APPENDIX G

RECCO, HDOB, AND TEMP DROP

CODES, TABLES, AND REGULATIONS

DATE | **ORGANIZATION** | **MISSION IDENTIFIER**

NUMBER / OBSERVATION															
9		G		Y	DAY OF WEEK SUN-1	L_o	LONGITUDE DEGREES	h_a	PRESSURE ALTITUDE OF AIRCRAFT REPORTED TO THE NEAREST DECAMETER	d	WIND DIRECTION AT FLIGHT LEVEL (Tens of deg. true.)	T	TEMPERATURE WHOLE °C	/	INDICATOR
X	RECCO INDICATOR SPECIFYING TYPE OF OBSERVATION	G	TIME OF OBSERVATION (Hours and Minutes) (GMT)	Q	OCTANT Table 3	L_o	AND TENTHS (Note 4)	h_a		d		T	(Note 6)	j	INDEX TO HHH Table 9
X		g		L_a	LATITUDE DEGREES	L_o		h_a		f	WIND SPEED AT FLIGHT LEVEL (Knots)	T_d	DEW POINT WHOLE °C (Note 6)	H	GEOPOTENTIAL HEIGHT/ D-VALUE OR SLP PER INDEX j
X	Table 1	g		L_a	AND TENTHS	B	TURBULENCE Table 4	d_t	TYPE OF WIND Table 6	f		T_d		H	
9		I_d	DEW POINT INDICATOR Table 2	L_a		f_c	FLIGHT COND Table 3 (Note 5)	d_a	METHOD OF OBTAINING WIND Table 7	f		w	PRESENT WEATHER (Note 7 Table 8)	H	(Note 8)
1		**2**		**3**		**4**		**5**		**6**		**7**		**8**	

REMARKS

TYPE AIRCRAFT | **CALL SIGN** | **METEOROLOGIST**

1	INDICATOR	C	CLOUD TYPE Table 11	C	CLOUD TYPE Table 11	C	CLOUD TYPE Table 11	1	INDICATOR	C	CLOUD TYPE Table 11	C	CLOUD TYPE Table 11	C	CLOUD TYPE Table 11
k_n	NR OF CLOUD LAYERS (Note 9)	h_s	ALTITUDE OF BASE Table 12	h_s	ALTITUDE OF BASE Table 12	h_s	ALTITUDE OF BASE Table 12	K_n	NR OF CLOUD LAYERS (Note 9)	h_s	ALTITUDE OF BASE Table 12	h_s	ALTITUDE OF BASE Table 12	h_s	ALTITUDE OF BASE Table 12
N_s	AMOUNT OF CLOUDS (Note 9) Table 10	h_s		h_s		h_s		N_s	AMOUNT OF CLOUDS (Note 9) Table 10	h_s		h_s		h_s	
N_s		H_t	ALTITUDE OF TOP Table 12	H_t	ALTITUDE OF TOP Table 12	H_t	ALTITUDE OF TOP Table 12	N_s		H_t	ALTITUDE OF TOP Table 12	H_t	ALTITUDE OF TOP Table 12	H_t	ALTITUDE OF TOP Table 12
N_s		H_t		H_t		H_t		N_s		H_t		H_t		H_t	
9		**10**		**11**		**12**		**13**		**14**		**15**		**16**	

REMARKS

RECCO RECORDING WORKSHEET

4	INDICATOR	6	INDICATOR (Note 11)	6	INDICATOR (Note 11)	7	INDICATOR	7	INDICATOR	8	INDICATOR	8	INDICATOR	9	INDICATOR	
d	DIRECTION OF SFC WIND (Tens of deg. true)	W_s	SIGNIFICANT WEATHER CHANGES Table 14	W_s	SIGNIFICANT WEATHER CHANGES Table 14	I_r	RATE OF ICING Table 17	h_i	ALT OF BASE OF ICING STRATUM (Note 12) Table 12	d_r	BEARING OF ECHO CENTER (Tens of Deg. True)	E_w	ECHO WIDTH OR DIAMETER Table 19	V_i	INFLIGHT VISIBILITY Table 23	
d		S_s	DISTANCE OF OCCURENCE OF Ws Table 15	S_s	DISTANCE OF OCCURENCE OF Ws Table 15	I_t	TYPE OF ICING Table 18	h_i		d_r		E_l	LENGTH OF MAJ AXIS Table 19	T_w	SEA SURFACE TEMPERATURE DEGREES AND TENTHS	
f	SURFACE WIND SPEED (Knots) (Note 10)	w_d	DISTANT WEATHER Table 16	w_d	DISTANT WEATHER Table 16	S_b	DISTANCE TO BEGINNING OF ICING Table 15	H_i	ALTITUDE OF TOP OF ICING STRATUM	S_r	DISTANCE TO ECHO CENTER Table 19	c_e	CHARACTER OF ECHO Table 21	T_w		REMARKS
f		d_w	BEARING OF w_d Table 13	d_w	BEARING OF w_d Table 13	S_e	DISTANCE TO ENDING OF ICING Table 15	H_i	(Note 12) Table 12	O_e	ORIENTATION OF ELLIPSE Table 20	i_e	INTENSITY OF ECHO Table 22	T_w		
17		**18**		**19**		**20**		**21**		**22**		**23**		**24**		

REMARKS

Figure G-1. Reconnaissance Code Recording Form

Table G-1. Reconnaissance Code Tables

TABLE 1   XXX
222   Sec One Observation without radar capability
555   Sec Three (intermediate) observation with or without radar capability
777   Sec One Observation with radar capability

TABLE 2 i_d
0   No dew point capability/acft below 10,000 meters
1   No dew point capability/acft at or above 10,000 meters
2   No dew point capability/acft below 10,000 meters and flight lvl temp -50°C or colder
3   No dew point capability/acft at or above 10,000 meters and flight lvl temp -50°C or colder
4   Dew point capability/acft below 10,000 meters
5   Dew point capability/acft at or above 10,000 meters
6   Dew point capability/acft below 10,000 meters and flight lvl temp -50°C or colder
7   Dew point capability/acft at or above 10,000 meters and flight lvl temp -50°C or colder

TABLE 3   Q
0	0° -90° W	Northern
1	90° W - 180°	Northern
2	180° - 90° E	Northern
3	90° - 0° E	Northern
4	Not Used	
5	0° - 90° W	Southern
6	90° W - 180°	Southern
7	180° - 90° E	Southern
8	90° - 0° E	Southern

TABLE 4   B
0   None
1   Light turbulence
2   Moderate turbulence in clear air, infrequent
3   Moderate turbulence in clear air, frequent
4   Moderate turbulence in cloud, infrequent
5   Moderate turbulence in cloud, frequent
6   Severe Turbulence in clear air, infrequent
7   Severe Turbulence in clear air, frequent
8   Severe Turbulence in cloud, infrequent
9   Severe Turbulence in cloud, frequent

TABLE 5 f_c
0   In the clear
8   In and out of clouds
9   In clouds all the time (continuous IMC)
/   Impossible to determine due to darkness or other cause

TABLE 6 d_t
0   Spot of Wind
1   Average wind
/   No wind reported

TABLE 7 d_a
0   Winds obtained using doppler radar or inertial systems
1   Winds obtained using other navigation equipment and/or techniques
/   Navigator unable to determine or wind not compatible

TABLE 8   w
0   Clear
1   Scattered (trace to 4/8 cloud coverage)
2   Broken (5/8 to 7/8 cloud coverage)
3   Overcast/undercast
4   Fog, thick dust or haze
5   Drizzle
6   Rain (continuous or intermittent precip - from stratiform clouds)
7   Snow or rain and snow mixed
8   Shower(s) (continuous or intermittent precip - from cumuliform clouds)
9   Thunderstorm(s)
/   Unknown for any cause, including darkness

TABLE 9   j
0   Sea level pressure in whole millibars (thousands fig if any omitted)
1   Altitude 200 mb surface in geopotential decameters (thousands fig if any omitted)
2   Altitude 850 mb surface in geopotential meters (thousands fig omitted)
3   Altitude 700 mb surface in geopotential meters (thousands fig omitted)
4   Altitude 500 mb surface in geopotential decameters
5   Altitude 400 mb surface in geopotential decameters
6   Altitude 300 mb surface in geopotential decameters
7   Altitude 250 mb surface in geopotential decameters (thousands fig if any omitted)
8   D - Value in geopotential decameters; if negative 500 is added to HHH
9   Altitude 925 mb surface in geopotential meters
/   No absolute altitude available or geopotential data not within ± 30 meters/4 mb accuracy requirements

TABLE 10 N_s
0   No additional cloud layers (place holder)
1   1 okta or less, but not zero (1/8 or less sky covered)
2   2 oktas (or 2/8 of sky covered)
3   3 oktas (or 3/8 of sky covered)
4   4 oktas (or 4/8 of sky covered)
5   5 oktas (or 5/8 of sky covered)
6   6 oktas (or 6/8 of sky covered)
7   7 oktas or more but not 8 oktas
8   8 oktas or sky completely covered
9   Sky obscured (place holder)

TABLE 11   C
0   Cirrus (Ci)
1   Cirrocumulus (Cc)
2   Cirrostratus (Cs)
3   Altocumulus (Ac)
4   Altostratus (As)
5   Nimbostratus (Ns)
6   Stratocumulus (Sc)
7   Stratus (St)
8   Cumulus (Cu)
9   Cumulonimbus (Cb)
/   Cloud type unknown due to darkness or other analogous phenomena

TABLE 12 $h_s h_s H_t H_t h_i h_i H_i H_i$
00	Less than 100
01	100 ft
02	200 ft
03	300 ft
etc, etc	
49	4,900 ft
50	5,000 ft
51-55	Not used
56	6,000 ft
57	7,000 ft
etc, etc	
79	29,000 ft
80	30,000 ft
81	35,000 ft
82	40,000 ft
etc, etc	
89	Greater than 70,000 ft
//	Unknown

TABLE 13 d_w
0	No report	5	SW
1	NE	6	W
2	E	7	NW
3	SE	8	N
4	S	9	all directions

TABLE 14 W_s
0   No change
1   Marked wind shift
2   Beginning or ending or marked turbulence
3   Marked temperature change (not with altitude)
4   Precipitation begins or ends
5   Change in cloud forms
6   Fog or ice fog bank begins or ends
7   Warm front
8   Cold Front
9   Front, type not specified

TABLE 15 $S_b S_e S_s$
0   No report
1   Previous position
2   Present position
3   30 nautical miles
4   60 nautical miles
5   90 nautical miles
6   120 nautical miles
7   150 nautical miles
8   180 nautical miles
9   More than 180 nautical miles
/   Unknown (not used for S_s)

TABLE 16 w_d

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

TABLE 17 I_r

7   Light
8   Moderate
9   Severe
/   Unknown or contrails

TABLE 18 I_t

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

TABLE 19 S_r, E_w, E_l

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

TABLE 20 O_e

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

TABLE 21 c_e

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

TABLE 22 i_e

2 Weak
5 Moderate
8 Strong
/ Unknown

TABLE 23 V_i

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

RECCO SYMBOLIC FORM

SECTION ONE (MANDATORY)

$9XXX9$ $GGggi_d$ $YQL_aL_aL_a$ $L_oL_oL_oBf_c$ $h_ah_ah_ad_td_a$

$ddfff$ TTT_dT_dw $/jHHH$

SECTION TWO (ADDITIONAL)

$1k_nN_sN_sN_s$ $Ch_sh_sH_tH_t$ .... $4ddff$

$6W_sS_sW_dd_w$ $7I_rI_tS_bS_e$ $7h_ih_iH_iH_i$ $8d_rd_rS_rO_e$

$8E_wE_lc_ei_e$ $9V_iT_wT_wT_w$

SECTION THREE (INTERMEDIATE)

$9XXX9$ $GGggi_d$ $YQL_aL_aL_a$ $L_oL_oL_oBf_c$ $h_ah_ah_ad_td_a$

$ddfff$ TTT_dT_dw $/jHHH$

Table G-2. Reconnaissance Code Regulations

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

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

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

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

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

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

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

8. When j is reported as a /, HHH is encoded as ///.

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

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

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

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

THE HDOB MESSAGE

The HDOB message is used to transmit High-Density/High-Accuracy (HD/HA) meteorological data from hurricane reconnaissance aircraft. These are created automatically by the system software. Each message consists of a communications header line (Table G-3), a mission/ob identifier line (Table G-4), and 20 lines of HD/HA data (Table G-5).

Within an HDOB message, the time interval (resolution) between individual HD/HA observations can be set by the operator to be 30, 60, or 120 seconds. However, regardless of the time resolution of the HD/HA data, the meteorological parameters in the HDOB message always represent 30-second averages along the flight track (except for certain peak values as noted in Table G-5).

The nominal time of each HD/HA record is the midpoint of the 30-second averaging interval. This means that an HD/HA record at time *t* will include data measured at time t+15 seconds. For purposes of determining peak flight-level and SFMR winds, the encoding interval begins 15 seconds after the nominal time of the last HD/HA record and ends 15 seconds after the nominal time of the record being encoded.

A sample HDOB message is given below (message begins with URNT15...):

```
0         1         2         3         4         5         6         7
012345678901234567890123456789012345678901234567890123456789012345678901234567890
--------------------------------------------------------------------------

URNT15 KNHC 281426
AF302 1712A KATRINA             HDOB 41 20050928
142030 2608N 08756W 7093 03047 9333 +192 +134 133083 089 080 999 00
142100 2609N 08755W 7091 03054 9330 +166 +146 133106 115 103 999 00
142130 2610N 08754W 7058 03040 9295 +134 +134 135121 124 111 999 00
142200 2611N 08753W 7037 03060 9291 +124 +124 138129 136 122 999 00
.
.
.
142230 2612N 08752W 7010 03057 9282 +102 +102 141153 166 148 999 00
142300 2612N 08751W 7042 03010 9293 +088 +083 133159 164 147 999 00
142330 2613N 08750W 6999 03064 9279 +088 +088 138158 161 144 999 00
142400 2614N 08749W 7005 03046 9281 +080 +080 138155 158 142 999 00
142430 2614N 08748W 6998 03048 9278 +078 +078 138151 153 137 999 00
142500 2615N 08747W 7002 03048 9279 +084 +084 140146 148 133 999 00
$$
```

Figure G-2. HDOB Description and Sample Message

Table G-3. Communications Headers for HDOB Messages

NODE	AWIPS ID	WMO HEADER	OCEAN BASIN
MIA	AHONT1	URNT15 ….	Atlantic
MIA	AHOPN1	URPN15 ….	East and Central Pacific
MIA	AHOPA1	URPA15 ….	West Pacific

Table G-4. Mission/Ob Identifier Line Format for HDOB Messages

A sample mission/ob identifier line is given below (beginning with AF302...), followed by a description of the parameters.

```
0         1         2         3         4         5         6         7
012345678901234567890123456789012345678901234567890123456789012345678901234567890
-------------------------------------------------------------------------
IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII HDOB NN YYYYMMDD

AF302 1712A KATRINA              HDOB 41 20050928  ← example
```

III...III: Mission identifier, as determined in Chapter 5, paragraph 5.7.6.

NN: Observation number (01-99), assigned sequentially for each HDOB
                      message during the flight. This sequencing is independent of the
                      numbering of other types of messages (RECCO, DROP, VORTEX, etc.),
                      which have their own numbering sequence.

YYYYMMDD: Year, month, and day of the first HD/HA data line of the message.

Table G-5. HD/HA Data Line Format for HDOB Messages

```
0         1         2         3         4         5         6         7
0123456789012345678901234567890123456789012345678901234567890123456789
----------------------------------------------------------------------
hhmmss LLLLH NNNNNW PPPP GGGGG XXXX sTTT sddd wwwSSS MMM KKK ppp FF
142230 2612N 08752W 7010 03057 9282 +102 +102 141153 166 148 999 00
```

hhmmss: Observation time, in hours, minutes and seconds (UTC). The observation time is the midpoint of the 30-s averaging interval used for the record's meteorological data.

LLLLH: The latitude of the aircraft at the observation time in degrees (LL) and minutes (LL). The hemisphere (H) is given as either N or S.

NNNNNH: The longitude of the aircraft at the observation time, in degrees (NNN) and minutes (NN). The hemisphere (H) is given as either E or W.

PPPP: Aircraft static air pressure, in tenths of mb with decimal omitted, at the observation time. If pressure is equal to or greater than 1000 mb the leading 1 is dropped.

GGGGG: Aircraft geopotential height, in meters, at the observation time.

XXXX: Extrapolated surface pressure or D-value (30-s average). Encoded as extrapolated surface pressure if aircraft static pressure is 550.0 mb or greater (i.e., flight altitudes at or below 550 mb). Format for extrapolated surface pressure is the same as for static pressure. For flight altitudes higher than 550 mb, **XXXX** is encoded as the D-value, in meters. Negative D-values are encoded by adding 5000 to the D-value.

s: Sign of the temperature or dew point (+ or -).

sTTT: The air temperature in degrees and tenths Celsius, decimal omitted (30-s average).

sddd: The dew point temperature, in degrees and tenths Celsius, decimal omitted (30-s average).

www: Wind direction in degrees (30-s average). North winds are coded as 000. 999 indicates missing value.

SSS: Wind speed, in kt (30-s average). 999 indicates missing value.

MMM: Peak 10-second average wind speed occurring within the encoding interval, in kt. 999 indicates missing value.

KKK: Peak 10-second average surface wind speed occurring within the encoding interval from the Stepped Frequency Microwave Radiometer (SFMR), in kt. 999 indicates missing value.

ppp: SFMR-derived rain rate, in mm hr^{-1}, evaluated over the 10-s interval chosen for KKK . 999 indicates missing value.

FF: Quality control flags.

First column indicates status of positional variables as follows:
0   All parameters of nominal accuracy
1   Lat/lon questionable
2   Geopotential altitude or static pressure questionable
3   Both lat/lon and GA/PS questionable

Second column indicates status of meteorological variables as follows:
0   All parameters of nominal accuracy
1   T or TD questionable
2   Flight-level winds questionable
3   SFMR parameter(s) questionable
4   T/TD and FL winds questionable
5   T/TD and SFMR questionable
6   FL winds and SFMR questionable
9   T/TD, FL winds, and SFMR questionable

Table G-6. TEMP DROP CODE

EXTRACT FROM: WMO-No. 306 MANUAL ON CODES
FM 37-X Ext. TEMP DROP: Upper-level pressure, temperature, humidity and wind report from a sonde released by carrier balloons or aircraft. See Figure G-3 for an example TEMP DROP message for tropical cyclone operations.

CODE FORM:

PART A

SECTION 1 $M_iM_iM_jM_j$ $YYGGI_d$ $99L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ $MMMU_{La}U_{Lo}$

SECTION 2 $99P_oP_oP_o$ $T_oT_oT_{ao}D_oD_o$ $d_od_of_of_of_o$

                       $P_1P_1h_1h_1h_1$ $T_1T_1T_{a1}D_1D_1$ $d_1d_1f_1f_1f_1$

                       $P_nP_nh_nh_nh_n$ $T_nT_nT_{an}D_nD_n$ $d_nd_nf_nf_nf_n$

SECTION 3 $88P_tP_tP_t$ $T_tT_tT_{at}D_tD_t$ $d_td_tf_tf_tf_t$
                    or
                    88999

SECTION 4 $77P_mP_mP_m$ $d_md_mf_mf_mf_m$ $(4v_bv_bv_av_a)$
                    or

                     $66P_mP_mP_m$ $d_md_mf_mf_mf_m$ $(4v_bv_bv_av_a)$
                    or
                    77999

SECTION 10   31313

                    51515 $101A_{df}A_{df}$ $0P_nP_nP'_nP'_n$·
                            or

                         $101A_{df}A_{df}$ $P_nP_nh_nh_nh_n$
                    61616

                    62626

PART B

SECTION 1 $M_iM_iM_jM_j$ $YYGG8$ $99L_aL_aL_a$ $Q_cL_oL_oL_o$ $MMMU_{La}U_{Lo}$

SECTION 5 $n_on_oP_oP_oP_o$ $T_oT_oT_{ao}D_oD_o$

                       $n_1n_1P_1P_1P_1$ $T_1T_1T_{a1}D_1D_1$

                       $n_nn_nP_nP_nP_n$ $T_nT_nT_{an}D_nD_n$

SECTION 6   21212 $n_on_oP_oP_oP_o$ $d_od_of_of_of_o$

$$n_1n_1P_1P_1P_1 \quad d_1d_1f_1f_1f_1$$

$$n_nn_nP_nP_nP_n \quad d_nd_nf_nf_nf_n$$

SECTION 7   31313 $s_rr_ar_as_as_a$ 8GGgg

SECTION 9   51515 $101A_{df}A_{df}$ or

                 $101A_{df}A_{df}$ $0P_nP_nP'_nP'_n$.   or

                 $101A_{df}A_{df}$ $P_nP_nh_nh_nh_n$

SECTION 10   61616

                 62626

PART ALPHA (A)

IDENTIFICATION LETTERS: M_JM_J

Identifier: M_JM_J - Identifier for Part A of the report.

DATE/TIME GROUP: $YYGGI_d$

Identifier: **YY -** Date group
Identifier: **GG -** Time group
Identifier: I_d - The highest mandatory level for which wind is available.

LATTITUDE: $99L_aL_aL_a$

Identifier: **99 –** Indicator for data on position follows.
Identifier: $L_aL_aL_a$ – Latitude in tenths of degrees

LONGITUDE: $Q_cL_oL_oL_oL_o$

Identifier: Q_c – The octant of the globe.
Identifier: $L_oL_oL_oL_o$ – Longitude in tenths of degrees

MARSDEN SQUARE: $MMMU_{la}U_{lo}$

Identifier: **MMM** - Marsden square.
Identifier: $U_{la}U_{lo}$ – Units digits in the reported latitude and longitude.

SEA LEVEL PRESSURE: $99P_0P_0P_0 \quad T_0T_0T_0D_0D_0 \quad d_0d_0f_0f_0f_0$

Identifier: **99** – Indicator for data at the surface level follows
Identifier: $P_0P_0P_0$ – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)
Identifier: $T_0T_0T_0$ – Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.
Identifier: D_0D_0 – Dewpoint depression at standard isobaric surfaces beginning with surface level.

NOTE

When the depression is 4.9C or less encode the units and tenths digits of the depression. Encode depressions of 5.0 through 5.4C as 50. Encode depressions of 5.5C through 5.9C as 56. Dew point

depressions of 6.0 and above are encoded in tens and units with 50 added. Dew point depressions for relative humidities less then 20% are encoded as 80. When air temperature is below –40C report D_nD_n as //.

Identifier: d_od_o – True direction from which wind is blowing rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.
Identifier: $f_of_of_o$ – Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. 29$\underline{5}^o$ at 125 knots encoded as 29$\underline{6}$25.

NOTE: 1. When flight level is just above a standard surface and in the operator's best meteorological judgment, the winds are representative of the winds at the standard surface, then the operator may encode the standard surface winds using the data from flight level. If the winds are not representative, then encode /////.

NOTE: 2. The wind group relating to the surface level ($d_od_of_of_of_o$) will be included in the report; when the corresponding wind data are not available, the group will be encoded as /////.

STANDARD ISOBARIC SURFACES : $P_1P_1h_1h_1h_1$ $T_1T_1T_1D_1D_1$ $d_1d_1f_1f_1f_1$

Identifier: P_1P_1 – Pressure of standard isobaric surfaces in units of tens of millibars.
  (1000 mbs = 00, 925mbs = 92, 850mbs = 85, 700mbs = 70, 500mbs = 50, 400mbs = 40, 300mbs = 30, 250mbs = 25).
Identifier: $h_1h_1h_1$ – Heights of the standard pressure level in geopotential meters or decameters above the surface. Encoded in decameters at and above 500mbs omitting, if necessary, the thousands or tens of thousands digits. Add 500 to hhh for negative 1000mb or 925mb heights. Report 1000mb group as 00/// ///// ///// when pressure is less than 950mbs.
Identifier: $T_1T_1T_1D_1D_1$ – Same temperature/dew point encoding procedures apply to all levels.
Identifier : $d_1d_1f_1f_1f_1$ – Same wind encoding procedures apply to all levels.

DATA FOR TROPOPAUSE LEVELS: 88 $P_tP_tP_t$ $T_tT_tT_tD_tD_t$ $d_td_tf_tf_tf_t$

Identifier: **88** – Indicator for Tropopause level follows
Identifier: $P_tP_tP_t$ – Pressure at the tropopause level reported in whole millibars. Report $88P_nP_nP_n$ as 88999 when tropopause is not observed.
Identifier: $T_tT_tT_tD_tD_t$ – Same temperature/ dew point encoding procedures apply.
Identifier: $d_td_tf_tf_tf_t$ - Same wind encoding procedures apply.

MAXIMUM WIND DATA: 77$P_nP_nP_n$ $d_nd_nf_nf_nf_n$ $4v_bv_bv_av_a$

Identifier: 77 – Indicator that data for maximum wind level and for vertical wind shear follow when max wind does not coincide at flight. If the maximum wind level coincides with flight level encode as 66
Identifier: $P_nP_nP_n$ – Pressure at maximum wind level in whole millibars.
Identifier: $d_nd_nf_nf_nf_n$ - Same wind encoding procedures apply.

VERTICAL WIND SHEAR DATA: $4v_bv_bv_av_a$

Identifier: **4** – Data for vertical wind shear follow.
Identifier: v_bv_b – Absolute value of vector difference between max wind and wind 3000 feet BELOW the level of max wind, reported to the nearest knot. Use "//" if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure "99".

Identifier: v_av_a – Absolute value of vector difference between max wind and wind 3000 feet above the level of max wind, reported to the nearest knot. Use "//" if missing and a 4 is reported. A vector difference of 99 knots or more is reported with the code figure "99".

SOUNDING SYSTEM INDICATION, RADIOSONDE/ SYSTEM STATUS, LAUNCH TIME: 31313 $s_rr_ar_as_as_a$ 8GGgg

Identifier: $s_rr_ar_as_as_a$ - Sounding system indicator, radiosonde/ system status: $s_ar_ar_as_as_a$
Identifier: s_a - Solar and infrared radiation correction (**0** – no correction)
Identifier: r_ar_a – Radiosonde/sounding system used   (**96** – Descending radiosonde)
Identifier: s_as_a – Tracking technique/status of system used   (**08** – Automatic satellite navigation)
Identifier: **8GGgg** – Launch time
Identifier: **8** – Indicator group
Identifier: **GG** – Time in hours
Identifier: **gg** – Time in minutes

ADDITIONAL DATA GROUPS: 51515 101XX 0$P_nP_nP_nP_n$

Identifier: **51515** – Additional data in regional code follow
Identifier: **10166** – Geopotential data are doubtful between the following levels 0$P_nP_nP_nP_n$. This code figure is used only when geopotential data are doubtful from one level to another.
Identifier: **10167** – Temperature data are doubtful between the following levels 0$P_nP_nP_nP_n$. This code figure shall be reported when only the temperature data are doubtful for a portion of the descent. If a 10167 group is reported a 10166 will also be reported. EXAMPLE: Temperature is doubtful from 540mbs to 510mbs. SLP is 1020mbs. The additional data groups would be : 51515 10166 00251 10167 05451.
Identifier: **10190** – Extrapolated altitude data follows:

When the sounding begins within 25mbs below a standard surface, the height of the surface is reported in the format **10190 $P_nP_nh_nh_nh_n$**. The temperature group is not reported. EXAMPLE: Assume the release was made from 310mbs and the 300mb height was 966 decameters. The last reported standard level in Part A is the 400mb level. The data for the 300mb level is reported in Part A and B as 1019030966.

When the sounding does not reach surface, but terminates within 25mbs of a standard surface, the height of the standard surface is reported in Part A of the code in standard format and also at the end of Part A and Part B of the code in the format as **10190 $P_nP_nh_nh_nh_n$**.
EXAMPLE: Assume termination occurred at 980mbs and the extrapolated height of the 1000mb level was 115 meters. The 1000mb level would be reported in Part A of the code as 00115 ///// ///// and in Part B as 10190 00115.

Identifier: **10191** – Extrapolated surface pressure precedes. Extrapolated surface pressure is only reported when the termination occurs between 850mbs and the surface. Surface pressure is reported in Part A as 99$P_0P_0P_0$ ///// and in Part B as 00$P_0P_0P_0$ /////. When surface pressure is extrapolated the 10191 group is the last additional data group reported in Part B.

AIRCRAFT AND MISSION IDENTIFICATION: 61616 AFXXX XXXXX XXXXX OB X

Identifier: **61616** – Aircraft and mission identification data follows.
Identifier: **AFXXX** – The identifier AF for U.S. Air Force and the last three digits of the aircraft's tail number.
Identifier: **XXXXX XXXXX** – The identifier for the type of mission being flown.

If a training mission the mission identifier is **WXWXA TRAIN.** The fifth letter "A" is the only character that could possibly change. The "A" defining that the flight originated in the Atlantic basin. The letter "C" identifies the Central Pacific area and the letter "E" identifies the Eastern Pacific.

If an operational storm mission: the first two numbers Identifier the number of times an aircraft has flown this system and the second two numbers Identifier the system number. The last character

again identifies the basin flown. The name of the storm would replace TRAIN.
EXAMPLE: AF968 0204A MARIE – Aircraft number 50968, this was the second flight into this system and the system was the fourth of the season. The system reached tropical storm strength and was named MARIE.

Identifier: **OB 14** – The observation (both vertical and horizontal) number as transmitted from the aircraft.

NATIONALLY DEVELOPED CODES: 62626

Identifier: **62626** – This is the remarks section. Only the remarks EYE, EYEWALL XXX, MXWNDBND XXX, or RAINBAND will be used. If the remarks EYEWALL is used it will be followed by the radian from the eye center to the sonde. Example: If the sonde is released in the NE quad of the storm, the value codes is 045.

Identifier: **REL XXXXNXXXXXW hhmmss** – Release location of the sonde and the release time.

Identifier: **SPG XXXXNXXXXXW hhmmss** - Impact location of the sonde based on its last GPS position and the splash time.

Identifier: **SPL XXXXNXXXXXW hhmm** - Impact location of the sonde based on its last GPS position and the splash time. (SPL has less precision than SPG and may be removed in the next version of the NHOP).

Identifier: **LAST WND XXX** - Height of the last reported wind. If a surface wind is reported the Last Wind remark is omitted. XXX will never be less than 13 meters

Identifier: **MBL WND dddff** - The mean boundary level wind. The mean wind in the lowest 500 meters of the sounding

Identifier: **AEV XXXXX** - This is the software version being used for the sounding.

Identifier: **DLM WND ddfff bbbttt** - The Deep Layer Mean wind. It is the average wind over the depth of the sounding. Where ddfff is the wind averaged from the first to the last available wind (these would correspond to the first and last significant levels for wind); ttt is the pressure at the top of the layer, and bbb is the pressure at the bottom of the layer (in whole mbs, with thousands digit omitted).

Identifier: **WL150 ddfff zzz** - Average wind over the lowest available 150 m of the wind sounding. Where ddfff is the mean wind over the 150 m layer centered at zzz m.

PART ALPHA (B)

DATA FOR SIGNIFICANT TEMPERATURE AND RELATIVE HUMIDITY LEVELSSIGNIFICANT ISOBARIC LEVELS:
$n_0n_0P_0P_0P_0 \ T_0T_0T_0D_0D_0$

IDENTIFICATION LETTERS: M_JM_J

Identifier: M_JM_J - Identifier for Part B of the report.

DATE/TIME GROUP: YYGG8

Identifier: **YY** - Date group
Identifier: **GG -** Time group
Identifier: **8** - Indicator for the use of satellite navigation for windfinding.

LATTITUDE: $99L_aL_aL_a$ (Same as Part A)

LONGITUDE: $Q_cL_oL_oL_oL_o$ (Same as Part A)

MARSDEN SQUARE: $MMMU_{la}U_{lo}$ (Same as Part A)
SEA LEVEL PRESSURE: $n_0n_oP_0P_0P_0 \ T_0T_0T_0D_0D_0$

Identifier: **nono** – Indicator for number of level starting with surface level. Only surface will be numbered as **"00".**

Identifier: $P_0P_0P_0$ – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)

Identifier: $T_0T_0T_0$– Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.

Identifier: D_0D_0 – Dewpoint depression at standard isobaric surfaces beginning with surface level. Encoded the

same as Part A.

FOR STORM DROPS ONLY. If SLP is less than 950mb encode the 1000mb group as 00/// ///// /////. When the SLP is between 950mb and 999mb encode 1000mb as 00PoPoPo ///// ///// (500 meters are added to height below surface).

DATA FOR SIGNIFICANT WIND LEVELS: $n_0n_0P_0P_0P_0$ $d_od_of_of_of_o$

Identifier: n_0n_0 – Number of level starting with surface level. Only surface will be numbered as **"00".**
Identifier: $P_0P_0P_0$ – Pressure at specified levels in whole millibars.
Identifier: d_od_o – True direction from which wind is blowing rounded to nearest 5 degrees. Report hundreds and tens digits. The unit digit (0 or 5) is added to the hundreds digit of wind speed.
Identifier: $f_of_of_o$ – Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. 295° at 125 knots encoded as 29<u>6</u>25.

Same notes in Part A apply.

31313, 51515, 61616, 62626 – Repeated from Part A.

FIGURE G-3. EXAMPLE TEMP DROP MESSAGE FOR TROPICAL CYCLONES

UZNT13 KNHC 080839
XXAA 58088 99192 70803 04590 99964 21676 20581 00814 ///// /////
92359 20476 22611 85085 18876 24614 88999 77999
31313 09608 80747
51515 10190 70752
61616 AF302 0617A PALOMA   OB 16
62626 EYEWALL 225 SPL 1925N08021W 0750 MBL WND 22112 AEV 20800 DL
M WND 23107 964833 WL150 21611 079 REL 1920N08030W 074700 SPG 192
6N08021W 075012 =
XXBB 58088 99192 70803 04590 00964 21676 11850 18876 22811 18476
33760 19677 44739 21077 55719 23261 66701 11430
21212 00964 20581 11963 20585 22960 20604 33958 21120 44955 21626
55949 22107 66939 22621 77933 22614 88917 22611 99900 23099 11874
23604 22867 24098 33864 24100 44859 24117 55850 24614 66701 26123
31313 09608 80747
51515 10190 70752
61616 AF302 0617A PALOMA   OB 16
62626 EYEWALL 225 SPL 1925N08021W 0750 MBL WND 22112 AEV 20800 DL
M WND 23107 964833 WL150 21611 079 REL 1920N08030W 074700 SPG 192
6N08021W 075012 =