

19930831H1-FDIR

Hurricane Emily 93, Flight 4

Flight 930831H N42RF (Miami - Charleston)

| <u>Type of data</u>                            | <u>Sensor or option</u> |
|------------------------------------------------|-------------------------|
| INE                                            | 2                       |
| Accelerometer                                  | 2                       |
| Temperature probe                              | 2                       |
| Altitude change option<br>(for vertical winds) | RA 159                  |
| Static pressure                                | Rosemount fuselage      |
| Dynamic pressure                               | Rosemount fuselage      |
| Time source                                    | Micro 29                |
| Constants file                                 | CO2931.CON              |

Notes:

Vertical winds were calculated using the radar altitude source, causing spurious values while the aircraft crossed mountainous islands (not much of a problem on this flight). This problem does not occur over the water.

INE2 positions were corrected with reliable GPS positions.

A new algorithm for dynamically correcting Dynamic and Static Pressure (PQ and PS) is in place for Hurricanes 93, and is described in the Record 2 section of the Standard Tape Format Sheet. The net result is a slightly higher PS and PQ than is found on the 10-second real-time printout.

Special Note: Locations 80, 81, and 82 of Record 5 on the AOC Standard Tape contain Vertical Groundspeed, Vertical Airspeed and Vertical Winds, respectively, computed using Dave Jorgensen's vertical wind algorithm.

|                          | <u>Take Off</u> | <u>Landing</u> |
|--------------------------|-----------------|----------------|
| Aircraft static pressure | 1014.8 mb       | 1013.0 mb      |
| Corrected tower pressure | 1016.3 mb       | 1014.2 mb      |

Flight Meteorologist: Jack Parrish

```

TITLE (MAX 21 CHARACTERS) -- EX HURRICANE PAINE
H. EMILY #4 LANDFALL
YYMMDDL FLIGHT ID EX: EARL1.PAR
930831H
HHMMSS START TIME -99999 DEFAULT TO START OF DATA FOR PRINTOUT ONLY
152911
HHMMSS END TIME 999999 DEFAULT TO END OF DATA FOR PRINTOUT ONLY
010500
HHMMSS TAKE OFF TIME
153800
* NUMBER OF TAPE (I2) ... FOR STANDARD TAPE OUTPUT ONLY
01
* -----LOGICAL UNIT OF INPUT DATA (I1) 4, 8 OR 9 FOR TAPE DRIVE
1 1 FOR READ FROM DISK
* -----LOGICAL UNI OF OUTPUT TAPE DRIVE (I1) [FOR STANDARD TAPE ONLY]
4
* -----LOGICAL UNIT OF PRINTER (I1)
6
* -----DATE OF PROGRAM (MMDDY)
04092
* -----STATIC PRSSURE PROBE (I1)
* 1 = PSW (WINGTIP)
* 2 = PSF (CO-PILO/FUSELAGE)
* 3 = FUTURE USE
2
* -----DYNAMIC PRESSURE PROBE (I1)
* 0 = PQW (WINGTIP)
* 1 = PQF1 (FUSELAGE 1281)
* 2 = PQF2 (FUSELAGE 1221)
* 3 = FUTURE USE
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]
2
* ----- DEWPONT TEMPERATURE PROBE (I1) [1 OR 2]
1
* -----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 BASE GENERATOR #1
* 3 = TIME BASE GENERATOR #2
1
* -----NAME OF CONSTANTS FILE EX CO3863.CON
CO2931.CON
*****

```

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

|                  |                     |                       |
|------------------|---------------------|-----------------------|
| FLT ID: 930831H  | FM: MIAMI, FL       | TO: CHARLESTON, SC    |
| FLT NO: 93-71    | BLK IN: 0105        | ATA: 0058             |
| ETD: 1530Z       | BLK OUT: 1529Z      | ATD: 1538             |
| ETE: 9+          | BLK TIME: 9:36(9.6) | FLT TIME: 9:20(9.3)   |
| SPONSOR ORG: NRD | PROGRAM: EMILY      | PURPOSE: 1 ADD FAL... |

## OAO PERSONNEL

|                      |                   |
|----------------------|-------------------|
| AC Ticknor ✓         | SYS ENG Rolos ✓   |
| CP Tennosen ✓        | DATA SYS Barr ✓   |
| NAV Strong Rathbun ✓ | RADAR 112/87      |
| FE Wade ✓            | BT/ODW Gonzalez ✓ |
| RADIO Arneson ✓      | CLD PHYS          |
| FD Parrish ✓         | DOFFER McFadden ✓ |

## PARTICIPATING SCIENTIST/VISITORS/OAO

| LAST, FIRST NAME | ACTIVITY ON A/C | AFFILIATION |
|------------------|-----------------|-------------|
| Black, P. ✓      |                 |             |
| Black, M. ✓      |                 |             |
| Christo, B. ✓    |                 |             |
| Danley, A. ✓     |                 |             |
| Dreschner, J. ✓  | Visitor         |             |
|                  |                 |             |
|                  |                 |             |
|                  |                 |             |
|                  |                 |             |

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

34 10 75 40 PROBS W/ ED BEFORE T.O.

FIX 1805Z 34°35'N, 75°10'W 965 mb 245/130KT

FIX 1927Z 34°52'N, 75°07'W 964 mb 330/130KT

FIX 2036Z 35°04'N, 75°10'W 962 mb 135/120KT

FIX 2157Z 35°14'N, 75°11'W 961 mb 245/130KT

FIX 2340Z 35°29'N, 75°00'W 961 mb 320/110KT

FIVE PENETRATIONS

058/205  
33 48  
78 12

1729Z  
34 30  
75 08  
132KT  
967  
1.2 S.D

930831H N. EMILY LANDFALL

| Time   | Lat     | Long    | TK  | WD       | WS  | PA     | GA   | TA   | TD    | SL     | PS     |                       |    |
|--------|---------|---------|-----|----------|-----|--------|------|------|-------|--------|--------|-----------------------|----|
| 1829   | 25 48.4 | 80 12.4 |     |          |     | -15    |      |      |       |        | 1015.1 | BLK                   |    |
| 1546   | 25 59.1 | 79 48.7 | 34  | 178      | 10  | 2333   | 2497 | 12.2 | 6.9   | 1016.1 | 755.9  |                       |    |
| 155950 | 26 42.2 | 78 59   | ~   | 146      | 8   | 4708   | 4992 | -1.3 | 73.9  | 1014.7 | 557.2  | over W End            |    |
| 162455 | 28 31.1 | 78 12.6 | 77  | 154      | 1   | 5176   | 5492 | -3.4 | -25.0 | 1013.2 | 527.5  |                       |    |
| 163250 | 28 54.4 | 78 32.1 | 345 | 231      | 3   | 5176   | 5489 | -3.3 | -23.3 | 1012.9 | 527.7  | 41010                 |    |
| 172815 | 32 18   | 75 15   | 9   | 255      | 37  | 961    | 1005 | 22.4 | 14.0  | 1012.1 | 903.0  | BLUOY                 |    |
| 1745   | 33 23.1 | 75 01.5 | 5   | 252      | 53  | 962    | 950  | 21.7 | 18.6  | 1006.0 | 902.9  | INROUND EYE AT 75 mi. |    |
| 175143 | 33 50   | 74 59   | 5   | 267      | 82  | 966    | 881  | 21.2 | 17.6  | 997.5  | 903.3  | 1804472 34 35N 75 10W |    |
| 181645 | 35 10   | 75 19   |     | 64       | 95  |        |      |      |       |        |        | BLUOY                 | 97 |
| 182042 | 35 22.5 | 75 09.4 | 0   | 63       | 79  | 1003   | 430  | 17.8 | 20.5  | 999.5  |        |                       |    |
| 183745 | DRG     | AT      | N   | PT       |     |        |      |      |       |        |        |                       |    |
| 183915 | 36 11.2 | 75 12.8 | 215 | 77       | 47  | 933    | 946  | 20.9 | 19.3  | 1007.1 | 906.1  |                       |    |
| 190430 | 34 36.3 | 76 38.1 |     |          |     |        |      |      |       |        |        | BLUOY                 |    |
| 190845 |         |         |     |          |     |        |      |      |       |        |        |                       |    |
| 191455 | 34 38.2 | 75 36.4 | 75  | 335      | 71  | 928    | 861  | 20.8 | 20.0  | 999.5  | 905    | → FM W                |    |
| 180447 | 34 35   | 75 10   |     |          |     |        |      |      |       | 964    |        | 6                     |    |
| 194143 | 34 52.2 | 74 04.8 | 89  | 183      | 75  | 943    | 882  | 21.1 | 19.0  | 1000.9 | 904.5  | 13T                   |    |
| 201522 | 35 52.2 | 74 01   | 227 | 126      | 67  | 940    | 920  | 21.1 | 19.5  | 1004.9 | 905.4  | NE PT                 |    |
| 203540 | 35 04   | 75 10.3 |     |          |     |        |      | 24.5 | 22.5  | 961    |        | 6                     |    |
| 204230 | 34 46   | 75 22   | 226 | 307      | 49  | 1021   | 882  | 19.9 | 20.8  | 994.5  | 879    |                       |    |
| 214715 | 34 45   | 74 08   | 324 | 242      | 12  | 10.4   | 844  | 20.6 | 20.2  |        |        |                       |    |
| 2157   | 35 14   | 75 10   |     |          |     |        |      |      |       | 961    |        | 6                     |    |
| 220715 | 35 46   | 75 25   | 346 | 38       | 97  | 974    | 822  | 20.3 | 20.9  | 992.2  | 858.6  |                       |    |
| 223130 | 36 54.3 | 75 42.2 | 110 | 63       | 38  | 965    | 981  | 22.0 | 15.4  | 1008.9 | 902.7  | BLUOY                 |    |
| 224145 | 36 42.2 | 75 05.0 | 113 | 79       | 46  | 963    | 955  | 20.9 | 19.4  | 1006.3 | 902.7  |                       |    |
| 224730 | 36 33.4 | 74 50.9 | 191 | 95       | 56  | 962    | 936  | 21.5 | 19.4  | 1004.1 | 902.7  |                       |    |
| 2305   | 35 31   | 75 01   |     |          |     |        |      |      |       | 961    |        |                       |    |
| 2313   | 35 14   | 75 03   | ~   | CIRCLE A | FOR | NOPIER | LEFT |      |       |        |        | 2336 END              |    |
| 2340   | 35 29.4 | 75 00   |     |          |     |        |      |      |       | 961    |        |                       |    |
| 235115 | 35 12.6 | 75 27.9 | 237 | 318      | 84  | 964    | 819  | A.S  | -     | 976    | 702    |                       |    |
| 001015 | 34 36   | 76 31   | 242 | 323      | 29  | 1062   | 1088 | 21.1 | 14.0  | 1010.1 | 881.8  | T over Cape lookout   |    |
| 002515 | 34 04   | 77 39   | 241 | 300      | 17  | 3837   | 4058 | 6.2  | -13.3 | 1011.4 | 629.8  |                       |    |
| 0105   | 32 54   | 80 02.1 |     |          | 11  |        |      | 28.1 | 21.6  |        | 1011.9 | BLK3                  |    |

| A/C COMMANDER                                                                                                                                     |                      | NAVIGATOR           |                       | A/C NO.             |                      | MISSION NO.         |            | TIME AIRBORNE |                               | LOCATION |  | DATE                 |  | PROJ. NAME |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|-----------------------|---------------------|----------------------|---------------------|------------|---------------|-------------------------------|----------|--|----------------------|--|------------|--|
| TICKNOR                                                                                                                                           |                      | LT STRONG           |                       | N42RF               |                      | 93-071              |            | 1538          |                               | MIA-CHS  |  | 31AUG93              |  | EMILY 93   |  |
| TIME OF ENTRY                                                                                                                                     | POSITION             | TYPE<br>INE<br>USED | INE #1<br>POSITION    | LAT<br>LON<br>COR'S | INE #2<br>POSITION   | LAT<br>LON<br>COR'S | ALT<br>GS  | TH<br>TK      | REMARKS                       |          |  |                      |  |            |  |
| 1525<br>1528<br>1538                                                                                                                              |                      |                     |                       |                     |                      |                     |            |               | ENG. START<br>TAXI<br>TAKEOFF |          |  |                      |  |            |  |
|                                                                                                                                                   | 26 42.5N<br>78 57.8W | GPS<br>2            | 26 42.1N<br>78 58.9W  | +1.4<br>-1.1        | 26 41.9<br>78 58.6   | +1.6<br>-1.8        | 170<br>279 | 008<br>007    | POOP<br>MARK ON TOP WEST END  |          |  |                      |  |            |  |
|                                                                                                                                                   | 28 54.5N<br>78 32.1W | GPS<br>2            | 28 53.8N<br>78 31.6W  | +1.7<br>+1.5        | 28 54.4N<br>78 31.3W | +1.1<br>+1.8        | 170<br>293 | 030<br>030    | POOP 3.1<br>MOT BUOY          |          |  |                      |  |            |  |
|                                                                                                                                                   | 32 18.5<br>W 75 15.2 | GPS<br>2            | 32 17.7N<br>75 14.9W  | +1.8<br>+1.3        | 32 17.7N<br>75 14.6W | +1.8<br>+1.6        | 3K<br>241  | 002<br>011    | POOP 2.9<br>MOT BUOY          |          |  |                      |  |            |  |
|                                                                                                                                                   | 33 49.6<br>W 74 58.9 | GPS<br>2            | 33 48.9N<br>074 58.2W |                     | 33 49.4N<br>74 57.5W | +1.2<br>+1.4        | 3K<br>221  | 346<br>3      | POOP 2.7<br>BT1               |          |  |                      |  |            |  |
|                                                                                                                                                   | 34 35.0<br>W 75 09.7 | GPS<br>2            | 34 34.2N<br>75 07.5W  | +1.8<br>+2.2        | 34 34.8N<br>75 06.9W | +1.2<br>+2.8        | 3K<br>230  | 325<br>329    | POOP 3.2<br>BT2               |          |  |                      |  |            |  |
|                                                                                                                                                   | 35 9.8<br>75 9.5     | GPS<br>0            | 35 08.7N<br>75 08.2W  | +1.1<br>+1.3        | 35 09.2N<br>75 07.7W | +1.6<br>+1.8        | 3K<br>162  | 024<br>002    | MOT<br>OSLN                   |          |  |                      |  |            |  |
|                                                                                                                                                   | 35 22.4<br>W 75 09.4 | GPS<br>2            | 35 21.4N<br>75 07.8W  | +1.0<br>+1.6        | 35 21.7N<br>75 07.5W | +1.7<br>+1.9        | 3K<br>182  | 018<br>000    | BT3<br>POOP 2.6               |          |  |                      |  |            |  |
|                                                                                                                                                   |                      |                     |                       |                     |                      |                     |            |               | POOP<br>BT4                   |          |  |                      |  |            |  |
|                                                                                                                                                   | 34 36.3<br>W 76 38.1 | GPS<br>2            | 36 36.3N<br>76 36.7W  |                     | 34 35.9N<br>76 36.4W |                     | 3K<br>221  | 062<br>075    | CKLN                          |          |  |                      |  |            |  |
|                                                                                                                                                   | 34 32.5<br>W 76 24.3 | GPS<br>2            | 34 32.4N<br>76 23.7W  | +1.1<br>+1.6        | 34 32.0N<br>76 23.3W | +1.5<br>+1.0        | 3K<br>232  | 004<br>078    | BT5                           |          |  |                      |  |            |  |
|                                                                                                                                                   | 34 38.2<br>75 57.9   | GPS<br>2            | 34 38.3N<br>75 56.2W  | -1.1<br>+1.7        | 34 37.7N<br>75 55.7W | +1.5<br>+2.2        | 3K<br>227  | 058<br>075    | BT6                           |          |  |                      |  |            |  |
| ATC CLEARANCE:                                                                                                                                    |                      |                     |                       |                     |                      |                     |            |               |                               |          |  |                      |  |            |  |
|                                                                                                                                                   |                      |                     |                       | 3403 N              |                      | 1517 Z              |            | (125.05)      |                               | 3430 N   |  | 17078<br>CROSS BOUND |  |            |  |
|                                                                                                                                                   |                      |                     |                       | 1720 Z              |                      | 075 03 W            |            |               |                               | 75 55 W  |  | 381.5                |  |            |  |
|                                                                                                                                                   |                      |                     |                       | 3430 N              |                      | 75 08               |            | 025           |                               |          |  |                      |  |            |  |
| ENROUTE CLEARANCES:                                                                                                                               |                      |                     |                       |                     |                      |                     |            |               |                               |          |  |                      |  |            |  |
|                                                                                                                                                   |                      |                     |                       | 3610                |                      | 1731                |            | 014 195       |                               | 1731     |  | 010                  |  |            |  |
|                                                                                                                                                   |                      |                     |                       | 7424 W              |                      | 165 T               |            |               |                               |          |  | 120                  |  |            |  |
|                                                                                                                                                   |                      |                     |                       |                     |                      |                     |            |               |                               |          |  | 3514.5 2130          |  |            |  |
|                                                                                                                                                   |                      |                     |                       |                     |                      |                     |            |               |                               |          |  | 7510 W               |  |            |  |
| TYPE OF FIX: (1) DR (2) RADIO (3) CELESTIAL (4) VISUAL (5) LORAN (6) RADAR (7) DOPPLER - INERTIAL<br>(8) OMEGA (9) INERTIAL (10) OMEGA - INERTIAL |                      |                     |                       |                     |                      |                     |            |               |                               |          |  |                      |  |            |  |

Page 3

PROPOSED T.O. 1530Z

ACTUAL T.O. 15387

| SYS          | BEGIN<br>ALIGN TIME | NCS<br>CONN | $\Omega$<br>AID | TIME OUT OF<br>COARSE     | ALIGN<br>STS<br>0-5 | (1) TIME<br>INTO NAV. | (2) TIME<br>OUT NAV. | $\Delta T$<br>(2)(1) | TERMINAL ERRORS |      |     |
|--------------|---------------------|-------------|-----------------|---------------------------|---------------------|-----------------------|----------------------|----------------------|-----------------|------|-----|
|              |                     |             |                 | ELAPSE ALIGN<br>POST TIME |                     |                       |                      |                      | LAT             | LONG | G S |
| INS 1        | 1325                |             |                 |                           | 0                   | 1522                  | 0102                 | 9+40                 | -3.4            | +3.7 | 3   |
| INS 2<br>IMU | 1325                |             |                 |                           | 5                   | 1522                  | 0102                 | 9+40                 | +3.2            | +2.1 | 2   |

OTHER REMARKS: