

The National Climatic Data Center
Standard Non-real-time Transfer Format
for
Radiosonde Data

Revision: 20130918 JDA



Revision History

Date	Who	Source	Notes
20030820	Larry Griffin (LJG)	Unknown	Unknown. First version available. Assumed modifications include <ul style="list-style-type: none"> • addition of codes in red font
20100310	Stuart Hinson (CSH)	Unknown	Unknown. Assumed mods include <ul style="list-style-type: none"> • Addition/rewording of codes in green font • Update of “background” section to reflect FTP / e-mail transfer of data
20121003	Jeff Arnfield (JDA)	Kevin Kay (NWS OPS/23); review of RS92/B2.2 documentation	<ul style="list-style-type: none"> • Addition of codes in purple font <ul style="list-style-type: none"> ○ Sonde 504 • Add Revision History page • Update font to Calibri • Pending: Update layout
20130123	Jeff Arnfield (JDA)	Aaron Poyer (NWS OPS/22); Kevin Kay (NWS OPS/23); review of flight data files	<ul style="list-style-type: none"> • Updated to include new sonde codes, other changes <ul style="list-style-type: none"> ○ Sonde 503 • Updated “HOUR” to reflect proper synoptic release range of H-60 to H+29 • Minor layout & formatting changes
20130405	Jeff Arnfield (JDA)	NCDC procedures	<ul style="list-style-type: none"> • Updated “Background” section to clarify file naming convention and reflect current NCDC procedure (no longer using diskette transfer) • Pending: clean up layout of H### section
20130715	Jeff Arnfield (JDA)	NWS Bill Blackmore	<ul style="list-style-type: none"> • Update the HOUR definition to reflect RRS V1.2 sites non-synoptic 06z & 18z flight windows
20130918	Jeff Arnfield (JDA)		<ul style="list-style-type: none"> • Updated description of sonde type 504 to match Kevin Kay’s notes • Minor H section format changes

Overview

This document describes the data format that the National Weather Service (NWS) uses to deliver radiosonde observations to the National Climatic Data Center (NCDC). The NWS radiosonde ground system equipment formats each sounding, intended for relay to the NCDC, as two files, an Identification file (H file) and a Sounding Data file (T file). Both the H and T files are necessary, and flights lacking one or the other cannot be processed.

The Identification file has one 160 character record containing date and time of flight, station and equipment metadata, and surface weather parameters at the time of balloon release. The file naming convention for Identification files is H plus ascension number from the first of the year, left padded with 0. Examples are H001, H151, etc

The Sounding Data file contains a variable number of 80 character records, each containing data for one reported level. Data records contain flight ascension number, elapse time since release, layer type, observed elements, and data quality indicators. The naming convention for Data Files is T plus ascension number from the first of the year, left padded with 0. Examples are T001, T151, etc

Anonymous File Transfer Protocol (FTP) is currently the only acceptable method of transferring flight data to NCDC. Recent upper air site software prepares and transmits data file packages with minimal operator intervention. Some older systems require field personnel to transfer data files to another pc, package them and transmit to NCDC via FTP.

The few remaining sites using older, MicroART-style equipment create and upload a single data file package at the end of each month. All H and T files for the month are package in a single .zip file. Some sites also include a high-resolution data file for each flight. The zip file naming convention uses the site's lower case, four character program ID (usually a valid ICAO ID), the two digit month number and the two digit year, with a ".zip" extension: ssssMMYY.zip Examples for March 2013 are pacd0313.zip, kedw0313.zip, pacd0313.zip.

Sites using the newer NWS Radiosonde Replacement System (RRS) equipment transmit each flight's data as an individual .zip file data package following the conclusion of the flight. Each RRS flight data package contains a single H### file, a single T### file and usually a single B### file containing BUFR-formatted data. The naming convention for single flight data packages is the site's lower case, four character program ID (usually a valid ICAO ID), the two digit year, two digit month, two digit day, and the two digit flight hour, with a ".zip" extension: ssssYYMMDDHH.zip. Examples are kilx13032000.zip (kilx on March 20, 2013 00Z) and kmhx12100312.zip (kmhx on Oct 03, 2012 00Z).

The NCDC processes incoming flight files through the NCDC upper-air quality control system to produce a digital archive. The NCDC upper-air data archive contains all original data and quality indicators generated by NCDC automated and interactive quality control process.

Identification File (H###)

RECORD POSITION	ELEMENT NAME	CODE DEFINITIONS AND REMARKS
1	STN-IND	STATION NUMBER INDICATOR - This field contains an indicator specifying the type of station number in the next field: 0 = WBAN NUMBER 1 = WMO NUMBER 2 = AIR FORCE AUGMENTED WMO NUMBER 3 = SHIP CALL SIGN 4 = MOBILE UNIT CALL SIGN
2-9	STN NUM	STATION NUMBER - The number assigned to the station according to the numbering system specified in record position 1. Numbers should be right justified with leading blanks, ship CALL signs left justified with trailing blanks. NWS stations must enter WBAN number. If the number is missing, enter "00000000".
10-14	LAT	LATITUDE - The station latitude in degrees and minutes. The last character is "N" or "S" as appropriate. When unknown, this field contains "9999N".
15-20	LONG	LONGITUDE - The station longitude in degrees and minutes. The last character is "E" or "W" as appropriate. When unknown, this field contains "99999E".
21-24	ELEV	ELEVATION - The height of the launch site in whole meters.
25-28	YEAR	YEAR - The 4-digit year expressed at the hour of observation (UTC).
29-30	MONTH	MONTH - The numeric month expressed at the hour of observation (UTC).
31-32	DAY	DAY - The numeric day expressed at the hour of observation (UTC).

33-34	HOUR	HOUR - The hour (24-hour clock) of observation (UTC). For synoptic hours (H=00, 06, 12, 18) the hour of observation will be H when the actual release time is H-60 to H+29. For example, the hour will be entered as 12 when the actual release is from 1100 to 1229 UTC. For regular synoptic observations the actual release should occur as close as possible to H-60. For non-synoptic hours, the hour of observation will be the nearest whole hour, H-30 to H+29 (e.g. the hour is entered as 10 when release is 0930 to 1029 UTC). Exception: Sites using RRS software version 1.2 use the narrower H-30 to H+29 window for 06 and 18 flights.
35-38	RELSE TIME	TIME OF ACTUAL RELEASE - The hour and minute UTC (24-hour clock) of release
39-42	ASCN NUM	ASCENSION NUMBER - The ascension number for the year. The first release on or after Jan 1 will be numbered 0001. Right-justified with leading zeros.
43-46	OBSVR INIT	OBSERVER INITIALS - The initials of the first and last name of the observer.
47-49	DTA RDC SYS	DATA REDUCTION SYSTEM - The type of data reduction system used at the site.
001 = MANUAL 002 = TIME-SHARE 003 = NOVA MINI COMPUTER 004 = MINI-ART 005 = MICRO-ART 007 = MARWIN, MRS 008 = MSS 009 = LAMS 010 = ASAP 011 = MV 7800 012 = AIR MET RESEARCH RAWIN SYSTEM 013 = VIZ W-9000 Meteorological Processing System (DOS based) 014 = RRS 018 = ATIR 019 = InterMet 1500 020 = WIN9000 (Software for LMG6 System) Windows based		

50-52 SONDE MAN SONDE MANUFACTURER - The manufacturer of
the Sonde in use.

001 = VIZ
002 = VAISALA
003 = SPACEDATA
004 = AIR
005 = ATIR
006 = Sippican

007 = InterMet

008 = Lockheed Martin Sippican (LMS)

53-55 SONDE TYP SONDE TYPE - The type of Sonde used at
the station.

001 = VIZ J031
002 = VIZ ACCU-LOC
003 = VIZ A
004 = VIZ B
005 = VIZ MSS
006 = SPACEDATA-TRANSPONDER
007 = SPACEDATA-ARTSONDE
008 = SPACEDATA-MSS
009 = VAISALA RS80 (version unknown)
010 = VIZ B mod. 1492-520 (1680/403MHz)- TRANSPONDER
011 = AIR INTELLISONDE
012 = VIZ Mark II MICROSONDE
013 = VIZ C mod. 1492-530 (1680 MHz) Accu Lok 014-019 reserved
020 = VAISALA RS80-15N Navy MRS (OMEGA Navaid windfinding)
021 = VAISALA RS80-15P (OMEGA Navaid windfinding)
022 = VAISALA RS80-15L (Loran-C Navaid windfinding)
...
038 = VAISALA RS80-56 (Radio Direction Finding(RDF), 1680 MHz)-
 pressure cell
039 = VAISALA RS80-57 (RDF, 1680 MHz)
040-044 reserved
045 = Sippican HRFE
046 = Sippican LRFE
...
489 = VIZ B-2 (RDF, 1680 MHz) capacitance aneroid pressure sensor
**500 = Mark IIA Sippican GPS 1680 MHz with aneroid pressure cell
 and carbon element RH**
501 = InterMet GPS
**502 = LMS6 Lockheed Martin Sippican 403 MHz GPS radiosonde with
 capacitive RH sensor and derived pressure from GPS height**
**503 = LMS6 Lockheed Martin Sippican 1680 MHz GPS radiosonde with
 capacitive RH sensor, resistive chip thermistor, capacitive
 aneroid pressure**
504 = Vaisala RS92-NGP (NWS GPS with Pressure) 1680 MHz GPS

radiosonde with P silicon capacitor, T capacitive wire, RH twin thin film capacitance heated sensor

56	SON/BAR IND	SONDE/BAROSWITCH NUMBER INDICATOR - An indicator specifying the type of number in the next field.
<p>0 = SONDE SERIAL NUMBER 1 = BAROSWITCH NUMBER</p>		
57-76	SON/BAR NUM	SONDE/BAROSWITCH - The Sonde serial number or the Baroswitch number right justified in the field, with leading blanks . This "number" probably will include non-numeric characters.
77-79	HUM TYP	HUMIDITY TYPE - Type of humidity element used in the system.
<p>001 = Lithium Chloride Hygristor 002 = 1960's Carbon Hygristor 003 = 1980's Carbon Hygristor 004 = Humicap 005 = H-Humicap 006 = VIZ Mark II carbon hygristor 007 = Capacitance sensor 008 = Sippican Mark IIA Carbon Hygristor 009 = LMS6 thin film capacitance humidity sensor 010 = Vaisala twin thin film capacitance heated sensor</p>		
80-82	TEMP TYP	TEMPERATURE TYPE - Type of temperature element used in the system.
<p>001 = Rod Thermistor 002 = Bead Thermistor 003 = Chip Thermistor 004 = Capacitive Bead 005 = Capacitive Wire</p>		

83-85	PRESS TYP	PRESSURE TYPE - Type of pressure element used in the system.
001		= Baroswitch
002		= Transducer - oven controlled
003		= Transducer - non-oven controlled
004		= Derived (Transponder)
005		= Capacitive Aneroid
006		= Resistive strain gauge
007		= Pressure derived from differential GPS geometric height
008		= Silicon Capacitor
86-88	TRK TYP	TRACKING TYPE - type of tracking system.
001		= 72-2
002		= SCR-658
003		= WBRT-57
004		= WBRT-60
005		= GMD-1
006		= GMD-1A
007		= GMD-1B
008		= GMD-5
009		= OMEGA
010		= LORAN
011		= ART-1
012		= ART-1R
013		= ART-2
014		= ART-2R
015		= MDS
016		= MSS RANGING
017		= RADIO THEODOLITE
018		= Global Positioning System (GPS)
89	TRNSP	TRANSPONDER - is a transponder used.
0		= No
1		= Yes
90-92	BAL MAN	BALLOON MANUFACTURER - The manufacturer of the balloon.
001		= KAYSAM
002		= WEATHERTRONICS
003		= KKS
004		= Totex
999		= Other
93-96	BAL WGT/ TYP	BALLOON WEIGHT/TYPE - Nominal weight of the balloon in grams or balloon type as follows:
0001		= GP26
0002		= GP28
0003		= GP30
0004		= HM26
0005		= HM28
0006		= HM30
0007		= SV16
9999		= Other

97-98	BAL AGE	BALLOON AGE - Age of the balloon in months.
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99	TRN REG	TRAIN REGULATOR - Was a train regulator used
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N = No
Y = Yes

100	PBL LGT	PIBAL LIGHT - Was a PIBAL light used
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N = No
Y = Yes

101	PBL TYP	PIBAL TYPE - PIBAL wind equipment type according to WMO Code Table 0265.
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0 = Pressure instrument associated with wind-measuring equipment
1 = Optical Theodolite
2 = Radio Theodolite
3 = Radar
8 = Satellite Navigation (or GPS)

102-103	REASON TERMN	REASON FOR TERMINATION - Reason for termination of the flight:
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01 = Balloon burst
02 = Balloon forced down by icing
03 = Leaking or floating balloon
04 = Weak or fading signal
05 = Battery failure
06 = Ground equipment failure
07 = Signal interference
08 = Radiosonde failure
09 = Excessive missing data
10 = Other

104	NUM RCP	RECOMPUTES - The number of times this flight has been recomputed.
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105-113 CLOUDS-WX CLOUDS AND WEATHER - The observation of the clouds and weather at the time of release. The field is of the form $N_h C_L h C_M C_H WWWW$, where:

N_h = The amount of low or mid-level clouds present according to WMO Code Table 2700.

0 = 0 okta (tenths)
1 = 1 okta (1/10) or less, but not zero
2 = 2 oktas (2/10-3/10)
3 = 3 oktas (4/10)
4 = 4 oktas (5/10)
5 = 5 oktas (6/10)
6 = 6 oktas (7/10-8/10)
7 = 7 oktas (9/10) or more, but not overcast
8 = 8 oktas (10/10)
9 = Sky is obscured by fog and/or other meteorological phenomena
- = Cloud cover is indiscernible for reason other than "9" or observation not made. The WMO code figure "/" must be converted to "-".

C_L, C_M, C_H = The cloud type according to WMO Code Tables 0509, 0513, and 0515. Code figure "/" must be converted to "-".

h = WMO Code Table 1600 for the height above ground of the base of the lowest cloud seen. Code figure "/" must be converted to "-".

WW = Present weather according to WMO Code Table 4677. Up to two types of present weather or obscurations may be entered. If present weather is not observed, enter "////" in this field (WWW).

114-116 SFCWND DIR SURFACE WIND DIRECTION - The direction of the surface wind at time of release in whole degrees.

117-119 SFCWND SPD SURFACE WIND SPEED - The speed of the surface wind at time of release in meters per second to the nearest 0.1 meter per second. Do not enter the decimal point; 12.3 meters per second = 123.

120-122	WIND AVE INT	WIND AVERAGING INTERVAL - The interval of time or height over which the wind is derived.
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000 = None (instantaneous)
001 = Two mins. to 14km (MSL), four mins. above 14km (MSL).
(Pre-1990 FMH Standard, NWS)
002 = Post-1989 FMH Standard
003 = 20 seconds to 15K ft., 60 seconds above 15K ft.
004 = 30 seconds up to 2500m AGL,
45 seconds up to 5000m AGL,
60 seconds up to 7500m AGL,
75 seconds up to 10 km AGL,
90 seconds up to 15 km AGL,
105 seconds up to 20 km AGL,
120 seconds above 20 km AGL.
005 = Four mins. for the entire flight
006 = Two mins. for the entire flight
007 = Variable
008 = One Minute smoothing

123-134	CORTYP	TYPE OF CORRECTION - The type of correction applied to individual data elements by automated systems or observers.
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123-124	CORTYP-P	PRESSURE CORRECTIONS
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00 = No correction applied
01 = NASA temperature correction
02 = EMCWF temperature correction
...
...
88 = Unknown

125-126	CORTYPE-Z	HEIGHT CORRECTIONS
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00 = No correction applied
01 = Local gravity correction
02 = Standard gravity correction
...
...
88 = Unknown

127-128 CORTYP-T TEMPERATURE CORRECTIONS

00 = No correction applied
01 = NASA radiation correction
02 = EMCWF radiation correction
03 = NMC radiation correction
04 = Vaisala RSN-93 solar and infrared radiation correction
...
...
11 = NASA lag correction
12 = EMCWF lag correction
13 = NMC lag correction
...
...
21 = NASA radiation and lag correction
22 = EMCWF radiation and lag correction
23 = NMC radiation and lag correction
...
...
88 = Unknown
89 = Sippican W-9000 Solar Correction
90 = Sippican (aka LMS) Solar with cloud cover
91 = InterMet Solar and Infrared
92 = LMS WIN9000 Solar and Infrared Correction without cloud
93 = Vaisala RSN2005 Solar and Infrared without cloud

129-130 CORTYP-H HUMIDITY CORRECTIONS

00 = No corrections applied
01 = NASA lag correction
02 = EMCWF lag correction
03 = NMC lag correction
...
...
88 = Unknown

131-132 CORTYP-TD DEW POINT CORRECTIONS

00 = No corrections applied
01 = NASA lag correction
02 = EMCWF lag correction
03 = NMC lag correction
...
...
88 = Unknown

133-134 CORTYP-W WIND CORRECTIONS

00 = No corrections applied
01 = Elevation angle correction
02 = Ranging correction
...
...
88 = Unknown

NOTE: At this writing, the types of corrections which may be applied to the data have not been determined. Input from various agencies will be used to develop initial codes and correction types.

135-144 SOFT VER SOFTWARE VERSION - The version of software in use with the specified recording system. Enter the software version left-justified with trailing blanks.

145-160 RES FLD RESERVED FIELD - Leave blank

DATA RECORD (T### file)

NOTES: The data records are repeated as many times as necessary to record all levels of the flight. All fields must be right-justified (least significant digit in the rightmost position) unless specified otherwise. All missing fields must be 9 filled unless specified otherwise. Do not enter decimal points. The decimal point is implied by the field position.

RECORD POSITION	ELEMENT NAME	CODE DEFINITIONS AND REMARKS
1-4	ASCN NUM	ASCENSION NUMBER - The ascension number for the year. The first release on or after Jan 1 will be numbered 0001.
5-9	ELPSD TIME	ELAPSED TIME - The time in minutes and seconds (mmmss) since the actual release time.
10-15	PRESS	PRESSURE - Atmospheric pressure at the current level in hundredths of hectopascals (0.01 millibars).
16-20	HGT	HEIGHT - Geopotential height of the pressure level in whole geopotential meters. (MSL)
21-24	TEMP	TEMPERATURE - Dry-bulb temperature to the nearest 0.1 degree Celsius.
25-28	REL HUM	RELATIVE HUMIDITY - The relative humidity to the nearest 0.1 percent.
29-31	DPDP	DEW POINT DEPRESSION - The dew-point depression to the nearest 0.1 degree Celsius
32-34	WIND DIR	WIND DIRECTION - The wind direction to the nearest whole degree.

35-38 WND SPD WIND SPEED - Wind speed to the nearest
0.1 meter per second.

39-40 TYP LEVEL TYPE OF LEVEL - The reason for selection
of the level:

00 = High resolution data sample
01 = Within 20 hectopascals (mb) of the surface
02 = Pressure less than 10 hectopascals (mb)
03 = Base pressure level for stability index
04 = Begin doubtful temperature, altitude data
05 = Begin missing data (all elements)
06 = Begin missing relative humidity data
07 = Begin missing temperature data
08 = Highest level reached before balloon descent because of
icing or turbulence.
09 = End doubtful temperature, altitude data
10 = End missing data (all elements)
11 = End missing relative humidity data
12 = End missing temperature data
13 = Zero degree crossing for the RADAT
14 = Mandatory pressure level
15 = Operator added level
16 = Operator deleted level
17 = Balloon re-ascended beyond previous highest level
18 = Significant relative humidity level
19 = Relative humidity level selection terminated
20 = Surface level
21 = Significant temperature level
22 = Mandatory temperature level
23 = Flight termination level
24 = Tropopause
25 = Aircraft report
26 = Interpolated (generated) level
27 = Mandatory wind level
28 = Significant wind level
29 = Maximum wind level
30 = Incremental wind level (e.g., 1-minute, fixed regional)
31 = Incremental height level (generated)
32 = Wind termination level
**33 = Pressure 100 to 110 hectopascals, when no other reason
applies.**
...
40 = Significant thermodynamic level (reason for selection
unknown)
41 = Significant relative humidity level, using NCDC criteria.
42 = Significant temperature level, using NCDC criteria.

43 = Begin missing wind data.
44 = End missing wind data.
99 = ?? unknown, but it's the most frequent type

41-43	SQP	SIGNAL QUALITY - Signal quality for the element(Pressure) expressed as a percentage of individual samples accepted.
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44-46	SQT	(Temperature)
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47-49	SQU	(Humidity)
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50-52	SQD	(Dew-point temperature)
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53-54	EQET	ELEMENT QUALITY FLAGS - These fields contain the results (Elapsed Time) of any quality control procedures for identifying suspect and doubtful individual elements:
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55-56	EQP	(Pressure/Ranging)
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00 = Element is correct
01 = Element is suspect

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57-58	EQH	(Height)
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02 = Element is doubtful
03 = Element failed QC checks
04 = Replacement value (correction)

59-60	EQT	(Temperature)
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05 = Estimated value
06 = Observer edited value
09 = Element not checked

61-62	EQU	(Humidity)
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63-64	EQD	(Dew-point depression)
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65-66	EQWD	(Wind direction)
<hr/>		
67-68	EQWS	(Wind speed)
<hr/>		
69-80	RES FLD	RESERVED FIELD Leave Blank; in RRS software versions 2.1 and above, filled with "9"
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