

**DSI-3297**

**CDMP COOP SUMMARY OF THE DAY FORTS**

Version 1.0

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This document was prepared by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Environmental Satellite Data and Information Service, Midwestern Regional Climate Center, Champaign, Illinois, and the National Climatic Data Center, Asheville, North Carolina.

This document is designed to provide general information on the current, origin, format, integrity and the availability of this data file.

Errors found in this document should be brought to the attention of the Data Base Administrator, NCDC. See topic 58 for a summary of this data set.

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Appendix A. Digitization of Historical Daily Cooperative Network Data

Appendix B. Documentation of Problems with and Changes Made to Keyed Data

Appendix C. Station Identifiers, and Beginning and Ending of Periods of Record

**1. Data Set ID:**

CDMP-Forts

**2. Data Set Name:**

COOP Summary of the Day - CDMP - 1700s and 1800s Forts and Other Voluntary Observers

**3. Data Set Aliases:**

Surface Land Daily Cooperative Data  
Summary of the Day Data  
Co-op Data  
Climatological Data  
Daily Weather Data  
SOD

**4. Access Method and Sort for Archived Data:**

Data are archived in a variable length element file structure. The element file structure is designed to allow maximum flexibility in requesting data. Only those elements or groups of elements of particular interest need be ordered. Archived data are currently sorted by Station-ID (excluding the Division Number) as the primary key and year, month, and meteorological element-type as secondary keys.

NCDC maintains an extensive digital collection of historical global, climatic archives from surface, oceanic, and satellite sources. Like types of meteorological data are categorized into "Tape Deck (TD) families". For instance: the TD-5600 series contains upper air data; the 1100 series contains marine data, the 9700 series contains model analysis data, etc.

In the early 1980's NCDC instituted the 'element file structure' in an effort to standardize the archival of meteorological data. The 3200 series utilizes the element file structure to assimilate surface weather information.

The record structure as shared by the TD-32XX records (where "XX" denotes any one of a particular TD series) may be generalized as two distinct "portions". These portions are as follows:

The contents of the first portion are essentially 'fixed' as it contains information used to describe the remainder of the record. By its design, the second portion allows for a logical maximum of 100 data values; nonetheless, the actual "maximum" varies with the TD series. For example, in the daily data series the actual maximum is 62; in the monthly data it is 26; in the minute data it is 60, etc. In this respect, this portion is termed as "variable"; consequently, the entire record is also of variable length.

Data may also be received in a fixed length record structure described in topic 5 "Description: Access Method and Sort for Supplied Data".

Provided within this section are information and examples of how to access the Variable Length data records, specifically:

- a. COBOL Data Description (1 example)
- b. FORTRAN Data Descriptions (2 examples)
- c. Control Language Notes
- d. List of Variables ("Elements")

e. Schematic Variable Length Record Format Layout

The following COBOL and FORTRAN statements are to be used as guidelines only. NCDC recognizes the fact that many different types of equipment are used in processing these data. It is impossible to cover all the idiosyncrasies of every system.

**a. COBOL Data Description**

This is a typical ANSI Standard COBOL Variable Length Description.

```
FD  INDATA
    LABEL RECORDS ARE STANDARD
    RECORDING MODE D
    BLOCK CONTAINS 12000 CHARACTERS
    DATA RECORD IS DATA-RECORD.
01  DATA-RECORD.
    02 RECORD-TYPE                PIC X(3).
    02 STATION-ID                 PIC X(8).
    02 ELEMENT-TYPE              PIC X(4).
    02 ELEMENT-UNITS-CODE        PIC XX.
    02 YEAR                      PIC 9(4).
    02 MONTH                    PIC 99.
    02 FILLER                    PIC 9(4).
    02 NUMBER-VALUES             PIC 9(3).
    02 DAILY-ENTRY
        OCCURS 1 TO 100 TIMES DEPENDING ON NUMBER-VALUES.
        04 DAY                   PIC 99.
        04 HOUR                  PIC 99.
        04 DATA-VALUE           PIC S9(5) SIGN LEADING
            SEPARATE.
        04 D-VAL REDEFINES DATA-VALUE.
            05 SIGN-VAL          PIC X.
            05 DATA-IN          PIC X(5).
        04 FLAG-1                PIC X.
        04 FLAG-2                PIC X.
```

**b. FORTRAN Data Description**

(1) FORTRAN 77 Example 1

This description is for those systems that can handle variable blocked records normally.

```
IMPLICIT INTEGER (A-Z)

OPEN (10, FILE = 'FILENAME', ACCESS = 'SEQUENTIAL', STATUS = 'OLD',
+   RFORM = 'VB', MRECL = 1230, TYPE = 'ANSI', BLOCK =
+   12000)
C   LAST 2 lines of OPEN statement are SPERRY UNIQUE

DEFINE FILE 10 (ANSI, VB, 1230, 12000)
CHARACTER*3 RECTYP
CHARACTER*8 STNID
CHARACTER*4 ELMTYP
CHARACTER*2 EUNITS
CHARACTER*1 FLAG1, FLAG2
```

```

        DIMENSION IDAY(100), IHOURL(100), IVALUE(100), FLAG1(100),
+         FLAG2(100)

10  READ (10,20,END=999,ERR=10) RECTYP, STNID, ELMTYP, EUNITS,
IYEAR,
+     IMON, IFIL, NUMVAL, (IDAY(J), IHOURL(J), IVALUE(J),
+     FLAG1(J), FLAG2(J), J=1, NUMVAL)
20  FORMAT (A3, A8, A4, A2, I4, I2, I4, I3, 100(2I2, I6, 2A1))
(2)  FORTRAN 77 Example 2

```

This description is for those systems that can't handle variable blocked records normally.

```

PROGRAM TAPERREAD
IMPLICIT INTEGER (A-Z)
.....
OPEN(1,FILE=TAPE:',ACCESS='SEQUENTIAL',FORM=FORMATTED',
+ STATUS='OLD',READONLY)

CHARACTER BUFFER*12000      ! YOUR MACHINE MUST SUPPORT
                             ! CHARACTER VARIABLES THIS LARGE

CHARACTER*3 RECTYP
CHARACTER*8 STNID
CHARACTER*4 ELMTYP
CHARACTER*2 EUNITS
CHARACTER*1 FLAG1, FLAG2
DIMENSION IDAY(100), IHOURL(100), IVALUE(100), FLAG1(100)
+     FLAG2(100)
.....
NBYTES=0
5     NBEG=1
10    READ(1,101,END=99)BUFFER      !READ IN PHYSICAL RECORD (BLOCK)
NBEG=NBEG+NBYTES
10    READ(BUFFER(NBEG:NBEG+3,102)NBYTES  !READ THE CONTROL WORD
IF( NBYTES.EQ.0 )GO TO 5
READ(BUFFER(NBEG+4:NBEG+NBYTES-1),103) RECTYP, STNID, ELMTYP,
+ EUNITS, 1YEAR, IMON, IFIL, NUMVAL, (DAY(J), IHOURL(J),
+ IVALUE(J), FLAG1(J), FLAG2(J), J=1, NUMVAL)
.....

.....
99    GO TO 10
CONTINUE
.....
.....
101   STOP 'FINISHED'
102   FORMAT(A)
103   FORMAT(I4)
103   FORMAT (A3, A8, A4, A2, I4, I2, I4, I3, 100(2I2, I6, 2A1))
END

```

### c. Control Language Notes

#### (1) IBM JCL Notes

```

For ASCII Variable specify:
LRECL   = 1234
RECFM   = DB

```

OPTCODE = Q

For EBCDIC Variable specify:

LRECL = 1234

RECFM = VB

(2) VAX DCL Notes

\$ MOUNT/FOREIGN/BLOCKSIZE=12000 MT: tapename TAPE:

**d. List of Variables**

ELEMENT	WIDTH	POSITION	
001 RECORD TYPE (= DLY)	3	001-003	--
002 STATION ID	8	004-011	
003 METEOROLOGICAL ELEMENT TYPE	4	012-015	
004 MET. ELEMENT MEASUREMENT UNITS CODE	2	016-017	-- ID
005 YEAR	4	018-021	
PORTION			
006 MONTH	2	022-023	
007 FILLER (= 9999)	4	024-027	
008 NUMBER OF DATA PORTIONS THAT FOLLOW	3	028-030	--
009 DAY OF MONTH	2	031-032	--
010 HOUR OF OBSERVATION	2	033-034	
011 SIGN OF METEOROLOGICAL ELEMENT VALUE	1	035	-- DATA
VALUE OF METEOROLOGICAL ELEMENT	5	036-040	
PORTION			
QUALITY CONTROL FLAG 1	1	041	
QUALITY CONTROL FLAG 2	1	042	--
DATA GROUPS IN THE SAME FORM AS ELEMENT 12		043-054	DATA
PORTION			
POSITIONS 31-42 REPEATED AS MANY	12	055-066	DATA
PORTION			
TIMES AS NEEDED TO CONTAIN ONE MONTH	12	067-078	DATA
PORTION			
OF RECORDS.	.....	.....	
608	12	1219-1230	DATA
PORTION			

**e. Format (Variable Length Record Layout)**

1. The first eight elements (positions 001-030) constitute the ID PORTION of the record and describe the characteristics of the entire record. The next six elements, the DATA PORTION of the record contains information about each meteorological element value reported. This portion is repeated for as many values as occur in the monthly record.

2. Each logical record is of variable length with a maximum of 1230 characters. Each logical record contains a station's data for a specific meteorological element over a one-month interval. The form of a record is:

ID PORTION (30 Characters) Fixed length

```
*****
* REC | STATION | ELEM |   |   |   |   | NUM >
* TYP |   ID    | TYPE | UNT | YEAR | MO | FILL | VAL >
*****|*****|*****|*****|*****|*****|*****|*****
* XXX | XXXXXXXX | XXXX | XX  | XXXX | XX  | XXXX | XXX >
```

```

*****
ELEMENTS 001      002      003      004      005      006      007      008

      DATA PORTION (12 Characters, repeated "NUM-VAL" times--up to 100)

*****
< DY | HR | MET. ELEM | FL | FL | DY | HR | MET. ELEM | FL | FL >
<    |   |          | 1 | 2 |   |   |          | 1 | 2 >
<    |   | ***** |   |   |   |   | ***** |   |   >
<    |   | DATA   |   |   |   |   | DATA   |   |   >
<    |   | S VALUE |   |   |   |   | S VALUE |   |   >

<****|****|****|*****|****|****|****|****|*****|*****|****>
< XX | XX | X | XXXXX | X | X | XX | XX | X | XXXXX | X | X >
*****
ELEMENTS 009 010 011 012 013 014 015 016 017 018 019 020

```

```

*****
< DY | HR | MET. ELEM | FL | FL *
<    |   |          | 1 | 2 *
<    |   | ***** |   |   *
<    |   | DATA   |   |   *
<    |   | S VALUE |   |   *
<****|****|****|*****|****|****|****|****|*****|*****
< XX | XX | X | XXXXX | X | X *
*****
ELEMENTS 603 604 605 606 607 608

```

3. The Number of Data Portions (position 008) for the logical record of type "DLY" ranges from 1 to 62.

### 5. Access Method and Sort for Supplied Data:

In addition to a variable length record structure, users may also receive data in a fixed length record structure as described below. However, the user must specify whether to extract either the original or edited data values. Supplied data are in the same sort as archived data (see topic 4 "Description: Access Method and Sort for Archived Data").

Provided within this section are information and examples of how to access the fixed length data records, specifically:

- a. COBOL Data Description
- b. FORTRAN Data Description
- c. List of Variables ("Elements")
- d. Schematic Fixed Length Record Format Layout

#### a. COBOL Data Description

This is a typical ANSI Standard COBOL Fixed Record Length Description

```

FD   INDATA
    LABEL RECORDS ARE STANDARD (FOR STD LABEL TAPES)
    RECORDING MODE F
    BLOCK CONTAINS 15 RECORDS
    DATA IS DATA-RECORD
01  DATA RECORD
    02  RECORD-TYPE          PIC X(3).
    02  STATION-ID           PIC X(8).
    02  ELEMENT-TYPE        PIC X(4).
    02  ELEMENT-UNITS       PIC XX.
    02  YEAR                 PIC 9(4).
    02  MONTH               PIC 99.
    02  FILLER              PIC 9(4).
    02  NUMBER-VALUES       PIC 9(3).
    02  DAILY-ENTRY
        OCCURS 31 TIMES.
        04  DAY              PIC 99.
        04  HOUR            PIC 99.
        04  DATA-VALUE     PIC S9(5) SIGN LEADING SEPARATE.
        04  D-VAL REDEFINES DATA-VALUE.
            05  SIGN-VAL    PIC X.
            05  DATA-IN   PIC X(5).
        04  FLAG-1          PIC X.
        04  FLAG-2          PIC X.

```

**b. FORTRAN Data Description**

FORTRAN 77 Example

```

        DEFINE FILE 10 (ANSI, FB, 402, 6030)
        CHARACTER*3 RECTYP
        CHARACTER*8 STNID
        CHARACTER*4 ELMTYP
        CHARACTER*2 EUNITS
        CHARACTER*1 FLAG1, FLAG2
        DIMENSION IDAY(31), IHOURL(31),
+  IVALUE(31), FLAG1(31), FLAG2(31)

10  READ (10,20,END=999,ERR=10)RECTYP, STNID, ELMTYP, EUNITS, IYEAR,
+    IMON, IFIL, NUMVAL, (IDAY(J), IHOURL(J), IVALUE(J),
+    FLAG1(J), FLAG2(J), J=1, 31)

20  FORMAT (A3, A8, A4, A2, I4,I2, I4, 13, 31(212, I6, 2A1))

```

**c. List of Variables**

ELEMENT	WIDTH	POSITION	
001	RECORD TYPE (= DLY)	3	001-003--
002	STATION ID	8	004-011
003	METEOROLOGICAL ELEMENT TYPE	4	012-015
004	MET. ELEMENT MEASUREMENT UNITS CODE	2	016-017
005	YEAR	4	018-021
006	MONTH	2	022-023
007	FILLER (= 9999)	4	024-027
008	NO. OF DATA PORTIONS THAT FOLLOW (= 031)	3	028-030--
009	DAY OF MONTH	2	031-032--
010	HOUR OF OBSERVATION	2	033-034
011	SIGN OF METEOROLOGICAL ELEMENT VALUE	1	035

VALUE OF METEOROLOGICAL ELEMENT	5	036-040	
QUALITY CONTROL FLAG 1	1	041	
QUALITY CONTROL FLAG 2	1	042	--
DATA GROUPS IN THE SAME FORM AS ELEMENT	12	043-054	DATA PORTION
POSITIONS 31-42 ARE REPEATED	12	055-066	DATA PORTION
31 TIMES.	.....	.....	
194	12	391-402	DATA PORTION

**d. Format (Fixed Length Record Layout)**

1. The first eight elements (positions 001-030) constitute the ID PORTION of the record and describe the characteristics of the entire record. The next six elements, the DATA PORTION of the record, contain information about each meteorological element value, reported. This portion is repeated 31 times.

2. Each logical record is fixed with 402 characters. Each logical record contains a station's data for a specific meteorological element over a one month interval. The form of a record is:

ID PORTION (30 characters) Fixed Length

```
*****
* REC | STATION | ELEM |   |   |   |   | NUM >
* TYP |   ID   | TYPE | UNT | YEAR | MO | FILL | VAL >
** ***|*****|*****|*****|*****|*****|*****|***** >
* XXX |XXXXXXXX|XXXX | XX | XXXX | XX | XXXX | XXX >
*****
ELEMENTS      001      002      003      004      005      006      007      008
```

DATA PORTION (12 Characters, repeated 31 Times)

```
*****
< DY | HR | MET. ELEM | FL | FL | DY | HR | MET. ELEM >
<   |   |*****|   |   |   |   |***** >
<   |   | DATA |   |   |   |   | DATA >
<   |   | S | VALUE |   |   |   |   | S | VALUE >
< ***|***|*****|***|***|***|***|***|***** >
< XX | XX | X / XXXXX | X | X | XX | XX | X | XXXXX >
*****
ELEMENTS      009      010      011      012      013      014      015      016      017      018
```

```
*****
< DY | HR | MET. ELEM | FL | FL *
<   |   |*****| 1 | 2 *
<   |   | DATA |   |   *
<   |   | S | VALUE |   |   *
< ***|***|***|*****|***|*****
< XX | XX | X | XXXXX | X | X *
*****
ELEMENTS      189      190      191      192      193      194
```

**6. Element Names and Definitions:**

RECORD TYPE

The type of data stored in this record. (Value is "DLY"). Each record

contains one month of daily values.

STATION-ID

This 8-character alphanumeric station identifier is assigned by the National Climatic Data Center. The first two digits refer to a state code (value range is 01-91; reference Table "A"). The next four digits refer to the Cooperative Network Index number (value range is 0001-9999). The last two digits are the Cooperative Network Division Number (value range is 01-10; 99 = Missing Division Number; reference Table "B").

METEOROLOGICAL ELEMENT-TYPE

The type of meteorological elements stored in this record. Range of values is listed below.

BARP

Barometric pressure, unadjusted instrument reading. Unit Measurement, Thousandths of Inches of Mercury.

BPTI

Barometric pressure, instrument reading adjusted for temperature and instrument correction. Unit Measurement, Thousandths of Inches of Mercury.

BPSL

Barometric pressure, instrument reading adjusted for temperature and instrument correction and reduced to sea level. Unit Measurement, Thousandths of Inches of Mercury.

CLSK, CLSA

Clearness of sky, on a scale of 0-10, with clear sky being 10, and cloudy being 0. CLSK for 24-hour average observation, CLSA for point measurement at time of observation. This element was sometimes recorded on a scale of 0-4; when this is occurred is not indicated in the daily data at this time.

CLDL, CLDU

Cloud direction of motion. CLDL for lower clouds; CLDU for upper clouds. Unit Measurement, Whole Degrees.

CLTL, CLTU

Cloud type (reference Table "C"). CLTL for lower clouds; CLTU for upper clouds.

CLVL, CLVU

Cloud velocity - speed component. CLVL for lower clouds; CLVU for upper clouds. Unit Measurement, Whole Miles per Hour.

DPTP

Dew point temperature. Unit Measurement, Hundredths of Degrees Fahrenheit.

DPTD

Dew point temperature depression. Unit Measurement, Hundredths of Degrees Fahrenheit.

DYSW

Daily occurrence of weather, including all different types of weather occurring that day (reference Table "D").

MNTP

Mean daily temperature, for 24-hour period ending at observation time. Generally, this mean is calculated from the average of the maximum and minimum daily temperatures, when available. See Section 33 - Station Data Time Averaging. Unit Measurement, Hundredths of Degrees Fahrenheit.

MNTO

Mean daily temperature, for 24-hour period ending at observation time. Generally, this mean is calculated from the average of three point measurements of the temperature observed over the course of the 24-hour period. See Section 33 - Station Data Time Averaging. Unit Measurement, Hundredths of Degrees Fahrenheit.

PTYP, PTAH

Precipitation type (reference Table "E"). PTYP for 24-hour period ending at observation time, PTAH for 8-hour or other period less than 24 hours ending at observation time.

PRCP, PRAH

Daily precipitation. PRCP for 24-hour period ending at time of observation; PRAH for 8-hour or other period less than 24 hours ending at observation time. Trace is less than 0.005 inch. Unit Measurement, Hundredths of Inches.

RGHT

River gauge height, or height of other body of water. Point measurement at time of observation. Unit Measurement, Tenths of Feet.

RGHC

Daily change in river gauge height, or height of other body of water. Change ending at time of observation. Unit Measurement, Tenths of Feet.

RHUM

Relative Humidity. Point measurement at the time of observation. Unit Measurement, Whole Percent.

SKYC, SKAL, SKAU

Daily cloudiness. SKYC for 24-hour period ending at time of

observation; SKAL for point measurement of lower clouds at observation time; SKAU for point measurement of upper clouds at observation time. Clear is zero coverage of the sky by clouds; "10" is completely cloudy. Unit Measurement, Scale of 0-10. This element was sometimes recorded on a scale of 0-4; when this is occurred is not indicated in the daily data at this time.

SMEL, SMAH

Water equivalent of melted snowfall. SMEL for 24-hour period ending at observation time; SMAH for 8-hour or other period less than 24-hours ending at observation time. Trace is less than 0.05 inch. Unit Measurement, Hundredths of Inches.

SNOW, SNAH

Daily snowfall. SNOW for 24-hour period ending at observation time; SNAH for 8-hour or other period less than 24-hours ending at observation time. Sleet and hail may or may not be included in the snowfall measurement, depending on the general and specific observer practices of the time. Trace is less than 0.05 inch. Unit Measurement, Hundredths of Inches.

SNWD, SDAH

Snow depth at observation time. Snow depth is depth of snow on the ground at time of observation. SNWD for when only one observation is recorded during a 24-hour period; SDAH for when more than one observation is recorded during a 24-hour period. Trace is depth less than 0.5 inch. Unit Measurement, Tenths of Inches.

STWX

State of the weather at time of observation (reference Table "D").

TAHR

Temperature measurement. Point measurement at time of observation. Unit Measurement, Hundredths of Degrees Fahrenheit.

TBAR

Temperature measurement using thermometer attached to barometer. Used to adjust barometer reading for temperature. Unit Measurement, Hundredths of Degrees Fahrenheit.

TMAX

Daily maximum temperature. Maximum temperature reading for 24 hours ending at time of observation. Unit Measurement, Hundredths of Degrees Fahrenheit.

TMIN

Daily minimum temperature. Minimum temperature reading for 24 hours ending at time of observation. Unit Measurement, Hundredths of Degrees Fahrenheit.

TMPD

Dry bulb temperature. Point measurement at time of observation. Unit Measurement, Hundredths of Degrees Fahrenheit.

TMDW

Wet bulb temperature. Point measurement at time of observation. Unit Measurement, Hundreths of Degrees Fahrenheit.

TPBG, TBAH, TPEN, TEAH

Time of beginning and ending of precipitation. TPBG and TPEN for time of beginning and ending for 24-hour observation of precipitation events (one time of beginning and ending within each 24-hour period). TBAH and TEAH for time of beginning and ending for 8-hour or other period less than 24 hours. Unit Measurement, Hour and Minutes, AM/PM indicator (reference Table "F").

TRNG

Daily temperature range. Maximum temperature minus minimum temperature. Unit Measurement, Whole Degrees Fahrenheit.

TWAR

Surface air temperature observed at location of water temperature observation. Unit Measurement, Hundredths of Degrees Fahrenheit.

TWBT

Bottom water temperature. Unit Measurement, Hundredths of Degrees Fahrenheit.

TWDP

Depth of water for TWBT - bottom water temperature observation. Unit Measurement, Tenths of Feet.

TWSR

Surface water temperature. Unit Measurement, Hundredths of Degrees Fahrenheit.

WD16, WDAH

Prevailing wind direction. WD16 for 24-hour period ending at time of observation; WDAH for 8-hour or other period less than 24 hours ending at observation time. Unit Measurement, 8-Point or 16-Point Compass Directions, Expressed as Whole Degrees (Calm is "0", North is "360").

WDDM, WDMA

Maximum wind direction. WDDM for maximum within 24-hour period ending at time of observation; WDMA for maximum within 8-hour or other period less than 24 hours ending at time of observation. Unit Measurement, 8-Point or 16-Point Compass Directions, Expressed as Whole Degrees (Calm is "0", North is "360").

WDFC, WFAH

Prevailing wind force. WDFC for 24-hour period ending at time of observation; WFAH for 8-hour or other period less than 24 hours ending at observation time. Unit Measurement, Scale of 0-10 or Scale of 0-12; which scale was used is not indicated in the daily data at this time.

WDMV, WMAH

Total wind movement. WDMV for total over 24-hour period ending at time of observation; WMAH for total over 8-hour or other period less than 24 hours ending at time of observation. Unit Measurement, Whole Miles.

WDVL, WVAH

Prevailing wind velocity, speed component. WDVL for average over 24-hour period ending at time of observation; WVAH for average over 8-hour or other period less than 24 hours ending at time of observation. Unit Measurement, Whole Miles.

WDVM, WVMA

Maximum wind velocity, speed component. WDVM for maximum within 24-hour period ending at time of observation; WDMA for maximum within 8-hour or other period less than 24 hours ending at time of observation. Unit Measurement, Miles per Hour.

METEOROLOGICAL ELEMENT MEASUREMENT UNITS CODE

The units and decimal position (precision) of the data value for this record (reference Table "G").

YEAR

This is the year of the record. Range of values is 1800-current year processed.

MONTH

This is the month of the record. Range of values is 01-12 LST.

FILLER

Filler value is 9999.

NUMBER OF DATA PORTIONS THAT FOLLOW

This notes the actual number of values reported. Range of values is 01-62.

NOTE: A record may contain fewer or more data values than you might expect. A monthly record of daily values may contain as few as one data value or as many as 62 data values.

A maximum of two DATA PORTIONS are used for each day of the month so as to allow one original meteorological data value and one edited data value. The only exception at this time, is that the "days with weather" element-types

(DYSW) of original data values can be reported in multiple logical records (e.g. only one original DYSW Data Portion for each day is given within a single DLY logical record). When more than two types of weather on any given day, a new DLY logical record for the same month will exist until DYSW is exhausted. At most, 62 data values may be contained in any given logical record (e.g.,  $30 + (62 \times 12) = 774$  characters). Thus, while a maximum of 1,230 characters has been assigned, no more than 774 characters will be used for the daily data record types.

If a particular data value was not taken or is unavailable, there is no entry for it. (For meteorological elements observed once a day, if all the daily observations of a given month are received and pass QC checks, there will be one DATA PORTION for each day. If every value were to fail the QC, there may be two DATA PORTIONS for every day of that month. When two DATA PORTIONS for a daily record are encountered (with the exception of DYSW), the original data values are flagged and the second DATA PORTION is the best possible replacement. (See code definitions for the Flag 2 element).

#### DAY OF MONTH

Contains the day of the month on which the data element was observed. Range of values is 01-31 LST.

#### HOOR OF OBSERVATION

Contains the hour of the daily observation. Hour is reported using the 24-hour clock 00-23. Other codes for non-specific hours are listed in the table below.

Sunrise	91
Sunset	92
Morning	93
Afternoon, evening	94
Missing hour	99
Midnight	0
Noon	12
DN - during night - means after midnight	93

#### SIGN OF METEOROLOGICAL VALUE

The algebraic sign of the meteorological data value is given as either a blank or a minus sign (-). Blank indicates a positive value and a minus sign represents a negative value (see topic 45 "Data Quality: Known Uncorrected Problems").

#### VALUE OF METEOROLOGICAL ELEMENT

The actual data value is given as a five-digit integer, except for cloud type, precipitation type, precipitation time of beginning and ending, and days with weather/state of the weather. (Tables "C" through "F").

For fixed length records only when a data value is missing, the sign of the data value is set to "-", the data value is set to "99999", flag position 1 is set to "M" and flag position 2 is blank.

When no daily precipitation reading was taken but the amount from that day (if any) is included in a subsequent value, the data value of precipitation is set

equal to "99999" and flagged with an "S" in flag position 1. In turn, the successive accumulated amount will be flagged with an "A" in flag position 1.

FLAG1

The Data Measurement FLAG (reference Table "H").

FLAG2

The Data Quality FLAG (reference Table "I").

TABLES

**TABLE "A"**

State-Code Table

01 Alabama	28 New Jersey
02 Arizona	29 New Mexico
03 Arkansas	30 New York
04 California	31 North Carolina
05 Colorado	32 North Dakota
06 Connecticut	33 Ohio
07 Delaware	34 Oklahoma
08 Florida	35 Oregon
09 Georgia	36 Pennsylvania
10 Idaho	37 Rhode Island
11 Illinois	38 South Carolina
12 Indiana	39 South Dakota
13 Iowa	40 Tennessee
14 Kansas	41 Texas
15 Kentucky	42 Utah
16 Louisiana	43 Vermont
17 Maine	44 Virginia
18 Maryland	45 Washington
19 Massachusetts	46 West Virginia
20 Michigan	47 Wisconsin
21 Minnesota	48 Wyoming
22 Mississippi	49 Not Used
23 Missouri	50 Alaska
24 Montana	51 Hawaii
25 Nebraska	66 Puerto Rico
26 Nevada	67 Virgin Islands
27 New Hampshire	91 Pacific Islands

**TABLE "B"**

Cooperative Network Division Table

NOTE: The division number for a station may change over time.

HAWAII (STATE 51)\*

ISLAND NAME	DIVISION
Kauai	01

Oahu	02
Molokai	03
Lanai	04
Maui	05
Hawaii	06

\*NOTE: Hawaii (State 51) division numbers were changed during the initial conversion of this file. Divisions within islands no longer exist. Division numbers now represent each island.

PACIFIC ISLANDS (STATE 91)

Division

02 -	East of 180th Meridian - Phoenix Islands, Line Islands, and American Samoa
03 -	Western Pacific Islands, North of 12N
04 -	Caroline and Marshall Islands

**TABLE "C"**

CLTL, CLTU - Cloud Type Table

C	Cirrus
K	Cumulus
ST	Stratus
CC	Cirro-cumulus
CS	Cirro-stratus
KS	Cumulo-stratus
KN	Cumulo-nimbus
N	Nimbus
NS	Nimbo-stratus
3	clouds
1	clear
HZ	haze
F	fog
HF	high fog
SM	smoky
SD	scudd

These two-character CLTL/CLTU cloud type codes are stored into the rightmost two characters of the data value portion of the meteorological element. Within the two characters used, the weather codes are entered left justified and zero filled. Thus, if cloud type is reported, the data values would appear as 000XX, where XX is the appropriate cloud type code. Cloud types may include codes for Daily Occurrence of Weather (Table D), or Precipitation Type (Table E).

**TABLE "D"**

DYSW/STWX - Daily Occurrence of Weather/State of the Weather Table

1	Clear
---	-------

2	Partly cloudy	Clearing, variable
3	Cloudy	Threatening
4	Rain	Showers/sprinkles
5	Snow	
6	Smoke/haze	
7	Fog	
8	Drizzle (mist)	Misty clouds
9	Sleet	
10	Glaze	
11	Thunder	
12	Hail	
13	Dust storm	
14	Blowing snow	
15	High wind	
16	Tornado	
17	Fair	
99	Illegible	

These two-character DYSW/STWX element-type codes are stored into the rightmost four characters of the data value portion of the meteorological element. Within the four characters used, the weather codes are entered left justified and zero filled. Thus, if one type of weather occurs during a day, the data values would appear as OXX00, where XX is the appropriate weather code. If two types of weather occur, the data value will contain OXXYY, where XX is value 1 and YY is value 2. If more than two types of weather occur on the same day, they will be stored into additional "DLY" records of the element-type code "DYSW" as needed. For STWX, only one element-type code is allowed for each observation time over the course of the day. The codes for cloud type (TABLE "C") may also appear in the DYSW/STWX data, if recorded as such by the observer. Each element-type code is reported only once for a given day, even if, for example, there were more than one case of thunder reported for the day.

**TABLE "E"**

**PTYP, PTAH - Precipitation Type Table**

R	rain
T	thunderstorm
S	snow
D	drizzle/mist
E	sleet
G	glaze
H	hail
I	ice
M	mixed - rain and snow
W	squalls/showers/sprinkles
F	fog
X	dew
Z	frost

These one-character PTYP/PTAH element-type codes are stored into the rightmost character of the data value portion of the meteorological element. Thus, if

precipitation occurs during a day, and the precipitation type is available, the data value would appear as 0000X, where X is the appropriate precipitation type code. Only one code is recorded for each day for PTYP; only one code per observation time is recorded for each day for PTAH.

**TABLE "F"**

**TPBG, TBAH, TPEN, TEAH - Time Table**

Sunrise	1300A
Sunset	1400P
Morning	___A
Afternoon, evening	___P
Missing hour	
Midnight	1200A
Noon	1200P
DN - during night - means after midnight	___A
Continuing or unknown	___D

Times are given in hours and minutes using a 12-hour clock and an AM/PM indicator. For TPBG/TPEN, if the observer wrote more than one time of beginning/ending into the slot for the day, the keyer digitized the first beginning time, and the last ending time, for each day.

**TABLE "G"**

**Units of Measurement Table**

Range of values where b = Blank:

HF	Hundredths of degrees Fahrenheit
bI	Inches
TI	Tenths of an inch
HI	Hundredths of inches
IT	Thousandths of inches of mercury
MH	Miles per hour
bM	Whole miles (right justified)
NA	No units applicable (nondimensional)
DG	whole degrees
TN	Scale of 0 to 10
WN	Scale of 0 to 12
PC	Whole percent
TP	Tenths of a percent
TG	Tenths of feet
HG	Hundredths of feet

**TABLE "H"**

**Data Measurement Flag 1**

- A - Accumulated amount since last measurement.
- M - For fixed length records only.  
Flag1 is "M" if the data value is missing. In this case, the sign of the meteorological value is assigned "-" and the value of the meteorological element is assigned "99999".
- S - Included in a subsequent value. (data value = "00000" OR "99999").

T - Trace (data value = 00000 for a trace).  
Blank - Flag not needed.

Flag 1 values of "S" and "A" usually occur in pairs (ie. a daily value will have Flag 1 assigned as "S" and the next daily value will have Flag 1 assigned as "A"). For some daily values these flags do not occur in pairs.

**TABLE "I"**

**Data Quality Flag 2**

0 - Valid data element.  
1 - Valid data element (from "unknown" source, pre-1982).  
2 - Invalid data element (subsequent value replaces original value).  
3 - Invalid data element (no replacement value follows).  
4 - Validity unknown (not checked).  
T - Failed internal consistency check

**7. Start Date:**

Data prior to 1896 comprise the bulk of the data set with most of the earliest records dating back to 1820.

**8. Stop Date:**

For the bulk of the data, the stop date is 1892 or 1896, but some data stop after 1900.

**9. Parameter:**

Atmospheric Dynamics>Atmospheric Temperature>Daily Maximum Temperature  
Atmospheric Dynamics>Atmospheric Temperature>Daily Minimum Temperature  
Atmospheric Dynamics>Atmospheric Temperature>Daily Average Temperature  
Atmospheric Dynamics>Atmospheric Temperature>Daily Temperature Range  
Atmospheric Dynamics>Atmospheric Temperature>Observation Time Temperature  
Atmospheric Dynamics>Precipitation>Daily Precipitation  
Atmospheric Dynamics>Precipitation>Daily Snowfall  
Atmospheric Dynamics>Precipitation>Daily Snow Depth  
Atmospheric Dynamics>Wind>Wind Movement  
Atmospheric Dynamics>Wind>Daily Prevailing Wind Direction  
Atmospheric Dynamics>Cloud>Daily Cloud Amount

**10. Discipline:**

Earth Science>Atmospheric>Meteorology/Climatology  
Daily Precipitation, Daily Snowfall, Daily Snow Depth, Daily Maximum Temperature, Daily Minimum Temperature, Observation Time Temperature, Wind Movement, Weather

Earth Science>Land>Hydrology  
Evaporation, Daily Snowfall, Daily Snow Depth, Daily Precipitation

Earth Science>Land>Agriculture  
Daily Precipitation, Evaporation

**11. Coverage:**

Southernmost Latitude                    22N  
Northernmost Latitude                    48N

Westernmost Longitude           125W  
Easternmost Longitude           68W

**12. Location:**

Areal Coverage

North America>Continental USA

**13. Keywords:**

Temperature  
Maximum Temperature (24 HR)  
Minimum Temperature (24 HR)  
Mean Temperature (24 HR)  
Temperature at Observation Time  
Precipitation  
Snow  
Snow on Ground  
Evaporation  
Sky Condition  
Weather  
Drizzle  
Ice Pellets  
Glaze  
Thunder  
Hail  
Dust  
Sand Storm  
Blowing Snow  
Winds  
Tornado  
Rain  
Smoke  
Fog  
TD-3206  
3206

**14. Storage Medium:**

HDSS

**15. File Mode:**

ASCII

**16. How to Order Data:**

These data are available for purchase from the National Climatic Data Center, Climate Services Branch, Federal Building, 151 Patton Avenue, Room 120, Asheville, NC., 28801-5001, phone number (828)-271-4800, e-mail [ncdc.orders@noaa.gov](mailto:ncdc.orders@noaa.gov)

**17. Historical and Current Data Sources:**

Cooperative Observations  
Principal Climatological Stations  
Summary of the Day Observations  
Punched Card Deck 345  
Punched Card Deck 486

State Universities  
Evaporation Observations  
Digital Files  
Daily Observations (manuscripts and publications)  
Tape Deck 9639  
Tape Deck 9727  
Historical Files  
MAPSO Diskettes

**18. Algorithms:**

No information available at this time.

**19. Responsibility for Algorithms:**

No information available at this time.

**20. Project:**

National Weather Service (NWS) Cooperative Program

**21. Archiving Data Center:**

National Climatic Data Center,  
NOAA/NESDIS/NCDC  
151 Patton Avenue  
Asheville, NC 28801-5001  
Phone (828) 271-4800

**22. Originating Data Center:**

National Climatic Data Center  
NOAA/NESDIS/NCDC  
151 Patton Avenue  
Asheville, NC 28801-5001  
Phone (828) 271-4800

**23. Technical Contact:**

National Climatic Data Center  
NOAA/NESDIS/NCDC  
151 Patton Avenue  
Asheville, NC 28801-5001  
Phone (828) 271-4800

**25. Sensor Name and Operating Principles:**

No information available at this time.

**26. Sensor Siting:**

No information available at this time.

**27. Sensor Accuracy and Calibration:**

No information available at this time.

**28. Sensor Sampling Characteristics:**

No information available at this time.

**29. Data Capture Method:**

No information available at this time.

**30. Station Location Accuracy:**

Station History Locations are digitized as recorded on the original forms. In most cases, the latitude and longitude were recorded to the nearest minute; in some cases, to the nearest second. The accuracy of the instrumentation and process of measuring the locations is unknown.

**31. Station Observation Schedule:**

Since the observations preserved in this digital data set are from the beginnings of instrumented weather observations and observing networks, the station observation schedule is non-standard, especially for the records for the early 1800's. Observations in this data set include daily observations recorded in either the morning, evening, or at midnight, as well as observations at one or more points in time throughout the day.

**32. Station Data Time Averaging:**

The daily mean temperatures keyed for this data set are those as recorded on the original forms by the observers. In general, when daily maximum and minimum temperatures were available, the daily mean was calculated by the observer or other editor as the simple average of the two. When three point measurements of the temperature (TAHR) were recorded over the course of the 24-hour period, the mean was generally calculated in one of two ways. One was to take the simple average of the three measurements; the other, to add in the evening temperature twice and divide by four. Which calculation method was used by the observer or other editor to calculate the daily mean is generally not available. Some information may be available in the accompanying metadata.

**33. Spatial Sampling Using Station Grouping:**

Not Applicable.

**34. Network Participation:**

This data set is comprised of stations from the 1800's from a variety of networks, as well as private journals and other documents. The networks include military and civil; some observers were paid, while others were volunteers. The funding and responsibility for maintenance of the instruments varied by network.

**35. Geographic Criteria for Selecting Stations:**

Not Applicable.

**36. Geographical Distribution:**

The distribution of stations varies over time and space as a result of the expansion of observers across the country and the evolution of observer networks. There are approximately 5,000 stations, as defined by location name, in the entire historical archive for the 1800's. A subset of these were

selected for digitization based on length and continuity of record, location, and other factors.

**37. Elevation Distribution:**

Elevations for fixed surface locations for the data set are mostly below 1,000 meters above sea level.

**38. Instrument Problems:**

No information available at this time.

**39. Missing Data Periods:**

No information available at this time.

**40. Sampling Biases:**

No information available at this time.

**41. Error Detection and Correction:**

The historical data were keyed from microfilm copies of original observation forms. A quality control process developed specifically for this data set performs internal consistency, climatological limit, and serial checks on both daily values and monthly values derived from the daily values. This process includes manual verification of flagged data. In general, quality control flags are not included in the digitized data set. The general purpose of the quality control process is to assure that the digitized data accurately reflect the observations as recorded on the form. In some cases, the assignment of element code to the data is adjusted to match the data rather than the column headings on the forms. For more information about the quality control process, please refer to Appendix A, "Digitization of Historical Daily Data from the 1800's". The user should investigate the accuracy and homogeneity of the data for each specific application.

**42. Missing Value Estimates:**

No information available at this time.

**43. Quality Control Responsibility:**

Responsibility for data quality rested with the individual observer, as well as the historical network managers.

**44. Known Uncorrected Problems:**

For some stations for some time periods, the date of the maximum temperature may be wrong by one day. The problem arises because the observer or network manager may have recorded the maximum temperature on a calendar date rather than on the date of the end of the 24-hour observation. This problem sometimes causes the maximum temperature for a day to be less than the minimum temperature. For more information about uncorrected problems, please refer to Appendix A.

**45. Confidence Factors:**

Because the data were keyed from microfilm, because the operational observation and quality assurance procedures changed markedly over the

historical period of the data set, and because no quality assurance of the data was performed for this project other than those noted in Appendix A, the user should be wary of all the data in this data set.

**46. History of Data Usage:**

This digital data set is new and does not yet have a history of use.

**47. Quality Statement:**

The historical nature of the data set, as well as limited resources (monetary and personnel) for applying quality control and assurance, contribute toward less than optimum conditions in ensuring the integrity of the data.

**48. Revision Date:**

None.

**49. Science Review Date:**

None.

**50. Future Review Date:**

Not applicable at this time.

**51. Source Data Sets:**

This data set is currently compiled from microfilm copies of manuscript forms from the National Archives.

**52. Essential Companion Data Sets:**

TD-3200.

**53. Derived Data Sets:**

None.

**54. Larger Collections:**

No information available at this time.

**55. Similar Data Sets:**

DS-3200 Coop Summary of the Day  
DS-3210 Summary of Day-First Order  
DS-3220 Coop Summary of Month  
DS-3240 Hourly Precipitation  
DS-3260 15-Minute Precipitation  
DS-3280 US Global Surface Airways Hourly Observations

**56. References:**

See Appendix A.

**57. Summary:**

This data set is a compilation of digitized daily observations for the 1800's. The period of record and number of stations varies among the states. The

records generally date back to the late 1820's. These data have been subjected to internal consistency checks, compared against climatological limits, and checked serially.

## Glossary

**Access Method for Archived Data** -- How a digital data set can be accessed in its archived condition.

**Access Method for Supplied Data** -- How the user can access data in its most commonly supplied form.

**Archiver** -- The one person or institution responsible for archival and maintenance of the data, and how to contact.

**Archiving Data Center** -- Name, organizational acronym and address of institution that archive and distribute the data.

**Confidence Factors** -- The expected numerical accuracy of the data.

**Cost of Acquiring Data** -- Describes how to find the approximate costs that are associated with obtaining the data set, or quotes the cost.

**Coverage** -- The smallest latitude-longitude "box" on the earth's surface that all data measurements occurred within.

**Data Capture Method at Sensor** -- The method used to collect data initially at the sensor. Aspects that should be mentioned here include such concepts as manual, automatic, forms, charts, telemetered, etc.

**Data Derivation Algorithms** -- The methods, if any, used to calculate values in the data set.

**Data Derivation Algorithms, Responsibility for** -- A list of programs or agencies that provide data derivation algorithms or which carry out the data derivations using the algorithms.

**Data Set Aliases** -- Other names associated with the data set, now or in the past.

**Data Set ID** -- A unique code number or acronym identifying the data set. Normally, it is the code number used by the data center as the data set is archived.

**Data Set Name** -- A descriptive name for the data set that provides a Thumbnail description.

**Derived Data Sets** -- Other data sets that are partly or entirely derived of this data set.

**Discipline** -- A collection of standard phrases that name the scientific disciplines, or fields, in which the data are normally used. Most of each phrase comes from the "Directory Interchange Format Manual".

**Elements** -- The basic units of data that need to be described. Often, elements are simply data variables such as station id, precipitation or ocean depth. However, when FORTRAN, C, etc. issued to access a digital data set, elements are the same as the "fields" used in the access software, such as in a FORTRAN "READ" format. (This definition simplifies the preparation and maintenance of the documentation.

**Element Names and Definitions** -- The names and brief definitions of the basic units of data that need to be described.

**Elevation Distribution** -- Variation of the elevations of the fixed observing locations.

**Error Detection and Correction** -- Any procedures used now or in the past to identify, and avoid or correct, data errors.

**Essential Companion Data Sets** -- Other data sets, if any, that must be obtained in order to use this data set.

**File Mode** -- The mode, or code standard, of a digital file in which a digital data set is stored. Commonly seen modes include ASCII, EBCDIC, Fielddata (unisys only), and binary.

**Future Review Data** -- The date, if any, recommended by the archiver for the next science review.

**Geographic Criteria for Selecting Stations** -- Fixed surface locations may be selected with a specific type of geographic environment in mind. Geographic selection criteria describes this.

**Geographic Distribution** -- The spatial sampling, i.e. the number and closeness of fixed observing locations within a geographical area.

**History of Data Usage** -- The extent to which this data set, or parts of it, has been used by researchers, and how they rated its quality.

**Instrument Problems** -- Difficulties that occur as a natural result of sensor operation.

**Investigator** -- Data set experts other than the archiver or technical contact, who can provide information that they cannot.

**Keyword** -- Words or short phrases that suggest the data set, or suggest aspects of it. Actual variable names should not be used as keywords.

**Known Uncorrected Problems** -- Known data difficulties, if any, for which no corrections have been made.

**Larger Collections** -- Supersets of data sets, if any, that include this data set.

**Location** -- A collection of standard phrases that name the major geographic area(s), and the atmospheric layer(s), that the data refer to. Most of each phrase comes from the "Directory Interchange Format Manual".

**Missing Data Periods** -- Times when major parts of the data are missing.

**Missing Value Estimates** -- Procedures used to produce estimated values for missing data.

**Network Participation** -- Describes the named collections of fixed surface locations, if any, whose data contribute to this data set.

**Originating Data Center** -- Name, organizational acronym, and address of the

data center(s) that generated the data documentation.

**Parameter** -- A collection of standard phrases that briefly name and describe the measured parameters of the data set. Most of each phrase comes from the "Directory Interchange Format Manual".

**Project** -- Specific campaign or effort, if any, with which the data set is associated.

**Quality Control Responsibility** -- Agencies or programs, if any, that provide major quality control processing.

**Quality Statement** -- A brief generalization of how good the data are. Includes a "quality value" number.

**Reference** -- Any important bibliographic reference pertaining to the data set or any part of it.

**Revision Date** -- The date that this documentation is created, or the date of its latest revision.

**Sampling Biases** -- Data biases caused by inadequacies in spatial or temporal sampling.

**Science Review Date** -- The date, if any, of the latest review of this documentation for accuracy of technical content.

**Sensor Accuracy and Calibration** -- The precision to which the measured variables are known. It refers both to the accuracy of the sensor and to the significant digits in the data values captured by the sensor.

**Sensor Name and Operating Principles** -- The sensors used to obtain the data in the data set.

**Sensor Sampling Characteristics** -- Spatial averaging, temporal accumulation, and sampling frequency that occur at the sensor.

**Sensor Siting** -- The local environment into which sensors are placed.

**Source Data Sets** -- Other data sets, if any, used to assemble this data set.

**Similar Data Sets** -- Other data sets, if any, used to assemble this data set.

**Sources** -- Origins of the data set.

**Spatial Sampling Using Station Groupings** -- How data from specific locations are collected, aggregated, or arranged to represent a geographical area.

**Start Date** -- The date of an earliest appearance.

**Station** -- A fixed surface location that reports data.

**Station Data Time Averaging** -- Aggregation or averaging of data over time to obtain values representative of a time period.

**Station Location Accuracy** -- How accurately the positions of the fixed surface location are known.

**Station Observation Schedule** -- When fixed surface locations make data measurements.

**Stop Date** -- The date of latest appearance.

**Storage Medium** -- The quantities, capacities, and types of media on which the data are now stored.

**Summary** -- A concise abstract that is used to capture a few of the most important facts about the data set, all of which should have appeared in more detail under individual topic discussions.

**Technical Contact** -- The person who can be contacted to obtain and provide information about the data.

## Appendix A

### Quality Control of Daily Data from the 1800's

The quality control tests developed for this data set are listed in the following table. The quality control tests are applied in order, with the outliers from each test verified before continuing to the next test. The outliers generated by each test are appended to the outlier file for each station. The verification process produces two files, one listing the verification with explanation for each outlier, the other listing necessary corrections to be applied to the data. After the outliers for one test are verified, the corrections are all applied in order to the data for the station, then the next test is run.

## Quality Control

Quality Control Test	Flag Type	Sub-Flag Type	Description
Translation	01	01	Gross Error Checks. This test is applied on translation of the data from the output keying format used by Image Entry to the TD-3200 format used by NCDC. This test flags individual daily values, with cutoffs set to the extreme range of each element type.
	01	02	Duration from metadata. This supplementary process pulls the duration of each element from the metadata and inserts it into the TD-3200 format data. No verification needed for this translation process.
	01	03	Date check. This test compares the date, for each image in the 3200 output file, with the dates keyed in the metadata. This test flags entire months of data.
	01	04	Station number check. This test compares the station number, as entered in the metadata through the PICS tool, with the station number keyed by the daily data keyers. This test flags entire months of data.
	01	05A	Just one daily mean check, with MNT0 and MNTP, applied to the metadata. Since only one daily mean temperature may be keyed for each month, but some forms include more than one daily mean temperature on an image, this check looks for images where MNT0 and MNTP are both marked "TO BE KEYED". In the metadata, this check automatically sets the MNT0 to no-key, and the MNTP is retained.
	01	05B	MNTP/MNT0 from metadata. This supplementary process pulls corrections from the metadata, such as changing MNTP to MNT0, and automatically applies them to the TD-3200 format data. The output from this process does not have to be verified.

	01	06	Automated wetbulb check. On the daily values, if the dry-bulb temperature is less than or equal to 32(F), and the wet-bulb temperature is greater than the dry-bulb, flag the wet-bulb temperature as an observer error in the TD-3200 format data. Values flagged as an observer error are excluded from remaining QC tests.
	01	07	Automated wind movement check. The test will verify that the number of digits in the monthly total wind movement as keyed is consistent with the sum of the daily data values. If any inconsistency exists, the program will write a correction to the Corrections file. No verification needed.
	01	08	Automated monthly precipitation mean test (day 33). Test will correct any systematic keying errors in the daily data by computing the monthly mean from the monthly sum, if the monthly sum matches the sum of the daily values. This test writes corrections to the Corrections file. No verification needed.
Elements List	-	-	This test checks for a match between the element types keyed by the daily data keyers versus the element list keyed in the metadata for each image. This test flags monthly element types.
	02	01	This test flags those elements that are in the daily data, but were not entered in the metadata.
	02	02	This test flags those elements which are included in the metadata, but are not in the daily data.
Duplication	03	01	This test checks for duplication of element types within each month for each station (checks between images for the same month). This test flags monthly element types and monthly dates.
Element Consistency	-	-	This test checks for consistency in observation time within each element type and assignment of element type within sets of element types.

	10	01	Consistency in observation time within each element type. This check is conducted visually using the daily inventory plotting tool.
	10	02	Uniqueness of exposed and dry-bulb observations. This check, for determining whether the exposed (at-hour) and dry-bulb observations were taken using one instrument or two, is conducted visually using the plot of the difference between the daily observations.
	10	03	Assignment of pressure element types. This check is conducted visually using the plot of monthly means for all pressure types available.
Small Number of Days	04	01	This test checks for a small number of days of data in a month for each element type (typically less than or equal to five days). This test flags entire months of data.
Monthly Means	05	01	This test checks for a match between the monthly means as keyed and as calculated from the daily values, for all numeric element types. This test flags both the monthly values and the entire month of daily values for an element type. Flags day 33 (monthly mean).
	05	02	Total daily values for the month, does not equal the monthly total. Flags day 32 (monthly sum).
	05	03	Monthly extremes test. For each element, this test calculates the standard deviation for each of the 12 months of the year, and flags months whose standard deviation is greater than 2.5.
	05	04	This test checks a month's PRCP. If day 31's total is equal to the sum of the previous days, day 31 is flagged.
Monthly Consistency: Temperature	-	-	This test checks for internal consistency of the monthly means and totals from the daily values for all element types within each station. This test flags entire months of daily values.
	06	01	monthly mean max < monthly mean min
	06	02	monthly mean max < mean of all at-hour temperatures

	06	03	monthly mean min < mean of all at-hour temperatures
	06	04	11AM-4PM temperatures < sunrise-1AM-10AM temperatures (afternoon < morning temperatures)
	06	05	11AM-4PM temperatures < 5PM-sunset-midnight temperatures (afternoon < evening)
	06	06	mean dry-bulb < mean wet-bulb (for each hour)
	06	07	at-hour temperature < wet-bulb temperature (for each hour)
	06	08	dry-bulb < dewpoint (for each hour)
	06	09	at-hour < dewpoint (for each hour)
	06	10	lowest at-hour minimum temperature > average temperature > highest at-hour max temperature
	06	11	mean monthly max temperature > mean monthly min temperature + 60 degrees
	06	12	mean average temperature range > 50
	06	13	mean average temperature range does not equal (mean max – mean min) +/- 1
	06	14	all at-hour pressure-attached temperatures < morning temperatures (or minimum temperature, whichever is lower)
Monthly Consistency: Precipitation and Snowfall	-	-	This test checks for internal consistency of the monthly means and totals from the daily values for all element types within each station. This test flags entire months of daily values.
	07	01	snowfall > 0 and the lowest monthly minimum temperature is > 39
	07	02	snowfall > 0 and there was no precipitation during the month
	07	03	snowfall > 1 inch and was also greater than 50 times the precipitation amount
	07	04	snowfall was zero and precipitation > 0.05 and the highest monthly max temperature was < 30
	07	05	snowfall > 1 inch and snowdepth was zero and the highest monthly max temperature was > 30
	07	06	snow depth > 0 and the lowest monthly minimum temperature was > 39

	07	07	If there was precipitation data on all days in the month, and only one day is missing (I.e. n-1 days), who summed together total zero. That is, the number of days with precip, including traces, is greater than or equal to n-1.
	07	08	The number of days with precipitation is less than the number of days with snowfall, and no snow depth.
	07	71	Precipitation amount is the highest monthly total in the record.
	07	72	Precipitation amount is the second highest monthly total in the record.
	07	73	Precipitation amount is the third highest monthly total in the record.
	07	74	Precipitation amount is the fourth highest monthly total in the record.
	07	75	Precipitation amount is the fifth highest monthly total in the record.
	07	81	Snowfall amount is the highest monthly total in the record.
	07	82	Snowfall amount is the second highest monthly total in the record.
	07	83	Snowfall is the third highest monthly total in the record.
	07	84	Snowfall is the fourth highest monthly total in the record.
	07	85	Snowfall is the fifth highest monthly total in the record.
	07	91	Snowdepth is the highest monthly snowdepth in the record.
	07	92	Snowdepth is the second highest monthly total in the record.
	07	93	Snowdepth is the third highest monthly total in the record.
	07	94	Snowdepth is the fourth highest monthly total in the record.
	07	95	Snowdepth is the fifth highest monthly total in the record.
Daily Extremes and Climatological Consistency	-	-	This test checks for extremes and internal consistency of the daily values within each station. The extreme limits are set on a daily basis using the climatology of the station within the CDMP Forts data set. This test flags individual daily values.
	08	01	Extremes test of maximum and minimum temperature
	08	02	Max/min inconsistency checks

	08	03	Flatliner check for TMAX and TMIN
	08	04	Excessive diurnal range for TMAX and TMIN.
	08	51	Spike Check
	08	52	Spike Check
	08	06	Step Check
	08	07	Fixed extreme: PRCP > 10 inches in a single day
	08	08	Precipitation cloud test: If a station reports precipitation, there must be at least one observation on that day of some sort of cloud cover.
	08	09	TMAX must be greater than or equal to largest at hour temperature (or drybulb), and TMIN must be less than or equal to lowest at hour temperature (or drybulb).
	08	10	At hour temperature versus dry bulb temperature, if the absolute value of TAHR-TMPD is greater than or equal to 10 deg. F, then both values are flagged.
	08	11	Combination test. At hour temperature versus wet bulb, and dry bulb versus wet bulb. If TAHR-TMPW, or TMPD-TMPW is greater than or equal to 2 deg. F, then both values are flagged.
	08	12	Wetbulb versus the dewpoint temperature. If TMPW-DPTP is greater than or equal to 2 deg. F, then both the daily values are flagged.
Daily Calculated Consistency	-	-	This test checks for consistency of the daily values that can be calculated from other keyed daily values within each station. This test flags individual daily values.
	09	01	Daily mean temperature consistency with at-hour/max-min temperatures check. Includes a check that doubles the 9pm temperature as another method for determining the daily mean.
	09	02	Daily range in temperature with at-hour/max-min temperatures check
	09	03	Daily consistency of dew point/dew point depression/relative humidity with exposed/dry bulb/wet bulb temperatures
	09	04	Daily total precipitation/snowfall measurements (24-hr duration) with partial-day duration (not 24-hrs) precipitation/snowfall consistency check

09	05	Daily mean wind direction, velocity, force, movement, max direction, and max velocity with at-hour/duration observations consistency check
09	06	Daily mean clearness and cloud amount with at-hour clearness and cloud amount consistency check
09	07	River gauge height and gauge height change consistency check

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