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NATIONAL HURRICANE OPERATIONS PLAN

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NATIONAL HURRICANE OPERATIONS PLAN

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Federal Coordinator
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Washington, D. C.
June 1970

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 Inter-departmental Hurricane Warning Conference (combined Atlantic and Pacific). These conferences are 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 Environmental Science Services Administration (ESSA) Weather Bureau (WB) officials shall provide Air Weather Service (AWS) and Naval Weather Service (NWS) designated representatives 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), ESSA Weather Bureau, Miami, is responsible for the North Atlantic Ocean, the Caribbean Sea, the Gulf of Mexico, and the States and possessions of the United States adjacent to these maritime areas.
2. The Meteorologist in Charge (MIC), Eastern Pacific Hurricane Center (EPHC), ESSA Weather Bureau, San Francisco, Calif., is responsible for the Eastern Pacific Ocean east of longitude 140° West and north of the Equator.
3. The MIC, Central Pacific Hurricane Center (CPHC), ESSA Weather Bureau, Honolulu, Hawaii, is responsible for the Central Pacific Ocean from longitude 140° West to the 180th meridian and north of the Equator.

The ESSA Weather Bureau shall:

1. Make the necessary analyses and prepare basic forecasts of tropical cyclones for the use of all Department of Defense (DOD) interests.
2. Supply tropical cyclone forecasts to DOD weather services in accordance with published interdepartmental agreements.

The U. S. Air Force and the U. S. Navy shall furnish to the ESSA Weather Bureau aircraft reconnaissance observations and other special observations which are required to support the provisions of Chapter 3 of this Plan.

1. The U. S. Navy and U. S. Air Force shall assign a single Chief, Aerial Reconnaissance Coordination, Atlantic Hurricanes (CARCAH), to the NHC. The CARCAH will be responsible for the coordination and final preparation of the Plan of the Day 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 in support of Chapter 8 of this Plan.

2. The Commanding Officer, Fleet Weather Central (FWC), Alameda, Calif., will be responsible for effecting necessary coordination and liaison with the MIC, EPHC, San Francisco, with respect to arrangements for aircraft reconnaissance and/or other special observations which are required to support the provisions of this Plan.

3. The Commanding Officer, Fleet Weather Central (FLEWEACEN), Pearl Harbor, Hawaii, and the Tropical Cyclone Reconnaissance Coordinator (Central North Pacific) and Commander, Detachment 1, 9th Weather Reconnaissance Wing, Hickam AFB, Hawaii, will be responsible for effecting necessary coordination and liaison with the 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 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 ESSA Weather Bureau, through the Director of the National Hurricane Center, Miami, Fla. (NHC-MIA); MIC, Eastern Pacific Hurricane Center, San Francisco, Calif. (EPHC-SFO); and MIC, Central Pacific Hurricane Center, Honolulu, Hawaii, (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 U.S. Navy and the U.S. Air Force in accordance with the detailed instructions in Chapter 3.

c. Provide the U.S. Air Force and U.S. Navy timely access to all significant tropical cyclone reports.

d. Consult as necessary with the U.S. Air Force and U.S. Navy regarding day-to-day requirements for tropical cyclone advice and arrange to meet these requirements within the capabilities of the hurricane warning offices.

e. Advise the CARCAH (Atlantic); Hurricane Liaison Officer (HLO), Fleet Weather Central, Alameda (HLO FLEWEACEN Alameda); and Tropical Cyclone Reconnaissance Coordinator (Central North Pacific) of aircraft reconnaissance and other observational requirements of the respective hurricane warning offices.

f. Coordinate the CPHC-HNL with FLEWEACEN Pearl Harbor and the Central Pacific Forecast Center (CENPAC-FC), Hickam AFB, before issuing tropical cyclone advisories. The EPHC-SFO will coordinate with FLEWEACEN Alameda on Eastern Pacific reconnaissance requirements.

2. The ESSA National Environmental Satellite Center (NESC) shall:

a. Operate satellite systems capable of providing local and global tropical coverage during the tropical cyclone season.

b. Receive requirements from the NHC for specific coverage.

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

d. 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 U.S. Navy and the U.S. Air Force through their respective hurricane liaison officers shall:

CHAPTER 1

- a. Provide up-to-date information to the 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 ADC radar sites under conditions specified in Chapter 6, paragraph 6.
4. The U.S. Navy and the U.S. Air Force will meet from their own resources any military requirements that are in excess of the common tropical cyclone requirements as stated in Appendix H, 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. ESSA Weather Bureau and DOD's, Deputy Director of Operations, Environmental Services (DDO/ES), 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 Director of Meteorological Services and disaster prevention agencies of those nations.

DEFINITIONS

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

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

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

TROPICAL DISTURBANCE: A discrete 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 WAVE: A trough of 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.

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

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

HURRICANE: A 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; and in the East 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.)

QUADRANT: A quadrant is defined as the 90° sector of the storm centered on a designated cardinal point of the compass.

Example: Northeast quadrant refers to the sector of the storm from 360° through 090°.

CHAPTER 3

TROPICAL CYCLONE FORECASTS AND INFORMATION TO BE FURNISHED BY THE ESSA WEATHER BUREAU TO THE U.S. AIR FORCE AND U.S. NAVY

1. Reports. The NHC-MIA, EPHC-SFO, and CPHC-HNL in their respective areas of responsibility will make available to the U.S. Air Force and U.S. Navy all significant tropical cyclone reports which they receive.

2. Advisories. The NHC-MIA, EPHC-SFO, and CPHC-HNL will issue and provide to the U.S. Navy and U.S. Air Force 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--WB 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 U.S. Air Force and U.S. Navy offices. The release time of such material by the 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 Air Force and Navy.

(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 04, 10, 16 and 22Z (Greenwich Mean Time--GMT). The 12-, 24-, 48-, and 72-hour forecasts will be based on the latest 6-hourly synoptic time 00, 06, 12, and 18Z. 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 at 03, 09, 15, and 21Z, and for synoptic positions at 00, 06, 12, and 18Z.

(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 "amended," "corrected," or "relocated," as appropriate, will appear immediately following the warning number. (See Form 1 of this chapter.)

(4) Amended Military Advisory. 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 the advisory being amended.

b. Content of Advisories. Advisories provided the U.S. Air Force and U.S. Navy 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.

CHAPTER 3

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

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

(11) Storm surge forecast (not used in Central Pacific).

(12) Heavy precipitation 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 U.S. Air Force and U.S. Navy 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 U.S. Navy and U.S. Air Force 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 (WB Form C-13, formerly WB 656-6) of this chapter.

a. Time and Circumstances of Issue of Bulletin for U.S. Air Force and U.S. Navy. 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 U.S. Air Force and U.S. Navy will contain the following information from WB 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 WB Form C-13) and WHPN3 PHNL (Tropical Storm or Hurricane Advisories on WB Form C-13) will be numbered sequentially as indicated, but the first issuance of WHPN2 PHNL (issuance in public format) will be Advisory Number 1, regardless of the 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 03, 09, 15, and 21Z 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 synoptic features, objective technique, climatology, etc. They will give reasons for intensity or track changes and include plans for warnings display.

CHAPTER 3

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 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 Weather Bureau Hurricane Warning Office 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 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 04, 10, 16, and 22Z will be edited by the Weather Bureau Forecast Office (WBFO) 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 03, 09, 15 and 21Z will be edited by WBFO San Francisco and included in Marine Bulletins broadcast by radio stations KPH, KMI, KFS, KOK, NMQ, KOU, and WWD.

c. Honolulu and Kahuka, Hawaii. Formal tropical storm and hurricane advisories issued at 03, 09, 15, and 21Z will be edited by WBFO Honolulu and included in Marine Bulletins broadcast in CW by radio stations KHK (Kahuku) and NMO (CG Honolulu) and in frequently scheduled voice broadcasts by stations NMO, KBP and KQM.

8. Bulletins. The NHC-MIA, EPHC-SFO, and CPHC-HNL will make available to the U.S. Navy and U.S. Air Force any public bulletins issued by the ESSA Weather Bureau regarding suspicious areas, tropical disturbances, tropical depressions, tropical storms, or hurricanes.

9. Distribution of Forecasts and Information. The ESSA Weather Bureau 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.

CHAPTER 3

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, WB 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.

Form I

WB FORM C-13 (4-70)
(Formerly WB Form 656-6)

ESSA NATIONAL HURRICANE CENTER MARINE/AVIATION/MILITARY *BULLETIN AMENDED TROPICAL DEPRESSION
ADVISORY NUMBER CORRECTED TROPICAL STORM
RELOCATED HURRICANE

(NAME/NUMBER*) Z (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] upgraded to tropical depression
downgraded from 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 AIR FORCE/NAVY/ESSA 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.

(AVIATION ADVISORY ENDS HERE)

STORM SURGE OF (Not used in Central Pacific)

HEAVY PRECIPITATION (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.

DIGITAL TROPICAL WEATHER WARNING (WORKSHEET)							CHAPTER 3 Form 2	
INSTRUCTIONS								
Group 1	Tropical weather warning indicator.		Group 4	Date-time (GMT) of initial position reported.		Group 8	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.)	
2	Up to six letters of name/number.		5 and similar groups	99 - WMO indicator. L _a L _a L _a - Latitude (tenth of degree).		and similar groups		
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		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 _o L _o L _o L _o - Longitude (tenth of degree)			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.
			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)			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 t _f	4. d d t t t t				
A N A L Y S I S	5. 99LoLoLo	6. Q _c LoLoLoLo	7. OWWWRR	8. QQ1RR	9. QQ2RR	10. QQ3RR	11. QQ4RR	
	99		O	ONE	OSE	OSW	ONW	
	(12) OWWWRR	(13) QQ1RR	(14) QQ2RR	(15) QQ3RR	(16) QQ4RR			
	0100	ONE	OSE	OSW	ONW			
	(17) OWWWRR	(18) QQ1RR	(19) QQ2RR	(20) QQ3RR	(21) QQ4RR			
12-hr Prog	0065	ONE	OSE	OSW	ONW			
	(22) OWWWRR	(23) QQ1RR	(24) QQ2RR	(25) QQ3RR	(26) QQ4RR			
	0050	ONE	OSE	OSW	CNW			
	(27) OWWWRR	(28) QQ1RR	(29) QQ2RR	(30) QQ3RR	(31) QQ4RR			
	0030	ONE	OSE	OSW	ONW			
24-hr Prog	32. 99LoLoLo	33. Q _c LoLoLoLo	34. 1WWWRR	35. 1Q1RR	36. 1Q2RR	37. 1Q3RR	38. 1Q4RR	
	99		1	1NE	1SE	1SW	1NW	
	(39) 1WWWRR	(40) 1Q1RR	(41) 1Q2RR	(42) 1Q3RR	(43) 1Q4RR			
	1050	1NE	1SE	1SW	1NW			
	(44) 99LoLoLo	(45) Q _c LoLoLoLo	(46) 2WWWRR	(47) 2Q1RR	(48) 2Q2RR	(49) 2Q3RR	(50) 2Q4RR	
48-hr Prog	99		2	2NE	2SE	2SW	2NW	
	(51) 2WWWRR	(52) 2Q1RR	(53) 2Q2RR	(54) 2Q3RR	(55) 2Q4RR			
	2050	2NE	2SE	2SW	2NW			
	(56) 99LoLoLo	(57) Q _c LoLoLoLo	(58) 4WWWRR	(59) 4Q1RR	(60) 4Q2RR	(61) 4Q3RR	(62) 4Q4RR	
	99		4	4NE	4SE	4SW	4NW	
72-hr Prog	(63) 4WWWRR	(64) 4Q1RR	(65) 4Q2RR	(66) 4Q3RR	(67) 4Q4RR			
	4050	4NE	4SE	4SW	4NW			
	(68) 99LoLoLo	(69) Q _c LoLoLoLo	(70) 7WWWRR	(71) 7Q1RR	(72) 7Q2RR	(73) 7Q3RR	(74) 7Q4RR	
	99		7	7NE	7SE	7SW	7NW	
	(75) 7WWWRR	(76) 7Q1RR	(77) 7Q2RR	(78) 7Q3RR	(79) 7Q4RR			
R E M A R K S	7050	7NE	7SE	7SW	7NW			
	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 WB Form 656-6) to digital format for computer consumption. Should digital advisories be transmitted, receipt by non-users will be minimal.							

CHAPTER 4

AIRCRAFT RECONNAISSANCE

1. Responsibility.

a. Atlantic: The U.S. Air Force and U.S. Navy will share 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) will supply backup operational support in accordance with the following:

(1) Reconnaissance will be on a shared basis 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 storm area (radius 80 nautical miles of center), the RFF will make the center fix and DOD aircraft will provide peripheral data.

(3) The resolution of conflicts will be made by the CARCAH.

(4) The U.S. Air Force Gull Hotel 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.

(5) Special flights may be scheduled through CARCAH to fill specific 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.

b. Pacific: The U.S. Air Force will be responsible for providing tropical cyclone aircraft reconnaissance in the Central Pacific Hurricane Center's (CPHC) area of responsibility subject to the capabilities of available aircraft. The U.S. Navy and the U.S. Air Force will share the responsibility for providing tropical cyclone aircraft reconnaissance in the Eastern Pacific Hurricane Center's (EPHC) area of responsibility subject to the capabilities of available aircraft.

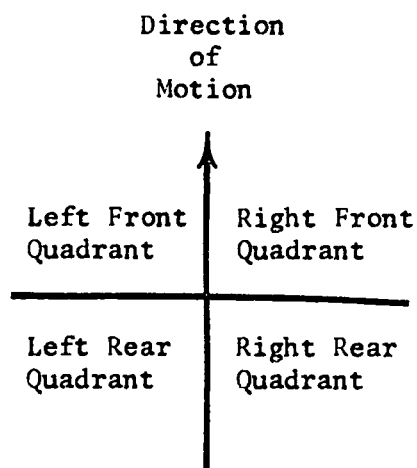
c. Investigative Reconnaissance: An investigative reconnaissance flight is a special mission to investigate the stage of development of a known tropical disturbance, specifically to determine (a) whether a pressure center exists near the surface, and (b) the maximum low level winds associated with the 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.



(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.

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

(2) Center Fixes. Hurricane reconnaissance flights assigned operational responsibility for obtaining center fixes and profile data of this storm area (80 nautical miles radius of center) by quadrant have the highest NHC priority. All center fixes will be made at 700 mb or below, except as indicated in Patterns C and D, and within aircraft safety limits. The flights should be planned so that center fixes are obtained at the specified times indicated below or as near those times as operational conditions permit. The

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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 center 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 POD.

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 center fix information will be included in the detailed eye/center 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 for each flight. This message will be transmitted as soon as possible in the interest of reducing time delay for delivery to the NHC-MIA. All radar fix reports will be made in plain text (Form 3 of this chapter). The method of obtaining the location of the center should always be included in eye position reports from reconnaissance aircraft.

The center should be located according to the following priority:

(a) Pressure eye. This is to be obtained by proper flight pattern to locate the position of the lowest surface pressure.

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

(c) Cloud eye. 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 fixes will be reported in degrees and minutes.

(3) Center Profile Data. Penetration and collection of vortex data (see below) will normally start at 700 millibars and at a radius of 80 nautical miles from the center as indicated by aircraft radar. The penetration of the eye from the left rear quadrant will culminate in the location of the center and release of a dropsonde. The flight will proceed radially outward through the right front quadrant a distance of 80 nautical miles, thence tangentially downwind to a point in the left front quadrant 80 nautical miles from the center. A second transit of the eye will begin at that point and terminate at a point 80 nautical miles from the center in the right rear quadrant. After the second transit of the eye, the flight will

proceed to collect peripheral vortex data in advance of storm center. The second 6-hour fix of the mission will consist of a single transit of the eye from the left rear to the right front quadrant with departure for the base immediately following the transit.

The storm center 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 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 surface wind speed profile should be obtained from 80 miles radius to the center at the designated flight pattern altitude. The radial distance from the center of the maximum to 63 knot, 50 knot, and 30 knot values should be observed in each quadrant.

(c) Maximum D-Value Profile. During the transit of the left rear and right front 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 the left rear and right front 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 center 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 27,000 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 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).

(5) Research Flight Facility (RFF). When the 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.

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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.

In the case of multiple aircraft penetration of the storm area, flying safety is of paramount importance. In consideration of this, the Director of NHC and the Director of NHRL will determine when RFF will obtain center fix and vortex data and when operational aircraft of the U.S. Navy and U.S. Air Force will obtain peripheral data.

b. Eastern Pacific:

(1) Center Fixes. Within the limits of operational safety, daily 2500 nm tropical cyclone reconnaissance flights will make all possible efforts to obtain an observed fix on the center as near 18Z as possible. Operational hurricane reconnaissance flights will fly the flight pattern (as shown and described in Appendix A) designated in the TCPOD. Two Center fixes at least six hours apart, preferably near 15Z and 00Z, and peripheral data as specified by the flight pattern will be provided when tropical cyclones are within 600 nm of the west coast of the United States or within 300 nm of Baja California, Mexico. 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 the EPHC-SFO and CPHC-HNL. 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 center should be located according to the priority in paragraph 3.a. (2), (a) through (d).

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 the CARCAH in consultation with the Director of NHC. When flights by the RFF are to be made, the Chief of the 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 the 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 5 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) Within an Altitude Reservation (ALTRV), aircraft of more than one agency may operate simultaneously in the storm and the aircraft having responsibility for obtaining the center 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 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 isotach (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, TACAN, etc.

5. Common UHF or VHF frequencies 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.

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

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

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 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

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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 ARTCC of 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.

(f) The FAA has directed that reconnaissance flights operating in support of the NHC into an area where a named storm exists shall be provided 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 POD by the inclusion of the statement "REQ ALTRV CLASS THREE." The remarks section of the aircraft FLIGHT PLAN should contain this same statement.

(g) Weather Reconnaissance Squadron (WEARECONRON)-FOUR U.S. Navy, 53rd WRS U.S. Air Force, and RFF-ESSA 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 Reconnaissance TCPOD.

(2) Dissemination of the Reconnaissance Plan of the Day. The Reconnaissance 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 U.S. Air Force, U.S. Navy, 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 ARTCC's of the Reconnaissance TCPOD immediately upon receipt.

b. Reconnaissance 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 Hurricane Liaison Officer (HLO), FLEWEACEN Alameda, 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 HLO with confirmation by message via the hurricane coordination net. These requirements will be provided HLO 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 considerations as listed in paragraph 5.a.(1), (a) through (d).

(b) The TCPOD will be prepared and disseminated daily during the period from 1 June through 31 October. 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 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° West and the 180th meridian. The Tropical Cyclone Reconnaissance Coordinator (TCRC) at Hickam AFB 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 the 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 (7) digits appear in the call sign; for

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example, "NAVH789." In the Atlantic, the NHC will be included as an information addressee (HGXP-Miami). Flight plans for flights which qualify 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 the FAA of changes in routine Gull flight tracks by forwarding planned changes to the following ARTCC's: 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 the FAA.

(3) Flight Levels. A single assigned flight level will be filed and flown. Pressure altitudes for flight or flight plan filing with the ARTCC will not be used. Requests will not be made for blocks of airspace for only one aircraft.

(4) Dropsondes. Dropsondes will only be released with approval of the ARTCC concerned. Release approval should be requested at least 10 minutes before the point at which the drop is planned.

5. Aircraft Reconnaissance Communications.

a. Atlantic:

(1) Meteorological reports from reconnaissance flights will be coded and transmitted in RECCO code 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 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 Celsius following the mandatory RECCO code 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 ESSA/RFF aircraft will be the same as for U.S. Navy aircraft, as shown in Appendix D of this chapter. ESSA/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 ESSA 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 hurricane missions and GULL for regular/special missions for U.S. Air Force, NAVY for U.S. Navy, and ESSA for ESSA--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, TWO, ...). 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.

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b. Eastern Pacific:

(1) Meteorological reports from reconnaissance flights will be coded and transmitted in RECCO code. 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 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 monitoring systems which are external to the message text in formatting messages for transmission to applicable ground stations.

(3) U.S. Navy flights will use communications procedures established for normal Pacific Weather Reconnaissance operations (Appendix F of this chapter). 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 HLO Alameda will be expeditiously transmitted to EPHC San Francisco by means of the hurricane circuit.

(5) Air Traffic Control (ATC) Communications. Normal ATC procedures will be followed.

6. Navy ATC Communications--Atlantic. The ATC/AG 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 SSB Stations--6723 kHz (primary), 4711 kHz (secondary).
- b. U.S. Air Force Aeronautical Station.
- c. 6567 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, Andrews AFB, and Albrook AFB).
- b. FAA Stations--6567 kHz (Miami, New Orleans, New York, San Juan).
- c. U.S. Navy SSB Stations--6723 kHz (primary), 4711 kHz (secondary), and (U.S. Navy Jacksonville).

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

8. Air-Ground Communications with FAA Stations--Atlantic. If the primary air-ground 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 HGXP. The appropriate FAA station will relay the data to the NHC.

CHAPTER 4
Form 1

INITIAL TROPICAL CYCLONE EYE/CENTER REPORT

UH AIR FORCE GULL
NAVY EYE/CENTER LOCATED BY
*ESSA

AT DEGREES MINUTES NORTH DEGREES

MINUTES WEST AT ZULU

*ESSA 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/CENTER 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		GROUND STATION RECEIPT TIME		
		Z		Z		
PRECEDENCE: IMMEDIATE						
MESSAGE HEADING						
A	SQUADRON CALL SIGN		MISSION NUMBER		OBS NUMBER	
B	Z		B. DATE AND TIME OF FIX (Zulu)			
C	DEG	Min	N	S	C. LATITUDE CENTER FIX (Degrees/Minutes) (Circle N or S)	
D	DEG	Min	E	W	D. LONGITUDE CENTER 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	NM				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	° /	NM				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	° /	NM				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 Centigrade)	
N	°				N. MAXIMUM FLIGHT LEVEL TEMP OUTSIDE THE EYE (degrees Centigrade).	
O	M /	M				O. ABSOLUTE ALTITUDE OUTSIDE/INSIDE EYE (meters)
P	° /	Min	N	S	P. CONFIRMATION OF FIX. Position (Degrees/Minutes); Date and Time (Zulu)	
	° /	Min	E	W	Z	
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 NM, length of minor axis 5 NM. CO8-14 - Concentric eye, diameter inner eye 8 NM, outer eye 14 NM.	
R					R. EYE CHARACTER: Closed Wall, Poorly Defined, Open SW, etc.	
S					S. REMARKS	
T	° /	Min	N	S	T. AIRCRAFT POSITION IF RADAR FIX (Degrees/Minutes).	
	° /	Min	E	W		
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

AIR FORCE GULL
 UH NAVY _____ 96669 11304 10189 68466 ----etc. -----X
 ESSA* _____

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

DEGREES _____ MINUTES NORTH _____ DEGREES _____ MINUTES WEST X

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

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

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

(RADAR WEATHER REMARKS) (Note 6)

*ESSA 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 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 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 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-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 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 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:				
<p>NOTES: Groups 5, 25, 45, and 65 are height of eyewall. Report to nearest 1000 ft. in a five digit group. ///// indicates hgt unk.</p> <p>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.</p> <p>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 centigrade. Add 50 for negative values.</p> <p>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.</p> <p>If data unobtainable, slashes will be reported.</p>				
Monitor		TOR		

NOAA Coral Gables Library
 Gables One Tower
 9 South Dixie Highway, Room 520
 Coral Gables, Florida 33145

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

FM: OL/8 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

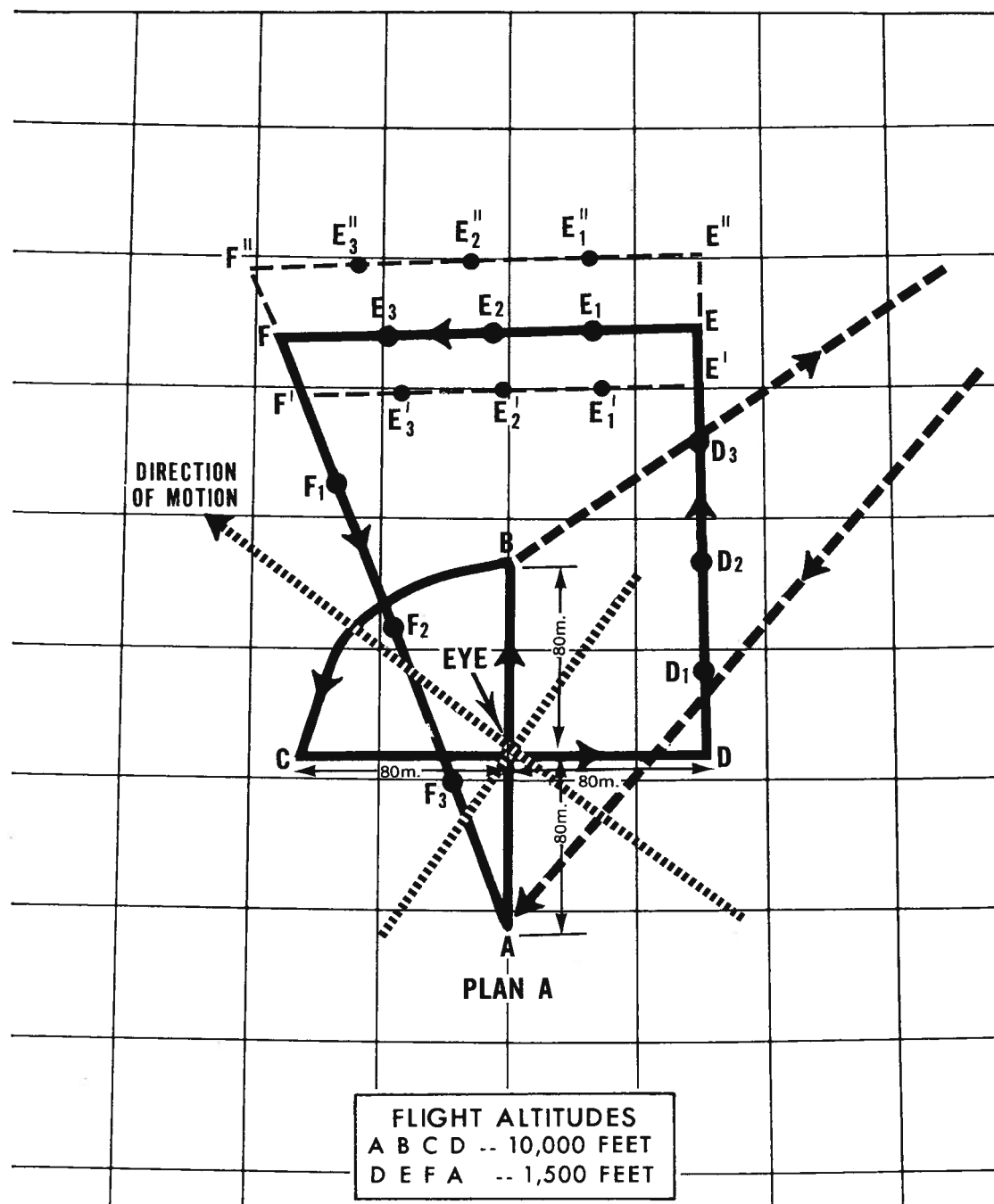
RECON POD FROM _____ Z _____ 70 TO _____ Z _____ 70 FOLLOWS

	1. _____ (STORM NAME-TD #)	2. _____ (STORM NAME-#)	3. _____ (STORM NAME-#)	4. _____ (STORM NAME-#)
FIX TIMES	A. _____ / _____ Z _____ / _____ Z	_____ / _____ Z _____ / _____ Z	_____ / _____ Z _____ / _____ Z	_____ / _____ Z _____ / _____ Z
CALL SIGN	B. _____	_____	_____	_____
ETD	C. _____ / _____ Z _____ / _____ Z	_____ / _____ Z _____ / _____ Z	_____ / _____ Z _____ / _____ Z	_____ / _____ Z _____ / _____ Z
DEPARTURE PT	D. _____	_____	_____	_____
ENROUTE ALT	E. _____	_____	_____	_____
FCST PSN	F. _____ N _____ W _____ N _____ W	_____ N _____ W _____ N _____ W	_____ N _____ W _____ N _____ W	_____ N _____ W _____ N _____ W
DESTINATION	G. _____	_____	_____	_____
FLT PATTERN	H. _____	_____	_____	_____
REMARKS	I. _____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

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

* For Eastern Pacific dissemination, see Appendix F, paragraph 3.d., of
 this chapter.

OPERATIONAL FLIGHT PATTERN "A"



**OBSERVATION DETAILS FOR
OPERATIONAL FLIGHT PATTERN "A"**

**CHAPTER 4
Appendix A
Attachment 1a**

ALPHABETIC POINT	OBSERVATION DATA	TRANSMIT ASSAP AFTER
A	First 8 groups RECCO Code.	A
Eye	Eye/Center and Dropsonde.	Eye (Initial Eye) Dropsonde may be appended to Point B Message.
B	First 8 groups RECCO Code.	B Detailed Eye/Center Message.
C	First 8 groups RECCO Code.	C
Eye	Eye/Center and Dropsonde.	Eye (Initial Eye) Dropsonde may be appended to Point D Message.
D	First 8 groups RECCO Code.	D Add new Detailed Eye/Center Message, if any significant changes.
D ₁ D ₂ D ₃ E	99999 GGggi ddfff TTTdTdW mjHHH SST (see note 4). Same as D ₁ , except omit 99999. Same as D ₂ . First 8 groups RECCO Code and SST (see note 4).	E Data for Point E trans- mitted first, then data for D ₁ , D ₂ , and D ₃ in chrono- logical order followed by SST for E, D ₁ , D ₂ , and D ₃ . See example below.
E ₁ E ₂ E ₃ F	99999 GGggi ddfff TTTdTdW mjHHH SST (see note 4). Same as E ₁ , except omit 99999. Same as E ₂ . First 8 groups RECCO Code and SST (see note 4).	F Data for Point F trans- mitted first, then data for E ₁ , E ₂ , & E ₃ in chronological order, followed by SST for F, E ₁ , E ₂ , and E ₃ . See example below.
VORTEX	VORTEX DATA	Supplementary Vortex Data Message transmitted between Points F and A.
F ₁ F ₂ F ₃ F ₄ A	99999 GGggi ddfff TTTdTdW mjHHH SST (see note 4). Same as F ₁ , except omit 99999. Same as F ₂ . Same as F ₂ . First 8 groups RECCO Code and SST (see note 4).	A Data for Point A trans- mitted 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.
Eye	Eye/Center and Dropsonde.	Eye (Initial Eye) Dropsonde may be appended to Point B Message.
B	First 8 Groups RECCO Code.	B Detailed Eye/Center Message.
VORTEX	VORTEX Data for last penetration	B

EXAMPLE OF RECON MESSAGE TRANSMITTED AT POINT E:

9xxx9 GGggi YQLaLaLa(1) LoLoLoBf(1) hhhdtda ddfff
TTTdt dw 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 D₁.

(3) Time at Point D₂.

(4) Time at Point D₃:

(5) Sea-Surface Temperature at:

	E	D ₁	D ₂	D ₃
SST	28.7C	26.5C	27.0C	28.0C

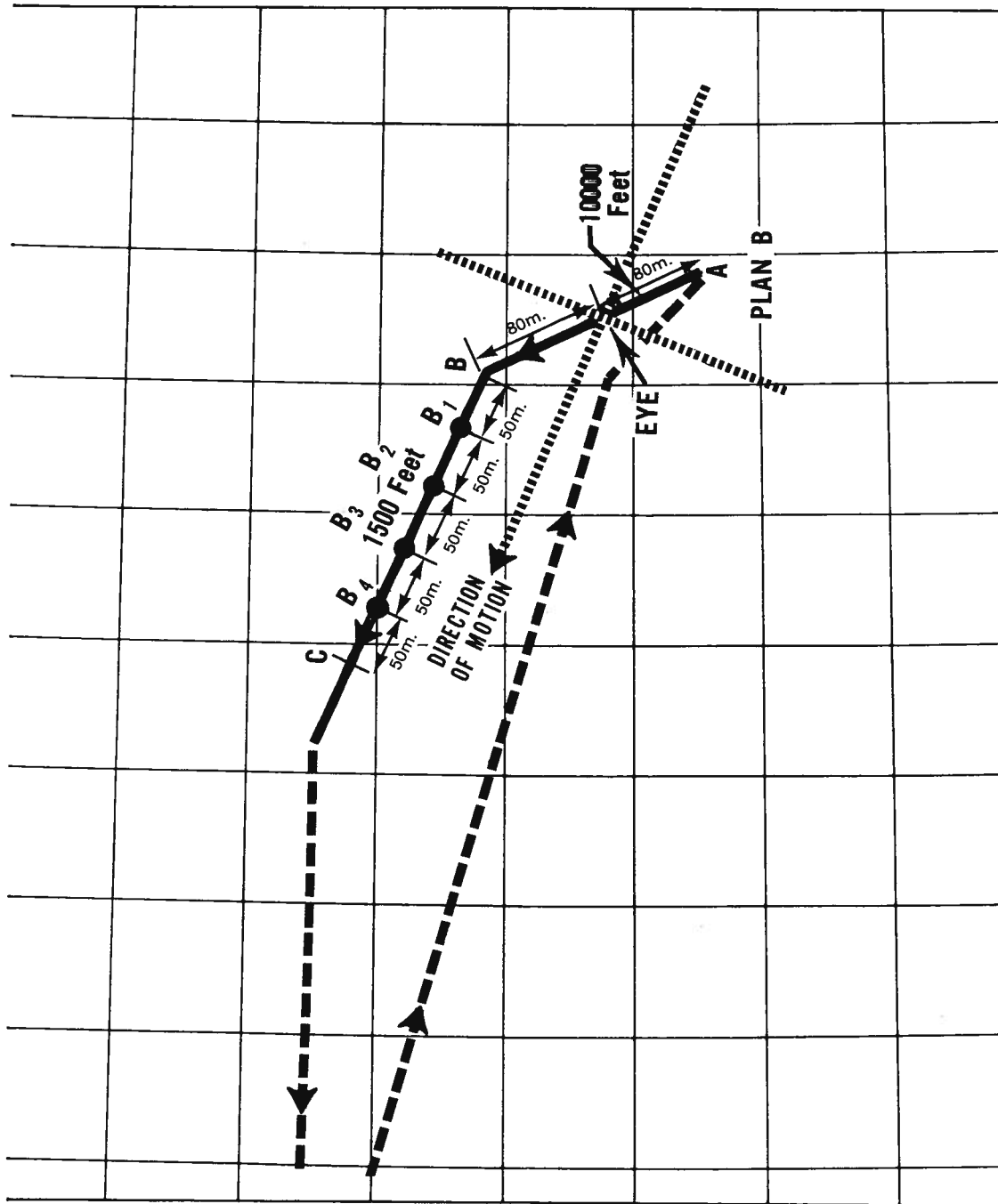
NOTES: (1) The track and altitude to observation Point A is unspecified as is the track home from the last observation point.

(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 (D₁, D₂, D₃, E₁, 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 ASSAP AFTER
A	First 8 groups RECCO Code.	A
Eye	Eye/Center and Dropsonde.	Eye (Initial Eye) Dropsonde may be appended to Point B Message.
B	First 8 groups RECCO Code.	B Detailed Eye/Center Message.
VORTEX	VORTEX DATA	Supplementary Vortex Data Message transmitted between B and C.
B ₁ B ₂ B ₃ B ₄ C	99999 GGggi ddfff TTT _d T _d w mjHHH SST (See note 1) Same as B ₁ , except omit 99999 Same as B ₂ . Same as B ₂ . First 8 groups RECCO Code and 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, Attach- ment 1a.

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--B₁, B₂, B₃, and B₄--are about 50 nautical miles apart.



OBSERVATION DETAILS FOR
OPERATIONAL FLIGHT PATTERN "C"

ALPHABETIC POINT	OBSERVATION DATA	TRANSMIT ASSAP AFTER
A	First 8 groups RECCO Code.	A
Eye	Eye/Center and Dropsonde.	Eye (Initial Eye) Dropsonde may be appended to Point B Message.
B	First 8 groups RECCO Code.	B Detailed Eye/Center Message.
C	First 8 groups RECCO Code.	C
Eye	Eye/Center and Dropsonde.	Eye (Initial Eye) Dropsonde,. New Detailed Eye/Center Message, if any significant changes.
C ₁ C ₂ D	99999 GGggi ddfff TTT _d T _d w mjHHH and SST (see notes 1 and 2). Same as C ₁ , except omit 99999 (see note 3). First 8 groups RECCO Code and SST (see note 1).	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.
D ₁ D ₂ D ₃ D ₄ E	99999 GGggi ddfff TTT _d T _d w mjHHH and SST (see note 1). Same as D ₁ except omit 99999 Same as D ₂ . Same as D ₂ . First 8 groups RECCO Code 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.
VORTEX	VORTEX DATA	Supplementary Vortex Data Message transmitted between Point E and Eye.
E ₁ E ₂ E ₃ E ₄ Eye	99999 GGggi ddfff TTT _d T _d w mjHHH and SST (see note 1). Same as E ₁ except omit 99999 Same as E ₂ . Same as E ₂ . Eye/Center and Dropsonde.	Eye (Initial Eye) Initial Eye/Center 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. Detailed Eye/Center 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."

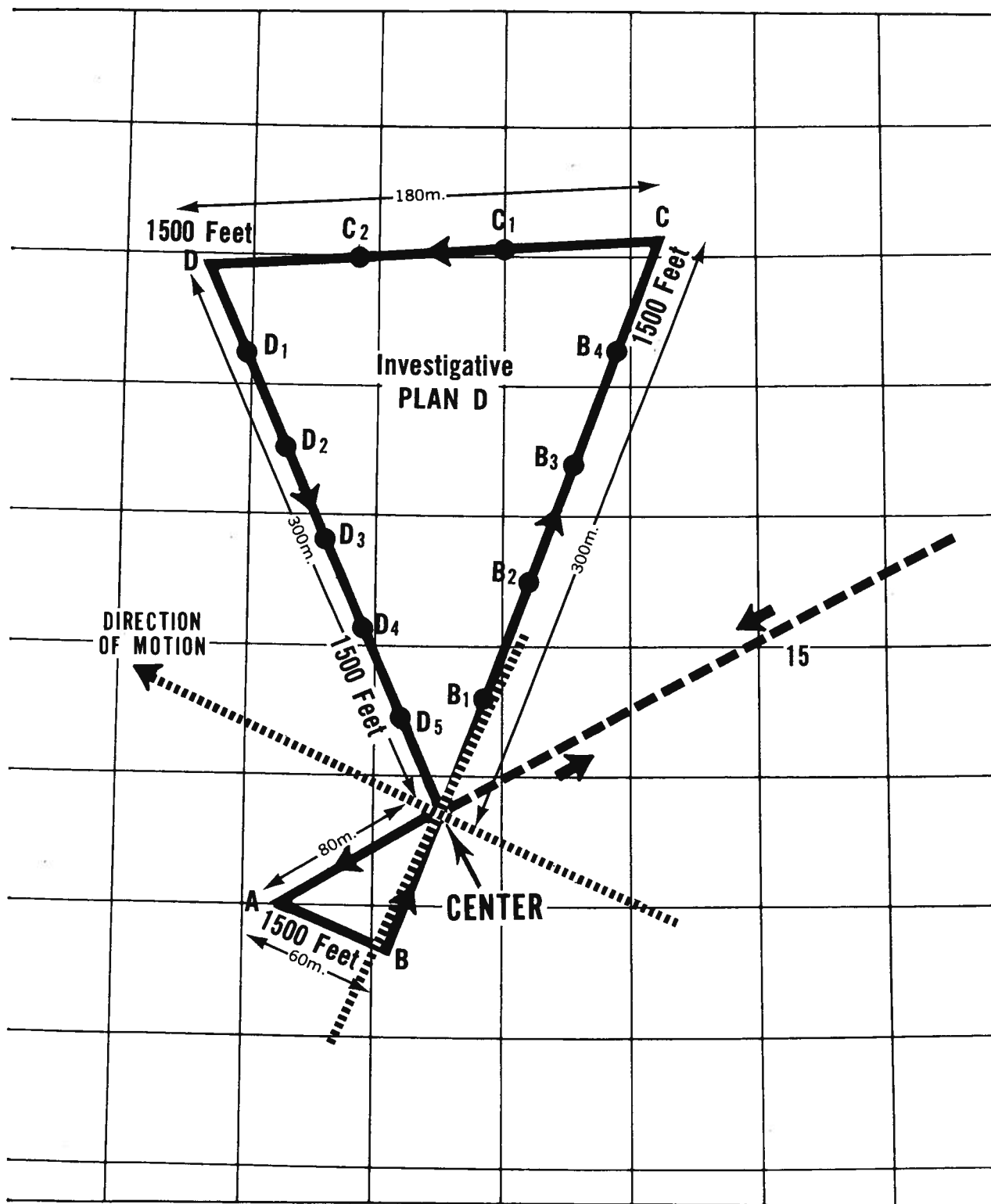
(2) Intermediate Points C_1 and C_2 are between center and Point D.

(3) Flight altitude from C_2 for peripheral data is either 1500 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 ft., dropsonde observations will be made at points D and E. Approval of dropsonde release will be requested from the ARTCC concerned at least 10 minutes before the drop point.

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

OPERATIONAL FLIGHT PATTERN "D"



OBSERVATION DETAILS FOR
OPERATIONAL FLIGHT PATTERN "D"

ALPHABETIC POINT	OBSERVATION DATA	TRANSMIT ASSAP AFTER
A	First 8 groups RECCO Code and SST.	A
B	Same as A.	B
Center	Center	Center (initial Center Message when applicable).
B ₁ B ₂ B ₃ B ₄ C	99999 GGggi ddfff TTT _d T _d w mjHHH SST Same as B ₁ except omit 99999 Same as B ₂ . Same as B ₂ . First 8 groups RECCO Code and 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.
C ₁ C ₂ D	99999 GGggi ddfff TTT _d T _d w mjHHH SST Same as C ₁ except omit 99999 First 8 groups RECCO Code and SST.	D Data for Point D transmitted first, then data for C ₁ and C ₂ in chronological order, follow- ed by SST for D, C ₁ , and C ₂ . See example Appendix A, Attachment 1a.
D ₁ D ₂ D ₃ D ₄ D ₅ or Center	99999 GGggi ddfff TTT _d T _d w mjHHH SST Same as D ₁ except omit 99999 Same as D ₂ . Same as D ₂ . First 8 groups RECCO Code and SST or Center Data, if applicable.	Center or D ₅ . If Center Data Message appli- cable, 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 chrono- logical order, followed by SST for D ₅ , D ₁ , D ₂ , D ₃ , and D ₄ .
VORTEX	VORTEX DATA (if applicable)	Supplementary Vortex Data Message transmitted ASSAP after last observation.

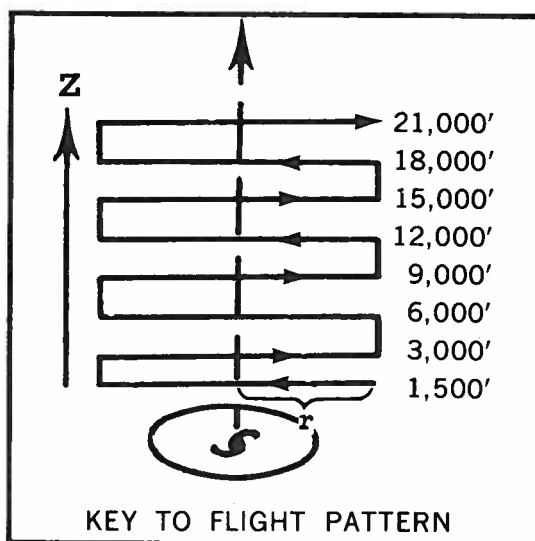
NOTES: (1) Notes 1 through 4 of Appendix A, Attachment 1a, Observation Details for Operational Flight Pattern "A" are applicable to Pattern "D."

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

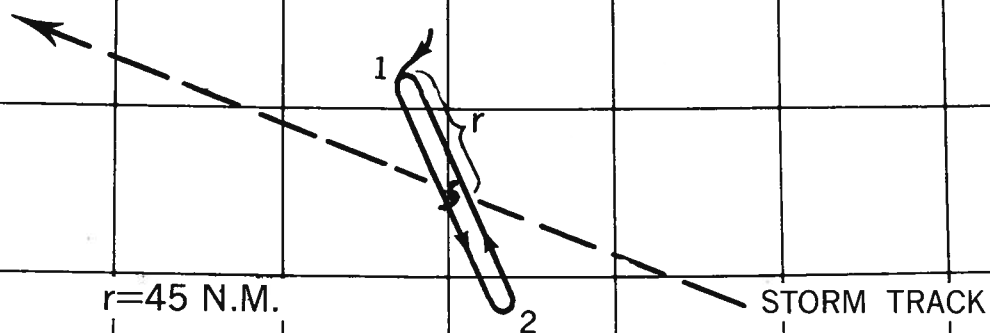
(3) If Leg B to C is along or parallel to an easterly wave, this leg should be flown parallel to the wave on either side. The side of wave (easterly) should be reported in Remarks.

RESEARCH FLIGHT FACILITY FLIGHT PATTERN

PLAN V (VICTORY)
STAIRSTEP RESEARCH PATTERN



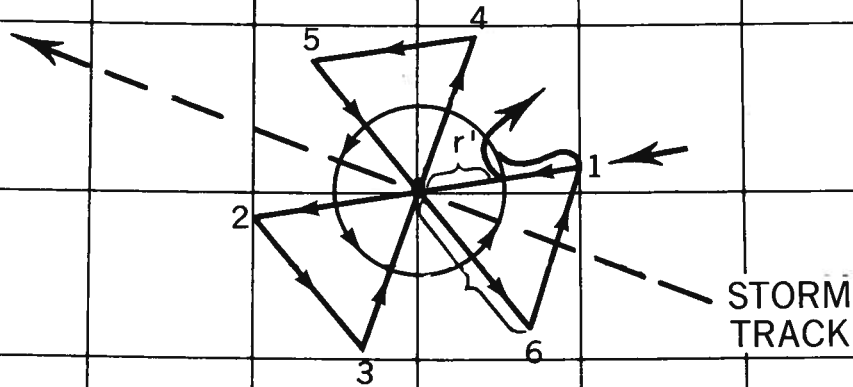
Preferred azimuth is through right front quadrant of the storm. Radial distance, r , from the eye is variable, i.e. 50 to 100 n.mi. Total pattern = $16r$ n.mi.



RESEARCH FLIGHT FACILITY FLIGHT PATTERN

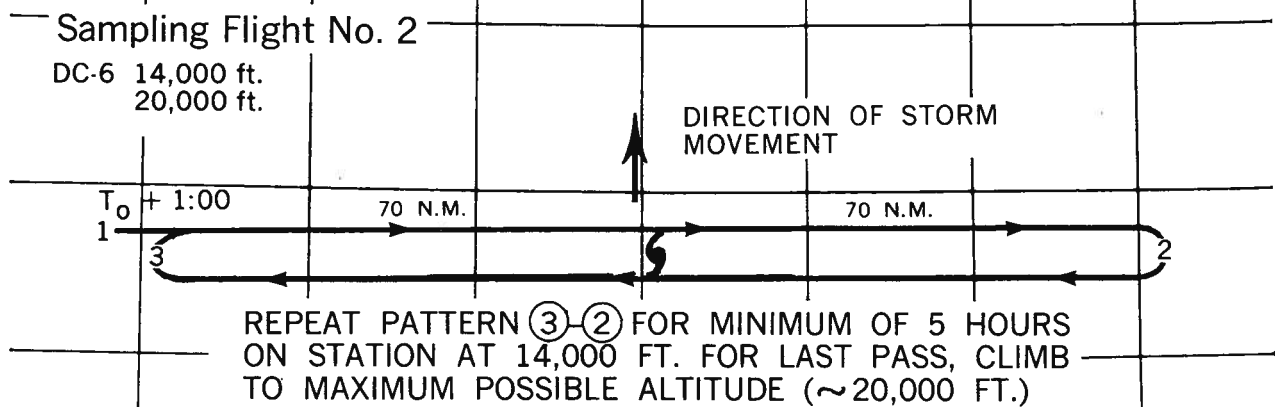
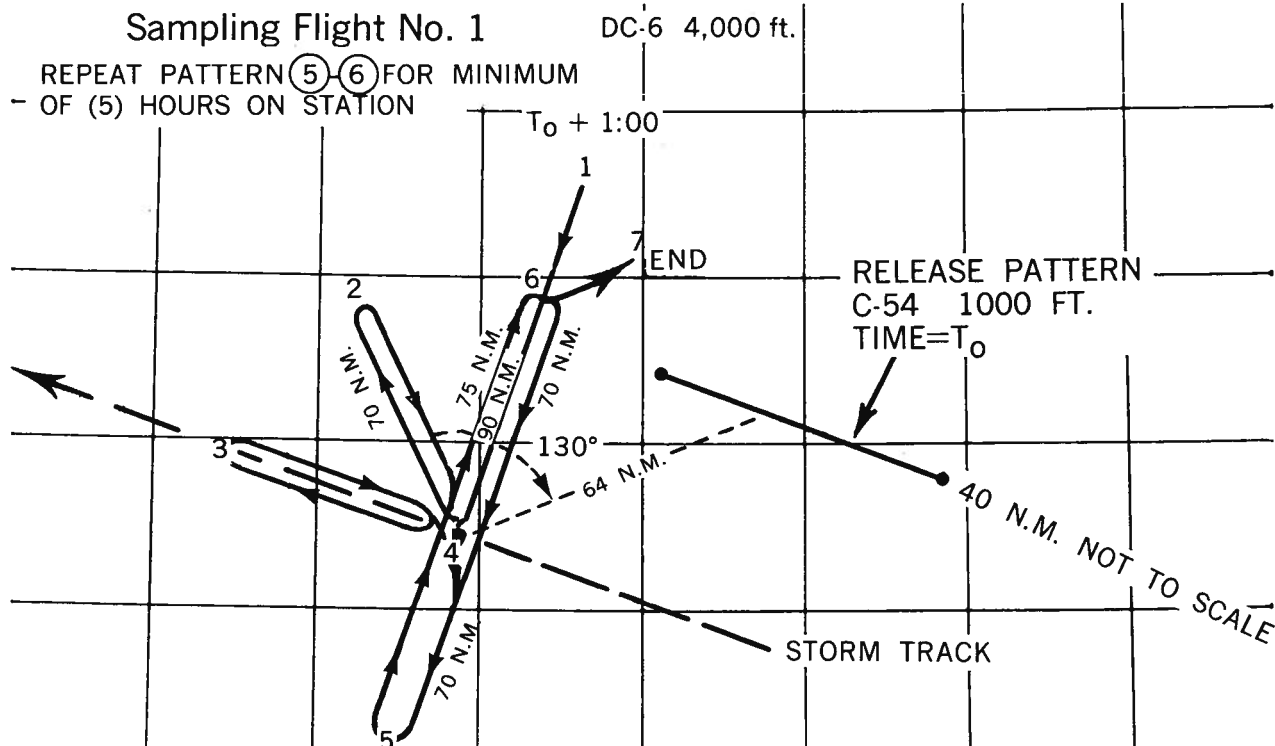
PLAN W (WHISKEY) RESEARCH CLOVERLEAF PLUS CIRCUMNAVIGATION

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 1500, 7000, 13000, 18000 ft.



RESEARCH FLIGHT FACILITY FLIGHT PATTERN

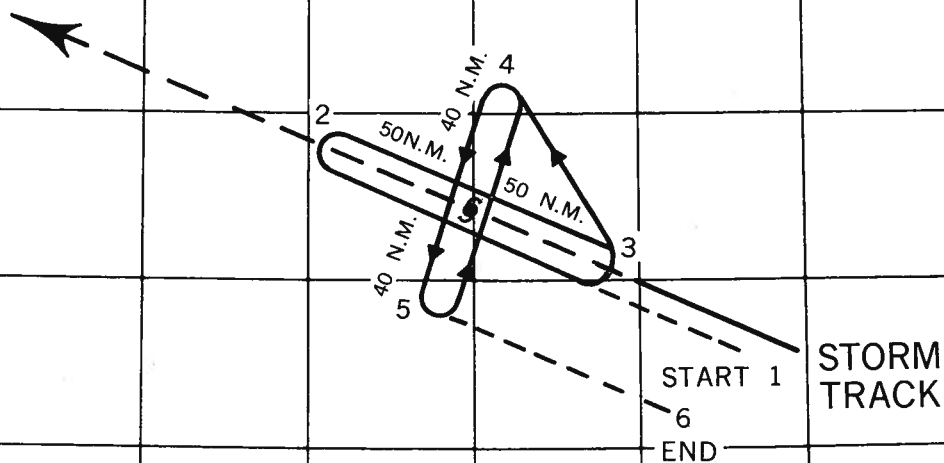
PLAN Y (YANKEE) — TRACER EXPERIMENT (SF) —



RESEARCH FLIGHT FACILITY FLIGHT PATTERN

PLAN Z (ZEBRA) WIND SPEED MONITORING

ALTITUDE 5000 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 53 Weather Reconnaissance Squadron (53 WRS) of the Air Weather Service (AWS) will operate from Ramey AFB, 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 weather monitor will evaluate and edit the reports to insure meteorological and technical accuracy. The monitor will relay the edited reports by land-line teletype 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 Carswell Automated Digital Weather Switch (KAWN) at Carswell AFB, Tex., using the USAF 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 the CARCAH with teletype tape and page copies of hurricane advisories. The CARCAH will relay these advisories by way of the USAF COMET II circuit to KAWN for introduction and distribution over the military weather communications system. Teletype facilities will also be provided for coordinating the Plan of the Day (POD) and other aspects of the reconnaissance activities. The latter facilities will link CARCAH; the 53WRS Mission Control Center (53 WRS MC) at Ramey AFB; the alternate CARCAH at Andrews AFB; Charleston Weather Monitor; Aeronautical Stations at MacDill AFB, Fla., and Andrews AFB, Md. A diagram of the U.S. Air Force hurricane communications network is included as Attachment 1 to this Appendix.

2. Air/Ground Communications.

a.. Whenever possible, U.S. Air Force hurricane reconnaissance aircraft will relay reconnaissance reports, through the Aeronautical Stations at MacDill, Andrews or Albright (C.Z.) AFB's. 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 the appropriate 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 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 weather monitor at Charleston AFB will be provided by the Aeronautical Station. The U.S. Air Force has

CHAPTER 4
Appendix C

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:

<u>PRIMARY METHOD</u>	<u>FIRST ALTERNATE</u>	<u>SECOND ALTERNATE</u>
	<u>MACDILL</u> <u>AERONAUTICAL STATION</u>	
Direct phone patch between recon aircraft and Weather Monitor at Charleston AFB 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 com'l long distance phone or direct teletype circuit (GT 22117), whichever is faster.
	<u>ANDREWS</u> <u>AERONAUTICAL STATION</u>	
Direct phone patch between recon aircraft and Charleston 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 direct teletype circuit (GT 22117).
	<u>ALBROOK</u> <u>AERONAUTICAL STATION</u>	
Direct phone patch between recon aircraft and Charleston 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 via most expeditious means.

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), 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 air/ground operator then passes the copied message to the Coordinator for relay to Charleston monitor via AUTOVON or teletype (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 missions 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 Teletype Communications Capability.

a. Circuit GT 22117 (JOGCU 304) will be configured with send/receive terminals at CARCAH, Alternate CARCAH, 53WRSMC, Ramey AFB; Charleston AFB (Recon Monitor); Fleet Weather Facility, (FWF) Suitland; Andrews and MacDill Aeronautical Stations. 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 Monitor will act as network control station and maintain circuit discipline. Authorized uses of this circuit are:

(1) Aircraft hurricane traffic received at Charleston via AUTOVON will be relayed to CARCAH over this circuit for further passing to the NHC.

(2) Coordination of TCPOD and other related matters between CARCAH and 53WRSMC will be handled over this circuit.

(3) MacDill and Andrews Aeronautical Stations to pass reports received from recon aircraft to Charleston when they cannot be handled by primary or first alternate means. (See second alternate A/G procedures for MacDill and Andrews.)

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

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), 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 air/ground operator then passes the copied message to the Coordinator for relay to Charleston monitor via AUTOVON or teletype (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.

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or

GULL NECTAR DIVERTED NEXT MSG AIR FORCE GULL ONE ANN.

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(1) Aircraft hurricane traffic received at Charleston via AUTOVON will be relayed to CARCAH over this circuit for further passing to the NHC.

(2) Coordination of TCPOD and other related matters between CARCAH and 53WRSMC will be handled over this circuit.

(3) MacDill and Andrews Aeronautical Stations to pass reports received from recon aircraft to Charleston when they cannot be handled by primary or first alternate means. (See second alternate A/G procedures for MacDill and Andrews.)

(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), ESSA Weather Bureau, Washington Hurricane Warning Office (HWO), traffic received at Charleston via 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 via the most expeditious means available.

(6) Dissemination of Air Force Storm Reconnaissance Aircraft "Departure" and "Arrival" messages from the 53 WRSMC in the following format:

10 LTRS
AA CR 4LF
OO URXX RMCS DTG
TEXT CR 4LF
NNNN
10 LTRS

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

(8) Coordination on hurricane matters by FWF-Jacksonville (Fla.) Alternate.

b. A COMET II drop is installed at CARCAH and will be used to transmit hurricane advisories to Carswell ADWS (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 services will be handled in accordance with standard procedures. Where contact cannot be made with Aeronautical Stations, air traffic control communications may be conducted in accordance with paragraph 8, of this chapter.

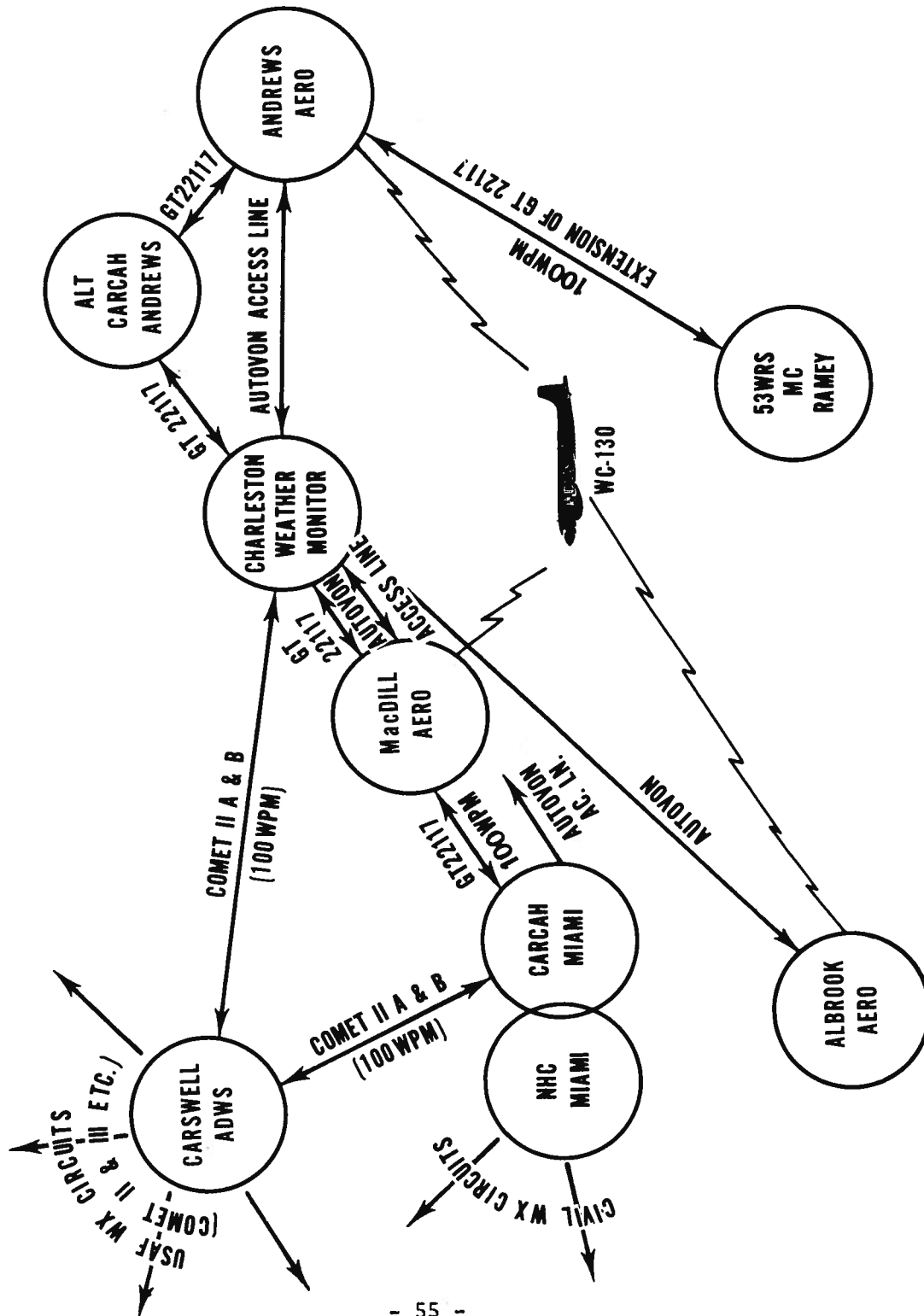
b. When U.S. Air Force hurricane reconnaissance are unable to communicate through Aeronautical Stations, contact will be made with the FWF's SSB radio facilities at Jacksonville Naval Air Station (NAS) or Roosevelt Roads, P.R. Frequencies are listed in paragraph 2.b.(1)(b), Appendix D, of this chapter. U.S. Air Force reconnaissance reports relayed in this manner will be forwarded by the U.S. Navy to CARCAH/NHC by means of their hot line teletype circuit or other Naval circuits as appropriate. The FWF's SSB radio facility 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 Monitor, AUTOVON number 630-1940.

c. The U.S. Navy and 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 by requesting the MacDill or Andrews A/G 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.

Appendix C

d. Commercial dial teletype system messages for the CARCAH-Coral Gables, Fla., 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 (WEARECONRONFOUR), an element of the Atlantic Fleet, will operate WC-121 aircraft from the Naval Air Station (NAS) at Jacksonville, Fla. Alternate staging of aircraft is normally from Naval Station (NAVSTA) Roosevelt Roads, P.R. The WEARECONRONFOUR 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 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 A/G communications and the subsequent relay of perishable RECCO reports.

2. Resources.

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

(1) Primary A/G Circuit:

(a) Circuit E1001, as set forth in Joint Army, Navy, Air Force Procedures (JANAP) 195, is the primary A/G Communications Circuit to be used by VW-4 aircraft in transmitting aircraft reports, weather, and other pertinent flight information while conducting hurricane reconnaissance missions. The E1001 is an HF/SSB Voice with alternate CW capability (voice calls indicated) linking VW-4 aircraft with:

1. FWF-Jacksonville (Net Control Station)
2. FWF-Suitland
3. NAVSTA-Roosevelt Roads.

(b) Circuit E1001 Frequencies*

1. ALPHA, 4701.5 kHz
2. BRAVO, 9011.5 kHz
3. CHARLIE, 13222.5 kHz
4. DELTA, 15082.5 kHz
5. ECHO, 23227.5 kHz.

(c) A/G communications can be maintained on the following frequencies:*

1. E0300(h) - 3096.5 kHz
2. E0300(bs) - 11192.5 kHz
3. E0300(ds) - 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. McDill Aeronautical Station
2. Albrook Aeronautical Station
3. Andrews Aeronautical Station.

(3) Backup and Emergency A/G Circuits:

(a) The FAA's ARTCC communications may be used to relay reconnaissance reports when the primary and secondary means have failed.

1. FAA Stations 6567 kHz (Miami-San Juan, New York)

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

(c) Emergency and Distress frequencies:

<u>FREQUENCY</u>	<u>EMISSION</u>	<u>USE</u>
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)
5695.5 kHz	V/CW	SAR Control (U.S. Navy)
8364.0 kHz	CW	International Lifeboat, Liferraft, 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 teletype 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) 30GT2352, Direct Line Teletype. This circuit consists of International Flight Service Station (IFSS) Miami, NHC-Miami, WEARECONRON FOUR and FWF-Jacksonville. Reconnaissance aircraft TCPOD will be transmitted on this circuit by CARCAH at NHC-Miami. All reconnaissance reports received at FWF-Jacksonville by SSB will be placed on this circuit as soon as received and monitored. The NHC-Miami will be responsible for entering these reports on the Hurricane Circuit 23421. The FWF-Jacksonville will act as backup for this responsibility in the event of casualty to NHC-Miami.

(c) 30GP2901, Direct Line Telephone. This circuit connects FWF-Jacksonville and NHC-Miami. This telephone is utilized to coordinate the TCPOD with CARCAH at NHC-Miami and for discussing hurricane data with NHC-Miami.

(d) COMET II. All reconnaissance reports received at FWF-Jacksonville by SSB are entered on this circuit by FWF-Jacksonville as soon as they are received and monitored.

(e) FWF-Jacksonville, Roosevelt Roads, and FWF-Suitland Reconnaissance Circuit (SSB). This circuit is utilized for operational messages from and to WEARECONRON FOUR (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.

1. At the end of each RECCO message, the coded longitude, latitude, flight level, and surface wind groups will be repeated for confirmation.

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

(c) Data Logging System. Whenever feasible and practicable, the Airborne Automatic Data Logging System will be used to report additional information between periodic RECCO reports.

(d) Radar Reports and Post-Flight Summaries 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, "INVESTIGATIVE" 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. The Airborne Automatic Data Logging System transmissions shall not be numbered within the same sequence of numbers.

(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)

Appendix D

Moderate or severe turbulence

- Immediate (0)

Significant changes in meteorological
conditions as determined by flight METRO

- Immediate (0)

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

(a) Primary Guard (E1001).

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 circuit E1001 only if normal means of communicating with the 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 prior to 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.

3. Frequency Assignments:

a. Utilization of Frequencies. Circuit E1001, as assigned in JANAP 195 (), will be utilized as follows:

1) FWF-Jacksonville will guard circuits as follows:

a) Primary: Circuit CHARLIE (13221 kHz).

b) Secondary: Circuit DELTA (15081 kHz).

2) FWF-Suitland will guard backup circuits as follows:

a) Primary: Circuit CHARLIE (13221 kHz).

b) Secondary: Circuit DELTA (15081 kHz).

3) Roosevelt Roads will guard backup circuits as follows:

a) Primary: Circuit CHARLIE (13221 kHz).

b) Secondary: Circuit DELTA (15081 kHz).

4) Circuits ALFA (4700 kHz), BRAVO (9010 kHz), and ECHO (23287 kHz) may be utilized if required.

4. Transmission Mode:

a. Voice. Most A/G transmissions will use voice procedures on HF/SSB E1001 frequencies.

b. RTTY. Radio-teletypewriter (RTTY) communications between the aircraft and the ground-monitoring station is both authorized and encouraged. The FWF-Jacksonville is equipped to receive A/G RTTY.

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

d. Data Logging System. The FWF-Jacksonville and FWF-Suitland are equipped to receive and process information received from aircraft equipped with the Airborne Automatic Data Logging System. Its use is encouraged.

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 Circuits GT 23421 or 2352 for further relay on GT 22117 to NMC Suitland.

3) COMET System for relay to Carswell (KAWN) on COMET II-A and for subsequent distribution on COMET network.

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

1) AUTODIN to addressees indicated in aircraft message.

2) GT22117 to CARCAH for further relay on 7072.

3) Manual, with physical delivery to ESSA Weather Bureau and NMC collocated in FOB #4, Suitland.

4) COMET System - The FWF-Suitland does not have access to the COMET system. The FWF-Jacksonville will relay traffic on COMET II received from Suitland.

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

1) AUTODIN to addressees indicated in aircraft message.

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

(b) Secondary Guard.

1. Air-Ground 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 Air-Ground Voice communications, as outlined in the "U.S. Air Force Communications Support Plan for

U.S. Air Force Hurricane Reconnaissance," Appendix C to this chapter of the current National Hurricane Operations Plan, 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) AUTOVON/other voice circuits.
- 2) GT22117.
- 3) AUTODIN.

c. The FWF-Suitland, upon receipt of messages on GT22117, shall effect manual delivery to ESSA Weather Bureau's HWO and NMC at Suitland.

(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 Air-Ground 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 INVESTIGATIVE 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 INVESTIGATIVE FIVE 97779....etc.

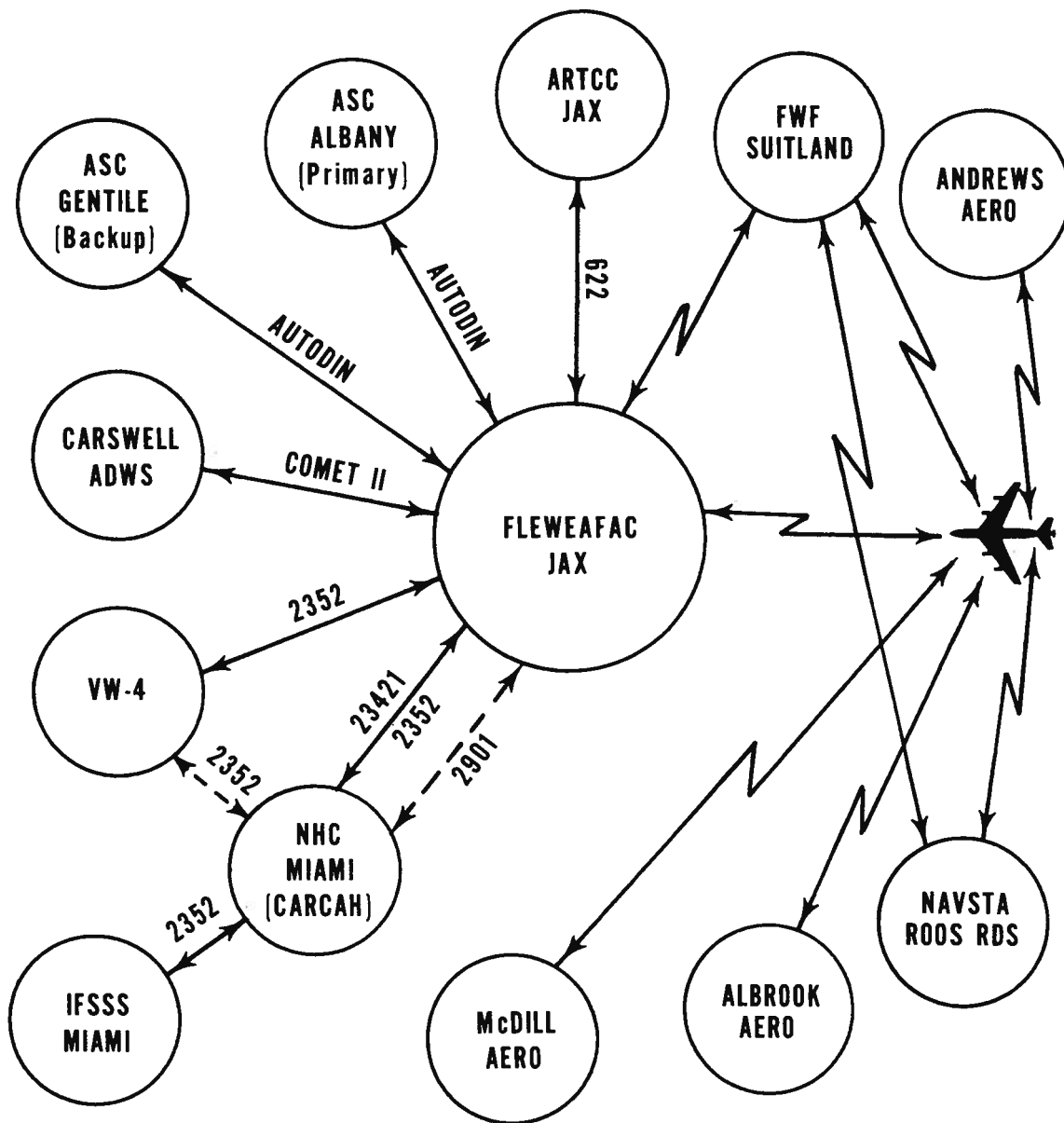
4. Miscellaneous Communications Services and Support.

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.

5. Attachment 1a illustrates the normal communications channels used by FWF-Jacksonville.

FLEWEAFAC JACKSONVILLE COMMUNICATIONS DIAGRAM



LEGEND

TELEPHONE \longleftrightarrow

TELETYPE \longleftrightarrow

SSB \longleftrightarrow

NOTE: AUTOVON available between all activities except IFSS MIAMI.

Appendix E

COMMON COMMUNICATIONS CAPABILITIES--ATLANTIC

<u>STATIONS</u>	<u>AUTODIN</u>	<u>GT22117</u>	<u>7072</u>	<u>COMET</u>	<u>GT2352</u>	<u>AUTOVON</u>
FWF-Jacksonville	RHCJAAA			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	X	X(RO)	X	X
NMC-Washington	RUEOLMA		X	X(RO)		
Weather Bureau Washington	RUEOLMA		X			
Charleston Weather Monitor	RUEBAIA	X		X		X
MacDill Aeronautical	RUCJBBB	X				X
Andrews Aeronautical	RUEBBAA	X				X
FLEWEACEN Norfolk	RUEBJNA		X	X(RO)		X
FWF-Quonset Point	RUEDDDA			X		X
VW-4 Jacksonville	RUCLBKA				X	X
53 WSRMC Ramey AFB	RUCLIMA	X				X
IFSS Miami	RUCLFPA				X	
ARTCC Jacksonville	RUWTAIA					X
ARTCC Washington	RUEDBRA					X
ARTCC Miami	RUCLFPA					X
ARTCC New York	RUEDJKA					X
ARTCC Houston	RUWTDPA					X

U.S. NAVY COMMUNICATIONS PLAN--EASTERN PACIFIC

1. General. During the period from June through October, a detachment of Weather Reconnaissance Squadron One (VW-1) consisting of WC-121 aircraft will be established at the Naval Air Station (NAS) Point Mugu, Calif. This detachment will make reconnaissance flights on Eastern North Pacific tropical cyclones in support of ESSA Eastern Pacific Hurricane Center (EPHC), San Francisco, Calif. and U.S. Navy tropical cyclone reconnaissance requirements. Oceanographic data will be collected as feasible in support of U.S. Navy requirements. This communications plan prescribes the means for expeditious relay of reconnaissance reports and oceanographic data from the aircraft to Fleet Weather Central (FWC) Alameda, Calif. (or backup Fleet Weather Facility (FWF) San Diego, Calif.); the passing of reconnaissance data to EPHC, Air Force Hurricane Liaison Office (AFHLO); and dissemination of reconnaissance data and FLEWEACEN Alameda tropical cyclone warnings to appropriate activities.

2. Resources.

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

(1) It is planned that equipment will be installed at FLEWEACEN Alameda and FWF-San Diego to permit direct A/G communications with reconnaissance aircraft. When this equipment is installed, FLEWEACEN Alameda will become the primary A/G circuit with FWF-San Diego as a standby. Circuits listed below as primary and secondary will become secondary and tertiary, respectively. Changes to this "U.S. Navy Communications Plan" will be issued as required.

b. Primary A/G Circuit:

(1) Pacific Missile Range Air-to-Ground Communications circuits are to be used by U.S. Navy aircraft in transmitting reconnaissance data and other pertinent flight information while on Eastern North Pacific tropical cyclone reconnaissance missions. These are HF/CW/VOICE/RATT circuits linking U.S. Navy reconnaissance aircraft with Pacific Missile Range (PACMISRA) Point Mugu, Operations (voice call PLEAD EIGHT). Frequencies available for this circuit are:

(a)	6747.5 kHz	J 0801	CW/VOICE/RATT
(b)	15078.5 kHz	J 0801	CW/VOICE/RATT
(c)	4736.5 kHz	J 0801	CW/VOICE/RATT
(d)	5081.5 kHz	J 0805	VOICE

(SSB suppressed carrier located 1.5 kHz below indicated frequency.)

Appendix F

(2) Relay of A/G communications from PACMISLAN to FLEWEACEN Alameda or FWF-San Diego backup will be:

(a) Primary. AUTOVON phone patch:

1. FLEWEACEN Alameda, AUTOVON 686-3552 and 686-3553.
2. FWF-San Diego, AUTOVON 951-7072.

(b) Secondary. If phone patch cannot be established, reconnaissance data and other pertinent information will be passed by telephone as soon as received at PACMISLAN. The same data will also be passed by AUTODIN and COMET II A for confirmation and dissemination to other addressees.

c. Secondary A/G Circuit:

(1) If A/G communications cannot be established on primary circuit, aircraft may contact one of the U.S. Air Force Aeronautical Stations using HF/SSB voice frequencies as listed in the latest DOD Flight Information Publication Enroute--Supplement for relay to FLEWEACEN Alameda. The Aeronautical Stations at McClellan AFB, Calif., or Albrook AFB, C.Z., are recommended. The Aeronautical Stations will relay the report to the McClellan Weather Monitor who will:

(a) Relay reconnaissance data to FLEWEACEN Alameda, and EPHC on the Hurricane Coordination Net and;

(b) On COMET II A.

d. Backup and Emergency A/G Circuits:

(1) Backup. Navy Universal Air-to-Ground (voice and CW) Circuit as listed in the latest DOD Flight Information Publication Enroute--Supplement.

(2) Backup. The FAA's ARTCC communications may be used to relay reconnaissance reports to FLEWEACEN Alameda if all other means failed. Insure that passing (Tango) instructions are given to the A/G station with which communications are established.

(3) Emergency and Distress Frequencies:

<u>FREQUENCY</u>	<u>EMISSION</u>	<u>USE</u>
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.
500.0 kHz	CW	International Distress and Calling Frequency.
2182.0 kHz	V	International Distress and Calling Frequency.

<u>FREQUENCY</u>	<u>EMISSION</u>	<u>USE</u>
5680.0 kHz	V	SAR Control (Coast Guard)
5695.5 kHz	V/CW	SAR Control (Navy)
8364.0 kHz	CW	International Lifeboat, Liferaft, and Survival Craft Frequency.

e. Ground Communication Circuits:

(1) West Coast Hurricane Coordination Net. This is a half-duplex Send/Receive 100-w.p.m. circuit established during the period from June through October to facilitate the coordination of reconnaissance plans, reconnaissance data, and information between EPHC, AFHLO-McClellan, 9th Wea Recon Wing and FLEWEACEN Alameda. FLEWEACEN Alameda is designated the Network Control Station and will maintain circuit discipline. The following stations are on the hurricane circuit, all with Send/Receive capability:

- (a) Fleet Weather Central Alameda
- (b) ESSA Weather Bureau, San Francisco (EPHC)
- (c) AFHLO-McClellan
- (d) 9th Wea Recon Wing.

(2) AUTODIN.

(a) Although phone patches and telephone calls are encouraged for relaying reconnaissance data to FLEWEACEN Alameda, the AUTODIN network remains the primary means for relaying RECORD communications. Accordingly, the A/G station placing the phone patch to FLEWEACEN Alameda shall monitor the RECCO report and effect RECORD delivery by AUTODIN. U.S. Air Force AERO Stations do not provide RECORD copy monitor or delivery service for air-ground phone patch traffic.

(b) AUTODIN is also the primary means for delivering Eastern Pacific tropical warnings to interested activities (other than ships at sea). An address indicating Group (AIG) Number 131 has been assigned FLEWEACEN Alameda for use in dissemination of hurricane warnings.

(c) Besides being used for general administrative and operational traffic not appropriate for the Hurricane Coordination Net, AUTODIN serves as a backup for the Hurricane Coordination Net and for passing reconnaissance data to or from stations not on that circuit.

(3) COMET II. Reconnaissance messages will be placed on the military weather networks through the COMET II terminal at the activity receiving the message by A/G communications from the reconnaissance aircraft.

(4) PAPA Circuit. This is a full-duplex 100-w.p.m. point-to-point circuit between FLEWFACEN Alameda and FLEWEACEN Pearl Harbor, Hawaii. This

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circuit will be used to pass Eastern Pacific tropical cyclone information to FLEWEACEN Pearl Harbor for their use.

(5) AUTOVON/Commercial Telephone. All interested military activities are interconnected by AUTOVON. EPHC-San Francisco is not on the AUTOVON net and must be contacted by commercial telephone, (Area code 415) 556-0484 or 341-3311, ext. 237.

3. Operations.

a. Aircraft Reconnaissance Reports:

(1) Reports.

(a) All reconnaissance reports except the center fix/data messages and radar reports will be encoded in the RECCO code, utilizing OPNAV Form 3140.2 (Rev. 1964).

(b) Detailed Eye/Center Data message will be in the format specified in the National Hurricane Operations Plan.

(c) Radar Reports and Post-Flight Summaries may be transmitted in plain language.

(d) Oceanographic data collected during tropical cyclone reconnaissance missions will be coded in accordance with Pacific Fleet Instructions as required by FLEWEACEN Pearl Harbor. Oceanographic data will be included in the sequential numbering system described below.

(e) Instructions:

1. Message texts (reports) shall be preceded by "UH," unit identification ("Navy"), mission number, type mission or cyclone identification, and sequential message number, with "ONE" assigned to the departure report. The sequence will be continuous for all messages on each flight, both in coded and plain language text. The arrival message will be the final report of the series. Mission numbers will be sequential for the life cycle of a tropical cyclone, regardless of its designation as "Tropical Depression," "Tropical Storm," or "Hurricane."

a. Example of a hurricane RECCO message:

0 162132Z

FM NAVY HURRECCO 896
TO FLEWEACEN ALAMEDA
INFO AFHLO-MCCLELLAN AFB
FLEWEAFAC SAN DIEGO
AEWRON (VW-1) DET PACMISAN

GR _____

BT

UNCLAS

UH NAVY TWO RACHEL FOUR 97779etc.

(FOURTH MESSAGE FROM SECOND NAVY MISSION
ON RACHEL)

UR NAVY ONE INVEST THREE 97779.....etc.

(THIRD MESSAGE FROM NAVY MISSION TO INVESTIGATE
SUSPICIOUS AREA)

(2) Communication Procedures. In drafting 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 Joint Army, Navy, Air Force (JANAP), and Allied Communications Procedures (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 35 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 METRO

- Immediate (O)

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

b. Relay of Reconnaissance Data. Reconnaissance data received at FLEWEACEN Alameda will be passed to the other agencies on the Hurricane Coordination Net as expeditiously as possible. U.S. Navy reconnaissance reports will also be placed on COMET II for further dissemination to military weather services.

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c. Promulgation of Tropical Cyclone Warnings. The FLEWEACEN Alameda tropical cyclones warnings will be broadcast to ships by appropriate Fleet Broadcasts. AUTODIN addressees and broadcast dissemination are included in AIG 131.

d. Plan of the Day (POD). The daily POD shall be disseminated on the Hurricane Coordination Net and by AUTODIN to the following addressees:

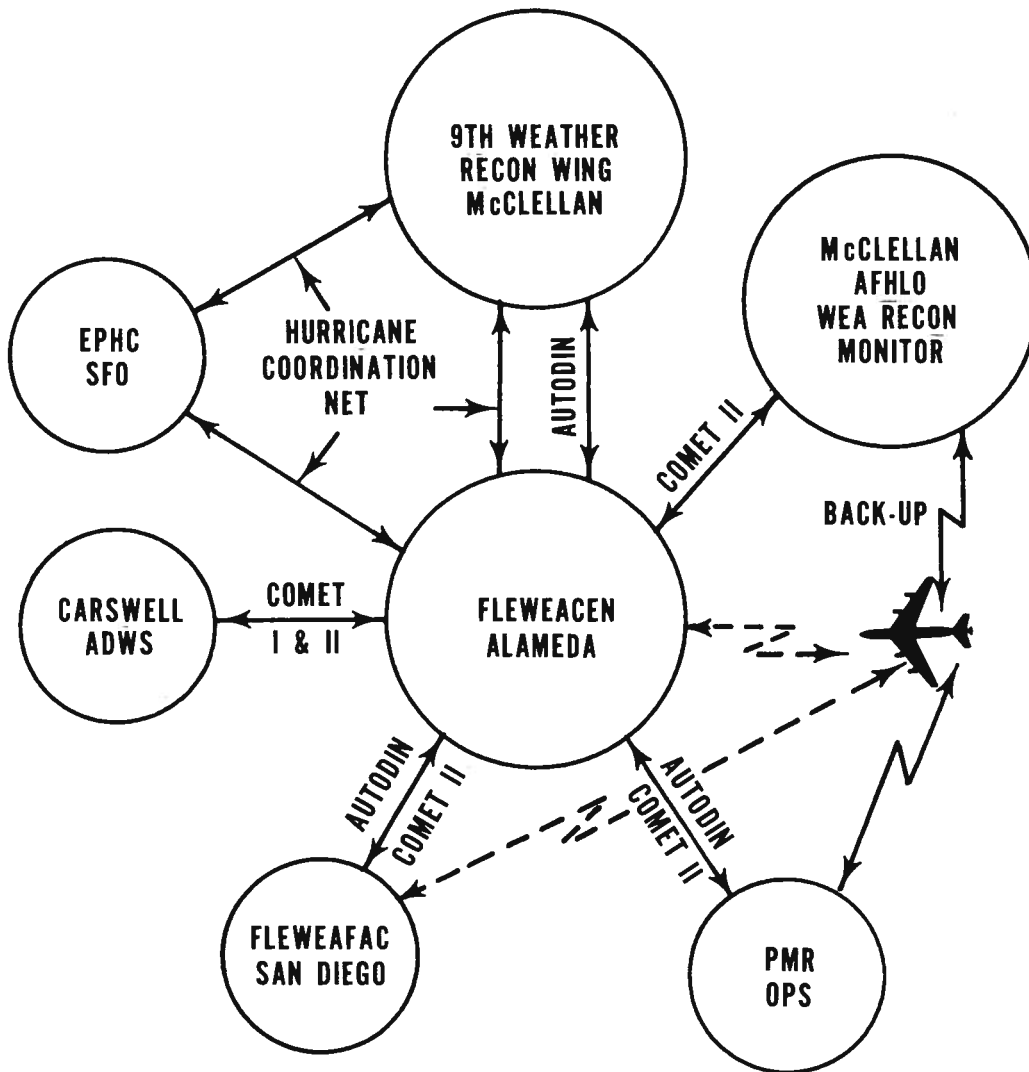
FM FLEWEACEN ALAMEDA (FLEWEAFAC SDIEGO - STANDBY)
TO COMFAIRSDIEGO
AEWRON (VW-1) DET SOCAL PACMISAN
9TH WEARECONWING MCCLELLAN
EPHC SAN FRANCISCO (HURRICANE RECONNAISSANCE
COORDINATING NET ONLY)

INFO FLEWEAFAC SAN DIEGO
DET. 8, 17TH WEA SQ (AFHLO)
PACMISAN
COMNAVAIRPAC
COMNAVWESERV
AWS (AWOAO) SCOTT AFB IL
AFGWC OFFUTT AFB.

4. Alternate Responsibility.

a. The FWF-San Diego is backup for FLEWEACEN Alameda as coordinator of Eastern North Pacific tropical cyclone reconnaissance. The FLEWEACEN Alameda will assure all pertinent communications are sent to FWF-San Diego to facilitate rapid assumption of tasks by San Diego. As it may not be possible for FLEWEACEN Alameda to alert the alternate station of impending outages, FWF-San Diego will assume responsibility for these tasks when it becomes apparent FLEWEACEN Alameda is no longer operational.

USN EAST PACIFIC HURRICANE COMMUNICATIONS DIAGRAM



LEGEND

SSB EXISTING

SSB PROPOSED: ALAMEDA — PRIMARY
SAN DIEGO — SECONDARY

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

1. General. If the U.S. Air Force is called upon by the U.S. Navy to perform hurricane reconnaissance in the Eastern Pacific, this Communications Support Plan will apply. Reconnaissance observations initiated by these 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 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 EPHC-SFO will provide the Air Force Hurricane Liaison Officer at McClellan AFB, Calif. (AFHLO-MCC) with hurricane advisories. These advisories will be sent to Carswell ADWS (KAWN) over COMET II for further distribution over the military weather communications system. A diagram of the U.S. Air Force hurricane communication network is included as Attachment 1 to Appendix G 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 Publications 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 via hot line.

Air/Ground (A/G) operator copy transmission from aircraft; relay to McClellan Weather Monitor via hot line.

ALBROOK AERONAUTICAL STATION

Direct phone patch between reconnaissance aircraft and McClellan Weather Monitor via AUTOVON. McClellan Monitor numbers 633-6810 or 633-6755. A direct phone patch can also be provided via AUTOVON to McClellan Aeronautical Station, extended to McClellan Weather Monitor via hot line.

A/G operator copy transmission from aircraft and pass to McClellan via AUTOVON for relay to McClellan Weather Monitor via 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 AIR FORCE LARK ONE - ON FOUR SEVEN - OVER.

(2) AIR FORCE LARK ONE - MCCLELLAN - GO AHEAD.

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

(4) AIR FORCE 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 AIR FORCE LARK ONE - OVER.

(7) ROGER - STANDING BY.

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

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

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

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

(12) AIR FORCE LARK ONE - OUT.

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

c. If at Item (10) 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) AIR FORCE 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 - AIR FORCE 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 via 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 Teletype Communications Capability. Teletype 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 AFHLO-MCC, EPHC, 9th Wea. Recon. Wing, and FLEWEACEN Alameda. This circuit is designated as the West Coast Hurricane Coordination Net. Authorized uses of this circuit are:

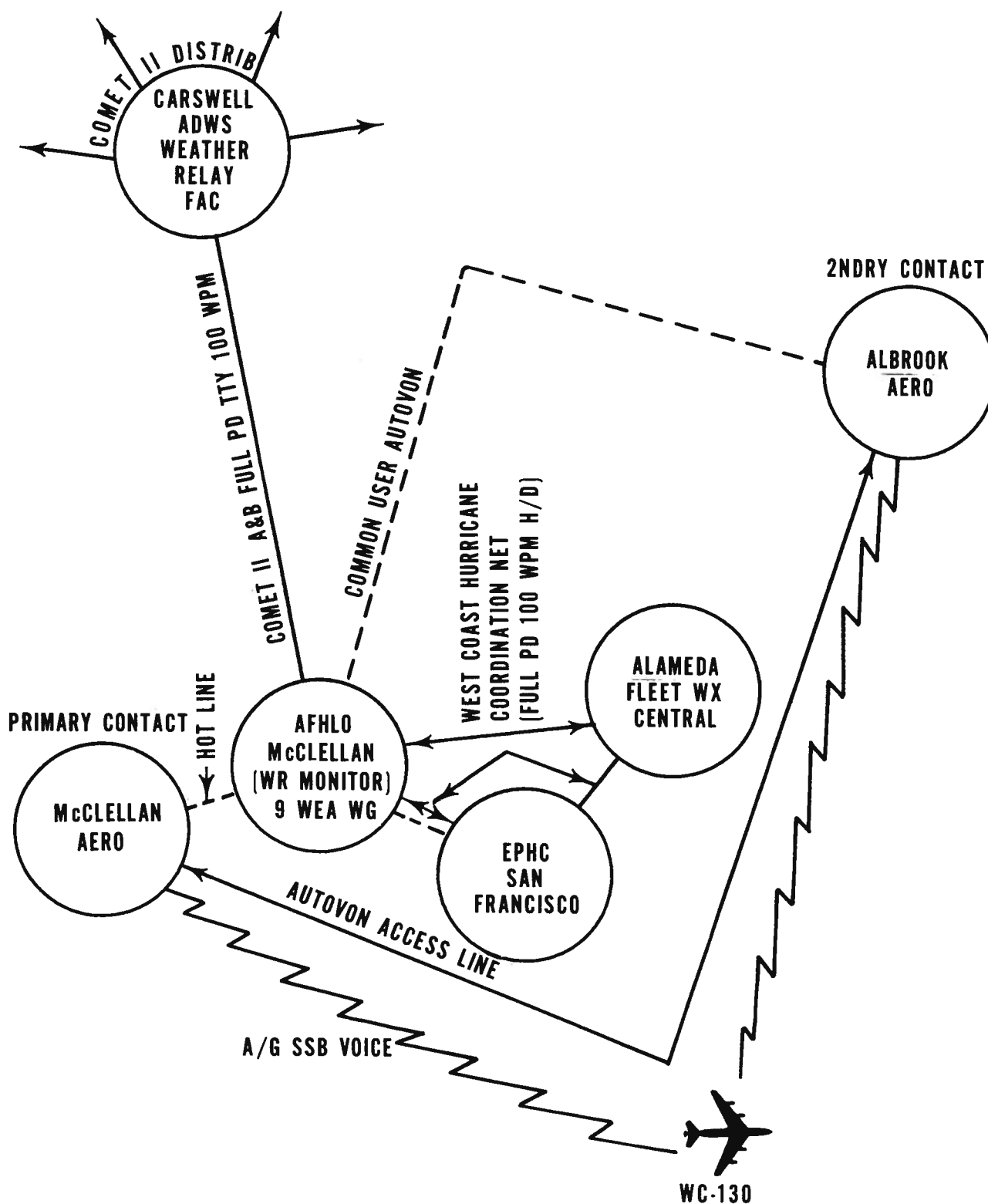
(1) Aircraft hurricane traffic received at McClellan by way of the hot line will be relayed to EPHC-SFO and FLEWEACEN Alameda over this circuit.

(2) Coordination of requests for reconnaissance and other related matters between AFHLO-MCC, FLEWEACEN-Alameda, 9th Wea. Recon. Wing, and EPHC-SFO will be handled over this circuit.

b. A COMET II A drop is installed at McClellan AFB 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 services will be handled in accordance with standard procedures.

USAF EAST PACIFIC HURRICANE COMMUNICATIONS SYSTEM



ATLANTIC AND EASTERN PACIFIC
JOINT REQUIREMENTS FOR AIRCRAFT RECCO DATA

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, except that, if winds are 100 knots or higher, penetration may be made at 500 mb.*	At center or within radar range.	Atlantic-- Every 6 hours at 00Z, 06Z, 12Z, and 18Z, except additional 3-hourly fixes at 03Z, 09Z, 15Z, and 21Z for tropical cyclones within 500 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 miles of the United States or within 300 miles of Baja, Calif. Fixes at least 6 hours apart, preferably near 15Z and 00Z (15Z if only one). 2. Otherwise, one daily fix at 18Z when cyclone is in San Francisco area of forecast responsibility.	+ 10 mi
Dimensions and configuration of eye	At 700 mb or any lower level.	"	"	Indeterminate
Central pressure	"	At center.	"	+ 2 mb
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 miles of center.	"	+ 5 mi + 5 kt
Radar echoes and direction of Cb blowoffs	"	Radar echoes--areas outside the principal rain shield. Blowoffs observed.	Irregular.	Indeterminate

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 of frequency of observation	Accuracy required
Winds, pressure heights, clouds, and weather enroute 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-mile intervals except at 120-mile intervals when within 300 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 100-300 mi.	Daily tracks as per interservice agreements. Special investigative flights as required.	+ 5 kt — 10 meters
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.	2000 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	"	"	Center, R = 15 n.mi., R = 30 n.mi., R = 45 n.mi., R = 80 n.mi.	0.5°C
Dew point profile	"	"	"	0.5°C
D-value profile	"	"	"	10 ft.
Sea-surface temperature	1,500 ft.	Vortex periphery along specified operational flight pattern.	Equally spaced observations.	0.5°C

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 of frequency of observation	Accuracy required
Equivalent potential temperature or temperature, dew point pressure	27,000 ft.	Vortex periphery along specified operational flight pattern.	Equally spaced observations.	0.5°C + 1 mb

* Low-level reconnaissance to be terminated whenever in the judgment of the aircraft commander the safety of the aircraft and crew would be jeopardized by continuing.

ATLANTIC

JOINT RADAR HURRICANE OBSERVING AND REPORTING PLAN

1. General. Radar observations of hurricanes will be taken and reported at radar stations of the U.S. Air Force, U.S. Navy, and ESSA Weather Bureau 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 ESSA Weather Bureau.

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's ARTCC, the ESSA Weather Bureau will furnish the necessary weather radar operators for the purpose of making and transmitting these observations. (See paragraphs 6 and 7 below.)

a. ESSA Weather Bureau (WB)

	<u>Radar</u>	<u>Latitude</u>	<u>Longitude</u>
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.
San Juan, P.R.	FPS-67*	18°16' N.	65°46' W.
Tampa, Fla.	WSR-57	27°58' N.	82°31' W.
Washington, D. C. **	WSR-57	38°51' N.	77°03' 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.

** Operation ceases Sept. 1970. Function transferred to FPS-41 Patuxent, Md.

b. Naval Weather Service (NWS)

	<u>Radar</u>	<u>Latitude</u>	<u>Longitude</u>
Beaufort MCAS, S.C.	FPS-41	32°29' N.	80°44' W.
Corpus Christi NAS, Tex.	FPS-81	27°42' N.	97°16' W.
Cherry Point MCAS, N.C.	FPS-81	34°54' N.	76°53' W.
Jacksonville NAS, Fla.	FPS-68	30°14' N.	81°41' W.
NAS Bermuda	CPS-9	32°22' N.	64°41' W.
Lakehurst NAS, N.J.	FPS-81	40°02' N.	74°20' W.
New Orleans, NAS, La.	FPS-81	29°50' N.	90°01' W.
Norfolk FWF, Va.	FPS-81	36°56' N.	76°18' W.
Patuxent NAS, Md.*	FPS-41	38°17' N.	76°25' W.
Pensacola NAS, Fla.	FPS-41	30°21' N.	87°19' W.
Quonset Point FWF, R.I.	FPS-41	41°35' N.	71°25' W.

* Operated by Weather Bureau, beginning Sept. 1970.

c. Air Weather Service (AWS)

Andrews AFB, Md.	FPS-77	38°49' N.	76°51' W.
Barksdale AFB, La.	FPS-77	32°30' N.	93°41' W.
Cape Kennedy AFS, Fla.	FPS-77	28°28' N.	80°33' W.
Eglin AFB, Fla.	FPS-77	30°29' N.	86°31' W.
Homestead AFB, Fla.	FPS-77	25°25' N.	80°24' W.
Keesler AFB, Miss.	FPS-77	30°24' N.	88°55' 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.
Otis AFB, Mass.	FPS-77	41°39' N.	70°31' 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.
Westover AFB, Mass.	FPS-77	42°12' N.	83°36' W.

d. 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.
Sudbury, Mass. (Air Force Cambridge Research Laboratory)	CPS-9 and FPS-68	42°25' N.	71°29' W.

	<u>Radar</u>	<u>Latitude</u>	<u>Longitude</u>
Victoria, Tex. (Copano Research Foundation)	APS-20B	28°51' N.	96°55' W.
#Wallops Station, Va.	MPS-19	37°50' N.	75°29' W.
(National Aeronautics and Space Administration)	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.

e. ADC Sites

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

	<u>Latitude</u>	<u>Longitude</u>
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 AFB, 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 Dq., Aiken AFS, S.C.	33°39' N.	81°41' W.

(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.
*907 Radar Sq., Bucks Harbor AFS, Maine	44°38' N.	67°24' W.

* Remoted in FAA's ARTCC: see paragraph 7.

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

a. When the WB, AWS, NWS, or ADC radar squadrons and AC&W radar stations are collocated (within 25 miles), the WB's WSR-57 radars will be the primary source for reports of storm and storm eye characteristics. The AWS, NWS, or ADC 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. U.S. Air Force and U.S. Navy 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 an ESSA Weather Bureau Office (WBO), the WBO 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 WBO for entry on weather teletypewriter circuits, or

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

b. From AWS 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.c. above will be transmitted by COMET II as an alternate.

c. From WBO's: 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 NWS Stations: The NWS 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 FAA's ARTCC's: Hurricane information will be telephoned to the nearest WBO having a drop on either teletypewriter circuits 23420, 23421, or 7072.

6. Procedures for Detailing ESSA Weather Bureau Radar Meteorologists to ADC Sites to Make Hurricane Radar Observations.

a. The Director of the ESSA Weather Bureau has been authorized to send radar meteorologists to ADC radar sites on the Atlantic and gulf 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 ESSA Weather Bureau 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 Section, 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 NORAD Regional Control Centers (NRCC) indicated in paragraph 3.e. will act as coordinators for these visits. Addresses and commercial telephone numbers for these staff weather offices are:

- (a) 20th NRCC - Commander, Det. 41, 4th Wea. Wing,
Ft. Lee AFS, Va. Telephone, area code 703, 732-0313,
Ext. 765.
- (b) 21st NRCC - Commander, Det. 27, 4th Wea. Wing, Hancock
Field, Syracuse, N.Y. Telephone, area code 315, 458-5500,
Ext. 765.

b. The ESSA Weather Bureau 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 WBO location.

c. Due to the limited facilities at some sites, the ESSA Weather Bureau 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 ESSA Weather Bureau personnel listed in paragraph 6.e. below must be on file at the ADC radar sites listed in paragraph 3.e. above. It will be the responsibility of the Emergency Warnings Section, Weather Analysis and Prediction Division (WXAP), Weather Bureau Headquarters, Silver Spring, Md., 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 WBH 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 (ADOWX)
Ent AFB, Colo. 80912

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

e. The following ESSA Weather Bureau personnel have SECRET security clearances and are authorized by the ADC to visit ADC radar sites listed in paragraph 3.e. 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 ARTCC's listed in paragraph 7 for the same purpose:

<u>NAME</u>	<u>INVESTIGATIVE AUTHORITY</u>	<u>DATE</u>
Baskerville, Robert W., Jr.	OIS*	4-11-69
Benton, Davis	OIS	8-04-60
Bigler, Stuart G.	CSC**	11-24-59
Black, Dale A.	CSC	7-05-56
Bowser, Carl O., Jr.	OIS	4-14-69
Capo-Dominguez, Rafael A.	CSC	3-14-67
Clay, Dale A.	CSC	5-15-63
Crouch, Billy J.	CSC	4-27-67
Dooley, J. T.	CSC	5-03-57
Drybala, Francis J.	CSC	4-05-68
Dunham, Hoyer S.	CSC	4-03-60
Filion, Joseph	CSC	8-08-62
Fisher, Robert E.	CSC	1-07-66
Flanders, Allen F.	CSC	8-09-57
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	4-11-58
Hull, Albert J.	CSC	3-02-56
Hurlbut, Sam R.	CSC	6-29-62
Johnson, Clyde C.	CSC	8-02-60

<u>NAME</u>	<u>INVESTIGATIVE AUTHORITY</u>	<u>DATE</u>
Keener, Robert W.	CSC	4-11-68
Kuhn, Ronald E.	CSC	5-07-69
Lee, John P.	OIS	3-01-63
Logan, Wendell B.	OIS	12-19-68
Lopez, Moses	OIS	7-29-69
Marier, Donald W.	CSC	11-05-62
Monroe, Harold J., Jr.	CSC	6-12-61
Myers, James C.	CSC	5-12-69
Oldmixon, Donald H.	CSC	7-07-59
Palmer, Cecil M.	CSC	4-20-61
Parrish, Samuel K.	CSC	10-27-60
Pentecost, Joseph B.	CSC	6-05-59
Phipps, Carl L.	CSC	9-16-57
Pruett, Jeter A.	CSC	9-24-64
Robinson, John M.	CSC	4-10-68
Sadowski, Alexander F.	CSC	7-24-59
Samet, Alvin M.	CSC	4-09-68
Sarnowski, Edward	CSC	8-24-65
Schonberger, Abram	OIS	11-15-60
Schulz, Walter A., Jr.	CSC	7-05-66
Sheffield, Richard K.	CSC	12-20-55
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	7-29-60
Warden, John D.	CSC	5-24-60
Wells, Fred E.	CSC	10-16-59
Williams, Milton L.	CSC	7-18-60
Wilk, Kenneth E.	CSC	12-06-62
Whitehead, Robert E.	OIS	7-21-60

* OIS: Office of Investigation and Security.

** CSC: Civil Service Commission.

7. Procedures for Detailing ESSA Weather Bureau Radar Meteorologists to the FAA's ARTCC's.

a. The ESSA Weather Bureau has been authorized by the FAA to send ESSA radar meteorologists to ARTCC's 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 ARTCC's, the ESSA Weather Bureau 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 ARTCC's.

d. Only those ESSA personnel listed in paragraph 6.e. are authorized to visit ARTCC's. Persons not listed in paragraph 6.4. will not be admitted.

e. Should there be a need for other cleared ESSA personnel to be added to the list, it will be the responsibility of the ESSA Weather Bureau Regional Headquarters to coordinate names of new radar meteorologists with the Investigation and Security Division of the responsible FAA Regional Offices. 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 ESSA Weather Bureau.

g. To expedite and assure the granting of access to ARTCC's the following will apply:

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

(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 ARTCC's are properly briefed.

i. The ESSA Weather Bureau Regional Headquarters will keep themselves advised of the radar site locations and be prepared to detail radar meteorologists to the ARTCC's if conditions warrant. The listed ADC locations below are remoted to ARTCC's:

ARTCC'sFAA RADAR SITESMILITARY 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.
Boston ARTCC (Nashua, N.H.)	Boston, Mass. Bucks Harbor, Maine	656 Radar Sq., Saratoga Springs AFS, N.H. 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., Jacksonville AFS, Fla.
Jacksonville ARTCC (Hilliard, Fla.)	Jacksonville, Fla. Charleston, S.C. Tyndall, Fla.	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.	
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 ESSA Weather Bureau 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 transmitted hourly when ESSA Weather Bureau personnel are on duty by facsimile to the WBFO Los Angeles, and the Salt Lake City 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 Navy 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 LAX WBFO over the radar facsimile circuit. The WBFO San Francisco must rely on RAWARC, telephone calls, and the NAFAX 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 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. 158°02' W. as a reference point. Reports will be transmitted by teletype to ESSA Weather Bureau, Honolulu, and FLEWEACEN, Pearl Harbor.

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

COLLECTION AND DISTRIBUTION OF TROPICAL CYCLONE REPORTSATLANTIC

1. Transmission of Reports to the National Hurricane Center (NHC). All reports and information regarding tropical cyclones received by the ESSA Weather Bureau, U. S. Air Force, U.S. Navy, or Federal Aviation Administration (FAA) will be transmitted immediately to the NHC at Miami, Fla. 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 HGXP, assigned to the NHC, will be utilized as an action addressee following the date-time group. The Washington Alternate Hurricane Center (HECU) and Fleet Weather Central, Suitland, Md. (YGLP) will also be included in the distribution if transfer of responsibility to HECU appears imminent. When FAA is unable to effect delivery of messages to HGXP, they will immediately transmit them to HECU.

If, during emergencies, responsibility has been transferred from the NHC at Miami to the HECU at Washington, the addressee indicating the group HECU will be used in place of HGXP. (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 ESSA Weather Bureau Hurricane Circuit. Relays from 7072 to 23421 will be handled on a semiautomatic basis at Suitland Weather Bureau 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.

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

4. Transmissions from U.S. Air Force Ground Stations. Hurricane reconnaissance messages will be handled in accordance with "USAF Communications Support Plan for USAF Hurricane Reconnaissance." (See Appendix C, Chapter 4.) During the hurricane season, drops on the ESSA Weather Bureau circuit 23421 will be installed in U.S. Air Force and U.S. Navy offices as required.

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, Fla., 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° West, a list of tropical depression numbers will be maintained by the FLEWEACEN Alameda, Calif. Numbering will start at the beginning of each calendar year.

(2) For the area west of longitude 140° West, 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 EPHC-SFO or the CPHC-HNL will respectively request a number from the FLEWEACEN-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:

(1) A separate set of names will be used each year, beginning with the first name in the set. In 4 years, after the four sets will have been used, the same four sets will be used again.

(2) If a major hurricane seriously affects the United States, the name assigned to that storm will be "retired" and another name substituted in the list. (This will facilitate identification in historical references, legal actions, insurance claim activities, etc., and will avoid public confusion which might result from associating a disastrous hurricane that has occurred in the recent past with another of the same name that may be threatening a coastal area.)

(3) 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. The list of names in Appendix B of this chapter will be used for identifying tropical cyclones in the Eastern Pacific east of longitude 140° West. Each list consists of four sets of names in alphabetical order. 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° West 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 replaced by the appropriate name.

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

* There will be no duplication of names in the three lists.

LIST OF ATLANTIC TROPICAL CYCLONE NAMES

<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
Alma	Arlene	Abby	Anna
Becky	Beth	Brenda	Blanche
Celia	Chloe	Candy	Cindy
Dorothy	Doria	Dolly	Debbie
Ella	Edith	Evelyn	Eve
Felice	Fern	Frances	Francelia
Greta	Ginger	Gladys	Gerda
Hallie	Heidi	Hannah	Holly
Isabel	Irene	Ingrid	Inga
Judith	Janice	Janet	Jenny
Kendra	Kristy	Katy	Kara
Lois	Laura	Lila	Laurie
Miriam	Margo	Molly	Martha
Noreen	Nona	Nita	Netty
Orpha	Orchid	Odette	Orva
Patty	Portia	Paula	Peggy
Rena	Rachel	Roxie	Rhoda
Sherry	Sandra	Stella	Sadie
Thora	Terese	Trudy	Tanya
Vicky	Verna	Vesta	Virgy
Wilna	Wallis	Wesley	Wenda

LIST OF EASTERN NORTH PACIFIC TROPICAL CYCLONE NAMES

<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>
Adele	Agatha	Annette	Ava
Blanca	Bridget	Bonny	Bernice
Connie	Carlotta	Celeste	Claudia
Dolores	Denise	Diana	Doreen
Eileen	Eleanor	Estelle	Emily
Francesco	Francene	Fernanda	Florence
Gretchen	Georgette	Gwen	Glenda
Helga	Hilary	Hyacinth	Heather
Ione	Ilsa	Iva	Irah
Joyce	Jewel	Joanne	Jennifer
Kristen	Katrina	Kathleen	Katherine
Lorraine	Lily	Liza	Lillian
Maggie	Monica	Madeline	Mona
Norma	Nanette	Naomi	Natalie
Orlene	Olivia	Orla	Odessa
Patricia	Priscilla	Pauline	Prudence
Rosalie	Ramona	Rebecca	Roslyn
Selma	Sharon	Simone	Sylvia
Toni	Terry	Tara	Tillie
Vivian	Veronica	Valerie	Victoria
Winona	Winifred	Willa	Wallie

LIST OF CENTRAL NORTH PACIFIC TROPICAL CYCLONE NAMES

Column 1 list will be repeated (ALICE) when last name in Column 4 (WINNIE) has been used.

<u>Column 1</u>	<u>Column 2</u>	<u>Column 3</u>	<u>Column 4</u>
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

CLASS 1-1-10

ALTERNATE HURRICANE WARNING OFFICES,
ATLANTIC-TRANSFER CONTROL MASTER PLAN, AND
ESSA WEATHER BUREAU 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 Bureau Offices (WBO). The alternate Hurricane Warning Office (HWO) for NHC will be the Washington Alternate Hurricane Center (HECU), Suitland, Md. In the absence of any earlier alert, hoisting of hurricane warnings for the Miami, Fla., 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 teletype whenever possible.
2. If incapacitation of NHC appears imminent, the NHC will maintain constant contact with HECU and FWF-Jacksonville by teletype, hot-line telephone, or radio. Transfer may be accomplished at the discretion of the Director, NHC, or may be delayed until contact between HECU and NHC is lost. If such contact is lost, HECU 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, HECU will notify Alternate CARCAH, Andrews AFB, and FWF-Jacksonville. It is expected that Alternate CARCAH will report to HECU. Communication with FWF-Jacksonville will be by telephone and over teletype circuits (7072 with relay to 23421).
4. If NHC becomes incapacitated without prior notification to HECU, the procedures of paragraphs 2. and 3. above will apply.
5. After communications to NHC have been restored or the threat to effectiveness has passed, NHC will so notify CARCAH, HECU, and FWF-Jacksonville; duty responsibilities will then be restored to NHC.
6. Geographical areas of responsibility for ESSA Weather Bureau Hurricane Warning Offices 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 Hurricane Warning Offices. Transfer will be to the Alternate Hurricane Warning Office listed in the last paragraph of Appendix A of this chapter.
8. At the discretion of the Director, NHC, a combined U.S. Air Force - ESSA Weather Bureau 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.

ESSA WEATHER BUREAU TRANSFER PLAN

Geographical areas of responsibility for HWO's. Areas of responsibility for tropical cyclone forecasting and warning are assigned to HWO's as follows:

Caribbean Sea, Gulf of Mexico, and Atlantic Ocean:

San Juan : Caribbean Sea, islands, and ocean areas south of latitude 20°North and longitudes 75°West to 55°West (warning responsibility only);

New Orleans : Gulf of Mexico and its coasts west of longitude 85°West (warning responsibility only);

Washington : Coastal and ocean areas from latitude 35°North to 41°North and eastward to longitude 65°West (warning responsibility only);

Boston : Coastal and ocean areas north of latitude 41°North and west of longitudes 65°West (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:

<u>Warning Center With Primary Responsibility</u>	<u>First Alternate</u>	<u>Second Alternate</u>
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 Reconnaissance Plan of the Day (POD), and the dissemination of the Military Hurricane Warning Advisory from the CARCAH (O/L8, Hq., Air Weather Service, Coral Gables, Fla.) to the Alternate CARCAH (Det. 2, 6th Weather Wing, Andrews AFB).

1. Procedures.

a. Whenever "hurricane warnings" are hoisted for the Greater Miami area and the 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 U.S. Air Force, U.S. Navy and ESSA Research Flight Facility (RFF) aircraft.

(2) Capability and location of U.S. Air Force, U.S. Navy, and ESSA/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 teletype 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 the 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 POD.

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 the CARCAH for any 15-minute period will coordinate with the alternate HWO (HECU) and automatically assume CARCAH responsibility. Under these conditions, however, the primary responsibility for notification of transfer to the Alternate CARCAH rests with the HECU.

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. The 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 POD with the U.S. Air Force, U.S. Navy, and ESSA/RFF, and will disseminate a Military Hurricane Warning Advisory to the U.S. Air Force and the 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 of actual operational failure of the 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 WEARECONRON FOUR 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 a. and b. 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
CARCAH 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 POD COORDINATION.
3. RECON FLIGHT SCHEDULE IAW TCPOD _____ Z.

CHAPTER 8
Appendix C

2. After assumption of responsibilities, FWF-Suitland will coordinate directly the TCPOD with the CARCAH and warnings with NHC by U.S. Air Force teletype circuit GT22117, Autovon number 894-3790, 899-1650, or by commercial telephone patch to (305) 666-3912 or 666-4612.

3. Attachment 1, this Appendix, illustrates the normal communications channels utilized by FWF-Suitland.

EASTERN PACIFIC
ALTERNATE HURRICANE WARNING OFFICE

Actions of the ESSA Weather Bureau is Alternate HWO-Los Angeles, Calif., in case of failure of normal operations at the Eastern Pacific Hurricane Center, San Francisco (EPHC-SFO), and the HLO FLEWEACEN Alameda 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 local Coast Guard teletype circuit. The FLEWEACEN Alameda will telephone selected ships in area of concern to Hurricane Warning Office at 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. The ALT HLO FWF-San Diego will telephone hurricane reconnaissance reports to HWO-LAX.
4. Coordination and liaison with ALT HLO FWF-San Diego and the U.S. Air Force Hurricane Liaison Officer (AFHLO), McClellan AFB, Calif., will be by conference telephone calls.
5. Requests for hurricane reconnaissance flights will be made by telephone to the ALT HLO FWF-San Diego.
6. After telephone coordination with FWF-San Diego and AFHLO-McClellan, final military tropical cyclone forecasts using WB Form 656-6 will be read to FWF-San Diego for entry on military communication circuits. The FWF-San Diego will enter the forecast on COMET II and insure distribution to U.S. Navy users by AUTODIN.
7. Public bulletins, advisories, and warnings from the ALT HWO-LAX will be transmitted on Services C and O and will be available to military bases with drops on these circuits.
8. The above procedures apply when failure of normal operations occur simultaneously at EPHC-SFO and FLEWEACEN Alameda. In cases where FLEWEACEN Alameda remains operational, substitute HLO FLEWEACEN Alameda for ALT HLO FWF-San Diego.

CENTRAL NORTH PACIFIC
TRANSFER OF WARNING RESPONSIBILITY

1. When a tropical cyclone approaches longitude 140° West, the transfer of responsibility will be accomplished through the Weather Bureau Offices (WBO) at San Francisco and 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 JTWC, Guam will append to the last warning issued on its area the statement "NEXT WARNING BY CPHC-HNL." The FLEWEACEN, 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 FLEWEACEN, 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 acknowledgement 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 ESSA environmental satellites will provide global coverage at least once daily for local direct reception by means of the Automatic Picture Transmission (APT) System, and for centralized reception and processing by means of the Advanced Vidicon Camera System (AVCS). The National Aeronautics and Space Administration (NASA) research and development satellites with meteorological applications will be employed in the surveillance of tropical storms as part of the evaluation of the various experimental subsystems. Attachment 1 shows the expected satellite operations and data availability for the current season.

2. Satellite picture data (nephanalyses, strip pictures, digitized mosaics, etc.) for Pacific, Atlantic, and Indian Ocean areas of tropical cyclone activity during their storm seasons 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 the National Environmental Satellite Center (NESC) of ESSA. These messages, called Satellite Weather Bulletins, will be entered on the ESSA Weather Bureau, U.S. Navy, and U.S. Air Force teletype 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 the NESC 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 NESC 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°East, westward to longitude 160°West. The other message, available at 1800 GMT daily, will summarize all tropical disturbances observed from longitude 160°West, westward to longitude 20°East.

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 vortices with tropical history observed in extra tropical 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 NESC 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 NESC 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 NESC Analysis Branch (telephone 301 - 440-7146) whenever storm characteristics as measured by reconnaissance data differ significantly from characteristics indicated by the appropriate NESC Satellite Weather Bulletin. The reconnaissance flight meteorologist should evaluate the accuracy of the Satellite Weather Bulletin in the post-flight report, whenever feasible.

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 NESC 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.

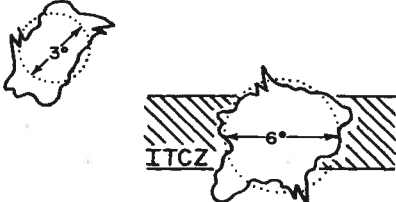
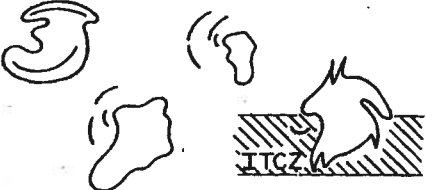




9. Characteristics of tropical cyclone areas observed by APT receivers at Guam, Wake Island, and Oahu, Hawaii, will be described in messages prepared by appropriate authorities and transmitted to responsible forecast centers. The responsible forecast centers will notify all stations affected.

SATELLITES AND SATELLITE DATA AVAILABILITY-1970

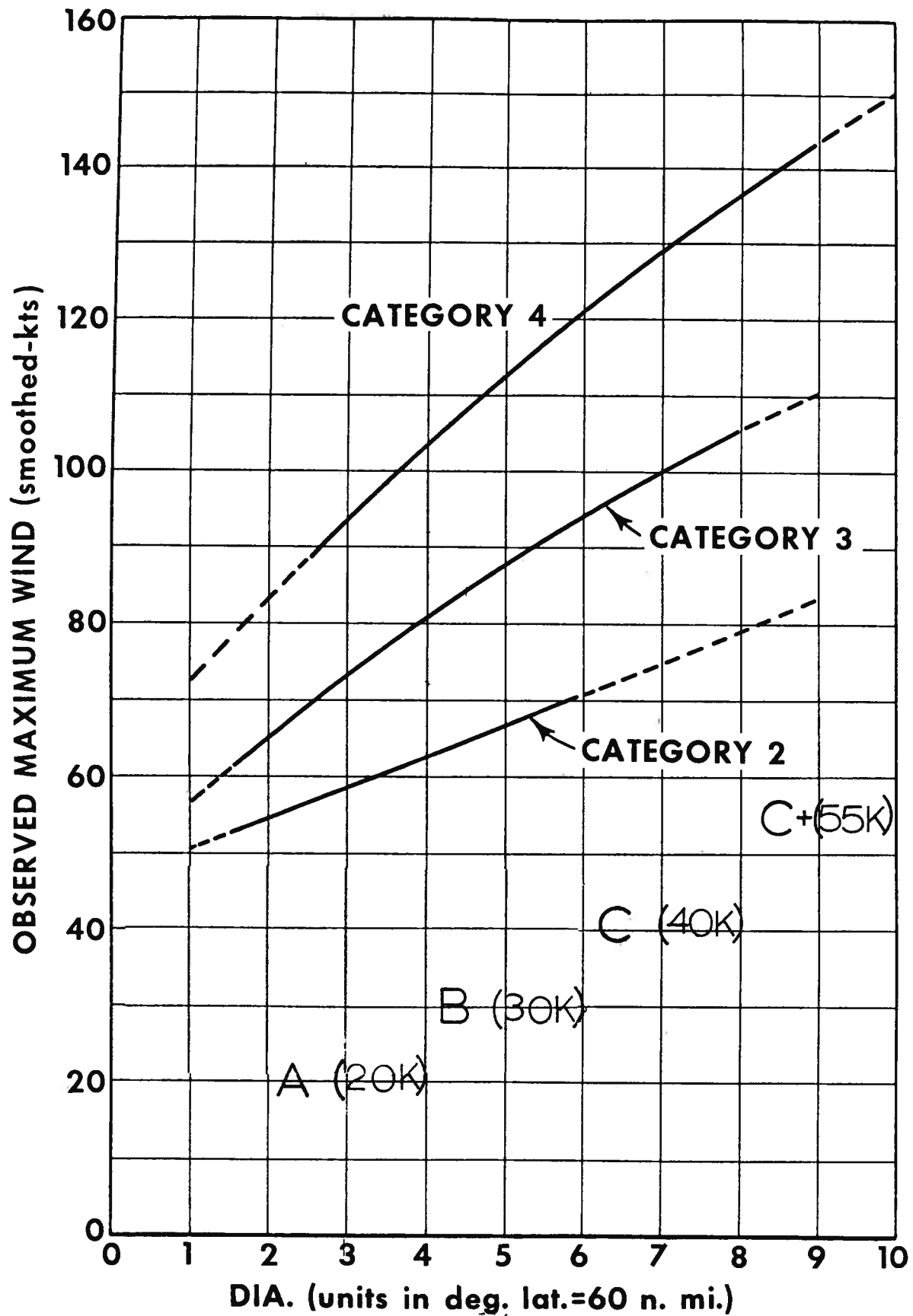
<u>SATELLITE</u>	<u>TYPE OF DATA</u>	<u>LOCAL TIME OF OBSERVATION</u>	<u>NESC PRODUCTS</u>	<u>PRODUCT DISTRIBUTION</u>
ESSA 9	AVCS (Stored)	1500	1. Gridded analog pictures 2. Mapped digitized video 3. Manual nephanalyses 4. Tropical wind analyses 5. Moisture analyses 6. Satellite Weather Bulletins	1. Facsimile 2. Telephone 3. Teletypewriter 4. WEFAX 5. FOFAX
ESSA 8	APT (Direct)	0900	1. Analog pictures 2. Satellite Weather Bulletins 3. APT video signal	1. Teletypewriter 2. Telephone 3. FOFAX
ITOS 1	AVCS (Stored) APT (Direct) IR (Stored) DRIR (Direct)	1500 1500 0300 1500 0300	1. Same as ESSA 8 and ESSA 9 above plus similar products from IR data and the DRIR signal	1. Facsimile 2. Telephone 3. Teletypewriter 4. WEFAX 5. FOFAX
ATS-1 149W		(1100L - 1500L) (2100Z - 0100Z)	1. Analog pictures 2. Mapped data 3. Wind analyses from movies 4. Satellite Weather Bulletins 5. SSCC signals	1. Facsimile 2. Teletypewriter 3. WEFAX 4. Telephone line (to Miami) 5. Telephone 6. FOFAX
ATS-3 (70W)	SSCC IDCS	(1000L - 1600L) 1500Z - 2100Z)	1. Same as ATS-1 above	1. Same as ATS-1 above except telephone line is to Kansas City, Mo.
NIMBUS 3 NIMBUS 4 if 3 becomes inoperative	APT (DRID) HRIR* (Stored) DRIR (Direct)	1200 0000 0000	1. Analog DRID and DRIR pictures 2. Satellite Weather Bulletins	1. Teletypewriter
APT - Automatic Picture Transmission ATS - Applications Technology Satellite AVCS - Advanced Vidicon Camera System DRID - Direct Readout Image Dissector DRIR - Direct Readout Infrared ESSA - Environmental Survey Satellite FOFAX - Forecast Office Facsimile Network HRIR - High Resolution Infrared Radiometer IDSC - Image Director Camera System IR - Infrared ITOS - Improved Tiros Operational Satellite SSCC - Spin-Scan Cloud Camera WEFAX - Weather Facsimile				

* Data from this sensor on Nimbus 3 may be available for research only.

TROPICAL AND SUBTROPICAL DISTURBANCE CLASSIFICATION FROM SATELLITE DATA

<p>A</p> <p>NO CURVED CLOUD LINES OR BANDS</p>		<p>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.</p> <p>The cloud mass must have an average diameter of 3° latitude or more.</p> <p>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.</p> <p>(2) In the Arabian Sea and the Bay of Bengal, the cloud mass must be 8° latitude or more in diameter.</p>
<p>B.</p> <p>POORLY ORGANIZED CURVED CLOUD LINES AND BANDS</p> <p>ILL-DEFINED CENTER</p>		<p>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.</p> <p>The pattern produced by the curved lines and bands is poorly defined--it does not appear to have one definite center.</p> <p>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.</p>
<p>C</p> <p>WELL ORGANIZED CURVED CLOUD LINES AND BANDS</p> <p>WELL DEFINED CENTER OUTSIDE DENSE CLOUD MASS</p>		<p>Stage C has well organized, curved cumulus cloud lines and/or broad curved bands of middle and high cloud.</p> <p>The pattern produced by the various curved lines and bands has a well defined single center.</p> <p>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.</p> <p>A C- has no associated dense cloud mass.</p> <p>A C+ appears very well organized with a large amount of curved cirrus outflow.</p>
<p>X CAT. 2</p> <p>WELL ORGANIZED BANDS</p> <p>SPIRAL BANDS DEFINE CENTER WITHIN CENTRAL CLOUD MASS</p>		<p>Category 2 has a bright, often asymmetrical central overcast. Cirrus outflow is curved and more extensive.</p> <p>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.</p> <p>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.</p>
<p>X CAT. 3</p> <p>MODERATE DEGREE OF CONCENTRICITY TO CLOUD BANDS</p> <p>IRREGULARLY SHAPED EYE WITHIN CENTRAL CLOUD MASS</p>		<p>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.</p> <p>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.</p> <p>A ragged and irregularly shaped eye is normally visible. This defines the storm center.</p>
<p>X CAT. 4</p> <p>HIGH DEGREE OF CONCENTRICITY TO CLOUD BANDS</p> <p>ROUND EYE NEAR CENTER OF CENTRAL CLOUD MASS</p>		<p>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.</p> <p>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.</p> <p>A well defined eye appears as a small dark circular area surrounded by a bright ring. This defines the storm center.</p>

NESC JUNE 1968



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 west of longitude 30°West. 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)	(#)	(Location)	(Time)	(STAGE)	(DIA)	(CAT)	(Name or FIRST SIGHTED or leave blank)
ATLANTIC							
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.

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 U.S. Navy, U.S. Air Force, and ESSA Weather Bureau, 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 of Operations, Environmental Services
The Joint Chiefs of Staff
Washington, D. C. 20301

Headquarters, Naval Weather Service Command
Building 200
Washington Naval Yard
Washington, D. C. 20390

Headquarters, Air Weather Service (AWFOI)
Scott Air Force Base, Ill. 62225

ESSA, Public Information Office
6010 Executive Boulevard
Rockville, Md. 20852

