APPENDIX G

RECCO, HDOB, MINOB, AND TEMP DROP

CODES, TABLES, AND REGULATIONS

RECONNAISSANCE CODE RECORDING FORM

Top Section

DATE | ORGANIZATION | MISSION IDENTIFIER

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

REMARKS

Middle Section

TYPE AIRCRAFT | CALL SIGN | METEOROLOGIST

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

REMARKS

Bottom Section — RECCO RECORDING WORKSHEET

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

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)

$9XXX9$ $GGgg_d$ $YQL_aL_aL_a$ $L_oL_oL_oBf_c$ $h_ah_ah_ad_td_a$

$ddfff$ 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)

$9XXX9$ $GGgg_d$ $YQL_aL_aL_a$ $L_oL_oL_oBf_c$ $h_ah_ah_ad_td_a$

$ddfff$ 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 //.

HDOB messages are created automatically by IWRS. Each HDOB consists of 20 lines of HD/HA data. Each HD/HA data line is composed of 30 second averages for each parameter reported, except max wind which is a 10 second average. The highest max wind recorded during the encoding interval is used in the HDOB.

The encoding interval of the HD/HA data lines in the HDOB message is operator adjustable to 30 seconds, 1 minute or 2 minutes. A 30 second encoding interval encodes every HD/HA data line and creates an HDOB every 10 minutes. A 1 minute interval encodes every other HD/HA data line and generates an HDOB every 20 minutes. Likewise, a 2 minute interval encodes every fourth HD/HA data line and generates an HDOB every 40 minutes. Regardless of the encoding interval selected, the highest max wind value since the previous encoded HD/HA data line will be reported in the observation. Samples of each type message is shown below. Each complete message would have 20 data lines.

```
SXXX50 KNHC 040952
AF967 1017A OPAL HDOB 39
     0942. 2643N 08846W 03036 5374 127 106 140 136 112 02680 0000000000
     0943  2641N 08847W 03036 5442 116 116 136 136 120 02612 0000000000
     0943. 2640N 08849W 03065 5521 100 087 140 140 099 02561 0000000000
     0944  2638N 08850W 03028 5591 087 059 186 160 074 02454 0000000000
     0944. 2637N 08850W 03053 5630 097 028 202 158 036 02440 0000000000
     0945  2635N 08850W 03059 5647 197 009 218 148 018 02429 0000000000
                             .
                             .
                             .
```
30-second data interval

```
SXXX50 KNHC 040952
AF967 1017A OPAL HDOB 39
     0942 2644N 08844W 03039 5333 135 094 138 136 096 02724 0000000000
     0943 2641N 08847W 03036 5442 116 116 136 136 120 02612 0000000000
     0944 2638N 08850W 03028 5591 087 059 186 160 099 02454 0000000000
     0945 2635N 08850W 03059 5647 197 009 218 148 036 02429 0000000000
     0946 2632N 08849W 03028 5632 274 052 226 148 067 02413 0000000000
     0947 2628N 08849W 03057 5488 271 118 194 130 124 02587 0000000000
                             .
                             .
                             .
```
1-minute data interval

```
SXXX50 KNHC 040952
AF967 1017A OPAL HDOB 39
     0942 2644N 08844W 03039 5333 135 094 138 136 096 02724 0000000000
     0944 2638N 08850W 03028 5591 087 059 186 160 120 02454 0000000000
     0946 2632N 08849W 03028 5632 274 052 226 148 067 02413 0000000000
     0948 2625N 08849W 03050 5378 263 113 172 140 124 02690 0000000000
     0950 2620N 08849W 03047 5268 259 094 142 134 109 02797 0000000000
     0952 2614N 08849W 03044 5217 262 075 162 108 090 02845 0000000000
                             .
                             .
                             .
```
2-minute data interval

Figure G-2. HDOB Description and Sample Messages

Table G-3. HDOB Message Format

HHMM L$_a$L$_a$mmH L$_o$L$_o$L$_o$mmH PPPPP DDDD WWW SSS TTT ddd MMM RRRRR FFFFFFFFFF

HHMM: The time of observation in hours and minutes (UTC). A period following
                HHMM indicates a data time of 30 seconds past the minute.

L$_a$L$_a$mmH: The latitude of the observation in degrees, minutes and hemisphere
                (N or S).

L$_o$L$_o$L$_o$mmH: The longitude of the observation in degrees, minutes and hemisphere
                (E or W).

PPPPP: The pressure altitude in meters.

DDDD: The absolute value of the D-value in meters (a 5 occupies the thousands
                place if the D-value is negative. For example, -34m is encoded as 5034.

WWW: The wind direction in degrees, with 0 being true north, increasing
                clockwise.

SSS: The wind speed in knots.

TTT: The air temperature in degrees and tenths Celsius. The tenths digit is even
                for temperatures at or above 0°C, odd for temperatures below 0°C.

ddd: The dew point temperature, encoded the same way as air temperature.

MMM: The maximum wind speed in knots measured during the minute. This is the
                peak wind speed averaged over a 10-sec period.

RRRRR: Radar altitude in meters

FFFFFFFFFF: Default status for the MINOB/HDOB data. A "1" indicates the parameter is
                defaulted (suspect value) or based on a parameter that is defaulted. A "0"
                indicates the value is not defaulted. The field indicate default for (in order):
                latitude, longitude, pressure altitude, D-value, wind direction, wind speed,
                air temperature, dew point, maximum wind speed, radar altimeter.

MinOb messages are created automatically by the NOAA P-3 Research Aircraft Measurement System (RAMS). Each MinOb message contains one or more lines of flight level data. Each line consists of data parameters, averaged over an operator-selected sample interval (common settings are 30 seconds and 1 minute). The time interval for collecting lines in a block before forming a message for transmission is also selectable, typically 10 or 15 minutes. The message length is based on the operator's selection of sample interval and block length, but will never exceed 3300 characters (approximately 50 lines) due to satellite transmission protocol limits.

Each line is terminated with an ASCII <cr><cr><lf> sequence (Hex 0D 0D 0A). The line length is variable, depending on whether the optional Stepped Frequency Microwave Radiometer (SFMR) fields are included (see Table G-4 description). All fields are separated by at least one ASCII blank (Hex 20) as shown in the Table by a . symbol.

```
URNT40 KWBC 261950
NOAA3 WX02A BONNIE
194030  3136 07758 6849 +0152 251053 +171 +106 251054 040 005
194100  3138 07758 6847 +0148 247053 +171 +102 249053 040 005
194130  3141 07758 6849 +0146 246053 +166 +106 247053 039 005
194200  3143 07758 6851 +0144 246054 +162 +111 246054 039 004
194230  3145 07758 6849 +0141 246053 +162 +112 246054 999 999
194300  3147 07558 6852 +0134 245053 +160 +114 245053 039 004
194330  3149 07759 6845 +0126 247052 +162 +110 247052 038 000
                                    .
                                    .
```
30-Second Data Interval (with optional SFMR data)

Note: Differences from the Air Force HDOB message include the following:

- C   Time code includes seconds, rather than a period to show 30-second mark
- C   Latitude and longitude hemispheres are denoted by a minus sign rather than an alphabetic character (N,S,E,W)
- C   Pressure altitudes and D-values are in feet
- C   D-value sign is explicit, rather than coded as a leading `5'
- C   Temperature and dewpoint signs are explicit, rather than making tenths odd/even
- C   There is no radar altitude or default status
- C   There may be SFMR data fields

Figure G-3. MinOb Description and Sample Message

Table G-4. NOAA MinOb Message Format

HHMMSS. L$_a$L$_a$L$_a$mm. L$_o$L$_o$L$_o$mm. PPPPP. ±DDDD. WWWSSS. ±TTT. ±ddd. wwwsss. *sss*. rrr

HHMMSS	The time of the observation in hours, minutes and seconds (UTC). All averages (except peak wind) are centered around this time.
L$_a$L$_a$L$_a$mm	The latitude of the observation in degrees and minutes. A negative number signifies the Southern hemisphere. There may be leading blanks in the degree subfield; the minutes will always be a two digit numeric (zero filled as required).
L$_o$L$_o$L$_o$mm	The longitude of the observation in degrees and minutes. A negative number signifies the Eastern hemisphere. NOTE: This is opposite the normal convention. There may be leading blanks in the degree subfield; minutes will always be a two digit numeric.
PPPPP	The pressure altitude in feet. There may be leading blanks.
±DDDD	The D-value (Geopotential Altitude - Pressure Altitude) in feet. There will always be a leading sign (+ or -) followed by four numeric characters (leading zeros if required)
WWW	The wind direction in degrees, with 0 being true North, increasing clockwise. There will always be three numeric characters, with leading zeros if required.
SSS	The wind speed in knots. There will always be three numeric characters, with leading zeros if required.
±TTT	The air temperature in degrees and tenths Celsius. There will always be a leading sign (+ or -) followed by three numeric characters (leading zeros if required). For example, 5.3 C would be coded +053.
±ddd	The dewpoint temperature, encoded the same way as air temperature.
www	The direction of the peak wind during this interval (30 sec, 1 min, etc.). The peak wind is defined as the maximum 10 second average wind. Format is the same as wind direction above.
sss	The speed of the peak wind in knots. Format is the same as wind speed above.
sss	The wind speed at the surface in knots, as measured by the Stepped Frequency Microwave Radiometer (SFMR). This is an optional field new for 1999, and may be omitted depending on the version of software being run. If omitted, the rain rate field will also be omitted, and the <cr><cr><lf> sequence will occur immediately after the peak wind speed field (no trailing blank). When present, there will be three numeric characters, with leading zeros if required. If the SFMR wind can not be calculated during the sample interval, it (and the rain rate) will be coded as 999.
rrr	The rain rate in mm/hr, as measured by the SFMR. When present (see SFMR wind speed discussion above), there will be three numeric characters, with leading zeros if required. If rain rate can not be calculated it will be coded as 999.

Table G-5. 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-4 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 $n_on_oP_oP_oP_o$ $d_od_of_of_of_o$

                   $n_1n_1P_1P_1P_1$ $d_1d_1f_1f_1f_1$

                   $n_nn_nP_nP_nP_n$ $d_nd_nf_nf_nf_n$
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: $99P_0P_0P_0$ $T_0T_0T_0D_0D_0$ $d_0d_0f_0f_0$

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_0d_0 – 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: $f_o f_o f_o$ – 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.

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 ($d_o d_o f_o f_o f_o$) will be included in the report; when the corresponding wind data are not available, the group will be encoded as /////.

STANDARD ISOBARIC SURFACES : $P_1 P_1 h_1 h_1 h_1$ $T_1 T_1 T_1 D_1 D_1$ $d_1 d_1 f_1 f_1 f_1$

Identifier: $P_1 P_1$ – 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: $h_1 h_1 h_1$ – 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: $T_1 T_1 T_1 D_1 D_1$ – Same temperature/dew point encoding procedures apply to all levels.
Identifier : $d_1 d_1 f_1 f_1 f_1$ – Same wind encoding procedures apply to all levels.

DATA FOR TROPOPAUSE LEVELS: 88 $P_t P_t P_t$ $T_t T_t T_t D_t D_t$ $d_t d_t f_t f_t f_t$

Identifier: **88** – Indicator for Tropopause level follows
Identifier: $P_t P_t P_t$ – Pressure at the tropopause level reported in whole millibars. Report $88 P_n P_n P_n$ as 88999 when tropopause is not observed.
Identifier: $T_t T_t T_t D_t D_t$ – Same temperature/ dew point encoding procedures apply.
Identifier: $d_t d_t f_t f_t f_t$ - Same wind encoding procedures apply.

MAXIMUM WIND DATA: 77$P_n P_n P_n$ $d_n d_n f_n f_n f_n$ $4 v_b v_b v_a v_a$

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: $P_n P_n P_n$ – Pressure at maximum wind level in whole millibars.
Identifier: $d_n d_n f_n f_n f_n$ - Same wind encoding procedures apply.

VERTICAL WIND SHEAR DATA: $4 v_b v_b v_a v_a$

Identifier: **4** – Data for vertical wind shear follow.
Identifier: $v_b v_b$ – 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: $v_a v_a$ – 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 $s_r r_a r_a s_a s_a$ 8GGgg

Identifier: $s_r r_a r_a s_a s_a$ - Sounding system indicator, radiosonde/ system status: $s_a r_a r_a s_a s_a$
Identifier: s_a - Solar and infrared radiation correction (**0** – no correction)
Identifier: $r_a r_a$ – Radiosonde/sounding system used   (**96** – Descending radiosonde)
Identifier: $s_a s_a$ – 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 $0P_nP_nP_nP_n$

Identifier: **51515** – Additional data in regional code follow
Identifier: **10166** – Geopotential data are doubtful between the following levels $0P_nP_nP_nP_n$. 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 $0P_nP_nP_nP_n$. 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 $99P_0P_0P_0$ ///// and in Part B as $00P_0P_0P_0$ /////. 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 to the eye center.

Identifier: **SPL XXXXNXXXXXW** *hhmm* - Impact location of the sonde based on its last GPS position *and the splash time*. The splash location will be recorded automatically by computer.

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:
$n_0 n_0 P_0 P_0 P_0 \; T_0 T_0 T_0 D_0 D_0$

IDENTIFICATION LETTERS: $M_J M_J$

Identifier: $M_J M_J$ - 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: $99L_a L_a L_a$ (Same as Part A)

LONGITUDE: $Q_c L_o L_o L_o L_o$ (Same as Part A)

MARSDEN SQUARE: $MMMU_{la}U_{lo}$ (Same as Part A)
SEA LEVEL PRESSURE: $n_o n_o P_0 P_0 P_0 \; T_0 T_0 T_0 D_0 D_0$

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

Identifier: $P_0 P_0 P_0$ – Indicator for pressure of specified levels in whole millibars (thousands digit omitted)

Identifier: $T_0 T_0 T_0$ – Tens and digits of air temperature (not rounded off) in degrees Celsius, at specified levels beginning with surface.

Identifier: $D_0 D_0$ – 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: $n_0 n_0 P_0 P_0 P_0 \; d_o d_o f_o f_o f_o$

Identifier: $n_0 n_0$ – Number of level starting with surface level. Only surface will be numbered as **"00".**
Identifier: $P_0 P_0 P_0$ – Pressure at specified levels in whole millibars.

Identifier: $d_o d_o$ – 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: $f_o f_o f_o$ – Wind speed in knots. Hundreds digit is sum of speed and unit digit of direction, i.e. 29<u>5</u>° 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-4. EXAMPLE TEMP DROP MESSAGE FOR TROPICAL CYCLONES

UZNT13 KNHC 061851
XXAA 56187 99251 70786 08158 99990 26444 ///// 00540 26247 13070 92827
22856 12565 85560 17834 13075 70200 13045 13585 88999 77999
31313 09608 81828
51515 10166 00270
61616 AF968 0204A MARIE OB 14
62626 MXWNDBND SPL 2525N07835W *1826* LST WND 012 MBL WND 13065
AEV 20200 DLM WND 13075 990699 WL150 13070 843
XXBB 56188 99251 70786 08158 00006 26444 11000 25841 22991 24657 33860
18233 44719 15657 55699 13045
21212 00990 ///// 11983 13570 22959 13065 33865 12560 44787 13075 55719
13575 66699 13585
31313 09608 81828
51515 10166 00270
61616 AF968 0204A MARIE OB 14
62626 MXWNDBND SPL 2525N07835W *1826* LST WND 012 MBL WND 13065
AEV 20200 DLM WND 13075 990699 WL150 13070 843