CHAPTER 16

DECODING AUTOSTATION REPORTS

16.1 AUTOSTATION REPORTS – GENERAL. Meteorological data are acquired from several different types of autostations in Canada and via various means of communication. The autostations in current use include two generations of MARS (Meteorological Automatic Reporting Station), two generations of MAPS^{R} (a registered trade name meaning Modular Acquisition Processing System), and more recently, READAC (Remote Environmental Data Acquisition Concept). The message from a MARS is generally transmitted via a telecommunications landline within five minutes of the hour whereas the message from a MAPS^{R} may be transmitted by a landline, or via a satellite link at times other than on (or near) the hour. Messages from a READAC station are being transmitted by landline. AES Regions and non–AES agencies have also established autostations other than the aforementioned.

Following collection from the autostation, the data are encoded in AES Regional HP9000 computers. Code conversion software (including CODCON) produces two main formats, that is, as an hourly Aviation Weather Report (often referred to as an 'Hourly' or 'SA'), and the international Synoptic Code (commonly referred to as a SYNO or SM). The reformatted autostation weather reports are then included in weather bulletins and redistributed on the National Computer Communications System (NCCS) via METSIS (Meteorological Satellite Information System).

Although autostations report in SA and/or SM format, the complement of sensors may vary from one station to another, particularly between types and generations of autostations. Furthermore, some parameters measured by autostations, particularly sky condition and visibility, are subject to a different interpretation from an observation made by man.

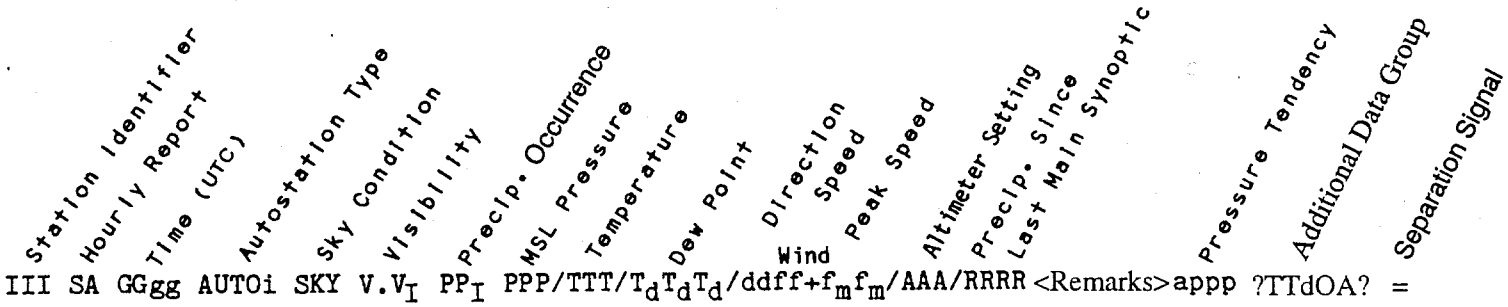
16.2 MONITORING OF AUTOSTATION REPORTS

16.2.1 Each Regional Headquarters routinely monitors autostation reports for accuracy and completeness. This task is normally assigned to staff of a weather station or a regional inspection unit. Details of the monitoring function are found in "User's Guide – Automatic Weather Station Reports" which may be obtained from Regional Headquarters.

Amendment n° 13
October 1994

16.3 HOURLY CODE – AUTOSTATION OBSERVATION

16.3.1 The symbolic form of the hourly code from an autostation observation is as follows:



16.3.2 Symbol Interpretation

16.3.2.1 III – Three–letter station identifier as published in Metstat.

16.3.2.2 Space – is used as a delimiter for each group prior to MSL pressure and between the precipitation amount and the pressure tendency groups.

16.3.2.3 SA – indicates that the report to follow is in the format of the hourly code.

16.3.2.4 GGgg – is the time of the report in hours and minutes (UTC).

16.3.2.5 AUTOi – indicates that the report originates from an automatic weather station.

i – This indicator identifies the type of autostation which has generated the observation.

Code	Autostation Type
AUTO1	MARS I
AUTO2	MARS II
AUTO3	MAPS I
AUTO4	MAPS II
AUTO5	READAC
AUTO6	HURRICANE
AUTO7	NON–AES AUTOSTATIONS
AUTO8	OTHER AUTOSTATIONS OPERATED BY AES
AUTOA	AUGMENTED AUTO5 REPORTS

16.3.2.6 SKY – The sky condition, which will be of variable length, is reported in the standard hourly code format.

Example : 7 SCT E15 BKN.

Heights in the sky condition group are reported in hundreds of feet. Due to limitations of the cloud sensors, the maximum height encoded is 99. This value represents a height of 9900 feet or greater. In an autostation report, the terms CLR BLO 100 or CLR BLO 50 will be used to indicate no cloud detected below 10 000 or 5 000 feet respectively. The actual term used will depend on the limits of the sensor installed at a specific autostation. Missing sky condition data are reported as M by AUTO1 and 2, or as spaces if there is no cloud sensor in the station configuration.

Amendment nº 13
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16.3.2.6.1 AUTO1 and AUTO2 sky condition reports may consist of as many as four layers. Each layer of an AUTO1 report belongs to a category having a range of heights, and each category is normally assigned one fixed height which is probably different from the actual height of the layer. The categories and reported heights of significant cloud are:

CATEGORIES	REPORTED HEIGHT	CODED HEIGHT
0– 500 feet	300 feet	3
501–1000 feet	700 feet	7
1001–2000 feet	1500 feet	15
>2000 feet	3500 feet	35

16.3.2.6.1.1 AUTO2,AUTO5 and AUTOA stations have the capability of reporting the measured height of cloud detected at the time of observation, that is, at the time reported by GGgg. Thus in autostation reports identified as AUTO2, AUTO5 or AUTOA, coded cloud heights represent actual heights of layers present at the time of observation.

16.3.2.6.2 AUTO2 stations equipped with both cloud and visibility sensors may report obscurations under conditions of low visibility according to the following table:

IF MEASURED VISIBILITY (MILES) IS USUALLY REPORTED AS	THEN SKY CONDITION IS
≤0.2	W1X
>0.2 ≤0.5	W3 X
>0.5 ≤2.0	–X
>2.0	SCT, BKN, OVC

16.3.2.6.2.1 If a ceiling layer is detected at the time of observation, the ceiling will be assigned the measured height by autostations having that capability. At AUTO1 and 2 sites, visibility is the factor that determines which ceiling designator, W or E, is used. W is used with visibilities of 0.5 mile or less; E is used with visibilities of more than 0.5 mile. AUTO5 and AUTOA reports will prefix the first BKN layer, or in its absence, the first OVC layer with an "M". E.G. M20 BKN 30 OVC or 2 SCT M50 OVC.

Amendment n° 13
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16.3.2.6.3 Traditional terms, i.e., SCT, BKN, and OVC, are used to report cloud cover detected by autostations. The sensor "sees" only that cloud which is vertically overhead, the traditional definitions of SCT, BKN, and OVC for autostations are not based on amount of cloud cover of the celestial dome as a human observer would see it, but are related to the persistence of cloud directly over the sensor. Because of these differences in methods of observation, there will be differences in the data produced even though the terminology used for autostation sky condition reports does not differ from that in human observations.

16.3.2.7 $V.V_I$ – Visibility index (not prevailing visibility) is reported in statute miles and tenths, up to 5.0 miles, and thereafter in whole miles up to 9 miles. A missing visibility index is reported as M, occupying three spaces in the message, as does each visibility index. The third character in a visibility index may be a digit, a space, a + sign, or an M.

16.3.2.7.1 Code for $V.V_I$ – Visibility Index (Except AUTO5 and AUTOA)

$V.V_I$ Code = miles	Increments	Interpretation
0.0, 0.1, etc. ... 1.0	0.1 mile	Measured visibility equals or
1.2, 1.4, etc. ... 2.0	0.2 miles	exceeds the coded value, but is
2.5, 3.0, etc. ... 5.	0.5 mile	less than the next higher
6. , 7. , 8.	1 mile	incremental value.
9.+		9 miles or more

Note: An autostation (except AUTO5 and AUTOA) visibility sensor is oriented in one direction only and measures visibility over a baseline of up to 600 feet. The AUTO5 and AUTOA visibility sensor samples a small volume of the air. The output represents visibility in one direction. In both cases, the visibility index will not necessarily be the same as prevailing visibility.

16.3.2.7.2 Visibility (reportable values)

Visibility is reported to the nearest 0.1 statute mile in the range 0.0 up to 3.0 (AUTO5 and AUTOA only)

Visibility is reported to the nearest 0.5 statute mile in the range >3.0 up to 4.0

Visibility is reported to the nearest 1 statute mile in the range >4.0 to >9.0

Visibility is reported as 9.+ for all values 9.0 statute miles and greater.

16.3.2.8 PP_IP_I – This three digit group indicates precipitation occurrence as measured by a "POSS" sensor. Missing data are reported as M. Stations without a "POSS" sensor report this field as M.

16.3.2.8.1 Code for PP_IP_I

PP_IP_I Code	Interpretation
R– –, R–, R, R+	Very light, light, moderate, heavy rain
S– –, S–, S, S+	Very light, light, moderate, heavy snow
L– –, L–, L, L+	Very light, light, moderate, heavy drizzle
A– –, A–, A, A+	Very light, light, moderate, heavy hail
"space"	no precipitation occurrence

16.3.2.9 PPP – Mean sea level pressure is expressed in tenths of a hectopascal, using the last three digits of the pressure and omitting the decimal point. Missing MSL pressure is reported as M.

Amendment n° 13
October 1994

16.3.2.10 / – Group delimiter symbol locations in the message are shown in the symbolic format of para. 16.3.1. The spaces shown in the symbolic format are also group delimiters.

16.3.2.11 < – This symbol is used to indicate whether data in any group are unusual or suspect, and if so, the symbol replaces the delimiter (space or solidus) which normally follows the group in question.

16.3.2.12 TTT – Air temperature is rounded to the nearest whole degree Celsius and is reported using two digits preceded by either a space (for positive temperatures) or a minus sign (negative temperatures). A missing temperature is reported as M.

16.3.2.13 $T_dT_dT_d$ – Dew–point temperature is rounded to the nearest whole degree Celsius and is reported using two digits preceded by either a space (for positive dew points) or a minus sign (negative dew points). A missing dew point is reported as M.

16.3.2.14 ddff+f_mf_m – Wind direction, mean speed and maximum speed consist of seven characters.

dd – The mean true wind direction from which the wind has blown during the ten minute period prior to GGgg is reported to the nearest ten degrees. (A two minute average is used by AUTO3 , AUTO5 and AUTOA stations.) Missing wind direction is reported as MM.

ff –The mean wind speed during the ten minute period prior to GGgg is reported in whole knots, using two digits. (A two minute mean is reported by AUTO 5 and AUTOA stations.) Missing wind speed is reported as MM.

+f_mf_m –The maximum wind speed reported (whole knots) is that observed in the ten minute period prior to GGgg. (This parameter is reported by AUTO2 and AUTO4 stations.) Maximum wind speed is reported only if it is 15 knots and higher and it exceeds the mean speed by 5 knots. AUTO5 and AUTOA stations will report G ahead of f_mf_m.

16.3.2.15 AAA – Altimeter setting from most autostations is not approved for aviation purposes and is being reported as an M between two delimiters (solidi). However, altimeter setting is reported from AUTO5 and AUTOA stations, and the standard format is three digits, representing units, tenths, and hundredths of an inch of mercury. A missing AUTO5 or AUTOA altimeter setting is reported as M.

16.3.2.16 RRRR – Accumulated rainfall since the previous main synoptic hour is reported in tenths of a millimetre. No rainfall in the period is reported as one space, and missing data are reported as M.

Amendment nº 14
June 1996

16.3.2.17 The remarks group will vary in content depending on occurrence and autostation type. Some remarks are CODCON generated and as a result to vary in order. Other remarks are added to the AUTO report through human intervention and may vary in order. All remarks are to be reported in the SA between RRRR and appp.

The following summarizes some of the possibilities for remarks:

16.3.2.17.1 Order of Priority for Remarks AUTO1 to AUTO7

ICG or ICG INTMT or INTMT ICG

PCPN x.xMM PAST HR

PRESFR or PRESRR

WND SPD fff

OBS TAKEN +gg

WX <manually entered text>*

TREND <manually entered text>**

(* AUTOA only)

(**AUTO5 OR AUTOA with trend forecast only)

16.3.2.17.2 Order of Priority of Remarks AUTO8 (CR21X)

PK WND ddff hhmmZ or PK WND SPD ff

WND SPD fff

/Sxx/ or /Rxx/

SUNSH xx

SOG xxx

PRESFR or PRESRR

OBS TAKEN +gg

Amendment n° 13
October 1994

16.3.2.18 appp — Station pressure tendency, reported hourly. Missing data are reported by M.

a — A detailed interpretation of the characteristic of pressure tendency is given in para. 16.3.2.18.1.

ppp — –The net amount of the station pressure change during the previous three hours is reported in tenths of hectopascals.

16.3.2.18.1 Code for "a" – Characteristic of Pressure Tendency

Code Figure	Graphic Representation	Characteristic	Atmospheric Pressure
0		Increasing, then decreasing	Same as or higher than 3 hours ago
1		Increasing – then steady	Higher than 3 hours ago
2		Increasing – steadily or unsteadily	
3		Decreasing or steady, then increasing	
4		Steady	Same as 3 hours ago
5		Decreasing, then increasing	Same as or lower than 3 hours ago
6		Decreasing – then steady	Lower than 3 hours ago
7		Decreasing – steadily or unsteadily	
8		Increasing or steady, then decreasing	

Note: The characteristic is computed from the current station pressure, and that of one and three hours ago.

16.3.2.19 TTdOA – Additional Data Group

T	Tenths of temperature
Td	Tenths of dew point
O	Total opacity (AUTO5 or AUTOA only or M)
A	Total amount (always M)

16.3.2.20= The = sign denotes the end of the message.

Amendment n° 13
October 1994

16.3.2.21 Missing Data – Autostation Code. Data which are unavailable due to a data transmission failure, a loss of recent data in the CODCON, or to an inoperative sensor appear in the message as an "M" for each missing digit or symbol.

16.3.2.22 Sensor Configuration – There are differences in the number and types of sensors in use at different types and generations of autostations. Even if an autostation is capable of reporting all the meteorological parameters of a complete hourly message, each station will not necessarily be equipped with all the sensors necessary for a complete message. A list of parameters follows, with the autostation systems capable of reporting them listed opposite. (See also para. 16.3.2.5)

cloud	AUTO1, AUTO2, AUTO5, AUTOA
visibility index	AUTO1, AUTO2, AUTO4, AUTO5, AUTOA
"present weather"	AUTO5, AUTOA
MSL pressure	ALL
temperature	ALL
dewpoint	ALL
wind direction	ALL
mean wind speed	ALL
peak wind speed	ALL
gust speed	AUTO5, AUTOA
altimeter setting	AUTO5, AUTOA
accumulated rainfall (6 hours)	ALL
remarks	ALL
pressure tendency (3 hours)	ALL

16.3.2.22.1 Autostations not equipped with a sensor to report sky condition, visibility, and/or present weather will indicate so in the SA by placing an M in the field followed by a single space delimiter.

16.3.2.22.2 Autostations not equipped with a pressure sensor will indicate so in the SA by replacing the MSL pressure group with an M, and by replacing 'appp' with an M followed by a single space delimiter.

16.3.2.22.3 Autostations not equipped with a sensor to report temperature, dew point, and/or mean wind direction and speed will indicate so in the SA by placing the delimiter, a solidus, which normally follows the unreported parameter(s) immediately next to the previous delimiter. Note that if temperature is unavailable, then MSL pressure will be reported as M.

16.3.2.22.4 Some AUTO5 and AUTOA stations are equipped with a POSS (Precipitation Occurrence Sensor System), a limited "present weather" sensor which reports the occurrence of rain (R), drizzle (L), snow (S), and hail (A), with intensities. Unidentifiable precipitation is assigned a 'P'.

Amendment nº 13
October 1994

16.3.3 Examples of Autostation Hourly Messages

1. WEB◆SA◆1200◆AUTO2◆M◆M◆M◆062/09/08/1120+35/M/0028◆PCPN 2.8MM PAST HR◆7028◆[83MM]=
2. WQC◆SA◆1000◆AUTO2◆-X◆CLR◆BLO◆50◆1.6◆M◆128/07/07/0000/M/◆1001◆[18MM]=
3. WCL◆SA◆1300◆AUTO5◆W3◆X◆0.3◆M◆150/00/-01/1004/037/◆2005◆[-37MM]=
4. WEP◆SA◆0700◆AUTO2◆M◆M◆M◆060/-12/-19/3012/M/◆1003◆[28MM]=
5. WNC◆SA◆1300◆AUTO2◆M◆M◆M◆006/M/-01<0818+27/M/◆8003◆[M2MM]=
6. WTB◆SA◆0751◆AUTO3◆M◆M◆M◆278/-26<-31<11MM/M/M◆M◆[31MM]=
7. WOI◆SA◆0900◆AUTO1◆M◆M◆M◆M/08/07/0407/M/0002◆PCPN 0.2MM PAST HR◆M◆[97MM]=
8. WGY◆SA◆1000◆AUTO8◆M◆M◆M◆M/M/M/0202/M/M◆M◆[MMMM]=
9. YTL◆SA◆1400◆AUTO5◆M20◆OVC◆9.+R--◆012/14/05/2410/970/◆2015◆[04MM]=

16.3.3.1 In the foregoing examples, spaces have been indicated by a '◆' for ease of reference. Because of the general similarity of the autostation SA and one produced by an observer, complete details of all the examples are not given.

16.3.3.2 The altimeter setting from autostations (except AUTO5 and AUTOA) is always output as an 'M' between two solidi. The second of these two solidi separates the altimeter setting from the six-hour precipitation amount.

16.3.3.2.1 In example 2, a single space is used to report a zero amount for RRRR.

16.3.3.3 Two of the stations either have no pressure sensors, or their MSL pressure output is being suppressed at CODCON, as indicated by the 'M' in examples 7 and 8. Note also that the group 'appp' is reported as 'M' in each of these examples.

16.3.3.4 Cloud sensors are apparently not installed at the stations in examples 1, 4, 5, 6, 7, and 8.

16.3.3.5 Visibility sensors are apparently not installed at the stations in examples 1, 5, 6, 7, and 8.

16.3.3.6 Temperature and dew point sensors are either not installed at the station in example 8, or the data are being suppressed at CODCON. Note also that the temperature and dew point of example 6 are being flagged as doubtful, as is the dew point of example 5.

16.3.3.7 The final group in each example is the "additional data group", consisting of the tenths value of temperature and dewpoint and total opacity and total amount of sky cover. (See para. 10.2.21.) This group is always preceded by a space and followed by an equal sign. The square brackets around the group represent "control" characters that are invisible to the user.

Amendment n° 13
October 1994

16.3.4 Unusual or Suspect Data – Hourly Code

16.3.4.1 Autostation data undergo a number of quality checks by the code conversion computer prior to the distribution of the hourly message. Two examples of the type of checking carried out are as follows:

(1) Is "$f_m f_m$" the same as or less than "ff"?

(2) Is the current temperature greater than the extreme maximum or less than the extreme minimum as published in Canadian Normals for the closest station for the current month?

Data found to be suspect or unusual in these or other ways are flagged by replacing the delimiter which follows the doubtful group with the symbol "<".

Example:

WMI♦SA♦0300♦AUTO2♦M♦M♦M♦M♦936/♦00/♦00/34MM+18<M/♦2019♦00MM=

In this example the wind group was flagged as suspect because the computer was unable to compare the maximum wind speed with the mean wind speed.

Note: Users who require more information about data quality checks carried out by computer on autostation data are referred to "Users' Guide–Automatic Weather Station Reports", copies of which may be requested from Regional Headquarters.

Amendment n° 13
October 1994

16.4 SYNOPTIC CODE – AUTOSTATION

16.4.1 The symbolic form of the synoptic code from an autostation observation is as follows:

IIiii $i_R i_x$hVV Nddff (00fff) $1s_nTTT$ $2s_nT_dT_dT_d$ $3P_oP_oP_oP_o$ 4PPPP 5appp $6RRRt_R$ $7w_aw_aW_{a1}W_{a2}$

9GGgg 333 $1s_nT_xT_xT_x$ $2s_nT_nT_nT_n$ $7R_{24}R_{24}R_{24}R_{24}$ 555 $3d_md_mf_mf_m$ $4f_hf_tf_tf_i$

16.4.2 The first three groups of the synoptic code shown in para. 16.4.1 are mandatory and therefore included in each synoptic message. All other groups are optional and their transmission is dependent on how complete the complement of sensors is at each station.

16.4.2.1 Autostations transmit parts of three major sections of the code, i.e., sections 1,3, and 5. Section 1 does not have a discrete identifier, but follows the station identifier, IIiii. The data of section 1 receive global distribution. Section 2, identified by 222, consists of marine data and is not discussed in this chapter. Section 3, identified by 333, consists of climatological data which are distributed within our WMO Regional Association, that is, RAIV. Section 4, identified by 444, consists of cloud data below the elevation of the station and is not reported by autostations. Section 5, identified by 555, consists of climatological data which are distributed nationally only. The synoptic code is described in greater detail in chapters 11 and 12.

16.4.2.2 Missing data may be represented in one of two ways; either by a solidus for each missing element or by omission of an entire group. For example, an autostation not equipped with a rain gauge would not transmit the 6–group of section 1 and the 7–group of section 3. Some AUTO5 and AUTOA stations are equipped with POSS (Precipitation Occurrence Sensor System), a sensing system capable of reporting limited present weather.

Amendment n° 13
October 1994

16.4.3 Group and Symbol Interpretation

16.4.3.1	IIiii	–	International index number
	II	–	block number (always 71 for Canadian land stations)
	iii	–	station number (listed in METSTAT)
16.4.3.2	$i_R i_x hVV$		
	i_R	–	indicator to confirm the inclusion or not of the precipitation group. See para. 16.4.4.1.
	i_x	–	indicates the origin of the message (manned or autostation), and whether present and/or past weather is being reported in the message. See para. 16.4.4.2.
	h	–	height, above ground, of base of lowest cloud. See para. 16.4.4.3.
	VV	–	visibility index. See para. 16.4.4.4.
16.4.3.3	Nddff		
	N	–	total amount of sky cover in oktas. N is encoded "/" for all auto–stations except AUTO5 and AUTOA stations with cloud sensors.
	dd	–	10 minute mean wind direction in degrees true. Append a zero to the coded value to obtain direction to the nearest 10 degrees.
	ff	–	10 minute mean wind speed in knots
16.4.3.4	00fff	–	wind speeds of 99 knots or greater; 00 is the group identifier.
	fff	–	10 min. mean wind speed (reported only by AUTO5 and AUTOA – rarely)
16.4.3.5	$1s_nTTT$	–	air temperature; '1' is the group identifier.
	s_n	–	may be coded 0 or 1. A '0' indicates temperature is 0.0 C or warmer; a '1' indicates temperature is colder than 0.0 C.
	TTT	–	temperature in tens, units, and tenths of a degree Celsius.
16.4.3.6	$2s_nT_dT_dT_d$	–	dew–point; '2' is the group identifier.
	s_n	–	as in para. 16.4.3.4
	$T_dT_dT_d$	–	dew point in tens, units, and tenths of a degree Celsius.
16.4.3.7	$3P_oP_oP_oP_o$	–	station pressure; '3' is the group identifier.
	$P_oP_oP_oP_o$	–	Station pressure is coded directly in hundreds, tens, units, and tenths of a hectopascal. The user must determine whether or not 1000 should be added to the coded value.
16.4.3.8	4PPPP	–	mean sea level pressure; '4' is the group identifier.
	PPPP	–	MSL pressure is coded directly in hundreds, tens, units, and tenths of a hectopascal. The user must determine whether or not 1000 should be added to the coded value.

16.4.3.9	5appp	–	character and amount of station pressure change during the three hours preceding the time of observation; '5' is the group identifier.
	a	–	The character of the three hour pressure tendency is given in para. 16.3.2.17.1.
	ppp	–	The amount of the three hour pressure change is coded in tens, units, and tenths of a hectopascal.
16.4.3.10	$6RRRt_R$	–	amount of precipitation and duration of measurement period; '6' is the group identifier.
	RRR	–	Precipitation amount is decoded in accordance with the table in para. 16.4.4.5.
	t_R	–	Multiply t_R by 6 to find the number of hours over which the measurement of precipitation (RRR) has extended.
			Note: Autostations not equipped to report precipitation will not transmit the 6–group.
16.4.3.11	$7w_aw_aWa_1W_{a2}$	–	present and past weather; '7' is the group identifier.
	w_aw_a	–	See para. 16.4.4.7 for a description of present weather codes.
	$W_{a1}W_{a2}$	–	See para. 16.4.4.8 for a description of past weather codes.
16.4.3.12	9GGgg	–	time (UTC) that the observation was made, if non–standard; '9' is the group identifier.
	GGgg	–	time of the observation in hours and minutes, for example, 0947(UTC).
16.4.3.13	333	–	indicates that groups following are part of section 3 of the synoptic code.
16.4.3.14	$1s_nT_xT_xT_x$	–	maximum temperature; '1' is the group identifier.
	s_n	–	may be coded 0 or 1. A '0' indicates temperature is 0.0 C or warmer; a '1' indicates temperature is colder than 0.0 C.
	$T_xT_xT_x$	–	maximum temperature in tens, units, and tenths of a degree Celsius. See para. 16.4.4.6 for time periods.
16.4.3.15	$2s_nT_nT_nT_n$	–	minimum temperature; '2' is the group identifier.
	s_n	–	as in para. 16.4.3.14.
	$T_nT_nT_n$	–	minimum temperature in tens, units, and tenths of a degree Celsius. See para. 16.4.4.6 for time periods.
16.4.3.16	$7R_{24}R_{24}R_{24}R_{24}$		precipitation amount in tenths of a millimetre, during the preceding 24 hour period; '7' is the group identifier.

16.4.3.17 555 – indicates that groups following are part of section 5 of the synoptic code.

16.4.3.18 $3d_md_mf_mf_m$ – maximum wind, mean or gust, in 24 hour period; '3' is the group identifier.

d_md_m – Append a zero to the coded value to obtain direction of the maximum wind to the nearest 10 degrees.

f_mf_m – speed of the maximum wind in knots during the 24 hour period ending at 0600 UTC. The 3–group is transmitted only when f_mf_m exceeds 16 knots, and then once daily at 0600 UTC.

16.4.3.19 $4f_hf_tf_tf_i$ – time of occurrence of maximum wind and speed range of maximum two minute mean wind speed; '4' is the group identifier.

f_h – the hundreds digit of f_mf_m in para. 16.4.3.18. A zero indicates the maximum speed was f_mf_m; a '1' indicates the maximum speed was 100 plus f_mf_m, and so on.

f_tf_t – the hour (UTC) on or immediately following the first occurrence of the maximum wind of group $3d_md_mf_mf_m$.

f_i – an index to identify the speed range of the maximum two minute mean wind speed during the 24 hour period ending at 0600 UTC.

f_i	Speed range of maximum two minute mean wind
0	16 knots or less
1	17–27 knots
2	28–33 knots
3	34 knots or more

Amend. No. 12
1992

16.4.4 Decoding Tables for Selected Groups

16.4.4.1 Code for i_R, WMO Code 1819

Code Figure i_R	Group 6RRRt$_R$ is:	Precipitation data are reported:
0	included	in Sections 1 and 3
1	included	in Section 1
2	included	in Section 3
3	omitted (precipitation amount = 0)	in none of Sections 1 and 3
4	omitted (precipitation amount not available)	in none of Sections 1 and 3

Autostations will normally use code figures 1, 3, or 4.

16.4.4.2 Code for i_x, WMO Code 1860

Code figure i_x	Type of station operation:	Group 7wwW$_1$W$_2$ or 7w$_a$w$_a$W$_{a1}$W$_{a2}$ is
1	staffed	included
2	staffed to report)	omitted (no significant phenomenon
3	staffed	omitted (not observed, data not available)
4	automatic	included, using Tables 4677 and 4561
5	automatic to report)	omitted (no significant phenomenon
6	automatic	omitted (not observed, data not available)
7	automatic	included, using Tables 4680 and 4531

Autostations, other than some READAC stations, will normally use code figure 6.

16.4.4.3 Code for h, WMO Code 1600

Code Figure h	Height of C_L cloud, or in the absence of C_L, height of C_M cloud
0	0 to less than 50 m
1	50 m to less than 100 m
2	100 m to less than 200 m
3	200 m to less than 300 m
4	300 m to less than 600 m
5	600 m to less than 1000 m
6	1000 m to less than 1500 m
7	1500 m to less than 2000 m
8	2000 m to less than 2500 m
9	Greater than 2500 m or no cloud
/	Sky completely obscured, no cloud visible, when VV is coded equal to or less than 08. (MARS)
./	No cloud sensor operating if VV is coded greater than 08. (MARS)
/	No valid cloud data, or sky totally obscured (READAC)

16.4.4.4 Code for VV, Visibility Index

VV Code	Visibility index (statute miles)	VV Code	Visibility index (statute miles)
00	0	48	3
02	1/8	56	4
04	1/4	58	5
06	3/8	59	6
08	1/2	61	7
10	5/8	62	8
12	3/4	64	9
16	1	66	10
20	1 1/4	67	11
24	1 1/2	69	12
28	1 3/4	70	13
32	2	72	14
36	2 1/4	74	15 or more
40	2 1/2		

16.4.4.5 Code for RRR, WMO Code 3590

Code figure RRR mm	Amount RRR	Code figure mm	Amount
001	1	*990	*Trace
002	2	992	0.2
.	.	993	0.3
.	.	994	0.4
.	.	995	0.5
.	.	996	0.6
.	.	997	0.7
988	988	998	0.8
989	989 or more	999	0.9

16.4.4.6 Time Periods to Which $T_xT_xT_x$ and $T_nT_nT_n$ Refer

Observation Time (UTC)	Time Period for $T_xT_xT_x$	Time Period for $T_nT_nT_n$
1200	24 hour period ending at 0600	previous 12 hours
1800	previous 12 hours	previous 24 hours
0000	previous 12 hours	previous 18 hours
0600	previous 24 hours (same $T_xT_xT_x$ as reported at next 1200Z observation)	previous 24 hours

*Autostations never report Trace amounts for RRR.

16.4.4.7 Selected Present Weather Codes Reported by an Autostation

*WMO Code 4680 (abridged)

Code figure Description	
$w_a w_a$	
21	PRECIPITATION, at the station during the preceding hour, but not at the time of observation
27	BLOWING OR DRIFTING SNOW OR SAND
30	FOG
40	PRECIPITATION
41	Precipitation, slight or moderate
42	Precipitation, heavy
43	Liquid precipitation, slight or moderate
44	Liquid precipitation, heavy
45	Solid precipitation, slight or moderate
46	Solid precipitation, heavy
47	Freezing precipitation, slight or moderate
48	Freezing precipitation, heavy
50	DRIZZLE
60	RAIN
70	SNOW
80	SHOWER(S) or INTERMITTENT PRECIPITATION
90	THUNDERSTORM

16.4.4.8 Past Weather Reported by an Autostation

*WMO Code 4531

Code figure Description	
W_{a1}, W_{a2}	
0	No significant weather observed
1	VISIBILITY REDUCED
2	Blowing phenomena, visibility reduced
3	FOG
4	PRECIPITATION
5	Drizzle
6	Rain
7	Snow or ice pellets
8	Showers or intermittent precipitation
9	Thunderstorm

*Note: Weather descriptions in the above tables are progressively complex. Stations having only basic sensing capability may use the lower code figures and basic generic descriptions (capital letters). Stations with progressively higher discrimination capability use the more detailed descriptions (higher codes).