CANADA

DEPARTMENT OF TRANSPORT
METEOROLOGICAL BRANCH

A MANUAL OF REGIONAL CLIMATOLOGICAL DATA PROCESSING

CLI—1—69
MARCH 1, 1969

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RECORD OF AMENDMENTS

Amendment List		Amendments made by	Date of Entry
Number	Date		

FOREWORD

This manual, which replaces an earlier draft issued in 1963, describes standard practices prescribed by Meteorological Branch Headquarters for processing climatological Data at Regional Data Processing Centres.

Regional data processing of reports from ordinary climatological stations was first begun many years ago when reports were mailed by observers to observatories in Victoria, B.C. and St. John, N.B. Positions were established later for data processing in Edmonton and Moose Jaw as "Agent of the Meteorological Service". In these observatories and offices the reports from ordinary climatological stations were summarized and abstracts of the data were maintained for local use. At the same time some supervision was provided to the observers through correspondence. With the change to machine processing of climatological data at Meteorological Branch Headquarters in the 1950's and the delegation of responsibility for the maintenance and development of the climatological networks to the Regions in 1962, the duties of Regional data processing became more closely integrated with both Regional administration and the machine and technical processing of data at Meteorological Branch Headquarters.

In the first two sections of this Manual (Administrative Procedures and Data Processing – General) there will be found suggestions or guidelines related to the role of the data processor with respect to Regional administration and climatological services. While it is desirable to have the duties of the data processors uniform from Region to Region, it is understood that local conditions may make it desirable to modify some of the duties. Thus some of these suggested duties may be altered by a Region without reference to Meteorological Branch Headquarters. However, in the succeeding sections the duties described for the data processor are closely linked with the system of data processing at Meteorological Branch Headquarters. Duties indicated by the use of "shall" must be carried out as described in this Manual unless prior concurrence is received for modification of these duties from Meteorological Branch Headquarters. It is strongly recommended that duties indicated as "should" be carried out as fully as staff and time permit.

March 1, 1969

J.R.H. Noble
Director

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1. ADMINISTRATIVE PROCEDURES

1.1. The Regional data processor will normally be responsible for a system of recording the receipt of documents and charts received from the climatological stations in the Region and for initiating action to trace missing or delayed reports.

1.1.2. It is recommended that such records be kept on card index files for ease in inserting cards for new stations in alphabetical order, or withdrawing cards for stations which have ceased reporting. Each station card should contain a record of all types of charts and forms routinely forwarded by the station to the Regional Data Processing Centre.

1.1.3. As cards are withdrawn from the current file, due to the station ceasing operation or the card becoming full, they should be filed in a permanent file. In this manner a complete file of all data available from stations in the Region can be built up for future reference by Regional personnel, i.e. inspection staff and those supplying climatological services.

1.2. The card index file showing receipt of documents from the stations should be checked on a monthly basis for reports and charts which are delayed or missing, and tracing action initiated.

1.2.1. Meteorological Branch Headquarters will provide periodically(at 6 month intervals at present) a listing of climatological stations indicating, among other things, when precipitation and climatological station reports have not been received. These should be checked against the Regional records to see if action is required on reports that have gone astray.

1.2.2. In spring and at the beginning of winter special action will be required to check that stations reporting on seasonal programmes (rate-of-rainfall, evaporation, snow survey, etc.) resume reporting at the beginning of the proper season.

1.3. Based on the assumption that the inspection staff will, before station inspection, require information on the charts and forms normally submitted by a station, any of these that have not been received, and a brief summary of the quality of data and particulars on difficulties encountered by observers in observing or recording data, it is recommended that the data processor maintain a second card index file on which entries are made monthly noting when an observer has submitted an incomplete report or has encountered difficulties with observing and recording data. Such information will not only be valuable to the inspection staff, but it will also serve as a useful guide to personnel assigned to data processing duties on a temporary basis during periods of leave, illness, etc.

1.4. Monthly climatological report forms and charts should be sent by the observers to the Regional Data Processing Centre as soon as possible after the end of the month. Those from which data will be transferred to punched cards should be processed and mailed to Meteorological Branch Headquarters by the end of the month in which they are received at the processing centre. Two exceptions to this are noted.

1.4.1. Forms 2322 are normally mailed directly from the station to Meteorological Branch Headquarters. If any of these forms are routed on a temporary basis through the Regional Office for checking, the prompt forwarding of such forms to Headquarters is required. All punching of data from form 2322 is scheduled to be completed three to four weeks after the close of each month and data from some stations are required to be tabulated from punched cards by the 20th of the month in which they are received.

1.4.2. Priority should be given to the processing and prompt mailing of all report forms delayed beyond the end of the month following the month to which the data apply. The prompt receipt of such delayed reports is required to allow the data to be published in the proper issue of the Monthly Record of Meteorological Observations in Canada.

1.5. Instructions for observing procedures and completing reports for observers at ordinary climatological stations measuring temperature and precipitation are contained in the booklets "Precipitation" and "Temperature". Instructions for observing procedures, completion of reports, disposition of charts and routing of forms and charts for supplementary climatological network instruments are included as sections of MANOBS or observing circulars. Since MANOBS and circulars are not normally distributed to observers at ordinary climatological stations, it will be necessary for the Region to make provisions for suitable instructions to be made available to climatological observers as required. The Regional data processor may not be responsible for issuing these instructions, but he is in a position to advise his supervisor when observers do not appear to have the required instructional material.

2. DATA PROCESSING – GENERAL

2.1. The climatological data processing system, which includes data processing at both Regional and Headquarters levels, has been designed with a view to keeping duplication of work to a minimum. Some of the instructions on data processing duties contained in the remaining sections of this Manual are integral steps in the National system for processing data, and conformity by the Regional data processors is required. On the other hand, there will be certain Regional requirements for accuracy in processed data supplied to consumers in the Region, or for evaluation of observer performance which will not be satisfied by these procedures, and suggestions have been included for satisfying these requirements.

2.2. In processing the report forms the data processor is required (indicated by the use of "shall") to check that certain entries are in the proper units or form. When these report forms are received at Meteorological Branch Headquarters they are passed to the punched card operator without further checking. Since the punched card operator is trained only in the punching of the card, and has not the training or the time to recognize non-standard entries, any non-standard items may be punched incorrectly and the resulting correction procedures are costly in time of the data control staff and the machine processing section.

2.2.1. On many of the observer report forms there are spaces for entering monthly sums or totals. Completion of these entries by the data processor is usually required in meeting Regional requirements for data. Whenever instructions are stated explicitly in this Manual that such entries shall be completed it should be understood that these entries are used in Headquarters data processing. Punched card operators may make errors in punching data and the standard method for elimination of these is to have a second operator punch the same data and compare the cards. When differences occur under this procedure it is indicative that one or both of the operators has made an error in punching, and when there is agreement in punching it is assumed that the punching is correct. However, when punching most climatological data the cost of punching can be effectively reduced by 50% by having the daily data punched only once and then by punching an additional monthly summary card in order to verify the punching. For example, when data from a climatological station report form are punched one card is punched for each day of the month, followed by an additional card containing the totals of the daily extremes of temperture and precipitation. Using machine methods, the entries in the daily cards are added and the sums are compared with the sums in the additional card. When these are the same it is assumed that the daily cards have been punched correctly. When differences are found it is then necessary to verify the original addition and then, if the addition is not in error, compare the punching in the daily cards with the entries on the original record to detect the error for correction.

2.3. Regional data processors share with staff at Meteorological Branch Headquarters the responsibility for the preliminary quality control of data for climatological purposes. In processing climatological data the term "quality control" has not the meaning associated with it in manufacturing where samples are selected from a production run, where, depending on how these samples meet specifications, the production run may be accepted or rejected. In handling climatological data, quality control is employed in its broadest sense, including the inspection of every observed value, passing judgement on its acceptability, correcting the data which are in error, and estimating values for faulty or missing data. The goal of quality control is to ensure that all data appearing in the official publications of the Meterological Branch and retained in machine sensible form are as complete and accurate as possible. There has always been a quality control of data for climatological purposes, but the emphasis on it and the methods used have changed

appreciably with the introduction of computers. Before computers were used, the summarizing of data by clerical means and the interpretation of the data and summaries prepared from them by professional staff with experience in climatology would normally disclose any major errors. Computer facilities are not a definite requirement for quality control but are particularly useful in carrying out consistent scanning of data to select suspect values. However, this is only a part of the quality control procedure as outlined in the following paragraph.

2.3.1. The six basic steps in the quality control of climatological data are:

STEP 1 All data are checked or scanned and those which appear to be far from normal conditions, or which are not consistent with other data reported by the same station, or with similar data from nearby stations, are selected for further investigation.

STEP 2 An attempt is made to justify the selected data as recorded or, in other words, try to prove the observer is right. For temperature data the effect of fronts, radiation, inversions, air drainage and thunderstorms or the peculiar exposure of a station in a valley, on the side of a hill, near a body of water, in a saucer-like depression etc. may justify retention of the data. When dealing with precipitation data, the topography at the station, the time of year and the meteorological processes causing the precipitation must also be considered.

STEP 3 If the data as recorded cannot be justified an attempt is then made to determine some logical way in which the observer may have made a mistake and to correct the data accordingly. Some common errors are reversal of digits, omission or erroneous use of the decimal point, reading thermometers 5, 10, 15, 20 degrees too high or too low, entering data on the wrong day or in the wrong column, resetting thermometers between observations or not resetting properly at time of observation, reading the wrong end of the index in the minimum thermometer, omitting minus signs with below zero temperatures, losing count of the number of times the rain gauge graduate (0.50 in. capacity) has been filled, estimating rather than measuring snowfall, illegible handwriting, typing errors, etc.

STEP 4 If the data cannot be justified (Step 2) or the type of mistake determined and a correction made (Step 3), then the recorded value (or values) must be rejected.

STEP 5 When a recorded value is rejected, a decision must be made as to whether or not an estimated value should be used. This decision is usually based on the effect of the missing values on the resultant processed values (missing temperatures during extremely cold or hot periods will likely bias the average, any missing values of rain, snow and precipitation will result in incomplete totals for the month) and the requirement for completing a station record that is otherwise generally complete. Estimated values entered on original records are always followed by an "E".

STEP 6 When observers appear to be making errors due to lack of understanding of procedures for observing and recording, consideration must be given to whether action should be initiated through correspondence or through a visit by the inspection staff for further training and/or motivation. The prevention of errors is perhaps a more important feature of quality control than correction of errors made in the past, but it may often be overlooked due to the pressures to meet data processing schedules.

2.3.1.1. Although quality control is not primarily a function of Regional data processing, it is desirable the Regional processors undertake some preliminary quality control on current data released to consumers in the Region to eliminate the more obvious errors or mistakes. For example, before using total monthly precipitation for any station in the Region judgement must be made as to whether the observer has recorded all precipitation occurrences during the month.

2.3.1.2. It is recommended that the Regional data processor build up aids to enable him to evaluate the completeness and accuracy of the reports from ordinary climatological station observers. To assess whether the temperature and precipitation values are being recorded on the proper day and whether or not the precipitation entries are complete, a series of daily weather maps for the month will be of value. For inter-comparison between stations the data reported from the principal stations on form 0063–2320 will usually be free from error but allowance will of necessity be required for the different climatological day used. There will also be a number of observers in the Region who consistently submit accurate reports and these should be used as references when considering reports from poor observers.

2.3.1.3. In computer processing of climatological data missing values may impose limitations on the use of the data. For example, if an observer misses an observation of precipitation and the letter "M" is entered instead of any precipitation amount for that day, the computer will not compute the total precipitation for that month. Procedures have been developed to overcome this problem whereby estimated data may be transferred to punched cards and flagged as such in the card. Any summarized monthly and annual values which are produced from data containing estimated data are also similarly flagged. When such data are printed in the Monthly Record of Meteorological Observations in Canada they are followed by the letter "E" indicating that the values themselves, or some of the data from which they were derived, were estimated.

2.3.1.4. While estimation for missing data will normally be done at Meteorological Branch Headquarters where more aids are available, it may be done by the Regional data processor whenever there is a requirement for current monthly means or totals and such are missing or biased by missing observations. Estimated values are usually derived by interpolation using data from nearby stations and adjusted for other influences such as the observing site exposure and elevation, the variability in space of the element concerned, etc. Normally the greatest requirement for estimated values is to complete missing records of precipitation and unfortunately these data are perhaps the most difficult to estimate.

2.4. Regional data processors should be familiar with Section 8 on station documentation in the Guide to the Administration of Climatological Stations and Supplementary Networks to Meet National Requirements and should take action as follows:

2.4.1. Retain all documents from new stations at the Regional Data Processing Centre until a recommended official name, the coordinates and elevation of the site and the name and address of the observer have been forwarded to Meteorological Branch Headquarters.

2.4.2. Whenever the first report is received from a new observer at an existing station the word "new observer" should be entered in red above the observer's name. The address of the new observer should also be entered on the first report form or on an attached slip of paper unless it is determined that this has already gone forward to Headquarters on an inspection report or by correspondence.

2.4.3. When the observing programme at a principal or ordinary climatological station is expanded by the addition of any type of supplementary network equipment (tipping bucket rain

gauge, evaporation pan, etc.) the words "first report" should be entered in red near the station name on the first report of data from the new equipment.

2.4.4. When a programme at a station is discontinued permanently, or a station is closed, this information will be of value at Meteorological Branch Headquarters. It would therefore be of great help in keeping inventories of stations and programmes at Headquarters if the last report of a programme or station is labelled "last report" with any applicable notes whenever possible.

2.4.5. Observers at climatological stations sometimes add remarks to report forms and charts indicating requirements for stationery, replacement or maintenance action in regard to instruments, etc. When these requests are noted by the data processor they should be initialled to indicate that they have been referred to the proper official for action in the Region and no further action is required when the request is noted later at Meteorological Branch Headquarters.

2.5. As indicated in the foreword, instructions containing the word "shall" in the sections which follow are a minimum pre-requisite to meet requirements for data processing at Meteorological Branch Headquarters and must be considered as mandatory instructions. Included with these are other instructions usually indicated as "should". While staff may not be available to carry out all of this later type of instructions, they have been included to give guidance on further checking of data to verify and/or improve data required immediately for climatological services in the Region, in spot-checking that observers in the Region are following instructions for observing and recording data properly, and in monitoring on a continuous basis data from poorer stations.

3. PROCESSING PRECIPITATION STATION REPORT FORM 0063–2300

3.1. Regional data processing of form 0063–2300 shall begin with a check that the report form carries the official station name, province, month and year.

3.2. Since daily entries and the totals in columns 4, 6, 7 and data for the last day of the month in column 10 will be transferred to punched cards at Meteorological Branch Headquarters without further checking, entries in these columns shall be checked for proper form:

(a) The entries in columns 4 and 7 must be recorded to the nearest hundredth of an inch, with a zero to the left of the decimal point omitted;

(b) The entries in column 6 must be to the nearest tenth of an inch with a zero to the left of the decimal point omitted;

(c) The entry in column 10 for the last day of the month must be in whole inches. Enter the letter "M" when no value is recorded during the snowfall season.

3.3. The sums or totals shall be entered for columns 4, 6 and 7 to the same precision as stated for daily values in para 3.2. When these entries have been completed by the observer the addition shall be checked. These totals are used later in processing for checking the accuracy of the punching of the daily values.

3.4. The precipitation amounts should be checked for completeness and accuracy, especially when data are to be used in the Region or retained in abstract form. The usual methods of checking include:

(a) Comparing the entries in the precipitation columns with the entries in the times of precipitation column and any information given under remarks;

(b) Comparing the number of days with precipitation and the total for the month with that reported by nearby stations which have submitted consistantly good reports in the past.

(c) Comparing the date of occurrence and amount of daily precipitation with that reported by other stations and for agreement with the date of occurrence of precipitation over the region, as indicated by daily weather maps, etc. Normally the thoroughness of this check will depend in part on the past performance of the individual station.

3.4.1. When precipitation is recorded on the wrong day a line shall be drawn through the original entry and the amount entered for the proper day.

3.4.2. When the precipitation data are judged to be incomplete one of the following courses of action are required.

3.4.2.1. If the missing data are judged to be 5% or less of the total precipitation for the month, or are less than .25 in., whichever is less, the report should be accepted.

3.4.3. When missing data appear to be greater than the limits given in para. 3.4.2.1., then the letter "M" will be entered in the appropriate columns for the day or days on which the data are missing. The reported values should be added and a total entered with "INC" entered in red above the total.

3.4.3.1. The precipitation report for any month will not be complete unless any rain or snow which fell in the period between the last observation on the last day of the month and the first observation on the first day of the next month is included on the report. When it is judged

that such data are missing from any particular report, the report shall be held until the missing data are available in the Regional Office through correspondence with the observer or by receipt of the report for the following month. The letter "M" as suggested in the preceding paragraph should not be used in these instances.

3.4.4. As an alternate to using the letter "M" for missing daily totals, the Regional Data Processor may insert estimated values (see paragraph 2.3.1.4.). Whenever estimated values are entered for daily amounts on the report they should be followed by the letter "E". The monthly totals which include estimated values will also be followed by an "E".

3.5. The following points may be useful in amplifying some of the instructions above.

3.5.1. When an observer begins observations during a month the letter "M" should be entered for all days prior to the commencement of the observations. This also holds true for the remainder of a month when an observing programme is discontinued before the end of the month. Totals are still required (3.4.3).

3.5.2. Periods when a mixture of rain or snow falls, or when one of these followed by the other occurs, the observer will likely find it difficult to observe the true amounts of each and record them properly. Quite often these are recorded under the column for total precipitation only with a note in remarks that both rain and snow fell. Rather than use the letter "M" for both rain and snow, it is preferable in these cases for the Data Processor to estimate the entries for these columns to agree with the total precipitation reported. If the observer indicated that either the rain or snowfall was very light, then the letter "T" may be used for this particular amount. The entry of a "T" should not be followed by the letter "E" to indicate an estimated value.

3.5.3. As indicated in paragraph 3.4.2.1. reports are considered complete when only small amounts of precipitation are not recorded. In such cases the letter "T" may be entered in the appropriate columns without affecting the total, and should be definitely used where there is an indication in the remarks column that light precipitation has occurred without an amount being recorded.

3.5.4. At present, only the depth of snow cover for the last day of the month is transferred to punched cards and published for all climatological stations except those at Canada Department of Agriculture establishments, where the daily snow depth measurements are transferred to punched cards. It will be noted that the depth of snow on the ground reported for the day is the amount measured at the time of the morning observation for that day. Snowfall which occurs later in the day and is credited to the climatological day of the same date, will not affect the depth of snow cover for that date. Common errors in these data result from observers entering total snowfall for the month or the season as the snow cover depth on the last day of the month.

3.6. All additions and corrections to the form made by the Data Processor shall be in red pencil or red ink.

3.7. Reference – "Precipitation" Form 63–9057.

4. PROCESSING CLIMATOLOGICAL STATION REPORT FORM 0063–2304

4.1. Regional data processing of form 0063–2304 shall begin with a check that the report form carries the official station name, province, month and year.

4.2. Since daily entries and the totals in columns 4, 6, 10, 12, 13 and the entry for the last day of the month in column 16 will be transferred to punched cards at Meteorological Branch Headquarters without further checking, entries in these columns shall be checked for proper form:

(a) The entries in columns 4 and 6 shall be recorded to the nearest degree using standard round-off procedures;

(b) A minus (–) sign shall be used to indicate below zero temperatures;

(c) The letter "M" shall be entered for each day on which data are not available in columns 4 and 6;

(d) The entries in columns 10, 12, 13 and 16 must be recorded as described in the corresponding columns of Form 0063–2300 in paragraphs 3.2. and 3.3.

4.3. The sums or totals shall be entered for columns 4, 6, 10, 12 and 13. When these entries have been completed by the observer the addition shall be checked. These totals are used later in processing for checking the accuracy of the punching of the daily values.

4.4. The entries of temperature should be checked for completeness and accuracy. The usual methods of checking include:

(a) Comparing the selected daily maximum and minimum temperatures (cols. 4 and 6) with the morning and afternoon readings (cols. 3 and 5) to ensure that the observer has correctly selected the extreme temperatures;

(b) Comparing the three temperature readings for possible interchange of the maximum, minimum and "after reset" readings;

(c) Comparing the reported extremes of temperature with the temperatures at time of observation. Since both maximum and minimum thermometers give the extreme temperatures for the complete period from the time of reset at the previous observation until time of reset at the current reading, it follows that the maximum must always be equal or higher than the values reported for the temperature at the time of the current and previous observations, and similarly the minimum temperature must always be equal or lower than each of the same two values.

(d) Comparing the date of occurrences of monthly extremes with dates of occurrences at other stations and through knowledge gained of the dates of extremes for the region from daily weather maps, etc., verifying that the temperature data have been recorded on the correct day.

4.4.1. When temperature data are missing for 1 or more days one of the following courses of action is required;

4.4.1.1. If the temperature (either maximum or minimum) are missing for 9 days or less during the month and providing no more than 5 of the missing temperatures are on consecutive days, the monthly totals and means may be accepted.

4.4.1.2. When the number of days with missing temperature data is greater than the limits given in paragraph 4.4.1.1. the reported values should be added with "INC" for incomplete entered below the original total.

4.4.1.3. The maximum temperature data for any month will not be complete unless the maximum temperature reading for the first observation on the first day of a new month is included on the report. When this temperature is missing from any report, the report shall be held in the Regional Office until the temperature becomes available through correspondence with the observer or by receipt of the report of the following month. The report should not be forwarded with an entry of "M" for the maximum of the last day of the month unless it is a final report for a station.

4.4.2. As an alternate of using the letter "M" for missing daily temperature data the Regional Data Processor may insert estimated values (see para. 2.3.1.4.). Whenever estimated values are entered for daily extreme temperature on a report they shall be followed by the letter "E". Any monthly total and monthly mean based on 1 or more estimated values shall be indicated similarly as an estimated value. This procedure is suggested if there is a Regional requirement for the data and if the missing values are grouped in a warm or cold period of the month.

4.5. The following points may be of interest in explaining some of the instructions above.

4.5.1. Whenever the temperature data are later processed by computers the occurrence of the letter "M" over the limits described in para. 4.4.1.1. will automatically result in monthly means being indicated as missing.

4.5.2. When an observer begins observations during a month the letter "M" should be entered for all days prior to the commencement of the observations. This also holds true for the remainder of the month when an observing programme is discontinued before the end of the month. For these partial reports, totals of available entries are still required for the card punching verification programme.

4.5.3. It should be noted that when only one observation is taken each day and the thermometers are reset in the morning, the maximum temperatures will agree with those from nearby stations taking two observations each day but there will be occasions when the reported minimum temperature will differ quite markedly. This difference may occur during a period of rising temperature when the value read from the minimum likely occurred near the time of reset in the morning of the previous day. This occurs most often in winter. In the same manner when the thermometers are reset in the afternoon only, the minimum temperature reported will compare on most days with those from nearby stations taking two observations each day, while the maximum temperatures may differ widely on occasions. These differences may occur during periods when the general temperature trend is downward and the value reported for the maximum will refer to the temperature when the thermometer was reset in the afternoon of the previous day. Corrections should not be applied to this type of report, but the limitations and the manner in which the reported values will disagree with those from nearby stations should be fully understood. The index of the Monthly Record of Meteorological Observations in Canada includes a code which may be used to inform users of these possible irregularities in data.

4.6. The temperature sums shall be entered in whole degrees and the means to the nearest tenth of a degree. The summary for temperature and temperature extremes in the lower right-hand portion of the form shall be completed.

4.7. Action shall be taken on data recorded in columns 10, 12, 13 and 16 in the same manner as given in Section 3 for processing similar data on form 0063-2300.

4.8. All additions and corrections to the form made by the Data Processor shall be in red pencil or red ink.

4.9. Reference – "Temperature" Form 0063-9059.

5. PROCESSING RECORDED PRECIPITATION ON CHARTS 99 AND FORM 0063-9856

5.1. The input for processing recorded precipitation at Meteorological Branch Headquarters will be the data abstracted and recorded on charts 99, or recorded on Form 0063-9856.

5.2. Charts 99.

5.2.1. The monthly charts for each station shall be checked as follows:

5.2.2. The charts are arranged in chronological order with the chart for the first day of the month face-up on top.

5.2.3. There is a chart for **each day** of the month. If a chart or charts are missing, insert a flag (action request form) listing the days when charts were not put on the recorder and, if available, the standard gauge totals for these days. Similar procedures should be followed when the programme is begun or ended during a month.

5.2.4. Each chart is properly identified with the official station name, month, year and the date the chart was put on the recorder.

5.2.5. Each chart contains a record of the time chart on, time zone and the measurement from the standard rain gauge for the period corresponding to the chart. An entry of "0" is required if there is no rain.

5.2.6. All entries for abstracted duration amounts and hourly amounts are complete and recorded properly:

(a) to the nearest hundredth of an inch with the zero to the left of the decimal point omitted,
(b) hourly amounts which include freezing precipitation are marked with an asterisk(*),
(c) hourly amounts which include some snow are underlined,
(d) charts containing recorded precipitation which resulted from snow alone are properly flagged by the entry of "snow" in the box for the hourly amount for the first hour after chart change.

5.2.7. The abstracted values for a day with heavy precipitation shall be checked for accuracy in abstracting data. If errors are found, the remainder of the abstracted data on other charts should be verified. This is particularly required for new stations, and for those where observers have made errors in the past.

5.2.8. Charts for each station month must be bound by two rubber bands and not stapled when forwarded to Meteorological Branch Headquarters.

5.3. Abstract of Recorded Precipitation – Form 0063-9856.

5.3.1. The entries in the heading of the form, including the official name and time zone, shall be checked for accuracy and completeness.

5.3.2. The form shall be checked in a manner similar to the checking described in para. 5.2.6.

5.3.3. When a gauge is not in service for part of a month there must be an "M" in col. 2 for the days for which data are not available and a line drawn from col. 3 to the right hand side of the form.

5.3.4. When a standard gauge is not operated in conjunction with the recording gauge, and no data are thus available for col. 3, the letter "M" shall be entered in this col. for day 1 and a line down the col. for the remainder of the month.

5.3.5. A spot check shall be made of the abstraction and recording of the amounts for various durations and hourly amounts for a day with heavy precipitation. If errors are found, the remainder of the abstracted data on all charts should be verified. This is particularly required for new stations and for those stations where observers have made errors in the past.

5.4. At the end of each winter special administrative action should be taken to ensure that all recording rain gauges taken out of action during the winter months are re-activated on schedule.

5.5. Reference: MANOBS, Chapter 19.

6. PROCESSING MONTHLY RECORD OF CLASS "A" PAN EVAPORATION – FORM 0063-2270

6.1. Regional data processing of form 0063-2270 shall include a check that each report form is completely identified by the official station name, province, month and year, and that the time (LST) of the beginning of the local evaporation day is entered in the space provided on the form.

6.2. All daily entries in columns 1, 2, 3, 5, 7, 8, 10 and 11 will be transferred to punched cards at Meteorological Branch Headquarters. Entries in these columns shall be checked for conformity with the instructions in MANOBS for recording the data. These may be summarized as follows:

6.2.1. Acceptable entries in columns 1. 2 and 3 are amounts to the nearest hundredth of an inch with zeros to the left of the decimal point omitted, or the letter "M" for missing data. Zero amounts are not entered.

6.2.2. The wind mileage in col. 5 is recorded to the nearest mile or the letter "M" for missing data. Note that the reading of the anemometer for the last day of the previous month is required for later calculation of the wind mileage for day 1.

6.2.3. Entries in col. 7, 8, 10 and 11 are to the nearest °F. The letter "M" is used for missing data.

6.2.4. When observations begin or end during the month, the letter "M" should be entered in all columns where entries are required for all days during the month when observations were not taken.

6.3. There should be a careful check on first reports from new stations, and spot checks of all stations, particularly when the evaporation programme begins each spring, to insure that data are being recorded properly for the "Evaporation Day".

6.3.1. When a station reports on form 0063-2304 as well as form 0063-2270, the reported daily values of rainfall and maximum air temperatures will be the same for each day. The minimum temperatures will not due to the different periods of time covered. However, if a selection is made from the recorded observed minimum temperatures on form 0063-2304 for the same period as the maximum temperatures, these selected values must agree with the daily minimum temperatures recorded on form 0063-2270.

6.3.2. When a station reports on form 0063-2322 the climatological day will not normally end at the time of the evaporation pan observations and differences in reported values of daily rainfall and extremes of air temperature will result.

6.4. Special administrative action should be taken each spring at the beginning of the frost free season to ensure that each station in the evaporation network resumes observations at the designated time.

6.5. Reference: MANOBS, Chapter 20.

7. PROCESSING RECORD OF SOIL TEMPERATURE REPORT FORM 0062-2271

7.1. Regional data processing of form 0063-2271 shall include a check that the report form carries the official station name, province, month and year. The time (LST) of the morning and afternoon observation must be entered, as well as the depth of the top sensing element.

7.2. Daily entries and totals in all columns will be transferred to punched cards at Meteorological Branch Headquarters without further checking. While the quality control of soil temperature data will be done mainly at Meteorological Branch Headquarters, it is necessary that the Regional Data Processor carry out some preliminary editing and checking to determine if the observers are following prescribed procedures. These checks should include:

7.2.1. The temperature entries, both daily values and totals, in column 2 to 8 and 10 to 12 shall be entered to the nearest whole degree Fahrenheit using standard round-off procedures.

7.2.2. The Depth of Snow on the Ground, column 9, shall be entered to the nearest inch. Zero (0) will be entered on each day when there is no snow on the ground.

7.2.3. The mean temperature for each depth shall be calculated to the nearest tenth of a degree.

7.3. The Regional Data Processor should check the daily entries for any departure from the normal pattern of temperature range at any depth for each particular season. Departure from the normal pattern or unusual fluctuations in temperature should be brought to the attention of Meteorological Branch Headquarters by notations in the Remarks section of the report.

7.4. Reference: Circular 4386, OBS. 338, 22 Feb. 66.

8. PROCESSING SUPPLEMENTARY DATA FOR AGROMETEOROLOGICAL STATIONS FORMS 0063–2310 AND 0063–9815

8.1. Regional data processing of form 0063–2310 and 0063–9815 shall include a check that the report from carries the official station name, province, month and year.

8.2. The data recorded on this form are collected to meet a Meteorological Branch commitment to publish daily meteorological data not otherwise available to the Canada Department of Agriculture. The form is completed by stations at the Canada Department of Agriculture establishments, Agriculture Colleges, and climatological reference stations. These data are transferred to punched cards at Meteorological Branch Headquarters without further quality control. Completion of the form is described in Agrometeorological Observations – Bulletin No. 15, Canada Department of Agriculture, December 1964.

8.3. The administrative channel for any action in regard to the completion of these forms at Canada Department of Agriculture stations is through Meteorological Branch Headquarters to the Agrometeorological Section of the Canada Department of Agriculture who will in turn contact the CDA Research Establishments.

9. PROCESSING OF SNOW SURVEY REPORT FORM 0063–2333

9.1. Regional data processing of form 0063–2333 shall include a check that the report form carries the official station name, province, month and year. The type of equipment used must be indicated in the space provided.

9.2. At the beginning and end of each snowfall season special administrative action should be taken to insure that forms 0063–2333 are received for the period beginning with the first scheduled date after the snow cover reaches 2 in. or more in depth, and continue until the date following the final disappearance of snow on the ground.

9.3. Snow surveys by designated stations are made to determine the water equivalent and depth of the snow pack. These data are not transferred to punched cards but abstracts of data by station are prepared at Meteorological Branch Headquarters and the data are published annually in Snow Cover Data – Canada. Meteorological Branch Headquarters staff normally do not take any action in abstracting data until after the reports have been accumulated for the entire winter season. It is therefore essential that the Regional Office check that the reports are received at the beginning of the snow cover season and each month thereafter until the end of the season, and ensure that data are entered in the correct manner. Particular attention should be given to the description of the conditions at the time of each survey, and that remarks on equipment difficulties and other facts relating to the programme requiring administrative action are referred to the responsible official in the Region for action.

9.4. Reference – Snow Surveying Manual.

10. PROCESSING SUNSHINE RECORD FORM 0063-2307.

10.1. Regional data processing of form 0063-2307 shall include a check that the report forms carry the official station name, province, month and year.

10.2. Hourly entries for each day and daily totals will be transferred to punched cards at Meteorological Branch Headquarters. Entries of daily values and totals shall be checked as follows:

10.2.1. For hours when bright sunshine occurred the amounts shall be recorded in tenths of an hour, omitting the decimal point.

10.2.2. When there was no bright sunshine, or less than 0.05 hours of bright sunshine during hours of possible sunshine, there must be entries of "0" for such hours.

10.2.3. During periods when the sunshine recorded was inoperative, or the data are missing for any reason during hours of possible sunshine, the letter "M" shall be entered.

10.2.4. There shall be no entries for hourly amounts outside the hours of possible sunshine as indicated by the earliest and latest hours on any day of the month when an amount of sunshine is recorded.

10.2.5. The total hours of sunshine for each day will be recorded in hours and tenths. 0.0 is used for days with no sunshine. When any or all hourly amounts for a day are missing (M), there shall be an entry of "M" for the total hours.

10.3. The remarks should be checked for possible requirement for action and a check mark or initials entered after any remark requiring action to indicate that it has been noted in the Region.

10.4. A procedure should be established to routinely spot check the accuracy of data abstraction from charts by the observers.

10.5. The Summary section is for use at Meteorological Branch Headquarters.

10.6. Reference: MANOBS, Chapter 17.

11. PROCESSING ANEMOGRAPH CHARTS 100B – FORM 0063-9605

11.1. Regional data processing of wind data shall include a check that the daily charts carry the official station name, province, time (LST) the chart was put on the recorder drum, time zone, year, month and day, and that the charts for the month are complete and arranged in chronological order beginning with that for the first day.

11.2. The abstracted wind direction and wind speed for each hour will be transferred to punched cards at Meteorological Branch Headquarters for those stations which do not take 24 hourly observations every day. It is necessary that the Regional Data Processor carry out some preliminary editing and checking on charts from which data will be punched to determine if the observers are following prescribed procedures in abstracting hourly data. These checks shall include:

11.2.1. Prevailing wind directions are recorded to 8 points of the compass.

11.2.2. Hourly wind speeds are recorded in miles.

11.2.3. Entries of wind direction and speed for short periods during which the anemograph was out of service shall be completed according to instructions in the reference noted in para. 11.6.

11.2.4. A spot check that the data for wind direction and speed are being correctly abstracted.

11.2.5. Data are recorded in the proper space at the top of each chart.

11.3. There is a chart for each day of the month. If a chart or charts are missing, insert a flag (action request form) listing the days for which charts are not included. Charts for each station month must be bound by two rubber bands and not stapled when forwarded to Meteorological Branch Headquarters.

11.4. Irregularities in the operation of the anemometer or the anemograph will quite often be detected by an inspection of the wind direction or wind speed trace on the chart. The data processor should initiate action within the Region when the charts indicate the wind equipment is not functioning properly. This will eliminate unnecessary delays in providing corrective action.

11.5. The abstracting of wind data on form 0063-2306 is normally undertaken only to satisfy a Regional or local need. The data on this form will not be transferred to punched cards or checked for accuracy at Meteorological Branch Headquarters and there is no Headquarters requirement for checking these forms.

11.6. Reference: MANOBS, Chapter 18.