

AIR TRAFFIC CONTROL TRAINING GUIDE



GENERAL

AVIATION ROUTINE WEATHER REPORT (METAR) AERODROME FORECAST (TAF)

15 APRIL 96

FOREWORD

PURPOSE: This publication is for use in the training of USAF air traffic controllers and is not intended to replace, substitute for, or supersede official regulations, procedures, or directives.

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Chapter 1. *METAR*

INTRODUCTION

Our present standard for reporting current aviation weather, specifically the surface aviation observation (SA) is giving way to the international community's aviation routine weather report or METAR. So where you expect to see, MKC SA 1754 20 SCT E50 BKN 100 OVC 3RW-F 128/72/63/3115G25/991, you will now see:

(Civilian observations)

METAR KMKC 141754Z 31015G25KT 3SM -SHRA BR SCT020 BKN050 OVC100 22/17 A2991 RMK SLP128

(Air Force observations)

KTIK 141754Z 31015G25KT 3SM -SHRA BR SCT020 BKN050 OVC100 22/17 A2991 RMK SLP128

NOTE: The only difference between a civilian and Air Force METAR report is the word "METAR" is excluded in an Air Force report.

The two reports (SA and METAR) look different, but the information is almost exactly the same just in a different format. Remember, it took some time adjusting to the SA when we were first introduced to it.

This section contains brief discussions of the differences between the standard SA and the new METAR format. This section assumes a prerequisite knowledge of the SA format. It will provide sufficient knowledge and reinforcements of the METAR format as it relates to the SA to enable the reader to transition to the new format with minimal difficulty. If there is no difference in the way the METAR information is spoken or interpreted from the way it was done in the SA, it will not be discussed in this section.

This section teaches to the basic level. Some prerequisite knowledge of the encoding of SA information will be necessary for success on the End-of-Training (EOT) test. Completion of the METAR EOT test is required prior to continuing with TAF training.

All of the elements of the SA are in the METAR report, they are just in different places. This section will highlight each element of the SA by shading in the box, then provide its new location in the METAR report. Each will be followed by a discussion of the differences between how the SA report describes the particular element versus how METAR describes it.

GENERAL

(1) "M" is spoken as "less than" when used in conjunction with visibility or "minus" when used in conjunction with temperatures. "P" is spoken as "more than." Other phraseology changes will be discussed in each element where changes have occurred from the present standard.

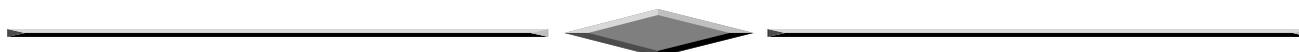
(2) Unless specifically indicated in this document, each element of a METAR report is separated by a space, where the SA used a solidus ("/"), space, or no separation (3TRW).

(3) Where the SA produced a "space-saver" for missing data (M), the METAR report will simply omit the element if the phenomena does not occur or cannot be observed.

LOCATION IDENTIFIER

SA REPORT

OKC	SA		1955	M10 OVC	3/4	TRW	F
LOCID	REPORT TYPE	MODIFIER	TIME	SKY CONDITIONS	VISIBILITY	WEATHER	OBSCURATIONS
132	/	64 / 60	/	2215G25	/	992	/ R17LVR26 TB25 OVHD MOVG E LTGIC
PRESSURE		TEMP/DEW POINT		WIND		ALTIMETER	REMARKS



METAR REPORT

METAR	KOKC	011955Z		22015G25KT	3/4SM	R17L/2600FT	TSRA BR
REPORT TYPE	LOCID	DATE/TIME	MODIFIER	WIND	VISIBILITY	RVR	WEATHER & OBSCURATIONS
OVC010CB		18/16		A2992		RMK LTGIC TSB25 TS OHD MOV E SLP 132	
SKY CONDITIONS		TEMP / DEW POINT		ALTIMETER		REMARKS	

(1) The LOCID is the second element of a METAR report versus the first of an SA.

(2) The new format will use the international (ICAO) four-letter LOCID versus the three letter. All lower 48 state LOCIDs will begin with "K" followed by, in most cases, the same three letters used for the SA.

EXAMPLE: SA - LSV METAR - KLSV

(3) Alaskan stations will begin with "PA" (Pacific Alaskan). Hawaiian stations will begin with "PH" (Pacific Hawaiian). The "PA" or "PH" will be followed by a two-letter identifier for that station. If the SA three-letter identifier for the Alaskan or Hawaiian station does not begin with an "A" or "H" respectively, the last letter is dropped and only the first two letters are used. Otherwise a "P" or an "H" just precedes the SA three-letter identifier.

EXAMPLE: SA - FAI METAR - PAFA
 SA - HNL METAR - PHNL

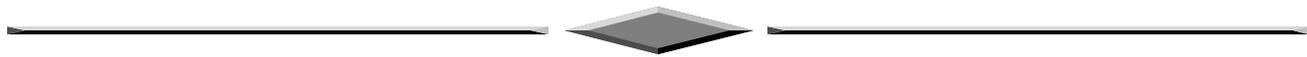
(4) Numerics will not be used in the LOCID. Weather stations that use numerics will receive a new identifier.

(5) En Route facilities will display **three-letter** station identifiers as the first element of a report. The K or P will **not** be shown.

REPORT TYPE

SA REPORT

OKC	SA	1955	M10 OVC	3/4	TRW	F	
LOCID	REPORT TYPE	MODIFIER	TIME	SKY CONDITIONS	VISIBILITY	WEATHER	OBSCURATIONS
132	/	64 / 60	/	2215G25	/	992	/ R17LVR26 TB25 OVHD MOVG E LTGIC
PRESSURE		TEMP/DEW POINT		WIND		ALTIMETER	REMARKS



METAR REPORT

METAR	KOKC	011955Z	22015G25KT	3/4SM	R17L/2600FT	TSRA BR	
REPORT TYPE	LOCID	DATE/TIME	MODIFIER	WIND	VISIBILITY	RVR	WEATHER & OBSCURATIONS
OVC010CB		18/16		A2992		RMK LTGIC TSB25 TS OHD MOV E SLP 132	
SKY CONDITIONS		TEMP / DEW POINT		ALTIMETER		REMARKS	

(1) Report type is the first element of a METAR report instead of the second as in the SA.

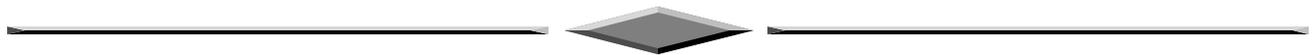
(2) Report type will be **METAR** for routine reports/hourly observations (previously SA) and **SPECI** for special reports (previously SP). There is no way to indicate that an hourly observation meets special criteria (previously RS). Reports will always begin with either **METAR** or **SPECI**.

(3) **En Route facilities** will display an **M** or **S** to indicate a **METAR** or **SPECI** report type. Instead of being the first element of a report, the M or S will follow the time of the observation.

DATE / TIME and MODIFIER

SA REPORT

OKC	SA	1955	M10 OVC	3/4	TRW	F	
LOCID	REPORT TYPE	MODIFIER	TIME	SKY CONDITIONS	VISIBILITY	WEATHER	OBSCURATIONS
132	/	64 / 60	/	2215G25	/	992	/ R17LVR26 TB25 OVHD MOVG E LTGIC
PRESSURE		TEMP/DEW POINT		WIND		ALTIMETER	REMARKS



METAR REPORT

METAR	KOKC	011955Z	22015G25KT	3/4SM	R17L/2600FT	TSRA BR	
REPORT TYPE	LOCID	DATE/TIME	MODIFIER	WIND	VISIBILITY	RVR	WEATHER & OBSCURATIONS
OVC010CB		18/16		A2992		RMK LTGIC TSB25 TS OHD MOV E SLP 132	
SKY CONDITIONS		TEMP / DEW POINT		ALTIMETER		REMARKS	

- (1) Date/Time group in METAR reports has six characters to include the day of the month and the time.
- (2) "Z" is placed at the end of the Date/Time group to indicate coordinated universal time.

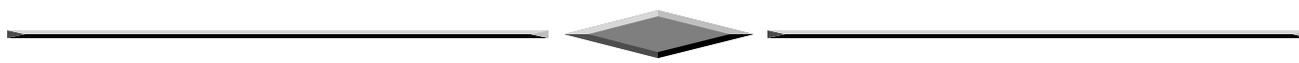
EXAMPLE: SA - 1955 METAR - 231955Z

- (3) The HOST computer at En Route facilities will edit out the date and show only the four digits of the time of the observation. The time will follow the three-letter station identifier.
- (4) Modifiers for the METAR report will be COR or AUTO. COR indicates the report is a correction of a previously transmitted manual report. AUTO indicates a fully automated station without augmentation (ASOS). The type of sensor equipment used at the station will be encoded in the remarks section.
- (5) Manual stations are identified by the absence of the AUTO modifier.

SKY CONDITIONS
(MAJOR CHANGES)

SA REPORT

OKC	SA		1955	M10 OVC	3/4	TRW	F
LOCID	REPORT TYPE	MODIFIER	TIME	SKY CONDITIONS	VISIBILITY	WEATHER	OBSCURATIONS
132	/	64 / 60	/	2215G25	/	992	/ R17LVR26 TB25 OVHD MOVG E LTGIC
PRESSURE		TEMP/DEW POINT		WIND		ALTIMETER	REMARKS



METAR REPORT

METAR	KOKC	011955Z		22015G25KT	3/4SM	R17L/2600FT	TSRA BR
REPORT TYPE	LOCID	DATE/TIME	MODIFIER	WIND	VISIBILITY	RVR	WEATHER & OBSCURATIONS
OVC010CB		18/16		A2992		RMK LTGIC TSB25 TS OHD MOV E SLP 132	
SKY CONDITIONS		TEMP / DEW POINT		ALTIMETER		REMARKS	

(1) Sky conditions are no longer the first weather element of the report. As you can see above, it follows the weather and obscuring phenomena associated with the visibility element.

(2) Coverage precedes the cloud height with no space in between.

(3) Cloud height will always be in three digits, but still indicating hundreds of feet.

EXAMPLE: SA - 35 SCT METAR - SCT035

PHRASEOLOGY: "Three thousand five hundred scattered"

(4) The sky is now divided into eighths rather than tenths to determine coverage and new coverage indicators have been added. (See Table 1)

(5) Indefinite ceilings (W) and sky obscured (X) are no longer reported. It is replaced by vertical visibility (VV). The phraseology for "VV" is "indefinite ceiling (height)"

EXAMPLE: SA - W5 X METAR - VV005

PHRASEOLOGY: "Indefinite ceiling five hundred"

Table 1. - Reportable Contractions for Sky Cover

Reportable Contractions	Meaning	Summation Amount
VV	Vertical Visibility (indefinite ceiling)	8/8
*SKC or CLR	Clear	0 or 0 below 12,000
FEW	Few	0 but \leq 2/8
SCT	Scattered	3/8 - 4/8
BKN	Broken	5/8 - 7/8
OVC	Overcast	8/8
CB	Cumulonimbus	When Present
TCU	Towering Cumulus	When Present

***SKC** will be reported at manual stations. The abbreviation, **CLR**, shall be used at automated stations when no clouds below 12,000 feet are reported.

(6) The new coverage indicator FEW indicates cloud coverage greater than zero and equal to or less than two-eighths. It is spoken as "Few clouds at (height)."

EXAMPLE: SA - 20 SCT METAR - FEW020

PHRASEOLOGY: "Few clouds at two thousand"

(7) There is no longer a ceiling designator (M, E) in the body of the report, but the ceiling is still the lowest, BKN or OVC layer aloft, or vertical visibility into a surface based phenomena. The word "ceiling" will still be spoken before verbalizing the layer that constitutes a ceiling.

EXAMPLE: SA - M35 OVC METAR - OVC035

(8) Cloud layers will no longer be identified as thin "-." The SA made a clear distinction between thin and opaque layers. The METAR report considered the entire layer without regard to its classification (thin or opaque). This is important to consider when interpreting the METAR report. In an SA a layer classified as thin would not be a ceiling. However, the same layer in a METAR report would be a ceiling

EXAMPLE: SA - 9 -OVC (not a ceiling) METAR - OVC009 (a ceiling)

PHRASEOLOGY: "Ceiling niner hundred overcast"

(9) CB and TCU will be reported along with the layer with which their base is associated.

EXAMPLE: SA - none METAR - BKN010CB or SCT025TCU

PHRASEOLOGY: "Ceiling one thousand broken, cumulonimbus" or "Two thousand five hundred scattered, towering cumulus"

This example indicates that the base of the towering cumulus is at 2500 feet. (The direction from the station is entered in remarks.)

SKY CONDITIONS PRACTICE

INSTRUCTIONS: Convert the following manually derived SA information into a METAR format.

For solutions turn to page 26.

- | | |
|---|---------------|
| 1. W3 X | METAR - _____ |
| 2. 15 SCT M45 OVC | METAR - _____ |
| 3. CLR | METAR - _____ |
| 4. M35 BKN (TCU is visible) | METAR - _____ |
| 5. 20 SCT (cloud cover less than 2/10 of the sky) | METAR - _____ |

(5) RVR is no longer the first element of remarks. When reported, it will be entered in the body of the report between the visibility and weather phenomena elements.

(6) Manual stations will report only one RVR, but automated stations can report up to 4 different locations.

(7) There are three minor changes in the way RVR is encoded. They are:

- Instead of separating the runway and visual range by "VR," they are now separated by a solidus ("/").
- The value is still in hundreds of feet, but the trailing zeroes are included instead of omitted as in the SA.
- "FT" is added to the end of the element to indicate the visibility is in FEET versus meters.

EXAMPLE: SA - R12LVR12 METAR - R12L/1200FT

**PHRASEOLOGY: "Runway one two left R-V-R one thousand two hundred" or
"Runway one two left visual range one thousand two hundred"**

(8) If the RVR value is less than its lowest reportable value, the lowest reportable value is encoded preceded by "M" (minus), spoken as "less than." If the RVR value is more than its greatest reportable value, the greatest reportable value is encoded preceded by "P" (plus), spoken as "more than."

EXAMPLE: SA - R12LVR10- METAR - R12L/M1000FT

PHRASEOLOGY: "Runway one two left R-V-R less than one thousand"

EXAMPLE: SA - R12LVR60+ METAR - R12L/P6000FT

PHRASEOLOGY: "Runway one two left R-V-R more than six thousand"

(9) If RVR equipment is out of service or data is not available, but criteria for reporting RVR exists, the element is omitted from the body of the report and RVRNO is entered in remarks.

(10) The HOST computer at En Route facilities will **not** display the RVR element.

(Weather Phenomena - Major Changes)

(11) Criteria for reporting weather phenomena are still pretty much the same. Weather is reported whenever it occurs and obscurations only when they restrict visibility to less than 7 statute miles.

(12) All the designators for weather and obscurations (restrictions to visibility) have changed and descriptors have been added. There is really no way to get around memorizing the new designators (symbols) in the table on the

following page. They will need to be memorized just the same as you did to become an expert on SA. The designators come from either an English or French word (remember this is an international format). To help in the memorization, the French word will be provided during the discussion of each category.

(13) They are reported in the order (left to right) listed in table 2 and within each column in the order of prominence. Intensity or proximity is entered first, then a descriptor (if needed), followed by a precipitation type or obscuration in order of predominance. The one exception to this is "FC" which will always be first when present.

Note: Refer to the table during the remaining discussion of weather and obscurations.

ABOUT THE TABLE: Instead of lumping all the precipitation and restrictions to visibility into one big pile to pick from (as in the SA), the METAR clearly divides them into separate categories. This gives the observer more flexibility in describing the weather. However, there are certain rules to follow in order to interpret the coded information correctly.

Table 2. - Notations for Reporting Weather

QUALIFIER				WEATHER PHENOMENA					
INTENSITY or PROXIMITY 1		DESCRIPTOR 2		PRECIPITATION 3		OBSCURATION 4		OTHER 5	
-	LIGHT	MI	Shallow	DZ	Drizzle	BR	Mist	PO	Dust/Sand Whirls
		BC	Patches	RA	Rain	FG	Fog	SQ	Squalls
	Moderate (No Qualifier)	DR	Low Drifting	SN	Snow	FU	Smoke	FC	Funnel Cloud, ----- +FC Tornado or Waterspout
		BL	Blowing	SG	Snow Grains	DU	Dust	SS	Sandstorm
+	Heavy	SH	Showers	IC	Ice Crystals	SA	Sand	DS	Dust storm
		TS	Thunderstorms	PE	Ice Pellets	HZ	Haze		
VC	In the Vicinity	FZ	Freezing	GR	Hail	PY	Spray		
		PR	Partial	GS	Small Hail or Snow Pellets (<1/4)	VA	Volcanic Ash		
				UP	* Unknown Precipitation				

The weather groups shall be constructed by considering columns 1-5 in this table, in sequence; i.e., intensity, followed by descriptor, followed by weather phenomena; i.e., heavy rain showers is coded as +SHRA.

*** Automated stations only.**

Intensity or Proximity

(1) The coding of intensity for the weather phenomena has not changed, but it moves to the front of the associated weather rather than the end and is used only once. The only exception to intensity codes is "+" used with "FC" which means "tornado or waterspout" instead of "heavy funnel cloud."

EXAMPLE: SA - 4R- METAR - 4SM -RA

PHRASEOLOGY: "Visibility four, light rain"

(2) When more than one type of precipitation is present, the intensity refers to the first precipitation element. The precipitation types and obscurations are entered in order of predominance (impact on restricting visibility), so any phenomena that follows will be the same or of a lesser intensity.

EXAMPLE: SA - 4R-L-S- METAR - 4SM -RASNDZ

PHRASEOLOGY: "Visibility four, light rain, snow, drizzle"

In the example, the SA enters the precipitation in the order of liquid, freezing, and frozen without regard to predominance. When reporting in a METAR, the observer considers predominance and enters the types in that order. In this case, the observer has determined that the snow is more predominant than the drizzle so it is encoded before the drizzle.

(3) Intensity refers to the next precipitation or certain obscuration types **not** to the descriptor that may separate them (more on this later).

(4) In the vicinity (VC) will be used only when the phenomena is **not** occurring at the station, but between 5 and 10 miles of the station. It will replace the intensity symbol. Intensity and "VC" will never be used in the same group.

(5) There are restrictions in which weather and obscurations can be used with VC. It is used only with TS, FG, FC, SH, PO, BLDU, BLSA, BLSN, SS, and DS.

EXAMPLE: SA - not applicable METAR - 7SM VCBLSN

PHRASEOLOGY: "Visibility seven, blowing snow in the vicinity"

Notice there are two descriptors SH and TS that can be used with VC. When this combination occurs, the type of precipitation is not entered.

EXAMPLE: SA - not applicable METAR - 7SM VCSH

PHRASEOLOGY: "Visibility seven, showers in the vicinity"

Descriptors

(1) MEMORIZATION AID: The designator for shallow (MI) comes from the French word *"mince."* The designator for patches (BC) comes from the French word *"banc."*

(2) The descriptors in the table can precede certain precipitation or obscurations in the next two columns. Where blowing snow had its own symbol (BS) in the SA format, the same phenomena in METAR would be BL from the descriptor list and SN from the precipitation list. Blowing is a description or qualifier of the type of precipitation.

EXAMPLE: SA - 4BS METAR - 4SM BLSN

PHRASEOLOGY: "Visibility four, blowing snow"

(3) Only one descriptor can be used for each grouping of weather phenomena reported. It is important to note that thunderstorm (TS) and shower (SH) are now descriptors of the precipitation rather than being a part of the weather phenomena category. Therefore, you will never see TS and SH in the same report. This does not mean that showers can no longer occur when thunderstorms are reported. Since thunderstorms imply convective, showery activity, the descriptor of TS along with the precipitation type of rain (RA) still translates to thunderstorm and rain shower. However, the word "showers" will not be spoken in the phraseology.

EXAMPLE: SA - 2TRW METAR - 2SM TSRA

PHRASEOLOGY: "Visibility two, thunderstorm, rain"

(4) Should a thunderstorm be occurring without precipitation, it is the only descriptor that can stand alone and will be encoded without a precipitation type.

EXAMPLE: SA - 10T METAR - 10SM TS

PHRASEOLOGY: "Visibility one zero, thunderstorm"

(5) When light precipitation is occurring along with a thunderstorm, the rule of intensity (-) before descriptor is used. **REMEMBER: The intensity refers to precipitation, not the descriptor. There is still no such thing as a light thunderstorm.**

EXAMPLE: SA - 3TRW- METAR - 3SM -TSRA

PHRASEOLOGY: "Visibility three, thunderstorm, light rain"

(6) Using the same principle, when a "+" is placed in front of "TS" it is not an indication of a severe thunderstorm. Again, the intensity symbol relates to the precipitation not the descriptor. METAR does not establish criteria for severe thunderstorms. Even though there will no longer be a classification of severe thunderstorms, by knowing the criteria (50 knot winds or 3/4" hail) the information is available in the report to know that one is occurring.

(7) There are restrictions on the use of descriptors. The most significant of these is mist (BR) which will never be used with a descriptor. So when a descriptor is used to describe fog, FG will always be used regardless of the visibility within the fog.

**EXAMPLE: SA - not applicable METAR - 3SM BCFG
(never BCBR)**

PHRASEOLOGY: "Visibility three, patchy fog"

Precipitation

(1) MEMORIZATION AID: The designator for hail (GR) comes from the French word "grele." The designator for small hail (GS) comes from the French word "gresil." There are a lot of recognizable names under new identifiers.

Obscurations

(1) MEMORIZATION AID: The first identifier on the list, mist (BR), comes from the French word "brume." The same applies to the identifier for smoke (FU) from the French word "fume."

(2) Obscuring phenomena when present along with precipitation will be in a separate group from precipitation and entered in order of predominance.

(3) Notice there is no identifier for ground fog and no descriptor to create ground fog. The best we can do is shallow fog (MIFG).

(4) The definition of mist and fog are the same. FG will not be encoded unless visibility is less than 5/8 statute miles or a descriptor is used, otherwise BR is encoded. **REMEMBER: BR is never used with a descriptor.**

Other Weather Phenomena

(1) Although squalls are a wind phenomena and in the SA were reported in the wind element, in METAR they are reported in the weather phenomena element. The definition of a squall has changed slightly from a sudden increase of at least 15 knots (SA) to a sudden increase of at least 16 knots. The sustained wind must now be 22 knots or more instead of the 20 knots required in the SA (see the Glossary for a complete definition).

EXAMPLE: SA - 2320Q45 METAR - 23045KT 7SM SQ

PHRASEOLOGY: "Wind two three zero at four five, visibility seven, squalls"

Partial Obscurations

As stated earlier in the sky conditions discussion, to report partial obscurations requires the use of the weather phenomena element as well as the sky conditions element.

(1) METAR makes no distinction between a partial obscuration and a cloud layer in the body of a report. It simply encodes the obscuration as a cloud layer whose height (base) is below 50 feet. To denote this, the sky conditions contraction is followed by 000. The sky conditions contraction used is determined by the total amount of sky obscured by the phenomena.

EXAMPLE: FEW000 (means greater than 0 to 2/8 of the sky is obscured)
SCT000 (means between 3/8 and 4/8 of the sky is obscured)
BKN000 (means between 5/8 and 7/8 of the sky is obscured)

(2) The ground based obscuring phenomena is identified in the weather phenomena element and also in remarks.

(3) Whenever a layer is followed by 000 it will be verbalized as "<sky condition> less than five zero." The amount of obscuration will be spoken with the remarks. In the case below, the correct phraseology for remarks would be "fog obscuring three- to four-eighths of the sky."

EXAMPLE: SA - -X 1/4F METAR - 1/4SM FG SCT000
 (in remarks: F4) (in remarks: FG SCT000)

PHRASEOLOGY: "Visibility one-quarter, fog, scattered clouds less than five zero"
(in remarks) "Fog obscuring three- to four-eighths of the sky"

(4) If the layer is actually a cloud layer aloft, less than fifty feet in height, and **not** ground based, remarks will **not** be shown. The layer is considered the first layer aloft.

VISIBILITY, RVR, WEATHER PRACTICE

INSTRUCTIONS: Convert the following manually derived SA information into a METAR format.

For solutions turn to page 27.

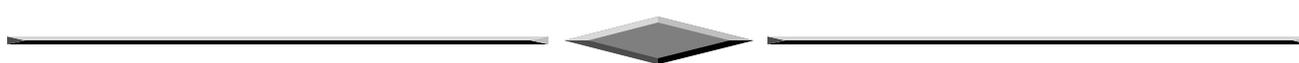
- | | | | | |
|----|----------------------------------|-------|---|-------|
| 1. | 1/2GF | METAR | - | _____ |
| 2. | 1RW-F
(in remarks: R17LVR60+) | METAR | - | _____ |
| 3. | 3/4TRW+A | METAR | - | _____ |
| 4. | 1/2S-BS
(in remarks: R30VR26) | METAR | - | _____ |
| 5. | 5HK | METAR | - | _____ |
| 6. | 7 (in remarks: OCNL RW-) | METAR | - | _____ |
| 7. | -X 3/4BS (in remarks: BS5) | METAR | - | _____ |

SEA-LEVEL PRESSURE

SA REPORT

OKC	SA		1955	M10 OVC	3/4	TRW	F
LOCID	REPORT TYPE	MODIFIER	TIME	SKY CONDITIONS	VISIBILITY	WEATHER	OBSCURATIONS

132	/	64 / 60	/	2215G25	/	992	/	R17LVR26 TB25 OVHD MOVG E LTGIC
PRESSURE		TEMP/DEW POINT		WIND		ALTIMETER		REMARKS



METAR REPORT

METAR	KOKC	011955Z		22015G25KT	3/4SM	R17L/2600FT	TSRA BR
REPORT TYPE	LOCID	DATE/TIME	MODIFIER	WIND	VISIBILITY	RVR	WEATHER & OBSCURATIONS

OVC010CB	18/16	A2992	RMK LTGIC TSB25 TS OHD MOV E <u>SLP 132</u>
SKY CONDITIONS	TEMP / DEW POINT	ALTIMETER	REMARKS

(1) Sea-level pressure is removed from the body of the report and placed in remarks.

(2) It is preceded by "SLP" and reported in hectopascals (same as millibars) with the beginning 9 or 10 omitted in the same manner as it was in the SA. *For civilian observations*, this will always be the last item in the Automated and Manual section of remarks. *For Air Force observations*, this may be located elsewhere within the remarks section depending on what other items are contained in the remarks.

EXAMPLE: **1013.2** hectopascals would be encoded as **SLP132**.

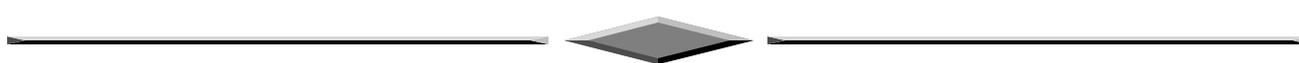
PHRASEOLOGY: "Sea-level pressure one zero one three point two hectopascals"

TEMPERATURE/DEW POINT

SA REPORT

OKC	SA		1955	M10 OVC	3/4	TRW	F
LOCID	REPORT TYPE	MODIFIER	TIME	SKY CONDITIONS	VISIBILITY	WEATHER	OBSCURATIONS

132	/	64 / 60	/	2215G25	/	992	/ R17LVR26 TB25 OVHD MOVG E LTGIC
PRESSURE		TEMP/DEW POINT		WIND		ALTIMETER	REMARKS



METAR REPORT

METAR	KOKC	011955Z		22015G25KT	3/4SM	R17L/2600FT	TSRA BR
REPORT TYPE	LOCID	DATE/TIME	MODIFIER	WIND	VISIBILITY	RVR	WEATHER & OBSCURATIONS

OVC010CB		18/16		A2992		RMK LTGIC TSB25 TS OHD MOV E SLP 132	
SKY CONDITIONS		TEMP / DEW POINT		ALTIMETER		REMARKS	

(1) The temperature and dew point will be reported in 2 digits Celsius instead of Fahrenheit. It is important to note that the Celsius scale is not graduated to as small a degree as the Fahrenheit scale. So temperatures that are only one degree apart on the Fahrenheit scale could read as the same temperature in Celsius based on the rounding to the nearest whole degree. For this reason, the hourly temperature and dew point to the nearest tenth of a degree will be encoded in the additive data section of remarks.

EXAMPLE: SA - 40/39 METAR - 04/04

(2) The temperature/dew point spread for considering saturated air will be 3 degrees or less instead of 5 degrees under the Fahrenheit scale.

(3) "M" precedes all temperatures below zero instead of "-" to indicate "minus."

EXAMPLE: SA - -5/-8 METAR - M20/M22

PHRASEOLOGY: "Temperature minus two zero, dew point minus two two"

(4) The temperature and dew point are considered to be a single group separated by a solidus ("/"). If the dew point is not reported or missing, the "/" still follows the temperature, but there is no indicator that dew point is missing.

EXAMPLE: SA - -5/M METAR - M20/

PHRASEOLOGY: "Temperature minus two zero, dew point missing"

(5) The biggest adjustment to make will be equating a new number (Celsius) to how it feels. (Is 20 degrees hot, cold, or just right?)

A hot summer day is 30° Celsius (86°F) and above.

A nice spring day is about 20° Celsius (68°F).

Sweater weather is in the teens, about 15° Celsius (59°F).

Jacket weather is single digits, about 5° Celsius (41°F).

Coat weather is below zero, about -3° Celsius (27°F).

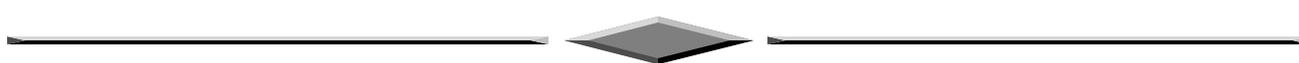
Sample Conversion Chart

CELSIUS	FAHRENHEIT
30°	86°
20°	68°
10°	50°
0°	32°
-10°	14°
-20°	-4°
-30°	-22°

WIND

SA REPORT

OKC	SA		1955	M10 OVC	3/4	TRW	F
LOCID	REPORT TYPE	MODIFIER	TIME	SKY CONDITIONS	VISIBILITY	WEATHER	OBSCURATIONS
132	/	64 / 60	/	2215G25	/	992	/ R17LVR26 TB25 OVHD MOVG E LTGIC
PRESSURE		TEMP/DEW POINT		WIND		ALTIMETER	REMARKS



METAR REPORT

METAR	KOKC	011955Z		22015G25KT	3/4SM	R17L/2600FT	TSRA BR
REPORT TYPE	LOCID	DATE/TIME	MODIFIER	WIND	VISIBILITY	RVR	WEATHER & OBSCURATIONS
OVC010CB		18/16		A2992		RMK LTGIC TSB25 TS OHD MOV E SLP 132	
SKY CONDITIONS		TEMP / DEW POINT		ALTIMETER		REMARKS	

(1) The wind element moves from succeeding the temperature/dew point in the SA to the first weather element of the report after the Date/Time group (or modifier if included in the report).

(2) Wind direction is reported relative to true north in three characters instead of two as in SA format.

(3) Wind speed will be reported normally in two characters or three when necessary. The speed is followed by "KT" to indicate the speed is in knots rather than kilometer per hour (KPH) or meters per second (MPS) as used in some other countries.

EXAMPLE: SA - 2215 METAR - 22015KT

PHRASEOLOGY: "Wind two two zero at one five"

(4) Even though wind can still be estimated, in METAR code, there is no way to indicate that wind direction or speed has been estimated in the body of the report.

EXAMPLE: SA - E3115 METAR - 31015KT

(5) Wind gusts will be reported in the same manner as in the SA.

EXAMPLE: SA - 3115G25 METAR - 31015G25KT

PHRASEOLOGY: "Wind three one zero at one five, gusts two five"

(6) Squalls "Q" will no longer be reported in the wind element. However, if the wind qualifies, "SQ" is placed in the weather element. Squalls will be discussed later.

(7) When the wind direction meets the criteria for a variable wind, wind speed greater than 6 knots and direction varies by 60 degrees or more, the minimum and maximum range will follow the wind group using three digits each.

EXAMPLE: SA - 3115 METAR - 31015KT 270V340
(in remarks WND 27V34)

PHRASEOLOGY: "Wind three one zero at one five, wind variable between two seven zero and three four zero"

(8) If the wind is 1 knot or greater and 6 knots or less, the wind direction *may* be replaced by "VRB" followed by the speed or reported as observed.

EXAMPLE: SA - 1204 METAR - VRB04KT or 12004KT

PHRASEOLOGY: "Wind variable at four" or "Wind one two zero at four"

(9) Calm wind (less than 1 knot) is encoded by five zeroes. Except for the one additional zero and the "KT," it's the same as in the SA.

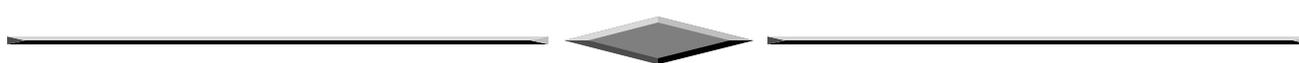
EXAMPLE: SA - 0000 METAR - 00000KT

PHRASEOLOGY: "Wind calm"

ALTIMETER and REMARKS

SA REPORT

OKC	SA		1955	M10 OVC	3/4	TRW	F
LOCID	REPORT TYPE	MODIFIER	TIME	SKY CONDITIONS	VISIBILITY	WEATHER	OBSCURATIONS
132	/	64 / 60	/	2215G25	/	992	/ R17LVR26 TB25 OVHD MOVG E LTGIC
PRESSURE		TEMP/DEW POINT		WIND		ALTIMETER	REMARKS



METAR REPORT

METAR	KOKC	011955Z		22015G25KT	3/4SM	R17L/2600FT	TSRA BR
REPORT TYPE	LOCID	DATE/TIME	MODIFIER	WIND	VISIBILITY	RVR	WEATHER & OBSCURATIONS
OVC010CB		18/16		A2992		RMK LTGIC TSB25 TS OHD MOV E SLP 132	
SKY CONDITIONS		TEMP / DEW POINT		ALTIMETER		REMARKS	

(1) The altimeter setting will still be in inches of mercury, but will be coded in four digits instead of three. The decimal is still dropped.

(2) The altimeter setting will be preceded by an "A." ("A" is the international indication that the code to follow is in inches of mercury vs. hectopascal).

EXAMPLE: SA - 992 METAR - A2992

PHRASEOLOGY: "Altimeter two niner niner two"

(3) Many of the remarks will be familiar since they will be exactly the same as they were in the SA just in a different order. This discussion will not rehash all the remarks, just the ones that are different or new from the SA and not previously covered in the other elements.

(4) If there are remarks to be included in the report, the element begins with the contraction "RMK."

EXAMPLE: SA - 992/ <remarks> METAR - A2992 RMK <remarks>

(5) Instead of the six groups in SA, the remarks element is broken into two major groups, 1) Automated, Manual, and Plain Language, and 2) Additive and Maintenance Data. The Additive and Maintenance Data remarks follow the

Automated, Manual, and Plain Language remarks. Items within each group will be listed in a specific sequence. (See Table at the end of this section)

(6) Automated stations will indicate one of two codes, AO1 or AO2. AO1 indicates the most basic of stations with no weather discriminating equipment. AO2 indicates a station with weather discriminating equipment. If one of these codes is not present, the report was generated by a real person or a person has augmented the observation.

(7) Peak wind (PK WND) is encoded the same except the direction is in three digits instead of two.

EXAMPLE: SA - PK WND 2845/15 METAR - PK WND 28045/15

PHRASEOLOGY: "Peakwind two eight zero at four five occurred at one five past the hour"

(8) The contraction for visibility when placed in remarks is now VIS instead of VSBY.

(9) "Vicinity" is now VC (the same as in the body) instead of VCNTY. It also has a new definition: between 5 - 10 statute miles of the station. A cardinal direction of the compass indicates the direction of the phenomena from the station. Weather occurring at the station or in the vicinity is reported in the body of the report.

**EXAMPLE: SA - VSBY 7 METAR - 7SM VCSH SW
(remarks: OCNL RW- SW)**

PHRASEOLOGY: "Visibility seven, showers in the vicinity, southwest"

(10) Distant (DSNT) is entered in front of the cardinal direction when it is more than 10 miles from the station. Weather occurring more than 10 miles from the station is reported in remarks.

EXAMPLE: SA - CB 20S METAR - CB DSNT S

PHRASEOLOGY: "Cumulonimbus distant south"

(11) Other new contractions for old standard terms:

"Frequent" is now FRQ instead of FQT.

"Continuous" is now CONS instead of CONT.

"Overhead" is now OHD instead of OVHD.

"Moving" and "Moved" are now MOV instead of MOVG or MOVD.

(12) The beginning and ending of precipitation is encoded in remarks in the same manner as in an SA (except for using METAR contractions) and will be placed in remarks preceding sea-level pressure. The size of hailstones will be reported after thunderstorm location and movement in the Automated, Manual, and Plain Language section of remarks.

EXAMPLE: SA - TB15 OVHD MOVG E AB17E40 HLSTO 3/4
 METAR - GRB17E40 TSB15 TS OHD MOV E GR3/4

PHRASEOLOGY: "Hail began at one seven, ended at four zero, thunderstorm began at one five, thunderstorm overhead moving east, hailstones three-quarter inch in diameter"

Table 3. - Order of Remarks

AUTOMATED, MANUAL, and PLAIN LANGUAGE		ADDITIVE and AUTOMATED MAINTENANCE DATA	
1. Volcanic Eruptions	21. PRESFR or PRESRR	27. Hourly Precipitation	
2. Tornado, Funnel Cloud, or Waterspout	22. Sea-Level Pressure (SLPppp)	28. Precipitation Amount	
3. STN Type (AO1/AO2)	23. ACFT Mishap	29. 24HR Precipitation	
4. PK WND	24. NOSPECI	30. Snow Depth on Ground	
5. WSHFT (FROPA)	25. SNINCR	31. Water Equivalent of Snow	
6. TWR VIS or SFC VIS	26. Other SIG Info	32. Cloud Type	
7. VRB VIS		33. Duration of Sunshine	
8. Sector VIS		34. Hourly Temperature/Dew Point (tenths)	
9. VIS @ 2nd Site		35. Maximum Temperature	
10. Dispatch Visual Range		36. Minimum Temperature	
11. (freq) LTG (type)(loc)		37. 24HR Max/Min Temperature	
12. Beginning/Ending of Precipitation/TSTMS		38. Pressure Tendency	
13. TSTM Location and MVMT		39. Sensor Status PWINO	
14. Hailstone Size (GR)		FZRANO	
15. Virga		TSNO	
16. VRB CIG Height		RVRNO	
17. Obscuration		PNO	
18. VRB Sky Condition		VISNO	
19. Significant Cloud Type		CHINO	
20. Sky @ 2nd Site		40. Maintenance Indicator (\$)	

SKY CONDITIONS PRACTICE SOLUTIONS

1. VV003

METAR reports indicate total obscurations by encoding the vertical visibility into the obscuration in the body of the report. Vertical visibility is encoded as "VV" followed by the height. This would be considered a ceiling.

2. SCT015 OVC045

METAR reports encode the layer coverage before the layer height. A ceiling designator is not entered.

3. SKC

METAR has two options for encoding clear skies. Automated stations use CLR and manual stations use SKC. Since this is from a manual station, clear would be encoded as SKC.

4. BKN035TCU

Any time CB or TCU are present, they will be encoded in the body of a METAR report. They will be attached to the layer with which their base is associated. Since there was only one layer reported, it would be attached to that layer.

5. FEW020

METAR has an additional reportable value used when the sky coverage is equal to or less than 2/8. This coverage is encoded as "FEW."

VISIBILITY, RVR, WEATHER PRACTICE SOLUTIONS

1. 1/2SM MIFG

The METAR equivalent of ground fog is shallow fog. To report fog rather than mist (BR) visibility must be less than 5/8 statute mile. However, the combination of the descriptor shallow (MI) and the phenomena mist (BR) is not authorized so whenever shallow fog (ground fog) is present it will be reported as MIFG.

2. 1SM R17L/P6000FT -SHRA BR

When the criteria exists, RVR is encoded in the body of the report between the visibility and weather phenomena. VR is replaced by "/", 00FT will always end the RVR value to indicate it is in hundreds of feet.

"P" is entered before the value if the value is more than the maximum reading. When precipitation is present, the intensity is always indicated and a descriptor is used if applicable. In this case, the rain is light so the intensity is entered first, followed by the descriptor that best describes the phenomena. METAR has a descriptor to indicate showery type precipitation (SH), it is encoded next, followed by the phenomena which is rain (RA). When precipitation and an obscuring phenomena is observed, they are shown in the order of predominance. In this case, the light rain showers is more predominant than the mist (fog).

3. 3/4SM +TSRAGR or 3/4SM +TSRAGS

Intensity is always encoded first followed by the descriptor. Only one descriptor can be used with each group, so when thunderstorms and showers are both occurring, thunderstorms will always be the descriptor. The size of the hailstones determine whether GR or GS is encoded. Since the size of hailstones is not known, both possible examples are shown. If GR is used, the size of the hailstones will be shown in remarks.

4. 1/2SM R30/2600FT -SN BLSN

When the criteria exists, RVR is encoded in the body of the report between the visibility and weather phenomena. VR is replaced by "/", 00FT will always end the RVR value to indicate it is in hundreds of feet.

When precipitation and obscurations are occurring at the same time, they are entered in order of predominance as opposed to SA entered in the order of liquid, freezing, frozen, and then obscurations (in order of predominance). Since there was no indication of predominance it would also be correct to have entered BLSN - SN.

5. 5SM HZFU

In this case, both types of reports enter obscurations in order of predominance. The only difference is the contraction.

6. 7SM VCSH

Since the phenomena is not occurring at the observation point at the time of observation, the SA will not enter a phenomena in the body of the report even though there are showers in the vicinity. The only way the observer can more clearly describe what is occurring is by adding remarks. However, the METAR has the flexibility through the use of the proximity qualifier to be more descriptive in the body. SH and TS are the only descriptors that can be used in conjunction with the VC qualifier. When they are used with VC, it replaces the intensity and the type of precipitation is not entered.

7. 3/4SM BLSN SCT000

Even though 000 technically means "height is less than 50 feet," it would be safe to equate the <sky contraction> 000 with -X as long as it is preceded with some type of obscuring phenomena. In this case, it is preceded by blowing snow. SCT is used as the sky contraction since the SA shows 5/10 of the sky obscured (4/8 in METAR). The remarks for this type of situation is a repeat of the obscuring phenomena and the layer and layer height (BL, SN SCT000) to denote what is obscuring the sky.

METAR CONVERSION EXERCISES

INSTRUCTIONS: Convert the following SA reports to METAR format. Solutions are provided along with an explanation of the conversion. Your answer does not need to duplicate the solution exactly to be correct. The conversion of the Fahrenheit temperatures to Celsius should expect a variance of $\pm 1^\circ$.

For solutions turn to page 31.

Note: All Observations are at a manual station taken on the 23rd day of the month.

1. CNU SA 1950 CLR 15 202/87/63/0000/013

2. OKC SA 1655 M50 BKN 90 BKN 120 OVC 7 120/72/59/2915/985

3. PIT SA 2250 30 SCT E100 BKN 10 121/94/79/2410/986/ SCT V BKN RWU W-NW
(The observer has determined the rain showers are about 7 miles from the station).

4. OMA SA 2151 30 SCT 80 SCT 250 SCT 12 101/93/68/E1310/982/TCU SW-W
(TCU is associated with the lowest layer).

5. PIT SP 1935 M10 OVC 3/4TRW+ 2215G25/992/ R22LVR28 TB33 OVHD MOVG E FQT LTGICCCCG
ALQDS

(The observer has determined the sea-level pressure to be 184, and the temperature and dew point to be 64/62, respectively).

6. ABI SA 1252 3 SCT 7 -BKN M15 OVC 3R-S-F 139/34/30/2708/004/ VSBY N-E SB38

(The observer has determined that snow then rain are predominant weather phenomena).

7. LAX SA 1650 -X E250 BKN 2FH 115/76/73/2003/997/ FH5

8. ALO RS 1153 E10 OVC 2SG-F 142/34/33/0118G26/992/ SE20RE30SGB35 WND 33V07 PCPN VRY
LGT

(The observer has determined that snow grains is the predominant weather phenomena).

9. DFW SA 2050 W3 X 1/4L-F 058/42/42/0606/969/R17LVR10- LB28

(Fog has been determined to be the predominant obstruction to vision).

10. CYS SA 1851 E7 BKN 25 OVC 1TRW-SW- 129/36/28/2908/995/ R09VR60+ TB31 W MOVG E OCNL
LITGICCG

(CB associated with the overcast layer, rain is the predominant precipitation).

METAR CONVERSION SOLUTIONS

1. METAR KCNU 231950Z 0000KT 15SM SKC 31/17 A3013 RMK SLP202

EXPLANATION: METAR reports begin with METAR or SPECI. The international code for location identifiers is used. The date is included with the time in METAR reports and the date/time element ends with "Z" to indicate coordinated universal time. Calm wind is encoded by five zeroes ending in "KT." Visibility always ends in "SM." Clear skies are now encoded as SKC versus CLR which is reserved for automated stations. Temperature and dew point are reported in Celsius and separated by a "/", but the two are a single element separated from the other elements by a space. The altimeter setting always begins with an "A" followed by the four-digit reading in inches of mercury. METAR remarks will always begin with "RMK" and will normally have at least one element, sea-level pressure (for those stations reporting sea-level pressure).

2. METAR KOKC 231655Z 29015KT 7SM BKN050 BKN090 OVC120 22/15 A2985 RMK SLP120

EXPLANATION: METAR reports begin with METAR or SPECI. The international code for location identifiers is used. The date is included with the time in METAR reports and the date/time element ends with "Z" to indicate coordinated universal time. The wind direction is reported in three digits and the element always ends in "KT". Visibility always ends in "SM." Sky coverage now precedes the cloud height. Cloud height is reported in three digits (indicating hundreds of feet) and attached to the coverage. The word "ceiling" will always be spoken before the first broken or overcast layer. The altimeter setting is encoded in four digits preceded by an "A." Sea-level pressure moves out of the body of the report into remarks and is preceded by "SLP."

3. METAR KPIT 232250Z 24010KT 10SM VCSH SCT030 BKN100 29/26 A2986 RMK SCT V BKN SLP121

EXPLANATION: METAR reports begin with METAR or SPECI. The international code for location identifiers is used. The date is included with the time in METAR reports and the date/time element ends with "Z" to indicate coordinated universal time. The wind direction is reported in three digits and the element always ends in "KT." Visibility always ends in "SM." Weather **not** at the station (RWU WNW) but within 10 miles is considered to be "in the vicinity" and encoded in the body instead of in remarks. When showers are reported as "in the vicinity" the type of precipitation is **not** included. Variable cloud layers are encoded in remarks the same in METAR as in SA. (See Table 3 ORDER OF REMARKS for the sequencing of the remarks).

4. METAR KOMA 232151Z 13010KT 12SM SCT030TCU SCT080 SCT250 34/20 A2982 RMK TCU SW-W SLP101

EXPLANATION: METAR reports begin with METAR or SPECI. The international code for location identifiers is used. The date is included with the time in METAR reports and the date/time element ends with "Z" to indicate coordinated universal time. The wind direction is reported in three digits and the element always ends in "KT." Visibility

always ends in "SM." There is **no** way to indicate the wind direction or speed was estimated in METAR report. When present, towering cumulus will be reported with the layer with which it is associated. When it is also included in remarks, it indicates that the TCU is not at the station. In this case, it is within 10 statute miles of the station. The remarks for significant cloud types looks the same between the SA and METAR reports just the location may vary.

5. SPECI KPIT 231935Z 22015G25KT 3/4SM R22L/2800FT +TSRA OVC010CB 18/17 A2992 RMK FRQ LTGICCCCG ALQDS TSB33 TS OHD MOV E SLP184

EXPLANATION: Special reports begin with SPECI and contain all the data that would be in an hourly observation which includes the sea-level pressure and temperature/dew point. RVR is now a part of the body following visibility. "VR" is replaced by a "/", zeroes are not dropped from the reading, and "FT" is added to the end of the element. The intensity symbol refers to the precipitation **not** the descriptor. Only one descriptor can be used with the precipitation element so TS and SH cannot be entered together. TS implies a form of showery activity. FQT and OVHD are replaced by the international contractions FRQ and OHD. The beginning time, ending time, and the location and movement of the thunderstorm is entered in the Automated, Manual, and Plain Language section of remarks.

6. METAR KABI 231262Z 27008KT 3SM -SNRA BR SCT003 BKN007 OVC015 01/M01 A3004 RMK VIS N-E 2 SNB38 SLP139

EXPLANATION: When precipitation and obscurations are both present, they are encoded in order of predominance. The intensity symbol precedes the group, and is used only once, referring to the first phenomena. Since the first phenomena is reported as light, the second can be assumed light (or at least lighter). Obscuring phenomena is separated from the precipitation group by a space. METAR does **not** differentiate between thin and opaque layers. Therefore, the first layer reported as broken is considered the ceiling. In this case, the station is IFR under METAR (ceiling 700) where it is MVFR under SA (ceiling 1500). Temperatures below freezing on the Celsius scale are prefixed with "M" instead of "-" as in SA reports. In remarks, sector visibility is reported the same except the contraction for visibility is now VIS. The beginning and ending of precipitation is encoded the same as in the SA except the METAR contractions are used.

7. METAR KLAX 231650Z VRB03KT 2SM BR HZ SCT000 BKN250 24/23 A2987 RMK BR HZ SCT000 SLP115

EXPLANATION: When wind is 6 knots or less, the observer has the option to encode "VRB" or the average direction. If you encoded the wind as 20003, it is also correct. BR is used to encode the obstruction to vision rather than FG since visibility is 5/8 or more. When more than one obscuration is present they are encoded together with a space in between and the predominant obstruction entered first. Since predominance could not be indicated in the SA, entering either one first would be correct. Partial obscuration is indicated by a layer contraction followed by 000. The amount of obscuration is determined by the layer contraction. In this case, SCT is encoded because the SA indicated 5/10 coverage which falls into the SCT category (3/8-4/8). The obstruction to vision and the layer coverage is also entered in remarks.

8. METAR KALO 231153Z 01018G26KT 330V070 2SM -SG BR OVC010 01/01 A2992 RMK SNE20RAE30SGB35 SLP142

EXPLANATION: There is **no** way to indicate that an hourly observation meets special criteria. All hourly observations will begin with METAR. Variable wind direction is indicated in the body of the report instead of remarks. Since the Celsius scale is **not** divided in as small an increments as the Fahrenheit scale, METAR reports will **not** show as much temperature/dew point variance as indicated in the SA report. A one degree spread in Fahrenheit could be zero in Celsius. Due to the other factor involved in the formation of weather, this difference should not have an impact on the significance of a temperature/dew point spread of zero. Remarks such as PCPN VRY LGT will not appear in METAR reports unless the observer determines the phenomena to be significant.

9. METAR KDFW 232050Z 06006KT 114SM R17L/M1000FT FG -DZ VV003 06/06 A2969 RMK DZB28 SLP058

EXPLANATION: When the criteria exists, RVR is entered in the body of a METAR report instead of remarks as in the SA. When RVR is greater than or less than the specified maximum or minimum values, a "P" or "M" precedes the value respectively. When precipitation and obscurations are both present, they are encoded in order of predominance. Precipitation and obscurations are separated by a space. When visibility is less than 5/8 statute mile, FG is used instead of BR. Indefinite ceilings are reported as vertical visibility (VV) in METAR reports.

10. METAR KCYS 231815Z 29008KT 1SM R09/P6000FT -TSRASN BKN007 OVC025CB 02/M02 A2995 RMK OCNL LTGICCG W TSB31 TS W MOV E SLP129

EXPLANATION: When RVR is greater than or less than the specified maximum or minimum values, a "P" or "M" precedes the value respectively. The intensity symbol refers to the first precipitation **not** the descriptor and is used only once. Since the precipitation is encoded in order of predominance, any items that follow are considered to be of less intensity then that preceding it. Since a thunderstorm is reported, CB is encoded with the layer with which it is associated. (Lightning is to the west, less than 1 flash per minute).

Chapter 2. *TAF*

INTRODUCTION

(1) An Aerodrome Forecast (TAF) is a concise statement of the expected meteorological conditions at an airport during a specified period (usually 24 hours). Each country is allowed to make modifications or exceptions to the code for use in each particular country. The TAF code, as described here, is the one used in the United States.

(2) TAFs use the same weather code found in METAR weather reports. Detailed explanations of weather coding is found only in the METAR sections of this workbook. Therefore, a prerequisite for continuing with TAF training is successful completion of the METAR End-of-Training (EOT) Test, page 50-57.

TAF REPORT ELEMENTS

TAF
KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT
P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006 2SM
TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040

(1) A TAF report contains the following sequence of elements in the following order:

- a. Type of Report (*NOTE: Type of report will be excluded in an Air Force report*)
- b. ICAO Station Identifier
- c. Date and Time of Origin
- d. Valid Period Date and Time
- e. Forecast Meteorological Conditions

(2) The international TAF also contains forecast temperature, icing, and turbulence. These three elements are not included in National Weather Service (NWS) prepared TAFs but are included in military TAFs (see AFMAN 15-124 for Code Figures).

(3) The U.S. has no requirement to forecast temperatures in an aerodrome forecast and the NWS will continue to forecast icing and turbulence in **AIRMETS** and **SIGMETS**.

(4) The following paragraphs describe the elements in a TAF report. A sample TAF report will accompany each paragraph with the subject element highlighted.

TYPE OF REPORT

TAF

**KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT
P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006 2SM
TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040**

(1) The report type header will always appear as the first element in the TAF forecast. There are two types of TAF reports, a routine forecast (**TAF**) and an amended forecast (**TAF AMD**). An amended TAF is issued when the current TAF no longer adequately describes the ongoing weather or the forecaster feels the **TAF** is not representative of the expected weather.

(2) Corrected (COR) or delayed (RTD) TAFs are identified only in the communications header which precedes the forecast text. The communications header is not displayed when the TAF report is retrieved by the specialist.

EXAMPLE:

TAF	-	Terminal Forecast
TAF AMD	-	Amended Terminal Forecast

ICAO STATION IDENTIFIER

TAF

**KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT
P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006 2SM TSRA
OVC008CB BECMG 0608 21015KT P6SM NSW SCT040**

(1) The TAF code uses ICAO four-letter location identifiers as described in the METAR section.

DATE AND TIME OF ORIGIN

TAF

KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006 2SM TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040

(1) This element is the UTC date and time the forecast was actually prepared. The format is a two-digit date and four-digit time followed, without a space, by the letter "Z." Routine TAFs are prepared and filed approximately one-half hour prior to scheduled issuance times. Civilian TAFs are scheduled for issuance four times daily at **0000Z**, **0600Z**, **1200Z**, and **1800Z**. Air Force TAFs may be issued at varying times, e.g., 0900Z, as determined by MAJCOM requirements.

EXAMPLE:

091050Z - Forecast prepared on the ninth day of the month at 1050Z

VALID PERIOD DATE AND TIME

TAF

KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006 2SM TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040

(1) The UTC valid period of the forecast is a two-digit date followed by the two-digit beginning hour and two-digit ending hour. Routine TAFs are valid for 24-hours. Valid periods beginning at 0000Z shall be indicated as "00." Valid periods ending at 0000Z shall be indicated as "24." The "24" indication applies to all time group ending times.

(2) In the case of an amended forecast, or a forecast which is corrected or delayed, the valid period may be for less than 24 hours. Where an airport or terminal operates on a part-time basis (less than 24 hours/day), the TAFs issued for those locations will have the abbreviated statement, "**NIL AMD SKED AFT (closing time)Z**," added to the end of the forecast. For the TAFs issued while these locations are closed, the word, "**NIL**," will appear in place of the forecast text. A delayed (RTD) forecast will then be issued for these locations after two complete observations are received. Air Force TAFs from limited-duty stations may include remarks such as: "LIMITED MET WATCH 0300Z TIL 1000Z" or, "LAST NO AMDS AFT <YYGG> NEXT <YYGG>." (YY indicates date of month and GG indicates time in UTC).

EXAMPLE:

091212 - Forecast valid from the ninth at 1200Z till the tenth at 1200Z.
110024 - Forecast valid from the eleventh at 0000Z till the twelfth at 0000Z. (not 110000 or 112400)

010524 - Amended forecast valid from the first at 0500Z till the second at 0000Z.

FORECAST METEOROLOGICAL CONDITIONS

TAF

KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006 2SM TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040

(1) This is the body of the TAF. The basic format is:

Wind - Visibility - Weather - Sky Condition - Optional Data (Wind Shear)

(2) The wind, visibility, and sky condition elements are always included in the initial time group of the forecast. Weather is included in the initial time group only if significant to aviation. If a significant, lasting change in any of the elements is expected during the valid period, a new time period with the changes is included. It should be noted that, with the exception of a FM group, the new time period will include only those elements which are expected to change (i.e., if a lowering of the visibility is expected but the wind is expected to remain the same, the new time period reflecting the lower visibility would not include a forecast wind. The forecast wind would remain the same as in the previous time period). *NOTE: Air Force TAFs must contain all elements in the FM and BECMG groups. The TEMPO group may contain only those elements expected to change.*

(3) Any temporary conditions expected during a specific time period are included with that time period. The following describes the elements in the above format.

Wind

(1) The wind group includes forecast surface winds. The surface wind forecast is the expected wind direction (first three digits) and speed (last two or three digits if 100 knots or greater). The contraction **"KT"** follows to denote the units of wind speed in knots. Wind gusts are noted by the letter **"G"** appended to the wind speed followed by the highest expected gust (two or three digits if 100 knots or greater).

(2) Calm winds (three knots or less) are encoded as **"00000KT."**

(3) Variable winds are encoded when it is impossible to forecast a wind direction due to winds associated with convective activity or low wind speeds. A variable wind direction is noted by **"VRB"** where the three digit direction usually appears.

EXAMPLE:

18010KT	-	"Wind one eight zero at one zero"
35012G20KT	-	"Wind three five zero at one two gusts two zero"

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00000KT - "Wind calm"
VRB16G28KT - "Wind variable at one six gusts two eight"

Visibility

(1) The expected prevailing visibility is forecast by the Air Force in meters and by civilians in statute miles and fractions of statute miles followed by "SM". Statute miles followed by fractions of statute miles are separated with a space, for example, 1 1/2SM. *Civilian* forecast visibility greater than 6 statute miles is indicated by coding "**P6SM.**" *Air Force* forecast visibility equal to or greater than 7SM is indicated by coding "**9999.**" Directional or variable visibility is **not** forecasted and the visibility group is omitted if missing.

EXAMPLE:

1/2SM (Civilian)	-	"Visibility one-half"
2 1/4SM (Civilian)	-	"Visibility two and one-quarter"
1200 (Air Force)	-	Visibility one thousand two hundred"

(2) Although **not** used in the U.S., the contraction "CAVOK" (ceiling and visibility OK) replaces visibility, weather, and sky condition if:

- visibility is 10 kilometers or more.
- no clouds below 1500 meters (5,000 feet) or below the highest minimum sector altitude, whichever is greater.
- no cumulonimbus.
- no significant weather phenomena.

Weather

(1) The expected weather phenomenon or phenomena is coded in TAF reports using the same format, qualifiers, and phenomena contractions as METAR reports (except UP). Weather code is found in the METAR section, page 12, table 2.

(2) The proximity qualifier "**VC**" will be used only with "DS, SS, FG, FC, SH, PO, TS, BLDU, BLSA, BLSN."

(3) Obscurations to vision will be forecast whenever the prevailing visibility is forecast to be 6 statute miles or less (*Air Force: - 9000 meters or less*).

(4) If no significant weather is expected to occur during a specific time period in the forecast, the weather group is **omitted** for that time period. If, after a time period in which significant weather has been forecast, a change to a forecast of no significant weather occurs, the contraction, "**NSW**" (No Significant Weather) will appear as the weather group in the new time period.

Sky Condition

(1) TAF sky condition forecasts use the METAR format described in the METAR section. Cumulonimbus clouds (CB) are the only cloud type forecast in TAFs.

(2) When the sky is obscured due to a surfaced-based phenomenon, vertical visibility (**VV**) into the obscuration is forecast. The format for vertical visibility is "**VV**" followed by a three-digit height in hundreds of feet. **Note:** Ceiling layers are not designated in the TAF code. For aviation purposes; the ceiling is the lowest broken or overcast cloud layer aloft or vertical visibility into a complete obscuration,

EXAMPLE:

SKC	- "Sky clear"
SCT005 BKN025CB BKN250	- "Five hundred scattered, ceiling two thousand five hundred broken cumulonimbus clouds, two five thousand broken"
VV008	- "Indefinite ceiling eight hundred"

Optional Data (Wind Shear)

(1) Wind shear is the forecast of non-convective low level winds (up to 2000 feet) and is entered after the sky conditions when wind shear is expected. The forecast includes the height of the wind shear followed by the wind direction and wind speed at the indicated height. Height is given in hundreds of feet AGL up to and including 2,000 feet. Wind shear is encoded with the contraction "**WS**" followed by a three-digit height, slant character "/", and winds at the height indicated in the same format as surface winds. The wind shear element is **omitted** if **not** expected to occur.

EXAMPLE:

WS010/18040KT - "Low level wind shear at one thousand, wind one eight zero at four zero"

(2) Other items not included in domestic TAF reports that may appear in international or some military reports as optional data following wind shear are:

- Icing forecast - a coded group beginning with a 6 followed by five digits.
- Turbulence forecast - a coded group beginning with a 5 followed by five digits.
- Temperature forecast - a coded group beginning with a T followed by the temperature and time.

PROBABILITY FORECAST

The probability or chance of thunderstorms or other precipitation events occurring, along with associated weather conditions (wind, visibility, and sky conditions). **NOTE:** This group **is not** used in military forecasts.

TAF

**KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT
P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 **PROB40 0006**
2SM TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040**

(1) The **"PROB40"** group is used when the occurrence of thunderstorms or precipitation is in the 30% to less than 50% range, thus the probability value **40** is appended to the **PROB** contraction. This is followed by a four-digit group giving the beginning hour and ending hour of the time period during which the thunderstorms or precipitation is expected. **Note:** "PROB40" will not be shown during the first six hours of a forecast.

EXAMPLE:

PROB40 2102 1/2SM +TSRA -	- "Chance between 2100Z and 0200Z of visibility one-half thunderstorm, heavy rain"
PROB40 1014 1SM RASN	- "Chance between 1000Z and 1400Z of visibility one rain and snow"
PROB40 2024 2SM FZRA	- "Chance between 2000Z and 0000Z of visibility two freezing rain"

FORECAST CHANGE INDICATORS

The following change indicators are used when either a rapid, gradual, or temporary change is expected in some or all of the forecast meteorological conditions. Each change indicator marks a time group within the TAF report.

FROM GROUP

TAF

KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR **FM1600 16010KT
P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 **PROB40 0006** 2SM TSRA
OVC008CB BECMG 0608 21015KT P6SM NSW SCT040**

(1) The **FM** group is used when a **rapid** change, usually occurring in less than one hour, in prevailing conditions is expected. Typically, a rapid change of prevailing conditions to a completely new set of prevailing conditions is associated with a synoptic feature passing through the terminal area (cold or warm frontal passage). Appended to the **FM** indicator is the four-digit hour and minute the change is expected to begin and continues until the next change group or until the end of the current forecast.

(2) An **FM** group will mark the beginning of a new line in a TAF report. Each **FM** group contains all the required elements; wind, visibility, weather, and sky condition. FM groups will not include the contraction "NSW."

EXAMPLE:

FM0100 SKC - "After 0100Z sky clear"
FM1430 OVC020 - "After 1430Z ceiling two thousand overcast"

BECOMING GROUP**TAF**

**KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT
P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006
2SM TSRA OVC008CB BECMG 0608 21015KT P6SM NSW SCT040**

(1) The **BECMG** group is used when a gradual change in conditions is expected over a longer time period, usually two hours. The time period when the change is expected is a four-digit group with the beginning hour and ending hour of the change period which follows the **BECMG** indicator. The gradual change will occur at an unspecified time within this time period. An element omitted from this change group would indicate that the element from the previous **BECMG** or **FM** group remains valid.

EXAMPLE:

OVC012 BECMG 1416 BKN020 - "Ceiling one thousand two hundred overcast, Then a gradual change to ceiling two thousand broken between 1400Z and 1600Z"

TEMPORARY GROUP**TAF**

**KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR FM1600 16010KT
P6SM NSW SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 PROB40 0006 2SM TSRA
OVC008CB BECMG 0608 21015KT P6SM NSW SCT040**

(1) The **TEMPO** group is used for any conditions in wind, visibility, weather, or sky condition which are expected to last for generally less than an hour at a time (occasional), and are expected to occur during less than half the time period. The **TEMPO** indicator is followed by a four-digit group giving the beginning hour and ending hour of the time period during which the temporary conditions are expected. Only the changing forecast meteorological conditions are included in **TEMPO** groups. The omitted conditions are carried over from the previous time group.

EXAMPLE:

SCT030 TEMPO 1923 BKN030 - "Three thousand scattered with occasional ceilings three thousand broken between 1900Z and 2300Z."

4SM HZ TEMPO 0006 2SM BR HZ - "Visibility four in haze with occasional visibility two in mist and haze between 0000Z and 0600Z."

TAF PRACTICE

INSTRUCTIONS: Answer the questions following each TAF report,

For solutions turn to page 45.

TAF
KSTL 161715Z 161818 16014G20KT P6SM SCT060 SCT120 TEMPO 1823 BKN120 BECMG 2324
19012KT SCT050 BKN120 PROB40 0006 19012G30KT 3SM TSR-A OVC030CB BECMG 0607
20010KT -TSRA OVC030CB TEMPO 0813 20010G40KT 2SM +TSR-A OVC015CB
FM1400 25010KT P6SM BKN035 BKN100 PROB40 1518 5SM -TSRA

1. The forecast conditions at 20Z are?
 - a. Wind _____
 - b. Visibility _____
 - c. Weather _____
 - d. Sky conditions _____

2. The forecast conditions at 03Z are?
 - a. Wind _____
 - b. Visibility _____
 - c. Weather _____
 - d. Sky conditions _____

3. The forecast conditions at 12Z are?
 - a. Wind _____
 - b. Visibility _____

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- c. Weather _____
- d. Sky conditions _____
- 4. What cloud type is forecast at 12Z? _____
- 5. What is the forecast for weather at 1430Z? _____
- 6. What are the chances of thunderstorms developing after 15Z? _____

TAF AMD

KSEA 161440Z 161512 23012KT P6SM SCT014 OVC020 TEMPO 1518 5SM -DZ BR BKN012 BECMG
1819 27008KT BKN022 BECMG 2022 30010KT SCT025 BECMG 0405 21012KT OVC015

- 7. The forecast conditions at 16Z are?
 - a. Wind _____
 - b. Visibility _____
 - c. Weather _____
 - d. Sky conditions _____
- 8. The forecast conditions at 20Z are?
 - a. Wind _____
 - b. Visibility _____
 - c. Weather _____
 - d. Sky conditions _____
- 9. The forecast conditions at 08Z are?
 - a. Wind _____
 - b. Visibility _____

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c. Weather _____

d. Sky conditions _____

10. How many hours is this forecast valid for? _____

11. How long will drizzle occur? _____

TAF

KJAX 161735Z 161818 32007KT P6SM BKN250 BECMG 1920 34007KT SCT035 BKN250 BECMG2324
00000KT BKN035 BECMG 0708 10010KT 3SM BR BKN025 TEMPO 0813 1 1/2SM BR PROB40
1113 TS FM1300 20012KT P6SM SCT025 BKN250 TEMPO 1316 BKN025 BECMG 1617
19010KT SCT030 BKN250

12. The forecast conditions at 21Z are? _____

a. Wind _____

b. Visibility _____

c. Weather _____

d. Sky conditions _____

13. The forecast conditions at 00Z are?

a. Wind _____

b. Visibility _____

c. Weather _____

d. Sky conditions _____

14. The forecast conditions at 11Z are?

a. Wind _____

b. Visibility _____

c. Weather _____

d. Sky conditions _____

15. Describe the surface winds at 03Z? _____

16. What event is forecast to occur after 13Z? _____

TAF PRACTICE - SOLUTIONS

1. 16014G20KT

P6SM

NSW

SCT060 SCT120 TEMPO BKN120

The KSTL TAF is valid for 24-hours and has four forecast time groups. The 20Z conditions are found in the first forecast time group from 18Z till 23Z, when conditions are forecasted to gradually change. **161818 16014G20KT P6SM SCT060 SCT120 TEMPO 1823 BKN120 BECMG 2324**. The forecasted wind, visibility, and weather conditions are constant throughout the time group. The sky condition is predominantly scattered with a temporary (occasional) broken ceiling expected to occur for less than an hour at a time for less than half the time period. The TEMPO time period is 18Z to 23Z.

2. 19012KT PROB40 19012G30KT P6SM PROB40 3SM

NSW PROB40 TSRA

SCT050 BKN120 PROB40 OVC030CB

The 03Z forecast falls within the second time group. **BECMG 2324 19012KT SCT050 BKN120 PROB40 0006 19012G30KT SM TSRA OVC030CB BECMG 0607**. Conditions forecasted during the second time group begin to gradually occur at 23Z and the changes are complete by 0000Z. All ending times of 0000Z in TAF reports are indicated by 24, including TEMPO, PROB40, and forecast valid period ending times. This time group is valid until another gradual change begins to occur at 06Z. During the time group there is a 30% but less than 50% probability (chance) of thunderstorms and rain developing from 00Z till 06Z. So, the forecast at 03Z would also include this chance of precipitation. If the thunderstorms and rain occur, the winds will become more gusty and the visibility and sky conditions will lower.

3. 20010KT TEMPO 20010G40KT

P6SM TEMPO 2SM

-TSRA TEMPO +TSRA

OVC030CB TEMPO OVC015CB

The 12Z conditions are in the third time group. **BECMG 0607 20010KT TSRA OVC030CB TEMPO 0813 20010G40KT 2SM +TSRA OVC015CB FM1400**. Conditions in this time group gradually occur between 06Z and 07Z and rapidly end at 1400Z. During the period, thunderstorms and light rain are forecasted to occur but visibility will

remain above six miles. Temporarily or occasionally between 08Z and 13Z, which includes the 12Z forecast, those thunderstorms will become more intense with heavy rain, gusty winds and lowering visibility, and sky conditions.

4. **CB**

When cumulonimbus clouds are forecasted, the contraction "CB" is appended to the associated cloud layer. Cumulonimbus is the only cloud type forecast in TAF reports.

5. **NSW**

The 1430Z forecast is in the fourth time group valid from 14Z till the end of the TAF valid period of 18Z. **FM1400 25010KT P6SM BKNO35 BKN 100 PROB40 1518 5SM -TSRA.** Between 14Z and 15Z, no weather appears in the FM group. Each FM group includes all the required elements; wind, visibility, weather, sky conditions. When weather is omitted from a FM group, it is implied to be not significant to aviation.

6. **30% TO LESS THAN 50%**

The 15Z forecast is in the fourth time group valid from 1400Z till the end of the TAF valid period at 18Z. **FM 1400 25010KT BKN035 P6SM BKN100 PROB40 1518 5SM -TSRA.** During this time group, there is a chance of thunderstorms and light rain occurring from 15Z till 18Z. The PROB40 group always indicates a chance of thunderstorms or some other precipitation event occurring along with associated weather conditions. The probability range is 30% up to but not including 50%.

7. **23012KT**

P6SM TEMPO 5SM

NSW TEMPO -DZ BR

SCT014 OVC020 TEMPO BKN012

The KSEA TAF is an amended report issued at 1440Z and has four time groups. The 16Z forecast is found in the first time group which ends at 18Z, with a gradual change till 19Z. **161512 23012KT P6SM SCT014 OVC020 TEMPO 1518 5SM -DZ BR BKN012 BECMG 1819.** During the first time group, conditions are temporarily affected by drizzle and mist between 15Z and 18Z, which includes the 16Z forecast. While drizzle and mist are occurring, the visibility and sky conditions will lower but wind remains constant throughout the time group.

8. **27008KT BECMG 30010KT**

P6SM

NSW

BKN022 BECMG SCT025

The 20Z forecast falls right at the beginning of the third time group which indicates a gradual change in winds and sky conditions. This change is forecast to be completed by 22Z. **BECMG 1819 27008KT BKN022 BECMG 2022 30010KT SCT025 BECMG 0405**. Until 22Z, we can only state that the winds and sky conditions are gradually changing from those in the second time group (18Z to 20Z) to those in the third time group (20Z to 04Z). Visibility and weather forecasts have not changed from the initial time group and therefore are **omitted** from the second and third time groups.

9. 11012KT**P6SM****NSW****OVC015**

The fourth time group from 04Z till the end of the forecast valid period at 12Z includes the 08Z forecast. **BECMG 0405 21012KT OVC015**. A gradual change in winds and sky conditions is forecasted to occur between 04Z and 05Z. The visibility and weather conditions are **omitted** because they are forecasted to remain the same as those forecasted in the initial time group.

10. 21 HOURS

Since this is an amended TAF report, it is valid for less than the normal 24-hours. The amendment was issued at 1440Z and is valid from 15Z till 12Z, or 21 hours. Note, origin time and valid period are given as date/time groups. **KSEA 161440Z 161512**. The 16 indicates this TAF report was prepared on and is valid for the sixteenth day of the month.

11. LESS THAN 1 1/2 HOURS

Drizzle is forecasted as part of the TEMPO group from 15Z till 18Z. The TEMPO group is used when conditions are expected to last for generally less than an hour at a time and are expected to occur during less than half the TEMPO time period. This TEMPO time period is three hours. So, the drizzle can be expected to occur during less than half the three hour time period, or less than 1 1/2 hours.

12. 34007KT**P6SM****NSW****SCT035 BKN250**

The KJAX TAF is valid for 24-hours and has six time groups. The 21Z forecast falls within the second time group. **BECMG 1920 34007KT SCT035BKN250 BECMG 2324**. The conditions in this group gradually begin at 19Z and end gradually between 23Z and 0000Z. The only conditions changing from the initial time group (18Z till 19Z) are winds and sky conditions. Since visibility and weather are not changing, those items are omitted in the second time group.

13. 00000KT P6SM NSW BKN035

In this case, the 00Z forecast is the ending BECMG time. **BECMG 2324 00000KT BKN035 BECMG 0708**. Therefore, after 00Z conditions are no longer gradually changing, but have changed. The third time group will remain valid until the next gradual change beginning at 07Z. Again, visibility and weather have not changed and are omitted in this time group.

14. 10010KT

3SM TEMPO 1 1/2SM

BR PROB40 TSRA

BKN025

The 11Z forecast is in the fourth time group, after 07Z till 1300Z. **BECMG 0708 10010KT 3SM BR BKN025 TEMPO 0813 11/2SM BR PROB40 1113 TSRA FM1300**. This time group includes a TEMPO group from 08Z till 13Z and a PROB40 group from 11Z till 13Z, which both apply to the 11Z forecast. Visibility during this time group is forecasted to lower due to mist with temporary periods of IFR visibility in mist. Then beginning at 11Z, there is a chance of thunderstorms and moderate rain developing until 13Z. The forecasted winds and sky conditions remain constant throughout the time group.

15. CALM

The 03Z winds forecast is found in the third time group from 23Z till 07Z. This BECMG group is forecasting the winds to be 00000KT, which is the METAR/TAF way of encoding calm winds.

16. WARM FRONTAL PASSAGE

The FM indicator is used when a rapid change of prevailing conditions is expected. Typically, a rapid change of conditions is associated with a synoptic feature passing through the terminal area. The trend of the KJAX TAF is consistent with warm frontal passage. Ahead of the front winds are out of the east, visibility is reduced due to mist, and a lower broken ceiling develops, **BECMG 0708 10010KT 3SM BR BKN025**. As the front approaches, visibility lowers to IFR in mist and the chance of thunderstorm activity increases, **TEMPO 0813 1 1/2SM BR PROB40 1113**

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TSRA. After 1300Z every prevailing condition is forecasted to change rapidly, the winds shift to the southwest, visibility becomes more than six miles, the threat of thunderstorms diminishes, and the sky becomes scattered occasionally broken.

Chapter 3. *End of Training Tests*

METAR EOT

INSTRUCTIONS: Select the response that best answers the question or completes the statement.

1. Routine METAR hourly observations that meet special criteria will be reported as
 - a. METAR
 - b. SPECI
 - c. SMETAR
 - d. SM

2. Station identifiers for all weather reporting stations in the conterminous United States will begin with a/an _____.
 - a. A
 - b. K
 - c. P
 - d. AP

3. Station identifiers for all weather reporting stations in Alaska will begin with a _____.
 - a. P
 - b. PA
 - c. K
 - d. PH

4. A manual reporting station is identified by _____.
 - a. MAN (in the body of the report following the report type)
 - b. A02 (in the body of the report following the report type)
 - c. the absence of a modifier
 - d. AO1 (in the remarks section of the report)

5. In a METAR report, the visibility element follows the _____ element.
 - a. sky conditions
 - b. wind
 - c. location identifier

- d. weather
6. Variable visibility is indicated by _____.
- a. "V" between the visibility value and "SM" and the minimum and maximum visibility entered in remarks separated by "V"
 - b. "V" following the "SM" and the minimum and maximum visibility entered in remarks separated by "V"
 - c. entering the minimum and maximum visibility in remarks preceded by VIS and separated by "V"
 - d. variable visibility is **not** considered in the METAR report
7. When the visibility element is missing, the element in the METAR report is
- a. omitted
 - b. replaced with "MM"
 - c. greater than seven statute miles
 - d. greater than ten statute miles
8. Where is the RVR value reported in a METAR or SPECI report?
- a. After the wind element
 - b. After the visibility element
 - c. After the weather element
 - d. In remarks
9. The contraction used to describe a total obscuration is _____ .
- a. W
 - b. X
 - c. VV
 - d. WX
10. What is the difference between SKC and CLR?
- a. SKC is reported at manual stations when the sky is clear and CLR is reported at automated stations when the sky is clear.
 - b. CLR is reported at manual stations when the sky is clear and SKC is reported at automated stations when the sky is clear below 12,000 feet.
 - c. SKC is reported at manual stations when the sky is clear and CLR is reported at automated stations when the sky is clear below 12,000 feet.
 - d. SKC and CLR are interchangeable.
11. Cloud heights are reported in
- a. hundreds of feet
 - c. oktas

- b. meters
- d. kilometers

12. Reportable layer types are _____ .

- a. X, SCT, BKN, OVC
- b. VV, FEW, SCT, BKN, OVC
- c. -X, SCT, BKN, OVC
- d. X, FEW, SCT, BKN, OVC

13. In a METAR report, the temperature/dew point group follows the _____ element.

- a. altimeter
- b. visibility
- c. sky condition
- d. weather

14. If the temperature element is missing, the element in the METAR report is _____ .

- a. omitted
- b. replaced with "M"
- c. replaced with "MM"
- d. replaced with "/"

15. In a METAR report, the altimeter element follows the _____ .

- a. temperature/dew point group
- b. visibility element
- c. sky condition element
- d. present weather element

16. VC indicates the location of a weather phenomena is _____ .

- a. within 5 miles of the observation point
- b. between 5 and 10 miles of the observation point
- c. between 10 and 30 miles of the observation point
- d. within 10 miles of the airport

17. DSNT indicates the location of the weather phenomena is _____ .

- a. within 5 miles of the observation point
- b. between 5 and 10 miles of the airport
- c. greater than 10 miles from the observation point
- d. more than 30 miles of the airport

INSTRUCTIONS: Select the phraseology that correctly represents the meaning of the *coded* elements of a METAR report.

18. 00000KT

- a. "Wind light and variable"
- b. "Wind calm"
- c. "Wind less than three knots"
- d. "Wind light"

19. VRB02KT

- a. "Wind variable at two"
- b. "Wind light and variable at two"
- c. "Wind zero two zero and varying in speed"
- d. "Wind light and variable"

20. 32015G28KT

- a. "Wind zero three two at one five gusts two eight"
- b. "Wind three two zero at one five gusts two eight"
- c. "Wind three two zero at one five peak gust two eight"
- d. "Wind zero three two at one five peak gusts two eight"

21. 13008KT

- a. "Wind one three zero at one zero eight"
- b. "Wind one three zero at zero eight"
- c. "Wind one three zero at eight knots"
- d. "Wind one three zero at eight"

22. 32012G22KT 280V350

AT-G-61

- a. "Wind three two zero at one two peak gust two two, wind variable between two eight zero and three five zero"
- b. "Wind zero three two at one two gusts two two, wind variable between two eight zero and three five zero"
- c. "Wind three two zero at one two, gusts two two, wind variable between two eight zero and three five zero"
- d. "Wind zero three two at one two peak gusts two two, wind variable between two eight zero and three five zero"

23. 10SM

- a. "Visibility ten miles"
- b. "Visibility ten statute miles"
- c. "Visibility ten"
- d. "Visibility one zero"

24. M1/4SM

- a. "Visibility minus one-quarter mile"
- b. "Visibility less than one-quarter statute mile"
- c. "Visibility less than one-quarter"
- d. "Visibility below one-quarter"

25. R17/M500FT

- a. "RVR for runway one seven is below five hundred"
- b. "Runway one seven middle visual range five hundred feet"
- c. "Runway one seven visual range more than five hundred feet"
- d. "Runway one seven visual range less than five hundred"

26. +SHRA

- a. "Severe snow, hail, and rain"
- b. "Severe showers of rain"
- c. "Heavy rain showers"
- d. "Heavy snow and rain"

27. BLSN

- a. "Blowing snow"

- b. "Blowing sand"
- c. "Blowing spray"
- d. "Blowing mist"

28. +TSRAGR

- a. "Heavy thunderstorm, snow, rain, and snow grains"
- b. "Thunderstorm, heavy rain showers, and hail"
- c. "Severe thunderstorm, rain, and hail"
- d. "Thunderstorm, heavy rain, and hail"

29. VCSH

- a. "Volcanic ash"
- b. "Showers in the vicinity"
- c. "Very close showers"
- d. "Vicinity showers"

30. -TSRA HZ

- a. "Light thunderstorm, rain, and haze"
- b. "Thunderstorm, light rain shower, and haze"
- c. "Thunderstorm and light rain shower"
- d. "Thunderstorm, light rain, and haze"

31. -FZRASN

- a. "Light freezing rain and snow"
- b. "Light freezing rain showers"
- c. "Light freezing rain and light snow"
- d. "Freezing rain and light snow showers"

32. VV006

- a. "Indefinite ceiling six hundred"
- b. "Variable ceiling at six hundred"
- c. "Vertical visibility six hundred feet"
- d. "Vertical visibility six hundred"

33. SCT030 BKN080 OVC120

- a. "Scattered layer at three hundred, broken layer at eight hundred, overcast layer at one thousand two hundred feet"
- b. "Three thousand scattered, eight thousand broken, one two thousand overcast"
- c. "Three thousand scattered, ceiling eight thousand broken, one two thousand overcast"
- d. "Three thousand scattered, ceiling at eight thousand broken, one two thousand overcast"

34. FEW025 SCT080

- a. "Two thousand five hundred few, eight thousand scattered"
- b. "Few at two thousand five hundred, scattered at eight thousand"
- c. "Few clouds at two thousand five hundred, scattered clouds at eight thousand"
- d. "Few clouds at two thousand five hundred, eight thousand scattered"

35. FEW000 BKN250

- a. "Few cloud at the surface, broken clouds at two five thousand"
- b. "Clouds on the surface, ceiling two five thousand broken"
- c. "Few clouds less than five zero, ceiling two five thousand broken"
- d. "Sky partially obscured, broken ceiling at two five thousand"

36. 10/

- a. "Temperature one zero, dew point one zero"
- b. "Temperature ten degrees"
- c. "Temperature one zero, dew point missing"
- d. "Visibility unrestricted" (reported at automated stations only)

37. A3001

- a. "Altimeter zero zero one"
- b. "Altimeter three zero zero one"
- c. "Altimeter thirty point zero one"
- d. "Altimeter three zero point zero one"

38. PK WND 28030/45

- a. "Peak wind two eight zero at three zero, gusts four five"
- b. "Peak wind two eight zero at three zero, gusts in squalls four five"
- c. "Peak wind two eight zero at three zero occurred at four five past the hour"
- d. "Peak wind two eight zero at three zero at four five past the hour"

39. 7SM VCSH SW

- a. "Visibility seven, variable showers, southwest"
- b. "Visibility seven miles, showers in the vicinity, southwest"
- c. "Visibility seven, showers in the vicinity, southwest"
- d. "Visibility seven statute miles, showers, southwest"

40. OVC009

- a. "Ceiling niner hundred overcast"
- b. "Niner hundred overcast"
- c. "Overcast ceiling at niner hundred"
- d. "Ceiling overcast, less than one thousand"

TAF EOT

INSTRUCTIONS: Select the response that best answers the question or completes the statement.

1. The two TAF reports types are routine and _____.
 - a. corrected
 - b. delayed
 - c. special
 - d. amended

2. Which of the following is a correctly formatted origin time?
 - a. 122330
 - b. 2330
 - c. 122330Z
 - d. 2330Z

3. How often are TAFs scheduled for issuance per day?
 - a. once
 - b. twice
 - c. three times
 - d. four times

4. TAFs are normally valid for how many hours?
 - a. 6
 - b. 12
 - c. 18
 - d. 24

5. Which of the following is a correctly formatted valid time?
 - a. 0012
 - b. 141818
 - c. 0618Z
 - d. 161212Z

6. Which of the following is a correctly formatted valid time for a TAF forecast from 0000Z to 0000Z on 12 Jun 95?
 - a. 120024
 - b. 120000
 - c. 120024Z
 - d. 0000Z

7. What forecast text will appear in civilian TAFs issued for part-time locations while they are closed?
- a. "NO RPT AVAIL"
 - b. "NIL AMD SKED AFT (closing time)Z"
 - c. "NIL"
 - d. "RTD"
8. The basic format for forecast conditions are _____ .
- a. Sky Condition - Visibility - Weather - Wind
 - b. Visibility Weather - Sky Condition - Wind
 - c. Weather Sky Condition - Wind - Visibility
 - d. Wind - Visibility - Weather - Sky Condition
9. As part of the sky conditions, which cloud type(s) is/are forecast'?
- a. TCU c. ACCAS
 - b. CB d. Rotor Clouds
10. Vertical visibility is only forecast when the sky is _____ .
- a. obscured c. clear
 - b. overcast d. partially obscured
11. Obscurations to vision are always included when visibility is _____ .
- a. 5 statute miles or less
 - b. less than 5 statute miles
 - c. 6 statute miles or less
 - d. less than 6 statute miles
12. Unrestricted visibility in an Air Force TAF is coded as _____ .
- a. +6SM c. 9999SM
 - b. P6SM d. 9999
13. Which of the following is a correctly formatted valid prevailing visibility"?

- a. 11/2SM
- b. 2 1/2SM
- c. 3 SM
- d. 7SM

14. Calm winds are less than _____ knot(s)?

- a. 10 c. 5
- b. 3 d. 6

15. How are calm winds indicated in the body of the TAF report?

- a. Omitted
- b. Encoded as 00000
- c. Encoded as 00000KT
- d. Encoded as WND CLM

16. Variable wind direction is associated with which forecast condition(s)?

- a. Variable winds are not forecast.
- b. Convective activity.
- c. Light winds (less than 3 knots).
- d. Convective activity or low wind speeds.

17. How are northwest winds at 105 knots shown?

- a. 330105
- b. 330105KT
- c. 8305
- d. 8305KT

18. Wind shear is given in hundreds of feet AGL up to and including _____ feet.

- a. 1,000 c. 2,000
- b. 1,500 d. 3,000

19. What contraction denotes variable winds?

- a. VRB c. V
- b. VB d. VA-RB

20. What contraction denotes wind shear?

- a. WNSHR c. WS
- b. WDSR d. W

21. Following the above wind shear contraction, which example depicts correctly encoded wind shear?

- a. 2205SKT/010AGL,
- b. 010/22055KT
- c. 010AGL/22055KT
- d. 22055KT010

22. How are ceilings shown in TAF reports?

- a. With the contraction CIG
- b. As either measured (M) or estimated (E)
- c. The first cloud layer
- d. Vertical visibility or the lowest broken or overcast cloud layer aloft

23. PROB40 is used in a civilian TAF when the occurrence of a thunderstorm or precipitation event is _____ percent.

- a. 40
- b. 30 to 50
- c. 30 to less than 50
- d. less than 50

24. When a forecaster uses PROB40 in a civilian TAF report, they are expecting the weather event _____ .

- a. will occur
- b. will occasionally occur
- c. has a chance of occurring
- d. has a slight chance of occurring

25. What do the four digits following the PROB40 contraction indicate?

- a. The hour and minute after which the weather event is expected.
- b. The time period during which the weather event is expected.
- c. The duration of the weather event.
- d. The mean wind direction and speed.

26. Events forecast to last less than an hour are encoded with what contraction?

- a. OCNL

- b. CHC
- c. EXPD
- d. TEMPO

27. Events described by TEMPO are expected to _____ .

- a. occur
- b. possibly occur
- c. have a chance of occurring
- d. have a slight chance of occurring

28. The FM contraction is used to indicate _____ .

- a. rapid changes
- b. gradual changes
- c. temporary
- d. an outlook forecast

29. What does the four-digit time period following the BECMG contraction indicate?

- a. Becoming hour and minute
- b. Duration of the BECMG event
- c. Time period when the change is expected
- d. Ending hour and minute of the BECMG event

30. What does the four-digit time appended to the FM contraction indicate?

- a. The hour and minute the change is expected
- b. The duration of the FM event
- c. The time period during which the change will occur
- d. The ending hour and minute of the FM event

METAR / TAF GLOSSARY

3-hourly report. A METAR report taken at 0300, 0900, 1500, or 2100 UTC.

6-hourly report. A METAR report taken at 0000, 0600, 1200, or 1800 UTC.

Actual Time of Observation. For METAR reports, it is the time the last element of the report is observed or evaluated. For SPECI reports, it is the time that the criteria for a SPECI was met or noted.

Additive Data. A group of coded remarks that includes pressure tendency, amount of precipitation, and maximum/minimum temperature during specified periods of time.

Aircraft Mishap. An inclusive term to denote the occurrence of an aircraft accident or incident.

Airport Location Point (ALP). The permanent airport reference point defined by the latitude and longitude published in the Airport Facility Directory.

Algorithm. A set of rules implemented (usually in a computer) to process data and generate defined outputs.

Altimeter Setting. That pressure value to which an aircraft altimeter scale is set so that it will indicate the altitude above mean sea-level of an aircraft on the ground at the location for which the value was determined.

Archives. A permanent record of surface weather reports and related data used to establish a climatological record for the United States.

Atmospheric Pressure. The pressure exerted by the atmosphere at a given point (see altimeter setting, pressure, sea-level pressure, station pressure).

Augmented Report. A meteorological report prepared by an automated surface weather observing system for transmission with certified weather observers signed on to the system to add information to the report.

Automated Report. A meteorological report prepared by an automated surface weather observing system for transmission, and with no certified weather observers signed on to the system.

Backup. An alternate method for providing a meteorological report, parts of reports, documentation, or communication of reports when the primary method is unavailable.

Barogram. An analog record of pressure produced by a barograph.

Barograph. A recording barometer.

Barometer. An instrument that measures atmospheric pressure.

Barometric Pressure. The actual pressure value indicated by a pressure sensor.

Blowing. A descriptor used to amplify observed weather phenomena whenever the phenomena are raised to a height of 6 feet or more above the ground.

Blowing Dust. Dust picked up locally from the surface of the earth and blown about in clouds or sheets, reducing the horizontal visibility to less than 7 statute miles.

Blowing Sand. Sand particles picked up from the surface of the earth by the wind to moderate heights above the ground, reducing the reported horizontal visibility to less than 7 statute miles.

Blowing Snow. Snow lifted from the surface of the earth by the wind to a height of 6 feet or more above the ground and blown about in such quantities that horizontal visibility is restricted at and above that height.

Blowing Spray. Water droplets torn by the wind from a body of water, generally from the crests of waves, and carried up into the air in such quantities that they reduce the reported horizontal visibility to less than 7 statute miles (*Air Force TAF: - 10,500 meters*).

Body of Report. That portion of a METAR or SPECI report beginning with the type of report and ending with the altimeter setting.

Broken Layer. A cloud layer covering whose summation amount of sky cover is 5/8 through 7/8.

Calm. A condition when no motion of the air is detected.

Candela. A unit of luminous intensity, equal to 1/60 of the luminous intensity of a square centimeter of a black body heated to 1773.5 degrees Celsius.

Ceiling. The height above the earth's surface (field elevation or ground elevation) of the lowest non-surface based layer that is reported as broken or overcast, or the vertical visibility into an indefinite ceiling.

Ceiling Light. A type of cloud-height indicator that uses a focused light to project vertically a narrow beam of light onto a cloud base.

Ceilometer. A device used to evaluate the height of clouds or the vertical visibility into a surface-based obscuration.

Certified Observer. An individual approved by designated agencies to take surface weather observations approved for use in aircraft operations.

Clear Sky. The state of the sky when it is cloudless.

Cloud. A visible aggregate of minute water droplets or ice particles in the atmosphere above the Earth's surface.

Cloud-Air Lightning (CA). Streaks of lightning which pass from a cloud to the air, but do not strike the ground.

Cloud-Cloud Lightning (CC). Streaks of lightning reaching from one cloud to another.

Cloud-Ground Lightning (CG). Lightning occurring between cloud and ground.

Cloud Height. The height of the base of a cloud or cloud layer above the surface of the earth.

Cloud Layer. An array of clouds whose bases are at approximately the same level.

Cloud Movement. The direction toward which a cloud is moving.

Cloud Type. A cloud form which is identified according to the WMO International Cloud Atlas.

Contraction. A shortened form of a word, title, or phrase used for brevity.

Coordinated Universal Time (UTC). The time in the zero degree meridian time zone.

Cumulus. A principal cloud type in the form of individual, detached elements which are generally dense and possess sharp non-fibrous outlines.

Cumulonimbus. An exceptionally dense and vertically developed cloud, occurring either isolated or as a line or wall of clouds with separated upper portions. These clouds appear as mountains or huge towers, at least a part of the upper portions of which are usually smooth, fibrous, or striated, and almost flattened.

Designated RVR Runway. A runway at civilian airports designated by the FAA for reporting RVR in longline transmissions.

Designated Stations. Weather observing stations that have been instructed by their responsible agency to perform a specified task that is not required by standards to be performed at all stations.

Dew Point. The temperature to which a given parcel of air must be cooled at constant pressure and constant water-vapor content in order for saturation to occur.

Diamond Dust. (See ice crystals).

Dispatch Visual Range. A visual range value derived from an automated visibility sensor.

Dissemination. The act of delivering a completed weather report to users.

Drizzle. Fairly uniform precipitation composed exclusively of fine drops (diameter less than 0.02 inch or 0.5 mm) very close together. Drizzle appears to float while following air current, although unlike fog droplets, it falls to the ground.

Duration of Sunshine. The amount of time sunlight was detected occurring at a given point.

Dust. (see widespread dust).

Duststorm. An unusual, frequently severe weather condition characterized by strong winds and dust-filled air over an extensive area.

Element. One of the basic conditions of the atmosphere discussed in this training guide (wind, visibility, runway visual range, weather, obstructions to vision, sky condition, temperature and dew point, and pressure). (See parameter).

Few. A layer whose summation amount of sky cover is greater than zero but less than 2/8.

Field Elevation. The elevation above sea level of the highest point on any of the runways of the airport.

Fog. A visible aggregate of minute water particles (droplets) which are based at the earth's surface and reduce horizontal visibility to less than 5/8SM and, unlike drizzle, it does not fall to the ground.

Freezing. A descriptor, FZ, used to describe drizzle and/or rain that freezes on contact with the ground or exposed objects, and used also to describe fog that is composed of minute ice crystals.

Freezing Drizzle. Drizzle that freezes upon impact with the ground, or other exposed objects.

Freezing Fog. A suspension of numerous minute ice crystals in the air, or water droplets at temperatures below 0° Celsius, based at the earth's surface, which reduces horizontal visibility; also called ice fog.

Freezing Precipitation. Any form of precipitation that freezes upon impact and forms a glaze on the ground or exposed objects.

Freezing Rain. Rain that freezes upon impact and forms a glaze on the ground or exposed objects.

Frozen Precipitation. Any form of precipitation that reaches the ground in solid form (snow, small hail and/or snow pellets, snow grains, hail, ice pellets, and ice crystals).

Funnel Cloud. A violent, rotating column of air which does not touch the ground, usually appended to a cumulonimbus cloud.

Glaze. Ice formed by freezing precipitation covering the ground or exposed objects.

Ground Elevation. The official height of a weather station with reference to sea-level when a field elevation has not been established. It is the height of the ground at the base of the ceilometer.

Ground Fog. (See shallow fog).

Gust. Rapid fluctuations in wind speed with a variation of 10 knots or more between peaks and lulls.

Hail. Precipitation in the form of small balls or other pieces of ice falling separately or frozen together in irregular lumps.

Haze. A suspension in the air of extremely small, dry particles invisible to the naked eye and sufficiently numerous to give the air an opalescent appearance.

Hectopascal. A unit of measure of atmospheric pressure equal to 100 newtons per square meter.

Horizon. The actual lower boundary of the observed sky or the upper outline of terrestrial objects, including nearby natural obstructions. It is the distant line along which the earth, or the water surface at sea, and the sky appear to meet.

Ice Crystals (Diamond Dust). A fall of unbranched (snow crystals are branched) ice crystals in the form of needles, columns, or plates.

Ice Fog. (See freezing fog).

Ice Pellets. Precipitation of transparent or translucent pellets of ice, which are round or irregular, rarely conical, and which have a diameter of 0.2 inch (5 mm), or less. There are two main types:

- a. Hard grains of ice consisting of frozen raindrops, or largely melted and refrozen snowflakes.
- b. Pellets of snow encased in a thin layer of ice which have formed from the freezing, either of droplets intercepted by the pellets, or of water resulting from the partial melting of the pellets.

In-Cloud Lightning (IC). Lightning which takes place within the thunder cloud.

Indefinite Ceiling. The ceiling classification applied when the reported ceiling value represents the vertical visibility upward into surface-based obscuration.

Intensity Qualifier. Intensity qualifiers are used to describe whether a phenomena is light (-), moderate (no symbol used), or heavy (+).

Layer. An array of clouds aloft whose bases are at approximately the same level.

Layer Amount. The amount of sky covered by clouds at a given level above the earth's surface.

Layer Height. The height of the bases of each reported layer of cloud above the surface or field elevation, or the vertical visibility into an indefinite ceiling.

Lightning. The luminous phenomenon accompanying a sudden electrical discharge (see cloud-air lightning, cloud-cloud lightning, cloud-ground lightning and in-cloud lightning).

Liquid Precipitation. Any form of precipitation that does not fall as frozen precipitation and does not freeze upon impact.

Local Dissemination. The transmission or delivery of a weather report to individuals or groups of users near the weather station.

Local Standard Time (LST). A time based on the geographic location of the station in one of the legally established time zones of the globe.

Long-Line Dissemination (also long-line transmission). The transmission of a weather report by a communication media to a group of users on a regional or national scale.

Long-Term Retention. Retention of data for 5 years to satisfy requirements for local studies and to support litigation.

Low Drifting. A descriptor, DR, used to describe snow, sand, or dust raised to a height of less than 6 feet above the ground.

Low Drifting Dust. Dust that is raised by the wind to less than 6 feet above the ground; visibility is not reduced below 7 statute miles (*Air Force TAF: - 9999 meters*) at eye level although objects below this level may be veiled or hidden by the particles moving nearly horizontal to the ground.

Low Drifting Sand. Sand that is raised by the wind to less than 6 feet above the ground; visibility is not reduced below 7 statute miles (*Air Force TAF: - 9999 meters*) at eye level although objects below this level may be veiled or hidden by the particles moving nearly horizontal to the ground.

Low Drifting Snow. Snow that is raised by the wind to less than 6 feet above the ground; visibility is not reduced below 7 statute miles (*Air Force TAF: - 9999 meters*) at eye level although objects below this level may be veiled or hidden by the particles moving nearly horizontal to the ground.

Manual Station. A station, with or without an automated surface weather observing system, where the certified observers are totally responsible for all meteorological reports that are transmitted.

Maximum temperature. The highest temperature during a specified time period.

May. A term used to indicate that a procedure or practice is optional.

METAR/SPECI. An evaluation of select weather elements from a point or points on or near the ground according to a set of procedures. It may include type of report, station identifier, date and time of report, a report modifier, wind, visibility, runway visual range, weather and obstructions to vision, sky condition, temperature and dew point, altimeter setting, and remarks.

METAR/SPECI Code. WMO code forms (FM 15-IX Ext. TAR and FM 16-IX Ext. SPECI, respectively) consisting of abbreviations, contractions, numbers, plain language, and symbols to provide a uniform means of disseminating surface weather reports.

Minimum Temperature. The lowest temperature during a specified time period.

Mist. A hydrometer consisting of air aggregate of microscopic and more-or-less hygroscopic water droplets or ice crystals suspended in the atmosphere that reduces visibility to less than 6 statute miles (*Air Force TAF: - 9000 meters*) but greater than or equal to 5/8SM (*Air Force TAF: - 1000 meters*).

Non-uniform sky condition. A localized sky condition which varies from that reported in the body of the report.

Non-uniform Visibility. A localized visibility which varies from that reported in the body of the report.

Obscurations. Any aggregate of particles in contact with the earth's surface that is dense enough to be detected from the surface of the earth. Also, any phenomenon in the atmosphere, other than precipitation, that, reduces the horizontal visibility.

Obscured sky. The condition when the entire sky is hidden by surface-based obscurations.

Observing Location. The point or points from which air element is evaluated.

Observing Station. The point or points from which the various elements of the report are evaluated.

Overcast. A layer of clouds whose summation amount of sky cover is 8/8.

Parameter. A subset of the group of evaluations that constitute each element of an observation, i. e., sky condition is an element, sky cover and ceiling are parameters.

Partial. A descriptor, PR, used only to report fog that covers part of the airport.

Partial Fog. Fog covering part of the station and which extends to at least 6 feet above the ground and apparent visibility in the fog is less than 5/8SM (*Air Force TAF: - 1000 meters*). Visibility over parts of the station are less than or equal to 5/8SM (*Air Force TAF: - 1000 meters*).

Partial Obscuration. The portion of the sky cover (including higher clouds, the moon, or stars) hidden by weather phenomena in contact with the surface.

Patches. A descriptor, BC, used only to report fog that occurs in patches at the airport.

Patches (of) Fog. Fog covering part of the station and which extends to at least 6 feet above the ground and the apparent visibility in the fog patch or bank is less than 5/8SM (*Air Force TAF: - 1000 meters*). Visibility in parts of

the observing area is greater than or equal to 5/8SM (*Air Force TAF: - 1000 meters*). When the fog is close to the point of observation, the minimum visibility reported will be less than 5/8SM (*Air Force TAF: - 1000 meters*).

Peak Wind Speed. The minimum instantaneous wind speed since the last METAR that exceeded 25 knots.

Precipitation. Any of the forms of water particles, whether liquid or solid, that fall from the atmosphere and reach the ground.

Precipitation Discriminator. A sensor, or array of sensors, that differentiates between different types of precipitation (liquid, freezing, frozen).

Precipitation Intensity. An indication of the rate at which precipitation is falling at the time of observation.

Precipitation Rate. The amount of water, liquid or solid, that reaches the ground in a specified period of time.

Pressure. The force exerted by a column of air above the point of measurement.

Pressure Change. The net difference between pressure readings at the beginning and ending of a specified interval of time.

Pressure Characteristic. The indication of how the pressure has been changing during a specified period of time, usually the 3-hour period preceding an observation, e.g., decreasing then increasing, pressure same or lower than 3 hours ago.

Pressure Falling Rapidly. A decrease in station pressure at a rate of 0.06 inch of mercury or more per hour which totals 0.02 inch or more.

Pressure Reduction Calculator. A device used to compute sea-level pressure, station pressure, altimeter setting, pressure altitude, etc.

Pressure Rising Rapidly. An increase in station pressure at a rate of 0.06 inch of mercury or more per hour which totals 0.02 inch or more.

Pressure Tendency. The character and amount of atmospheric pressure change during a specified period of time, usually the 3-hour period preceding an observation.

Pressure Unsteady. A pressure that fluctuates by 0.03 inch of mercury or more from the mean pressure during the period of measurement.

Prevailing Visibility. The visibility that is considered representative of conditions at the station, the greatest distance that can be seen throughout at least half the horizon circle, not necessarily continuous.

Rain. Precipitation, either in the form of drops larger than 0.02 inch (0.5 mm), or smaller drops, which in contrast to drizzle, are widely separated for automated stations, precipitation that remains in the liquid state upon impact with the ground or other exposed objects.

Remarks. Plain language or coded data added to the body of the METAR/SPECI to report significant information not provided for in the body of the report.

Rotor Cloud. A turbulent cloud formation found in the lee of some large mountain barriers. The air in the cloud rotates around an axis parallel to the mountain range.

Runway Visual Range (RVR). An instrumentally-derived value, based on standard calibrations, that represents the horizontal distance a pilot may see down the runway from the approach end.

Sand. Loose particles of granular material.

Sandstorm. Particles of sand ranging in diameter from 0.008 to 1 mm that are carried aloft by a strong wind. The sand particles are mostly confined to the lowest ten feet, and rarely rise more than fifty feet above the ground.

Scattered. A layer whose summation amount of sky cover is 3/8 through 4/8.

Scheduled Time of Report. The time a scheduled report is required to be available for transmission.

Sea-Level Pressure. The pressure value obtained by the theoretical reduction or increase of barometric pressure to sea-level.

Sector Visibility. The visibility in a specified direction that represents at least a 45 degree arc of the horizon circle.

Shall. A term used to indicate that a procedure or practice is mandatory.

Shallow. A descriptor, MI, used only to describe fog when the visibility at 6 feet above the ground is 5/8SM (*Air Force TAF: - 1000 meters*) or more and the apparent visibility in the fog layer is less than 5/8SM (*Air Force TAF: - 1000 meters*).

Shallow Fog. Fog in which the visibility at 6 feet above ground level is 5/8SM (*Air Force TAF: - 1000 meters*) or more and the apparent visibility in the fog layer is less than 5/8SM (*Air Force TAF: - 1000 meters*).

Sheet Ice. Ice formed by the freezing of liquid precipitation or the freezing of melted solid precipitation (see snow depth).

Short-Term Storage. Storage of data for 4 or more days to assist in sensor/system maintenance and verification of sensor/system records in the event of an aircraft mishap.

Should. A term used to indicate a procedure or practice is recommended.

Shower(s). A descriptor, SH, used to qualify precipitation characterized by the suddenness with which they start and stop, by the rapid changes of intensity, and usually by rapid changes in the appearance of the sky.

Significant Clouds. Cumulonimbus, cumulonimbus mammatus, towering cumulus, altocumulus castellanus, and standing lenticular or rotor clouds.

Sky Condition. The state of the sky in terms of such parameters as sky cover, layers and associated heights, ceiling, and cloud types.

Sky Cover. The amount of the sky which is covered by clouds or partial obscurations in contact with the surface,

Small Hail. (See snow pellets).

Smoke. A suspension in the air of small particles produced by combustion. A transition to haze may occur when smoke particles have traveled great distances (25 to 100 statute miles or more) and when the larger particles have settled out and the remaining particles have become widely scattered through the atmosphere.

Snow. Precipitation of snow crystals, mostly branched in the form of six-pointed stars, for automated stations, any form of frozen precipitation other than hail.

Snow Depth. The vertical height of frozen precipitation on the ground. For this purpose, frozen precipitation includes ice pellets, glaze, hail, any combination of these, and sheet ice formed directly or indirectly from precipitation.

Snow Grains. Precipitation of very small, white, opaque grains of ice; the solid equivalent of drizzle.

Snow Pellets. Precipitation of white, opaque grains of ice. The grains are round or sometimes conical. Diameters range from about 0.08 to 0.2 inch (2 to 5 mm).

SPECI. A surface weather report taken to record a change in weather conditions that meets specified criteria or is otherwise considered to be significant.

Spray. An ensemble of water droplets torn by the wind from an extensive body of water, generally from the crests of waves, and carried up into the air in such quantities that it reduces the horizontal visibility.

Squall. A strong wind characterized by a sudden onset in which wind speeds increase to at least 16 knots and are sustained at 22 knots or more for at least one minute.

Standard Atmosphere. A hypothetical vertical distribution of the atmospheric temperature, pressure, and density, which by international agreement is considered to be representative of the atmosphere for pressure altimeter calibrations and other purposes (29.92INS or 1013hPa).

Standing Lenticular Cloud. A, more or less, isolated cloud with sharp outlines that is generally in the form of a smooth lens or almond. These clouds often form on the lee side of and generally parallel to mountain ranges. Depending on their height above the surface, they may be reported as stratocumulus standing lenticular cloud (SCSL); altocumulus standing lenticular cloud (ACSL); or cirrocumulus standing lenticular cloud (CCSI).

Station Elevation. The officially designated height above sea-level to which station pressure pertains. It is generally the same as field elevation at an airport station.

Station Identifier. A four alphabetic character code group used to identify the observing location.

Station Information File. A record that documents the site characteristics of a surface weather station and the reporting program at the station.

Station Pressure. The atmospheric pressure at the designated station elevation.

Summation Layer Amount. A categorization of the amount of sky cover at and below each reported layer of cloud.

Summation Principle. This principle states that the sky cover at any level is equal to the summation of the sky cover of the lowest layer, plus the additional sky cover present at all successively higher layers up to and including the layer being considered.

Surface. The horizontal plane whose elevation above sea level equals the field elevation. At stations where the field elevation has not been established, the surface refers to the ground elevation at the observation site.

Surface Visibility. The prevailing visibility determined from the usual point of observation.

Synoptic Surface Weather Observation. Surface weather observations evaluated in accordance with WMO regulations (perhaps modified by national practices). These observations are reported no more frequently than every 3 hours.

Temperature. A measure of the hotness or coldness of the ambient air as measured by a suitable instrument.

Thunderstorm. A descriptor, TS, used to qualify precipitation produced by a cumulonimbus cloud that is accompanied by lightning and thunder, or for automated systems, a storm detected by lightning detection systems.

Time of Occurrence. A report of the time weather begins and ends.

Tornadic Activity. The occurrence or disappearance of tornadoes, funnel clouds, or waterspouts.

Tornado. A violent, rotating column of air touching the ground; funnel cloud that touches the ground (see funnel cloud and water spout).

Tower Visibility. The prevailing visibility determined from the airport traffic control tower when the surface visibility is determined from another location.

Towering Cumulus. A descriptive term for a cloud with generally sharp outlines and with moderate to great vertical development, characterized by its cauliflower or tower appearance.

Type of Report. A code (METAR, SPECI) included in the weather report to indicate the content of the observation, and to indicate whether certain reporting criteria have been met.

Type of Station. A code figure (AO1, or AO2) for automated stations which is included in the remarks section of the report to indicate the scope of the observation program at the station that generated the report.

Unknown Precipitation. Precipitation type that is reported if the automated station detects the occurrence of light precipitation but the precipitation discriminator cannot recognize the type.

Variable Ceiling. A ceiling of less than 3,000 feet which rapidly increases or decreases in height by established criteria during the period of observation.

Variable Layer Amounts. A condition when the reportable amount of a layer varies by one or more reportable values during the period it is being evaluated (variable sky condition).

Variable Prevailing Visibility. A condition when the prevailing visibility is less than 3 statute miles and rapidly increases and decreases by 1/2 mile or more during the period of observation.

Variable Wind Direction. A condition when (1) the wind direction fluctuates by 60 degrees or more during the 2-minute evaluation period and the wind speed is greater than 6 knots, or (2) the direction is variable and the wind speed is 6 knots or less.

Vertical Visibility. A subjective or instrumental evaluation of the vertical distance into a surface-based obscuration that an observer would be able to see.

Vicinity. A proximity qualifier, VC, used to indicate weather phenomena observed between 5 and 10 statute miles (*Air Force TAF: - 8000 - 9999 meters*) of the usual point of observation but not at the station.

Virga. Visible wisps or strands of precipitation falling from clouds that evaporate before reaching the surface.

Visibility. The greatest horizontal distance at which selected objects can be seen and identified or its equivalent derived from instrumental measurements.

Visibility Reference Points. Selected objects at known distances from the weather station that are used to manually evaluate visibility.

Volcanic Ash. Fine particles of rock powder that originate blown out from a volcano and that may remain suspended in the atmosphere for long periods. The ash is a potential hazard to aircraft operations and may be an obscuration.

Volcanic Eruption. An explosion caused by the intense heating of subterranean rock which expels lava, steam, ashes, etc., through vents in the earth's crust.

Water Equivalent. The liquid content of solid precipitation that has accumulated on the ground (snow depth). The accumulation may consist of snow, ice formed by freezing precipitation, freezing liquid precipitation, or ice formed by the refreezing of melted snow.

Waterspout. A violent, rotating column of air that forms over a body of water, and touches the water surface; tornado or funnel cloud that touches a body of water (see funnel cloud and tornado),

Weather. A category of individual and combined atmospheric phenomena which must be drawn upon to describe the local atmospheric conditions at the time of observation.

Well-Developed Dust/Sand Whirl. An ensemble of particles of dust or sand, sometimes accompanied by small litter, raised from the ground in the form of a whirling column of varying height with a small diameter and an approximately vertical axis.

Widespread Dust. Fine particles of earth or other matter raised or suspended in the air by the wind that may have occurred at or far away from the station.

Will. A term used to indicate futurity; it is not a requirement to be applied to practices.

Wind. The horizontal motion of the air past a given point.

Wind Character. The description of the variability of the wind speed in terms of gusts.

Wind Direction. The true direction from which the wind is moving at a given location.

Wind Gust. (See gust).

Wind Sheer. A rapid change in wind speed and/or direction resulting in a tearing or sheering affect.

Wind Shift. A change in the wind direction of 45 degrees or more in less than 15 minutes with sustained wind speeds of 10 knots or more throughout the wind shift.

Wind Speed. The rate at which air is moving horizontally past a given point. It may be a 2-minute average speed (reported as wind speed) or an instantaneous speed (reported as a peak wind speed, or gust).

METAR / TAF CONTRACTIONS

\$	Maintenance Check Indicator
-	Light Intensity
+	Heavy Intensity
/	Indicator that visual range data follows; Separator between temperature and dew point data.
ACC	Alto cumulus Castellanus
ACFT MSHP	Aircraft Mishap
ACSL	Alto cumulus Standing Lenticular Cloud
AO1	Automated Station Without Precipitation Discriminator
AO2	Automated Station With Precipitation Discriminator
ALP	Airport Location Point
APCH	Approach
APRNT	Apparent
APRX	Approximately
ATCT	Airport Traffic Control Tower
AUTO	Fully Automated Report
B	Began
BC	Patches
BKN	Broken

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BL	Blowing
BR	Mist
C	Center (with reference to runway designation)
CA	Cloud-Air Lightning
CB	Cumulonimbus Cloud
CBMAM	Cumulonimbus Mammatus Cloud
CC	Cloud-Cloud Lightning
CCSL	Cirrocumulus Standing Lenticular Cloud
cd	Candela
CG	Cloud-Ground Lightning
CHI	Cloud-Height Indicator
CHINO	Sky condition at secondary location not available
CIG	Ceiling
CLR	Clear
CONS	Continuous
COR	Correction to a previously disseminated observation
DOC	Department of Commerce
DOD	Department of Defense
DOT	Department of Transportation
DR	Low Drifting
DS	Duststorm
DSIPTG	Dissipating

DSNT	Distant
DU	Widespread Dust
DVR	Dispatch Visual Range
DZ	Drizzle
E	East, Ended, Estimated Ceiling (SAO)
FAA	Federal Aviation Administration
FC	Funnel Cloud
FEW	Few Clouds
FG	Fog
FIBI	Filed but impracticable to transmit
FIRST	First observation after a break in coverage at manual station
FRQ	Frequent
FROPA	Frontal Passage
FT	Feet
FU	Smoke
FZ	Freezing
FZRANO	Freezing rain sensor not available
GR	Hail
GS	Small Hail and/or Snow Pellets
HLSTO	Hailstone
HZ	Haze

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IC	Ice Crystals, In-Cloud Lightning
ICAO	International Civil Aviation Organization
INCRG	Increasing
INTMT	Intermittent
KT	Knots
L	Left (with reference to runway designation)
LAST	Last observation before a break in coverage at a manual station
LST	Local Standard Time
LTG	Lightning
LWR	Lower
M	Minus, Less Than
max	Maximum
METAR	Routine weather report provided at fixed intervals
MI	Shallow
min	minimum
MOV	Moved/Moving/Movement
MT	Mountains
N	North
N/A	Not Applicable
NCDC	National Climatic Data Center
NE	Northeast
NOS	National Ocean Survey

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NOSPECI	No SPECI reports are taken at the station
NOTAM	Notice to Airmen
NW	Northwest
NWS	National Weather Service
OCNL	Occasional
OFCM	Office of the Federal Coordinator for Meteorology
OHD	Overhead
OVC	Overcast
OVR	Over
P	Indicates greater than the highest reportable value
PCPN	Precipitation
PE	Ice Pellets
PK WND	Peak Wind
PNO	Precipitation Amount Not Available
PO	Dust/Sand Whirls (Dust Devils)
PR	Partial
PRES	Pressure
PRESFR	Pressure Falling Rapidly
PRESRR	Pressure Rising Rapidly
PWINO	Precipitation Identifier Sensor Not Available
PY	Spray

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R	Right (with reference to runway designation)
RA	Rain
RTD	Routine Delayed (late) Observation
RV	Reportable Value
RVR	Runway Visual Range
RVRNO	RVR system values not available
RY	Runway
S	Snow, South
SA	Sand
SCSL	Stratocumulus Standing Lenticular Cloud
SCT	Scattered
SE	Southeast
SFC	Surface
SG	Snow Grains
SH	Shower(s)
SKC	Sky Clear
SLP	Sea-Level Pressure
SLPNO	Sea-Level Pressure not available
SM	Statute Miles
SN	Snow
SNINCR	Snow Increasing Rapidly
SP	Snow Pellets

SPECI	An unscheduled report taken when certain criteria have been met
SQ	Squalls
SS	Sandstorm
STN	Station
SW	Snow Shower, Southwest
TCU	Towering Cumulus
TS	Thunderstorm
TSNO	Thunderstorm information not available
T	Tower
UNKN	Unknown
UP	Unknown Precipitation
UTC	Coordinated Universal Time
V	Variable
VA	Volcanic Ash
VC	In The Vicinity
VIS	Visibility
VISNO	Visibility at secondary location not available
VR	Visual Range
VRB	Variable
VV	Vertical Visibility
W	West

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WG/SO Working Group for Surface Observations

WMO World Meteorological Organization

WND Wind

WSHFT Wind Shift

Z Zulu, i.e., Coordinated Universal Time

METAR End Of Training ANSWERS

1. A METAR
2. B K
3. B PA
4. C The absence of a modifier
5. B Wind
6. C Entering the minimum and maximum visibility in remarks preceded by VIS and separated by V
7. A Omitted
8. B After the visibility element
9. C VV
10. C SKC is reported at manual stations when the sky is clear and CLR is reported at automated stations when the sky is clear below 12,000 feet
11. A Hundreds of feet
12. B VV, FEW, SCT, BKN, OVC
13. C Sky condition
14. A Omitted
15. A Temperature/Dew point group
16. B Between 5 and 10 miles of the observation point
17. C Greater than 10 miles of the airport
18. B "Wind calm"
19. A "Wind variable at two"
20. B "Wind three two zero at one five gusts two eight"
21. D "Wind one three zero at eight"
22. C "Wind three two zero at one two, gusts two two, wind variable between two eight zero and three five zero"
23. D "Visibility one zero"
24. C "Visibility less than one-quarter"
25. D "Runway one seven visual range less than five hundred"
26. C "Heavy rain showers"
27. A "Blowing snow"
28. D "Thunderstorm, heavy rain, and hail"
29. B "Showers in the vicinity"
30. D "Thunderstorm, light rain, and haze"
31. A "Light freezing rain and snow"
32. A "Indefinite ceiling six hundred"
33. C "Three thousand scattered, ceiling at eight thousand broken, one two thousand overcast"
34. D "Few clouds at two thousand five hundred, eight thousand scattered"
35. C "Few clouds less than five zero, ceiling two five thousand broken"
36. C "Temperature one zero, dew point missing"
37. B "Altimeter three zero zero one"

- 38. C "Peak wind two eight zero at three zero occurred at four five past the hour"
- 39. C "Visibility seven, showeres in the vicinity, southwest
- 40. A "Ceiling niner hundred overcast"

TAF End Of Training ANSWERS

- 1. D Amended
- 2. C 122330Z
- 3. D Four times
- 4. D 24
- 5. B 141818
- 6. A 120024
- 7. C "NIL"
- 8. D Wind - visibility - weather - sky condition
- 9. B CB
- 10. A Obscured
- 11. C 6 statute miles or less
- 12. D 9999
- 13. B 2 1/2SM
- 14. B 3
- 15. C Encoded asa 00000KT
- 16. D Convective activity or low wind speeds
- 17. B 330105KT
- 18. C 2,000
- 19. A VRB
- 20. C WS
- 21. B 010/22055KT
- 22. D Vertical visibility or the lowest broken or overcast cloud layer aloft
- 23. C 30 to less than 50
- 24. C Has a chance of occurring
- 25. B The time period during which the weather event is expected
- 26. D TEMPO
- 27. A Occur
- 28. A Rapid changes
- 29. C Time period during which the change will occur
- 30. A The hour and minute the change is expected