

INTRODUCTION

Purpose – The purpose of weather observations is to provide detailed information of weather and climate to meet the needs of the various users. Some users require up-to-the-minute information; others require daily, monthly or long term climatological data. For example, an aircraft operator wants current weather reports and forecasts; a heating company requires degree day data. The farmer is interested in temperature, sunshine and precipitation information. The decision to construct an airport in a certain locality, or how strong a building should be to withstand the weight of rooftop snow accumulation or wind stress, may depend on weather data obtained over a long period. Thus, weather observations and carefully prepared records have long range, as well as immediate value.

World Meteorological Organization (WMO) – Since weather systems and climatic conditions do not recognize international boundaries, it is necessary that weather information be freely exchanged throughout the world. This requires coordination and standardization of practices and procedures and the efficient exchange of weather transmissions. To promote these services and to further the application of meteorology to aviation, shipping, agriculture and other human activities, the WMO was formed. Its membership is drawn from more than 100 countries and territories. Its weather reporting codes are called International Codes.

To carry out the resolutions of the WMO, and to discuss and coordinate meteorological activities within certain geographical areas, there are six Regional Associations in the WMO. One of these Associations, Region IV, comprises Canada, the United States and the Central American countries. Because of differences in units of measure, national development, etc., between Regions, some of the International Code forms have been modified slightly or additional codes have been introduced for Regional use. These codes are known as Regional Codes.

Again, because of differences in climate or to meet special requirements, a Member or group of Members within a Region may develop a special reporting code. An example of this is the Hourly Weather Code developed through bilateral agreement between Canada and the United States to meet the requirements of aviation and other users. Such codes or code changes are called National Practices.

Although International, Regional and National Codes may all be used in weather reporting, weather messages for interregional broadcast are in international code form. All of the codes, International, Regional and National are listed in WMO Publication No. 306, Manual on Codes, Volumes I and II.

Amend. No. 9
Sept. 1987

Manual Content – this manual has been prepared with due consideration to the recommended practices and procedures set down by the World Meteorological Organization. Five parts are included containing instructions on the following:

Part (A) Observing Procedures – General (yellow pages).

Part (B) Hourly Observations – Detailed Coding and Reporting (white pages).

Part (C) Synoptic Observations – Detailed Coding and Reporting (green pages).

Part (D) Supplementary Codes – Detailed Coding and Reporting – Pilot's Reports (PIREPS), Pilot Balloon Observations, Weather codes – Automatic Weather Stations, METAR (blue pages).

Part (E) Abstracting and Recording Supplementary Data – Climatological Summary, Wind, Rain. (pink pages).

Authority – All statements throughout this manual shall be regarded as authoritative and shall be considered by the observer to be instructions. Where the term "ADMA" is used it means, The Assistant Deputy Minister, Atmospheric Environment Service.

The word "shall" is used in this manual to indicate that instructions are mandatory, or must be followed. The word "should" is used to denote a recommended practice, or a good way to do something.

Weather Observer – A weather observer is a member of the Atmospheric Environment Service of Canada qualified to make weather observations and reports, or a person authorized to do so by the Assistant Deputy Minister.

Duties – It is the duty of the weather observer to report weather conditions as they actually exist at the time of observation. While on duty, weather observers are required to keep a close and continuous watch on the weather. Their records and reports shall be as complete and accurate as possible. Prompt and accurate reporting is vital for forecasting and weather warning services. They may be the means of preventing property damage and loss of life. Delayed reports rapidly lose their value for forecasting. However, if communication or other difficulties delay or prevent distribution of reports the observer shall continue to observe the weather and record his observations on schedule. It is essential that climatological records be complete. Neatness is necessary for ready reference and for quick processing of the data; illegible or doubtful records are of little use.

NOTE: It is particularly emphasized that any attempt by anyone to have the observer alter any portion of an observation in such a manner as to decrease its accuracy to suit the purposes of an individual or organization, shall be reported by letter immediately, giving full details to:

Assistant Deputy Minister
Atmospheric Environment Service
4905 Dufferin Street
North York, Downsview
Ontario
M3H 5T4

A meteorological officer (Inspector or Instructor) authorized by the ADMA may instruct an observer to change his observation to improve its accuracy and completeness.

Priority of Duties – Atmospheric Environment Service personnel whose duties include observing and reporting weather conditions, shall give highest priority to weather observing duties, except when the imminent occurrence of severe weather conditions (e.g. tornadoes, waterspouts, funnel clouds, severe thunderstorms), either observed or forecast, and posing a threat to life and major property requires the rapid dissemination of a warning or advisory. In these circumstances, a weather report is to be prepared and transmitted immediately following the dissemination of the warning. Other personnel (i.e. non-AES employees) who take weather observations shall give such duties the priority specified by their employing agency.

Qualifications – The weather observer must be competent and trained to make observations accurately and to code the resulting reports within the time allotted. The observer should realize however, that it is not possible nor desirable to prepare detailed instructions to cover the variety of weather in all its forms. Therefore, initiative and resourcefulness in dealing with unusual conditions are most important qualities in an observer.

Weather Observing Station – A weather observing station is any site where an observer is located and from which weather observations are made. It is normally equipped with instruments for measuring some of the meteorological elements.

Point of Observation – A point of observation is any site at which meteorological instruments are exposed or from which visual observations are taken. The term “At the Station” as used in this manual refers to any point of observation from which the weather data are gathered.

Surface Weather Observation – A surface weather observation is an evaluation of meteorological elements, visually and/or by measurement at a specified location on the earth’s surface (usually a weather observing station).

Observations at Night – Prior to making an observation during darkness, the observer should spend several minutes outside so that his eyes will become dark adapted.

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TIMES OF OBSERVATIONS

Standard Time of Observation – The Standard Time of Observation is determined by international agreement; it is with reference to UTC and is published in the Technical Regulations of the WMO. For example, the Standard Times for the main Synoptic Observation are 0000, 0600, 1200 and 1800 UTC; for Upper Air observations, the Standard Times are 0000 and 1200 UTC.

Surface Observations – The time of a surface observation shall be the time at which the barometer is read. In the case of a special Hourly Observation, where a barometer reading is not taken, the time of the observation is the time at which the element necessitating the special was observed. The time assigned to a special observation issued to report the end of a thunderstorm, showery precipitation or intermittent precipitation would normally be 15 minutes later than the actual time of the last occurrence of thunder or precipitation.

Official Time of Observation – In Canada the Official Time of a surface weather observation is the same as the Standard Time.

Local Standard Time – The Local Standard Time used for record purposes shall normally be that of the standard time zone in which the station is located, whether or not “daylight saving time” is adopted for other purposes. If there are any changes in standard time zones, stations affected, for record purposes, shall first coordinate the effective date of change by a letter to the ADMA, through the appropriate channels.

QUALITY STANDARDS – OBSERVATIONS – Data held in the National Meteorological Archives are used in the preparation of official publications and by both government and industry in the preparation of statistical analyses as a basis for decision making. The accuracy of the archived data determines, to a large degree, the quality of the publication or analysis, and hence it is extremely important that suitable measures be taken to ensure that archived data are of the highest quality, consistent with reasonable cost.

Before being transferred to the Archives, observational data are subjected to a computer analysis or review which reveals possible errors in recording or transmission, and gross errors only in instrumental readings, calculations and estimation of parameters. The suspect data are checked by technical staff and corrected where necessary.

Because the computer review of data is incapable of uncovering all errors and it is neither possible nor desirable to create a large quality review unit at AES Downsview it is extremely important that Regions establish and maintain satisfactory data quality control programs for stations falling within their jurisdiction. Normally, the minimum program should consist of thorough checking of data by station personnel. However, additional measures should and must be taken where a need is indicated.

Although the data review at AES Downsview does not reveal all errors in observational data, experience has shown that the number of corrections required in this quality control program is a reliable indicator of the likely overall quality of the data. As an aid to Regional network managers and operators in appraising station performance and identifying those stations requiring augmented or alternate quality checking programs, AES Downsview supplies a listing of the corrections made to the data for each month from individual stations and a monthly report indicating, for each observing station, the error count as a percentage of observations taken requiring one or more corrections.

ROUNDING OF DATA

When a figure is to be rounded to fewer digits than the total number available, the procedure shall be as follows:

- (a) When the first digit discarded is less than five, the last digit retained shall not be changed; example:

3.44 rounded to two digits becomes 3.4
3.49 rounded to one digit becomes 3
-1.849 rounded to two digits becomes -1.8

- (b) When the first digit discarded is five, or greater than five, the last figure retained shall be increased by one unit; examples:

2.51 rounded to one digit becomes 3
2.66 rounded to two digits becomes 2.7

- (c) The algebraic sign of the number shall remain unchanged; examples:

-0.5 rounded to one digit becomes -1
0.5 rounded to one digit becomes 1
1.5 rounded to one digit becomes 2
-2.5 rounded to one digit becomes -3

(d) Additional examples:

Figure	Rounded To Two Digits	Rounded To One Digit
5.49	5.5 refer (b)	5 refer (a)
6.501	6.5 " (a)	7 " (b)
6.50	6.5 " (a)	7 " (b)
-0.15	-0.2 " (b)	0 " (a)*
-0.55	-0.6 " (b)	-1 " (b)
-1.45	-1.5 " (b)	-1 " (a)

*Note: When a negative quantity rounds to exactly zero the negative sign shall be omitted in the rounded value.

CORRECTIONS TO WEATHER RECORDS

Black ballpoint shall be used for all entries and corrections. To make a correction, draw one horizontal line through all the digits in the original entry. Record the corrected data neatly above.

If a correction is made at the originating station after the report has been transmitted, the correction shall be entered in red. Refer also to para. 8.2.10.1.

If the records are reviewed at a field office other than the originating station, corrections shall be made in a colour other than red or green. Red is reserved for corrections at the originating station; green is reserved for corrections at AES Downsview.

Observer's Notebook – The Observer's Notebook (Form 63–2321) is a pad of work sheets to be used by the observer in making calculations and recording data during the observation. The Observer's Notebook should be used for all surface weather observations and should be retained on the station for at least two months so that the original data are available if required in checking the permanent station records.

Meteorological Instruments – Instruments are generally installed by an Inspector or other person with special training. This manual deals only with the use of the instruments as part of the general observing procedure. Instructions for the routine care and maintenance of instruments will be found in the appropriate Instrument Circulars and Manuals and in the reference manual "Installation, Maintenance and Repair of Meteorological Instruments and Instrument Systems, Reference Manual for Supervisory Personnel, 2nd edition, November 1976".

Instrument Manuals – Each observing station shall have copies of the instrument manuals which deal with the instruments installed at the station, copies of INS* and OBS* circulars, relevant instrument Information Bulletins and SPC circulars. The following is a list of manuals or bulletins for the various types of instruments:

<u>Manual</u>	<u>Title</u>
10	Pressure Measurements with Mercury Barometers
11	Barographs
15	Altimeter Setting Indicator
20	Liquid-in-Glass Thermometers
21	The Bimetal Thermograph
30	MSC Psychrometers
32	Remote Temperature and Dew Point Measuring System – Type 2
TM 02-04-01	Remote Temperature/Dewpoint System
TM 04-01-03	Tipping Bucket Rain Gauge System Sept. 1981
TM 04-02-01	AES Rain Gauge Type B System Sept. 1985
50	Wind Measuring Equipment, Type U2A
51	MSC Anemometer Type 45B
TM 05-01-04	Type 78D Anemometer and Display Unit
60	Pilot Balloon Observations
70	Ceiling Projectors and Associated Equipment
TM 07-01-01	Ceiling Balloon Equipment, 76 mm (3 inch) Nov. 1977
75	Operation of the Rotating Beam Ceilometer
76	Routine Maintenance of the Rotating Beam Ceilometer
IB 07-005	Description and Operation (ASEA Laser Control Unit and Chart Recorder)
IB 07-006	Operation and Maintenance Procedures (ASEA Laser Ceilometer QL 1212)
TM 14-01-01	Solar Radiation
	Sunshine Jan. 1974
	Evaporation May 1978
	Snow Surveying – Second Edition
	Soil Temperature – March 1978

In addition, each station shall have:

- (a) The appropriate Books of Psychrometric Tables, both “ventilated” and “non ventilated” to conform with the station elevation.
- (b) The AES publication “Conversion Tables” which is provided to facilitate the consistent conversion of meteorological values from the Imperial System of Units to the International System of Units by weather observers in their daily operational activities.

*INS circulars and Data Sheets deal with interim instructions on the installation, operation and routine maintenance of instrument equipment.

*OBS circulars contain supplemental observing instructions. The contents of these Circulars and Data Sheets will be included in later editions of the manuals concerned.

Distribution of Reports – In Canada the principal method of distributing coded weather reports is by teleprinter circuits. In areas not served by these circuits, other methods of communication (radio, telephone, telex, etc.,) are employed in accordance with the station's current communications instructions as listed in "MANTRANS – Meteorological Teletype Traffic, Canadian Data".

Retention – Meteorological records, charts, forms, etc., are retained at the station for various periods of time. Procedures regarding the retention of documents are given elsewhere in this manual with detailed instructions pertaining to each chart or document.

Station Name – The station name, entered on any meteorological observing chart or form, **shall be the official name of the station, as published in METSTAT.** For newly-established stations the official name selected for the station shall be submitted to the ADMA, through appropriate channels, for approval.