUCLBKA	X(RO)			X	X	X
53 WRSMC Ramey AFB	RUCLIMA	X				X	
IFSS* Miami					X		
ARTCC Jacksonville	RUWTAIA					X	
ARTCC Washington	RUEONEA					X	
ARTCC Miami	RUCLFPA					X	
ARTCC New York	RUEDJKA					X	
ARTCC Houston	RUWTDPA					X	
Carswell ADWS	RUCLDAA	X(RO)		X		X	

#East Coast Reconnaissance Circuit.

(RO) Receive only

*IFSS--International Flight Service Station.

U.S. AIR FORCE COMMUNICATIONS SUPPORT PLAN FOR U.S. AIR FORCE EASTERN PACIFIC HURRICANE RECONNAISSANCE

1. General. Reconnaissance observations initiated by U.S. Air Force aircraft will be transmitted by voice over high frequency single sideband (HF/SSB) radio through the U.S. Air Force Aeronautical Station complex to a weather monitor at McClellan AFB, Calif. The McClellan Weather Monitor will evaluate and edit the reports to ensure meteorological and technical accuracy. The Monitor will then relay these monitored reconnaissance reports over the West Coast Hurricane Coordination Net and COMET II to all customers requiring this information. The Eastern Pacific Hurricane Center-San Francisco (EPHC-SFO) will provide the McClellan Weather Monitor with hurricane advisories. These advisories will be sent to Carswell Automated Digital Weather Switch (KAWN) over COMET II for further distribution over the military weather communications system. A diagram of the U.S. Air Force East Pacific Hurricane Communication System is included as attachment 1 to appendix F of this chapter.

2. Air/Ground Communications.

a. Whenever possible, U.S. Air Force hurricane reconnaissance aircraft will relay reports through the Aeronautical Stations at McClellan AFB or Albrook AFB, C.Z., in that order. The HF/SSB frequencies to be used are listed in DOD Flight Information Publication Enroute--Supplement. When specifically requested by the aircrew and when circuit conditions will permit, a direct voice-phone patch between the aircraft and the Weather Monitor at McClellan AFB will be provided by the Aeronautical Station. To facilitate such voice-phone patching, a hot line has been provided between the McClellan Aeronautical Station and the McClellan Weather Monitor. An "Immediate" precedence is authorized for the voice transmission of these reports. Specific methods for handling Pacific hurricane reconnaissance messages are listed below for each station:

PRIMARY METHOD	ALTERNATE METHOD
MCCLELLAN AERONAUTICAL STATION:	
Direct phone patch between reconnaissance aircraft and McClellan Weather Monitor over the hot line.	Air/Ground (A/G) operator copy transmission from aircraft; relay to McClellan Weather Monitor over the hot line.

ALBROOK AERONAUTICAL STATION

Direct phone patch between reconnaissance aircraft and McClellan Weather Monitor over AUTOVON. McClellan Monitor phone numbers 633-6810 or 633-6755. A direct phone patch can also be provided over AUTOVON to the McClellan Aeronautical Station, extended to McClellan Weather Monitor over the hot line.	A/G operator copy transmission from aircraft and pass to McClellan over AUTOVON for relay to McClellan Weather Monitor over the hot line.

b. The following is a typical sequence of actions required for passing an observation message from the aircraft through the McClellan Aeronautical Station to the receiving facility at McClellan Weather Monitor:

(1) MCCLELLAN - THIS IS LARK ONE - ON FOUR SEVEN - OVER.

(2) LARK ONE - MCCLELLAN - GO AHEAD.

(3) MCCLELLAN - LARK ONE - REQUEST IMMEDIATE PHONE PATCH TO MCCLELLAN WEATHER MONITOR - OVER.

(4) LARK ONE - MCCLELLAN - STAND BY.

(5) The A/G operator conditions his console for a ground subscriber call and calls the McClellan addressee using the direct hot line. When the McClellan party answers, the operator advises:

(6) THIS IS MCCLELLAN - STAND BY FOR PHONE PATCH FROM LARK ONE - OVER.

(7) ROGER - STANDING BY.

(8) The A/G operator then conditions his console for phone patch and advises the aircraft:

(9) LARK ONE - THIS IS MCCLELLAN - YOUR PATCH TO MCCLELLAN MONITOR IS READY - GO AHEAD.

(10) MCCLELLAN MONITOR - THIS IS LARK ONE - MESSAGE FOLLOWS - BREAK BREAK - AIR FORCE LARK ONE AGATHA FOUR TEXT TEXT TEXT - OVER.

(11) LARK ONE - MCCLELLAN MONITOR - ROGER - OUT.

(12) LARK ONE - OUT.

(13) The McClellan A/G operator then breaks the patch.

c. If at Item (10) above the McClellan Weather Monitor has any question or comment on the observation message, it will be resolved before discontinuation of the patch. If at Item (3) above the phone patch cannot be provided, the following sequence of actions would be typical:

(1), (2), and (3). See paragraph 2.b. above.

(4) LARK ONE - MCCLELLAN - UNABLE TO PROVIDE PATCH AT THIS TIME - YOUR SIGNAL IS NOT PATCH QUALITY - I CAN PROVIDE RELAY TO ADDRESSEE - OVER.

(5) MCCLELLAN - LARK ONE - PASS TO MCCLELLAN WEATHER MONITOR - BREAK BREAK - AIR FORCE LARK ONE AGATHA FOUR TEXT TEXT TEXT - OVER.

(6) MCCLELLAN.

(7) The A/G operator then passes the copied message to the Coordinator for relay to McClellan Weather Monitor over the hot line.

d. Regular hurricane mission messages will include the unit indicator (AIR FORCE LARK), followed by the numerical mission number (ONE), the name of the tropical cyclone (AGATHA), and the numerical sequence of reports during a flight (ONE, etc.).

Examples:

First tropical cyclone, first mission, first report:
AIR FORCE LARK ONE AGATHA ONE.

First tropical cyclone, second mission, tenth report:
AIR FORCE LARK TWO AGATHA TEN.

Second tropical cyclone, first mission, fifth report:
AIR FORCE LARK ONE BRIDGET FIVE.

e. Diverted hurricane search missions will append a plain language explanatory message to the last scheduled position message; for example:

AIR FORCE LARK BRAVO DIVERTED NEXT MSG AIR FORCE LARK ONE CYCLONE, or
AIR FORCE LARK BRAVO DIVERTED NEXT MSG AIR FORCE LARK ONE AGATHA.

f. Reconnaissance messages from suspicious areas will read:

AIR FORCE LARK ONE CYCLONE, etc.

Reconnaissance mission messages into suspicious areas will be numbered consecutively without regard to the tropical cyclone itself; for example, first reconnaissance of a suspicious area during the season will be AIR FORCE LARK ONE CYCLONE etc., with the next suspicious area investigated identified as AIR FORCE LARK TWO CYCLONE, etc.

3. Point-to-Point Teletypewriter Communications Capability. Teletypewriter facilities provided in support of the hurricane reconnaissance effort will be configured as follows:

a. A leased half-duplex (send/receive) 100-w.p.m. circuit will be installed with terminations at the 9th Weather Reconnaissance Wing (9 WRWg) Tropical Cyclone Reconnaissance Coordinator (TCRC), McClellan Weather Monitor--Detachment 8, 17th Weather Squadron (Det 8, 17 WSq), FWC Alameda, and EPHC-SFO. This circuit is designated as the West Coast Hurricane Coordination Net. Authorized uses of this circuit are:

(1) Relay of aircraft hurricane traffic received by the McClellan Weather Monitor to TCRC and EPHC-SFO.

(2) Coordination of requests for reconnaissance and other related matters.

(3) Relay of hurricane advisories from EPHC-SFO for introduction into the military weather communications system.

b. A COMET II-A drop is installed at McClellan Weather Monitor and will be used to introduce hurricane reconnaissance reports and hurricane advisories into the dedicated military weather communications system for further distribution, as required.

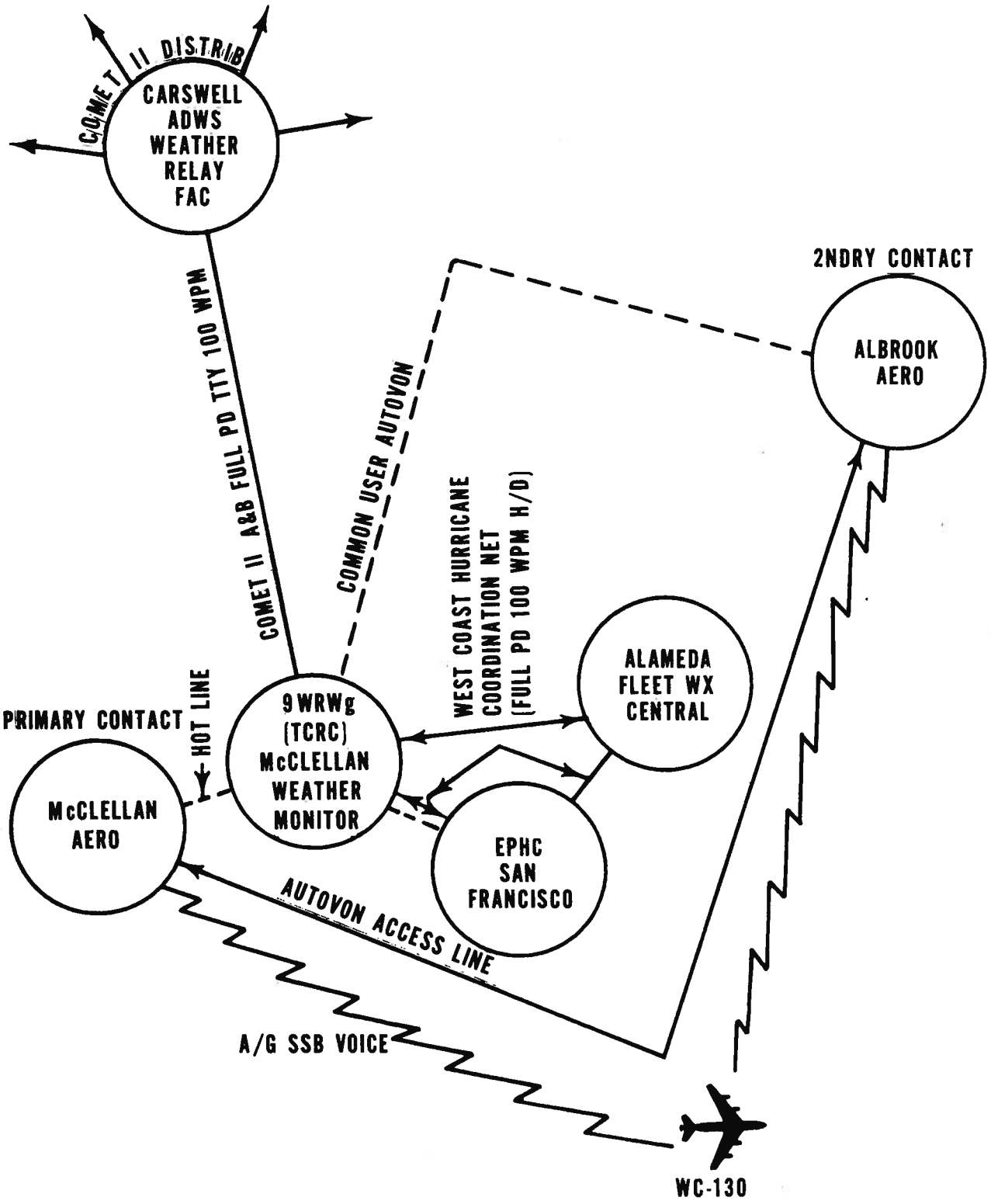
4. Miscellaneous Communications Services and Support. Routine communications between weather reconnaissance aircraft and U.S. Air Force Aeronautical Stations for normal air traffic control (ATC) services will be handled in accordance with standard procedures.

5. Dissemination of the Eastern Pacific Tropical Cyclone Plan of the Day (TCPOD). The daily TCPOD shall be disseminated on the West Coast Hurricane Coordination Net or AUTODIN to the following addressees:

FM: 9 WRWG MCCLELLAN AFB CALIF
TO: FLEWEACEN ALAMEDA CALIF (HURRICANE COORDINATION NET)
EPHC SAN FRANCISCO (HURRICANE COORDINATION NET)

Info: FLEWEAFAC SAN DIEGO (AUTODIN)
DET 8, 17 WSQ (HURRICANE COORDINATION NET)
AWS/AO SCOTT AFB ILL (AUTODIN)
AFGWC OFFUTT AFB NEB (AUTODIN)
FLEAWEACEN PEARL (AUTODIN)

USAF EAST PACIFIC HURRICANE COMMUNICATIONS SYSTEM



ATLANTIC AND EASTERN PACIFIC
JOINT REQUIREMENTS FOR AIRCRAFT RECCO

Data required	Altitudes at which data are required	Areal portion of cyclone in which data are needed	Time or frequency of observation	Accuracy required
Location of eye or center	At 700 mb or below*	At center or within radar range	Atlantic--Every 6 hours at 0000Z, 0600Z, 1200Z, and 1800Z, except additional 3-hourly fixes at 0300Z, 0900Z, 1500Z, and 2100Z for tropical cyclones within 500 nautical miles or 48 hours of any land areas and not within range of land-based radar. Eastern Pacific-- 1. Two fixes daily when cyclone is within 600 nautical miles of the United States or within 300 nautical miles of Baja California. Fixes at least 6 hours apart, preferably near 1500Z and 0000Z (1500Z if only one). 2. Otherwise, one daily fix at 1800Z when cyclone is in San Francisco area of forecast responsibility.	± 10 mi
Dimensions and configuration of eye	At 700 mb or any lower level.	Do	Do	Indeterminate
Central pressure	Do	At center	Do	± 2 mb

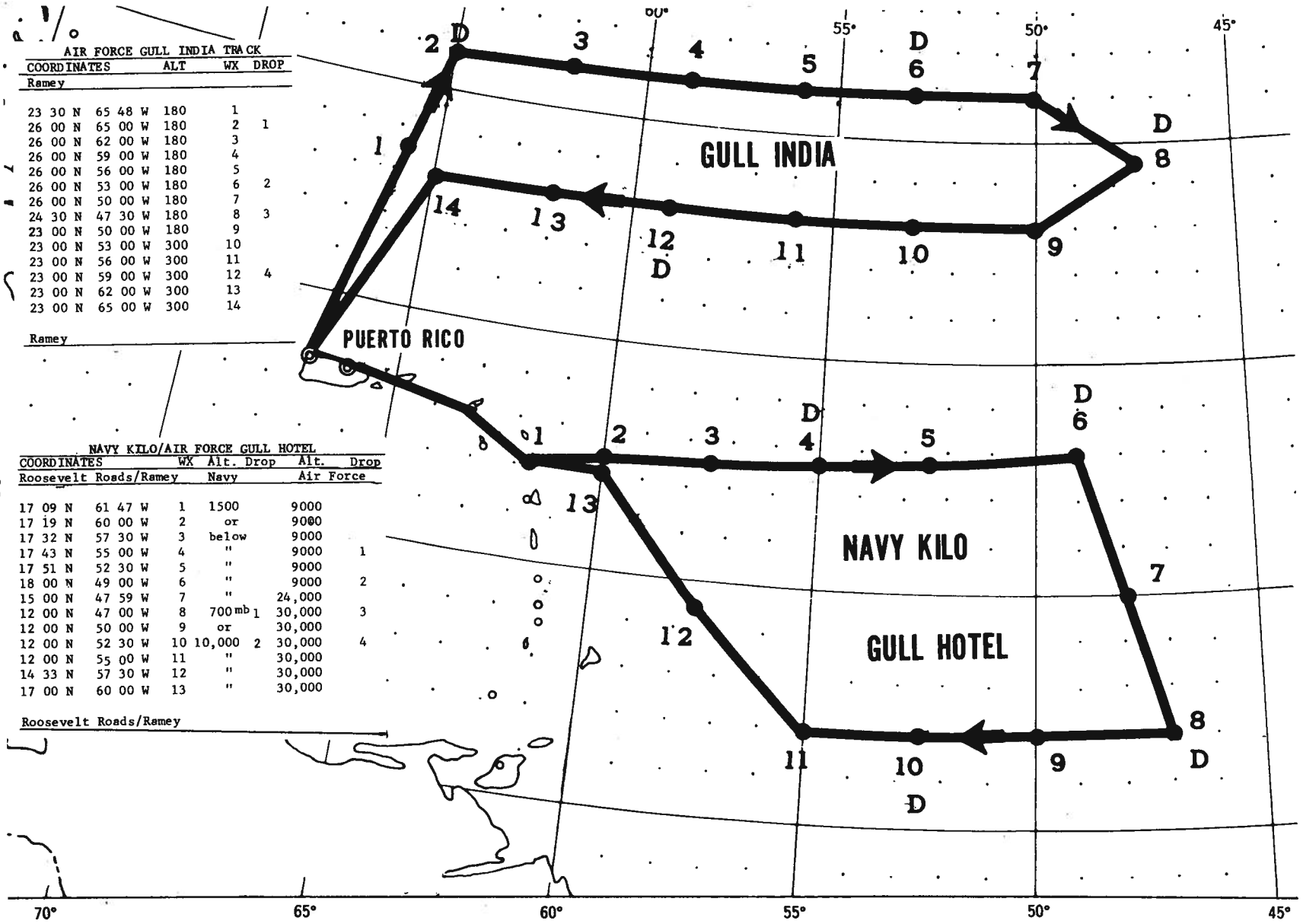
ATLANTIC AND EASTERN PACIFIC
JOINT REQUIREMENTS FOR AIRCRAFT RECCO DATA--(continued)

Data required	Altitudes at which data are required	Areal portion of cyclone in which data are needed	Time or frequency of observation	Accuracy required
Radius and strength of maximum winds	Surface or by Doppler radar at 700 mb or lower.	Whenever maximum winds are found, but usually within 50 nautical miles of center.	Do	± 5 mi ± 5 kt
Radar echoes and direction of Cb blow-offs	Do	Radar echoes-areas outside the principal rain shield. Blowoffs observed.	Irregular.	Indeterminate
Winds, pressure heights, clouds, and weather en route to cyclone and return	Winds and pressure heights at flight level; clouds and weather as observed from flight level.	From latitude 30°N. southward.	At 180-nautical-mile intervals, except at 120-nautical-mile intervals when within 300-nautical miles of cyclone center or as indicated in Atlantic flight patterns.	Winds, ± 5 kt; Pressure heights, ± 10 meters
Winds, pressure heights, and weather in suspicious areas.	Daily tracks as per interservice agreements. At 700 mb or as low as 1,500 ft for investigative flights, as required.	Variable radius 100 to 300 miles.	Daily tracks as per interservice agreements. Special investigative flights as required.	± 5 kt; ± 10 meters

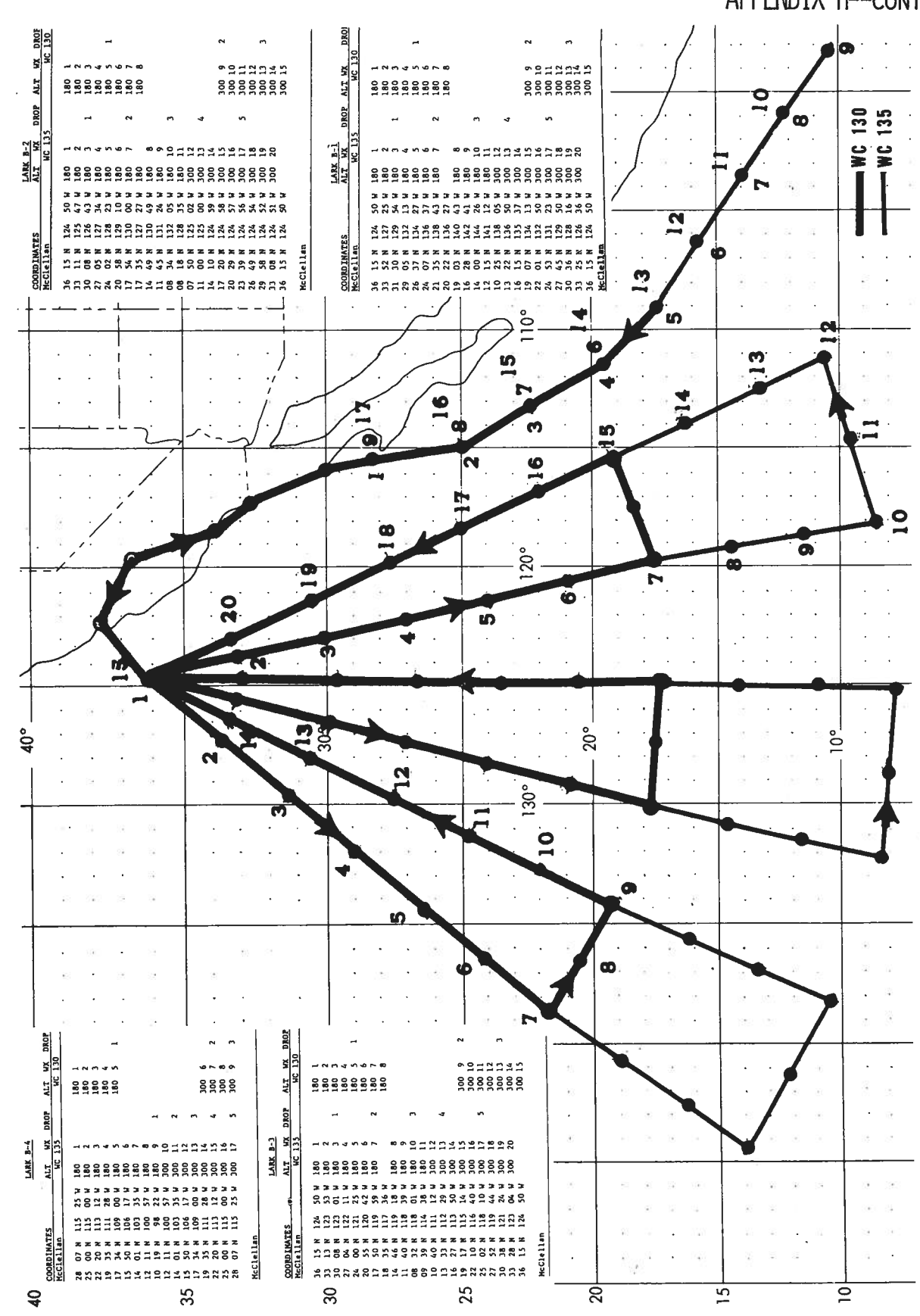
ATLANTIC AND EASTERN PACIFIC
JOINT REQUIREMENTS FOR AIRCRAFT RECCO DATA--(continued)

Data required	Altitudes at which data are required	Areal portion of cyclone in which data are needed	Time or frequency of observation	Accuracy required
Height of eye wall	Atlantic: as specified in flight pattern. Eastern Pacific: 300 mb.	Atlantic: by quadrant at eye wall within radar range.	Atlantic: as specified in flight pattern. Eastern Pacific: daily observation.	2,000 ft
Wind profile	Specified flight pattern altitude.	By quadrant of cyclone.	Radial distance from center of maximum, 63 kt, 50 kt, 30 kt.	± 5 mi
Temperature profile	Do	Do	Center, R = 15 n.mi., R = 30 n.mi., R = 45 n.mi., and R = 80 n.mi.	± 0.5°C
Dew-point profile	Do	Do	Do	± 0.5°C
D-value profile	Do	Do	Do	± 10 ft
Sea-surface temperature	1,500 ft.	Vortex periphery along specified operational flight pattern.	Equally spaced observations.	± 0.5°C
Equavalent potential temperature or temperature, dew point, and pressure.	27,000 ft	Vortex periphery along specified operational flight pattern.	Equally spaced observations.	± 0.5°C ± 1 mb

*Reconnaissance to be terminated whenever in the judgment of the aircraft commander the safety of the aircraft and crew would be jeopardized by continuing.



Department of Defense Standard Synoptic Tracks - Atlantic



Department of Defense Standard Synoptic Tracks - Eastern Pacific

ATLANTIC

JOINT RADAR HURRICANE OBSERVING AND REPORTING PLAN

1. General. Radar observations of hurricanes will be taken and reported at radar stations of the Department of Defense and National Weather Service in accordance with the plan and procedures described in the paragraphs which follow. Radar stations of other cooperators will provide radar observations of hurricanes on a voluntary basis in accordance with arrangements which are in effect between them and the National Weather Service.

2. Procedures for taking radar observations of hurricanes will be those given in the Weather Radar Manual (WBAN).

3. Participants. Participating radar stations are listed below. If radar observations are needed from participating Air Defense Command's (ADC) Radar Squadrons and/or Aircraft Control and Warning (AC&W) sites and Federal Aviation Administration (FAA) Air Route Traffic Control Centers (ARTCC), the National Weather Service will furnish the necessary weather radar operators for the purpose of making and transmitting these observations. (See paragraphs 6 and 7 below.)

a. National Weather Service

	Radar	Latitude	Longitude
Apalachicola, Fla.	WSR-57	29°44' N.	84°59' W.
Atlantic City, N.J.	WSR-57	39°27' N.	74°34' W.
Brownsville, Tex.	WSR-57	25°55' N.	97°26' W.
Brunswick, Maine	WSR-57	43°53' N.	69°56' W.
Charleston, S.C.	WSR-57	32°54' N.	80°02' W.
Daytona Beach, Fla.	WSR-57	29°11' N.	81°03' W.
Galveston, Tex.	WSR-57	29°18' N.	94°48' W.
Hatteras, N.C.	WSR-57M	35°16' N.	75°33' W.
Jackson, Miss.	WSR-57M	32°20' N.	90°13' W.
Key West, Fla.	WSR-57	24°33' N.	81°45' W.
Lake Charles, La.	WSR-57M	30°07' N.	93°13' W.
Miami, Fla.	WSR-57	25°43' N.	80°17' W.
New Orleans, La.	WSR-57	29°57' N.	90°05' W.
New York, N.Y.	WSR-57	40°46' N.	73°59' W.
Patuxent, Md.	WSR-57	38°17' N.	76°25' W.
San Juan, P.R.	FPS-67*	18°16' N.	65°46' W.
Tampa, Fla.	WSR-57	27°58' N.	82°31' W.
Waycross, Ga.	WSR-57M	31°15' N.	82°24' W.
Wilmington, N.C.	WSR-57	34°17' N.	77°55' W.

*FAA-U.S. Navy joint-use radar.

b. Department of Defense

	Radar	Latitude	Longitude
Andrews AFB, Md.	FPS-77	38°49' N.	76°51' W.
Barksdale AFB, La.	FPS-77	32°30' N.	93°41' W.
Beaufort MCAS, S.C.	FPS-41	32°29' N.	80°44' W.
Cape Kennedy AFS, Fla.	FPS-77	28°28' N.	80°33' W.
Cherry Point MCAS, N.C.	FPS-81	34°54' N.	76°53' W.
Corpus Christi NAS, Tex.	FPS-81	27°42' N.	97°16' W.
Eglin AFB, Fla.	FPS-77	30°29' N.	86°31' W.
Homestead AFB, Fla.	FPS-77	25°25' N.	80°24' W.
Jacksonville NAS, Fla.	FPS-68	30°14' N.	81°41' W
Keesler AFB, Miss.	FPS-77	30°24' N.	88°55' W.
Lakehurst NAS, N.H.	FPS-81	40°02' N.	74°20' W.
MacDill AFB, Fla.	CPS-9	27°51' N.	82°30' W.
Maxwell AFB, Ala.	CPS-9	32°23' N.	86°21' W.
McGuire AFB, N.J.	FPS-77	40°01' N.	74°35' W.
NAS Bermuda	CPS-9	32°22' N.	64°41' W.
New Orleans NAS, La.	FPS-81	29°50' N.	90°01' W.
Norfolk FWC, Va.	FPS-81	36°56' N.	76°18' W.
Otis AFB, Mass.	FPS-77	41°39' N.	70°31' W.
Pensacola NAS, Fla.	FPS-41	30°21' N.	87°19' W.
Pope AFB, N.C.	CPS-9	35°11' N.	79°01' W.
Ramey AFB, P.R.	FPS-77	18°30' N.	67°08' W.
Randolph AFB, Tex.	FPS-77	28°32' N.	98°17' W.
Robins AFB, Ga.	FPS-77	32°38' N.	83°36' W.
Seymour Johnson AFB, N.C.	FPS-77	35°20' N.	77°58' W.
Sudbury, Mass	CPS-9 and FPS-68	42°25' N.	71°29' W.
Westover AFB, Mass	FPS-77	42°12' N.	83°36' W.

ADC Sites

(1) 20 NORAD Region Control Center (20th NRCC)

	Latitude	Longitude
632 Radar Sq., Roanoke Rapids AFS, N.C.	36°27' N.	77°44' W.
*645 Radar Sq., Patrick AFB, Fla.	28°13' N.	80°36' W.
*660 Radar Sq., MacDill AFB, Fla.	27°50' N.	82°28' W.
*678 Radar Sq., Tyndall AFB, Fla.	30°05' N.	85°37' W.
*679 Radar Sq., Jacksonville AFS, Fla.	30°13' N.	81°41' W.
691 Radar Sq., Cross City AFS, Fla.	29°38' N.	83°06' W.
701 Radar Sq., Ft. Fischer AFS, N.C.	33°59' N.	77°55' W.
702 Radar Sq., Hunter AAF, Ga.	32°01' N.	81°10' W.
770 Radar Sq., Ft. George G. Meade RSI, Md.	39°07' N.	76°44' W.
*771 Radar Sq., Cape Charles AFS, Va.	37°08' N.	75°57' W.
*792 Radar Sq., North Charleston AFS, S.C.	32°54' N.	80°01' W.
861 Radar Sq., Aiken AFS, S.C.	33°39' N.	81°41' W.

ADC Sites--(Continued)

(2) 21 NORAD Region Control Center (21st NRCC)

*648 Radar Sq., Benton AFS, Pa.	41°21' N.	76°18' W.
*656 Radar Sq., Saratoga Springs AFS, N.Y.	43°01' N.	73°41' W.
*680 Radar Sq., Palermo AFS, N.J.	39°13' N.	74°41' W.
762 Radar Sq., North Truro AFS, Mass.	42°02' N.	70°03' W.
773 Radar Sq., Montauk AFS, N.Y.	41°04' N.	71°52' W.
*907 Radar Sq., Bucks Harbor AFS, Maine	44°38' N.	67°24' W.

*Remoted in the FAA ARTCC: see paragraph 7.

c. Cooperating Sites

Bay St. Louis, Miss. (NASA)	CPS-9	30°42' N.	89°07' W.
Cambridge, Mass. (Massachusetts Institute of Technology)	CPS-9 and M-33	42°42' N.	71°06' W.
College Station, Tex. (Texas A. & M. Univ.)	CPS-9	30°37' N.	96°21' W.
Coral Gables, Fla. (University of Miami)	SP-1M and CPS-6B	25°43' N.	80°17' W.
Victoria, Tex. (Copano Research Foundation)	APS-20B	28°51' N.	96°55' W.
#Wallops Station, Va. (NASA)	MPS-19	37°50' N.	75°29' W.
	SPS-12	37°56' N.	75°28' W.
	FPS-16	37°50' N.	75°29' W.
	FPQ-6	37°52' N.	75°31' W.

#Radar used depends upon the location of the hurricane; the one in use will be properly identified.

4. Procedures to be Used When Radar Units are Collocated (Within 25 Miles).

a. When the National Weather Service and Department of Defense radar stations are collocated (within 25 miles), the WSR-57 radars of the National Weather Service will be the primary source for reports of storm and storm eye characteristics. The Department of Defense radar units will provide backup service in case the WSR-57 radar fails.

b. When radar units less powerful than the WSR-57 are collocated with an ADC radar unit or other more powerful units, the ADC unit will be the primary source for reports of storm and storm eye characteristics providing it is manned by a competent weather radar operator. The less powerful units will provide backup or coordination service.

c. Normally only the hurricane radar reports from the primary source, as defined above, will be transmitted. However, when significant phenomena are detected by any of the other collocated radars but not by the primary source, such phenomena should be reported.

d. Consultation between all radar sites will be by telephone.

5. Communications. Hurricane observations must be transmitted in a manner to assure receipt at the NHC with the least possible delay. In essence, communications procedures are directed toward getting hurricane radar data onto RAWARC Circuit 23421 or teletypewriter (T/T) Circuit 7072 with a minimum number of relays, as quickly as possible. The Department of Defense stations not having transmission capability on Circuits 23421 or 7072 may use COMET II as an alternate means. When commercial telephone is used to pass hurricane observations to the Weather Service Office (WSO), the WSO will accept "reverse charges" calls for this purpose. The following procedures will be used in communicating hurricane radar observations:

a. From ADC Sites:

(1) Commercial telephone to the nearest WSO for entry on weather teletypewriter circuits, or

(2) Hot line to the supporting base weather station for entry on weather teletypewriter circuits.

b. From Other Air Force Stations: Radar Reports (RAREPS) and other hurricane observation information received or observed will be transmitted every half hour at H+15 and H+45 on RAWARC Circuits 23420 or 23421 if send-receive capability is available on either of these Circuits. If not, hurricane observation information from those stations listed in paragraph 3.b. above will be transmitted by COMET II as an alternate.

c. From WSOs: The RAREPS and other hurricane observation information received or observed will be transmitted over either RAWARC Circuit 23420 or 23421 every half hour at H+15 and H+45.

d. From Navy Stations: The Navy stations having send-receive drops on either RAWARC Circuits 23420 or 23421, or T/T Circuit 7072 shall transmit reports on one of these Circuits every half hour at H+15 and H+45. If not, those stations having transmit capability on COMET II will transmit hurricane observations by that circuit as an alternate means.

e. From the ARTCCs: Hurricane information will be telephoned to the nearest WSO having a drop on either teletypewriter Circuits 23420, 23421, or 7072.

6. Procedures for Detailing National Weather Service Radar Meteorologist to ADC Sites to Make Hurricane Radar Observations.

a. The Director of the National Weather Service has been authorized to send radar meteorologists to ADC radar sites on the Atlantic and gold coasts during periods when hurricanes threaten these regions for the purpose of making and reporting hurricane radar observations. To expedite the granting of access to a site and to maintain proper security measures, the following procedures will be used:

(1) The National Weather Service must notify the appropriate coordinator by wire or telephone of the intent to visit a site. Notification will normally be done by the responsible Regional Headquarters, but in case this function cannot be so handled, the Emergency Warnings Branch, Silver Spring, Md., will make the necessary arrangements. The coordinator will notify the site commander(s) concerned of the impending visit. This notification will include name, security clearance, and date(s) of the visit.

(2) Staff weather offices of the North American Air Defense (NORAD) Regional Control Centers (NRCC) indicated in paragraph 3.b. will act as coordinators for these visits. Addresses and commercial telephone numbers for these staff weather offices are:

(a) 20th NRCC--Commander, Detachment 41, 4th Weather Wing, Ft. Lee AFS, Va. Telephone, area code 703, 732-0313, Ext. 765. (For those sites from Maryland south).

(b) 21st NRCC--Commander, Detachment 27, 4th Weather Wing, Hancock Field, Syracuse, N.Y. Telephone, area code 315, 458-5500, Ext. 765. (For those sites from Pennsylvania north).

b. The National Weather Service personnel are authorized to use government quarters and messing facilities. They are authorized to visit site operations to view and transmit radar weather observations from the PPI and RHI scopes. Normal commercial telephone facilities will be used to transmit hurricane information to the nearest WSO location.

c. Due to the limited facilities at some sites, the National Weather Service agrees that not more than two persons will visit a site at any given time. Each visit will normally be short, 1 or 2 days, but will depend upon the progress of the hurricane under observation.

d. The permission to visit and security status of the National Weather Service personnel listed in paragraph 6.e below must be on file at the ADC radar sites listed in paragraph 3.b. above. It will be the responsibility of the Emergency Warnings Branch, Weather Analysis and Prediction Division (WXAP), National Weather Service Headquarters in Silver Spring to coordinate additions, changes, and/or deletions in this list with Headquarters, ADC, at least 2 weeks in advance of the effective date of the change. The coordinating

correspondence from the National Weather Service Headquarters to ADC should refer to this document and paragraph, and will include the security clearance, effective date, and authority for the clearance. Correspondence should be addressed as follows:

Hq. ADC (DOW)
Ent AFB, Colo. 80912

After authorization, Hq. ADC (DOW) will notify the NORAD Regional Control Center Staff Weather officers and ADC radar sites of additions (or deletions) from the list of authorized National Weather Service personnel.

e. The following National Weather Service personnel have SECRET security clearances and are authorized by the ADC to visit ADC radar sites listed in paragraph 3.b. above after compliance with paragraphs 6.a.(1) and (2) above. Positive identification must be presented to the ADC radar site entry post before entry to the site will be granted. The purpose of these visits is to make and transmit radar hurricane observations. These personnel have also been authorized by the FAA to visit the ARTCCs listed in paragraph 7 for the same purpose:

NAME	INVESTIGATIVE AUTHORITY	DATE
Baskerville, Robert W., Jr.	CSC*	4-11-69
Benton, Davis	CSC	8-04-60
Black, Dale A.	CSC	6-24-63
Bowser, Carl O., Jr.	CSC	4-14-69
Capo, Rafhel A.	CSC	3-14-67
Clay, Dale A.	CSC	5-15-63
Crouch, Billy J.	CSC	4-24-67
Dooley, J. T.	CSC	8-18-61
Drybala, Francis J.	CSC	5-28-68
Dunham, Hoye S.	CSC	10-31-60
Filion, Joseph	CSC	8-08-62
Flanders, Allen F.	CSC	11-03-60
Foster, Harrie E., Jr.	OIS**	10-26-56
Fuertsch, Francis E.	CSC	12-10-68
Hamilton, Robert E.	CSC	1-05-66
Harris, Gordon W.	OIS	1-16-63
Hexter, Paul L., Jr.	CSC	10-27-59
Hull, Albert J.	CSC	11-06-59
Hurlbut, Sam R.	CSC	7-13-62
Johnson, Clyde C.	CSC	8-12-60
Keener, Robert W.	CSC	4-11-68
Kuhn, Ronald E.	CSC	5-07-69
Lee, John P.	OIS	3-01-63
Logan, Wendell B.	CSC	12-19-68
Lopez, Moses	OIS	7-29-69

NAME	INVESTIGATIVE AUTHORITY	DATE
Monroe, Harold	CSC	6-14-61
Oldmixon, Donald H.	CSC	7-29-60
Palmer, Cecil M.	CSC	12-01-60
Parrish, Samuel K.	CSC	11-25-60
Pentecost, Joseph B.	CSC	6-05-59
Phipps, Carl L.	CSC	3-17-61
Pruett, Jeter A.	CSC	10-22-64
Robinson, John M.	CSC	4-10-68
Sadowski, Alexander F.	CSC	8-06-59
Samet, Alvin M.	CSC	5-28-68
Sarnowski, Edward	CSC	9-16-65
Schonberger, Abram	CSC	11-15-60
Schulz, Walter A., Jr.	CSC	7-05-66
Smith, Robert L.	OIS	4-15-54
Stewart, Eldyn L.	CSC	10-08-69
Teague, Jack L.	CSC	5-05-65
Thomas, Billy D.	CSC	8-03-60
Warden, John D.	CSC	6-17-60
Wells, Fred E.	CSC	10-22-59
Williams, Milton L.	CSC	7-20-60
Wilk, Kenneth E.	CSC	12-17-62
Whitehead, Robert E.	OIS	7-21-60

* CSC: Civil Service Commission.
**OIS: Office of Investigation and Security.

7. Procedures for Detailing National Weather Service Radar Meteorologist to the FAA's ARTCCs.

a. The National Weather Service has been authorized by the FAA to send National Weather Service radar meteorologists to ARTCCs during the hurricane season. These meteorologists will make, record, and transmit hurricane radar observations as well as act as a focal point to solicit and process pilot reports from the hurricane area.

b. Due to the limited facilities at the ARTCCs, the National Weather Service agreed that no more than two persons will visit a center at any given time. Each visit will normally be short, 1 or 2 days, but will depend upon the progress of the hurricane under observation.

c. Security clearances are required by the FAA of all personnel visiting ARTCCs.

d. Only those National Weather Service personnel listed in paragraph 6.e. are authorized to visit ARTCCs. Persons not listed in paragraph 6.e. will not be admitted.

e. Should there be a need for other cleared National Weather Service personnel to be added to the list, it will be the responsibility of the National Weather Service Regional Headquarters to coordinate names of new radar meteorologists with the responsible FAA Regional Investigation and Security Division Office. These requests will be forwarded 2 weeks in advance of the anticipated utilization of such personnel.

f. The list in paragraph 6.e. will be updated each year by the National Weather Service.

g. To expedite and assure the granting of access to ARTCCs, the following will apply:

(1) A copy of this Plan with personnel security clearance information shall be forwarded to the ARTCCs.

(2) A copy of this Plan shall be forwarded to the FAA Regional Investigation and Security Division to assure visiting access is accomplished.

h. The FAA Regional Investigation and Security Division will insure that appropriate ARTCCs are properly briefed.

i. The National Weather Service Regional Headquarters will keep themselves advised of the radar site locations and be prepared to detail radar meteorologists to the ARTCCs if conditions warrant. The listed ADC locations below are remoted to ARTCCs:

ARTCCs	FAA RADAR SITES	MILITARY RADAR SITES
New York ARTCC (Islip, N.Y.)	New York, N.Y. Trevose, Pa. Benton, Pa.	648 Radar Sq., Benton AFS, Pa.
Washington ARTCC (Leesburg, Va.)	Washington, D.C. Bedford, Va. Benson, N.C. Cape Charles, Va.	771 Radar Sq., Cape Charles AFS, Va. 649 Radar Sq., Bedford AFS, Va.
Boston ARTCC (Nashua, N.H.)	Boston, Mass. Bucks Harbor, Maine Saratoga Springs, N.Y.	656 Radar Sq., Saratoga Springs AFS, N.Y. 907 Radar Sq., Bucks Harbor AFS, Maine
Miami ARTCC (Miami, Fla.)	MacDill, Fla. Patrick, Fla. Richmond, Fla.	644 Radar Sq., Richmond AFS, Fla. 645 Radar Sq., Patrick AFB, Fla. 660 Radar Sq., MacDill AFB, Fla.
Jacksonville ARTCC (Hilliard, Fla.)	Jacksonville, Fla. Charleston, S.C. Tyndall, Fla. Valdosta, Ga.	678 Radar Sq., Tyndall AFB, Fla. 679 Radar Sq., Jacksonville AFS, Fla. 792 Radar Sq., North Charleston AFS, S.C.
Houston ARTCC (Houston, Tex.)	Alexandria, La. Ellington, Tex. Lackland, Tex. New Orleans, La. Oilton, Tex.	
Oakland ARTCC (Fremont, Calif.)	Fallon, Nev. Oakland, Calif. Paso Robles, Calif. Red Bluff, Calif. Sacramento, Calif.	858 Radar Sq., Navy Aux. Air Sta., Fallon, Nev.
Los Angeles ARTCC (Palmdale, Calif.)	San Pedro, Calif. Boron, Calif. Cedar City, Utah Las Vegas, Nev. Mt. Laguna, Calif. Paso Robles, Calif.	670th Radar Sq., Ft. MacArthur AFS, Calif. 750th Radar Sq., Boron AFS, Calif. 751 Radar Sq., Mt. Laguna AFS, Calif.

EASTERN PACIFIC

JOINT RADAR HURRICANE OBSERVING AND REPORTING PLAN

1. General. Radar observations of hurricanes will be taken and reported in accordance with the plan and procedures described in the Weather Radar Manual (WBAN).

2. Participants. Normally, the FAA radar stations at Mt. Laguna, Paso Robles, and San Pedro, Calif., which are remoted into the Los Angeles ARTCC, are the only source of hurricane radar information for the southernmost part of California. The National Weather Service has a limited staff of radar meteorologists presently located at this Center. However, if a hurricane is threatening this area, continuous surveillance will be maintained.

3. Communications. Los Angeles ARTCC radar-composited overlays are prepared by National Weather Service personnel when on duty and then transmitted hourly by means of facsimile to the Weather Service Forecast Office (WSFO) Los Angeles and to the Salt Lake City, Utah, ARTCC radar unit. The Salt Lake City ARTCC radar unit composites these data and communicates them to the Kansas City Radar Analysis and Development Unit (RADU) where they are included on the National Facsimile (NAFAX) Radar Summary Chart 14 times per day. The Kansas City RADU prepares hourly SD-1 messages that include the Los Angeles ARTCC radar data each hour, entering them on all Service A circuits. Special radar overlays are prepared at more frequent intervals, when requested, and transmitted to the WSFO Los Angeles over the radar facsimile circuit. The WSFO San Francisco must rely on RAWARC, telephone calls, and the NAFAX Radar Summary Chart for radar data.

CENTRAL NORTH PACIFIC

JOINT TROPICAL CYCLONE RADAR OBSERVING AND REPORTING PLAN

1. There is currently no weather-dedicated radar within the Central Pacific Hurricane Center (CPHC) area of responsibility. The Hawaiian Air Defense Division has agreed to allow the following radar units to supply radar data:

326 Air Division:

150 AC&W Sq., Kokee, Hawaii	22°09' N.	159°39' W.
169 AC&W Sq., Mt. Kaala, Hawaii	21°31' N.	158°09' W.

2. These units will provide Radar Reports (RAREPS) once each hour whenever weather echoes appear on their radar and each half hour whenever eye or center positions are observed in the area of surveillance.

3. The RAREPS will be provided to the Central Pacific Forecast Center (CENPAC FC), Hickam AFB, by telephone. The CENPAC FC will code reports in accordance with Weather Radar Manual (WBAN) using Honolulu VOR-TAC, coordinates 21°20' N. and 158°02' W., as a reference point. Reports will be transmitted by teletypewriter to National Weather Service, Honolulu, and Fleet Weather Center Pearl Harbor.

4. During a critical situation, National Weather Service radar meteorologists with SECRET clearance will be detailed to ADC radar sites to take radar observations.

COLLECTION AND DISTRIBUTION OF TROPICAL CYCLONE REPORTS

ATLANTIC

1. Transmission of Reports to the National Hurricane Center (NHC). All reports and information regarding tropical cyclones received by the National Weather Service, Department of Defense, or Federal Aviation Administration (FAA) will be transmitted immediately to the NHC at Miami. When reports and information of operational significance are available from research aircraft, they will be transmitted immediately to the NHC in the same manner as meteorological reports from hurricane reconnaissance aircraft.

The address group KMIAYM assigned to the NHC, and the group KNIP assigned to Fleet Weather Facility (FWF) Jacksonville, will be utilized as an action addressee following the date-time group. The Washington Alternate Hurricane Center (KWBCYM)# and the FWF Suitland (YLGP) will also be included in the distribution if transfer of responsibility to KWBCYM appears imminent. When FAA is unable to effect delivery of messages to KMIAYM, it will immediately transmit them to KWBCYM.

If, during emergencies, responsibility has been transferred from the NHC at Miami to the Washington Alternate Hurricane Center (WAHC) at Washington, the addressee indicating the group KWBCYM will be used in place of KMIAYM. (See chapter 8.)

The respective services will assign an appropriate high precedence to messages to the NHC or reports containing initial indication of the genesis or existence of a tropical cyclone.

2. Transmissions on National Weather Service Hurricane Circuit. Relays from Circuit 7072 to 23421 will be handled on a semiautomatic basis at Suitland Weather Service Communications Operating Branch (WBC). Manual backup relay capability will be retained at NHC. In addition, such local circuits will be installed as necessary to provide channels for local coordination in Miami. During the hurricane season, drops on the National Weather Service Circuit 23421 will be installed in Department of Defense offices as required.

3. Transmission on Service 0. Reconnaissance reports and advisories will be afforded priority handling on the Service 0 system.

4. Transmission from U.S. Air Force Ground Stations. Hurricane reconnaissance messages will be handled in accordance with "U.S. Air Force Communications Support Plan for U.S. Air Force Hurricane Reconnaissance." (See appendix C, chapter 4.)

#The designator KWBCYM is the communications address for this office. For purposes other than communications, it is also referred to as WAHC.

DESIGNATION OF TROPICAL DEPRESSIONS AND CYCLONES

1. Numbering of Tropical Depressions

a. Atlantic.

(1) Tropical depressions will be numbered as soon as their identity can be established; the first one for the year being numbered "one."

(2) The National Hurricane Center (NHC) assigns numbers to tropical depressions. The NHC will phone the U.S. Navy at Jacksonville to give them information on each tropical depression. This call will include the number of the depression, its location, an indication of its intensity, and its potential to develop into a storm.

b. Pacific. Each tropical depression will be assigned a number that will be retained throughout the life cycle of the cyclone.

(1) For the area east of longitude 140° W., a list of tropical depression numbers will be maintained by the Fleet Weather Center (FWC) Alameda, Calif. Numbering will start at the beginning of each calendar year.

(2) For the area west of longitude 140° W., a list of tropical depression numbers from 01 through 99 will be maintained by the Joint Typhoon Warning Center (JTWC), Guam. Renumbering will be at the end of sequence, or, in all cases, at the beginning of each calendar year.

(3) When a tropical depression generates in the Pacific, the Eastern Pacific Hurricane Center-San Francisco (EPHC-SFO) or the Central Pacific Hurricane Center-Honolulu (CPHC-HNL) will respectively request a number from the FWC Alameda or JTWC Guam. When forecast responsibility is passed from one warning office to another, the number assigned will be retained.

2. Tropical Cyclone Names

a. Atlantic and Eastern Pacific:

A separate set of names will be used each year, beginning with the first name in the set. The list of names in appendix A of this chapter will be used for identifying tropical cyclones in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. In 10 years, after the 10 sets will have been used, the same 10 sets will be used again. The list of names in appendix B of this chapter will be used for identifying tropical cyclones in the Eastern Pacific Ocean east of longitude 140° West. In four years, after the four sets will have been used, the same four sets will be used again. Names beginning with the letters Q, U, X, Y, and Z are not included because of the scarcity of suitable names beginning with these letters.

b. Central North Pacific:

(1) When a tropical depression intensifies into a tropical storm or hurricane between longitude 140°W. and the 180th meridian, the CPHC-HNL will request a name (see appendix C of this chapter) from JTWC Guam. The depression number will be discontinued and be replaced by the appropriate name.

(2) For tropical cyclones originating east of longitude 140°W., names will be assigned by the Meteorologist in Charge (MIC), EPHC-SFO. Tropical cyclones that cross longitude 140°W. from either west or east will retain their original assigned name.

LIST OF ATLANTIC TROPICAL CYCLONE NAMES

1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
ARLENE	AGNES	ALICE	ALMA	AMY	ANNA	ANITA	AMELIA	ANGIE	ABBY
BETH	BETTY	BRENDA	BECKY	BLANCHE	BELLE	BABE	BESS	BARBARA	BERTHA
CHLOE	CARRIE	CHRISTINE	CARMEN	CAROLINE	CANDICE	CLARA	CORA	CINDY	CANDY
DORIA	DAWN	DELIA	DOLLY	DORIS	DOTTIE	DOROTHY	DEBRA	DOT	DINAH
EDITH	EDNA	ELLEN	ELAINE	ELOISE	EMMY	EVELYN	ELLA	EVE	ELSIE
FERN	FELICE	FRAN	FIFI	FAYE	FRANCES	FRIEDA	FLOSSIE	FRANNY	FELICIA
GINGER	GERDA	GILDA	GERTRUDE	GLADYS	GLORIA	GRACE	GRETA	GWYN	GEORGIA
HEIDI	HARRIET	HELEN	HESTER	HALLIE	HOLLY	HANNAH	HOPE	HEDDA	HEDY
IRENE	ILENE	IMOGENE	IVY	INGRID	INGA	IDA	IRMA	IRIS	ISABEL
JANICE	JANE	JOY	JUSTINE	JULIA	JILL	JODIE	JULIET	JUDY	JUNE
KRISTY	KARA	KATE	KATHY	KITTY	KAY	KRISTINA	KENDRA	KAREN	KIM
LAURA	LUCILE	LORETTA	LINDA	LILLY	LILIAS	LOIS	LOUISE	LANA	LUCY
MARGO	MAE	M ADGE	MARSHA	MABEL	MARIA	MARY	MARTHA	MOLLY	MILLIE
NONA	NADINE	NANCY	NELLY	NIKI	NOLA	NORA	NOREEN	NITA	NINA
ORCHID	ODETTE	ONA	OLGA	OPAL	ORPHA	ODEL	ORA	OPHELIA	OLIVE
PORTIA	POLLY	PATSY	PEARL	PEGGY	PAMELA	PENNY	PAULA	PATTY	PHYLLIS
RACHEL	RITA	ROSE	ROXANNE	RUBY	RUTH	RAQUEL	ROSALIE	ROBERTA	ROSIE
SANDRA	SARAH	SALLY	SABRINA	SHEILA	SHIRLEY	SOPHIA	SUSAN	SHERRY	SUZY
TERESE	TINA	TAM	THELMA	TILDA	TRIXIE	TRUDY	TANYA	TESS	THEDA
VERNA	VELMA	VERA	VIOLA	VICKY	VILDA	VIRGINIA	VANESSA	VESTA	VIOLET
WALLIS	WENDY	WILDA	WILMA	WINNIE	WYNNE	WILLENE	WANDA	WENDA	WILLETTE

LIST OF EASTERN NORTH PACIFIC TROPICAL CYCLONE NAMES

1971	1972	1973	1974
Agatha	Annette	Ava	Aletta
Bridget	Bonny	Bernice	Blanca
Carlotta	Celeste	Claudia	Connie
Denise	Diana	Doreen	Dolores
Eleanor	Estelle	Emily	Eileen
Francene	Fernanda	Florence	Francesco
Georgette	Gwen	Glenda	Gretchen
Hilary	Hyacinth	Heather	Helga
Ilsa	Iva	Irah	Ione
Jewel	Joanne	Jennifer	Joyce
Katrina	Kathleen	Katherine	Kristen
Lily	Liza	Lillian	Lorraine
Monica	Madeline	Mona	Maggie
Nanette	Naomi	Natalie	Norma
Olivia	Orla	Odessa	Orlene
Priscilla	Pauline	Prudence	Patricia
Ramona	Rebecca	Roslyn	Rosalie
Sharon	Simone	Sylvia	Selma
Terry	Tara	Tillie	Toni
Veronica	Valerie	Victoria	Vivian
Winifred	Willa	Wallie	Winona

CHAPTER 7
APPENDIX C

LIST OF CENTRAL NORTH PACIFIC TROPICAL CYCLONE NAMES

Column 1 list will be repeated with ALICE when the last name in Column 4, WINNIE has been used.

Column 1	Column 2	Column 3	Column 4
Alice	Anita	Amy	Agnes
Betty	Billie	Babe	Bess
Cora	Clara	Carla	Carmen
Doris	Dot	Dinah	Della
Elsie	Ellen	Emma	Elaine
Flossie	Fran	Freda	Faye
Grace	Georgia	Gilda	Gloria
Helen	Hope	Harriet	Hester
Ida	Iris	Ivy	Irma
June	Joan	Jean	Judy
Kathy	Kate	Kim	Kit
Lorna	Louise	Lucy	Lola
Marie	Marge	Mary	Mamie
Nancy	Nora	Nadine	Nina
Olga	Opal	Olive	Ora
Pamela	Patsy	Polly	Phyllis
Ruby	Ruth	Rose	Rita
Sally	Sarah	Shirley	Susan
Therese	Thelma	Trix	Tess
Violet	Vera	Virginia	Viola
Wilda	Wanda	Wendy	Winnie

ALTERNATE HURRICANE WARNING OFFICES, ATLANTIC-TRANSFER CONTROL MASTER PLAN, AND NATIONAL WEATHER SERVICE TRANSFER PLAN

1. If it appears probable that the National Hurricane Center (NHC) may be disabled, the duty forecaster will notify the Chief, Aerial Reconnaissance Coordination, Atlantic Hurricanes (CARCAH); Fleet Weather Facility (FWF) Jacksonville; and appropriate Weather Service Offices (WSO). The alternate Hurricane Warning Office (HWO) for NHC will be the Washington Alternate Hurricane Center (WAHC) at Suitland. In the absence of any earlier alert, hoisting of hurricane warnings for the Miami area will be considered standby notification of a possible later requirement for transfer of responsibility. At the time of hoisting of warnings or other alert to a possible transfer, pertinent information necessary for an effective transfer will be exchanged. To provide "hard copy," telephone or radio messages will be supplemented by teletypewriter whenever possible.

2. If incapacitation of NHC appears imminent, the NHC will maintain constant contact with WAHC and FWF Jacksonville by teletypewriter, hot-line telephone, or radio. Transfer may be accomplished at the discretion of the Director, NHC, or may be delayed until contact between WAHC and NHC is lost. If such contact is lost, WAHC will automatically assume responsibility for NHC. Contact will be assumed lost if attempts at communication have failed for a period of 15 minutes.

3. Immediately upon assuming forecast responsibility for NHC, WAHC will notify the Alternate CARCAH at Andrews AFB, and FWF Jacksonville. It is expected that Alternate CARCAH will report to WAHC. Communication with FWF Jacksonville will be by telephone and over teletypewriter Circuits (7072 with relay to 23421).

4. If NHC becomes incapacitated without prior notification to WAHC, the procedures of paragraphs 2. and 3. above will apply.

5. After communications to NHC have been restored or the threat to effectiveness has passes, NHC will so notify CARCAH, WAHC, and FWF Jacksonville; duty responsibilities will then be restored to NHC.

6. Geographical areas of responsibility for the National Weather Service HWOs are delineated in appendix A of this chapter, along with assignment of alternate responsibilities in case of disability of a Center.

7. Essentially, the same transfer procedures will apply when loss of communications is possible or imminent at other HWOs. Transfer will be to the Alternate HWO listed in the last paragraph of appendix A of this chapter.

8. At the discretion of the Director, NHC, a combined Department of Defense-National Weather Service drill in the above procedures will be held during the early part of June. Explicit instructions will be distributed in advance to all concerned in case a drill is planned.

CHAPTER 8
APPENDIX A

NATIONAL WEATHER SERVICE TRANSFER PLAN

Geographical areas of responsibility for Hurricane Warning Offices (HWO). Areas of responsibility for tropical cyclone forecasting and warning are assigned to HWOs as follows:

Caribbean Sea, Gulf of Mexico, and Atlantic Ocean:

San Juan	:	Caribbean Sea, islands, and ocean areas south of latitude 20° N. and longitudes 70° W. to 55° W. (warning responsibility only);
New Orleans	:	Gulf of Mexico and its coasts west of longitude 85° W. and north of latitude 25° N. (warning responsibility only);
Washington	:	Coastal and ocean areas from latitude 35° N. to 41° N. and eastward to longitude 65° W. (warning responsibility only);
Boston	:	Coastal and ocean areas north of latitude 41° N. and west of longitudes 65° W. (warning responsibility only);
Miami	:	Forecast responsibility for all coastal and ocean areas. Warning responsibility for all areas in the Gulf of Mexico and Caribbean Sea not assigned to HWO New Orleans or HWO San Juan, and those areas in the Atlantic Ocean not assigned to HWO Boston or HWO Washington.

Alternate responsibilities in event of disability of a Center due to communications failure or other cause are assigned as follows:

Warning Center with primary responsibility	First alternate	Second alternate
NHC Miami	HWO Washington	HWO New Orleans
HWO New Orleans	NHC Miami	HWO Washington
HWO San Juan	NHC Miami	HWO Washington
HWO Washington	NHC Miami	HWO Boston
HWO Boston	HWO Washington	NHC Miami

CHIEF, AERIAL RECONNAISSANCE COORDINATION,

ATLANTIC HURRICANES-TRANSFER PLAN

Transfer of responsibility for coordination of the Tropical Cyclone Reconnaissance Plan of the Day (TCPOD), and the dissemination of the Military Hurricane Warning Advisory from CARCAH to the Alternate CARCAH (Detachment 2, 6th Weather Wing, Andrews AFB).

1. Procedures.

a. Whenever "hurricane warnings" are in effect for the Greater Miami area and the National Hurricane Center (NHC) is thereby threatened with becoming inoperative due to inclement weather or loss of communications, the CARCAH will advise the Alternate CARCAH and the Fleet Weather Facility (FWF) Jacksonville of the following:

(1) Current and planned reconnaissance missions of DOD and RFF aircraft.

(2) Capability and location of DOD and RFF aircraft.

(3) Status of coordination of reconnaissance aircraft into or through the Air Force Missile Test Range warning areas.

(4) The latest Military Hurricane Warning Advisory.

(5) Status of the requirements for any special surface and radar weather observations.

(6) Notification to maintain continuous contact between CARCAH and Alternate CARCAH on the U.S. Air Force hurricane teletypewriter Circuit (GT 22117/JQGCU 304), or any other communication facilities available.

b. In the event that it becomes necessary later to effect actual transfer, the NHC will advise CARCAH of the planned transfer time. The CARCAH will immediately notify the Alternate CARCAH and FWF Jacksonville of any later developments since the initial alert and will provide the following additional information:

(1) Specific time of transfer of responsibility.

(2) Latest position of any storms.

(3) Last numbered Military Hurricane Warning Advisory and time issued.

(4) The current Reconnaissance TCPOD.

c. In the event that communications are unexpectedly disrupted between the initial alert and the orderly transfer as outlined, the Alternate CARCAH after unsuccessful contact with CARCAH for any 15-minute period will coordinate with the Washington Alternate Hurricane Center (WAHC) and automatically assume CARCAH responsibility. Under these conditions, however, the primary responsibility for notification of transfer to the Alternate CARCAH rests with WAHC.

2. CARCAH Reassumption of Responsibility. The NHC will advise CARCAH when it is again operational. If all required communications are restored, CARCAH will resume normal responsibility in the same manner as it was relinquished and at the same time that NHC resumes normal operation; CARCAH will notify the Alternate CARCAH.

3. Transfer Drill. At the discretion of the Director, NHC, a complete transfer of CARCAH responsibility drill will be conducted in conjunction with any NHC transfer drill early in June. During this drill, the Alternate CARCAH will coordinate a Reconnaissance TCPOD with the Department of Defense and RFF, and will disseminate a Military Hurricane Warning Advisory to the U.S. Air Force and FWF Jacksonville. If feasible, this drill will also include a flight by U.S. Air Force aircraft to test alternate routing of weather reconnaissance observations. Detailed instructions for this transfer drill will be disseminated to all concerned sufficiently in advance of the drill.

U.S. NAVY TRANSFER PLAN

1. In the event of impending or actual operational failure of the Fleet Weather Facility (FWF) Jacksonville, its responsibilities will be transferred to the FWF Suitland in accordance with current directives. When FWF Jacksonville can resume its responsibilities, FWF Suitland will be so notified. Procedures for transfer of responsibilities will be as follows:

a. The FWF Jacksonville shall request the Commanding Officer, FWF Suitland, by appropriate available communications channels to assume the responsibilities at a specified time, if foreseeable.

b. Notify addressees in paragraph 1.e. below.

c. In the event of an operational failure occurring before the above action being taken, it is requested that the FWF Suitland assume the responsibilities as soon as cognizant of the failure.

d. Time permitting, FWF Suitland will be advised by classified message of the status and location of all VW-4 aircraft and will be briefed by telephone of any special forecasting responsibilities of which FWF Suitland would not be cognizant.

e. When possible, actions of paragraphs a. and b. above shall be carried out by one message. Format of the request for transfer follows:

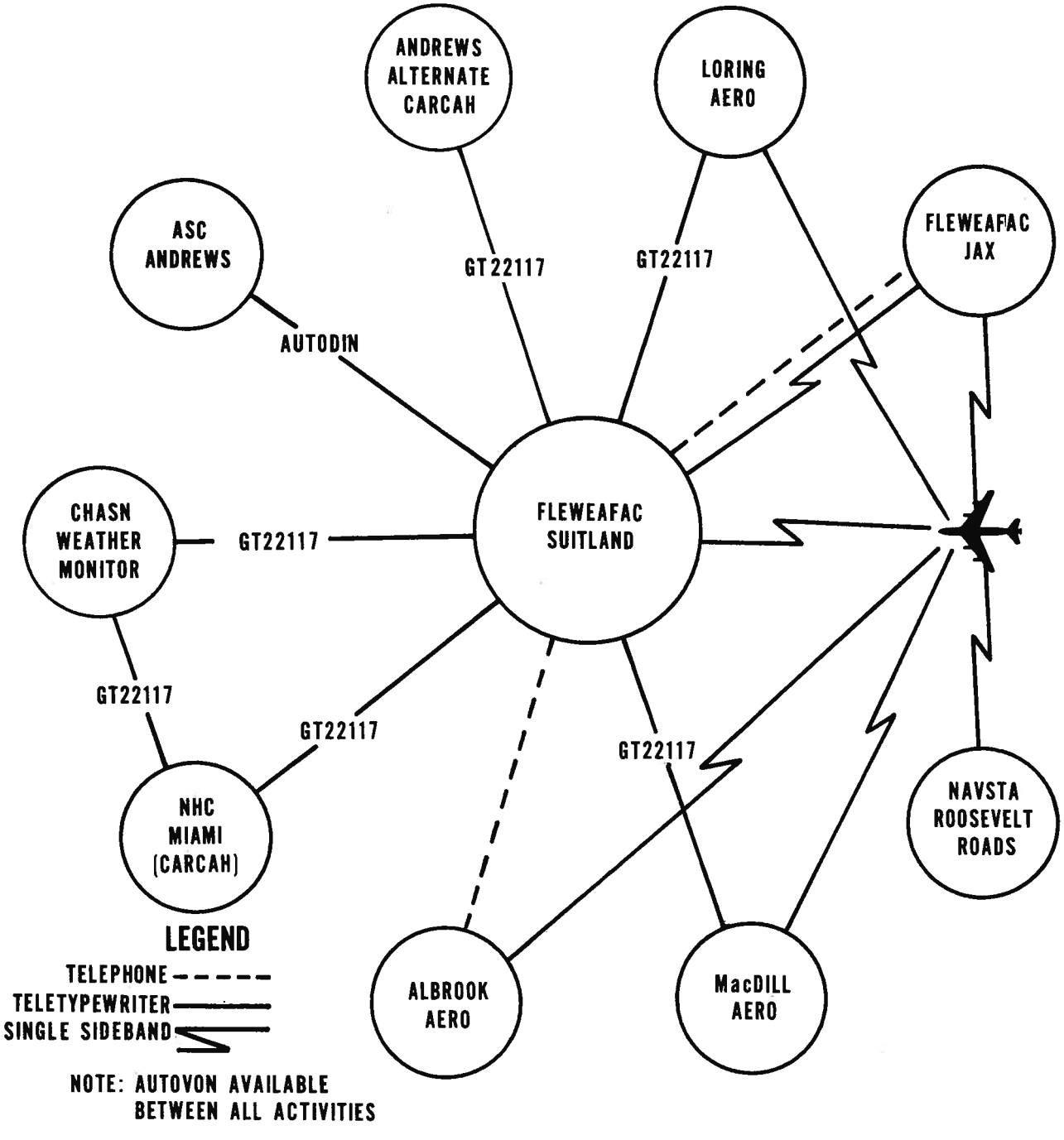
FM FLEWEAFAC JACKSONVILLE
TO FLEWEAFAC SUITLAND
WEARECONRON FOUR
INFO CNO
CINCLANTFLT
COMNAVAIRLANT
COMNAVWEASERV
NHC MIAMI
CARACH MIAMI
COMFAIRJAX
WEARECONRON FOUR DET SIX
FLEWEACEN NORFOLK
FLEWEAFAC QUONSET PT

UNCLAS
EMERGENCY TRANSFER OF RESPONSIBILITY
1. FLEWEAFAC JACKSONVILLE CASUALTY IMMINENT.
2. REQUEST FLEWEAFAC SUITLAND ASSUME HURRICANE WARNING AND FORECAST RESPONSIBILITIES AND TCPOD COORDINATION.
3. RECON FLIGHT SCHEDULE IAW TCPOD_____Z.

2. After assumption of responsibilities, FWF Suitland will coordinate directly the Tropical Cyclone Plan of the Day (TCPOD) with CARCAH and warnings with the National Hurricane Center (NHC) by U.S. Air Force teletypewriter Circuit GT22117, AUTOVON number 894-3790, 899-1650, or by commercial telephone patch to (305) 666-3912 or 666-4612.

3. Attachment 1 of this appendix illustrates the normal communications channels utilized by FWF Suitland.

FLEET WEATHER FACILITY
SUITLAND COMMUNICATIONS DIAGRAM



EASTERN PACIFIC

ALTERNATE HURRICANE WARNING OFFICE

Actions of the National Weather Service as the Alternate Hurricane Warning Office (HWO) Los Angeles, in case of failure of normal operations at the Eastern Pacific Hurricane Center San Francisco (EPHC-SFO) and with the Tropical Cyclone Reconnaissance Coordinator (TCRC) McClellan are detailed below:

1. Pacific ship reports normally received at EPHC-SFO will be rerouted by communication agencies concerned to METEO Los Angeles where they will be received on Western Union tieline, TWX, or on the local Coast Guard teletypewriter circuit. The Fleet Weather Center (FWC) Alameda will telephone selected ships in the area of concern of the Alternate Hurricane Warning Office Los Angeles (HWO-LAX).

2. Pacific ship reports received at the Alternate (ALT) HWO-LAX will be given to FAA Flight Service Station (FSS) at Los Angeles for transmission on Service C, Circuit 35 and Service O, Circuit 8274. Military stations not on either of these Circuits will receive reports as relayed on COMET III.

3. Public bulletins, advisories, and warnings from ALT HWO-LAX will be transmitted on Services C and O and will be available to military bases with drops on these Circuits.

4. The McClellan Weather Monitor will telephone hurricane reconnaissance reports to HWO-LAX.

5. Coordination and liaison with the TCRC will be by telephone calls.

6. Requests for hurricane reconnaissance flights will be made by telephone to the TCRC.

7. After telephone coordination with TCRC, final military tropical cyclone forecasts using WS Form C-13 will be read to them for entry on military communication circuits. The McClellan Weather Monitor will enter the forecast on COMET II.

The above procedures apply when failure of normal operations occur at EPHC-SFO.

CENTRAL NORTH PACIFIC

TRANSFER OF WARNING RESPONSIBILITY

1. When a tropical cyclone approaches longitude 140° W., the transfer of responsibility will be accomplished through the San Francisco and Honolulu Weather Service Offices (WSO). The Central Pacific Hurricane Center-Honolulu (CPHC-HNL) will advise other agencies concerned regarding transfer of warning responsibility.

2. When a tropical cyclone crosses the 180° meridian from west to east, the Joint Typhoon Warning Center (JTWC) Guam will append to the last warning issued on its area the statement "NEXT WARNING BY CPHC-HNL." The Fleet Weather Center (FWC) Pearl Harbor will acknowledge and notify all interested local agencies of assumption of tropical cyclone warning responsibility by CPHC-HNL. In similar fashion, CPHC-HNL, through the FWC Pearl Harbor, will pass responsibility to JTWC Guam for a tropical cyclone crossing the 180° meridian from east to west. All local agencies will be notified when acknowledgment is received.

3. Transfer of responsibility will not affect the name or numbering sequence used to identify the tropical cyclone.

4. The EPHC-SFO will assume all CPHC-HNL functions when failure of normal operations at CPHC-HNL is imminent.

5. If failure of normal operations at the JTWC Guam is imminent, the Alternate Joint Typhoon Warning Center (AJTWC) in Japan will assume warning responsibility west of the 180° meridian to the Malay Peninsula and north of the Equator. In this event, all references to JTWC Guam in this Plan will be replaced by AJTWC Japan.

TROPICAL STORM SURVEILLANCE BY SATELLITES

1. The NOAA environmental satellites will provide coverage of the tropical areas at least twice a day for both local reception and centralized reception of global data. Local stations may receive morning and midafternoon Automatic Picture Transmission (APT) pictures and midafternoon and nighttime Scanning Radiometer (SR) data from the direct transmission systems. Global visible midafternoon data will be centrally received and processed as well as nighttime infrared data from the SR system. Some of the data from several NASA research and development satellites will be employed in the surveillance of tropical storms. The geostationary Applications Technology Satellites ATS 3 (Atlantic) and ATS 1 (Pacific) can provide pictures of the visible earth disc at intervals of 25 minutes. If only Northern Hemisphere coverage is desired, the interval between pictures can be reduced to 12 minutes. Data from the two ATS satellites will not be received simultaneously. These pictures will be available routinely at the National Environmental Satellite Service (NESS) and the National Hurricane Center (NHC). Movie loops prepared from a series of ATS pictures show movement and changes of character of tropical disturbances. Attachment 1 shows the expected satellite operations and data availability for the 1971 season.

2. During storm seasons, satellite picture data (nephanalyses, strip pictures, digitized mosaics, etc.) for the Pacific, Atlantic, and Indian Ocean areas of tropical cyclone activity will be provided as expeditiously as possible to those forecast centers whose forecast responsibility includes these areas.

3. Tropical disturbances observed by the satellites will be described in messages prepared by the Analysis Branch of NESS. These messages, called Satellite Weather Bulletins, will be entered on the National Weather Service and Department of Defense teletypewriter circuits for distribution to the responsible forecast centers. The Bulletins will be numbered serially, beginning January 1 for each of the five geographical subdivisions: Atlantic Ocean (including the Gulf of Mexico and Caribbean Sea); Eastern North Pacific Ocean; Western North Pacific Ocean; South Pacific Ocean; and Indian Ocean.

The Satellite Weather Bulletin is a semicoded message based upon a satellite observation of a disturbed area, described by NESS through a Tropical and Subtropical Disturbance Classification from Satellite Data Form. Attachment 2 is a graphical description of this classification system. The chart in attachment 3 may be used to estimate the maximum surface wind speed from the banding category and the diameter of the overcast.

The message format for the Satellite Weather Bulletin is shown in attachment 4.

4. The NESS will distribute two daily messages entitled "Satellite Tropical Disturbance Summary." One message will be available daily at 0600 Greenwich Mean Time (GMT) and will summarize the tropical disturbances observed between longitude 20° E. westward to longitude 160° W. The other message, available at 1800 GMT daily, will summarize all tropical disturbances observed from longitude 160° W. westward to longitude 20° E.

These messages will:

a. List the day's Satellite Weather Bulletins.

b. Give information on disturbances for which continuity was not maintained.

c. Give locations of vortexes with tropical history observed in extratropical waters.

d. Describe all significant disturbed areas for which no Bulletins were sent.

A copy of the format for these messages is contained in attachment 5 of this chapter.

5. The NESS will examine on a continuing basis the current classification system for relating banding and storm diameter to surface winds, particularly to weakening or dissipating storms, and will inform all forecast agencies of new developments.

6. The NESS will inform the responsible forecast centers by the most expeditious communications available of the:

a. Discovery of a new storm.

b. Sudden change in size or apparent intensity of a storm.

c. Observed storm position in disagreement with advisory.

d. Apparent storm intensity in disagreement with advisory if in data sparse or nonreconnaissance area.

This communication is normally accomplished through the Satellite Weather Bulletin procedure or by telephone call.

7. Forecasting centers will advise the NESS Analysis Branch (telephone 301-440-7146) whenever storm characteristics as measured by reconnaissance data differ significantly from characteristics indicated by the appropriate NESS Satellite Weather Bulletin.

8. Guidelines for classifying tropical cyclones as named tropical storms, hurricanes, or typhoons, based solely on information from satellites, are as follows:

a. Classification will be based on the standard NESS Banding Category/ Overcast Circle Diameter/Wind Speed (BC/OCD/WS) graph; only Stage X, Category 2, 3, or 4 cyclones may be classified as storms, hurricanes, or typhoons.

b. Stage A, B, or C may be classified as tropical disturbances, waves, or depressions.

9. Characteristics of tropical cyclone areas observed by APT receivers at Guam, Wake Island, and Oahu, Hawaii, will be described in messages prepared by appropriate authorities and transmitted to responsible forecast centers. The responsible forecast centers will notify all stations affected.

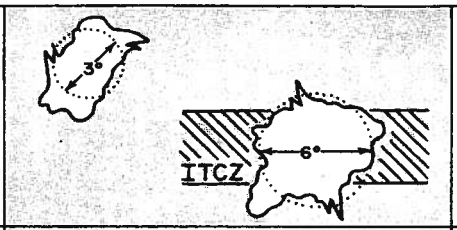
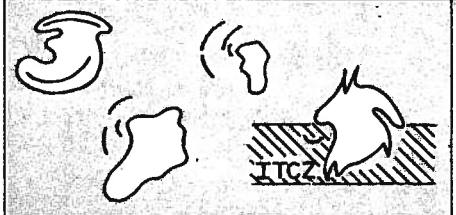
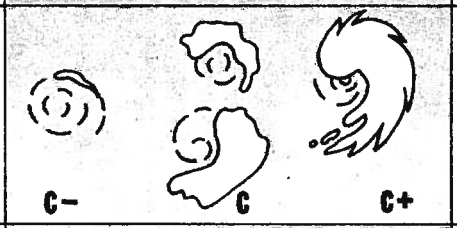
SATELLITES AND SATELLITE DATA AVAILABILITY--1971

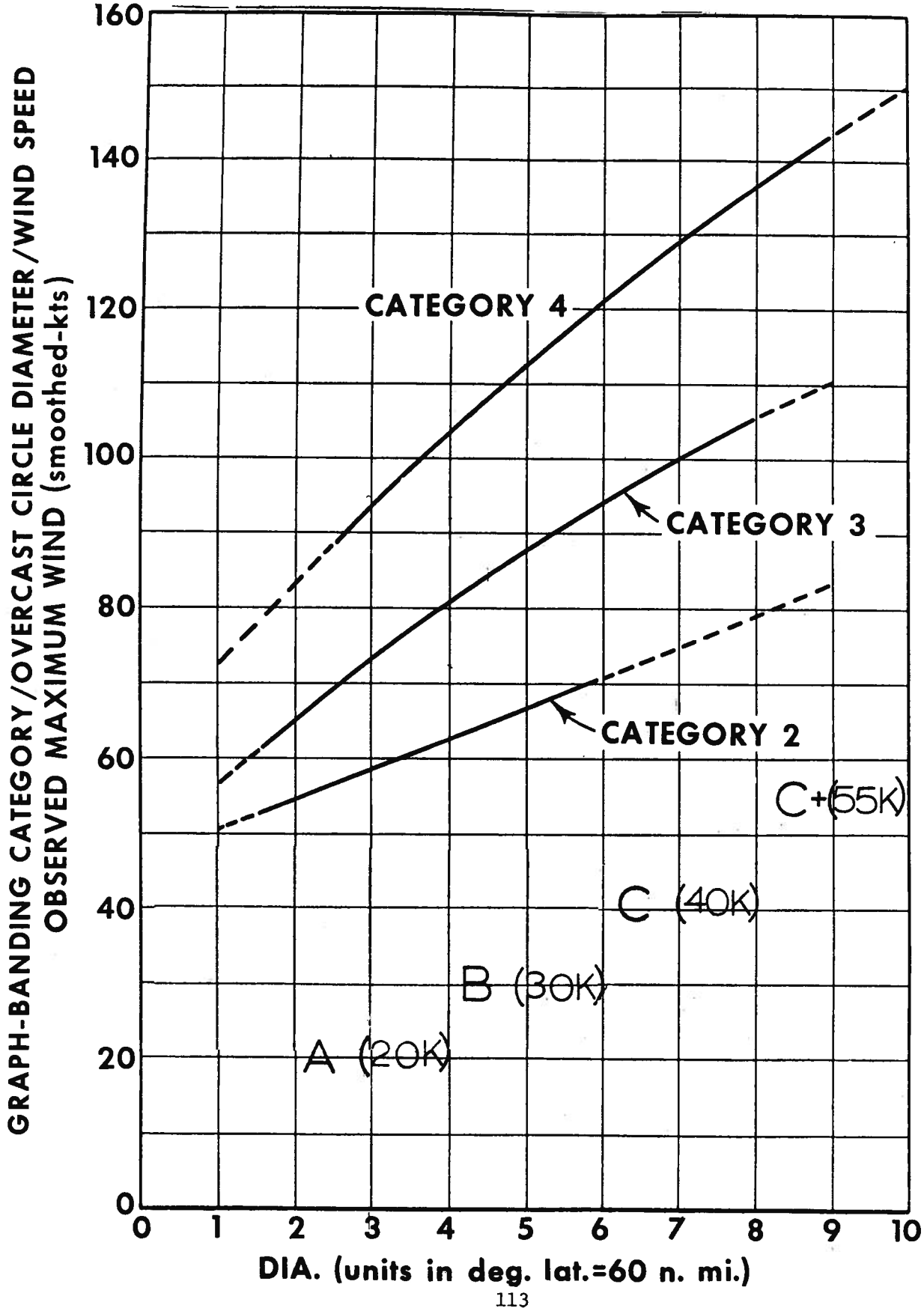
Satellite	Type of data	Local time	NESS products	Product distribution
ITOS-1 or NOAA-1	AVCS (stored) APT (direct) IR (stored) DRIR (direct)	1500 1500 0300 0300, 1500	1. Mapped digitized IR and Video 2. Sea-surface temperature analysis 3. Satellite Weather Bulletins 4. Tropical wind analyses 5. Manual nephanalyses 6. Moisture analyses 7. Gridded analog pictures 8. SINAP	a.) Facsimile b.) FOFAX c.) WEFAX d.) Teletypewriter e.) Telephone
ESSA-8	APT (direct)	1000	1. Analog pictures 2. Satellite Weather Bulletins 3. APT video signal	b.) FOFAX d.) Teletypewriter e.) Telephone
ATS-3 (70W) (Note: 80W until June 10, 1971, moving to 70W by August 1.)	SSCC	1200Z-2000Z (1200Z-2200Z)*	1. SSCC signals 2. Mapped digitized data 3. Wind analyses from movies 4. Satellite Weather Bulletins 5. Analog pictures	a.) Facsimile b.) FOFAX c.) WEFAX d.) Teletypewriter e.) Telephone f.) Telephone line
ATS-1 (150W)	SSCC	2000Z-0100Z (2200Z-0100Z)*	Same as ATS-3 above except for 5.	

APT - Automatic Picture Transmission
ATS - Applications Technology Satellite
AVCS - Advanced Vidicon Camera System
DRID - Direct Readout Image Dissector
ESSA - Environmental Survey Satellite
FOFAX - Forecast Office Facsimile Network
HRIR - High Resolution Infrared Radiometer
IR - Infrared
ITOS - Improved Tiros Operational Satellite
SINAP - Satellite input numerical analysis and prediction
SSCC - Spin-Scan Cloud Camera
WEFAX - Weather Facsimile

*During active Atlantic hurricane periods, the period of operation of ATS-3 will be extended.
**Data from this sensor on Nimbus IV may be available for research only.

TROPICAL AND SUBTROPICAL DISTURBANCE CLASSIFICATION FROM SATELLITE DATA

A NO CURVED CLOUD LINES OR BANDS		Stage A is a dense amorphous cloud mass composed of cumuliform, cirriform, and layered middle cloud in any combination. Some cirrus outflow is usually present. The cloud mass must have an average diameter of 3° latitude or more. Exceptions: (1) If the cloud mass is contiguous to or within the ITCZ in the Atlantic, Pacific, or south Indian Ocean, it must have an average diameter of 6° latitude or more and be partially isolated by breaks from the general cloudiness. (2) In the Arabian Sea and the Bay of Bengal, the cloud mass must be 8° latitude or more in diameter.
B POORLY ORGANIZED CURVED CLOUD LINES AND BANDS ILL-DEFINED CENTER		Stage B is a dense cloud mass with adjacent curved cumulus cloud lines and/or curved bands of middle cloud which are either detached from, or form part of, the major overcast area. The curved cloud lines and bands are often poorly organized. The pattern produced by the curved lines and bands is poorly defined--it does not appear to have one definite center. Along the ITCZ, the cloud mass and associated curved cumulus cloud lines and/or bands must be separated from the ITCZ cloudiness on at least one side and cirrus outflow must be evident.
C WELL ORGANIZED CURVED CLOUD LINES AND BANDS WELL DEFINED CENTER OUTSIDE DENSE CLOUD MASS		Stage C has well organized, curved cumulus cloud lines and/or broad curved bands of middle and high cloud. The pattern produced by the various curved lines and bands has a well defined single center. The center of the pattern generally lies outside but adjacent to an associated dense cloud mass, but it can be on the edge or as much as one-half degree latitude within the cloud mass. A C- has no associated dense cloud mass. A C+ appears very well organized with a large amount of curved cirrus outflow.
X CAT. 2 WELL ORGANIZED BANDS SPIRAL BANDS DEFINE CENTER WITHIN CENTRAL CLOUD MASS		Category 2 has a bright, often asymmetrical central overcast. Cirrus outflow is curved and more extensive. At least one long, major, well organized band spirals at a large angle into the central cloud mass. A linear curved break accompanies this band. Within the central cloud mass, the break is covered by thin cirrus but is readily detectable. Minor peripheral bands outside the overcast are poorly organized. An eye is not visible. The central tip of the major spiral band defines the center. This center must be more than one-half degree latitude within the central cloud mass.
X CAT. 3 MODERATE DEGREE OF CONCENTRICITY TO CLOUD BANDS IRREGULARLY SHAPED EYE WITHIN CENTRAL CLOUD MASS		Category 3 has a bright central overcast that is compact and tends to be circular. There is considerable curved cirrus outflow visible at the edge of the central overcast. Curved striations within the central cloud mass define spiral cloud bands which are moderately concentric about a visible eye. Well organized peripheral bands, some with well developed cirrus, are present. A ragged and irregularly shaped eye is normally visible. This defines the storm center.
X CAT. 4 HIGH DEGREE OF CONCENTRICITY TO CLOUD BANDS ROUND EYE NEAR CENTER OF CENTRAL CLOUD MASS		Category 4 has a very circular bright central overcast. The edge is often sharp and smooth over one or two quadrants, otherwise, it is striated cirrus. Highly concentric striations appear within the central overcast. Banding outside the central overcast is very well organized and circular. The entire cloud system is very symmetrical in appearance. A well defined eye appears as a small dark circular area surrounded by a bright ring. This defines the storm center.


GRAPH-BANDING CATEGORY/OVERCAST CIRCLE DIAMETER/WIND SPEED
OBSERVED MAXIMUM WIND (smoothed-kts)
160
140
120
100
80
60
40
20
0
CATEGORY 4
CATEGORY 3
CATEGORY 2
C+(55K)
C (40K)
B (30K)
A (20K)
0 1 2 3 4 5 6 7 8 9 10
DIA. (units in deg. lat.=60 n. mi.)

CHAPTER 9
ATTACHMENT 4

SATELLITE WEATHER BULLETIN

ABXX-1
ABXX-2 KWBC

SATELLITE WEATHER BULLETIN

(Satellite) (Area) (Bulletin #)

(Day) (Month) (Year) (Hour Min.) Z

(Lat. Location Long.) STAGE DIA. CAT.

(Remarks about eye) (Storm Name) *(Trend in development)

*Past_____Hour Movement

APPROX. TIME NEXT OBS. (Month/Day/Hour)

(Remarks)

* Not to be used in the Caribbean, Gulf of Mexico, and Atlantic. However, in these areas pertinent information, especially regarding trends as indicated by the appearance of the disturbance, will be placed in Remarks.

NOTE: A comment on the accuracy of the location of observed features will be entered in Remarks when unusual circumstances prevent determination of the accuracy to a normal accuracy of 60 nautical miles.

SATELLITE TROPICAL DISTURBANCE SUMMARY

ABXX-3 KWBC
SATELLITE TROPICAL DISTURBANCE SUMMARY

_____
(Date)

ATLANTIC

	(#)	(Location)	(Time)	(STAGE)	(DIA.)	(CAT.)	(Name or FIRST SIGHTED or leave blank)
BLTN.	____	_____	_____	_____	_____	_____	_____
BLTN.	____	_____	_____	_____	_____	_____	_____
BLTN.	____	_____	_____	_____	_____	_____	_____
BLTN.	____	_____	_____	_____	_____	_____	_____
BLTN.	____	_____	_____	_____	_____	_____	_____

_____
(If any Bltns. were sent yesterday on storms not reported today, state why.)

_____

_____

_____
(Give location of any vortex with tropical history observed in extrop. waters)

_____

_____

_____
(Remarks: Describe all significant disturbed areas for which no Bltn. was sent.)

EASTERN PACIFIC

	(#)	(Location)	(Time)	(STAGE)	(DIA.)	(CAT.)	(Name or FIRST SIGHTED or leave blank)
BLTN.	____	_____	_____	_____	_____	_____	_____
BLTN.	____	_____	_____	_____	_____	_____	_____
BLTN.	____	_____	_____	_____	_____	_____	_____

_____

_____

_____

ABXX-4 KWBC--Satellite Tropical Disturbance Summary will include the same type of information as ABXX-3 for the Western Pacific, South Pacific, and Indian Ocean areas.

CHAPTER 10

PUBLICITY

News media releases, other than warnings and/or advisories for the purpose of informing the public of the operational and research activities of the Department of Defense and the National Weather Service should reflect the joint effort of these agencies by giving due credit to the participation of other agencies. Copies of these releases should be forwarded to:

Deputy Director for Operations (Environmental Services)
The Joint Chiefs of Staff
Washington, D.C. 20301

Headquarters, Naval Weather Service Command
Building 200
Washington Navy Yard
Washington, D.C. 20309

Headquarters, Air Weather Service (AWS/OI)
Scott Air Force Base, Ill. 62225

NOAA, Office of Public Affairs
6010 Executive Boulevard
Rockville, Md.

Commandant, Marine Corps
Headquarters, U.S. Marine Corps
Washington, D. C. 20380

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