

**SURFACE AIRWAYS HOURLY
TD-3280**

AND

**AIRWAYS SOLAR RADIATION
TD-3281**

Prepared by

National Climatic Data Center

Federal Building

Asheville, North Carolina

March 1997

This document was prepared by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Environmental Satellite Data and Information Service, 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.

Table of Contents

Topic	Page Number
INTRODUCTORY TOPICS	
1. Data Set ID	1
2. Data Set Name	1
3. Data Set Aliases	1
<hr/> DESCRIPTION <hr/>	
4. Access Method and Sort for Archived Data	1
5. Access Method and Sort for Supplied Data	6
6. Element Names and Definitions	12
7. Start Date	39
8. Stop Date	39
9. Parameter	39
10. Discipline	39
11. Coverage	39
12. Location	39
13. Keyword	40
14. Storage Medium	40
15. File Mode	40
16. How to Acquire the Data	41
17. Historical and Current Data Source	41
18. Data Derivation, Algorithms	41
19. Data Derivation Algorithms, Responsibility for	41
20. Project	41
<hr/> DATA CENTER <hr/>	
21. Data Center, Archiving	41
22. Data Center, Originating	42
<hr/> PERSONNEL <hr/>	
23. Archiver	42
24. Technical Contact	42
25. Investigator	42
<hr/> SENSORS <hr/>	
26. Sensor Name and Operating Principles	42
27. Sensor Siting	43
28. Sensor Accuracy and Calibration	43
29. Sensor Sampling Characteristics	43
30. Data Capture Method at/near Sensor	43
<hr/> STATIONS <hr/>	
31. Station Location Accuracy	43
32. Station Observation Schedule	43
33. Station Data Time Averaging	44
34. Spatial Sampling Using Station Grouping	44

35.	Network Participation	45
36.	Geographical Criteria for Selecting Stations	45
37.	Geographical Distribution	45
38.	Elevation Statement	45
39.	Instrument Problems	45
40.	Missing Data Periods	45
41.	Sampling Biases	46
42.	Error Detection and Correction	46
43.	Missing Value Estimates	46
44.	Quality Control Responsibility	46
45.	Known Uncorrected Problems	46
46.	Confidence Factors	46
47.	History of Data Usage	46
48.	Quality Statement	46
<hr/>		
	DATES	
49.	Revision Date	47
50.	Science Revision Date	47
51.	Future Review Date	47
<hr/>		
	OTHER DATA SETS	
52.	Input Sources to this Data Set	47
53.	Essential Companion Data Sets	47
54.	Derived from this Data Set	48
55.	Larger Collections	48
56.	Similar Data Sets	48
<hr/>		
	SUMMARIZATION	
57.	Reference	48
58.	Summary	48

1. Data Set ID

TD-3280 and TD-3281

2. Data Set Name

Surface Airways Hourly and Airways Solar Radiation

3. Description: Data Set Aliases

Not applicable

4. Description: Access Method and Sort for Archived Data

MANUAL AND TAPE NOTATIONS

1. FILE (NCDC Variable Length Storage Structure)

A. Physical Characteristics

Data in this file are retained in chronological order by station. Although library tapes are normally maintained as described below, different characteristics including fixed length records can be furnished on request. Additional charges may be accrued for special processing.

B. COBOL or FORTRAN Data Description

(1) Typical ANSI COBOL

```
IDENTIFICATION DIVISION.
PROGRAM-ID. CRDWT3280.
* THIS PROGRAM READS TD3280 DATA AND LISTS IT ON
* A PRINTER.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER. UNIVAC-1100.
OBJECT-COMPUTER. UNIVAC-1100.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
        SELECT INDATA ASSIGN TO INTERCHANGE.
DATA DIVISION.
```

```

FILE SECTION.
FD  INDATA
    LABEL RECORDS ARE STANDARD
    RECORDING MODE IS D
    BLOCK CONTAINS 12000 CHARACTERS
    DATA RECORD IS DATA-RECORD.
01  DATA-RECORD.
    02 RECORD-ID.
        03 RECORD-TYPE PIC X(3).
        03 STATION-ID PIC X(8).
        03 ELEMENT-TYPE PIC X(4).
        03 ELEMENT-UNITS PIC XX.
        03 YEAR PIC 9(4).
        03 MONTH PIC 99.
        03 SOURCE-CODE-1 PIC X.
        03 SOURCE-CODE-2 PIC X.
        03 DAYX PIC 9(2).
        03 NUM-VALUES PIC 9(3).
    02 DAILY-ENTRY OCCURS 1 TO 100 TIMES DEPENDING ON NUM-
        VALUES.
        04 TIME-OF-VALUE PIC 9(4).
        04 DATA-VALUE PIC S9(5) SIGN LEADING SEPARATE.
        04 FLAG-1 PIC X.
        04 FLAG-2 PIC X.

```

★

WORKING-STORAGE SECTION.

★

```

01  ELEM-CT PIC 9(5) COMP.
01  PRCT PIC 9(5) COMP.

```

★

★

PROCEDURE DIVISION.

OPENING.

OPEN INPUT INDATA.

READ-REC.

READ INDATA AT END GO TO ENDALL.

ADD 1 TO ELEM-CT.

IF ELEM-CT 5 GO TO ENDALL.

```

***** THE TWO STATEMENTS IMMEDIATELY ABOVE CONTROL
***** THE NUMBER OF ELEMENTS PRINTED.

```

DISPLAY UPON PRINTER.

DISPLAY '++++++'

UPON PRINTER.

DISPLAY RECORD-ID UPON PRINTER.

MOVE 0 TO PRCT.

PERFORM PRINT-A-RECORD NUM-VALUES TIMES.

```

        GO TO READ-REC.
PRINT-A-RECORD.
        ADD 1 TO PRCT.
        DISPLAY DAILY-ENTRY (PRCT) UPON PRINTER.
ENDALL.
        DISPLAY
        UPON PRINTER.
        DISPLAY
        UPON PRINTER.
        DISPLAY 'E N D   O F   R U N' UPON PRINTER.
        CLOSE INDATA.
        STOP RUN.

```

(2) TYPICAL FORTRAN 77

```

*****PROGRAM  FRDWT3280
*****THIS PROGRAM READS TD3280 AND LISTS IT ON A PRINTER.

        CHARACTER*3  RECTYP
        CHARACTER*8  STNID
        CHARACTER*4  ELMTYP
        CHARACTER*2  EUNITS
        CHARACTER*1  SRC1, SRC2, FLAG1, FLAG2
        DIMENSION  ITIME(100), IVALUE(100), FLAG1(100), FLAG2(100)
        OPEN(10, FILE='INDATA', ACCESS='SEQUENTIAL',
             STATUS='OLD', RFORM='VB', MRECL=1230,
+           TYPE='ANSI', BLOCK=12000)

*****THE LAST FOUR ARGUNENTS OF THE OPEN STATEMENT ARE
*****EXTENSIONS ON THE UNISYS SYSTEM.

5      READ(10,100,END=999)RECTYP,STNID,ELMTYP,EUNITS,IYEAR,
+IMON,SRC1,SRC2,IDAY,NUM,(ITIME(J),IVALUE(J),FLAG1(J),
+FLAG2(J) J=1,NUM)
100    FORMAT(A3,A8,A4,A2,I4,I2,A1,A1,I2,I3,100(I4,I6,2A1))
C      IELMCT=IELMCT+1
C      IF(IELMCT.GT.5)GO TO 999

*****THE TWO STATEMENTS IMMEDIATELY ABOVE CONTROL
*****THE NUMBER OF ELEMENTS TO PRINT.

        WRITE(6,200)RECTYP,STNID,ELMTYP,EUNITS,IYEAR,IMON,SRC1,
+SRC2,IDAY,NUM
200    FORMAT(1X,A3,A8,A4,A2,I4,I2,A1,A1,I2,I3)
15     DO 25 I=1,NUM
        WRITE(6,300)ITIME(I),IVALUE(I),FLAG1(I),FLAG2(I)
300    FORMAT(1X,I4,I6,2A1)

```

```

25      CONTINUE
      GO TO 5
999     CLOSE (UNIT=10)
      WRITE(6,*) ' E N D   O F   R U N '
      STOP
      END

```

NOTE: If you do not have FORTRAN 77 you can read the character data described above into integer variables.

C. IBM JCL NOTES.

1. For ASCII Variable specify:

```

      LRECL          1234
      RECFM          DB
      OPTCODE        Q

```

2. For EBCDIC Variable specify:

```

      LRECL          1234
      RECFM          VB

```

2. RECORD

A. Physical Characteristics

Each logical record contains one station's hourly data values for a specific meteorological element for a period of **one** day. The record consists of a control word, and identification portion, and a data portion. The control word is used by the computer operating system for record length determination. The identification portion identifies the record type, observing station, element type, element units, year/month, source codes, day and number of values. The data portion contains the meteorological observations for the hourly data values and flags. The data portion is repeated for as many hourly values as occur in a day.

NOTE: Present Weather Code (PWTB) is an exception. See Code Definitions and Remarks on 'PWTB'.

NCDC Library Tapes are structured as follows:

Record Length	Variable with maximum of 1230 characters
Blocked	12000 characters maximum
Media	ASCII 18-Track IBM-Type 3480 Cartridge
Density	36,000 BPI
Parity	Odd
Label	ANSI Standard Labeled
File	1 File per tape

B. FORMAT (VARIABLE RECORD)

The first ten tape fields, the ID PORTION of the record, describe the characteristics of the entire record. The DATA PORTION of the record contains information about each element value reported. This portion is repeated for as many hourly values as occur in a day.

Each logical record is of variable length with a maximum of 1230 characters. Each logical record contains a station's hourly data for a specific meteorological element over a one day interval.

C. List of Variables

ELEMENT	WIDTH	POSITION
001 RECORD TYPE	3	001—003 b p I
002 STATION I.D.	8	004—011 b D
003 METEOROLOGICAL ELEMENT TYPE	4	012—015 b
004 MET. ELEMENT MEASUREMENT UNIT CODE	2	016—017 b P
005 YEAR	4	018—021 b O
006 MONTH	2	022—023 b R
007 SOURCE CODE 1	1	024
008 SOURCE CODE 2	1	025
009 DAY OF MONTH	2	026—027 b O
010 NUMBER OF DATA PORTION GROUPS THAT FOLLOW	3	028—030 b p N
011 TIME OF OBSERVATION (HOUR)	4	031—034 b I
012 SIGN OF METEOROLOGICAL VALUE	1	035
013 VALUE OF METEOROLOGICAL ELEMENT	5	036—040 b A
014 QUALITY CONTROL FLAG 1	1	041
015 QUALITY CONTROL FLAG 2	1	042
(016-020) DATA GROUPS IN THE SAME FORM AS TAPE	12	(043—054)
(021-025) FIELDS 011-015. REPEATED AS MANY TIMES	12	(055—066) b P
(026-030) AS NEEDED TO CONTAIN ONE DAY OF RECORD.	5	(067—078) b O
(196-201)	6	

b p b T
I
O
N

ID PORTION (30 Characters) Variable Length

```
|REC|STATION |ELEM|    |    |    |SRC|SRC|    NO. >
|TYP|    ID   |TYPE|UNT|YEAR| MO| 1 | 2 |DAY|VAL.>
```

```
|XXX|XXXXXXXXX|XXXX| XX|XXXX| XX|  X |  X | XX|XXX
```

```
TAPE      001      002  003 004  005 006 007 008 009 010
FIELD
```

DATA PORTION (12 Characters Number-Values Times)

```
< TIME          DATA | FL | FL | TIME          DATA >
< HOUR          ELEM |  1 | 21 | HOUR          ELEM >
      |....|      |   |   |      |...|
      | S | VALUE |   |   |      | S | VALUE >
      |...|      |   |   |      |...|
< XXXX | X | XXXXX |  X |  X | XXXX | X | XXXXX
```

```
TAPE      011  012      013  014  015  016  017      018
FIELD
```

```
      DATA | FL | FL |
      ELEM |  1 |  2 |
      |   |   |
< S |VALUE |   |   |
      |. |
< X | XXXXX |  X |  X |
```

```
TAPE      198      199  200  201
FIELD
```

5. Description: Access Method and Sort for Supplied Data

Definitions and general information about the Surface Airways Hourly Observations are contained in the basic documentation used to describe the format of Variable length records. Variable length and fixed length records can be supplied to users. The variable length attributes are described under Topic 4 of this document.

>

MANUAL AND TAPE NOTATIONS

1. FILE (NCDC FIXED LENGTH (USER SERVICES))

A. Physical Characteristics

Data in this file are retained in chronological order by station. The fixed length records described below can be furnished upon request. Additional charges may be accrued for this special processing.

B. COBOL or FORTRAN Data Description

(1) Typical ANSI COBOL (Fixed Length)

FD INDATA

```
          LABEL RECORDS ARE STANDARD
          RECORDING MODE F
          BLOCK CONTAINS 20 RECORDS
          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             PIC XX.
    02  YEAR                      PIC 9(4).
    02  MONTH                     PIC 99.
    02  SOURCE-CODE-i             PIC X.
    02  SOURCE-CODE-2             PIC X.
    02  DAY                       PIC 9(2).
    02  NUN-VALUES                PIC 9(3).
    02  DAILY-ENTRY
        OCCURS 24 TIMES.
    04  TIME-OF-VALUE             PIC 9(4).
    04  DATA-VALUE               PIC S9(5) SIGN
                                LEADING SEPARATE.
    04  FLAG-i                    PIC X.
    04  FLAG-2                    PIC X.
```

(2) Typical FORTRAN 77 (Fixed Length)

PROGRAM "FB3280"

THIS PROGRAM READS FIXED-LENGTH TD3280 AND LISTS
IT ON A PRINTER.

```

CHARACTER*3 RECTYP
CHARACTER*8 STNID
CHARACTER*4 ELMTYP
CHARACTER*2 EUNITS
CHARACTER*1 SRC1, SRC2, FLAG1, FLAG2
DIMENSION ITIME(24), IVALUE(24), FLAG1(24), FLAG2(24)
OPEN(10,FILE='INDAT',ACCESS='SEQUENTIAL',
+STATUS='OLD',RFORM='FB',MRECL=318,
+TYPE='ANSI' BLOCK=6360)

```

—THE LAST FOUR ARGUMENTS OF THE OPEN STATEMENT ARE
=====EXTENSIONS ON THE UNISYS SYSTEM.

```

5      READ(10,100,END=999)RECTYP,STNID,ELMTYP,EUNITS,IYEAR,
+IMON,SRC1,SRC2,IDAY,NUM,(ITIME(J),IVALUE(J),FLAG1(J),
+FLAG2(J),J=1,24)
100    FORMAT(A3,A8,A4,A2,I4,I2,A1,A1,I2,I3,24(I4,I6,2A1)
C      IELMCT=IELMCT+1
C      IF(IELMCT.GT.5)GO TO 999

```

=====THE TWO STATEMENTS IMMEDIATELY ABOVE CONTROL
=====THE NUMBER OF ELEMENTS TO PRINT

```

      WRITE(6,200)RECTYP,STNID,ELMTYP,EUNITS,IYEAR,IMON,SRC1,
+SRC2,IDAY,NUM
200    FORMAT(1X,A3,A8,A4,A2,I4,I2,A1,A1,I2,I3)
15     DO 25 I=1,NUM
      WRITE(6,300)ITIME(I),IVALUE(I),FLAG1(I),FLAG2(I)
300    FORMAT(1X,I4,I6,2A1)
25     CONTINUE
      GO TO 5
999    CLOSE(UNIT=10)
      WRITE(6,*)'E N D   O F   R U N'
      STOP
      END

```

NOTE: If you do not have FORTRAN 77 you can read the
character data described above into integer variables.

1. RECORD

A. Physical Characteristics

Each logical record contains one station's hourly data values for a specific meteorological element for a period of one day. The record consists of an identification portion, and a data portion. The identification portion identifies the record type, observing station, element type, element units, year/month, source codes,

day, and number of values. The data portion contains the meteorological observation for the hourly data values and quality flags. The data portion is repeated 24 times.

NOTE: Present Weather Code (PWTH) is an exception. See Code Definitions and Remarks on 'PWTH' in documentation on variable format.

TD3280/TD3281 data can be provided on magnetic tape structured as follows:

Record Length	FIXED 318 characters
Blocked	6360 characters
Media	ASCII or EBCDIC Magnetic Tape - 9 Track/ 18 Track, 1.44Mb Disketts
Density	1600 or 6250 BPI (36,000 BPI on IBM-Type 3480 cartridge)
Parity	Odd
Label	ANSI standard labeled (ASCII only) or unlabeled
File	1 File per tape

These fixed length records may be selected in either of the following two forms:

1. The data values as originally reported.
2. The data values as originally reported with edited replacement values substituted for the values which did not pass the quality checks. If no choice is made by the user, NCDC will supply form #2.

B. FORMAT (FIXED RECORD)

1. The first ten tape fields, the ID PORTION of the record, describe the characteristics of the entire record. The DATA PORTION of the record contains information about each element value reported. This portion is repeated for 24 hourly values representing 1 full day of observations. Each logical record is of fixed length with 318 characters. Each logical record contains a station's data for a specific meteorological element over a one day interval.

ELEMENT	WIDTH	POSITION	
001 RECORD TYPE	3	001-003	
002 STATION I.D.	8	004-011	I
003 METEOROLOGICAL ELEMENT TYPE	4	012-015	D
004 MET. ELEMENT MEASUREMENT UNITS	2	016-017	
005 YEAR	4	018-021	P
006 MONTH	2	022-023	O
007 SOURCE CODE 1		024	R
008 SOURCE CODE 2	1	025	b T
009 DAY OF MONTH	2	026-027	I
010 NUMBER OF DATA PORTION GROUPS THAT FOLLOW	3	028-030	b O
(24)		b	N
011 TIME OF OBSERVATION (HOUR - LEFT JUSTIFIED	4	031-034	b
012 SIGN OF METEOROLOGICAL VALUE	1	035	
013 VALUE OF METEOROLOGICAL ELEMENT	5	036-040	b
014 QUALITY CONTROL FLAG 1		041	
015 QUALITY CONTROL FLAG 2	1	042	b
(016-020) DATA GROUPS IN THE SAME FORM AS TAPE	12	(043-054)	b P
(021-025) FIELDS 011-015.	12	(055-066)	b O
(026-030) REPEATED 24 TIMES	12	(067-078)	b R
		b	T
(126-130)	12	(307-318)	b I
		b	O
ID PORTION (30 characters) Fixed Length			N

b

REC STATION ELEMI	SRC SRC NO >
TYP ID TYPE UNT YEAR MO 1 2 DAY VAL >	
XXX XXXXXXXX XXXX XX XXXX XX X X XX XXX >	

TAPE	001	002	003	004	005	006	007	008	009	010
------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

FIELD

DATA PORTION (12 Character Data Portion repeats the number of times indicated by the data value stored in Tape Field 010, Fixed are 12 characters repeated 24 times.)

<TIME		DATA		FL		FL		TIME		DATA >
<HOUR		ELEM		1		2		HOUR		ELEM >
		S		VALUE				S		VALUE >
< XXXX		X		XXXXX		XI		X		XXXI
		X		XXXXX		X		XXXXX		>

b

TAPE	011	012	013	014	015	016	017	018
------	-----	-----	-----	-----	-----	-----	-----	-----

FIELD

<							
<		DATA		FL		FL	
<		ELEM		1		2	
<	S		VALUE				
<	X		XXXX		IX		IX

TAPE	127	128	129	130
FIELD				

6. Description: Element Names and Definitions

SPECIAL NOTES

CEILING HEIGHTS

Ceiling was recorded in hundreds of feet above the ground to nearest 100 feet up to 5,000 feet, to nearest 500 feet from 5,000 to 10,000 feet, to nearest 1,000 feet above that. The recording increments changed for Automated Surface Observing System(ASOS) stations beginning in 1992. ASOS stations report ceiling up to only 12,000 feet with a precision to nearest 100 feet up to 5,000 feet, to nearest 200 feet between 5,000 feet and 10,000 feet, and to nearest 500 feet above 10,000 feet. Before 1949 Air Force stations recorded ceilings up to and including 20,000 feet, above which point the ceiling was classified as unlimited; Weather Bureau and Navy stations recorded ceiling only up to and including 9,500 feet, above which point the ceiling was considered unlimited. Beginning in 1949, ceiling was redefined to include the vertical visibility into obscuring phenomena not classified as thin, that, in summation with all lower layers, cover 6/10 or more of the sky. Also at that time, all limits to height of ceiling were removed, so that unlimited ceiling became simply less than 6/10 sky cover, not including thin obscuration. Then, beginning June 1, 1951, ceiling heights were no longer established solely on the basis of coverage. The ascribing of ceilings to thin, broken or overcast layers was eliminated. A layer became classified as "thin" if the ratio of transparency to total coverage at that level is 1/2 or more.

SKY CONDITIONS AND CLOUD LAYERS

Many different coding practices on sky conditions and cloud layers occurred throughout the years. The new element format conversion has taken all the different practices into account and has converted all the procedures into a common format. If you are interested in all the changes in coding, please refer to WBAN Surface Observations Card Deck 144 documentation.

DATSAV SOURCE DATA

Because of differences in Airways and METAR codes and the limited information available on the telecommunicated source compared with manuscript forms, DATSAV derived data contains less complete information than otherwise available. Element conversions unique to METAR stations are as follows:

1. Visibility - METAR codes are converted to Airways codes or the NCDC data base. This conversion will cause 6-mile visibilities from METAR stations to be recorded as 7-mile visibilities. METAR code permits the transmission of a visibility of 9,000 meters without obstruction, while **Airways requires a visibility of at least 7 miles** without obstruction. The 9,000 meters is converted to 6 miles in the program and flagged because it is less than the 7-mile requirement. These 6-mile visibilities are changed to 7 miles so that these data will conform with the rest of the data in the data base. When 'CAVOK' is found in the transmitted data, 7 miles with no obstructions is entered in the data base.
2. Weather - Only the highest numbered weather code is transmitted. This causes all accompanying weather to be lost from the data base. For example, the manuscript form might indicate moderate or heavy rain and snow showers mixed (code 84) with fog (code 45). Only code 84 will be transmitted and fog will be eliminated.
3. Clouds - Total sky and sky condition are not reported on telecommunicated data. Layer amounts are reported in eighths and converted to tenths. This conversion results in the loss of any entries of 2 or 7 tenths.
4. Ceiling - When 'CAVOK' is found in the transmitted data, an unlimited ceiling is entered in the data base.
5. Temperature and Dew Point Temperature - These temperatures are given in Celsius on the forms, Kelvin on DATSAV, Celsius on intermediate output, and are stored in Fahrenheit in whole degrees in the data base. Rounding during conversions can cause a loss of accuracy of one degree.

RECORD TYPE

The type of data stored in this record. (Value is "HLY") Each record contains one day of hourly values.

STATION-ID

Contains the WBAN Station Number. (Assigned by NCDC.) ID Range of values = 00000000-00099999. Five digit station numbers are always justified and zero filled.

METEOROLOGICAL ELEMENT-TYPE

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

ALC"x"

Sky condition and height contained within one element per layer prior to JULY 1996. The "x" indicates the layer where:

- 1 The lowest layer
- 2 The second layer
- 3 The third layer

The ASOS ceilometer will provide data for a maximum of three layers at or below 12,000 feet.

The DATA-VALUE portion of the record will appear as XXYY where:

XX The code for sky condition

YYY The layer height in hundreds of feet.

XX Code . Sky Condition

- 00 clear of less than .1 coverage
- 02 scattered .1 to .5 coverage
- 04 broken .6 to .9 coverage
- 06 overcast 1.0 coverage
- 07 obstruction 1.0 coverage
- 09 unknown

=

NOTE: This XX code is the same used for element CLC"x"
= except that thin layers and partial obscurations
are not currently measured by ASOS.

=

The NWS Automated Surface Observing System (ASOS) began implementation in September 1992. Sky and ceiling information are automatically derived from ceilometer data in the ASOS. Sky and ceiling are no longer an estimate of conditions from a human observer. The ASOS cloud height is an estimate based on the heights of clouds detected each 30 seconds during the previous 30 minutes (with the last 10 minutes of data double

weighted). The cloud amount (CLR, SCT, BKN, OVC) is derived from the ratio of the number of possible hits. The ceilometer measures clouds at or below 12,000 feet.

ALM"x"

Sky condition and height contained within one element per layer. The "x" indicates the layer where:

- 1 The lowest layer
- 2 The second layer
- 3 The third layer

This element is only used for stations using the ASOS system and beginning July 1996. The ASOS ceilometer will provide data for a maximum of three layers at or below 12,000 feet. The reportable increment for layers less than 500 feet is 100 feet. Cloud layers between 500 and 1000 feet are reported to the nearest 500 feet, and layers above 10,000 feet are reported to the nearest 1000.

The DATA-VALUE portion of the record will appear as XXYYY where:

= XX The code for sky condition
 YYY The layer height in hundreds of feet.

=
~~XX Code~~ Sky Condition
 =

- 00 Clear
- 01 few scattered 1/8 to 2/8 coverage
- 02 = scattered 3/8 to 4/8 coverage
- 04 broken 5/8 to 7/8 coverage
- 06 overcast 8/8 coverage
- 07 obscuration 8/8 coverage
- 09 unknown

NOTE: This XX code is the same used for element CLM"x", the MAPSO station version of ALM"x".

~~YYY Code~~ Layer Height

999 = Clear conditions (with '00' code for XX)

999 Unknown value (with '09' code for XX)

The NWS Automated Surface Observing System (ASOS) began

implementation in September 1992. Sky and ceiling information are automatically derived from ceilometer data in the ASOS. Sky and ceiling are no longer an estimate of conditions from a human observer. The ASOS cloud height is an estimate based on the heights of clouds detected each 30 seconds during the previous 30 minutes (with the last 10 minutes of data double weighted). The cloud amount (CLR, SKC, FEW, SCT, BKN, OVC) is derived from the ratio of the number of possible hits. The ceilometer measures clouds at or below 12,000 feet.

NOTE: This element is used beginning JULY 1996.

ALTP

Altimeter setting.

Range of values: 02700 to 03200

Unknown or Missing: 99999

NOTE: This element is used for Navy stations only beginning SEP 1984. All stations beginning JULY 1996.

CC51

The sky condition as recorded prior to June 1951. DATA-VALUE will appear as OXYYZ where:

X Amount of higher layer
YY Height of lowest scattered layer in hundreds of feet
Z = Amount of lowest layer

NOTE: This element is only recorded for data prior to June 1, 1951. Check Flags 1 and 2 for further definition of CC51. C-A-U-T-I-O-N must be taken when using this element.

Sky condition is a descriptive symbolic coding of the state of the sky, referring in general to the amount of the celestial dome covered by clouds or obscuring phenomena.

X and Z Code Amounts

0	clear or less than .1 coverage
1	thin scattered
2 =	scattered
3	dark scattered
4	thin broken
5	broken
6	dark broken

7 thin overcast
 8 overcast
 9 dark overcast
 . obscuration 10/10ths obscuration
 b (blank) partial obscuration

= YY Code
 00 - 95 Height in hundreds of feet
 = 96 Value unknown. Manuscript entry was
 'bb' (blanks)
 = 97 No low scattered clouds. Manuscript entry was
 '(line)
 = 98 Invalid original value. Manuscript entry was
 **
 = 99 10,000 feet or higher.

CLC"x"

The sky condition and cloud coverage by layer. The "x" indicates the layer where:

1 = Lowest cloud layer
 2 2nd cloud layer
 3 3rd cloud layer
 4 = 4th cloud layer
 N N'th cloud layer if necessary

=
 Cloud information pertaining to sky condition and cloud coverage are contained within one element per level. Check data Flags 1 and 2 for further definition.

=
 The DATA-VALUE portion of the record will appear as: Example
 OXXYY constitutes the five character field where:

XX code for sky condition
 YY cloud coverage (tenths)

XX Code . Sky Condition

00 Clear or less than .1 coverage
 01 thin scattered .1 to .5 coverage
 02 scattered .1 to .5 coverage
 03 thin broken .6 to .9 coverage
 04 broken .6 to .9 coverage
 05 thin overcast 1.0 coverage
 06 = overcast 1.0 coverage
 07 obscuration 1.0 coverage

=

=

=

08 = partial obscuration <1.0 coverage
09 unknown

YY Code . Cloud Coverage

Cloud coverage is expressed in tenth's. Value of 9s indicate unknown values.

NOTE: Prior to 1984, if the sky was totally clear of clouds then CLC"x" is not reported and the TSKC (Total Sky Cover) element appears as "0000". It indicates that some cloud type less than .1 coverage was observed and not a clear sky condition.

Sky condition and height contained within one element per layer. The "x" indicates the layer where:

1 = The lowest layer
2 The second layer
3 The third layer
4 The fourth layer
5 = The fifth layer
6 The sixth layer

This element is only used for stations using the MAPSO system and beginning July 1996.

The DATA-VALUE portion of the record will appear as 0XXYY where:

XX The code for sky condition
YY The layer height in hundreds of feet.

XX Code . Sky Condition

00 Clear
01 few scattered 1/8 to 2/8 coverage
02 scattered 3/8 to 4/8 coverage
04 broken 5/8 to 7/8 coverage
06 overcast 8/8 coverage
07 = obscuration 8/8 coverage
09 unknown

Note: This XX code is the same used for element ALM"x",
= the ASOS station version of CLM"x".

=

=

=

YY Code . Cloud Coverage

Cloud coverage is expressed in eighths.
Value of 9s indicate the following circumstances:

- 99 Clear conditions (with '00' code for XX)
- 99 Unknown value (with '09' code for XX)

With **MAPSO** stations, sky remains an estimate of conditions from a human observer; ceiling may be estimated or measured.

NOTE: This element is used beginning JULY 1996.

CLHT =

Ceiling height is defined as the height of the lowest sky cover layer that is more than 1/2 opaque. Heights are defined in hundreds of feet. The DATA-VALUE will appear as 00XXX. Range of values 00000 to 99999. The unknown or missing value is 00999.

CLT"x"

The cloud type and height by layer. The "x" indicates the layer where:

- 1 lowest cloud layer or obscuring phenomena
- 2 2nd cloud layer
- 3 3rd cloud layer
- 4 4th cloud layer
- 5 = 5th cloud layer
- 6 6th cloud layer

Cloud information pertaining to cloud type and cloud height are contained within one element per level. The DATA-VALUE portion of the record will appear as: XXYYY.

XXYYY constitutes the five character field where:

- XX Code for cloud type (or obstruction to vision code at lowest cloud layer) code listed below.

YYY Cloud height (hundreds of feet)

9's for any unknown value.

NOTE: (1) Cloud type/obscuring phenomena code check Flags 1 and 2 for further definition.

=

(2) Prior to 1984, if any of the four layers (maximum number of layers reported) were obscured the remaining layers appear as "00999" indicating "no clouds". If the sky was totally clear of clouds then CLT'x" was not reported. After 1984 only those cloud layers observed are indicated.

Generic cloud type or obscuring phenomena codes are:

	<u>CLOUD TYPE</u>	<u>ABBREVIATION</u>
00	None	
11	Cumulus	CU
12	Towering Cumulus	TCU
13	Stratus Fractus	STFRA
14	Stratus Cumulus Lenticular	SCSL
15	Stratus Cumulus	SC
16	Stratus	ST
17	Cumulus Fractus	CUFRA
18	Cumulonimbus	CB
19	Cumulonimbus Mammatus	CBMAM
21	Altostratus	AS
22	Nimbostratus	NS
23	Alto cumulus	AC
24	Alto cumulus Lenticular	ACSL
28	Alto cumulus Castellanus	ACCAS
29	Alto cumulus Mammatus	ACMAM
32 =	Cirrus	CI
35	Cirrocumulus Lenticular	CCSL
37	Cirrostratus	CS
39	Cirrocumulus	CC

OBSCURING PHENOMENA

(Began Jan. 1984 _____)

=

01 =	Blowing spray	BY
03 =	Smoke and haze	KH or HK
04	Smoke	K
05 =	Haze	H
06 =	Dust	D
07 =	Blowing dust	BD
08	Volcanic ash (begin Aug. 92)	VA

=

=

=

=

=

30	Blowing sand	N or BN
36	Blowing snow	BS
44	Ground fog	GF
45	Fog	F
48	Ice fog	IF
50	Drizzle	L or ZL
60	= Rain	R or RW or ZR
70	Snow	S or SP or SW or SG
76	= Ice crystals	IC
98	= Obscuring phenomena other than fog (prior to 1984)	
	=	

C2C3=

The total amount of sky cover by the first two cloud layers and the first three cloud layers. DATA-VALUE will appear as **OXXYY where:**

=

Prior to JULY 1996:

XX = **Summation** of first two cloud layers (10ths)

YY Summation of first three cloud layers (10ths)

=

Range = 00 through 10 and 99.

=

00	Clear or < .1
01	0.1
02	0.2
03	0.3
04	= 0.4
05	0.5
06	0.6
07	0.7
08	0.8
09	0.9
10	1.0
99	Unknown or missing

Beginning JULY 1996:

XX = Summation of first two cloud layers (8ths)

YY Summation of first three cloud layers (8ths)

Range 00 through 08 and 99.

00	Clear or 1/8
01	= 1/8
=02	2/8
03	3/8
04	4/8
05	5/8

=

=

=

06 6/8
 07 7/8
 08 = 8/8
 99 Unknown or missing

NOTE: Check Flags 1 and 2 for further definitions.

=

DPTC

Dew Point Temperature in tenths degrees Celcius. The DATA-VALUE will appear as 00XXX.

Range of values: 00000 to 00600

Unknown or Missing: 00999

NOTE: This element is used beginning JULY 1996.

DPTP

Dew Point Temperature in degrees Fahrenheit. The DATA-VALUE will appear as 00XXX.

Range of values: 00000 to 00140

Unknown or Missing: 00999

Measured in whole degrees F.

NOTE: The DATA-VALUE is a derived value (from Celcius temperature) beginning JULY 1996.

DRAD

Direct radiation. Hourly values are one-minute samples summed over the hour and divided by 60 to obtain the mean hourly value ending on the hour indicated in Local Standard Time (LST). Zeros are inserted during nighttime hours. (Nearest tenth watt per meter squared.)

GRAD

Global radiation. (Same comments as DRAD)

HZVS

The prevailing "Horizontal Visibility" (usually at an elevation of 6 feet above the ground). The DATA-VALUE will appear as XXXXX. Range of value 00000 to 99999. 9s indicate unknown or missing values. (100th's of miles) code follows:

HZVS CODE

00000	Zero vsby	**00125	1 1/4 mi. (ASOS only)
00006	1/16 mile	00138	1 3/8 mile
00012	1/8 mile	**00150	= 1 1/2 mile
**00019	3/16 or 1/4 mile	00162	= 1 5/8 mile
**00025	1/4 mile	**00175	1 3/4 mile
00031	5/16 mile	**00200	2 miles
00038	3/8	00225	2 1/4 miles
**00050	1/2	**00250	2 1/2 miles
00062	5/8	00275	2 3/4 miles
**00075	= 3/4	**00300	= 3 miles
*00081	3/4 or 7/8 etc!	**00350	= 3 1/2 mi. (ASOS only)
00087	= 7/8	**00400	= 4 miles
**00100	1 mile	**00500	5 miles
00112	= 1 1/8 mile	**00700	7 miles
		**01000	10 mi. (10+ for ASOS)
	= <	10000	100 MILES
		99999	Missing, Unknown, or
	=		= Unlimited (See
			Flag 1)
	=		=

NOTE: Historical archived data prior to Jan. 1984 did not differentiate between 3/4 and 7/8 visibilities. This ambiguous TD-1440 historic data was converted to TD-3280 as '00081' (*) In September 1992 Automated Surface Observing Systems began to be commissioned at NWS, FAA and DOD sites. The automated visibility sensors data are reported in the range 1/4 to 10+ miles. The reportable ASOS values are indicated with a double asterisk (**) and also includes 5 and 7 miles.

=

PRES

The station pressure at station level in inches and thousandths of mercury. The DATA-VALUE will appear as XXXXX.

Range of values: 19000 to 39990 =
Unknown or Missing: 99999 =

NOTE: The DATA-VALUE is a derived value (for ASOS stations only) beginning JULY 1996. =

--

PWTH

The present (or prevailing) weather occurring at the time of the observation. DATA-VALUE will appear as follows:

PRESENT WEATHER CODES

Present weather codes are two characters in length. The leftmost character indicates the general class of present weather while the rightmost character is a qualifier.

The two digit codes are stored into the five digits of the DATA-VALUE portion. ***If there is no occurrence of present weather the valid DATA-Value will always be 00000. Within the five digits used, the leftmost digit is always set to zero. The two-digit weather codes are entered left justified for the remaining four digits. Thus, if two types of weather occur for the same hour, the value field would appear as 0XXYY.

If more than two types occur for the same hour they will be stored into additional PWTH records as necessary.

Consider the following examples:

On day 11 Feb 1981 at 1200 (noon) and 1300 hours no present weather occurred.

0054HLY00005264PWTHNA19810211110021200b00000b11300b00000b1

On day 11 Feb 1981 at 1200 (noon) light snow, light freezing rain, ice fog, and blowing snow all occur. The records will appear as:

0042HLY000005264PWTHNA1981021111001120004026b1

0042HLY000052664PWTHNA1981021111001120007184b1

PWTH DATA-VALUE code descriptions follow:

CODE FOR PWTH RANGE 00

00 ***** No Occurrence

where:

00 No present weather occurred

CODE FOR PWITH RANGE 10 TO 19

1X ***** Thunderstorm, Tornado, Squall
where:

- X 0 thunderstorm - lightning and thunder.
wind gust 50 knots - hail .75 in.
- 1 heavy or severe thunderstorm frequent
intense lightning and thunder. Wind
gust 50 knots or greater - hail .75
in. or greater.
- 2 report of tornado or water spout
- 3 light squall (through May 1951 only)
- 4 moderate squall - Beginning in June
1951, only this code (14) is recorded.
- = Code 13 and 15 are recorded beginning
in January 1949 and ending in May 1951.
Prior to < 1949 rain squalls are
distinguished from snow squalls and
recorded in separate general classes of
present weather. A squall is a sudden
increase of wind speed by at least 16
knots, reaching 22 knots or more and
lasting for at least one minute.
- 5 heavy squall (through May 1951 only)
- 6 water spout (began Jan 1984)
- 7 funnel cloud (began Jan 1984)
- 8 tornado (began Jan 1984)
- 9 unknown

CODE FOR PWITH RANGE 20 TO 29

2X ***** Rain, Rain Showers, Freezing Rain
where:

- X 0 light rain
- 1 moderate rain
- 2 heavy rain
- 3 light rain showers
- 4 moderate rain showers
- 5 heavy rain showers
- 6 light freezing rain
- 7 moderate freezing rain
- 8 heavy freezing rain
- 9 unknown

Light = Trace (K .005 in.) to .10 inches per hour

Moderate .11 to .30 inches per hour

Heavy = > .30 inches per hour

CODE FOR PWITH RANGE 30 TO 39

3X ***** Rain Squalls, Drizzle, Freezing Drizzle
where:

X 0 light rain squalls (through 1948 only)
= 1 moderate rain squalls (through 1948 only)
2 heavy rain squalls (through 1948 only)
3 light drizzle
= 4 moderate drizzle
5 heavy drizzle
= 6 light freezing drizzle
7 moderate freezing drizzle
8 heavy freezing drizzle
= 9 unknown

When drizzle or freezing drizzle occurs with other weather phenomena:

=
Light Trace (\approx .005 in.) to .01 inches per hour
Moderate = > .01 to .02 inches per hour
Heavy > .02 inches per hour

When drizzle or freezing drizzle occurs alone:

=
Light Visibility 5/8 mile or greater
Moderate Visibility 5/16 - 1/2 mile
Heavy Visibility 1/4 mile or less

CODE FOR PWITH RANGE 40 TO 49

4X ***** Snow, Snow Pellets, Ice Crystals
where:

=
X 0 light snow
= 1 moderate snow
- 2 heavy snow
- 3 light snow pellets
4 moderate snow pellets
- 5 heavy snow pellets
- 6 light ice crystals
- 7 moderate ice crystals
- 8 heavy ice crystals

9 unknown
Beginning April 1963 any occurrence of ice crystals is recorded as a 47. Prior to this date intensities were reported.

CODE FOR PWITH 50 TO 59

5X ***** Snow Showers, Snow Squalls, Snow Grains
where:

- X 0 light snow showers
- 1 moderate snow showers
- 2 heavy snow showers
- 3 light snow squall (through 1948 only)
- 4 moderate snow squall (through 1948 only)
- 5 heavy snow squall (through 1948 only)
- 6 light snow grains
- 7 moderate snow grains
- 8 heavy snow grains
- 9 unknown

CODE FOR PWITH RANGE 60 TO 69

6X ***** Sleet, Sleet Showers, Hail
where:

- =
- X 0 light ice pellet showers
- 1 moderate ice pellet showers
- 2 heavy ice pellet showers
- 3 light hail
- 4 moderate hail
- 5 heavy hail
- 6 light small hail
- 7 moderate small hail
- 8 heavy small hail
- 9 unknown

Prior to April 1970 ice pellets were coded as sleet. Beginning April 1970 sleet and small hail were redefined as ice pellets and are coded as 60, 61 or 62. Beginning Sep 1956 intensities of hail were no longer reported and all occurrences were recorded as a 64.

-

CODE FOR PWTB RANGE 70 TO 79

7X ***** Fog, Blowing dust, Blowing Sand
where:

X 0 fog
1 ice fog
= 2 ground fog
3 blowing dust
- 4 blowing sand
- 5 heavy fog
- 6 glaze (begin 1984)
- 7 heavy ice fog (begin 1984)
- 8 heavy ground fog (begin 1984)
- 9 unknown

These values recorded only when visibility less
than 7 miles.

=

CODE FOR PWTB RANGE 80 TO 89

8X ***** - Smoke, Haze, Smoke and Haze, Blowing Snow,
Blowing Spray, Dust

where:

X 0 smoke
- 1 haze
2 smoke and haze
- 3 dust
4 blowing snow
5 blowing spray
- 6 dust storm (begin 1984)
- 7 volcanic ash (begin Aug.1992)
8 not used
9 unknown

These values recorded only when visibility less
than 7 miles.

CODE FOR PWTB RANGE 90 TO 92 AND 99

9X ***** Ice Pellets
where:

- X 0 light ice pellets
- 1 moderate ice pellets
- **2 heavy ice pellets**
- 9 unknown

PWVC

The present (or prevailing) weather occurring at the time of the observation in the vicinity of the observation. The DATA-VALUE will be determined in the same manner as the PWT element. See the PWT notes for details.

NOTE: This element is used beginning JULY 1996.

RHUM

Relative Humidity expressed in whole percent. The DATA-VALUE will appear as 00XXX.

Range of values: 00000 to 00100

Unknown or Missing: 00999

NOTE: The DATA-VALUE is a derived value (for ASOS stations only) beginning JULY 1996.

SLVP

Pressure, reduced to sea level, expressed in millibars and tenths. The DATA-VALUE will appear as XXXXX.

Range of values: 09000 to 10999

Unknown or Missing: 99999

TMCD

Dry Bulb (Air) Temperature in tenth degrees Celsius. The DATA-VALUE will appear as 00XXX.

Range of values: 00000 to 00600

Unknown or Missing: 00999

NOTE: This element is used beginning JULY 1996.

TMPD

Dry Bulb (Air) Temperature expressed in whole degrees Fahrenheit. The DATA-VALUE will appear as 00XXX.

Range of values: 00000 to 00140

Unknown or Missing: 00999

NOTE: The DATA-VALUE is a derived value (from degrees Celcius) beginning JULY 1996.

TMPW

Wet bulb Temperature expressed in degrees Fahrenheit to tenths. The DATA-VALUE will appear as 0XXXX.

Range of values: 00000 to 01400

Unknown or Missing: 00999

NOTE: The DATA-VALUE is a derived value (from degrees Celcius) beginning JULY 1996.

TSCE

Total sky cover and total opaque sky cover, measured in eighths.

The amount of the celestial dome covered by clouds or obscuring phenomena. Opaque means clouds or obscuration through which the sky or higher cloud layers cannot be seen.

The DATA-VALUE will appear as OXXYY where XX is the total sky cover and YY is the total opaque sky cover.

00	clear
01	scattered clouds 1/8 coverage
02	scattered clouds 2/8 coverage
03	scattered clouds 3/8 coverage
04	= scattered clouds 4/8 coverage
05	scattered clouds 5/8 coverage
06	= scattered clouds 6/8 coverage
07	= scattered clouds 7/8 coverage
08	overcast 8/8 coverage
99	= unknown

NOTE: This element is used beginning JULY 1996.

TSKC

Total sky cover and total opaque sky cover. Range of value 00 to 10 (tenths) and 99.

The amount of the celestial dome covered by clouds or obscuring phenomena. Opaque means clouds or obscuration

through which the sky or higher cloud layers cannot be seen.

The DATA-VALUE will appear as 0XXYY where XX is the total sky cover and YY is the total opaque sky cover.

00	clear or less than .1 coverage
01	scattered clouds .1 coverage
02	scattered clouds .2 coverage
03	scattered clouds .3 coverage
04	scattered clouds .4 coverage
05	scattered clouds .5 coverage
06	scattered clouds .6 coverage
07	scattered clouds .7 coverage
08	scattered clouds .8 coverage
09	scattered clouds .9 coverage
10	overcast 1.0 coverage
99	= unknown

=

WD16

Wind direction and speed to 16 point WBAN code. Direction is the direction from which the wind is blowing. Speed in knots.

=

WIND DIRECTION CODES
(through Dec. 1963 only)

16 Pt WBAN Code	Degrees
=	
00 Calm	Calm
11 = N	349-011
12 = NNE	012-033
22 = NE	034-056
32 = ENE	057-078
33 = E	079-101
34 = ESE	102-123
44 = SE	124-146
54 = SSE	147-168
55 = S	169-191
56 = SSW	192-213
66 = SW	214-236
76 = WSW	237-258
77 = W	259-281
78 = WNW	282-303
88 = NW	304-326
18 = NNW	327-348
99	Unknown

Example of DATA-VALUE XXYYY for wind direction and speed:
 12037 wind is from the NNE at 37 knots. 12 wind from
 NNE. 037 = wind speed is 37 knots.

NOTE: Beginning 1 Jan 1964 wind directions were observed
 and coded to tens of degrees. WD16 code no longer
 reported.

=

WIND

Wind Direction and Speed. Direction is the direction from
 which the wind is blowing. Speed in knots. Range of value
 (direction) 00 to 36 and 99. Range of value (speed) 000
 to 250.

Example of DATA-VALUE XXYYY for wind direction and speed:
 02037 wind is from 020 degrees at 37 knots. 02 wind
 020 degrees. 037 wind speed is 37 knots.

NOTE: WIND (10's of Degrees Code) element begins January
 1964. Prior to 1964 winds observed in the WD16
 (16 point code).

WIND DIRECTION CODES (begin 1964)

10's of Degrees Code	Degrees	=
00	Calm	
01	010	
02	020	
through		
36	360	=
99	Unknown	
=		

WND2

Wind Direction and Speed from ASOS beginning in September
 1992. ASOS wind speeds are two-minute averages in knots.
 Direction is the direction (in tens of degrees) from which the
 wind is blowing.

The DATA VALUE portion of the record will appear as XXYY where:

XX = The direction in tens of degrees. 00 = calm,
36 360 degrees.
YYY The speed of the wind in knots.

Example: 28014 is a wind from 280 degrees at 14 knots.

ELEMENT

The unit and decimal position of the DATA-VALUE for UNITS this record.

ELEMENT-UNITS TABLE

DT	Wind direction in tens of degrees
F	Whole degrees Fahrenheit
HF	Hundreds of feet
HM	Miles and hundredths
IH	Inches and hundredths of mercury
IT	Inches and thousandths of mercury
KD	knots and direction in tens of degrees
KS	Knots and direction in 16 point WBAN Code
MT	Millibars and tenths
NA	No units applicable (non-dimensional)
Ni	No units applicable - element to tenths
N2	No units applicable - element to hundredths
P	Whole percent
TF	Degrees Fahrenheit in tenths
WH	Watt hour per meter squared

NOTE: All entries are left justified and blank filled.

YEAR

This is the year of the record. Range of value is 1900 current year processed.

MONTH

This is the month of record. Range of value is 01-12.

CODE-1

Contains a code indicating the primary source of the original record this element was taken from. Range is 1-9.

SOURCE CODE TABLE

1	Original Manuscript
2	SRRS
3	AFOS
4	DATSAV
5	NMC
6	Foreign Keyed
7	MAPSO
8	SRRS plus
9	Other/unknown
A	ASOS

Source codes reflect normally expected data sources and do not necessarily indicate the actual source of a specific item. Pre-1984 data will only contain a 1.

CODE-2

Contains a code indicating the back-up source of the original record this element was taken from. Range is 1-9.

SOURCE CODE TABLE

1	Original Manuscript
2	SRRS
3	AFOS
4	DATSAV
5	NMC
6	Foreign Keyed
7	MAPSO
8	SRRS plus
9	Other/unknown
A	ASOS

Pre-1984 data will only contain 1.

DAY

Contains the day of the record. Range 01-31.

**NUM-
VALUES**

This notates the actual number of values reported. Range of values is 001-048.

NOTE: A record may contain fewer or more data values than you might expect. A daily record or hourly value may contain as few as 1 data value or as many as 48. This is primarily due to missing or edited data. If a particular data value was not taken or is unavailable there is no entry for it. Also, when erroneous data are encountered during quality control the original values are flagged and are followed by replacement values (see FLAG-2 TABLE for details).

**TIME -OF
VALUE**

Contains the hour and minute of the hourly element value. Range is 0000-2300. The hour is in the leftmost two digits and the minute is in the rightmost two digits. Hour is reported using the 24 hour clock. (Minutes are always 00.) See 'Special Notes' on time of record observations.

**SIGN OF
METEOROLOGICAL
VALUE**

This is the 'SIGN' of the meteorological data value (Tape Field 013) This field contains either a blank or a minus sign (never a plus sign)

**DATA-ET 1 w 108 246 m 143 246 l S BT
VALUE**

Actual data value. This field is a five digit integer. Unit and decimal position are indicated in the ELEMENT-UNITS field described in Tape Field 004.

FLAG-1

The data measurement FLAG.

FLAG-i TABLE (Measurement Value)

C	Ceiling of cirroform clouds at unknown height (Sep 56 Mar 70)
D	Derived value
E	Estimated value
G	Visibility > or = 100 miles (data value = 10000)
M	Visibility missing (data value 99999)
N	Unlimited visibility (data value 99999)
R	Dew Point and/or Relative Humidity, originally calculated with respect to ice have been recomputed with respect to water. (DPTP,RHUM)
U	Unlimited ceiling height (DATA-VALUE 99999) (CLHT)
b	(blank) Flag not needed. (All elements except CC51)

The following 4 flags apply only to the 'CC51' element type produced for cloud coverage prior to July 1951.

B	The 0 found in byte 2 of CC51 should be a 'b' thin obscuration.
.	The 0 found in byte 2 of CC51 should be a original value invalid.
	The 0 found in byte 2 of CC51 should be a total obscuration. =
9	The digit found in byte 2 of CC51 (high cloud amount) is a valid code. See Pre-June 1951 Cloud Cover Table.

FLAG-2

The data quality FLAG.

FLAG-2 (Quality Flag)

(Valid for all elements except CC51, GRAD=and DRAD)

0	Observed data has passed all internal consistency checks.
1	Validity indeterminable (primarily for pre-1984 data).
2	Observed data has failed an internal consistency check subsequent edited value follows observer value.
3	Data beginning January 1,1984 observed data has

This determination is currently made using the ratio of global/direct radiation. These flags may not be truly reliable until the hourly sky cover is included in the QC.

- 6 Data below model by greater than 5% but less than or equal to 10%
- 7 Data below model by greater than 10%
- 8 Data outside physical limits or are otherwise determined to be ERRONEOUS
- 9 Missing

7. Description: Start Date

Military stations provided most of the early observations for archiving from 1941 through June 1948. Major changes in observing and recording practices during 1948 represent the primary basis of digital information for all the principle reporting stations residing in this data set. ASOS stations began in September 1992.

8. Description: Stop Date

Present

9. Description: Parameter

Atmospheric Composition>Clouds>Cloud Type
Atmospheric Dynamics>Geopotential Height
Atmospheric Dynamics>Pressure>Station Pressure
Atmospheric Dynamics>Humidity>Relative Humidity
Atmospheric Dynamics>Solar Radiation
Atmospheric Dynamics>Atmospheric Temperature
Atmospheric Dynamics>Visibility
Atmospheric Dynamics>Winds

10. Description: Discipline

Earth Science>Atmosphere>Meteorology
Earth Science>Atmosphere>Climatology

11. Description: Coverage

Southernmost Latitude: 90S
Northernmost Latitude: 90N
Westernmost Longitude: 180W
Easternmost Longitude: 180E

12. Description: Location

Areal Coverage

U.S.A., Caribbean Islands, Pacific Islands, and other overseas stations of the National Weather Service, U.S. Navy, and U.S. Air Force.

13. Description: Keyword

Meteorology
Climatology
TD-3280
3280
Dew Point Temperature
Direct Radiation
Global Radiation
Horizontal Visibility
Visibility
Temperature
Dry Bulb Temperature
Wet Bulb Temperature
Station Pressure
Sea Level Pressure
Pressure
Weather
Present Weather
Relative Humidity
Humidity
Sky Cover
Total Sky Cover
Cloud Heights
Cloud Type
Wind
Wind Direction
Wind Speed

14. Description: Storage Medium

The data are currently stored on 673 magnetic cartridges totalling about 60 gigabytes. Tape copies can be made of either the variable length or fixed length record structure. Data may be acquired on 9-track magnetic tapes at 1600, and 6250 BPI density; on 18-track/36,000 BPI IBM-type 3480 cartridges; or on IBM-compatible 1.44 megabyte diskettes.

15. Description: File Mode

ASCII
EBCDIC (at additional cost)

16. Description: How to Acquire the Data

The data are available for purchase from the National Climatic Data Center, Climate Service Branch, Federal Building, 151 Patton Avenue, Room 120, Asheville, NC 28801-5001, phone number (704)-271-4800.

17. Description: Historical and Current Data Sources

Principal Climatological Stations

Surface Airways Hourly

TD-1440

Daily Observations (Original Manuscripts)

Mapso Diskettes

AFOS

DATSAV

SRRS Manuscripts

Card Deck 144

18. Description: Data Derivation, Algorithms

No information available at this time.

19. Description: Data Derivation, Algorithms Responsibility for

No information available at this time.

* *****

20. Description: Project

Federal Aviation Administration (FAA) Major Airport Study.
National Weather Service (NWS) ASOS Program.

21. Data Center: Data Center, Archiving

National Climatic Data Center

NOAA/NESDIS/NCDC

Federal Building

151 Patton Avenue, Room 120

Asheville, NC 28801-5001

22. Data Center: Data Center, Originating

National Climatic Data Center
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

23. Personnel: Archiver

Chief, Data Base Management Branch
NOAA/NCDC
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

*** *****

24. Personnel: Technical Contact

Climate Services Division
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

*** *****

25. Personnel: Investigator

Chief, Data Base Management Branch
NOAA/NCDC
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

26. Sensor: Sensor Name and Operating Principles

See Federal Meteorological Handbook No. 1 (FMH), Surface Aviation Observations, FCM-HI-1994 and the ASOS User's Guide. A description of sensor and observation differences between conventional and ASOS systems is contained in Environmental Information Summary C-2, (EIS C-2) Local Climatological Data.

27. Sensor: Sensor Siting

Sensor siting is determined and approved by the headquarters of the agency with controlling authority over the station such as National Weather Service, Navy, and Federal Aviation Administration. NCDC station history files contain information on siting provided by NWS.

28. Sensor: Sensor Accuracy and Calibration

See the ASOS USER'S GUIDE for information on ASOS sensors. NWS sensor accuracy and calibration information is contained in various NWS manuals not available through NCDC.

29. Sensor: Sensor Sampling Characteristics

See the ASOS USER'S GUIDE for information on ASOS sensors. The EIS C-2 contains limited information on sensor sampling characteristics for conventional and ASOS observations.

30. Sensor: Data Capture Method at/near Sensor

See the ASOS USER'S GUIDE for information on ASOS sensors.

31. Station: Station Location Accuracy

Station History Locations are known to the nearest minute of latitude and longitude. ASOS provides location to the nearest second.

32. Station: Station Observation Schedule

Beginning January 1 1965, for most National Weather Service Stations and March 1, 1972, for most Naval Weather Service Stations the digitizing of the Airways Observations was reduced from 24 obs/day to 8 obs/day. These observations, at 3-hourly intervals, coincide with the normal GMT schedule of 00Z, 03Z, 06Z etc. This means, of course, that the observations, keyed in Local Standard Time (LST) differ according to time zone. Beginning with August 1981 data, 24 obs/day were again digitized for most active stations.

The time entered is that of the record observation, taken within 10 minutes prior to the hour (e.g., 1355 keyed 1400) Prior to June 1957, observations were taken within 10 minutes prior to the half hour; minutes are disregarded in punching (e.g., 0222 punched 02; 1428,14). All "War Times" and "Standard Meridian Times" were converted to Local Standard Time before punching. For Air Force stations in the United States, the times were punched in accordance with the established time zones. Time entries for Air Force stations outside the United States were edited prior to punching and, where necessary, converted to the Local Standard Time of the nearest meridian evenly divisible by 15 degrees.

33. Station: Station Data Time Averaging

Conventional observations were generally instantaneous and collected by a human observer during the ten minutes prior to the hour. Cloud data, visibility, present weather, and freezing rain were estimated and noted at the time of observation. Temperature and dew point were read from a dial or analog chart record. Pressure was read from a dial or scale on the mercurial barometer and precipitation was manually measured at the gauge each hour. Wind data were estimated by viewing a dial for one minute and estimating the average speed and direction during that time.

The Automated Surface Observations System (ASOS) is designed to collect data continuously. Hourly observations are computed from data accumulations over the following time periods prior to the report:

Cloud Height	30 minutes
Cloud Amount	60 minutes
Visibility	10 minutes
Present Weather	10 minutes
Freezing Rain	15 minutes
Temperature/Dew Point	5 minutes
Wind	2 minutes
Pressure	1 minute
Precipitation Accumulation	60 minutes

34. Station: Spatial Sampling Using Station Grouping

Not applicable

35. Stations: Network Participation

The network consists of NWS, FAA and NAVY conventional and ASOS sites. NWS ASOS stations are expected to number approximately 245 when fully commissioned in the late 1990's. The FAA is commissioning a similar network of automated stations which are expected to number more than 800. The Navy has also indicated that they will install ASOS sites.

36. Stations: Geographic Criteria for Selecting Stations

The majority of NWS and FAA stations are located at major airports to support aviation activities.

37. Stations: Geographical Distribution

Stations are located in the contiguous United States, Alaska, Puerto Rico, Hawaii and other Pacific islands. A few Navy stations are distributed globally.

38. Stations: Elevation Distribution

Elevations are generally below 1000 meters above sea level. The minimum elevation is near sea level and the maximum elevation is about 2000 meters.

39. Data Quality: Instrument Problems

Specific instrumental and data problems are addressed in articles published in various journals of the American Meteorological Society.

40. Data Quality: Missing Data Periods

Besides the period before 1948 and 1965 - 1981, there are no general periods of missing data. Data may be missing at random times due to instrument failures or communications problems. There are a few part-time stations that collected data for less than 24 hours each day.

41. Data Quality: Sampling Biases

No information available at this time.

42. Data Quality: Error Detection and Correction

See the EIS C-2 for a discussion of editing techniques.

43. Data Quality: Missing Value Estimates

Replacement values for missing data are not estimated.

* * *

44. Data Quality: Quality Control Responsibility

Responsibility for data quality control rests with the controlling agency, generally NWS, FAA or DOD.

45. Data Quality: Known Uncorrected Problems

See various discussions under Topic 6, Meteorological Element-Type.

46. Data Quality: Confidence Factors

See various discussions under Topic 6 and the EIS C-2.

47. Data Quality: History of Data Usage

See EIS C-2.

48. Data Quality: Quality Statement

The hourly surface observations have received various quality control measures depending on the agency and the years of collection. Generally, quality has improved throughout the period of record. See EIS C-2.

The ASOS data receive various types of quality control at the station. For example, pressure is quality, controlled by use of redundant sensors. If one or more of the six samples read each

minute from one pressure sensor is missing, only the remaining sensors are used to determine the pressure. Sensor values for the same minute may not differ by more than 0.04 inches. The lowest pressure reading that does not differ from the other sensor readings by more than 0.04 inches Hg. is considered the observed pressure. Discussion of quality control procedures for other sensors may be found in the ASOS USER'S GUIDE

49. Dates: Revision

May 1994
August 1994
November 1995
February 1997
March 1997

50. Dates: Science Review Date

May 1994
August 1994
November 1995
February 1997
March 1997

51. Dates: Future Review Date

Not applicable at this time.

52. Other Data Sets: Input Sources to this Data Set

Not applicable.

53. Other Data Sets: Essential Companion Data Set

None

54. Other Data Sets: Derived from this Data Set

Daily **Summary** Data, processed into TD3210 and published in the Local Climatological Data (LCD) publication.

Monthly **Summary** Data, TD3220.

Hourly precipitation, TD3240.

Weather Duration, TD3292.

55. Other Data Sets: Larger Collections

No information available at this time.

56. Other Data Sets: Similar Data Sets

See Topic # 54.

57. Reference

National Weather Service, August 1991: ASOS USER'S GUIDE, NOAA-NWS, Silver Spring, MD.

Environmental Information Summary C-2, Local Climatological Data
National Climatological Data Center (NCDC).

58. Summary

Hourly surface observations are collected primarily at major airports and military bases by trained personnel or automated equipment that has been tested by the controlling agency. The controlling agencies are the National Weather Service (NWS), the Federal Aviation Administration (FAA), and the U.S. Navy. The NWS and FAA sites are located in the contiguous U.S., Alaska, Puerto Rico, Hawaii and other Pacific Islands. The Navy operates several stations worldwide.

The digital data file begins in the late 1940's. Data for earlier years are available in manuscript form. The hourly data includes observations of clouds, weather, visibility, temperature, humidity, winds, and pressure. Hourly precipitation data are stored in the Hourly Precipitation Data file TD3240.