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MANUAL OF SURFACE OBSERVATIONS (WBAN)

CIRCULAR N

Seventh Edition

(Revised to include Changes 1 through 14)

NOTE: 7TH. EDITION INCLUDES CH. 1-13
CH. 13A AND 14 REQUIRED PRIOR CH. 15

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Change No. 15 (July 1968) to Circular N, Manual of Surface Observations (WBAN), 7th Edition (Revised), April 1966.

Orientation Preface

The most significant items in this change, in addition to the pen and ink changes, are as follows:

Chapter 2: (1) ¶2420.(3) (AF). Addition of a statement concerning ten minute mean RVR.

(2) ¶2424 thru 2426.3. Addition of AF criteria for reporting RVR and evaluation of RVR computer, meter, and recorder readouts.

(3) ¶ 2650. Revised th respect to use of day or night scale in determining RVV or RVR.

(4) ¶2680. Equipment Outage. Redefines responsibility for monitoring the performance of transmissometer systems.

(5) ¶2690. Procedures for advising restoration of transmissometer equipment revised.

(6) ¶2712. Procedures for entry of control tower visibility in Col. 4a clarified.

(7) ¶2731. Explanation of format for encoding of RVV expanded.

(8) ¶2740. Explanation of format for encoding of RVR for local dissemination revised and expanded.

(9) ¶2745 thru 2747.1. Addition of AF criteria for reporting, encoding and dissemination of RVR data.

(10) ¶2850. Explanation of format for encoding of RVR for longline transmission expanded.

(11) ¶2860-2860.1. Addition of AF procedures for encoded format and ten minute mean RVR dissemination.

(12) Table 2-2. (AF). Addition of RVR Equation Table.

(13) Tables 2-2 and 2-3 a, b, and c, changed to TA 465-0-2 and TA 465-0-3A, B, and C.

Chapter 3: Section 3100. Revises definitions of "Tornadoes, Waterspouts or Funnel Clouds."

Section 3200. Revises definition, evidence of occurrence and intensity criteria for thunderstorms.

Chapter 5: ¶5690. (5) (AF). Adds a new subparagraph concerning dissemination locally of temperature values.

Chapter 7: ¶7032.1. (AF). Adds instructions for obtaining "r" pressure computation values.

¶7210.1. (AF). Provides for use of an estimated temperature 12 hours ago in determining 12-hour mean temperature argument.

¶7411. Adds instruction for AF preparation of altimeter setting tables.

¶7421.(AF). Revises instructions for redetermination of altimeter setting.

¶7630 (1). Adds ..."more at the time of the observation."

¶7680.1. (AF). Instruction for AF use of microbarograph in determining station pressure.

¶7684.1., .2 and .3. Revises instructions for correction of mercury barometer readings.

¶7720. (2). Revises instructions for entry of comparison data in standardizing aneroid pressure instruments.

Chapter 8: ¶8473. Revises instructions for entry of peak speed and direction data at AF stations.

¶8473.1. Provides for the entry, under certain conditions, of peak speed and direction data even though there is a break in the recorder trace.

Chapter 9: Table 9-1. Adds additional footnotes for inclusion of AF requirements.

¶9131. Revises criterion for taking a special observation following a break in the hourly observation schedule.

¶9131. (1). Revises criteria for taking special observations on changes in ceiling values.

¶9131. (3). Revises criteria for taking special observations on changes in prevailing visibility values.

¶9131. (4) (b). Adds additional criteria for AF taking of special observations on RVR.

¶9140. Restates requirement for taking local observations.

¶9141. Revises criteria for taking local observations.

Chapter 10. ¶10181. Revises instructions for "AF, N" reporting of runway surface condition and reading.

¶10182. (3) (a). Includes AF in instructions for reporting of "K" data.

¶10320(2). Revises criteria for taking and disseminating local observations.

Chapter 11: ¶11021.1. (AF). Provides for alternate procedures for AF use of pen or pencil in recording observational data.

¶11024. Revises instructions for dissemination of statistical data.

§11026. (2) (c). Adds AF instruction for documentation of "corrected" reports.

§11212. (AF) Adds AF instructions for equipment and outage remarks in Block 90 of WBAN Form 10.

§11220. (AF) Revises AF instructions for entry of selected data on WBAN Form 10.

§11221. (AF) Revises AF instructions for entries in addition to those specified in §11220 (AF) on WBAN Form 10.

Chapter 12: §12123.1. Revises AF procedures for reporting clear air turbulence.

§12210. Now considered a WBAN instruction.

§12210.2. (AF) Adds an elaboration on the dissemination of pilot reports.

§12420. (AF) (2). Deletes remainder of sentence after "report."

Additional Pen and Ink Changes

Chapter 1: (1) Page 1-5, Table 1-4:

(a) Delete entire column headed "Nozzle lift[4] 132 gm. hyd. or 147 gm. helium".

(b) Change 0:20 seconds height in 30 gm. col. from "230" to "240" and "920" to "930" for 1 minute and 20 seconds.

(c) Delete from Footnote 3 "and at Air Force Stations using nozzle ML-462/UM".

(d) Delete Footnote 4.

(2) Page 1-25, Table 1-9:

(a) Ceiling Designator "R (1)", line 5, change "altiform" to "non-cirriform".

9b) Ceiling Designator "R (2) (B)", line 2, change "(Air Force WPC916B)" to "(DOD-WPC 9-16)".

(3) Page 1-26, delete from ¶1612.3(3) "when observed by radar and not otherwise reported, e.g., Col. 3".

(4) Page 1-26, ¶1612.5 (AF), delete in its entirety. AF stations are no longer required to report operational status contractions for AN/TPQ-11 equipment.

(5) Page 1-28, change second sentence of ¶1620 in the lead paragraph to read "except (1), (2) and (10) which will be ...".

(6) Page 1-29, delete ¶1631. (AF).

Chapter 2: Page 2-11, insert a new subparagraph number "2724.1. (WB, N)", immediately following "VSBY 1V2" of the first sentence of ¶2724.

Chapter 3: Page 3-11, Table 3-5, change "Heavy Thunderstorm" to "Severe Thunderstorm".

Chapter 4: (1) Page 4-7, delete "(WB, N)" from ¶4331.

(2) Page 4-9, delete "(WB, N)" from ¶4350.

(3) Page 4-10, change "(WB-1)" to "(WB-1, AF) in ¶4360(6).

(4) Page 4-10, delete "(WB, N)" from ¶4370.

Chapter 5: Page 5-9, change to read "Observe dry-bulb and dew-point temperatures at each record observation" in ¶5323(1).

Chapter 8: (1) Page 8-1, insert "(WB)" following (3) and (4) of ¶8130.

(2) Page 8-3, insert "(WB)" between "records." and "During" of ¶8311(1).

(3) Page 8-7, delete ¶8510.5) (AF).

Chapter 9: Page 9-6, delete reference to Footnote 2 following the word "broadcast" in the fourth line of §9151.

Chapter 10: (1) Page 10-1, §10111, change to read "and are not to be transmitted over longline teletypewriter circuits".

(2) Page 10-2, Table 10-1, under "Order and Format of Data Groups", change "$3R_{24}R_{24}R_{24}$" to "$3R_{24}R_{24}R_{24}R_{24}$".

(3) Retain deletion of $2h_{85}h_{85}h_{85}a_3$ from Table 10-1. Transmission Requirements for Coded Remarks.

(4) Retain deletion of 10156. (WB) Height of 850-Millibar Surface.

(5) Page 10-11, insert "(WB, N)" following §10310.1.

Chapter 11: (1) Page 11-3, §11031. (AF), change "disposal" to "disposition".

(2) Page 11-5, §11201. , insert "(WB, N)" following paragraph number.

(3) Page 11-5, §11201, delete last two "(AF)" sentences.

(4) Page 11-7, §11207.6, insert "(WB, N) (Cols. 57-58)" following paragraph number.

(5) Page 11-7, §11208., insert "(WB, N)" following paragraph number.

(6) Page 11-7, §11211., insert "(WB, N)" following paragraph number.

The following interim instructions may be discarded:

MAL 52-64	Nov. 17, 1964 - RVV and RVR Observations During Snow Conditions.
MAL 14-65	July 30, 1965 - AWS Interim Change to Circular N.
WBANNICXIV-1	May 5, 1966 - AWS Interim Change XIV-1.
MAL 5-66	March 7, 1966 - Manual of Surface Observations (WBAN), Circular N, 7th Edition.
MAL 16-66	June 22, 1966 - Transmissometer and RVR Computer Equipment Operation and Maintenance.
Memorandum	Jan. 9, 1967 - Content of Aviation Observations.
WBANNICXIV-2	Jan. 1[illegible], 1967 - AWS Interim Change XIV-2.
WBANNICXIV-3	Feb. 23, 1967 - AWS Interim Change XIV-3.
MAL 5-67	April 13, 1967 - Definition of Runway Visual Range (RVR).
WBANNICXIV-4	May 1, 1967 - AWS Interim Change XIV-4.

2300. (WB, N) RUNWAY VISIBILITY

2310. Definition. Runway visibility is the visibility along an identified runway. Where a transmissometer is used for measurement, the instrument is calibrated to indicate values statistically comparable to those that would be observed by a human observer, using as targets either dark objects against the horizon sky during daylight or moderately intense unfocused lights at night.

2320. Transmissometer Determination. Runway visibility values determined from a transmissometer are applicable only to the specified runway or runways near which the instrument is located. When the instrument is defective, or when the observer has reliable reports or has otherwise determined that the transmissometer indication is not a representative value for the runway, transmissometer data will not be used.

2321. Observational Technique:

(1) From "visibility" meters and recorders equipped with "day" and "night" scales, read runway visibility to the nearest reportable value given in Table 2-1; otherwise, see (2) below.

(2) Where or when (1), above, is not applicable, read transmission to the nearest 1/2% from the recorder trace or "transmission" meter. Use a table appropriate to the baseline to convert transmission to runway visibility; e.g., TA 465-0-2A, where baseline is 750 ft., +10 ft.; TA 465-0-2B, where baseline is 500 ft., +10 ft. Request tables for other baselines from appropriate headquarters.

2330. Variable Runway Visibility. Runway visibility is considered variable when it is less than 2 miles and its range of variability (the extreme values) in the past ten minutes, as determined by the transmissometer, includes four or more reportable values (see Table 2-1). (See ¶2730 for recording instructions.)

2340. Emergency Local Dissemination. (See ¶2750.)

2400. RUNWAY VISUAL RANGE

2410. Definition. The maximum distance in the direction of take-off or landing at which the runway or the specified lights or markers delineating it can be seen from a position above a specified point on its center line at a height corresponding to the average eye-level of pilots at touchdown.

2410.1. In the United States, runway visual range (RVR) is a value determined normally by instruments located alongside and about 14 feet higher than the center line of the runway and calibrated with reference to the sighting of high intensity runway lights or the visual contrast of other targets--whichever yields the greater visual range.

2420. Determination. Short term averages of runway visual range (RVR) may not be representative for more than a few minutes after they are observed. For this reason:

(1) nominal one-minute values of RVR are considered to be valid only for immediate use and are used only for local air traffic.

(2) (WB) ten-minute extreme values of RVR are considered to be more representative for periods greater than five minutes after observation and are used for longline transmissions.

* (3) (AF) the ten-minute mean RVR is considered more representative for periods greater than five minutes after observation and is therefore used for longline transmissions.

2421. One-Minute Mean RVR. Normally, only air traffic control personnel or other personnel passing information directly to pilots about to take off or land will use one-minute values of RVR. These values are usually read directly from self-indicating digital displays but may,

on occasion, be computed from values of atmospheric transmission as read from the transmissometer recorder.

2421.1. (WB, N) Digital Displays. Read valid RVR values directly from the digital display. Invalid RVR values are displayed as follows:

(1) Test values are indicated by a "T" in the third digit position.

(2) When high intensity runway lights are off, or on light settings 1 or 2, the letter "L" will appear in the third digit position.

(3) Errors in the transmission of RVR values from the basic unit to the display unit are indicated by an "E" in the third digit position. The Aeronca computers indicate this type of error by a red over-light on the digital display.

2421.2. (WB, N) Manually Computed One-Minute Means. Because of lag in the transmissometer recorder system, the instantaneous indications on the recorder trace or on the transmission indicator dial may be considered as nominal one-minute means of atmospheric transmission. These indications can be converted directly to runway visual range equivalents whenever the appropriate runway light setting and day or night condition are known. This computation is made by using TA 465-0-3A, B, C as appropriate.

* 2422. (WB) Ten-Minute Extremes of RVR. Ten-minute extreme values (lowest and highest) of RVR are determined by selecting the values indicated on the recorder chart and converting to hundreds of feet by using TA 465-0-3A, B, C.

2423. (WB) When ten-minute extremes of RVR are determined for longline dissemination, values based on light setting 5 will always be used regardless of the light setting actually in use. These RVR values represent the lowest and highest of all RVR values that would have been present during the ten-minute period prior to observation if the runway lights had been on setting 5. This is an important distinction because one-minute means of RVR for local dissemination are based on the light setting in use at the time of observation.

* 2424. (AF) Air Force stations will report RVR based on data received from a transmissometer located within 2000 feet of the runway threshold.

* 2425. (AF) The one-minute mean RVR will be based on the current light setting for the primary runway in use. The ten-minute mean RVR will be based on the highest available light setting for the primary runway in use.

* 2426. (AF) RVR will be obtained by the following methods which are listed in priority order of usage:

* 2426.1. RVR Computer:

(1) With the computer Light Setting Switch in the "NORMAL" position, obtain the one-minute mean RVR value directly from the PRIMARY readout. RVR values 10- and 60+, are displayed as -- and ++ respectively.

(2) Obtain the ten-minute mean RVR value from the SECONDARY readout. Since the SECONDARY readout indicates RVR in increments of 100 feet, the indicated value must be converted to the nearest reportable value of RVR contained in TA 465-0-3B. When the indicated value is halfway between reportable values, use the lower value, e.g., if the indicated value is 21, report the ten-minute mean RVR as 20. When the RVR computer is not being operated on the highest available runway light setting, the reportable RVR value must also be converted to a value based on the highest available light setting, before it can be used for reporting purposes. To do this, enter the day or night column, as appropriate, of Table 2-2 and select the subcolumn headed with the current runway light setting. Locate the reportable ten-minute mean RVR value

within this column and move horizontally to the subcolumn headed with the highest available runway light setting (normally light setting 5). The value contained in this column will be reported as the ten minute mean RVR. (NOTE: Where a dash (-) appears in the column, move up the column to where a value appears.)

Examples:

(1) A reportable RVR value of 22 at night, with the RVR computer operating on L.S. 3, equates to a reportable RVR value of 30 when the highest available light setting for the primary runway in use is L.S. 5.

(2) A reportable RVR value of 26 at night, with the RVR computer operating on L.S. 3, equates to a reportable RVR value of 30 when the highest available light setting for the primary runway in use is L.S. 4.

* 2426.2. (AF) Meter and Recorder:

(1) Determine the one minute mean transmissivity value by reading the meter, and reviewing the past one minute trace of the recorder record.

(2) Determine the ten minute mean transmissivity value from the past ten minute trace of the recorder record.

(3) Subtract the current background illumination transmissivity value from the indicated transmissivity value to obtain the corrected value of transmissivity.

(4) Using the corrected value of transmissivity, obtain RVR from TA 465-0-3B.

(a) Use the current light setting for the primary runway in use to determine the one minute mean RVR, and

(b) Use the highest available light setting for the primary runway in use to determine the ten minute mean RVR.

NOTE: The transmissometer RANGE SWITCH may be placed in the HIGH mode during low transmissivity conditions. Transmissivity values obtained from either the recorder or meter while in the HIGH mode, must be divided by five before entering the transmissivity tables in this chapter.

* 2426.3. (AF) Meter or Recorder Inoperative. Determine the mean transmissivity value from the available indicator and follow the instructions described in subparagraphs 2426.2 (3) and (4). Do not determine a ten minute mean transmissivity value solely from the meter.

* 2430. Discontinue RVR observations whenever it is determined from a reliable source that the indicated value differs by more than 400 feet from actual conditions within the area of the transmissometer.

2440. (WB) Emergency Local Dissemination. (See §2750) when readouts used by traffic control personnel are inoperative weather station personnel will:

(1) Relay RVR and/or RVV information to traffic control personnel as long as weather station equipment is known to be operating correctly (and, in the case of RVR, the high intensity runway lights are on a setting of 3 or higher).

(2) Base RVR values on light setting 5 when an operating computed readout is not available and the control tower has not specifically requested data for a lower light setting.

2500. CONTROL TOWER OBSERVATIONS.

2510. (WB, N) Weather Bureau - Navy Practice. (See §2511 and 2512, below.)

2511. (WB, N) Control Tower Action. Unless otherwise authorized, control tower personnel certificated for the purpose will maintain a continuous watch of prevailing visibility when the prevailing visibility at the usual point of observation (see §2512) is less than four miles. During this condition, control tower personnel will:

(1) notify the weather station promptly of changes in prevailing visibility at the control tower level of one or more reportable values (Table 2-1). Each observation may be used for aircraft operations immediately but it should be transmitted to the weather station as promptly as possible.[1] When visibility is reported as variable, subsequent actual observed values may be used by the control tower as official values if within the limits of variability. These values need not be transmitted to the weather station.

(2) Record on graphic transcription equipment (Tel Autograph, etc.) WBAN Form 10, or a separate tabulation sheet the following data for each observation in (1) above:

(a) Time of observation.

(b) Prevailing visibility.

(c) Remarks (such as visibility in different sectors).

(d) Observer's initials.

2512. (WB, N) Weather Station Action. Weather station personnel will:

(1) notify the control tower whenever the prevailing visibility at the weather station observation point decreases to less than four miles, or increases to equal or exceed four miles.

(2) re-evaluate weather station prevailing visibility immediately upon receipt of a differing control-tower value, and upon receipt of subsequent reportable changes.

(3) use control tower values of prevailing visibility as a guide in determining the weather station value where the observer's view of the horizon is obstructed, such as by trees, buildings, etc. For example, any atmospheric obstruction to vision (smoke, fog, thick ground fog, etc.) that is uniformly distributed to heights above the level of the tower is sufficient reason for evaluating the weather station visibility to be the same as the tower level value.

(4) arrange for retention of records of control-tower observations (graphic transcription record will normally suffice) for a minimum of 30 days and until they have been compared with entries on WBAN Form 10. The records may then be destroyed.

2600. TRANSMISSOMETER

* 2610. Operation. Operate the transmissometer in accordance with National Bureau of Standards Report No. 2588 (Revised) and separate instructions. Where they differ, the separate instructions will take precedence, within the service(s) concerned, over the National Bureau of Standards instructions. Air Force stations use TO 31M1-2GMQ-61 and 31M1-2 FMN1-2.

2610.1. (AF) The transmissometer will be operated continuously.

2620. (WB) Tower Notification. Notify the tower and IFR room immediately of performance checks, (including daily and weekly checks) or adjustments such as background adjustments (¶2630) and zero adjustments that are likely to affect their readings of runway visibility or runway visual range.

2630. (WB, N) Background Measurements and Adjustments. These instructions are applicable at transmissometer stations not equipped with RVR computers. Separate instructions will be supplied for use at computer installations. "Background Level" measurements should be made whenever it is likely that the background level may be great enough to invalidate the RVV or RVR values determined from the equipment.

[1] This procedure is also applicable if previous visibility value was above 4 miles but is noted to have worsened rapidly to below 4 miles.

2630.1. (WB, N) Method of Measurement:

(1) Depress the BACKGROUND switch to the TEST position.

(2) Read the indicated value of the adjacent recorder trace.

(3) Release the switch button (to return it to NORMAL position).

(4) If the reading in (2) exceeds 1% of fullscale, adjust the ZERO ADJUSTMENT control, as necessary to reduce the reading to near zero.

2631. (WB,N) Daily and Weekly Checks. In addition to the background measurement specified in ¶2630, see separate instructions appropriate to the agency.

2640. Annotation of Recorder Charts.

(1) Place the station name, time check, date - time group (local time), runway number, and length of transmissometer baseline at the beginning and ending of each chart.

(2) Enter a time check and date - time group near each noon line on the chart.

(3) Indicate maintenance shut-downs or other periods of nonoperation by inscribing time checks and date - time groups at the end of one period of operation and beginning of the next.

(4) Enter a time check and date - time group near the trace whenever notified of an aircraft accident or mishap in the vicinity of the station.

(5) Adjust the chart to correct time whenever the time error is 5 minutes or more and note the correction and a new time check on the recorder chart.

2641. (WB) Disposition of Charts. When the chart on a recorder roll has been exhausted, insert the used roll into an empty chart carton and enter on the carton the station name, dates for beginning and ending of the roll, and the runway identification. Hold used roll on station for 15 days. If no request is received within that time, for review or copy of any portion of the roll, mail it to the National Weather Records Center (NWRC). Please check each chart roll, immediately befor forwarding to the NWRC, to insure that the full identification specified in (1) of ¶2640 has been entered.

* 2650. Use of Day or Night Scale. In determining runway visibility or runway visual range from a meter or a recorder, the observer should select the appropriate time for changing from day to night values or vice versa. In general, the day scale should be used in the evening until low intensity lights on the airport complex are clearly visible, and the night scale should be used in the morning until these lights begin to fade.

2660. (WB) Readout Check. Check concurrent readings of all readouts, (usually in tower, IFR room and WB) once during each 8-hour shift. Simultaneous readings, made with the assistance of IFR or tower personnel, should conform to the following standards:

(A) RVR computer readouts should display identical values at all positions and should also normally agree within one reportable value with concurrent values derived from the recorder trace and appropriate tables.

(B) RVV meter readouts should display approximately identical values at all positions. Meter recorder comparisons are made with the system in a test condition, as follows, and involve the controls on the indicator panel:

(1) Inform meter readout positions of the beginning of the test period.

(2) Switch the ZERO control to TEST position.

(3) Use the ZERO ADJUSTMENT control, if necessary, to zero the recorder.

(4) Obtain meter readings from all positions in terms of the ± departure of each meter needle from the "0" graduation of the meter scale, in terms of the width of the needle at the circle separating the night and day scales. Departures should not exceed ±0.5%, i.e., a departure equal to one needle width.

(5) Reset ZERO switch to NORMAL.

(6) Set the CALIBRATE switch to CALIBRATE.

(7) Adjust the CALIBRATION ADJUSTMENT control for a recorder reading as follows:

Transmissometer Conversion Values

	Runway Visual Range		Runway Visibility	
	500 ft Baseline	750 ft Baseline	500 ft Baseline	750 ft Baseline
Recorder Readings	84.3	77.4	82.6	75.1
Meter Equivalents on DAY Scale	6000 ft	6000 ft	1-7/16 mi.*	1-7/16 mi.*
	100% of full scale	100% of full scale	98.6% of full scale	98% of full scale

*The graduation separating the 1-3/8 and 1-1/2 mile increments.

(8) Obtain meter readings from all positions in terms of the ± departure of each meter needle from the 1-7/16 mile DAY scale graduation mark on the meter face. The meter needles should not depart from the specified graduation by more than about four needle widths.

(9) Adjust the CALIBRATION ADJUSTMENT control until the recorder reading is 90.0 and reset the CALIBRATE switch to NORMAL.

(10) Inform the meter readout positions of the end of the test.

(11) Discontinue the use of meters that do not agree with calibrated recorder readings within the limits specified above. Notify the responsible electronic technician of meters that fall outside these limits.

2670. Transmission Variation. Almost all short-term fluctuations of runway visibility or runway visual range as displayed on the recorder and applicable meter or computer readout are real. The transmissometer is very sensitive to the varying light transmission characteristics of the atmosphere; variations which occur particularly under low visibility conditions. For this reason, caution must be used in rejecting visibility or visual range values as erroneous.

2670.1. A lamp which is failing can cause false transmission variations (see separate instructions applicable to the agency).

* 2680. Equipment Outage. The FAA is responsible for monitoring the performance and determining the operational status of all RVR/RVV systems not an integral part of an AMOS, for removing from and restoring to service such systems, and for advising all concerned of such actions. Whenever a malfunctioning is suspected arrangements will be made for necessary electronic, performance and visual checks on the system including, if feasible, a comparison of indicated values with conditions in the area of the transmissometer. If the malfunctioning is obvious or is verified by the checks, the system will be taken out of use until repairs are made. Upon removal of the system from service the following action will be initiated:

(1) Notify immediately all readout positions (either RVR or RVV) that data are no longer valid and shall not be used.

(2) Notify the responsible electronic technician of the malfunction as quickly as possible.

* (3) Enter a notation of the outage on the FAA maintenance form showing the date and time the system is taken out of service.

* 2690. (WB) Equipment Restored to Service. When the FAA determines the system has been restored to operational status and returns it to service, all readout positions will be notified that RVR or RVV data may now be used and an appropriate notation will be made on the FAA maintenance form showing the date and time the system was placed back in service.

2700. ENTRIES ON WBAN FORM 10

2710. Prevailing Visibility. (Cols. 4 and 4A) Enter reportable values, in accordance with Table 2-1.

TABLE 2-1. *Reportable visibility values (miles)* [1,3]

Increments of separation (miles)

1/16	1/8		1/4	1/2	1		5[2]
0	1/8	1 1/4	2	2 1/2	3	10	15
1/16	1/4	1 3/8	2 1/4	3	4	11	20
1/8	3/8	1 1/2	2 1/2		5	12	25
3/16	1/2	1 5/8			6	13	30
1/4	5/8	1 3/4			7	14	35
3/16	1	1 7/8			8	15	40
3/8	1 1/8	2			9		etc.

[1] Statute miles at land stations; nautical miles on Navy ships and ocean-station vessels. When the visibility is halfway between consecutive tabular values, select the lower value.

[2] When the prevailing visibility is judged to exceed:
(1) 15 miles, but no markers are present beyond 15 miles, code the visibility as 15+
(2) the distance of the most distant marker beyond 15 miles by more than 10%, enter the tabular value appropriate to the most distant marker and suffix it with a "+" symbol.

[3] Suffix a "V" for "variable", to the average of several observed values, whenever the prevailing visibility.
(1) is less than 3 miles, and
(2) rapidly increases or decreases by one or more tabular values (consecutive increments) during the period of the observation.

2711. Enter the visibility at the usual point of observation in Col. 4.

* 2712. (WB, N) Enter control tower visibility in Col. 4a, when the prevailing visibility at the usual point of observation is less than 4 miles, unless either

(1) the visibility at the usual point of observation is twice or more than twice the visibility at the tower level, or

(2) the tops of surface-based obscuring phenomena present are below the level of the tower.

2713. Priority for Coding. Whenever an entry of prevailing visibility is made in Col. 4A use this value in coding the aviation report. Otherwise use the value entered in Col. 4. The entry in Col. 4 will always be used in coding synoptic observations and for climatological purposes.

2714. Variable Visibility. When the visibility entered in either Col. 4 or Col. 4a is less than 3 miles and the observer has determined that it was variable, enter "V" following the visibility value.

2720. Remarks. (Col. 13) Enter visibility data in this column in accordance with §2721-2724. When these remarks are not otherwise identified, they will relate to the same observation point as the visibility value used in the body of the coded aviation weather report.

2721. Visibility by Sectors. Enter sector visibility when it differs from the prevailing visibility and:

(1) is less than 3 miles, or

(2) is considered operationally significant when equal to or more than 3 miles.

Prefix each value with the corresponding sector designator (see §11103.5). With prevailing visibility of 8 miles and sector visibilities of NE 4, SW 8, NW 2, enter in remarks VSBY NW 2 NE 4.

2722. (WB, N) Prevailing Visibility at Different Levels. When control tower visibility differs from visibility at the usual point of observation and is entered in Col. 4A, enter, in Col. 13, the visibility at the usual point of observation, e.g., SFC VSBY 2.

2722.1. (WB, N) When the control tower visibility differs from visibility at the usual point of observation and is not entered in Col. 4A:

(1) If visibility at the usual point of observation is less than 4 miles, visibility at the control tower level must be entered in remarks.

(2) If visibility at the usual point of observation is 4 miles or more, visibility at the control tower level need not be entered in remarks unless it is considered operationally significant.

2723. (AF) Prevailing Visibility at Different Levels. Enter in Col. 13 prevailing visibility determined at levels other than the official point of observation, when it is less than 4 miles and differs from the value in Col. 4. Each prevailing visibility value entered in Col. 13 will be identified by the location from which it was observed, e.g., Col. 4 entry "5", Col. 13 entry "TWR VSBY 3".

2724. Variable Visibility. (Col. 13) When prevailing visibility is variable and is less than 3 miles, enter the range of variability separated by "V"; e.g., "VSBY 1V2". When visibility is reported as variable, subsequent actual observed values may be used for local dissemination as official values if they are between the limits of variability. These values need not be recorded separately. Special observations in accordance with ¶9131(3) need not be recorded or transmitted for visibility changes within this range of variability.

2730. (WB, N) Runway Visibility. Report RVV:

(1) When it is less than 2 miles along the appropriate runway, or

(2) When prevailing visibility is less than the highest instrument minimum for the appropriate runway.

(3) (Navy stations only) When runway visibility is considered operationally significant.

2730.1. (WB) Transmissometer Stations. In normal circumstances, RVV will not be reported at any station where RVR is reported from at least one runway. An exception to this general rule may be made at the observer's discretion when fog, or some other obscuring phenomenon persistently covers only one part of the airport. When this condition results in either the RVR or RVV equipped runway being substantially better than the other both RVR and RVV should be reported to indicate the disparity in visibility conditions at the airport.

2730.2. (WB-1) Joint Use Station. Report RVV when transmissometer(s), if any, are inoperative, and runway visibility is available from a military source.

* 2731. (WB,N) Coding of Runway Visibility. Runway visibility is encoded in one of the following formats with meanings as shown:

(1) Rnn(d)VVvv

(2) Rnn(d)VVvvVvv

(3) Rnn(d)VVNO

R = Indicator that runway number follows.

nn = Number assigned to a particular runway.

d = Designator to distinguish between parallel runways on the same airport. Encoded as "R" for right and "L" for left.

VV = Indicator that runway visibility data follow.

vv = Runway visibility in miles and/or fractions of miles (reportable increments of the appropriate RVV TA 465-0-2A, B, or C).

V = Indicator meaning variable. It will be preceded by "vv" for lower limit of variability and followed by "vv" for upper limit of variability. For example, runway visibility on runway 12 varying from 1/8 mile to 1 mile would be coded R12VV1/8V1.

NO = Indicator that data normally transmitted are not available.

2731.1. (WB, N) Rnn(d)VVNO is used whenever the prevailing visibility is less than 2 miles and runway visibility is not available from a runway for which it is normally reported.

2731.2. (WB, N) Report Rnn(d)VVNO on all appropriate observations unless and until the disruption to service has been reported in a NOTAM.

2731.3. (WB, N) Runway visibility will precede all entries in Col. 13 except RVR.

* 2740. (WB, N) Runway Visual Range (RVR) for Local Dissemination. When a local requirement for these data has been established by mutual agreement with the FAA, append the current one-minute RVR value, in parentheses, for the appropriate runway(s) to the concurrent aviation observation in the format IMRnn-(d)VRV$_r$V$_r$(V$_s$) where:

IM = Identifier for a code group of one-minute mean RVR data.

R = Indicator that runway number follows.

nn = Runway number.

(d) = Runway number designator - "R" for right, "L" for left.

VR = Indicator that runway visual range data follow.

V$_r$V$_r$ = One-minute mean RVR in hundreds of feet.

(V$_s$) = Symbol (+ or -) to indicate one-minute RVR value greater than the highest or less than the lowest reportable increment in the appropriate RVR-transmission conversion table (TA 465-0-3A, B, or C). For example, 60+ when RVR exceeds 6000 feet, 10- when it is less than 1000 feet, 06- when it is less than 600 feet, etc.

These data will be disseminated locally when required but will not be given long-line dissemination.

* 2745. (AF) Runway Visual Range. Air Force stations will include runway visual range data in all observations (except single element observations relating to other weather parameters) when:

(1) Prevailing visibility is one mile or less, or runway visual range is 6000 feet or less, and

(2) A transmissometer is located within 2000 feet of the runway threshold.

* 2746. (AF) Coding Runway Visual Range. Enter RVR as the first element in the remarks section (Col. 13). Enter data as follows:

RVR	Identifier for one minute mean RVR data
V$_R$V$_R$	One minute mean RVR in increments of 200 feet between 1000 and 4000 feet, and increments of 500 feet between 4000 and 6000 feet.
(V$_R$)	Plus (+) or minus (-) sign, when required
/	Data separator
RVRM	Identifier for ten minute mean RVR data
V$_R$V$_R$	Ten minute mean RVR in increments of 200 feet between 1000 and 4000 feet, and increments of 500 feet between 4000 and 6000 feet.
(V$_R$)	Plus (+) or minus (-) sign, when required.

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Coded Examples:

RVR10-/RVRM14, RVR10-/RVRM10-, RVR45/RVRM60+, RVR60+/RVRM60+.

* 2746.1. (AF) TA 465-0-3B contains all reportable values of RVR.

* 2746.2. (AF) Enter RVRNO or RVRMNO when RVR is required to be reported but cannot be obtained. When the ten minute mean value is unobtainable, enter the one minute mean value followed by RVRMNO, e.g., RVR36/RVRMNO. When the one minute mean value is unobtainable, it is presumed a valid ten minute mean value is also unobtainable, therefore, enter the single contraction "RVRNO."

* 2747. (AF) Local Dissemination of RVR. Locally disseminate the one minute mean RVR. Local dissemination of the ten minute mean RVR is authorized when locally requested, or when a single teletype tape is used for both local and longline dissemination.

* 2747.1. (AF) The one minute mean RVR will be disseminated in the format $RVRV_RV_R(V_R)$. The format $RVRV_RV_R(V_R)$ will be used for disseminating both RVR values, simultaneously. Disseminate RVRNO or RVRMNO using the procedures described in §2746.2. Disseminate RVRMNO only when local dissemination of the ten minute mean RVR is authorized.

2750. (WB-1) Emergency Reporting of Runway Visibility and Runway Visual Range. During periods when criteria for reporting RVR or RVV are met and all FAA readouts of runway visibility and/or RVR are out of service but weather station readouts or recorders are operating; the weather station will relay to the FAA, by graphic transcription or other available means, appropriate values of RVV and/or RVR. As a minimum, this information will be disseminated as soon as possible whenever the RVR and/or RVV:

(1) has dropped below the lowest landing minimum or,

(2) if below, has increased to equal or exceed the lowest landing minimum.

Additional criteria may be used at local discretion. All values disseminated to the FAA in accordance with these instructions should be recorded and the record maintained for 90 days. The graphic transcription record (Tel Autograph, etc.) will serve this purpose.

2800. RUNWAY VISUAL RANGE (RVR) FOR LONGLINE DISSEMINATION

2801. General. RVR data for the approach end of the runway are included in longline transmissions as an aid in flight planning.

2810. (WB) Definitions which apply to longline dissemination of RVR are:

(1) Designated RVR Runway. The runway officially designated by the FAA for the reporting of RVR values in longline dissemination. This will normally be the runway having the lowest instrument minima.

(2) Secondary RVR Runway. A runway selected by the observer when the highest ten-minute value for the Designated RVR Runway is below the Category I RVR minimum for that runway. Selection is based on the Secondary RVR Runway
   (a) being above Category I RVR minimum and

   (b) being the runway whose approach end is most nearly aligned with the current wind direction or,

   (c) having the highest RVR value when the wind is light and variable.

(3) Category I. An instrument landing system performance category based on a combination of ceiling height and RVR or equivalent visibility values. The RVR minimum for the Designated RVR Runway, at each airport, is designated by the FAA.

(4) Ten-minute RVR extremes. The lowest and highest RVR values recorded during the last ten minutes based on a light setting of 5, regardless of the light setting in use.

2820. (WB) Reporting Criteria. Include ten-minute extremes of RVR in Record and Special observations whenever:

(1) The airport visibility is less than two miles or

(2) The Designated RVR Runway indicates values of 6000 feet or less.

2830. (WB) Preliminary Procedures. Observers must have knowledge of

(1) Which recorder indicates RVR values at the approach end of the Designated RVR Runway.

(2) The location of all the other RVR equipment on the airport and the relation of RVR sensors and readouts to the runway approaches.

(3) The Category I RVR minimum for all RVR runways.

2840. (WB) Observational Procedures.

(1) Check the Designated RVR Runway recorder trace frequently.

(2) Always consider the latest ten minutes when determining extremes.

(3) When the criteria for making longline dissemination of RVR are met, report the ten-minute extremes for the Designated RVR Runway.

(4) If the highest value for the Designated RVR Runway is below the Category I minimum, or is not available (Rnn(d)VRNO, add the ten-minute extremes from a Secondary RVR Runway. If a Secondary RVR Runway cannot be selected, send only the data from the Designated RVR Runway.

* 2850. (WB) Encoding. For longline dissemination, RVR is encoded to report the lowest and highest values of RVR as determined from the most recent ten minutes of transmissometer records where the instruments are commissioned for RVR reporting. When the RVR value during the ten minutes preceding the observation has been constant and a minimum and a maximum report would be redundant, report only the constant value. The following code formats are used; meanings are shown:

(1) Rnn(d)VR$V_nV_n(V_s)$V$V_xV_x(V_s)$

(2) Rnn(d)VR$V_cV_c(V_s)$

(3) Rnn(d)VRNO

R = Indicator that runway number follows.

nn = Runway number.

(d) = Runway number designator - R for right, L for left.

VR = Indicator that visual range data follow.

V_nV_n = Lowest value in hundreds of feet of runway visual range for the past 10 minutes.

(V_s) = Symbol (+ or -) to indicate lowest 10-minute RVR value greater than the highest or less than the lowest reportable increment in the appropriate RVR-transmission conversion table (TA 465-0-3A, B, or C). For example, 60+ when RVR exceeds 6000 feet, 10- when it is less than 1000 feet, 06- when it is less than 600 feet, etc.

V = Indicator separating lowest and highest values.

V_xV_x = Highest value in hundreds of feet of runway visual range for the past 10 minutes.

V_cV_c = Constant value in hundreds of feet of runway visual range for the past 10 minutes.

(V_s) = Symbol (+ or -) to indicate highest 10-minute RVR value greater than the highest or less than the lowest reportable increment in the appropriate RVR-transmission conversion table (TA 465-0-3A, B, or C). For example, 60+ when

RVR exceeds 6000 feet, 10- when it is less than 600 feet, etc.

NO = Indicator that data normally available from the Designated RVR Runway are not available to the observer.

* 2860. (AF) Air Force Procedures. Transmit the ten-minute mean RVR over longline communications circuits. Longline transmission of the one-minute mean RVR is authorized when a single teletype tape is used for both local and longline transmission.

*' 2860.1. (AF) The ten-minute mean RVR will be transmitted in the format RVRMV$_R$V$_R$(V$_R$). The format RVRV$_R$V$_R$ (V$_R$)/RVRMV$_R$V$_R$(V$_R$) will be used to simultaneously transmit the one and ten minute mean RVR. Transmit RVRMNO over longline circuits only when the ten minute mean RVR is not obtainable and a one minute mean RVR value is reported, otherwise transmit RVRNO.

Table 2-2. (AF) RVR Equation Table

DAY				NIGHT		
L.S. 2	L.S. 3	L.S. 4	L.S. 5	L.S. 4	L.S. 3	L.S. 2
10-	10-	10-	10-	10-	10-	10-
--	--	10	12	10	--	--
--	--	--	14	12	10	--
10	10	12	16	14	12	--
12	12	14	18	16	14	12
14	14	--	20	18	--	--
16	16	16	22	--	16	14
18	18	18	24	20	18	--
20	20	20	26	22	--	16
22	22	22	28	24	20	--
24	24	24	28	--	--	--
26	26	26	30	26	22	18
28	28	28	32	28	24	--
30	30	30	34	30	--	20
32	32	32	34	--	--	--
34	34	34	36	--	26	--
36	36	36	38	32	28	22
38	38	38	38	--	--	--
40	40	40	40	34	--	24
--	--	--	40	36	30	--
45	45	45	45	38	32	26
--	--	--	45	40	--	--
50	50	50	50	--	34	28
--	--	--	50	--	36	--
55	55	55	55	45	38	30
--	--	--	55	--	40	32
60	60	60	60	50	--	34
60+	60+	60+	60+	55	45	36
			60+	60	50	38/40
			60+	60+	55	--
			60+	60+	60	45
			60+	60+	60+	50
			60+	60+	60+	55
			60+	60+	60+	60
			60+	60+	60+	60+

TA 465-0-2A (WB, N)
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RUNWAY VISIBILITY FROM TRANSMISSOMETER
CONVERSION TABLE FOR 750-FOOT BASELINE

DAY			NIGHT		
Corrected Transmissometer Reading		Visibility	Corrected Transmissometer Reading		Visibility
From	To		From	To	
.013*	.072	1/8	.010§	.029	1/4
.073	.152	3/16	.030	.061	5/16
.153	.231	1/4	.062	.120	3/8
.232	.302	5/16	.121	.205	1/2
.303	.390	3/8	.206	.285	5/8
.391	.481	1/2	.286	.356	3/4
.482	.549	5/8	.357	.417	7/8
.550	.602	3/4	.418	.470	1
.603	.644	7/8	.471	.516	1 1/8
.645	.679	1	.517	.556	1 1/4
.680	.707	1 1/8	.557	.591	1 3/8
.708	.731	1 1/4	.592	.620	1 1/2
.732	.751	1 3/8	.621	.647	1 5/8
.752	.768	1 1/2	.648	.670	1 3/4
.769	.783	1 5/8	.671	.691	1 7/8
.784	.797	1 3/4	.692	.718	2
.798	.808	1 7/8	.719	.749	2 1/4
.809	.824	2	.750	.785	2 1/2
.825	.841	2 1/4	.786	.835	3
.842	.861	2 1/2	.836	.876	4
.862	.889	3	.877	.902	5
.890	.913	4	.903	.920	6
.914	.928	5	.921	.933	7
.929	.939	6	.934	.942	8
.940	.946	7	.943	.950	9
.947	.953	8	.951	.956	10
.954	.958	9			
.959	.961	10			

*If reading is less than .013, report visibility as "LESS THAN 1/8".

§If reading is less than .010, report visibility as "LESS THAN 1/4".

Computations based on the sighting of dark objects against horizon sky during daylight and light intensity of 25 cp. at night.

TA 465-0-2B (WB, N)
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U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
WEATHER BUREAU

RUNWAY VISIBILITY FROM TRANSMISSOMETER
CONVERSION TABLE FOR 500-FOOT BASELINE

DAY			NIGHT		
Corrected Transmissometer Reading		Visibility	Corrected Transmissometer Reading		Visibility
From	To		From	To	
.053*	.172	1/8	.010§	.044	3/16
.173	.285	3/16	.045	.096	1/4
.286	.376	1/4	.097	.155	5/16
.377	.450	5/16	.156	.243	3/8
.451	.534	3/8	.244	.348	1/2
.535	.614	1/2	.349	.433	5/8
.615	.670	5/8	.434	.502	3/4
.671	.713	3/4	.503	.559	7/8
.714	.746	7/8	.560	.605	1
.747	.772	1	.606	.643	1 1/8
.773	.793	1 1/8	.644	.676	1 1/4
.794	.811	1 1/4	.677	.704	1 3/8
.812	.826	1 3/8	.705	.727	1 1/2
.827	.839	1 1/2	.728	.748	1 5/8
.840	.850	1 5/8	.749	.766	1 3/4
.851	.859	1 3/4	.767	.782	1 7/8
.860	.868	1 7/8	.783	.802	2
.869	.879	2	.803	.825	2 1/4
.880	.891	2 1/4	.826	.851	2 1/2
.892	.905	2 1/2	.852	.887	3
.906	.925	3	.888	.915	4
.926	.941	4	.916	.934	5
.942	.951	5	.935	.945	6
.952	.959	6	.946	.955	7
.960	.964	7	.956	.961	8
.965	.968	8	.962	.966	9
.969	.972	9	.967	.972	10
.973	.974	10			

*If reading is less than .053, report visibility as "LESS THAN 1/8".

§If reading is less than .010, report visibility as "LESS THAN 3/16".

Computations based on the sighting of dark objects against horizon sky during daylight and the sighting of a 25 cp. light at night.

TA 465-0-2C (WB, N)
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RUNWAY VISIBILITY FROM TRANSMISSOMETER
CONVERSION TABLE FOR 250-FOOT BASELINE

DAY			NIGHT		
Corrected Transmissometer Reading		Visibility	Corrected Transmissometer Reading		Visibility
From	To		From	To	
.013*	.231	1/16	.018§	.101	1/8
.232	.415	1/8	.102	.210	3/16
.416	.534	3/16	.211	.309	1/4
.535	.614	1/4	.310	.394	5/16
.615	.671	5/16	.395	.493	3/8
.672	.731	3/8	.494	.590	1/2
.732	.783	1/2	.591	.658	5/8
.784	.819	5/8	.659	.709	3/4
.820	.845	3/4	.710	.747	7/8
.846	.864	7/8	.748	.778	1
.865	.879	1	.779	.802	1 1/8
.880	.891	1 1/8	.803	.822	1 1/4
.892	.901	1 1/4	.823	.839	1 3/8
.902	.909	1 3/8	.840	.853	1 1/2
.910	.916	1 1/2	.854	.865	1 5/8
.917	.922	1 5/8	.866	.875	1 3/4
.923	.927	1 3/4	.876	.884	1 7/8
.928	.932	1 7/8	.885	.896	2
.933	.937	2	.897	.908	2 1/4
.938	.944	2 1/4	.909	.922	2 1/2
.945	.951	2 1/2	.923	.942	3
.952	.962	3	.943	.957	4
.963	.970	4	.958	.966	5
.971	.975	5	.967	.972	6
.976	.979	6	.973	.977	7
.980	.982	7	.978	.980	8
.983	.984	8	.981	.983	9
.985	.986	9	.984	.985	10
.987	.987	10			

*If reading is less than .013, report visibility as "LESS THAN 1/16".

§If reading is less than .018, report visibility as "LESS THAN 1/8".

Computations based on the sighting of dark objects against horizon sky during daylight and the sighting of a 25 cp. light at night.

TA 465-0-3A (WB, N)
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RUNWAY VISUAL RANGE (RVR) - TRANSMISSION
CONVERSION TABLE FOR 750-FOOT BASELINE

NIGHT				DAY			
RVR (ft.)	L.S. 5	L.S. 4	L.S. 3	RVR (ft.)	L.S. 5	L.S. 4	L.S. 3
1000-				1000-			*
1000	.00004	.00017	.00063	1000	.00769	.02941	.08919
1200	.00035	.00106	.00318	1200	.02450	.07342	.13841
1400	.00146	.00369	.00934	1400	.05257	.13304	.18762
1600	.00402	.00898	.02009	1600	.08984	.20088	.23452
1800	.00859	.01747	.03553	1800	.13321	.27096	.27815
2000	.01547	.02920	.05512	2000	.17982	.31825*	.31825
2200	.02471	.04391	.07802	2200	.22743	.35492	.35492
2400	.03618	.06115	.10335	2400	.27450	.38837	.38837
2600	.04960	.08039	.13028	2600	.32002	.41890	.41890
2800	.06467	.10112	.15813	2800	.36342	.44679	.44679
3000	.08105	.12289	.18634	3000	.40437	.47232	.47232
3200	.09844	.14531	.21448	3200	.44275	.49573	.49573
3400	.11656	.16804	.24225	3400	.47857	.51727	.51727
3600	.13516	.19082	.26940	3600	.51190	.53713	.53713
3800	.15403	.21344	.29578	3800	.54286	.55548	.55548
4000	.17300	.23576	.32129	4000	.57160	.57248	.57248
4500	.20605	.27373	.36364	4500	.59939	.59939	.59939
5000	.25203	.32494	.41896	5000	.63257	.63257	.63257
5500	.29571	.37215	.46835	5500	.66077	.66077	.66077
6000	.33666	.41530	.51230	6000	.68501	.68501	.68501
6000+	.37472	.45455	.55139	6000+	.70606	.70606	.70606

*Values below this point based on contrast.

TA 465-0-3B (WB, N)
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RUNWAY VISUAL RANGE (RVR) - TRANSMISSION
CONVERSION TABLE FOR 500-FOOT BASELINE

NIGHT				DAY			
RVR (ft.)	L.S. 5	L.S. 4	L.S. 3	RVR (ft.)	L.S. 5	L.S. 4	L.S. 3
1000-				1000-			*
1000	.00123	.00302	.00738	1000	.03897	.09528	.19962
1200	.00500	.01040	.02162	1200	.08436	.17533	.26757
1400	.01286	.02387	.04434	1400	.14033	.26061	.32774
1600	.02527	.04322	.07390	1600	.20059	.34300	.38030
1800	.04193	.06732	.10807	1800	.26083	.41874	.42611
2000	.06208	.09482	.14483	2000	.31858	.46614 *	.46614
2200	.08484	.12446	.18258	2200	.37259	.50129	.50129
2400	.10939	.15521	.22022	2400	.42237	.53231	.53231
2600	.13500	.18626	.25699	2600	.46787	.55985	.55985
2800	.16111	.21705	.29242	2800	.50926	.58443	.58443
3000	.18729	.24719	.32624	3000	.54683	.60649	.60649
3200	.21320	.27639	.35831	3200	.58091	.62637	.62637
3400	.23861	.30451	.38860	3400	.61183	.64439	.64439
3600	.26336	.33144	.41712	3600	.63992	.66077	.66077
3800	.28734	.35715	.44393	3800	.66547	.67574	.67574
4000	.31048	.38164	.46910	4000 *	.68875	.68946	.68946
4500	.34886	.42158	.50947	4500	.71090	.71090	.71090
5000	.39899	.47265	.55991	5000	.73690	.73690	.73690
5500	.44386	.51739	.60309	5500	.75864	.75864	.75864
6000	.48394	.55664	.64025	6000	.77708	.77708	.77708
6000+	.51976	.59118	.67241	6000+	.79292	.79292	.79292

* Values below this point based on contrast.

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U.S. DEPARTMENT OF COMMERCE
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
WEATHER BUREAU

RUNWAY VISUAL RANGE (RVR) - TRANSMISSION
CONVERSION TABLE FOR 250-FOOT BASELINE

NIGHT				DAY			
RVR (ft.)	L.S. 5	L.S. 4	L.S. 3	RVR (ft.)	L.S. 5	L.S. 4	L.S. 3
600-				600-			
600	.00134	.00299	.00670	600	.02995	.06696	.14973
800	.01128	.02003	.03560	800	.10376	.18436	.32757*
1000	.03513	.05493	.08589	1000	.19740	.30867	.44679*
1200	.07074	.10198	.14702	1200	.29045	.41873	.51727
1400	.11338	.15451	.21056	1400	.37461	.51050	.57248
1600	.15897	.20788	.27184	1600	.44787	.58566	.61668
1800	.20477	.25946	.32874	1800	.51072	.64710*	.65277
2000	.24916	.30793	.38056	2000	.56443	.68274*	.68274
2200	.29128	.35279	.42730	2200	.61040	.70802	.70802
2400	.33073	.39396	.46928	2400	.64990	.72960	.72960
2600	.36742	.43158	.50694	2600	.68401	.74823	.74823
2800	.40139	.46589	.54076	2800	.71362	.76448	.76448
3000	.43277	.49718	.57117	3000	.73948	.77877	.77877
3500	.48199	.54552	.61741	3500	.77742	.80003	.80003
4000	.54149	.60282	.67110	4000	.81945*	.82418	.82418
4500	.59064	.64929	.71377	4500	.84315*	.84315	.84315
5000	.63166	.68749	.74827	5000	.85843	.85843	.85843
5500	.66623	.71929	.77659	5500	.87100	.87100	.87100
6000	.69566	.74608	.80016	6000	.88152	.88152	.88152
6000+	.72094	.76888	.82001	6000+	.89046	.89046	.89046

* Values below this point based on contrast.

3000. GENERAL

3010. Atmospheric phenomena considered as weather elements of an observation are tornadoes, waterspouts, funnel clouds, thunderstorms, squalls and precipitation in any form. Hydrometeors other than precipitation, and lithometeors are termed obstructions to vision. Igneous and luminous meteors, such as lightning, rainbows, halos, coronas, and auroras, are also observed. Observations of these phenomena, except freezing rain and the determination of intensity of precipitation (see ¶3430.2.1 and 3432), are taken without the use of instruments and from as many points as necessary to view the entire horizon.

* 3100. TORNADOES, WATERSPOUTS OR FUNNEL CLOUDS

* 3110. Descriptions. These storms occur when meteorological conditions are favorable for intense thunderstorm activity. The distinguishing feature is the funnel shaped appendage that hangs from the base of the cloud. The appendage, or pendant, is visible when clouds or particulate matter are suspended within the rotating column of air.

* 3111. Tornado. A violent rotating column of air, forming a pendant, usually from a cumulonimbus cloud and touching the ground. It nearly always starts as a funnel cloud and is accompanied by a loud roaring noise.

* 3112. Funnel Cloud. A violent rotating column of air which does not touch the ground, usually a pendant from a cumulonimbus cloud.

3113. Waterspout. If a funnel cloud
* forms over a large body of water, such as a bay, gulf or lake and touches the water surface, it is called a waterspout.

3120. Observation. Note the direction from the station, and the direction toward which it is going. The direction of motion is the same as that of the cloud with which the phenomenon is associated.

3130. Tornado Reports by Public. The cooperation of local newsgathering agencies, police departments, and other organizations having special communication facilities will be solicited in obtaining public reports of tornadoes. (See ¶3920(1)). At locations where there are both military and civil weather stations, these arrangements will be made by the civil station.

3140. (WB, N) Communications. Reports of tornadoes, funnel clouds, and waterspouts will be marked "URGENT," in accordance with ¶10350.1, in order to give it priority handling on longline teletypewriter circuits.

3200. THUNDERSTORMS

* 3210. Definition. A thunderstorm is a local storm produced by a cumulonimbus cloud, and is always accompanied by lightning and thunder, usually with strong gusts of wind, heavy rain, and sometimes with hail.

* 3211. Thunderstorm activity at the station will be reported when:

(1) thunder is heard within the past 15 minutes, or

(2) overhead lightning or hail is observed within the past 15 minutes and the local noise level is such as might prevent hearing thunder.

* 3220. Observation. Note the following for each center of activity (cell):

(1) Occurrence of thunder (or other phenomena--see ¶3210).

(2) Location of storm center with respect to the station.

(3) Direction toward which the storm is moving, when determinable.

(4) Whether lightning is occurring from cloud to cloud, cloud to ground, or within clouds.

*(5) Intensity of the storm (see ¶3230).

* 3230. Determination of Intensity. The intensity of a thunderstorm is based on the following characteristics, observed within the previous 15 minutes:

(1) Thunderstorm (T), Wind gusts less than 50 knots and hail, if any, less than 3/4 inch in diameter,

(2) Severe Thunderstorm, (T+), Wind gusts of 50 knots or greater or hail, 3/4 inch or greater in diameter.

3300. SQUALLS

3310. A squall is a wind that increases suddenly in speed, maintains a peak speed of 16 knots or more over a period of two or more minutes, and decreases in speed; similar fluctuations will occur at succeeding intervals. The occurrence of squalls is indicative of turbulence near the surface. The essential difference between squalls and gusts is the duration of the peak wind speed (see ¶8310). Although squalls are classified as an atmospheric phenomenon, instructions for reporting them will be found in ¶8440, because their observational criteria are exclusively wind.

3400. HYDROMETEORS

3410. Hydrometeors. A hydrometeor is a meteor consisting of an ensemble of liquid or solid water particles falling through or suspended in the atmosphere, blown by the wind from the earth's surface, or deposited on objects on the ground or in the free air.

3420. Clouds. Clouds are considered separately in Chapter 1.

3430. Precipitation. Precipitation includes all forms of moisture that fall to the earth's surface - rain, snow, hail, etc. The fall is usually from cloud, but may occur from apparently cloudless skies. Dew and frost are not considered in this manual as precipitation (see ¶3450), and are therefore not included in precipitation measurements.

3430.1. Character of Precipitation. Determine character of precipitation in accordance with the following criteria:

3430.11. Continuous. Intensity increases or decreases gradually.

3430.12. Intermittent. Intensity increases or decreases gradually, and precipitation stops and recommences at least once within one hour preceding the time of observation.

3430.13. Showery. Precipitation associated with cumuliform clouds, especially swelling cumulus and cumulonimbus. Intensity varies rapidly. Showers begin and end abruptly.

3430.14. Combinations. Showers and continuous or intermittent rain may occur in combination. Under such conditions the precipitation does not always cease. When it is showery, the precipitation increases and decreases suddenly in intensity as the showers abruptly begin and end. Only the predominating character will be reported.

5690. Remarks. (Block 90) Enter notes as follows:

(1) Identify time of changing from use of one temperature and humidity measuring system to another and identify system in use.

(2) (WE, N) When calibration errors are found to exceed allowable tolerances, document the period of erroneous and doubtful record, as far as practicable, until use of a standby instrument is begun or the instrument is recalibrated, e.g., "Hygrothermometer dry-bulb error excessive 2/3/60, checked OK on 1/28/60, use of sling psychrometer begun at 1500 E, 2/3/60." (See ¶5340.)

(3) (WB, N) Date and time of changes in exposure of sensors in use.

(4) When wet-bulb is observed to be less than 32°F and wick is unfrozen, explain the entry in Col. 19 with a remark in Block 90, e.g., "Wick unfrozen."

* (5) (AF) Temperature values disseminated locally, and not recorded in Col. 7, will be entered in Block 90 if used as the maximum or minimum temperature, e.g., 1520L TEMP 85.

5700. (AF) RUNWAY TEMPERATURES.

5710. Definition. Runway temperature is the temperature of the air just above the runway used in the determination of density altitude.

5720. General. Runway temperatures will be considered as the same value as the dry-bulb temperature when measurements are taken from a properly exposed and aspirated instrument shelter or Humidity Temperature Measuring Set (see appropriate T.O.).

5730. Runway temperatures at stations not equipped with properly exposed equipment, are taken by inserting the bulb of an ML-7 thermometer into an opening midway from the open ends of a cardboard cylinder, about 4 inches in diameter and 10 inches in length. The cylinder is then held horizontal and parallel to the wind flow at a point near the lee end (approach end) of the active runway for approximately one minute.

Table 5-4. Temperature Entries on WBAN-10, Cols. 7, 8, 14B[1], 18, 19, 20 & Block 90.

Part A. HYGROTHERMOMETER or equivalent (including remote reading dry-bulb thermometer and Dewcel dewpoint facilities) i.e., dry-bulb & dew point observed; wet-bulb & R. H. computed.

WBAN-10 Column or Block	Where station std. (§5040) is a hygrothermometer or equivalent, including psychrometer dry-bulb & Dewcel, telethermometer & Dewcel, AF AN/TMQ-11(V), or Navy AN/GMQ-14().			
	Fully operational and Dry-bulb is above -35°F. [3,4]	Dry-bulb sensor only is operational - Dry-bulb is above -35°F. [3,4]	Dry-bulb sensor is operational - Dry-bulb is -35°F to -50°F.	Dry-bulb sensor not operational, or Dry-bulb below operational limits.
Col. 7 DRY-BULB entries to nearest °F	From station standard system.	From station standard system.	From station standard system .	From standby system.
Col. 8, DEW POINT entries to nearest °F. (Determine with respect to water at all temperatures.)	From station std.[1]	Compute from entries in Cols. 18 and 19.[1]	Assume dew point (ice) to be same as dry-bulb and compute its water equivalent. (Enter in parentheses) (FAA) No entry required	Compute from entries on Cols. 18 & 19.
Col. 18, (WB,N) DRY-BULB entries (degrees & tenths unless otherwise stated)	(N) From station standard. (N) To nearest °F.	From standby system.	(N) From station standard. (N) To nearest °F.	From standby system. (WB-1).[2]
Col. 19 (WB,N) WET-BULB with respect to water at WET-BULB of 32°F or more; with respect to ice below 32°F.	(WB) No entry. (N) Compute[5] from entries in Cols. 7 & 8 and enter to nearest degree.	From standby system, to degrees & tenths.	(N) Enter dry-bulb value in parentheses from Col. 18. to nearest °F.	From standby system to degrees & tenths.
Col. 20 (WB,N) RELATIVE HUMIDITY entries to nearest percent.	(N) Compute from entries in Cols. 7 & 8. (WB) Entries optional.	(N) Compute from entries in Cols. 7 & 8. (WB) Entries optional.		(N) Compute from entries in Cols. 7 & 8. (WB) Entry optional
Block 90, REMARKS.				Note change from use of station std. to standby system.

[1] When dew points from system in use (hygrothermometer or standby) equal or exceed the hygrothermometer (or equivalent) dry-bulb and recent scheduled or concurrent checks indicate that the calibration of the operational portion(s) of the hygrothermometer is within allowable limits (§5351.1.).

(1) Assume dry-bulb, wet-bulb and dew point to be the same as indicated (hygrothermometer) dry-bulb, unless ice fog is present.

(2) When ice fog is present and hygrothermometer dew-point sensor is operational:

(A) Assume hygrothermometer dew point to be erroneous (defer checking calibration while ice fog is present).

(B) Assume that the dew point with respect to ice is the same as the indicated dry-bulb, and convert this value to its water equivalent (see §5451, and see footnote 5, also).

(C) (WB) Enter observed value in Col. 14B, in parentheses, and caption entries "Observed Dew Point".

(3) When ice fog is present and dew point is computed from standby system, follow step (2,B), above.

(4) Enter the dew point value from (1) of (2,B), above, as appropriate, in Col. 8.

[2] (WB-1) Where less than 24 record observations are taken daily, enter (to nearest degree) the corrected temperature from the thermograph for hours when personnel are not on duty. If the thermograph fails, enter in parentheses, data obtained by interpolating between available recorded and observed data.

[3] See §5311 for temperature limits to the operational status of dry-bulb and dew-point sensors.

[4] When the difference between dry-bulb & dew point exceeds 40°F, compute the relative humidity to determine if §5330 is applicable.

[5] When the dew point value in Col. 8 is obtained from the calculator (§5451), in accordance with item 2,B of footnote 1, enter the indicated dry-bulb in Col. 19 in parentheses.

7000. GENERAL

7001. The standard reference for the subject of barometry is the Manual of Barometry, (WBAN) Vols. I and II. Instructions in this chapter, which are in conformance with the general principles of this reference, will be used for pressure determinations.

7002. Definition. Atmospheric pressure is the pressure exerted by a column of air, of unit area, extended vertically from the reference surface to the top of the atmosphere.

7010. Pressure Values. Pressure values that are determined routinely are:

(1) Station Pressure. The pressure at the assigned station elevation (H_p).

(2) (WB) Monthly Mean Climatological Station Pressure. The monthly mean pressure at the climatological station elevation, determined at Weather Bureau Stations only, in accordance with separate instructions.

(3) Sea-Level Pressure. The pressure at mean sea level, obtained by reduction of station pressure (see §7200).

(4) Altimeter Setting. The pressure value used for setting pressure-scale type altimeters.

7020. Instrumentation. Types of barometers in general use are:

(1) Mercury (adjustable and fixed cistern).
(2) Aneroid.
(3) Microbarograph.
(4) (WB) Altimeter Setting Indicator.

When corrections have been established for two or more types, observe the descending order of priority in Table 7-1 for selecting the instrument to be used for routine determination of station pressure.

Table 7-1. Barometer Priority for Station Pressure [1]

Types of Observations	
Aviation & 3-hourly	6-hourly
Precision Aneroid	Precision Aneroid
Altimeter Setting Indicator (WB)	Altimeter Setting Indicator (WB)
Microbarograph (WB, AF)	
Mercury	Mercury

[1] Provided a mercury barometer is used as a calibration standard.

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7030. Pressure Reduction Computer, WBAN 54-7-8. The pressure reduction computer serves to:

(1) Reduce station pressure to sea level in millibars or inches of mercury.

(2) Compute the altimeter setting from the station pressure.

(3) Compute the station pressure from the altimeter setting.

(4) Compute the pressure altitude from the pressure or altimeter setting.

7031. A table of "r" values must be used in conjunction with the computer to determine sea-level pressures. The "r" value is the ratio of sea-level pressure to station pressure for each degree of temperature. Since this ratio is always equal to or greater than unity, the figure "1" preceding the decimal point has been omitted. No interpolation is necessary when using the table of "r" values.

7032. Instructions for use of the computer are printed on each side. The tables of "r" values are computed individually for each station.

* 7032.1. (AF)AWS Wings are authorized to correspond directly with Hq USAF ETAC to obtain "r" value computations and discuss questions relating to "r" values.

7033. Precision of Station Pressure Data for Use with Computer. Since present instructions in Circular N, §7640, require the entry of station pressures in Col. 17 of WBAN Form 10B to the nearest 0.005 inch of mercury, those stations which employ the pressure reduction computer, WBAN 54-7-8, should also use the station pressure arguments to the nearest 0.005 inch computing the pressure reduced to sea level. At stations equipped with an altimeter-setting indicator, the altimeter setting should be read from the instrument to the nearest 0.005 inch; and the altimeter setting thus obtained should be converted to the corresponding station pressure to the nearest 0.005 inch for use in the reduction of pressure to sea level by means of the computer.

7034. Pressure Altitude. The instructions printed on the computer WBAN 54-7-8 relating to pressure altitude will yield the pressure altitude pertinent to the station elevation (H_p). The military services and other agencies interested in aviation require the pressure altitude with reference to the 10-foot plane above the field elevation (H_a+10). In view of this requirement, the following instructions should be substituted for those on the computer whenever H_p differs from H_a + 10.

Instructions for Pressure Altitude Computation:

(1) Find the field elevation (H_a) on the "H" scale and set this value opposite the altimeter setting on either the "P" or "P,A.S." scale as appropriate.

(2) Read pressure altitude on the "H" scale opposite the "29.92" graduation of the "P,A.S." scale.

7035. If the altimeter setting reads lower than 29.92", the pressure altitude will be higher than the elevation of the field. If the altimeter setting reads higher than 29.92", the pressure altitude will be below the field elevation. The pressure altitude will differ from the field elevation by about 1,000 feet for

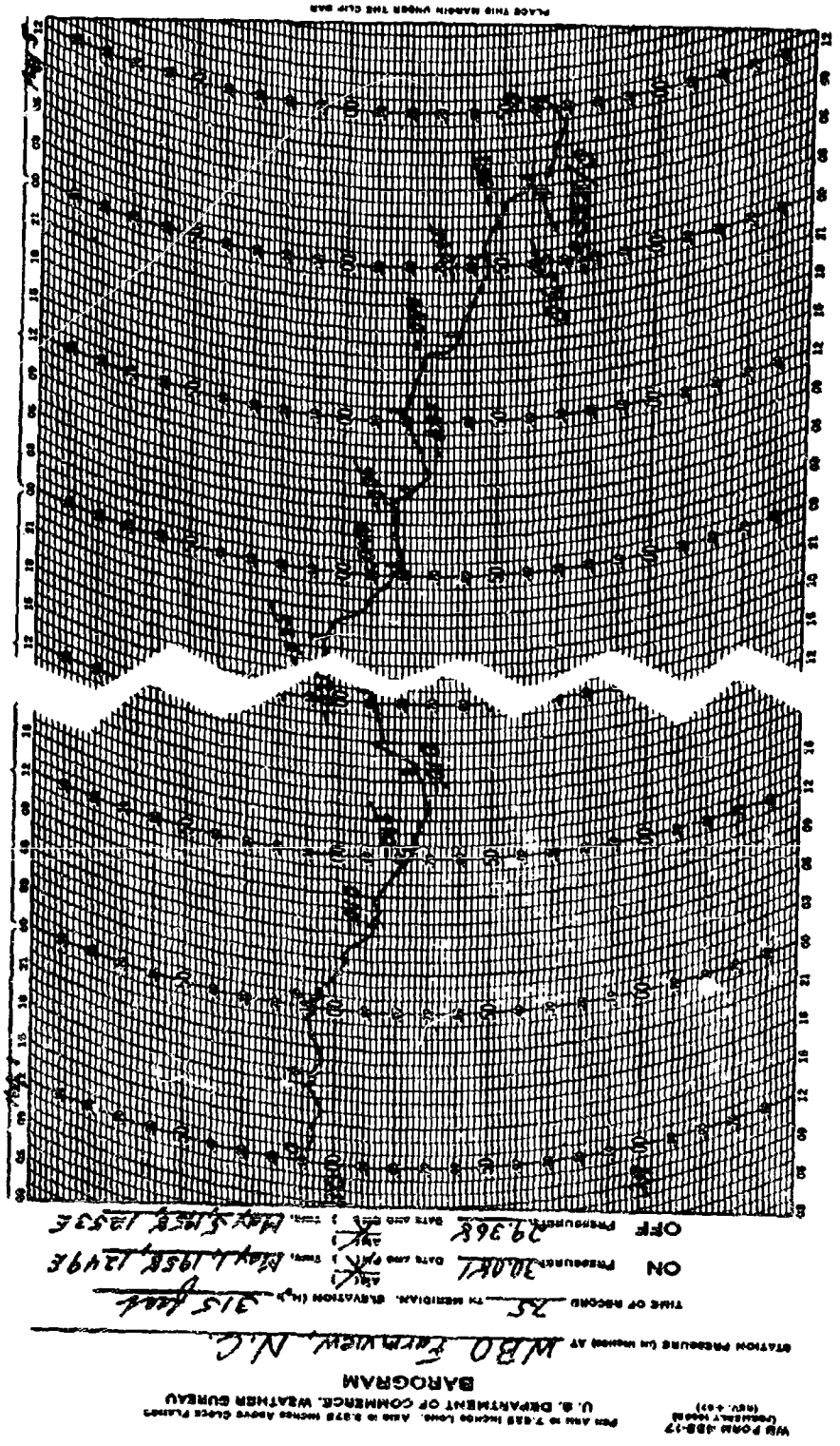


Figure 7-2. (WB, N) Microbarogram.

the sum of inches and tenths from the vertical argument and hundredths, or five thousandths, from the horizontal argument, or

(c) the sum of the value in (2) and the fixed correction, where authorized for use at stations near sea level.

7200. SEA-LEVEL PRESSURE

7210. General. Sea-level pressure represents the atmospheric pressure at sea level under prevailing meteorological conditions of temperature and station pressure. Station pressure is reduced to sea level by means of the pressure reduction computer, or reduction tables described in the WBAN Manual of Barometry. Use as arguments in the table:

(1) The station pressure, rounded to the nearest 0.01" or 0.1 mb.

(2) The 12-hour mean temperature obtained from the current air temperature and the air temperature 12 hours previously (to tenths if practicable, e.g., at high-altitude stations having sea-level reduction tables with 2°F increments. Interpolate as necessary (single or double arithmetic interpolation) to obtain the tabular value of sea-level pressure corresponding to the foregoing arguments. Interpolation may be facilitated by the use of Proportional Parts Tables 7-3 described below.

* 7210.1. (AF) When computing the 12-hour mean temperature, estimate the temperature 12 hours ago if this information is not otherwise available.

7211. The use of a sea-level reduction table and Proportional Parts Tables 7-3 is illustrated in the following example, utilizing Tables 7-3a to 7-3d.

EXAMPLE

Given:

(1) Station pressure = 24.17".

(2) 12-hour mean temperature = 58.7°F.

(3) The following portion of a sea-level reduction table.

Computation:

(1) Find the station pressure argument in the table next lower to the actual station pressure: 24.10.

(2) Find the temperature argument in the sea-level table next higher to the 12-hour mean temperature: 60.

(3) Find the tabular value at the intersection of the columns selected in accordance with (1 & 2) above: 30.71.

(4) Find the vertical pressure differences between the tabular value selected in accordance with (3) above and the next higher tabular value: 0.01 (difference between 30.71 and the next higher value, 30.72).

(5) Find the horizontal pressure difference between the value found in accordance with (3) above and the next higher tabular value: 0.12 (difference between 30.71 and the next higher horizontal value, 30.83).

(6) Find the temperature difference to tenths between the actual 12-hour mean temperature and the value selected in accordance with (2) above: 1.3 (difference between 58.7 and 60.0).

(7) Find the pressure difference between the actual station pressure and the value selected in accordance with (1) above: 0.07 (difference between 24.17 and 24.10).

(8) To summarize, the following values have been found:

(a) Vertical pressure difference (0.01).

(b) Horizontal pressure difference (0.12).

(c) Temperature difference (1.3).

(d) Press difference (0.07).

(9) Select the vertical pressure versus temperature table of proportional

TABLE 7-3f. *Proportional parts for use with sea-level reduction tables, in millibars, having increments of 5° F. and 0.10 inch. Tabular values are tenths of millibars*

Temperature increments (° F.)	Vertical tabular differences														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
0.3	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0.4	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
0.5	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2
0.6	0	0	0	0	1	1	1	1	1	1	1	1	2	2	2
0.7	0	0	0	1	1	1	1	1	1	1	2	2	2	2	2
0.8	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2
0.9	0	0	1	1	1	1	1	1	2	2	2	2	2	3	3
1.0	0	0	1	1	1	1	1	2	2	2	2	2	3	3	3
2.0	0	1	1	2	2	2	3	3	4	4	4	5	5	6	6
3.0	1	1	2	2	3	4	4	5	5	6	7	7	8	8	9
4.0	1	2	2	3	4	5	6	6	7	8	9	10	10	11	12
5.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

TABLE 7-3g. *Proportional parts for use with sea-level reduction tables, in millibars, having increments of 10° F. and 0.10 inch. Tabular values are tenths of millibars*

Temperature increments (° F.)	Vertical tabular differences														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
0.5	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
0.6	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
0.7	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
0.8	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
0.9	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
1.0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2
2.0	0	0	1	1	1	1	1	2	2	2	2	2	3	3	3
3.0	0	1	1	1	2	2	2	2	3	3	3	4	4	4	5
4.0	0	1	1	2	2	2	3	3	4	4	4	5	5	6	6
5.0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8
6.0	1	1	2	2	3	4	4	5	5	6	7	7	8	8	9
7.0	1	1	2	3	4	4	5	6	6	7	8	8	9	10	11
8.0	1	2	2	3	4	5	6	6	7	8	9	10	10	11	12
9.0	1	2	3	4	5	5	6	7	8	9	10	11	12	13	14
10.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Table 7-3h. *Proportional parts for use with all sea-level reduction tables in millibars. Tabular values are tenths of millibars*

Pressure increments (inch)	Horizontal tabular differences																				
	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5
0.02	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10
0.03	9	9	10	10	10	11	11	11	11	12	12	12	13	13	13	14	14	14	14	15	15
0.04	12	12	13	13	14	14	14	15	15	16	16	16	17	17	18	18	18	19	19	20	20
0.05	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25
0.06	18	19	19	20	20	21	22	22	23	23	24	25	25	26	26	27	28	28	29	29	30
0.07	21	22	22	23	24	25	25	26	27	27	28	29	29	30	31	32	32	33	34	34	35
0.08	24	25	26	26	27	28	29	30	30	31	32	33	34	34	35	36	37	38	38	39	40
0.09	27	28	29	30	31	32	32	33	34	35	36	37	38	39	40	41	41	42	43	44	45
0.10	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50

7400. ALTIMETER SETTING

7410. General. Unless estimated values required for operational purposes (see ¶7620), altimeter settings are determined only at stations equipped with a Mercury Barometer that is used periodically as a comparison standard.

* 7411. From Station Pressure. Altimeter-setting tables, containing arguments for obtaining altimeter settings from station pressure values, are computed for stations requiring them. The station pressures pertain only to the elevation of the station at which the table is designed to be used. The station pressure arguments are given at the side of the table to tenths of an inch and at the top of the table to hundredths of an inch. AF stations desiring to use altimeter setting tables will establish them in accordance with the WBAN Manual of Barometry, Fig. 8.1.1.

7411.1. To determine the altimeter setting, read the station pressure to the nearest 0.01" and find in the body of the table the value corresponding to the station pressure. No interpolation is necessary.

EXAMPLES

A portion of the altimeter setting table for Kansas City, Mo., follows:

Altimeter settings, Kansas City, Mo., field elevation 742 feet

Station Pressure (inches)	0.01	0.02	0.03	0.04
28.80---	29.60	29.61	29.62	29.63
28.90---	29.70	29.71	29.72	29.73

Station elevation, H_p=750.0 feet.
Actual elevation barometer, H_z=760.328 ft.

(1) Given: Station Pressure 28.825, rounded to the nearest 0.01 inch---------- 28.83

Value from table found in column headed 0.03------- 29.62

(2) Given: Station Pressure 28.927, rounded to the nearest 0.01 inch---------- 28.93

Value from table found in column headed 0.03------- 29.72

7412. (WB, N) From Altimeter Setting Indicators. Read the scale of the altimeter setting indicator to the nearest 0.01" at the index. The reading corresponds to the altimeter setting, unless a correction is required.

7420. (WB, N) Criteria for Redetermination. Redetermine the altimeter setting whenever the information is requested and the latest determination was made more than 30 minutes ago.

* 7421. (AF) Criteria for Redetermination. Redetermine the altimeter setting whenever requested, using the current station pressure.

7430. (WB, N) Dissemination. At civil stations, furnish altimeter settings determined at the time of the 6-hourly synoptic observations to local operations desiring them immediately after determination. These readings are for comparative purposes, and are in addition to those normally transmitted in observations to local operations.

7500. DETERMINATION OF CHARACTERISTIC AND AMOUNT OF PRESSURE TENDENCY

7510. General. The barometric pressure tendency comprises two elements:

(1) The net change within a specified time.

(2) The characteristic of the change during the period, based (a) on the appearance of the barogram, and (b) on the direction of change, if any, i.e., higher, lower, or no change.

7520. Determination. Pressure tendencies will be determined only at stations equipped with a microbarograph. Determine the elements from the trace as follows:

(1) For the full 3-hour period ending at the actual time of the observation.

7521. Observe the amount of change in pressure to the nearest 0.005" (see §7660).

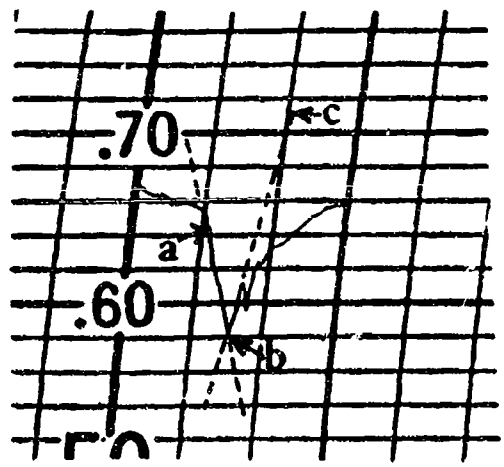
7522. Classify the characteristic of the trace for the 3-hour period, using the code figure in Table 7-4 corresponding to the same general pattern. When the tendency of the observed trace is incompatible with the sign of the net change (see §7660), select the tendency that is most nearly representative and still compatible with this sign.

7523. When the barogram indicates a rapid fall in pressure followed by an abrupt rise, with both rise and fall at the rate of 0.06" per hour, and with both rise and fall equal to 0.03" or more (see Example), the lowest pressure in the "V" will be noted and converted to sea-level pressure for reporting in accordance with §7630. The mean temperature used in the reduction will be determined in accordance with the following:

(1) When a thermograph (or hygrothermograph) is available, select the temperatures corresponding to the time of the lowest pressure and to the time 12 hours previously.

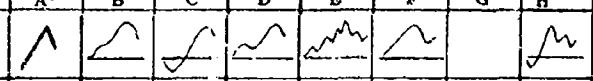
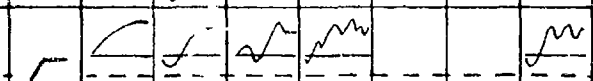
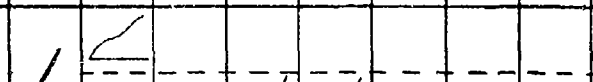
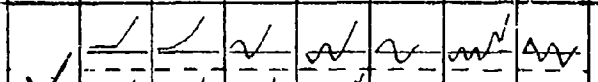
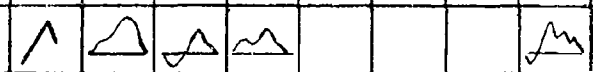
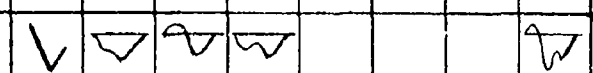
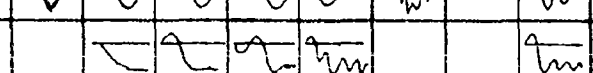
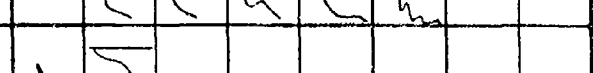
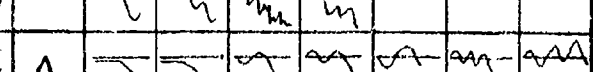
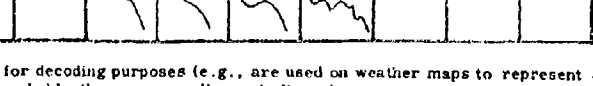
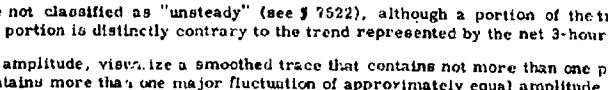
(2) When a thermograph is not available, select the temperatures at the preceding observation and at a time 12 hours previously.

EXAMPLE



"a–b" represents a fall of approximately 0.07 inch at a rate of approximately 0.13 inch per hour.
"b–c" represents a rise of approximately 0.03 inch at a rate of approximately 0.13 inch per hour.

Table 7-4. Determination of characteristic of barometer tendency.

DESCRIPTION OF CHARACTERISTIC		NOMINAL GRAPHIC REPRESENTATION[3] (For Coding Purposes)								Code Figure
PRIMARY UNQUALIFIED REQUIREMENT	ADDITIONAL REQUIREMENTS	A[1]	B	C	D	E	F	G	H[2]	
HIGHER Atmospheric pressure now higher than 3 hours ago.	Increasing, then decreasing.									0
	Increasing, then steady; or									1
	increasing, then increasing more slowly.									
	Increasing: Steadily									2
	Increasing: Unsteadily									
	Decreasing or steady, then increasing; or									3
	increasing, then increasing more rapidly.									
THE SAME Atmospheric pressure now same as 3 hours ago.	Increasing, then decreasing.									0
	Steady or unsteady									4
	Decreasing, then increasing.									5
LOWER Atmospheric pressure now lower than 3 hours ago.	Decreasing, then increasing.									5
	Decreasing, then steady; or									6
	decreasing, then decreasing more slowly.									
	Decreasing: Steadily									7
	Decreasing: Unsteadily									
	Steady or increasing, then decreasing; or									8
	decreasing, then decreasing more rapidly.									

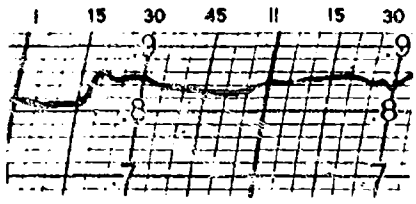
[1]The symbols in this column are also used for decoding purposes (e.g., are used on weather maps to represent any of the types of characteristic appropriate to and coded by the corresponding code figure).

[2]These examples illustrate types that are not classified as "unsteady" (see § 7522), although a portion of the trace is unsteady because the trend of the unsteady portion is distinctly contrary to the trend represented by the net 3-hour change.

[3]When fluctuations in the trace vary in amplitude, visualize a smoothed trace that contains not more than one peak or one valley, or in the event that the trace contains more than one major fluctuation of approximately equal amplitude (e.g., one peak and one valley), the trace should be smoothed to reflect the trend of the most recent fluctuation, e.g., see example C opposite code figure 5. Note, however, that the most recent fluctuation is usually ignored when it represents a fluctuation of relatively minor amplitude, as shown in example H opposite code figure 1, or example F, opposite code figure 0.

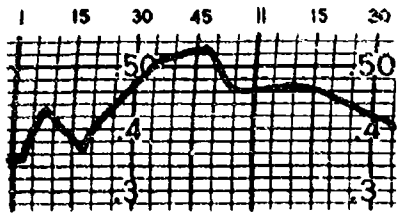
PRESSURE-JUMP EXAMPLES

A.



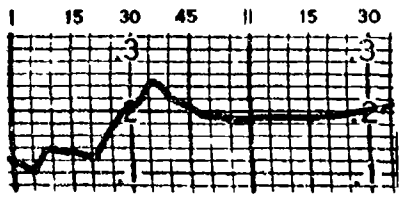
* From 1317 to 1319 CST, the pressure increased from 28.81" to 28.85" at a rate in excess of 0.005"/min. The pressure remained at least 0.02" higher than at 1317 CST for at least 20 minutes. This jump was coded in a special observation as PRJMP 4/1917/19. These data were reported again as remarks in the 1400 observation as PRJMP 4/1917/19.

B.



From 1302 to 1307CST, the pressure increase satisfied requirement (a), but not (b). From 1318 to 1335 CST, (a), (b), and (c) were satisfied by an increase of 0.14" (from 28.37" to 28.51"). The jump was coded in a special as PRJMP 14/1918/35. It was sent in the 1400 record observation as PRJMP 14/1918/35.

C.



From 1305 to 1308CST, the pressure increase (0.35") satisfied requirements (a), (b), and (c), therefore, it was coded in a special observation at 1328 as PRJMP 4/1905/08. The increase between 1322 and 1328 CST satisfied requirements (a) and (b) only, and the increase between 1331 and 1335 CST satisfied only requirement (a), therefore, neither was reported.

7600. ENTRIES ON WBAN FORM 10

7610. Sea-Level Pressure.[1] (Col. 6) Omit the initial "9" or "10" of the sea-level pressure and enter it as three figures (without a decimal point) representing tens, units, and tenths of millibars; e.g., enter 1013.2 as "132".[2]

7620. Altimeter Setting.[3] (Col. 12) Omit the initial "2" or "3" of the altimeter setting and enter it as three figures (without a decimal point) representing units, tenths, and hundredths of inches, e.g., enter 29.94 as "994". When the altimeter setting is less than 29.00 inches, include the word "LOW" immediately preceding the altimeter-setting value, e.g.; enter 28.96 as "LOW 896".[2]

[1](AF) Recorded only at the time of the 3- and 6-hourly observations.

* [2]Prefix an "E" to entries based on pressure-measuring instruments (a) of doubtful accuracy, (b) based on an aneroid barometer or microbarograph which has not been compared with a mercury barometer in accordance with ¶7680 and Sec. 7700, or (c) a sea-level pressure determined using an estimated 12-hour mean temperature argument.

[3]Designated FAA stations are authorized to omit recording and transmission of altimeter setting.

7630. Mandatory Remarks. (Col. 13) See §10150 and 10211 regarding coded entries, at 3-hour intervals. Enter pressure data in Col. 13 as follows:

Observed	Entry
* (1) Pressure rising or falling at a rate of 0.06 inch per hour or more at the time of the observation.	PRESRR or PRESFR.
(2) Barogram "V" (see §7523).	Enter in the next record observation the lowest sea-level pressure in tens, units, and tenths of millibars, and time of occurrence GMT; e.g., "LOWEST PRES 631 2345."
(3) Pressure unsteady, as shown on the barogram by sharp troughs or crests that depart at least 0.03 inch from the mean trend.	PRES UNSTDY.
(4) A pressure jump,[1] as indicated by a pressure rise at a rate exceeding 0.005 inch per minute (0.01", or 0.34 mb. per 2 minutes), will be reported provided all of the following requirements are satisfied. (a) The rise is at least 0.02" (0.68 mb.). (b) The pressure for 20 minutes or more following the beginning of the jump remains at least 0.02" higher than at the beginning. (c) The beginning of the jump is distinctly separated from the beginning of any preceding jump by at least 20 minutes, and by a segment of the trace having a rise less rapid than 0.01" per 2 minutes, or steady, or falling.	PRJMP, followed by (1) magnitude of the jump (in hundredths of an inch), (2) the time that the jump began (see example) and (3) the time that the jump ended. If sent as a special (see ch. 9) repeat this remark on the next succeeding record observation. Do not transmit data ending more than 2 hours ago. Use slants to separate numerical data, e.g., "PRJMP 8/1612/18" where 8 is the magnitude of the jump (i.e., 0.08"), 1612 is the time the jump began, and 18 is the time that the jump ended.

[1]Pressure-jump data are observed and transmitted only at stations having 12-hour microbarographs. They are reported in special observations in accordance with §9132.8. See §10310.1. when a special reporting a pressure jump is not transmitted.

7640. Station Pressure. (Col. 17) Enter station pressure to the nearest 0.005 inch (determined from the appropriate instrument in accordance with §7020), and use these entries in determining sea-level pressure and altimeter settings, after rounding to the nearest 0.01 inch.[1]

7650. (WB, N) Pressure Characteristic. (Col. 37) Make this entry for 3- and 6-hourly synoptic observations at stations having a microbarograph. Enter a single code figure, taken from Table 7-4 for pressure characteristics during the 3-hour period ending at the time of observation. (See Sec. 7500.)

7660. Net 3-Hour Pressure Change. (Col. 38) Make entries only at Weather Bureau and Navy stations having a microbarograph. Determine the net change in station pressure for the preceding 3 hours to the nearest 0.005 inch by subtracting corresponding entries in Col. 17. If an observation was not taken 3 hours earlier, determine the change from the barogram.

7680. Station Pressure Computations. (Lines 59-65) Enter station pressure computations for the 6-hourly synoptic observations as specified in §7681.

* 7680.1. (AF) At Air Force stations make these entries only when using the microbarograph for the routine determination of station pressure.

7681. Time. (Line 59) Enter the time of reading the barometer. Note that this time will usually differ from that ascribed to the observation in Cols. 2 and 16.

7682. Attached Thermometer. (Line 60) Enter the temperature of the thermometer to the nearest 0.5° Fahrenheit or Celsius (centigrade). Omit entries when the pressure readings are taken from altimeter-setting indicator or aneroid barometer.

7683. Observed Barometer. (Line 61) Enter the uncorrected observed reading of the mercury barometer to the nearest 0.001" or 0.05 mb.; or of the precision aneroid barometer to the nearest 0.005" or 0.1 mb. Omit entry if reading is obtained from the altimeter-setting indicator.

7684. Total Correction. (Line 62) Enter the sum of all corrections required to reduce the observed reading to station pressure. Omit entry if reading is obtained from altimeter-setting indicator.

* 7684.1. (WB) Correction of Mercury Barometer Readings. Readings of mercury barometers should be corrected for scale error and capillarity, gravity, removal (i.e., the difference between the actual elevation of the barometer and the assigned station elevation), and any known residual errors. The sum of these corrections should be obtained from WBAN Form 54-3.3.1 as issued or verified by the pertinent headquarters.

* 7684.2. (WB) Correction for Temperature. Unless otherwise directed by separate instructions pertaining to a Bowen fixed cistern or other special barometers; all Weather Bureau stations should use one of the tables listed below to obtain the proper temperature correction when computing station pressure from mercury barometers:

(1) TA 455-0-1 (Formerly WB Form 1080) "Correction of Mercurial Barometer for Temperature, English Measures."

(2) TA 455-0-4 or TA 455-0-4A "Barometer Total Correction Table (for Fortin barometers, scale true at 62°F.)"

(3) Manual of Barometry (WBAN), Table 5.2.1, "Correction of Mercurial Barometer for Temperature (scale true at 62°F.)"

[1] Prefix an "E" to entries based on pressure-measuring instruments (a) of doubtful accuracy, (b) based on an aneroid barometer or microbarograph which has not been compared with a mercury barometer in accordance with §7680 and Sec. 7700, or (c) a sea-level pressure determined using an estimated 12-hour mean temperature argument.

(4) Manual of Barometry (WBAN), Table 5.4.1, "Barometer Total Correction Table (for Fortin barometers, scale true at 62°F.)"

* 7684.3. (AF) Use the following references to obtain the proper temperature correction when computing station pressure with an Air Force calibrated mercurial barometer:

(1) ML-2, Barometer:

(a) WBAN Manual of Barometry, Table 5.2.1, Correction of Mercurial Barometer for Temperature (scale true at 62°F.).

(b) TO 31M2-3MI2-1, Table III, Correction for Mercurial Barometer for Temperature.

(2) ML512 Barometer. WBAN Manual of Barometry, Table 5.2.3, Correction of Mercurial Barometer for Temperature (scale true at 32°F.).

7685. Station Pressure. (Line 63) Enter to the nearest 0.001" or 0.05 mb. for mercury barometer reading to the nearest 0.005" or 0.1 mb. for precision aneroid or altimeter-setting indicator readings.

7686. Barograph Reading. (Line 64) Enter to the nearest 0.005" or 0.2 mb. according as the barogram is graduated in millibars or inches. When the barogram is changed at the time of the 6-hourly observation, take the reading from the new barogram. Adjust barograph to a zero correction when chart is changed and correction exceeds 0.01" or 0.3 mb. (see ¶7122).

7687. Barograph Correction. (Line 65) Enter to the nearest 0.005" or 0.1 mb. with proper sign, the difference between the entries in Lines 63 and 64, that is, Line 63 minus Line 64. When this difference is zero, enter "0". When this difference exceeds 0.05" (approx. 1.5 mb.), reset the barograph to a zero correction (see ¶7122). The entry in Col. 64 will show the observed reading before resetting. Enter an asterisk in Col. 65 (see ¶7687.1.).

7687.1. Following adjustment of the barograph to a zero correction in accordance with ¶7687 above, enter in Col. 90, as explanation of the asterisk in Col. 65, the notation "barograph reset to zero correction at" followed by the local standard time, to minutes, and zone indicator from Table 11-1.

7700. BAROMETER COMPARISONS

7701. General. Aneroid barometers and altimeter setting indicators must be periodically compared with a mercury barometer to ascertain continued reliability and determine suitable corrections to apply to the readings of the aneroid instruments.

7710. Routine Comparisons. After an aneroid instrument has been standardized and accepted as reliable in accordance with ¶7720, make two comparisons, at 6-hour intervals, on the same day of every week. Enter all comparison data on WBAN Form 54-6.6 (Fig. 7-3) using the guide for preparation on the reverse of the form. Determine a mean of correction values every week and use this figure (Col. 12) as your posted correction to apply to the readings of the aneroid instrument.

7720. Standardizing Aneroid Instruments. When a precision aneroid barometer or altimeter-setting indicator is installed or relocated, make comparative readings with a mercury barometer to determine the reliability of the instrument as follows:

(1) Make 2 comparisons daily at 6-hourly intervals for 5 days. Enter the data on WBAN Form 54-6.6 in Cols. 1-10, as appropriate.

* (2) After 5 days of comparisons, compute the algebraic mean of the 10 differences between the instruments (C_a). Enter appropriate data in Cols. 11, 12 and 13 of the form at WB and Navy stations. AF stations will use Cols. 11 and 12 only.

* (a) (WB, AF) Add the mean, algebraically, to subsequent uncorrected readings of the aner-

oid instrument for comparison purposes only, until a new correction is determined (see para 7720(5)).

(3) Draw two vertical lines in the remarks column and label the new columns formed 14A and 14B. Enter corrected aneroid readings in Col. 14A. Enter the algebraic difference between station pressure and corrected aneroid reading in Col. 14B.

NOTE: Cols. 14A and 14B will be used only while determining the reliability of an aneroid instrument, not for routine barometer comparisons.

* (a) (WB) When an altimeter-setting indicator is being standardized, add algebraically the mean correction, C_a, (Col. 10) to subsequent uncorrected readings (Col. 9), and enter the thus corrected ASI readings in Col. 14A; until a new correction is determined (see (5) below). Subtract the corrected ASI reading (Col. 14A) from the corresponding altimeter setting based upon the mercury barometer (Col. 8) and enter the difference in Col. 14B.

(4) Continue to take 2 comparisons daily until you have had 20 consecutive comparisons (excluding those of the first 5 days) in which no single entry in Col. 14B has exceeded ± .3 mb. or .010 inch.

* (5) Determine a correction value by obtaining a mean of all the differences entered in Col. 10, for the latest 20 observations. This mean of differences (Col. 12) will be the posted correction and the instrument may now be used for observational purposes.

(6) Recompute your posted correction every 5 days by obtaining a mean of all the differences entered in Col. 10, beginning with the 20 observations mentioned in (4) above.

* (7) After comparative readings have been taken daily for at least 8 weeks, and the comparisons of corrected readings (Col. 14B) of the last 10 consecutive days do not exceed ± .3 mb. or .010 inch, the aneroid instrument may be considered as reliable.

(8) Then make comparisons, two at 6-hourly intervals every 7 days. Redetermine the posted correction by obtaining the algebraic mean of the latest two readings and those made on the preceding 7th, 14th, 21st and 28th days.

(9) Consult your Regional Headquarters or field maintenance shop when an aneroid instrument cannot be standardized and considered reliable within 15 weeks; or, when there are indications that the instrument is unreliable or erratic.

FORM WBAN 54 - 6.6

WB FORM 455-7 (6-64)

U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU

BAROMETER COMPARISONS

(See detailed instructions for preparation of form on reverse side)

Station: WBAS, Doe City, Alabama

Location: Roe County Airport

COMPARISON OF: Altimeter-setting indicator [✓]; Aneroid barometer [ ]; Serial No. 1342

With mercury-barometer serial No. 1011

Actual elev. merc. bar., H_z = 916.61 ft.; Station elevation, H_p = 912 ft.

Actual elev. aneroid bar., = ——— ft.; Actual elev. alt.-setting ind. = 919.1 ft.

Sum of mercury-barometer corrections from line 6 of WBAN Form 54-3.3.1: −0.034

Comparison No.	Year 19 Month and day	Time (LST)	Data based on mercury-barometer: Temp. attach. therm.	Observed barometer reading	Station pressure	Station pressure	Altimeter setting	Observed reading (Aneroid or A.S. ind.)	Correction (C_e)	Sum of C_e for group	Comp. Nos.	Mean C_e for group (C_{em})	Difference between successive means	Remarks: Enter elevation-scale reading (ft.) of altimeter-setting indicator. Enter comp. nos. here if they take more space than Column 11
1	2	3	4	5	6	7	8	9	10	11		12	13	14
					(In. Hg)n	mb.	in.	in.	in.	in.		in.	in.	
29	3/8	0652	71.0	28.755	28.611		29.564	29.548	+.016					908
30	3/8	1251	73.0	28.976	28.826		29.766	29.769	+.017	+.148	21-30	+.015	.000	908
31	3/15	0653	72.0	29.305	29.156		30.124	30.110	+.014					908
32	3/15	1252	74.0	29.397	29.242		30.212	30.196	+.016	+.146	23-32	+.015	.000	908
33	3/22	0649	73.0	29.464	29.312		30.284	30.266	+.018					908
34	3/22	1253	75.0	29.477	29.319		30.291	30.274	+.017	+.143	25-34	+.014	+.001	908
35	3/29	0650	72.5	29.233	29.083		30.049	30.040	+.009					908
36	3/29	1252	73.0	29.169	29.018		29.982	29.965	+.017	+.147	27-36	+.015	−.001	908
37	4/5	0651	70.0	28.795	28.653		29.608	29.594	+.014					908
38	4/5	1253	71.0	28.924	28.779		29.737	29.718	+.019	+.157	29-38	+.016	−.001	908
39	4/12	0653	70.5	29.628	29.482		30.458	30.442	+.016					908
40	4/12	1252	72.0	29.609	29.459		30.436	30.418	+.018	+.158	31-40	+.016	.000	908
41	4/19	0650	71.0	29.461	29.314		30.287	30.272	+.015					908
42	4/19	1249	71.5	29.148	29.001		29.964	29.951	+.013	+.156	33-42	+.016	.000	908
43	4/26	0652	71.0	29.236	29.090		30.056	30.037	+.019					908
44	4/26	1251	72.5	28.924	28.775		29.732	29.715	+.017	+.157	35-44	+.016	.000	908
45	5/3	0653	71.5	28.894	28.748		29.704	29.690	+.014					908
46	5/3	1253	73.0	28.925	28.775		29.732	29.714	+.018	+.163	37-46	+.016	.000	908
47	5/10	0652	70.5	29.100	28.956		29.918	29.901	+.017					908
48	5/10	1251	72.0	29.017	28.869		29.830	29.809	+.021	+.168	39-48	+.017	−.001	908
49	5/17	0649	73.0	28.453	28.305		29.250	29.242	+.008					908
50	5/17	1252	72.0	28.434	28.288		29.232	29.218	+.014	+.156	41-50	+.016	+.001	908
51	5/24	0653	72.5	28.716	28.568		29.520	29.511	+.009					908
52	5/24	1250	75.0	28.618	28.464		29.413	29.399	+.014	+.151	43-52	+.015	+.001	908

* Figure 7-3. Form WBAN 54-6.6, Barometer comparisons (showing sample entries of data for routine comparisons).

8400. ENTRIES ON WBAN-10

8410. Wind Direction. (Col. 9) Enter wind direction in tens of degrees to the nearest ten degrees. Use 2 digits as shown in Table 8-1. Enter "00" when the wind is calm.

Table 8-5. Corrections to indicated wind speeds[1] (Direct-reading types)

Wind System	Uncorrected speed (mph or knots)	Correction (mph or knots)[2]
F420	2.5 to 75--------	0
	5.0 to 150 (double range).	-3
F420A, B, C or D	2.0 to 75--------	0
	4.0 to 150 (double range).	-2
Aerovane	0 to 8----------	+1
	9 to 95---------	0

[1] Corrections are based on adjustment of the pointer, under calm conditions, to the lowest indicated speed given in this table for the type of indicator in use.

[2] As appropriate to calibration of instrument used.

8420. Wind Speed[2,3] (Col. 10) Enter wind speed in knots. Enter "00" when the wind is calm. If estimated, enter "E" immediately following the speed unless gusts or squalls are reported (¶8430). When the speed exceeds 100 knots, enter only the tens and units figures and add 50 to the wind direction, e.g., 112 knots from 270°, enter "7712".

8430. Gustiness. (Col. 11) Report gusts by the symbol "G" immediately after the 1-minute wind speed. Enter immediately after this symbol the peak speed of gusts in knots observed during the past 15 minutes. These data will be reported when they occur regardless of the type [illegible] and equipment used. When the wind sp[illegible] or gustiness is estimated enter an "E" following the estimate of gustiness.

[2] Note that a special is required (¶0131(8)) when wind speed has doubled and exceeds 26 knots.

[3] See ¶10310.1 when a special reporting one of these phenomena is not transmitted.

8440. Squalls. (Col. 11) Report squalls by the symbol "Q" immediately following the 1-minute wind speed in lieu of a "G" and preceding the peak speed of gusts observed during the past 15 minutes.

Table 8-6. Corrections to indicated wind speeds (1/60- or 1-mile anemometers)

Speed Indicated		
By 3-cup "S" type anemometer, m.p.h.	By small airway "SA" type anemometer, m.p.h.	Corrections in whole miles per hour
[2] 0- 16	[2] 0-35	+1
17- 26	35-57	0
27- 35		-1
36- 44	(Corrections for	-2
45- 52	higher velocities	-3
53- 61	not determined, use	-4
62- 70	zero.)	-5
71- 79		-6
80- 87		-7
88- 96		-8
97-105		-9
106-114		-10
115-122		-11
123-132		-12
133-139		-13
140-149		-14
150-157		-15
158-166		-16
167-174		-17
175-184		-18
185-192		-19
193-200		-20

[2] Mo[illegible] of anemometer cups observed.

8450. Shifts.[3] (Col. 13) Enter "WSHFT" immediately followed by the time (GMT) of the shift , e.g., WSHFT 0003.

EXAMPLES

015+ 185/38/32/0000/008
015 216/57/45/2703/017
E30015 172/47/32/3220G32/016
E18G37RW- 150/63/55/2328G37/997
015 116/38/32/1600E/991
E18G37RW- 122/63/55/2333G42E/991
E30015 172/47/32/3220G32/016/WSHFT 0003

8450.1 (AF) Windshifts, determined by a forecaster to be associated with a frontal passage, will include the contraction "FROPA", i.e., "WSHFT 0003 FROPA".

* 8460. Magnetic Wind Direction.

8462. (AF) (Col. 13) Stations transmitting over tactical weather circuits or disseminating locally via pony teletype circuits are authorized to append magnetic wind direction to the remarks portion of an aviation observation.

(1) Enter these data in Col. 13 using the symbolic form MAGdd, i.e., MAG16 indicates a magnetic direction of 160 degrees.

(2) Omit entry when wind is calm.

8463. (WB) (Col. 13) If magnetic wind direction is used in air-ground communications and differs from the true direction, enter the magnetic direction in tens of degrees in parentheses either in Col. 13 or following the last element on Form 630-4, whichever is more convenient. Omit this entry when the communications station has a wind direction indicator, or when wind data are not broadcast.

8470. Maximum Wind Data.

8471. (WB, N)[1] Peak Gusts and Maximum One-Minute Wind Speed. (Col. 13) Whenever the maximum one-minute speed or the peak gusts during the past hour, (a) exceed values currently reported in Cols. 10, 11 and 13 (see ¶8420, 8430 and 8472), (b) exceed values reported in the preceding observation by 10 knots or more, and (c) also exceed 45 knots, enter:

(1) the maximum one-minute wind speed, its direction in tens of degrees and time.

(2) the peak gust, and its time (GMT) if more than 15 minutes from time of maximum one minute speed.

EXAMPLES

MAX WND 3480 1405 G92 1423

MAX WND 1154 1405[2]

MAX WND 3480 1405 G92[3]

8472. Peak Gusts. (Col. 13) Enter peak speed of gusts accompanying tornadoes, funnel cloud, or waterspouts, (¶3920(1, b)), thunderstorms and hail in accordance with ¶3920(4, a).

* 8473. Peak Speed and Direction. (Cols. 71-73) Enter these items only at stations equipped with continuous instantaneous wind-speed recorders. The peak speed is the highest momentary speed recorded during the 24 hours ending at midnight. The direction of the peak speed will be taken from recorder charts if available. Otherwise, estimate from entries in Col. 9 of WBAN Form 10. Enter these data as follows:

(1) (WB) the direction to 16 points if suitable recording equipment is available, otherwise to 8 points, e.g., NE 3.

(2) (AF) the direction to the nearest tens of degrees in two digits.

(3) the speed to the nearest knot.

(4) the approximate time to the nearest minute. If the same peak speed occurs more than once during the day, enter all times (continue in Block 90 if additional space is required).

* 8473.1. Enter peak speed and direction data even though there is a break in the recorder trace, provided this break, in the judgment of the observer, is not believed to have occurred during the period of maximum wind speeds for that day. Otherwise, disregard the recorder trace and enter "M" in Cols. 71-73.

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[1] Except at civil SAWR, S- and A-type stations.

[2] Gustiness is not reported here because the peak gust occurred at 0948E, within 15 minutes of the record observation, and is therefore entered in Col. 11 (see ¶8430).

[3] Gust was recorded within 15 minutes of time of occurrence of MAX WND.

9000. GENERAL

9001. Definition. An observation is an evaluation of the meteorological situation at the point where the observation is taken. The component parts of an observation, when referred to in a general sense, are termed elements. The terms "aviation" and "synoptic" observations connote assemblage of elements in a specific manner (see Sections 9100 and 9200).

9002. Time of Beginning. Begin scheduled observations just sufficiently in advance of the standard time of observation (see Chap. 10) to permit accurate evaluation of all elements prior to filing time.

9003. Order of Observing Elements. The elements of an observation should be observed in the following order:

(1) Elements observed or determined outdoors. Review sky cover, visibility and weather, if practicable, before filing aviation reports, to insure current data.

(2) Elements determined from indoor indicators, or instruments near the observer's desk.

(3) Pressure. Observe as close as practicable to H+00.

9100. AVIATION OBSERVATIONS

9110. General. Aviation weather observations are classified as record (R), special (S) or (RS), local (L) or check (✓). When a local or check observation reveals a requirement for a special observation, the observation will be taken as a special observation containing the necessary elements of both. It will be for transmission as a special. However, elements of the local may be disseminated locally before the special is completed.

9111. Observation of Elements. Observe the weather and evaluate its various elements between scheduled (record) observations as often as is consistent with the primary duties of the observer (see the Introduction) and current requests for public service (in that order of priority). Changing weather conditions that might require a special observation will be watched most closely to insure prompt filing of a report after such changes occur.

9112. Recency of Observed Data. All elements reported in an aviation observation will have been observed within 15 minutes preceding the time of the last entry of the observation on WBAN-10, unless otherwise excepted.

9113. Content of Aviation Observations. Aviation observations will contain one or more of the elements in Table 9-1, unless otherwise specified, in the order shown.

9120. Record Observations. A record observation is taken at scheduled intervals, having a standard time of H+00; normally at hourly intervals, unless otherwise instructed.

9130. Special Observations "S." An "S" observation may consist of one or more elements (Table 9-1), but when it occurs at the time of an "R" observation, it is labeled "RS" (record-special) and will contain all the elements of an "R" observation. "S" observations are reported at all aviation-weather observing stations, except that at civil A- & SA-type stations, they are prepared only at separately designated stations. [1]

9130.1. "S" observations are taken in accordance with criteria in §9131, to report the beginning, end and other significant changes in weather elements. Amount of change criteria are with respect to the preceding "R," "RS" or "S" observation, whether transmitted or not.

9130.2. (WB-1) At joint-use WB stations, check observations will be amplified and filed as "S" observations, if appropriate, in accordance with additional military criteria for specials for the service concerned, as authorized in § 9131.

[1] Civil SAWRS that take less than 24 hourly observations a day will take S observations in accordance with §9131 following the first observation of the day.

*Table 9-1. Content of Aviation Observations

Element(s)	Type of Station												
	Manned by Observing Personnel					AMOS (Automatic Meteorological Observing Station)							
						Observing Personnel on Duty (Manned/ Automatic Status)					Unmanned or Personnel off Duty		
	Type of Observation					Type of Observation					Type of Ob.		
	R	RS	S	L	✓	R	RS	S	L	✓	R	RS	S
(1) Ceiling and Sky	X	X	X	X	X	X	X	X	X	X			
(2) Prevailing Visibility	X	X	X	X	X	X	X	X	X	X			
(3) Weather & Obstructions to Vision	X	X	X	X	X	X	X	X	X	X			
(4) Sea-Level Pressure	X	X				X	X	X			X	X	X
(5) Temperature	X	X				X	X	X			X	X	X
(6) Dew Point	X	X				X	X	X			X	X	X
(7) Wind Direction, Speed & Character	X	X	X		X	X	X	X		X	X	X	X
(8) Altimeter Setting	X	X	X		X	X	X	X		X	X	X	X
(9) Cumulative Precipitation for the 6-hour Period ending at 0000, 0600, 1200 & 1800 GMT						X	X				X	X	X
(10) Remarks, as appropriate	X	X	X	X	X	X	X	X	X	X			

Items (1), (2) and (3) should be reevaluated, if practicable, prior to dissemination of the observation to insure that these data are current.

Items (1), (2), (3) and Wind Character are appended in "remarks" at manned/automatic stations not equipped with "push-buttons" or a "Digiswitcher".

Item (4) is included at AF stations in 3- and 6-hourly observations only.

Item (7) may be omitted from "check" observations at stations where the broadcaster can determine them at the air-ground communication position.

Item (8) is included at AF stations in all observations.

Appropriate remarks include data such as operationally significant information (RVV or RVR, obscuring phenomena, mandatory remarks, wind shifts, etc.) and coded 3- and 6-hourly additive data groups.

* 9131. Criteria for Taking Specials. A special observation will be taken within 15 minutes after the observer returns to duty following a break in the hourly observation schedule. Special observations will also be taken when any of the following criteria are met:

(1) Ceiling forms below, decreases to less than, or if below, increases to equal or exceed:

(a) 3,000 feet

(b) 1,000 feet

(c) 500 feet

(d) All nationally published minima applicable to the airport

(e) Values established locally because of their significance to aircraft operations.

(2) Sky Condition. Cloud is present below:

(a) 1,000 feet, and no cloud was reported below 1,000 feet in the preceding "R" or "S" or "RS" observation.

(b) (WB) the highest instrument minimum for the airport, and no sky cover was previously reported below this minimum height. These minimums are with reference to instrument minimums (day or night, depending on the time of the observation) exclusive of ILS, GCA or Alternate minimums; if no instrument minimums have been established, these observations should be with respect to lowest VFR minimums.

(3) Prevailing visibility decreases to less than, or if below increases to equal or exceed:

(a) 3 miles

(b) 2 miles

(c) 1 1/2 miles

(d) 1 mile

(e) All nationally published minima applicable to the airport

(f) Values established locally because of their significance to aircraft operations.

(4) Runway Visual Range:

(a) (WB) The highest value from the designated RVR Runway during the preceding ten minutes, rises above, if initially below, or drops below, if initially above, the minimum for Category I operations.

(b) (AF) The ten minute mean RVR decreases to less than, or if below, increases to equal or exceed each nationally published RVR minimum applicable to the primary runway in use, or (AF)

(c)/ RVRNO or RVRMNO is first required to be reported, or is first determined to be no longer applicable.

(5) Tornado or Funnel Cloud or Waterspout.[1]

(a) Is observed.

(b) Disappears from sight.

(c) Occurred within past 6 hours, according to outside sources and has not been observed and recorded at the station.

This element may be reported in a single element special.

(6) Thunderstorm.[1]

(a) Begins (A special observation is not required to report the beginning of a new thunderstorm if one is currently reported as in progress at the station).

(b) Increases in intensity.

[1] If the special is not transmitted, See ¶10310.1.

(c) Ends (Special observation 15 minutes after thunder is last heard at station).

* (7) Precipitation.[1]

(a) Hail ("A", not "AP") begins or ends.

(b) Freezing precipitation other than very light begins, ends, or changes in intensity.

(c) Sleet other than very light begins, ends, or changes in intensity.

(d) (AF) Precipitation intensity other than "very light" begins or ends.

(8) Wind and Wind Shifts. See ¶8330 and 8330.1).[1]

(a) Sudden doubling of average 1-minute wind speed to more than 26 knots. These data may be reported as a single element special.

(b) Wind Shifts.

At Weather Bureau and Navy stations, these data may be reported as a single element special.

(9) Pressure Jump. (WB) (¶7630 (4)). This element may be reported alone, as a single element special. If the special is not transmitted see ¶10310.1.

(10) Miscellaneous. Any other meteorological situation that in the opinion of the observer is of importance to the safety or efficiency of aircraft operations.

* 9140. Local Observations. Local observations may be taken at any weather observing station. The elements included in these observations are specified in Table 9-1, "Content of Aviation Observations."

[1] If the special is not transmitted, See ¶10310.1.

* 9141. Criteria for Local Observations.

(1) Local observations will be taken

(a) when changes in ceiling, visibility, weather, or other elements are significant for local aircraft operations. Definitions, or standards, of significant changes shall be developed locally with aviation interests. These observations will be recorded on WBAN Form 10, except at AF stations when a permanent printed record of the observation is made by a local dissemination device, e.g., Tel Autograph, Electrowriter, Teletypewriter, etc.

(b) immediately following notification of an aircraft mishap occurring at or near the station, except when notification is delayed and there has been an intervening record observation. Such observations will consist of all the elements normally included in a record observation except sea-level pressure, and will be identified by entering the contraction "ACFT MISHAP" in Col. 13. Any other desirable explanatory information will be entered in Col. 90. These observations will be recorded on WBAN Form 10 by all stations. Local arrangements should be made to assure that the observer is notified as soon as possible of all aircraft mishaps.

(2) Local observations for purposes other than those listed in (1) above may be taken as requested. The recording of such observations on WBAN Form 10 is left to the judgment of the observer.

9150. Check Observations. Where scheduled aviation weather broadcasts are made, take a check observation as near to broadcast time as practicable (at least within 20 minutes), unless all personnel on duty are engaged in other higher priority duties, e.g., taking a pilot balloon observation.

9151. Entries on WBAN-10. If an aviation observation has been taken within 20 minutes of broadcast time, or the broadcast[2] cannot be made because of equipment failure, omit the observation and, in the case of equipment failure, enter an explanatory note on WBAN-10.

9151.1. Check observations should be recorded on WBAN-10 and disseminated as a local or special whenever a change requires a local or special, in accordance with §9130 and 9140.

9151.2. Check observations will be entered on WBAN-10:

(1) Whenever any of the following elements have changed by a reportable amount[2] since the preceding aviation observation:

(a) Ceiling or heights of other sky cover (see Table 1-10).

(b) Sky cover amounts (see Table 1-8).

(c) Prevailing visibility (see Table 2-1).

(d) Weather and obstruction to vision (see Tables 3-5 and 3-6).

(2) Whenever changes since the preceding aviation observation exceed:

(a) 22-1/2° in wind direction, for wind speeds above 10 knots.

(b) a 50% increase or decrease in wind speed or a change of 10 knots at the time of both observations.

(c) 0.02" in altimeter setting.

(3) Whenever changes in remarks are considered operationally significant (see instructions for entry of remarks in Chapters 1-8).

9152. Contents. Include appropriate elements in accordance with Table 9-1, unless otherwise authorized.

9200. SYNOPTIC OBSERVATIONS

9210. Data for synoptic observations are observed and evaluated in accordance with instructions in this manual, for the elements specified in separate coding instructions. Where aviation-weather observations are taken, code synoptic observation from entries on WBAN Form 10 for corresponding "R" or "RS" observations, and enter the coded data on the immediately following line of WBAN Form 10. Temperature in the PPPTT group and dew point in the T_dT_d app group of the synoptic observation will be entered in Celsius code figures. When the synoptic observation differs in any respect from corresponding elements of the aviation observation because of rapidly changing conditions, explain briefly in Block 90.

9211. (WB) Retain a copy of each synoptic observation, as transmitted, for at least 30 days:

(1) where TelAutograph is used in lieu of Form 630-4 (see §10352.).

(2) where observing and communications duties are performed by the same personnel.

TelAutograph copy, WBAN Form 10, or Form 630-4 may be retained, provided the entries are legible.

[2] A reportable amount is any amount of change in an element, that would be reported by a value that differs from the one used in the immediately preceding observation, where the values used are taken from a table of selected values appropriate to the element reported, e.g., the tables specified in §9151.2.

9300. MIDNIGHT OBSERVATIONS

9310. At midnight, LST, take an observation of MAX. and MIN. temperatures and precipitation, where personnel are on duty at that time.[1] Synoptic and aviation observations scheduled for 0000LST constitute the source of most midnight data; however, temperature extremes and precipitation data (§10150) will be taken to complete midnight data. Record the data on forms for the day ending at the time they are taken, i.e., for the hour 2400LST of the day of record (§11102). In time zones where midnight data are entered in Cols. 42-58, on line 4, (e.g., CST zone), omit entries on the lines labeled "Mid to" and "Mid."

9400. RUNWAY OBSERVATIONS

9410. (WB) At designated civil stations, append runway observations, as remarks, to all observations (R, S, ✓, or L), in accordance with separate instructions.

9500. CONTROL TOWER OBSERVATIONS

9510. (AF) In accordance with AFM 60-5, certified control-tower personnel will maintain a continuous meteorological watch, giving careful attention to visibility, wind direction and speed, and gustiness, as well as to ceiling, sky condition and other weather of significance to aircraft operations, such as thunderstorms, freezing rain, showers, etc. They will report any apparent differences to the weather observer on duty.

9520. (WB,N) Certified control-tower personnel take observations of visibility at the control-tower level whenever the visibility (prevailing) at the weather station level is less than 4 miles (see §2511).

9600. JOINT-USE AIRWAY OBSERVATIONS

9610. (WB-1) A joint-use station is a Weather Bureau station separately designated to provide weather information for civil and military operations. A careful watch for weather changes will be maintained with full cognizance of both civil and military criteria for special and local observations.

[1] (FAA) Applicable only to designated stations.

/4 = Indicator that the 0°C isotherm was crossed 4 times; i.e., that there are two inversions, both crossing the 0°C isotherm.

(3) RADAT ZERO

ZERO indicates that all portions of the sounding are colder than 0°C

10161.1. When an hour or more elapses between time balloon first reached 0°C isotherm and time of transmission of the data in an aviation observation, add a time group (hrs., minutes GMT, 24-hr. clock) to indicate the time balloon first reached 0°C isotherm; e.g., RADAT 20/041/2 1237.

10161.2. Transmit RADAT MISG when the sounding is terminated before the 0°C isotherm is reached, or when a scheduled release is not made.

10162. ICING DATA. The altitude of icing determined in accordance with the Manual of Radiosonde Observations, will be coded in hundreds of feet MSL, preceded by the identification group RAICG, and followed by the altitude indicator MSL (mean sea level), e.g., RAICG 13 MSL to indicate "icing above 1300 feet above mean sea level."

10162.1. Add the group "SNW" to report reduced ascensional rate apparently owing in part to snow, e.g., RAICG 13 MSL SNW.

10162.2. When an hour or more elapses between time balloon reaches icing level and time of the aviation observation in which it is transmitted, add a time group to indicate the time at which icing was first indicated, e.g., RAICG 13 MSL SNW 0635; omit the group whenever a time group is included in the freezing level data.

10170. Decoding Aid (TA 631-0-1). Decoding information for aviation weather reports is contained in TA 631-0-1, Explanation of Teletypewriter Weather Reports. These aids are available in limited quantity through normal procurement channels to supplement pilot-briefing activities.

10180. Miscellaneous Appended Data.

* 10181. (AF, N) Runway Surface Condition and Runway Condition Reading. Runway surface condition and runway condition reading data, when provided by the Base Operations Officer, will be entered on WBAN Form 10 for longline dissemination only:

(1) In single element special format, using Cols. 1, 2 and 13 (ascribed time is entered in Col. 2, in accordance with Introduction §4.0.C.), or

(2) If an R, RS, or S aviation observation is being prepared at the time these data are received, they will be appended to the aviation observation in the order specified in §10211.

* 10181.1. (AF, N) Runway surface condition and runway condition reading data will not be disseminated over local weather dissemination systems, except where a single teletypewriter tape is used for both local and longline dissemination. After initial longline dissemination, these data will be appended to subsequent hourly aviation observations until the data are amended or cancelled by the Base Operations Officer. These data are coded on the basis of the following:

(1) Runway Surface Conditions.

(a) Wet Runway = WR

(b) Slush on Runway = SLR

(c) Loose Snow on Runway = LSR

(d) Packed Snow on Runway = PSR

(e) Ice on Runway = IR

(f) Append "P" when conditions are patchy.

(2) Runway Condition Reading. A two-digit number between 02 and 26 following the runway surface condition code.

* (3) Appended "SANDED" to coded data when applicable.

EXAMPLES

PSR 15 = Packed snow on runway; decelerometer reading of 15.

IR08P = Ice on runway; decelerometer, reading of 8. Conditions patchy.

LSR20 = Loose snow on runway; decelerometer reading of 20.

* IR05P SANDED = Ice on runway, decelerometer reading of 5. Condition patchy, runway sanded.

10182. (AF, WB). K Data (Radiation Intensity Level). Where nuclear radiation intensity level is reported:

(1) Encode the observed values as follows:

(a) When the radiation level is "zero," to the nearest roentgen per hour, encode the level as RZERO.

(b) For values from one through 999 roentgens/hr., use the code group RIII, and encode III, as the hundreds, tens and unit ciphers of the observed level, to the nearest roentgen/hr., e.g., R012 for 12r./hr.

(c) For values that exceed 999 r./hr., subtract the thousands value and code the excess as in (b), above. Add the thousands value in plain language (e.g., R127 PLUS 1000 to report a level of 1127r./hr.).

(2) When the K data are not available, use the code group "R///".

(3) Append the appropriate code group from (1) or (2), above, to aviation weather observations in the order specified in §10211 (e.g., following PIREP data when available), as follows:

* (a) (AF) Stations within the CONUS, append to the 1600 GMT observation at 4-week intervals beginning with the first Wednesday of each calendar year.

(b) (WB) Append to the 1600 GMT observation, at designated stations, at 4-week intervals beginning with the first Wednesday of each calendar year.

(c) (WB) Whenever a reportable numerical value is obtained, or under the special conditions specified WBM III-D-61 append reports hourly as long as aviation observations are transmitted.

10200. FORMAT AND CONTENT

10210. General. Group elements of an aviation observation as illustrated below, with a slant or space separating numerical data that might otherwise be misinterpreted. Use a slant and a space to separate the coded remarks (especially the "app" group), from preceding coded elements of the report. Use M to indicate that data normally transmitted preceding remarks (including estimated values) are missing; transmit an "/", as specified in subparagraphs of §10150, to indicate missing additive data (see appropriate communications manuals).

EXAMPLE

DCA 012 271/74/58/0708/032/503

10211. Insofar as data are available and transmission authorized, append data in the suggested following order:

(1) RVR or runway visibility.
(2) Obscuring phenomena.
(3) Wind shifts.
(4) (AF) Magnetic wind.
(5) MSL heights of bases and tops of sky-cover layers not visible at stations.
(6) Remarks pertaining to preceding coded elements.
(7) 3- and 6-hourly scheduled code groups.
(8) Raob data (RADAT and RAICG).
(9) (WB, AF) RAREP.
(10) PIREP.
(11) (AF, N) Runway conditions and braking action.
(12) (AF, WB) K Data - RIII Group.
(13) (WB) NOTAM.

10300. DISSEMINATION

10310. General. Transmit synoptic and record or special aviation observations by teletypewriter or radio where available. When transmission is delayed until time for the next record or special observation, transmit only the latest observation and enter "FIBI" on WBAN Form 10 following the observation not transmitted. When FIBI specials do not pertain to data referred to in ¶10310.1(A), transmit later specials over longlines only when the overall change between the last transmitted report and the current report equals or exceeds the criteria for a special observation. Do not FIBI a record observation (hourly) unless a later record observation is available for transmission.

(WB-1) Transmit special hurricane observations in accordance with WBM III-B-5101 and 5107.

10310.1. Whenever a special observation pertaining to one or more of the elements specified in (A) is not transmitted, include the portions of the special specified in (B) as remarks in the next transmitted observation:

(A) Data not transmitted in original special observation:

(1) Tornadoes, including waterspouts and funnel cloud (¶9131(5)).

(2) Thunderstorms (¶9131(6)).

(3) Precipitation (¶9131(7)).

(4) Wind and wind Shifts (¶9131(8)).

(5) (WB, N) Pressure jump (¶7630(4) and 9131(9)).

(B) Data related to (A), reported as remarks in next transmitted observation in following format:

(1) Local time of observation which was not transmitted.

(2) Weather, obstructions to vision, and wind data from observation not transmitted, insofar as it does not duplicate data included in remarks in accordance with ¶3920, i.e., does not duplicate appropriate remarks pertaining to:

(a) tornadoes reported by public (¶3920(1,c)).

(b) ending or disappearance of tornadoes (¶3920(1,b)), or thunderstorms (¶3920(2,b)).

(c) (WB,N) times of beginning and ending of precipitation (¶3920(4,g)).

EXAMPLES

SPECIAL AT 1937Z:

S 1937 M15Φ2RW+ 3225Q55/WSHFT 1932 (FIBI)

SPECIAL AT 1948Z:

S 1948 M20ΦbRW- 3215/1937 RW+ 3225Q55 WSHFT 1932

10310.2. When pilots' or radar reports of heights of bases of layers not visible at the station from the surface, and reports of the tops of layers have been coded in a special observation, recode and transmit them in the next record observation also, unless later information indicates the report is no longer considered valid.

10311. (AF) Transmission and dissemination priority for aviation weather observations:

(1) Local Control Agencies (Tower, GCA, RAPCON, GCI).

(2) Command Control Nets (SAGE, Tactical Loop, etc.)

(3) Longline communications.

* 10320. Local Dissemination.[1] The following information will be disseminated to local interests in accordance with ¶10320.1:

(1) All record and special observations.

* (2) Local observations as follows:

(a) All local observations taken in accordance with paragraph 9141 (1) may be disseminated or not at the discretion of the observer.

(b) Other observations may be disseminated locally as needed, this includes local observations taken in accordance with paragraph 9141(2). Do not transmit remarks, recorded for record purposes only, such as ACFT MISHAP.

(3) Remarks considered operationally significant, either as a part of (1) and (2) above, or separately when available.

(4) (AF) The time prefix assigned to all observations will be in GMT for dissemination purposes.

10320.1. Disseminate the information specified in ¶10320 as follows:

(1) Immediately to any control tower, GCA units or other air-ground communications position (i.e., ahead of longline dissemination). At Air Force stations special observations will be disseminated prior to recording the datum on WBAN Form 10. The time of observation will be the time the phenomenon requiring the special was first observed.

(2) By a single broadcast-type communications system, when available, to as many other interests desiring them as possible.

(3) By other available communications methods to local interests desiring the information as time and workload permits.

10320.2. Other observations may be disseminated locally as needed. Regarding PIREPS not incorporated in, or appended to scheduled aviation observations, see ¶12210.

10320.3. Disseminate runway observations locally in accordance with Sec. 9400.

10321.1. (AF) TelAutograph Relay. Indicate time of observation preceding weather data. Add time of transmission and initials of observer, as last items of the transmission.

10321.2. (AF) Voice Relay. Where voice relay is used, use a "read-back" system to insure that the observation has been correctly recorded at receiving end. Also, maintain a log, or tape recordings where available, to indicate:

(1) Time of the observation (from Col. 2 of WBAN Form 10).

(2) Time the observation was transmitted to the tower, or other local agencies, and the initi of the individual receiving the observation.

(3) Reasons for delays or non-delivery of observation.

(4) Initials of observer making entries.

[1] Not applicable at civil A-type stations.

11000. GENERAL

11010. Scope. Instructions in this chapter relate primarily to entry of nonmeteorological data. Consult chapters 1-8 for instructions relating to entry on WBAN Form 10 of elements discussed in these chapters.

11020. Preparation of WBAN Form 10:

(1) WBAN Forms 10A and 10B are used at stations provided with a mercury barometer, including use by FAA and SAWRS at combined WB/FAA and WB/SAWR stations (see (3), below, also).

(2) (WB) WBAN Form 10D (WB Form 500-10) is prepared in accordance with instructions in WB Manual, §III-E-1009, "a" and "c" and Exhibit III-E-10-2. It is prepared by Weather Bureau personnel for FAA, SAWR, A- and SA-type 2d-order stations.

(3) (LAWR, SAWR, A) WBAN Form 10A only is used at civil SAWR, LAWR and A-type stations that do not have a mercury barometer. Data for several days of the same month may be entered on each form. Enter month, day and year on the line preceding the observations for each day.

(4) WBAN Form 10 (FAA) is used at designated FAA stations. Enter data in Cols. 41-70 on the page in use at the time of observation.

(5) Prepare WBAN Forms 10A and 10 (FAA) in duplicate, at least (see §11030). Unless otherwise specified start a new page each day with the first observation having an ascribed time that is both:

(a) later than 0000 LST, and

(b) later than the ascribed time of the observation having a standard (reference) time of 0000 LST.

11021. Legibility. Enter observations in chronological order, using a fine, ballpoint, black-ink pen and enough pressure to ensure satisfactory carbon copies. If a ball-point pen is not available, use a black-lead drawing pencil (Venus 2H or equivalent). Data entered should be easily read and deciphered, and restricted, so far as possible, to the appropriate column as indicated in the columnar heading. Each entry should be of sufficient size as to fill approximately three-fourths of the vertical space between the lines on the form.

* 11021.1. (AF) Use either a fine, ballpoint, black ink pen, or black-lead drawing pencil (Venus 2H or equivalent), as long as all data for the record day are entered using the same type of writing instrument.

11022. Slants. Enter slants to separate data in accordance with Chapter 10 at stations where WBAN Form is used directly by the communications operator.

11023. Missing Data. Enter "M" in individual columns to indicate that data normally entered on WBAN Form 10 including estimated data, are missing or are considered erroneous, except that "/" will be entered in 3- and 6-hourly code groups, in Col. 13, as specified in §10150-60. Explain the necessity for "M" or "/" entries briefly in Block 90 of WBAN Form 10B at WB first-order stations; in Col. 13 (in parentheses) of WBAN Form 10A at civil A, LAWR and SAWR stations; and in the "Remarks, notes and miscellaneous phenomena" block at WBAN Form 10 (FAA) stations.

* 11024. Statistical Data. Data entered in parentheses are for statistical purposes only, and are not to be transmitted over longline teletypewriter circuits.

11025. Late Observations. When an observation is taken late ("DLAD") and no appreciable changes have occurred since the scheduled time, enter the entire observation in black ink and enclose in parentheses. When conditions have changed appreciably since the scheduled time, estimate the conditions probable at the observation time, using recording instruments wherever possible, and enter the observation in red pencil. The observation will be used for computation of sums and averages.

11026. Corrections. Enter corrected data as follows:

(1) For errors discovered in Cols. 1 thru 13 of WBAN Form 10 and corrected before the report is disseminated, either locally or longline:

(a) Erase the erroneous entries from all copies and record corrected data in black; or

(b) Draw a line thru the erroneous entries and record corrections in black in the appropriate blocks on the same or next line.

(2) For errors in Cols. 1 thru 13 of WBAN Form 10 discovered after report is disseminated, either locally or longline:

(a) Draw a red line thru the erroneous entry and record correction in red above it on all copies. If insufficient space is available, enter correction, appropriately identified in Col. 13, e.g., SLPRES 196, DWPNT 57, ALSTG 969, etc.

(b) (WB, N) Record the corrected report on WBAN Form 10, omitting an entry in Col. 1 and entering the ascribed time (LST) of the corrected report in Col. 2. Disregard columnar headings and continue with the contraction "COR" and the type and time (GMT) of the original report. This time shall be the scheduled time of transmission for "R" and "RS" reports and the ascribed time for "S" reports. Follow with a contraction for and the value of the element being corrected, e.g., ALSTG 969, DWPNT 57, etc. If the corrected report is a complete report, enter each element of the observation in the appropriate column on the next line.

*(c) (AF) If the correction is transmitted over longline teletypewriter circuits, enter "COR" in red, in Col. 13, followed by either the filing time where the report is delivered to communications personnel, or the actual time of transmission where the observer transmits the report. When the correction is only disseminated locally, enter the actual time of local dissemination following "COR".

(3) Where WBAN Form 10B is prepared errors discovered, either prior to or after local or longline dissemination, should be corrected in black as follows:

(a) Erase the erroneous entries and record corrected data, or

(b) Draw a line thru the erroneous entries and record corrected data directly above it on all copies.

11026.1. (WB) Form 920-9 and Punched Cards. Upon receipt of Form 920-9 at civil stations, except FAA, correct retained copies of WBAN Form 10 in red. If any corrections appear to be erroneous, the form may be returned to the originating station (NWRC, or supervising stations for SAWR and A-type stations) with appropriate comments; otherwise:

(1) At first-order stations, retain the forms until inspected by a field aide, or 6 months, after which they may be destroyed. The punched cards may be destroyed after corrections have been made on WBAN Form 10.

(2) At FAA and other second-order stations, retain the form until inspected by a field aide, or for 90 days, after which they may be destroyed.

11027. (WB) Record Observations During Pibals. Enter data pertaining to a record observation omitted during a pibal as follows:

(1) Enter "R" in Col. 1.

(2) Enter, in Cols. 2 and 16, the reference time of the sequence in which the omitted observation normally would have appeared.

(3) Enter data pertaining to ceiling, sky, visibility, weather and obstructions to vision, and clouds and obscuring phenomena in the appropriate columns. These data will be observed during the pibal at the scheduled time of the omitted observation.

(4) Use thermograph and recording telepsychrometer data in obtaining dry-bulb and dew-point values when available. Otherwise, obtain these values to tenths of a degree by interpolating between the dew point and dry-bulb of observations immediately preceding and following the missing observation. Enter these data to whole degrees in Cols. 7 and 8, and to tenths of a degree in Col. 18. When the dew point is obtained by interpolation, compute the wet-bulb values from psychrometric tables using interpolated dry-bulb and dew point and enter it in Col. 19. When the interpolated dew point is below 32°, use Table 5-2 (Dew

Group" of the combined Surf Code (SURFCO). Enter it every 6 hours at stations (and ships when appropriate) with means of observing surf condition.

11207.1. (WB-1,N) Primary Surf Data Group. A five-figure code group, symbol form $H_S H_S M_S P_S D_S$.

11207.2. (WB-1,N) Symbol $H_S H_S$. Average height of waves in feet. Ninety-nine indicates average height impossible to estimate. Two figures to be entered for whole feet.

EXAMPLES

01 for 1 foot, 12 for 12 feet, etc.

11207.3. (WB-1,N) Symbol M_S. Difference between height of maximum waves and average waves in a 5-minute interval to be entered in accordance with Code Table 11-4.

Table 11-4. Surf (M_S)

Code No.	Difference between height of maximum waves and average waves.	Code No.	Difference between height of maximum waves and average waves.
0	0.	8	8 feet.
1	1 foot.	9	Greater than 8 feet except when $H_S H_S$ is reported as "9", in which case this figure means that an estimate is impossible.
2	2 feet.		
3	3 feet.		
4	4 feet		
5	5 feet.		
6	6 feet		
7	7 feet.		

11207.4. (WB-1, N) Symbol P_S. Period, i.e., time between passage of successive breakers at a fixed point to be entered in accordance with Code Table 11-5.

Table 11-5. Surf (P_S)

Code No.	Time between successive breakers	Code No.	Time between successive breakers
0	No surf.	6	13 to 15 seconds.
1	Less than 5 seconds.	7	16 to 18 seconds.
2	5 or 6 seconds.	8	Greater than 18 seconds.
3	7 or 8 seconds.	9	Time impossible to estimate.
4	9 or 10 seconds.		
5	11 or 12 seconds.		

11207.5. (WB-1, N) Symbol D_S. Angle of breakers with the beach and direction of wave travel (referred to observer on beach facing the sea) to be entered in accordance with Table 11-6.

Table 11-6. Surf (D_S)

Code No.	Angle of breakers with the beach	Code No.	Angle of breakers with the beach
0	Calm	5	0° up to 10° (from the right)
1	0° up to 10° (from the left)	6	10° up to 20° (from the right)
2	0° up to 20° (from the left)	7	More than 20° (from the right)
3	More than 20° (from the left)	8	Confused, but predominantly from the right.
4	Confused, but predominantly from the left.	9	Not known.

11207.6. Miscellaneous. Cols. 57-58) Any data needed locally may be entered in Cols. 57-58. Identify the data in the column headings.

11208. Thickness of Ice on Water. (Col. 74) At designated stations, enter this datum to the nearest inch. Determine thickness from a representative ice layer on a nearby river, lake, or harbor free of artificial influence (such as dredging). Use an ax or augur to cut a hole in the ice, and measure thickness with a suitable rod or rule. (If a new hole is not cut for each measurement, allow for any artificial accretion of ice near the hole). Measure each Monday near local noon, and more frequently if ice conditions are changing rapidly, or if specifically requested.

11209. (WB-1) Frozen Ground Layer. Cols. 75-76) At designated stations, enter this datum to the nearest whole inch.

11210. WB-1) River Gage. (Col. 77) At Weather Bureau first-order stations where a river gage is read, enter the river gage reading to the nearest 0.1 foot.

11211. Miscellaneous. (Cols. 80-81) Except in accordance with §4380, any data needed locally may be entered in Cols. 80 and 81. Identify the data in the column headings.

* 11212. (AF) Remarks, Notes and Miscellaneous Phenomena. (Col. 90). Note times of equipment outages and changes from one instrument measuring system or location to another, by identifying the systems involved, and reason for change, i.e.,

0649 AN/TMQ-11 readings suspected to be too high, standby sling psychrometer being used.

0815 AN/TMQ-11 checked out O.K., use of sling psychrometer discontinued.

0902 RBC Runway 13 inoperative, changed to RBC Runway 31.

1416 Runway 13 instruments changed to Runway 31, primary runway in use.

1829 AN/GMQ-10 inoperative, no signal indicated.

Additional entries will be made in accordance with separate chapter instructions; to describe significant meteorological conditions which are not of current operational value; and to describe conditions which would affect the accuracy of representativeness of the recorded observations. All time entries will be made in local standard time.

* 11220. (AF) Required entries on WBAN Form 10 or equivalent form are limited to Cols. 17, 21, 42, 44, 45, 69, 71-73, and Block 90.

(1) Entries in Col. 17 will be made for each 3- and 6-hourly observation.

(2) Entries in Col. 21 will be made for each hour.

(3) Entries in Cols. 42, 44, 45, 68 and 69 will be made only when precipitation has occurred during the appropriate period.

* 11221. (AF) Additional entries are authorized on WBAN Form 10 provided:

(1) A justified request for data from the supported agency is on file and the data are not recorded elsewhere, or

(2) The barograph is used in place of the aneroid barometer for the routine determination of pressure. Specific entries will include Cols. 59 through 65.

12000. GENERAL

12010. General. Pilot's reports of meteorological phenomena encountered in flight are termed PIREPS. These reports are an extremely valuable source of information that often is not otherwise available. Observers will cooperate to the fullest extent possible with pilots and with ground personnel to secure and disseminate available pilots' reports promptly. (See Sec. 12200 for dissemination instructions.)

12011. PIREPS are encoded and disseminated in the PIREP format specified in §12120. PIREPS of the height of bases and tops of sky-cover layers are encoded in R, RS, and S aviation observations, when valid, in accordance with §1450. These sky-cover data will always be entered on WBAN Form 10-A in accordance with §1612.

12011.1. (AF) All PIREPS given local or longline dissemination will be recorded on WBAN-12.

12100. CODING

12110. General. Express all references to heights of phenomena encountered in flight in hundreds of feet to the nearest hundred above mean sea level[1]. Use authorized weather symbols (with appropriate intensity indicator), international cloud abbreviations, and word and phrase contractions; or if they are lacking, complete words. Use "U" for "intensity unknown", following type of phenomena and separated by a space.

12111. Specific instructions relating to the coding of selected meteorological elements are contained in §12121-12127. Other elements of meteorological or operational importance will be reported in the format specified in §12120, using plain language or authorized contractions in accordance with §12110. Other elements that will be encoded when available and disseminated when valid include TORNADOES (or waterspouts), LINES of thunderstorms (or squall lines), and widespread duststorms or sandstorms in which the visibility is reduced to less than two miles.

12120. Arrangement of Elements. Insert a standard weather heading ahead of text, in messages prepared for longline circuits (see Communications manuals). General order and content of text (for coding, see §12121-12127):

(1) Station identification.

(2) The term PIREP.

(3) (WB, N) GMT of entry of report on WBAN -12 (where this form is not used, enter time that report is prepared for transmission.

(4) Location or extent of phenomena relative to an observing station or other nationally known point; by conversion of data reported relative to a fanmarker or intersection, if necessary. Express all distances in nautical miles; except, report visibility statute miles.

(5) GMT (Table 11-1) of pilot's observation, if known.

(6) Phenomena reported.

(7) Altitude of phenomena in hundreds of feet above MEAN SEA LEVEL (MSL).

(8) Type of aircraft in reports of turbulence, condensation trails, and icing only; if unknown, report "ACFT UNKN".

Repeat items (4) to (8), as necessary, to report multiple phenomena, or phenomena occurring at different times or places.

[1] Pilot reports of cloud heights used as a ceiling in aviation observations will be converted to feet above the surface and coded in accordance with §1450-51.

295-792 O - 68 - 5

12121. Icing. Use the contraction "ICG" with indication of intensity and type, if known. For example:

TRACE ICG=Trace of ice.
LGT RIME ICG=Light rime icing condition.
MDT ICG=Moderate icing condition.
HVY ICG=Heavy icing condition.

EXAMPLES

The pilot of a Stinson, flying between Seattle and Oakland, reports to Medford that at 0700 PST he encountered light icing conditions 5 to 20 miles north of Eugene, Ore., at 2000 feet MSL:

MFR PIREP 1515 5-20 N EUG
1500 LGT ICG 20 STSN

The pilot of an F-51 flying between Oakland and Burbank reports an encounter with heavy icing conditions at 0925 PST over mountains north of Burbank; top of icing at 11,500 MSL, base 10,000:

BUR PIREP 1731 MTNS N BUR
1725 HVY ICG 100-115 F-51

12122. Electrical Discharge or Lightning Stroke - termed "DISCHARGE".

EXAMPLES

A pilot flying a P2V between Richmond, Va., and Washington, D. C., reports to Washington that at 1620 EST his aircraft experienced an electrical discharge 20 miles south of Washington at an altitude of 5000 feet MSL:

DCA PIREP 2129 20 S DCA 2120
DISCHARGE 50

The pilot of a liaison aircraft en route from St. Louis, Mo., to Chicago, Ill., reports to Chicago that a 1515 CST his plane experienced an electrical discharge over the Kankakee River at an Altitude of 2500 feet MSL:

MDW PIREP 2135 15 S JOT 2115
DISCHARGE 25

12123. Turbulence. Use the contraction "TURBC" preceded by an indication of intensity as illustrated in the following list:

LGT TURBC=Light turbulence.
MDT TURBC=Moderate turbulence.
SVR TURBC=Severe turbulence.
EXTRM TURBC = Extreme turbulence.

When clear air turbulence is reported, use the abbreviation "CAT" preceded by an indication of intensity, e.g., "MDT CAT".

* 12123.1. (AF) When PIREPS of clear air turbulence are reported, use the contraction "CAT", and when available, code and report the proximity of clouds in addition to the elements specified in ¶12120.

EXAMPLES

BLV PIREP 1415 50N STL 1345
MDT CAT 440 F-104

BLV PIREP 50-100S MLI 1745
MDT CAT 400 F-101
CI ABV IAS 390

EXAMPLES

A pilot reports to Atlanta, Ga., that his C-54 encountered extreme turbulence at 2330 CST, 10 miles northeast of Knoxville, Tenn., at 6000 feet MSL:

ATL PIREP 0535 10 NE TYS
0530 EXTRM TURBC 60 C54

The pilot of a DC-3 flying at 10,000 feet MSL through Donner Summit Pass, Calif., reports to Reno, Nev., that light turbulence is being experienced 1050 PST:

RNO PIREP 1855 OVR DONNER
SUMMIT 1850 LGT TURBC 100
DC3

12124. Hail. Use weather symbol "A". NOTE that second example illustrates PIREP of multiple phenomena, e.g., turbulence, rain, hail, and electrical discharge:

EXAMPLES

The pilot of a DC-4 reports to Omaha, Nebr., at 1617 CST that he is flying through moderate hail 10 miles south at an altitude of 3500 feet MSL:

OMA PIREP 2219 10 S OMA 2217 A 35

At 1628 CST he reports light hail, heavy rain, and extreme turbulence at 3000 feet MSL, 15 miles southwest of Omaha, and that at 5000 feet MSL his plane had experienced a discharge:

OMA PIREP 2235 15 SW OMA 2228 EXTRM TURBC R+A 30 DISCHARGE 50 DC4

12125. Winds Aloft:

(1) Use the contraction "WND".

(2) Code true direction from which the wind is blowing in three figures representing the degrees, of the compass, to the nearest 10 degrees.

(3) Use figures to code the wind speed in knots.

EXAMPLES

At 0845 CST the pilot of a C54 reports to Bismarck, N. Dak., that he is encountering an 82-knot wind 30 miles west of Bismarck at 6000 feet MSL, wind direction 80 degrees:

BIS PIREP 1450 30 W BIS 1445 WND 080 82 KT 60

At 1215 CST the pilot of a P2V reports, to Madison, Wis., a 72-knot wind from 240 degrees, 20 miles southeast of the station, at 8500 feet MSL:

MSN PIREP 1825 20 SE MSN 1815 WND 240 72 KT 85.

12126. Bases and Tops of Sky Cover. Use appropriate sky-cover symbols, enter height of base preceding the amount symbol, and height of top following the amount symbol, in hundreds of feet MSL. (Note: Intervals specified in Table 1-10 for reporting heights of clouds above stations are not applicable to pilot's reports.)

EXAMPLES

The pilot of a C-123 flying over Temple, Tex., at 0613 CST reports to Houston the top of an overcast at 8500 feet MSL:

HOU PIREP 1218 OVR TPL 1213 ⊕85

If the plane had been 15 miles southeast of Temple when the pilot determined the height of the top of the overcast, the coded report would read:

HOU PIREP 1218 15 SE TPL 1213 ⊕85

A pilot of a DC-3 flying over Washington, D. C. reports at 1110 EST to Washington that the ceiling is 1500 feet MSL, and top of overcast 4500 feet MSL:

DCA PIREP 1618 OVR DCA 1610 15⊕ 45

A pilot flying between Casper and Sheridan, Wyo., reports to Sheridan that the cloud base of an overcast layer over Kaycee is 14,000 feet MSL. The type of aircraft was not reported, nor the time of the observation.

SHR PIREP 0150 65 S SHR 140⊕

12126.1. (AF) Heights of bases of sky-cover layers not visible at the station or of tops that are observed within 20 nautical miles of the airport (cirriform layers within 50 miles) will be appended to the aviation observation in accordance with ¶1450.

12127. Condensation Trails. Use the term "CONTRAILS", followed by altitude in hundreds of feet MSL at which pilot reports CONTRAILS occurred, and type of aircraft when available.

EXAMPLES

A pilot of an F-86 30 miles south of Omaha, Nebr., at 1425 CST reports CONTRAILS at 45,000 feet MSL:

OMA PIREP 2028 30 S OMA 2025 CONTRAILS 450 F86

12200. DISSEMINATION

12210. General. Disseminate PIREPS both locally and on longline teletypewriter circuits in accordance with the instructions in this section. Two or more PIREPS may be combined in PIREP format to avoid repetition of the station identifier or other identical items. When two or more PIREPS contain substantially the same information disseminate only the most recent. Data need not be disseminated locally when they are substantially the same data as disseminated locally within the past 30 minutes.

12210.1. Pilot reports of the following hazardous weather phenomena will be disseminated locally and on longline circuits in PIREP format:

(1) Tornadoes, funnel clouds and waterspouts.

(2) Lines of thunderstorms o. line squalls.

(3) Widespread dust or sandstorms in which visibility is less than two miles.

Additionally, pilot reports of tornadoes, funnel clouds or waterspouts will be disseminated as special observations in accordance with §9131(5) or appended to a transmitted observation.

* 12210.2 (AF) Pilot reports will be evaluated by the forecaster to determine the need for local dissemination or longline transmission. Height values of cloud layers visible at the station need not be evaluated by a forecaster prior to being reported in the aviation observation. When a forecaster is not on duty (or assigned), all pilot reports will be disseiminated locally and over longline weather communications circuits, except reports that duplicate previously disseminated reports, or reports containing only heights of cloud layers (visible at the station) used in the aviation observation.

12210.3. (AF, N) Pilot reports of weather conditions considered to be operationally significant to local airfield operations will be appended to or transmitted as a special observation (reference §9131(10)). This information will also be given longline dissemination as a PIREP. See §12420 for WBAN Form 10 coding instructions.

1221. (WB) Pilot's reports will not be appended to aviation observations except as indicated in §1450.

12212. (AF, N) Military land stations will transmit pilot's reports according to AFCSM 105-2 and AWSM 105.2.

12213. A pilot's report of sky cover, of the type specified in §1450 that has been disseminated at a scan (continuous polling) period, will be repeated in the next record observation in accordance with §1612.

12300. WBAN-12 (AF, N)

12310. (AF, N) WBAN-12, Pilot Reports will be maintained in as many copies as deemed necessary to effectively handle the flow of pilot reports within the weather activity. Entries will be made in accordance with column headings and coding instructions in Sec. 12100.

(1) Time entries in Col. 1 will be in GMT.

(2) Entries in Cols. 2 and 4 may be extended into other columns on one or more lines of the form provided the next required entry is made on the first succeeding space under the appropriate column heading.

(3) Long post-flight summaries may be entered without regard to column heading provided all elements are appropriately identified by the report itself.

(4) Completed WBAN-12 forms are classified as worksheets and will be disposed of in accordance with AFM 181-5 or OPNAV INST P3140.32( ).

(5) Omit entries in columns for which data are missing.

12400. WBAN FORM 10

12410. Entries. Sky-cover heights (bases and tops) will be entered in Col. 13 in accordance with §1612.

12411. (AF) Pilot's reports appended to aviation observations will also be given longline dissemination as a PIREP. Pilot's reports of sky-cover heights need not be transmitted as a PIREP unless considered to be of special operational significance.

* 12420. (AF) Pilot's reports of hazardous weather or conditions considered to be operationally significant to local airfield operations will be entered in Col. 13 in accordance with §12120 except that:

(1) The station identifier will be omitted; and

(2) The time of the pilot's observation will be omitted if made within 20 minutes of the time of the surface report.

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