U.S. DEPT. COMM./NOAA/OAO - DATA SECTION WORK FORM NO.1 OAOWF1 FILE

FLT ID: 970215H	FM: EINN	TO: EINN
FLT NO: 97-024	BLK IN: 1655	ATA: 1652
ETD: 0730	BLK OUT: 0719	ATD: 0728
ETE: 1700	BLK TIME: 9.6	FLT TIME: 9:24 9.4
SPONSOR ORG: NOAA	PROGRAM: FASTEX	PURPOSE: WAVE

OAO PERSONNEL

AC KENNEDY, P ✓	SYS ENG LYNCH, T ✓
CP ~~TAGGART~~, B ✓	DATA SYS MCMILLAN, S
NAV STRONG, T ✓	RADAR ~~BARR, J~~
FE TORREY, R/~~ROGERS~~ WADE, S ✓	BT/ODW OFFUTT, D ✓
RADIO ROGERS, M ✓	CLD PHYS
FD WHITE, S ✓	DOPPLER

PARTICIPATING SCIENTIST/VISITORS/OAO

LAST, FIRST NAME	ACTIVITY ON A/C	AFFILIATION
#7 JORGENSON, D ✓		NSSC ↓
SHEPHERD, T ✓		
ROUX, F ✓		CNRS ↓
BOUSQUET, O ✓		
WAKIMOTO, R ✓		UCLA ↓
LIU, C ✓		
HUA, C ✓		

PROPOSED/ACTUAL MISSION/REMARKS (RECCO, FIXES, STORM, PCNET, NHOP #)

120/7 1006.0

53N 25W C → 25W

1013.0 150/12

U.S. DEPT. COMM./NOAA/OAO - DATA SECTION WORK FORM NO.2 OAOWF2 FI

FLT ID: 9702WH TIME OFF: 0728 TIME ON: 1652

	A/C T/O	WX STN	A/C LAND	WX STN
PRESSURE	1004.9 ~~1014.9~~	1006.0mb	1012.8	1013.0

	NO	DATA DISPOSITION/DATE/QUALITY
1/SEC FLT LVL TAPES	Y	
FAST FLT LVL TAPES	Y	
RADAR TAPES	Y	
DOPPLER TAPES	Y	
~~ODW CASSETTES~~		
HARD COPIES	Y	30s
AXBT		
AXCP		
ODW		

PHOTOGRAPHY

	FWD	LS	RS	VERT	
ON					
OFF					
RATE					

REMARKS

FASTEX FLIGHT #9

FLIGHT #09 H970215

TYPE OF DATA	SENSOR OR OPTION
INE	2
Accelerometer	2
Temperature probe	1
Altitude change option (for vertical winds)	RA159
Static pressure	Rosemount fuselage
Dynamic pressure	Rosemount fuselage
Time source	Micro 99
Constants file	CO2971.CON

Notes:

There were no time/data gaps.

Radar Altitude (APN-159) patched from 0728:31 - 0728:51
1652:01 - 1655:00

Dewpointer #2 (DW#2) replaced with dewpointer #1 (DW#1) from:
1450:01 - 1530:00

Downward spikes in radar altimeter data are a result of overflying land.

SPECIAL NOTE!!! Locations 80, 81 and 82 of record five on the standard tape contain vertical ground, vertical air and vertical speeds, respectively, computed using Dave Jorgensen's vertical wind algorithm. It is recommended that these values be used for vertical wind analysis.

	Takeoff	Landing
Aircraft static pressure	1004.9 mb	1012.8 mb
Corrected tower pressure	1006.0 mb	1013.0 mb

Flight Meteorologist: Sean White, (813) 828-3310 ext. 3072

CI>

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fITLE (MAX 21 CHARACTERS) -- EX  HURRICANE PAINE
FASTEX IOP15 WAVE CYCLONE
YYMMDDL  FLT I.D.
970215H
HHMMSS START TIME    -99999 DEFAULT TO START OF DATA FOR PRINTOUT ONLY
072501
HHMMSS END TIME      999999 DEFAULT TO END OF DATA FOR PRINTOUT ONLY
165500
HHMMSS TAKE OFF TIME
072800
* NUMBER OF TAPES (I2) ...FOR STANDARD TAPE OUTPUT ONLY
09
* -------LOGICAL UNIT OF INPUT DATA (I1)  5, 8 OR 9 FOR TAPE DRIVE
8
* -------LOGICAL UNIT OF OUTPUT TAPE DRIVE (I1) [FOR STANDARD TAPE ONLY]
8
* -------LOGICAL UNIT OF PRINTER (I1)
6
* -------DATE OF PROGRAM (MMDDY)
06094
* -------STATIC PRESSURE PROBE (I1)
* 1 = PSW (WINGTIP)
* 2 = PSF (CO-PILOT/FUSELAGE)
* 3 = FUTURE USE
2
* -------DYNAMIC PRESSURE PROBE (I1)
* 0 = PQW(WINGTIP)
* 1 = PQF1 (FUSELAGE 1281)
* 2 = PQF2 (FUSELAGE 1221)
* 3 =FUTURE US
1
* ---------INE SELECTION  (I1)
* 1 = INE 1
* 2 = INE 2
2
* ---------ACCELEROMETER (I1) - USUALLY THE SAME AS YOUR INE SELECTION
2
* --------- TOTAL TEMPERATURE PROBE (I1) [1 OR 2]
1
* --------- DEWPOINT TEMPERATURE PROBE (I1) [1 OR 2]
2
* ---------ALTIMETER OPTION (I1) - FOR VERTICAL WIND COMPUTATION
* 0 = PRESSURE ALTITUDE (OVER LAND)
* 1 = RADAR ALTITUDE APN-159 (OVER WATER)
* 2 = RADAR ALTITUDE APN-232 (OVER WATER)
1
* ---------PRINTOUT RATE  SECONDS (I2)
10
* ---------WINDSPEED/DIRECTION RUNNING AVERAGE TIME, SECONDS (I2)
10                                  ! FOR STANDARD TAPE OUTPUT ONLY
* ---------TIME OPTION (I1)
* 1 = MICRO 29
* 2 = TIME BASED GENERATOR #1
* 3 = TIME BASED GENEATOR #2
1
* ---------NAME OF CONSTANTS FILE EX CO3863.CON
CO2971.CON
****************************************************************
CI>
```

Form 413-50
- 63

970215 H

Time	LA	LO	TA	TD	WD	WS	R						
0715							ENG	57.7#					
0719							TAXI						
0728	LA	LO	TA	TD	120	7	TOFF						
0746	522.2	1035	-8.2	-17.4	264	49.7	LEVEL 15K						
							~~BOUY 62105 5K~~						
0834							Balance TW1 → TW3						
0838	560.9	1411.4	-4.4	-8.4	190	24.8	BOUY 62105 5K turn pt 2						
1004	525.1	2056.0	-3.4	-4.4	177	55.8	pearl right						
1022	51.0	2158.3	1.4	-5.0	187	56.0	turn pt 3						
1042	529.6	2358.0	-1.2	-8.4	151	27.9	turn pt 4						
112200	515.4	2220.4	2.3	-4.5	191	54.4	pearl left						
113300	552.2	2150.7	0.0	-4.7	169	59.5	pearl right						
1145	530.7	2130.9	-3.1	-7.6	127	52.2	pearl left						
1155	512.5	2111.8	-3.8	-7.4	130	45.4	pearl left						
120200	55.6	2125.5	-3.9	-6.6	121	43.8	pearl left						
122000	523.7	2330.4	-3.9	-7.6	108	46.6	pearl left						
123400	529.7	2258.5	-5.1	-8.8	090	43.6	pearl left						
125000	548.2	2450.9	-3.6	-6.9	083	54.9	pearl left						
	~~56~~		~~0.4~~	~~-5.0~~	~~149~~	~~22.2~~	turn to 5630N 2530W tk 120						
	1632.0	2528.3	0.4	-5.0	149	23.2	turn pt 7						
133700	559.7	2357.9	-4.6	-8.7	054	55.0	turn pt 8 ↗ 10K						
1538	559.3	1418.3	-4.9	-9.8	186	39.1	BOUY 62105 @ 10K ↗ 25K						
1652							LND						
							BLK						

c:\fastex\970215h.wpd
FASTEX AIRCRAFT CHIEF SCIENTIST EVENT LOG

Flight Number: 970215H1 Page 1 of
Date: February 15, 1997 Aircraft ID: 42RF Scientist: Jorgensen

Event Log

Time (UTC)	Approx. Location (Lat, Lon,Hdg,Trk, GS, P,Palt)	Event & Comments
7:07:17	Shannon	This is Flight #9 IOP15 on Low 38. P-3, G-IV, and C-130 will work this system. The G-IV is flying now and will return about 0930 UTC. P-3 departs 0730, and the C-130 0600 UTC. Planned patterns are three radial legs through the cloud head band to the east, north, and west of the low center.
7:15:09	Shannon	Engine Start
7:19:32	52.691 -8.919 91.8 92.0 3 1017.9	Block Out
7:28:03	SNN	Takeoff
7:29:23	52.689 -8.916 29.6 29.5 104 994.0	Light precip on climb out from SNN
7:33:49	52.688 -8.915 306.3 310.7 99 745.3 2516	METMAN estimates their pt. A at 0815-about 15 min ahead of schedule
7:46:47	53.419 -10.144 305.2 312.8 117 548.9 4880 0840	overcast beginning to break up-can see the sea sfc below a scattered low cu deck-ETA to pt.1(buoy) is or about 17 minutes behind schedule
7:55:46	53.785 -10.867 301.8 308.0 118 548.8 4881	Radar recording began at 0750 UTC. The TA is seeing light echo just above us a km or so
8:19:18	54.904 -12.724 317.8 324.6 131 548.8 4881	some precip bands on LF 300-400 km to our SW.
8:21:56	55.065 -12.931 317.7 324.5 132 548.8 4882	begin descent to 5kft-METMAN reports time to pt. A 0830 UTC
8:26:17	55.313 -13.264 317.0 322.8 136 693.5 3086	more extensive anvil deck now evident on the TA-echo depth from 3km to about 8km
8:28:07	55.417 -13.407 317.4 322.0 138 760.6 2354	now out of upper cloud-can see ocean sfc below-few whitecaps wind at flight level 200/30 knots

8:30:47	55.568 -13.617 316.0 320.7 125 837.7 1576	at 5k ft. About 7 minutes out from the buoy
8:33:54	55.734 -13.841 317.8 322.9 123 837.1 1582	going by echo on the right-some convective characteristics
8:38:57	56.013 -14.178 298.5 303.5 118 834.4 1608	over buoy turn to track to pt. 2 begin leg 1
8:43:10	55.909 -14.546 231.0 236.8 105 836.7 1586	in extensive TA echo max dBZ only about 30-small convective cells left and right of track echo top 5km above us
8:47:31	55.766 -14.900 226.8 233.5 104 837.1 1582	arking band segment 5-10 nm ahead on nose radar-weak reflectivities however
8:50:25	55.675 -15.147 229.4 237.3 111 835.8 1594	bright band on TA less than 1 km above the sfc
8:57:23	55.465 -15.769 233.9 242.4 104 834.6 1607	more arc band segments evident 10 nm ahead on the nose radar
9:00:01	55.397 -15.983 231.0 239.2 106 834.6 1606	passing through band-small convective cells seen on the TA
9:09:30	55.080 -16.809 227.6 238.0 107 830.8 1644	sfc pressure estimate agrees pretty well with model for 09Z-about 1003mb
9:13:05	54.970 -17.106 228.1 236.7 105 830.2 1649	through band-temps warming - warm front? precip weakening on TA
9:38:42	54.235 -19.046 228.0 237.0 98 827.2 1679	at 0915Z the GPS began to have problems with noise. Switched to INE1 for displays-another antenna problem
9:45:37	54.032 -19.568 225.8 233.7 100 827.5 1676	in warm sector-band about 110 nm ahead-cold front
9:51:29	53.850 -19.999 225.4 234.2 101 824.1 1709	echo intensity on TA increasing as we proceed toward pt. 2
9:56:47	53.685 -20.409 226.4 236.6 100 824.3 1707	small band of ~30 dBZ echo ahead 5nm
9:58:00	53.648 -20.497 224.3 233.9 99 824.4 1706	in band now-mostly stratiform

10:01:33	53.537 -20.757 223.9 235.1 98 824.5 1705	out of the band now. Another band 10 nm ahead (cold front location?)
10:04:09	53.460 -20.944 230.0 241.1 101 821.6 1734	begin perl #1 in band
10:07:12	53.492 -20.969 221.6 233.3 101 821.5 1735	end perl #1 - resume southwest track to pt. 2
10:11:40	53.350 -21.261 219.3 230.8 92 821.7 1732	winds beginning to increase in speed as we approach the frontal band - LLJ?
10:14:47	53.251 -21.459 220.0 228.8 94 821.8 1732	temps beginning to decrease a bit
10:16:08	53.207 -21.548 225.1 232.7 96 821.5 1735	sea sfc has many whitecaps
10:16:36	53.192 -21.580 225.3 233.3 96 821.7 1733	entering frontal band
10:22:20	53.016 -21.969 224.3 234.6 93 819.6 1754	at pt. 2 - completed leg 1 - turn to track to pt. 3
10:26:41	53.101 -22.392 283.9 293.8 120 817.7 1772	Ops Center suggests moving pt. C (our pt. 3) 1 degree farther west based on sat imagery-but Sid wants to stay near the region of max descent so we'll stick with the original plan
10:28:08	53.139 -22.538 283.6 292.9 120 817.7 1772	flying near the base of the thick anvil-echo tops about 4 km above
10:42:09	53.491 -23.954 290.6 297.5 122 814.2 1807	at pt. 3 - start leg 2 - in clear air - thin overcast cirrus above - clouds visually slope up to the north
10:46:28	53.783 -23.838 19.2 19.3 135 814.4 1804	back into the TA echo again
10:55:48	54.427 -23.474 20.3 18.7 131 814.6 1803	winds have decrease to 20 knots as we go north - low center split as model suggests?
11:03:54	54.982 -23.149 22.8 18.4 138 814.6 1803	winds strengthening again now 180/46 knots
11:10:24	55.437 -22.864 25.1 20.5 135	shallow precip below us-rising just to flight level-band of extensive precip evident on LF about

	814.6 1803	60 nm ahead
11:20:06	56.117 -22.429 22.5 18.8 142 814.7 1802	more intense echo on TA now-well marked bright band just above us
11:22:12	56.267 -22.337 13.9 13.7 145 814.6 1803	start perl #2 in stratiform precip-occlusion zone?
11:25:10		end of perl resume 020 track
11:28:42		radar data system froze up
11:30:06		radar system back up
11:30:36	56.722 -22.043 28.3 20.5 147 818.3 1767	much more intense precip now-winds are also starting to back to east and temps beginning to decrease
11:33:06	56.904 -21.920 31.3 21.9 141 818.1 1768	starting perl #3 to the right in heavy stratiform precip
11:36:09		end of perl - resume 020 track
11:39:06	57.170 -21.785 34.7 21.6 132 818.2 1767	temperature is steadly decreasing along this track - now -2C
11:41:12		minimum sfc Press seen at 1135 UTC
11:45:13	57.538 -21.499 22.8 11.4 124 819.8 1752	start perl #4 in stratiform precip-bright band now close to the ground
11:48:01		end of perl - resume 020 track
11:53:20	57.871 -21.298 37.7 26.0 118 822.3 1726	exciting out of the north side of the band - precip decreasing on nose radar
11:59:20	58.225 -21.041 328.3 325.3 137 822.4 1726	at pt. 4 end of leg 2 turn to track to pt. 5
12:01:02		radar system froze just before pt. 4
12:02:03	58.260 -21.401 271.7 275.5 137 822.3 1726	radar system back up again - start perl #5 in moderate precip
12:05:19		end of perl resume track of 274 to pt. 5
12:20:14	58.399 -23.554 262.3 266.9 138 822.4 1726	start of perl #6 in moderate precip-interesting sharp shear layer about 4 km above us
12:23:48		end of perl resume track to pt. 5
12:31:51	58.480 -24.860 277.7 276.2 138 822.6 1724	temps dropping off to -5C now - the bright band has all but disappeared into the ground

12:34:09	58.497 -25.187 268.1 268.4 137 822.4 1725	at pt. 5 start perl #7 in moderate precip
12:40:12		end of perl start leg 3 through the occlusion band
12:50:29	57.828 -24.918 206.7 217.2 134 822.5 1724	start perl #8 in heavy precip of occlusion band
12:53:10		end perl #8
12:56:03	57.636 -24.813 149.6 162.6 109 822.3 1726	exiting precip band going ESE
13:01:17	57.356 -24.641 158.8 166.3 101 822.3 1727	out of precip - end of leg 3 turn to trk 210 to cut a little time off the next leg through the bend back front on the west side of the low
13:07:11		METMAN reports good looking sonde cross sections through the cold and warm fronts on their first two legs
13:08:57	56.957 -25.031 203.1 208.3 111 813.0 1819	TA is seeing upper level cloud deck 2 km above us-good radial velocity structure all the way to sfc
13:16:58	56.530 -25.468 206.8 211.6 112 812.0 1828	end of leg turn to track to pt. 7 start of leg 4 through bent back region
13:25:28	56.705 -26.447 289.2 290.5 128 811.7 1832	Going through a field of small convective cells-must be near cloud top as the turbulence has increased
13:29:30		radar system froze up again
13:32:54		radar system back up
13:37:23	56.990 -27.953 324.3 308.2 120 812.6 1823	at pt. 7 - end of leg -climb to 10k ft for trip to buoy
13:38:30	57.025 -27.922 85.3 92.8 98 780.2 2151	sloped isopleths on the raidal velocity display
13:45:49	56.998 -27.160 97.2 94.8 114 694.6 3073	TA shows some wild velocity structure in the upper levels of the bent back region
13:55:58	56.955 -26.015 98.1 94.6 117 694.8 3071	still in moderate precip-good radial velocity structure
14:04:09	56.920 -25.066 99.1 93.2 120 694.8 3071	precip intensity increasing winds shifting to southerly
14:14:18	56.867 -23.909 106.2 95.0 117 694.8 3070	bright band is now 1-2 km above the ground in the warm sector

14:18:47		METMAN to track south through the low center
14:45:47	56.631 -20.371 108.3 97.2 115 695.1 3068	still in very extensive stratiform precip as we track eastward just south of the occlusion front
14:55:25	56.539 -19.307 109.5 99.6 118 695.1 3068	finally breaking out the precip-sun is out-thin overcast above and thick overcast just below our flight level of 10k ft.
15:24:28	56.194 -15.940 112.6 103.2 121 694.7 3072	turbulence as we encounter some shallow precipitation. Echo tops are only to flight level, with a strong bright band in evidence.
15:32:54	56.068 -14.938 113.2 104.6 130 695.0 3069	still within light precip to flight level. Some turbulence too.
15:34:54	56.034 -14.684 111.3 102.7 126 695.0 3069	more intense precip now. Multiple layers on the TA
15:38:38	55.980 -14.258 118.8 109.0 125 695.0 3068	over buoy-turn to track to SNN-climb to 15k ft
15:41:48	55.844 -14.018 148.4 141.1 115 617.3 3989	very intense precipiation now-bright band in excess of 35 dBZ
15:53:11	55.246 -13.187 152.3 141.5 121 571.2 4580	flying parallel to a band that exhibits a strong north south slope to the reflectivity
15:59:31	54.908 -12.736 153.4 143.1 126 571.2 4580	exiting the precip
16:16:46		Radar Recording Halted
16:35:07	53.157 -9.653 135.3 126.6 135 605.2 4141	begin descent into SNN
16:52:11		Land SNN
16:56:54		Block In

MSA Coordinator Summary Report

9702015H IOP15 (Flight 9) on Low 38
Aircraft Involved: P-3, UK C-130, and G-IV

(The G-IV completed a dropsonde "figure 4" pattern over the low center several hours before the

departure of the P-3 from Shannon)

Summary Description of Mission:

The planned primary mission was a series of 4 radial legs normal to the orientation of various frontal features of the LOW 38. The P-3 and C-130 flew stacked legs (although differing often by minutes in time), starting from an Initial Point that was the northern buoy (56N, 14.2W). The first leg was through the warm front and cold front. The warm front was seen near 55N 17W, about where it was predicted to be by the UKMO LAM model near 0900 UTC. Farther along on that first leg, both aircraft encountered precipitation bands that may have been associated with the cold front. At the P-3's flight level the winds turned slightly from southerly to southesterly and the ambient termperature dropped 4-5 C as the band was crossed. An extensive warm tougue was seen in the equiv. potential temperature pattern at 5k ft. The next leg focused on the occlusion zone northeast of the low center. Extensive precipitation was noted north of about 57N, and many "perl" patterns were completed by the P-3. Another leg through the occlusion band farther west was completed by both aircraft by 1300 UTC, at which time the P-3 headed southwest to line up for a westbound run through the "bent back" frontal region, and the C-130 continued to track southbound for a run through the low pressure center. The data from the P-3s leg to the westnorthwest through the bent back region exhibited a dramatic wind shift and temperature drop. Flight level winds (5 k ft MSL) shifted in a few minutes from southeasterly at 30 knots to northerly to northeasterly at 20 knots. Complicated shear patterns were also seen in the radar radial velocity display. Following the completion of the leg to pt. 7 (57N, 38W) the P-3 climbed to 10k ft for fuel economy and tracked to the northern buoy. Extensive precipitation was seen during most the 1.6 hour leg. Following a run over the buoy at 10k ft, the P-3 returned to SNN and landed at about 1700 UTC, for a mission duration of 9.7 hours.

Communications and Coordination:

1. No problems with VHF. The Sat Comm e-mail system on the C-130 worked well in getting information from the Ops Center.

P-3 Equipment Problems Encountered:

1. The P-3 radar system froze a couple of times in inopportune moments.
2. The P-3s GPS navigation system became unreliable after about 0915 UTC. Poor reception of the signals. The P-3s primary navigation source was switched to INE #1.

Recommendations & Evaluation:

1. Very good mature cyclone case. Excellent coordinated data on frontal transects. Sondes on C-130 apparently worked much better than previous IOP. Fascinating structures seen in the "bent-back" region on the radial velocity display on the P-3.
2. 8 "perl" patterns were completed by the P-3 in moderate to heavy precipitation associated with the occluded front.

3. 47 sondes were deployed by the C-130

--Dave Jorgensen & Frank Roux

DATE : 15 FEB 97

TO : Chief, AOC Flight Operations

FROM : Pilot/Flight Director, Aircraft N42RE ON 1655 BLOCKTIME
OFF 0719 9.6

SUBJECT: Hazardous Duty

PURPOSE OF FLIGHT: FASTEX

Hazardous Duty Pay is required for flight made on 15 FEB 1992 (DATE)

Request based on HAZARDOUS FLIGHT IN PENETRATING OCCULDED CYCLONE AT LOW ALTITUDES

Personnel on board authorized Hazard Pay:

TORREY, R	
WADE, S	
ROGERS, M	
LYNCH, T	
MCMILLAN, S	
OFFUTT, D	

~~PILOT~~/FLIGHT DIRECTOR: LCDR S.R. WHITE

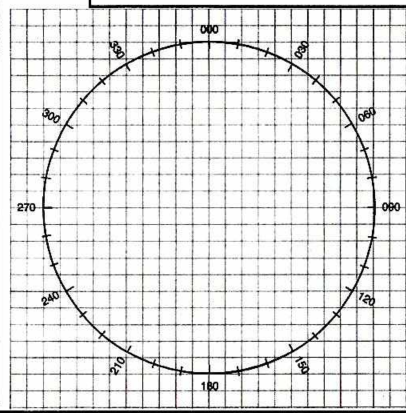
APPROVED: _____ DISAPPROVED: _____

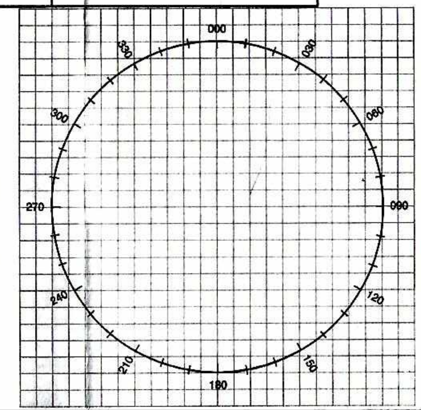
CHIEF, AOC FLIGHT OPERATIONS: _____

CLEARANCES			
FREQ	ALT	HDG	OTHER

MISSION LOG

PAGE ___ OF ___





POSITION REPORT

1. POSITION
2. TIME
3. ALTITUDE
4. NEXT POSITION
5. ETA
6. NEXT POSITION

EMERGENCY MESSAGE

TRANSMIT THE FOLLOWING MESSAGE TO ANY AGENCY ON THE AIR-GROUND FREQUENCY IN USE. IF UNABLE TO ESTABLISH COMMS, ATTEMPT CONTACT ON ANY OF THE FOLLOWING EMERGENCY FREQUENCIES:

UHF/VOICE	VHF/VOICE	MF/VOICE	HF/CW	MF/CW
243.0	121.5	2182 KHZ	8364 KHZ	500 KHZ

MAYDAY, MAYDAY, MAYDAY
THIS IS NOAA ______, NOAA ______, NOAA ______

- POSITION ____________________ N/S
____________________ E/W AT __________Z
- HEADING ______ TRUE/MAG
- AT _______ KTS TRUE/INDICATED
- FLIGHT LEVEL OR ALTITUDE _______
- WE ARE A P-3 AIRCRAFT WITH _______ SOULS ON BOARD
- NATURE OF EMERGENCY
- ASSISTANCE DESIRED
- PILOT INTENTIONS
- WE HAVE _________ ENDURANCE REMAINING

TIME	FIX TYPE	POSITION	INS 1 POSITION	K ERR	INS 2 POSITION	K ERR	MH	VAR +E==>	TH	DR +R==>	TRK	GS	WD	WS	ALT	TAS	NEXT PT	DIST	TIME	ETA	REMARKS
0840	G	55-59.8 14-19.3	55-58.8 14-19.7	+1.1 -.4	55-59.4 14-19.3	+.4 0															FM1
1530	Ⓓ	56-06.2 15-08.0	56-05.8 15-10.1	+.4 +2.1	56-06.9 15-10.2	-.7 +1.8															GPS DOWN
1606	G	54-34.6 12-07.4	54-33.7 12-10.9	+.9 -3.5	54-34.7 12-08.3	-.1 -.9	155	12W	143	.	133	255	215	43	15.0	264	EHNN				FM1
1700	V	52-41.7 8-55.5	52-40.4 9-00.9	+1.7 -5.4	52-42.9 8-55.2	-1.2 +.3															