BY ORDER OF THE SECRETARY OF THE AIR FORCE

AIR FORCE MANUAL 15-124

16 JANUARY 2019

Weather

METEOROLOGICAL CODES

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

ACCESSIBILITY: Publications and forms are available on the e-Publishing website at **www.e-Publishing.af.mil**

RELEASABILITY: There are no releasability restrictions on this publication

---

OPR: HQ USAF/A3WP

Certified by: HQ USAF/A3W (Mr. Ralph O. Stoffler)

Supersedes: AFMAN15-124, 28 February 2013

Pages: 88

This manual implements Air Force (AF) Policy Directive (AFPD) 15-1, *Weather Operations*, as well as AF coding practices derived from World Meteorological Organization (WMO) No. 306, *Manual on Codes*, Volume 1.I, Part A and other codes that are not covered in No. 306. This publication applies to all personnel responsible for weather operations to include AF Reserve, Air National Guard (ANG) and government contractors performing weather operations in support of Federal missions. This AF Manual (AFMAN) may be supplemented at any level, but all supplements that directly implement this publication must be routed to the office of primary responsibility (OPR) for coordination prior to certification and approval. Refer recommended changes to the OPR using AF Form 847, *Recommendation for Change of Publication*; route AF Form 847s from the field through the appropriate functional office within the chain of command. The authorities to waive wing/organization level requirements in this publication are identified with a Tier number ("**T-0, T-1, T-2, T-3**") following the compliance statement. See AFI 33-360, *Publications and Forms Management*, for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority. Ensure all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual 33-363, Management of Records, and disposed of in accordance with the Air Force Records Disposition Schedule located in the Air Force Records Information Management System. . The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

SUMMARY OF CHANGES

This publication has been revised to provide an overview, background information, and roles and responsibilities to ensure compliance with publication guidance in AFI 33-360. In addition, some of the guidance language has been revised for clarity and more logical flow. Core guidance regarding meteorological codes has not changed.

Chapter 1

AIR FORCE TERMINAL AERODROME FORECAST (TAF) CODE

1.1. Roles and Responsibilities. The procedures in this manual apply to all AF Weather organizations or associated contractors performing forecasting of weather and solar operations in support of AF, Army or DoD wide operations. Compliance items for this publication are driven by international policy to ensure safety of aviation. This chapter gives instructions for encoding Terminal Aerodrome Forecasts (TAFs). Air Force weather organizations specify, amend, and disseminate TAFs in accordance with AFI 15-128, *Weather Roles and Responsibilities* and AFMAN 15-129 Volume 1, *Air and Space Weather Operations – Characterization*.

1.2. Code Format. Air Force weather forecast coding practices are derived from international standards established by the World Meteorological Organization (WMO) as published in WMO No. 306, *Manual on Codes*, Volume I.1, Part A, Section FM 51, Aerodrome Forecast, and aligns with practices of the Aviation Routine Weather Report (METAR) code found in AFMAN 15-111, *Surface Weather Observations*.

1.2.1. Unless otherwise specified, forecast elements in the main body of the forecast text (clouds, weather, wind, etc.) apply to the area at or within a 5 statute mile radius of the center of the aerodrome. Specified weather greater than 5 statute miles but less than or equal to 10 statute miles of the aerodrome center is encoded as VC (in the vicinity). **(T-0)** Do not specify elements outside of the "vicinity" in forecasts.

1.2.2. Forecast elements represent the expected condition during the forecast period and in the forecast area.

1.3. TAF Encoding.

1.3.1. TAF Code Format. Use the following format in **Figure 1.1** for encoding TAFs:

Figure 1.1. TAF Code Format.

MESSAGE HEADING **TAF (AMD or COR) CCCC YYGGggZ YYG1G1/YYG2G2 dddffGfmfmKT VVVV w'w' NsNsNshshshsCC or VVhshshs or SKC (VAbbbttt) (WShxhxhx/dddfffKT) (6IchihihitL) (5BhBhBhBtL) QNHP1P1P1P1INS (Remarks)** **TTTTT YYGGGeGe or YYGG/YYGeGe ddffGfmfmKT…same as above… (Remarks)** **TX(M)TFTF/YYGFGFZ TN(M)TFTF/YYGFGFZ**

1.3.1.1. Make all TAFs valid for a 30-hour forecast period.

1.3.1.2. Use groups in parentheses only as condition exists or as required.

1.3.2. Specification of Symbolic Letters.

1.3.2.1. Message Heading (TAF [AMD or COR] CCCC YYGGggZ YYG1G1/YYG2G2). The message heading consists of:

1.3.2.1.1. Message identifier of TAF

1.3.2.1.2. Forecast modifier indicating an amendment or correction (AMD or COR). Only one modifier at a time.

1.3.2.1.2.1. When issuing an amendment (AMD), issue only the remaining valid period of the TAF (e.g. If a TAF originally starting at 1600Z is amended at 1847Z, only forecast groups valid at and after 1800Z are included; groups that are no longer valid are removed).

1.3.2.1.2.2. When issuing a correction (COR), issue the entire original text of the TAF, changing only the TAF header and the erroneous elements (e.g., if a TAF originally starting at 1600Z is corrected at 1615Z, all forecast groups remain included). See **Figure 1.4** for an example TAF correction.

1.3.2.1.3. Four Letter Location identifier (CCCC)

1.3.2.1.4. Issue Date and Time, YYGGggZ. The issue date and time consists of the current day of the month (YY) and the Coordinated Universal Time (UTC) in hours (GG) and minutes (gg) followed by the letter Z. This time is updated for each change to a TAF (i.e. a new TAF, amendments, and/or corrections).

1.3.2.1.5. Valid Period (YYG1G1/YYG2G2). The valid period consists of the current day of the month (YY) and the 30-hour period of the forecast beginning time (G1G1) and ending time (G2G2) in whole hours, except for amended TAFs. All times are in UTC. For TAF groups starting and stopping at midnight UTC, use 00 and 24, respectively, to indicate the appropriate valid times. Amended TAFs are valid from the current hour to the ending hour of the original TAF. For example, if the current time is 1640Z, the amended time would be 16Z; if the current time is 2110Z, the amended time would be 21Z. For example, amending the 0318/0424Z TAF at 2131Z, the valid period is 0321/0424Z.

1.3.3. Change Groups (TTTTT). Use BECMG YYGG/YYGeGe, TEMPO YYGG/YYGeGe, and FM YYGGgg change groups to indicate changes from the predominant forecast condition at some intermediate date and hour time (YYGGgg) or during a specified period between hours (YYGG to YYGeGe). TEMPO groups may be used to forecast a change in any or all forecast groups and be followed by a description of all the elements for which a change is forecast to occur intermittently from YYGG to YYGeGe. **Exception:** Non-convective low-level wind shear and QNH groups are not included in TEMPO groups. FM change groups must include all encoded elements. Start a new line of text for each change group. Change groups that begin or end at midnight UTC will use 00 and 24 respectively to indicate the appropriate valid times. Limit change groups to those that are significant to airfield operations. **(T-0)** Avoid overlapping forecast periods in order to avoid confusion and keep the intent of the forecast simple.

1.3.3.1. Becoming (BECMG)—The change-indicator group TTTTT YYGG/YYGeGe in the form of BECMG YYGG/YYGeGe is used to indicate a change to forecast prevailing conditions expected to occur at either a regular or irregular rate at an unspecified time within the period defined by a two-digit date (YY), two-digit change beginning time (GG) with a slash separating a two-digit date (YY) and a two-digit ending time (GeGe) in whole hours. The time-period described by a BECMG group is usually for one hour but never exceeds two hours. This change to the predominant conditions are followed by a description of all elements for which the change is forecast. The forecast conditions encoded after the BECMG YYGG/YYGeGe group are those elements expected to prevail from the ending time of this change group (GeGe) to the ending time of the forecast period

(YYG2G2). The forecasted conditions must occur less than 30 minutes after the YYGeGe group start time. **(T-0)** When using the BECMG group to forecast a change in one or more elements, repeat the entire element(s). For example, if the BECMG group was used to forecast a decrease in the ceiling and all other forecast layers were expected to remain the same, the entire cloud code group is repeated, not just the ceiling layer.

1.3.3.2. Temporary (TEMPO)—The change-indicator group TTTTT YYGG/YYGeGe in the form of TEMPO YYGG/YYGeGe group is used to indicate temporary fluctuations to the forecast meteorological conditions. Conditions described by the TEMPO group must occur once during the specified time-period indicated by the date YY and time GG to the date YY and time G_eG_e, for less than 30 consecutive minutes or occur for an aggregate total of less than 30 minutes of every cardinal hour and cover less than half of the period indicated by the date YY and time GG to the date YY and time GeGe. **(T-1) Exception:** Organizations will allow 45 minutes for thunderstorms. **(T-0)** The extra 15 minutes provide for the 15-minute period between the time thunder is last heard and the time the thunderstorm is officially ended. If forecast conditions in the TEMPO group last more than 30 consecutive minutes or are expected to last more than half of the period indicated by the time YYGG to YYGeGe, then the temporary condition will be considered to be predominant and entered in the initial forecast period or following a FMYYGGgg or BECMG group. **(T-0)**

1.3.3.3. From (FMYYGGgg)—The time indicator YYGGgg in the form of FMYYGGgg is used to indicate the beginning of a self-contained part of the forecast indicated by the two-digit date YY and four-digit time GGgg. When the group FMYYGGgg is used, all forecast conditions preceding this group are superseded by the conditions forecasted in this group. For example, if the TAF period is 1909/2015 and a change is forecast at 1420 UTC, the entry FM191420 shall be encoded. The elements entered on this line are in effect from 191420 UTC to the end of the forecast period, 201500 UTC. While the use of a four-digit time in whole hours (e.g., 1600) remains acceptable, a forecast and amending events may require a higher time resolution. Use forecast minutes in this case. Four-digit resolution will only be used in this FMGGgg group. The forecasted conditions must occur in less than 30 minutes from the time specified in the YYGGgg group. **(T-0)**

1.3.4. Wind Group (dddffGfmfmKT). Surface wind direction, speed and gusts, if any.

1.3.4.1. Wind direction (ddd). Forecast true wind direction (from which wind is blowing) to the nearest 10 degrees. If direction varies more than 60 degrees, encode the prevailing direction for ddd and append the limits of variability to remarks (e.g., WND 270V350). Forecast a prevailing wind direction whenever it can be determined. In rare cases, there may be situations when forecasting a prevailing direction is not possible. In these situations, encode VRB for ddd.

1.3.4.1.1. When winds are calm, encode dddff as 00000KT.

1.3.4.1.2. When wind speed is 6 knots or less and a direction cannot be determined, encode dddff as VRBff.

1.3.4.2. When wind speeds are be more than 6 knots, do not use VRB for ddd unless the situation involves air-mass thunderstorm activity during which forecasting a prevailing wind direction with confidence is not possible. When it is possible to forecast the peak gust direction, but not the prevailing direction, encode the wind group as VRBffGfmfmKT and append the probable peak gust direction to remarks (e.g., GST DRCTN 250).

1.3.4.2.1. Wind Speed (ff). Mean forecast wind speed in whole knots. When speed is equal to or greater than 100 knots, use three digits.

1.3.4.2.2. Gusts (Gfmfm). Forecast speed or gusts, in whole knots. Encode gusts when the maximum speed exceeds a mean speed (ff) by 10 knots or more or when the peak wind speed is forecast to exceed the lull by 10 knots or more. Encode gusts of 100 knots or more in three digits. **(T-0)**

1.3.4.2.3. KT. Unit indicator for wind speeds in knots.

1.3.5. Visibility Group (VVVV). Forecast prevailing visibility in meters, rounded down to the nearest reportable value from **Table 1.1**. Include weather and/or an obscuration (w'w') whenever visibility is forecast less than 9,999 meters. **(T-0)** If visibility alternates frequently from one significant value to another, describe the situation with a TEMPO group; do not use variable visibility remarks. **Note:** While a visibility of less than 9,999 meters requires a weather and/or obscuration, weather such as precipitation does not require a restriction to visibility to be reported in a forecast (e.g., 9999 –RA). In this case, the weather is significant because it is occurring, not because it is restricting visibility.

Table 1.1. Visibility (VVVV).

Statute Miles	Meters	Statute Miles	Meters
0	0000	1 3/8	2,200
1/16	0100	1 1/2	2,400
1/8	0200	1 5/8	2,600
3/16	0300	1 3/4	2,800
1/4	0400	1 7/8	3,000
5/16	0500	2	3,200
3/8	0600	-	3,400
-	0700	2 1/4	3,600
1/2	0800	-	3,700
-	0900	2 1/2	4,000
5/8	1,000	2 3/4	4,400
-	1,100	-	4,500
3/4	1,200	-	4,700
-	1,300	3	4,800* See NOTE 1
7/8	1,400	-	5,000* See NOTE 1
-	1,500	4	6,000
1	1,600	-	7,000
-	1,700	5	8,000
1 1/8	1,800	6	9,000
1 1/4	2,000	7 and above	9,999
Note 1: Substitute 5000 meters for 4800 meters Outside the Continental United States (OCONUS) locations based on the host-nation national practice.			

1.3.6. Forecast Weather and Obscuration Group (w'w'). AFMAN 15-111 defines forecast weather and obscurations for construction of w'w' groups (**Table 1.2**).

Table 1.2. Weather (w'w') Group Code.

QUALIFIER		WEATHER PHENOMENA		
INTENSITY OR PROXIMITY	**DESCRIPTOR**	**PRECIPITATION**	**OBSCURATION**	**OTHER**
1	**2**	**3**	**4**	**5**
- Light Moderate **+** Heavy (well-developed in the case of tornadoes or waterspouts) **VC** In the Vicinity	**MI** Shallow **PR** Partial (covering part of the aerodrome) **BC** Patches **DR** Low Drifting **BL** Blowing **SH** Shower(s) **TS** Thunderstorm **FZ** Freezing (Super-cooled)	**DZ** Drizzle **RA** Rain **SN** Snow **SG** Snow Grains **IC** Ice Crystals (Diamond Dust) **PL** Ice Pellets **GR** Hail **GS** Snow Pellets	**BR** Mist **FG** Fog **FU** Smoke **VA** Volcanic Ash **DU** Widespread Dust **SA** Sand **HZ** Haze **PY** Spray	**PO** Well-developed Dust/Sand Whirls **SQ** Squalls **FC** Funnel cloud(s) (Tornado or Waterspout) **SS** Sand storm **DS** Dust storm

1.3.6.1. Construct predominant forecast weather (w'w') groups by considering **Table 1.2**, columns one to five in sequence. That is intensity/proximity, followed by description, followed by precipitation type (two precipitation types can be used in the same w'w' group), obscuration, or other weather phenomena (e.g., +SHRA is heavy showers of rain, +TSRAGR is thunderstorms, heavy rain, and hail; -RASN is light rain and snow; TS is thunderstorm without precipitation).

1.3.6.2. Only one w'w' group is normally included unless one group does not adequately describe the forecast situation. When more than one weather or obscuration condition exists, limit the w'w' group to three groups. When more than three w'w' groups apply to a situation, select and encode the three w'w' that are most significant to operations.

1.3.6.3. When applicable, funnel clouds (FC) and tornadoes (+FC) take precedence over all other w'w' groups and are forecast as at the station and not in the vicinity.

1.3.6.4. VC may be encoded in combination with thunderstorms (TS), showers (SH), fog (FG), blowing snow (BLSN), blowing dust (BLDU), blowing sand (BLSA), well-developed dust/sand whirls (PO), sand storm (SS), and dust storm (DS). When encoding, place VC before the precipitation, obscuration, or other weather phenomena entry without a space between the two (e.g., VCSH, VCPO). Do not encode intensity qualifiers with VC. Forecast weather in the vicinity is the last entry in the weather (w'w') group.

1.3.6.5. When an encoded predominant forecast condition is followed by a change group (BECMG or FM) without a w'w' group, encode the change group w'w' as NSW (no significant weather) to indicate that significant weather is no longer expected. This includes weather forecast in the vicinity (e.g., VCSH was included in a previous group, and forecasted to end).

1.3.6.6. Forecast Volcanic Ash (VA) as present weather regardless of restrictions to visibility when VA is observed **(T-0)** or the Volcanic Ash Advisory Center (VAAC) forecast includes a surfaced-based VA plume. **(T-1)**

1.3.6.7. Forecast Squall (SQ) when a strong wind characterized by a sudden onset in which the wind speed increases at least 16 knots and sustained at 22 knots or more for at least one minute.

1.3.7. Cloud and Obscuration Group (NsNsNshshshsCC). Report as often as necessary to indicate all forecast cloud layers up to the first overcast layer. Arrange groups in ascending order of cloud bases AGL (e.g., lowest base first). **(T-0)**

1.3.7.1. Cloud Amount (NsNsNs). The cloud amount is given as sky clear (SKC = no clouds); few (FEW = trace to 2/8ths); scattered (SCT = 3/8ths to 4/8ths); broken (BKN = 5/8ths to 7/8ths); or overcast (OVC = 8/8ths). Follow the three-letter abbreviations with the height of the base of the cloud layer (mass) hshshs without a space (e.g., FEW100, SCT250). The summation principle applies. 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 at all successively higher layers, up to and including, the layer being considered. Do not assign a sky cover to a layer less than a lower layer (e.g., SCT015 FEW020 should be SCT015 BKN020).

1.3.7.2. When the sky is totally obscured, encode VVhshshs, where VV is the indicator and hshshs is the vertical visibility in hundreds of feet (e.g. VV002).

1.3.7.3. Ceiling Height (hshshs). A ceiling is the height above the earth's surface of the lowest layer reported as broken or overcast; or the vertical visibility into an indefinite ceiling. Consider all layers and obscuring phenomena to be opaque.

1.3.7.4. Indefinite Ceiling (VVhshshs). The vertical visibility measured in feet, into a surface-based total obscuration, which hides the entire celestial dome (8/8ths).

1.3.7.5. Surface-Based Partial Obscuration. When forecasting a surface-based partial obscuration, encode as FEW000, SCT000, or BKN000 as appropriate to indicate a surface-based partial obscuration. Code as a remark the obscuring phenomena and the applicable layer. For example, FG SCT000 would indicate the w'w' weather element causing the obscuration is caused by fog and layer amount is SCT. Include the amount of partial obscuration in your sky cover summation computation. Do not consider surface-based partial obscurations as a ceiling.

1.3.7.6. Variable Sky Condition. If two or more significant sky conditions alternate frequently from one to the other, describe the situation with a TEMPO group; do not use variable sky condition remarks.

1.3.7.7. Height of Cloud Base (hshshs). Forecast the height of the base of each sky cover layer in hundreds of feet AGL using the reportable layers defined in **Table 1.3**.

Table 1.3. Reportable Cloud Layers.

Range of Height Values (feet)	Reportable Increments (feet)
≤ 50 feet	Round down to 000 feet
> 50 feet but ≤ 5,000 feet	To the nearest 100 feet
> 5,000 feet but ≤ 10,000 feet	To the nearest 500 feet
> 10,000 feet	To the nearest 1,000 feet

1.3.7.8. Cloud Type (CC). The only cloud type included in the aerodrome forecast is cumulonimbus (CB); when appropriate, the contraction CB follows cloud or obscuration height (hshsh) without a space. **(T-0).** The cloud or obscuration group will include a forecast cloud type of cumulonimbus (CB) whenever a thunderstorm is included in the significant weather group. This includes forecasts for thunderstorms in the vicinity (i.e., VCTS). **(T-0)** The following example shows the use of the CB contraction:

Figure 1.2. TAF Example Using CB Contraction.

TAF CCCC 101555Z 1016/1122 24025G35KT 0800 TSRA BKN035CB OVC080 QNH2978INS
BECMG 1017/1018 27010G15KT 9999 VCTS FEW040CB SCT080 QNH2989INS
BECMG 1019/1020 31012KT 9999 NSW SCT080 QNH2995INS TX14/1022Z TN09/1113Z

1.3.8. Example TAF. **Figure 1.3** provides an example TAF for Barksdale AFB, LA. Interpretation and explanations of the coded information follows.

Figure 1.3. TAF Example.

TAF KBAD 011555Z 0116/0222 03008KT 0800 PRFG FEW000 BKN005 BKN012 QNH3001INS FG FEW000
TEMPO 0118/0121 14012G18KT 3200 -SHSN BLSN FEW000 OVC006 620065 BLSN FEW000
FM012145 15012G20KT 9999 NSW OVC030 QNH2992INS
BECMG 0123/0124 15012G20KT 3200 -SN BLSN FEW000 OVC004 620046 QNH2983INS BLSN FEW000
TEMPO 0201/0203 13015G25KT 0200 -FZDZ FG VV001 660001 650109 TX00/0121Z TNM01/0212Z

1.3.8.1. The forecast is for Barksdale AFB, LA (KBAD), issued on the first at 1555Z, valid from 011600Z to 022200Z. The initial conditions (1600Z to 2144Z) are for winds from 030 degrees at 8 knots, visibility 800 meters in partial fog; sky cover is few (either a surface-based partial obscuration or a layer at or lower than 50 feet), sky is broken (ceiling) at 500 feet and broken at 1200 feet. The lowest altimeter setting between 011600Z and 012144Z is 30.01 inches of mercury. There is a fog-induced surface-based partial obscuration from 1/8 to 2/8 coverage.

1.3.8.1.1. Between 011800Z and 012100Z, conditions vary temporarily to winds from 140 degrees at 12 knots gusting to 18 knots, visibility 3200 meters in light snow showers and blowing snow, sky cover is few at the surface (surface-based partial obscuration), overcast at 600 feet (the ceiling), with light rime icing from 600 to 5600 feet above ground level (AGL). The surface-based partial obscuration (FEW000) is caused by blowing snow.

1.3.8.1.2. Beginning at 012145Z, conditions change to wind from 150 degrees at 12 knots gusting to 20 knots; unrestricted visibility 9,999 meters or greater, no significant weather, sky cover overcast at 3000 feet and the lowest altimeter setting from 012145Z until 012400Z is 29.92 inches of mercury.

1.3.8.1.3. Between 012300Z and 012400Z, conditions become: wind from 150 degrees at 12 knots gusting to 20 knots; visibility 3200 meters in light snow and blowing snow, sky cover is few (either a surface-based partial obscuration or a layer at or lower than 50 feet), sky has an overcast ceiling at 400 feet. There is light rime icing from 400 to 6400 feet AGL and the lowest altimeter setting from 020000Z until 022200Z is 29.83 inches of mercury. There is a blowing snow-induced surface based partial obscuration from 1/8 to 2/8 in coverage.

1.3.8.1.4. Between 020100Z and 020300Z, conditions vary temporarily to winds from 130 degrees at 15 knots gusting to 25 knots, visibility 200 meters with light freezing drizzle and fog, sky totally obscured with vertical visibility 100 feet. There is also moderate icing (clear) in precipitation from surface to 1000 feet AGL and moderate icing in cloud (rime) from 1000 feet AGL up to 10000 feet AGL. The forecast maximum temperature is 00°C at 012100Z and the forecast minimum temperature is minus 01°C at 021200Z.

1.3.8.2. Example Corrected (COR) TAF**.** **Figure 1.4** provides an example of a corrected (COR) TAF for Ramstein AB, Germany. Interpretation and explanation of the coded information follows.

Figure 1.4. Corrected TAF Example.

TAF COR ETAR 011615Z 0116/0222 28012G25KT 8000 -RASN SCT006 BKN015 OVC020 620158 540009 QNH2960INS
BECMG 0118/0119 27012KT 9999 NSW SCT015 BKN020 QNH2965INS TX15/0120Z TN04/0211Z

1.3.8.2.1. The forecast is a correction for Ramstein AB, Germany (ETAR), issued on the first of the month at 1615Z, valid from 011600Z to 022200Z. Initial conditions (011600Z to 011900Z) for the forecast are winds from 280 degrees at 12 knots gusting to 25 knots, visibility 8000 meters in light rain and snow, sky cover is scattered at 600 feet, broken at 1500 feet, and overcast at 2000 feet. There is light rime icing in cloud between 1500 and 9500 feet AGL and occasional moderate turbulence in cloud from surface to 9000 feet AGL. Lowest altimeter setting from 011600Z to 011900Z is 29.60 inches of mercury.

1.3.8.2.2. Between 011800Z and 011900Z, the predominant condition changes gradually to winds from 270 degrees at 12 knots, visibility greater than or equal to 9,999 meters, no significant weather, sky cover scattered at 1500 feet and broken at 2000 feet. The lowest altimeter setting from 011900Z to 022200Z is 29.65 inches of mercury. The forecast maximum temperature is 15°C at 012000Z and the forecast minimum temperature is forecast 4°C at 021100Z.

1.3.9. Operationally significant/Hazardous weather Groups. Volcanic ash and wind shear are potentially hazardous problems for aircraft. Include forecasts for ash and non-convective wind shear on an as-needed basis to focus the attention of the pilot on existing or expected problems.

1.3.9.1. VA. The volcanic ash group indicator. Volcanic Ash (VA) Group (VAbbbttt). Include a VA group in the TAF, following the cloud and obscuration group. Encode all VA plume forecasts provided by the VAAC in TAF coded products. The VA plume forecast must be horizontally consistent with the official VAAC forecast. **(T-0)** Note: If the responsible VAAC cannot produce the volcanic ash products, then Air Force forecasts are the primary source. **(T-0)**

1.3.9.1.1. bbb. The height of the base of the volcanic ash, encoded in hundreds of feet AGL

1.3.9.1.2. ttt. The height of the top of the volcanic ash layer, encoded in hundreds of feet AGL, as forecast by the VAAC.

1.3.9.1.3. When forecasting VA to be surface based, encode VA as both present weather (w'w') and add a VA group. The following examples show the use of the VA group:

Figure 1.5. Example of Surface-based Volcanic Ash Forecast.

TAF CCCC 101555Z 1016/1122 24010KT 9999 VA FEW100 VA000200 QNH2992INS

1.3.9.1.4. In this example VA is surface-based and aloft. The VAAC ash plume forecast from the surface with a plume top of 20,000 feet.

Figure 1.6. Example of Volcanic Ash Plume Forecast.

TAF CCCC 101555Z 1016/1122 24010KT 9999 FEW100 VA100200 QNH2992INS

1.3.9.1.5. VA is not surface-based but forecasted in a VAAC ash plume over the TAF location. The VAAC forecasted ash plume has a base height of 10,000 feet and a plume top of 20,000 feet.

1.3.9.2. Non-Convective Low-Level Wind Shear Group (WShxhxhx/dddfffKT). Use this group only to forecast wind shear not associated with convective activity from the surface up to and including 2,000 feet AGL.

1.3.9.2.1. Encode non-convective low-level wind shear forecasts in the following format:

1.3.9.2.1.1. WS. Low-level wind shear group indicator.

1.3.9.2.1.2. hxhxhx. Forecast height of the wind shear in hundreds of feet AGL.

1.3.9.2.1.3. ddd. Forecast wind direction, in tens of degrees true, above the indicated height. Do not use VRB in the non-convective low-level wind shear forecast group.

1.3.9.2.1.4. ff. Forecast wind speed, in knots, of the forecast wind above the indicated height.

1.3.9.2.1.5. KT. Unit indicator for wind speed in knots.

1.3.9.2.2. Non-convective low-level wind shear forecasts are included in the TAF, when expected, following the cloud forecast and before the altimeter setting forecast in the initial forecast period or in a FM or BECMG group. Once included in the forecast, the wind shear group remains the prevailing condition until the next FM or BECMG group or until the end of the forecast valid period if there are no subsequent FM or BECMG groups. Forecasts for non-convective low-level wind shear will not be included in TEMPO groups. **(T-1)**

1.3.9.2.2.1. The following is an example of a TAF containing a non-convective low-level wind shear forecast.

Figure 1.7. Example of TAF with Non-Convective Low-Level Wind Shear.

TAF CCCC 011555Z 0116/0222 03008KT 0800 PRFG FEW000 BKN005 BKN012 WS015/12038KT QNH3001INS FG FEW000
TEMPO 0118/0120 14012G18KT 3200 -SN BLSN FEW000 OVC006 620065 SN FEW000
FM012130 15012G20KT 9999 NSW SCT030 QNH2992INS
BECMG 0123/0124 15012G20KT 3200 -SN BLSN FEW000 OVC004 620046 QNH2983INS SN FEW000 TX08/0119Z TNM04/0211Z

1.3.9.2.2.2. In this TAF, non-convective low-level wind shear is forecasted at 1,500 feet with winds from 120 degrees at 38 knots from 011600Z until the beginning of the next FM group at 012130Z.

1.3.10. Icing Group (6IchihihitL). Forecast icing group used to forecast icing not associated with thunderstorms (thunderstorm forecasts imply moderate or greater icing). Repeat as necessary to indicate multiple icing layers. Omit when no icing is forecast. Format icing groups as:

1.3.10.1. 6—Icing group indicator.

1.3.10.2. Ic—Type of icing (**Table 1.5**). When forecasting more than one type of icing within the same layer, encode the highest code figure

1.3.10.3. hihihi—Height of base of forecasted icing layer in hundreds of feet AGL (**Table 1.4**).

1.3.10.4. tL—Icing layer thickness in thousands of feet (**Table 1.6**). When forecasting a layer to be thicker than 9,000 feet, repeat the icing group so that the base of the layer expressed by the second group coincides with the top layer given by the first group **(See Note).**

1.3.11. Turbulence group (5BhBhBhBtL). Forecast turbulence group used only to forecast turbulence not associated with a thunderstorm (thunderstorms already imply severe or extreme turbulence). Turbulence forecasts apply to category II (CAT II) aircraft. A list of aircraft turbulence categories can be found in Air Force Handbook (AFH), 11-203, Volume 2, *Weather for Aircrews – Products and Services*. Omit when no turbulence is forecasted. Format turbulence groups as:

1.3.11.1. 5—Turbulence group indicator.

1.3.11.2. B—Type and intensity of turbulence (**Table 1.7**)—When forecasting more than one type of turbulence within the same layer, encode the highest code figure

1.3.11.3. hBhBhB—Height of base of forecasted turbulence layer in hundreds of feet AGL (**Table 1.4**).

1.3.11.4. tL—Thickness of the turbulence layer in thousands of feet (**Table 1.6**)—When forecasting a layer to be thicker than 9,000 feet, repeat the turbulence group so that the base of the layer expressed by the second group coincides with the top layer given by the first group . **NOTE:** Icing and turbulence forecasts are for phenomena not associated with thunderstorm activity, from surface to 10,000 feet AGL. Forecasters may address the areas above 10,000 feet mean sea level (MSL) provided the forecast in the TAF is horizontally consistent with turbulence products in the forecaster-in-the-loop (FITL) graphics. Deviations from the authoritative forecast require concurrence from the servicing OWS.

Table 1.4. Height of Lowest Level of Turbulence (hBhBhB)/Icing (hihihi).

Code Figure	Meters	Feet
000	<30	<100
001	30	100
002	60	200
003	90	300
004	120	400
005	150	500
006	180	600
007	210	700
008	240	800
009	270	900
010	300	1,000
011	330	1,100
099	2,970	9,900
100	3,000	10,000
110	3,300	11,000
120	3,600	12,000

Table 1.5. Icing Type (Ic).

Code Figure	Type of Icing
0	Trace icing
1	Light icing (mixed)
2	Light icing in cloud (rime)
3	Light icing in precipitation (clear)
4	Moderate icing (mixed)
5	Moderate icing in cloud (rime)
6	Moderate icing in precipitation (clear)
7	Severe icing (mixed)
8	Severe icing in cloud (rime)
9	Severe icing in precipitation (clear)

Table 1.6. Thickness of Turbulence/Icing Layers (tL).

Code Figure	Thickness
1	1,000 feet
2	2,000 feet
3	3,000 feet
4	4,000 feet
5	5,000 feet
6	6,000 feet
7	7,000 feet
8	8,000 feet
9	9,000 feet

Table 1.7. Turbulence Type/Intensity (B).

Code Figure	Turbulence Type and Intensity
0	None
1	Light Turbulence
2	Moderate Turbulence in clear air, occasional.
3	Moderate Turbulence in clear air, frequent.
4	Moderate Turbulence in cloud, occasional.
5	Moderate Turbulence in cloud, frequent.
6	Severe Turbulence in clear air, occasional.
7	Severe Turbulence in clear air, frequent.
8	Severe Turbulence in cloud, occasional.
9	Severe Turbulence in cloud, frequent.
X	Extreme Turbulence
Note: Occasional is defined to occur less than 1/3 of the time. Frequent is defined as occurring greater than or equal to 1/3 of the time.	

1.3.12. Lowest Altimeter group (QNHP1P1P1P1INS). Lowest altimeter setting expected (in inches of mercury) during the initial forecast period and in each Becoming (BECMG) and From (FM) change group. Do not include QNH in Temporary (TEMPO) groups. Format the altimeter group as:

1.3.12.1. QNH—Altimeter setting in inches of mercury indicator

1.3.12.2. P1P1P1P1—Forecast lowest altimeter setting

1.3.12.3. INS—Indicator for units of measure for inches of mercury.

1.3.13. TAF Remarks. For weather and obscurations, use the alphabetic abbreviations in **Table 1.2** Use Federal Aviation Administration (FAA) Order JO 7340.2, *Contractions*, for all others. Relate operationally significant forecast elements to geographical features within the aerodrome radius when possible and add start/end times without adding a Z when applicable (e.g. FG OVR RIVER E, WND 06010KT AFT 1219, or SHRA OMTNS E 1414-1419). Ensure start/end times are not confused with other numerical values. Do not use the terms OCNL, VC, or CB in remarks. Do not use the remarks section as a substitute for a BECMG or TEMPO group. Encode remarks in the following order of entry:

1.3.13.1. Forecast Maximum and Minimum Temperature groups (T(X)(N)[M]TFTF/YYGFGFZ). This group provides a mechanism to forecast a two-digit temperature (TFTF: whole degrees Celsius) in the TAF code for specific times. To indicate forecast maximum and minimum temperatures expected to occur at the time indicated by GFGFZ, the letter indicator TX for the maximum forecast temperature and TN for the minimum forecast temperature shall precede TFTF without a space. Organizations encode the forecast maximum (first entry) and minimum temperature (last entry) for the first 24-hour period of the TAF. Format temperature groups as:

1.3.13.1.1. TX— Maximum Temperature remark indicator

1.3.13.1.2. TN— Minimum Temperature remark indicator

1.3.13.1.3. TFTF—The forecast temperature in whole degrees Celsius (C). Precede temperatures between +9°C and -9°C with a zero (0); precede temperatures below 0°C by the letter M (for minus).

1.3.13.1.4. YY—The 2 digit day of the month.

1.3.13.1.5. GFGF—The valid time to the nearest whole hour UTC of the temperature forecast.

1.3.13.1.6. Z—Abbreviation for Zulu, the military time zone associated with UTC.

Figure 1.8. Example of Min/Max Temperature Groups.

TX17/0721Z TN08/0812Z — forecast maximum temperature is 17°C at 072100Z and forecast minimum temperature is 8°C at 081200Z.

TX00/1418Z TNM09/1507Z — forecast maximum temperature is 0°C at 141800Z and forecast minimum temperature is minus 9°C at 150700Z.

1.3.13.2. Limited-Duty and Limited METWATCH Remarks. Limited-duty locations coordinate with their supporting Operational Weather Squadron on all TAF valid times around operational hours. At locations where limited-duty operations (i.e. when there is not 24-hour coverage with weather personnel on duty) are in effect, use the following remarks with YY being the day of the month UTC and GG is the time to the nearest whole hour UTC.

1.3.13.2.1. LAST NO AMDS AFT YYGG NEXT YYGG—Use this remark when the airfield is closed and a TAF is no longer required per coordinated requirements.

1.3.13.2.2. LIMITED METWATCH YYGG TIL YYGG—Use this remark when an airfield is open, no weather personnel are on duty and an operational automated sensor is not in use.

Chapter 2

PILOT REPORT (PIREP) CODE

2.1. General. This chapter contains instructions for encoding pilot reports (PIREPs) in a standard format to facilitate processing, transmission, storage, and retrieval of reports of in- flight weather occurrences. Federal Meteorological Handbook No. 12 (FCM-H12), U*nited States Meteorological Codes and Coding Practices*, provides additional information as well as AFMAN 15-129, Volume 2, *Air and Space Weather Operations – Exploitation*, which outlines procedures for requesting, recording, and disseminating PIREPs.

2.2. Encoding PIREPS. PIREP data may be obtained from a pilot either in the air or on the ground, or from a reliable source on the ground. Each report will:

2.2.1. Identify the type of report and each element in the report by a text element indicator (TEI). **(T-0)**

2.2.2. Include as a minimum, the transmitting organization, entries for message type, location, time, flight level, type of aircraft, and at least one other element. **(T-0)**

2.2.3. Describe location with reference to a very high frequency (VHF) navigational aid (NAVAID), the four-letter airport identifier (KQ and EQ identifiers will not be used), or under certain circumstances as identified in **paragraph 2.3.2** using latitude/longitude. **(T-0)**

2.2.4. Use only authorized contractions listed in FAA order JO 7340.2, *Contractions*, aircraft designators listed in FAA Order JO 7360.1, *Aircraft Type Designators*, and authorized four-letter location identifiers listed in FAA order JO 7350.9, *Location Identifiers*. Where plain language is called for, authorized contractions and abbreviations should be used. However, do not omit essential remarks due to lack of readily available contractions. **(T-0)**

2.2.5. Omit TEIs for unreported or unknown elements other than those in **paragraph 2.2.2**. If one of the required TEIs is unknown, enter "UNKN" for that element. **(T-0)**

2.2.6. Correcting a PIREP. Correct original PIREP by adding 1 minute to the initial Time group (/TM_GGgg) and add a remark (e.g., COR 1814) when the correction is transmitted as the last entry in the REMARKS section. **(T-0)**

2.3. PIREP Code Breakdown.

Figure 2.1. PIREP Format.

CCCC (transmitting organization) **UUA** or **UA /OV_**(location)/**TM_**(time)/**FL(**flight level)/**TP_**(type of aircraft)/SK_(sky cover)/WX_(weather)/TA_(temperature)/ WV_(winds)/TB_(turbulence)/IC_(icing)/RM_(remarks) (COR GGgg) **Note:** Areas in **bold** indicate MANDATORY entries, plus one other element. **Note:** Each TEI is preceded by a slash (/) and, except for flight level, followed by a space. The underline symbol (_) is used for illustration purposes only to indicate a required space. In the individual TEI sections that follow, the information enclosed in parentheses depicts the format of optional entries.

2.3.1. Message Type. Identifies the type of message reported. Use UUA for urgent or UA for routine pilot reports. Use UUA whenever reporting any of the following:

2.3.1.1. Tornado/waterspout (+FC) or funnel cloud (FC)

2.3.1.2. Severe icing

2.3.1.3. Severe or extreme turbulence, including Clear Air Turbulence (CAT)

2.3.1.4. Widespread dust storm and sand storm

2.3.1.5. Low-Level Wind Shear (LLWS)—This condition exists when the fluctuation in airspeed is 10 knots or more.

2.3.1.6. Hail (GR)

2.3.1.7. Volcanic eruption and/or ash (VA) when reported by any source, in the air or on the ground.

2.3.1.8. Any condition that, in the judgment of the person entering the PIREP into the system, would present an extreme hazard to flight.

2.3.2. Location (/OV). After the TEI, describe the point at which, or the line along which, the reported phenomenon or phenomena occurred by reference to a VHF NAVAID(s), or an airport using the four-letter location identifier. Latitude/longitude may be used anywhere in the world and reported in degrees and minutes where latitude is reported in four digits appended with N or S (North or South) and longitude is reported in five digits appended by E or W (East or West) **Note:** Some weather processing systems may drop the leading K, P, or H on the location identifier and display only the three-letter identifier. If appropriate, follow the identifier by the radial bearing and distance from the NAVAID. Using three digits each, indicate the magnetic bearing direction in degrees followed by the distance in nautical miles.

2.3.2.1. FORMAT: **/OV_LOC/AIRPORT or NAVAID (RRRDDD) (AIRPORT or NAVAID (RRRDDD) or /OV_LLLLN LLLLW (LATITUDE and LONGITUDE).**

2.3.2.2. LOC/AIRPORT or NAVAID is the four-letter location identifier for the airport or four-letter identifier for the VHF NAVAID. RRR and DDD are the magnetic bearing and distance from the location, respectively. There is no space between location and RRRDDD. There is also no space before or after the hyphen when two AIRPORTS/NAVAIDs are reported. When used, latitude and longitude are recorded using degrees and minutes North/South and East/West. Do not use contractions such as DURC or statements such as AT TOP OF CLIMB in this field. Add these as Remarks (/RM). A further explanation of distance, referencing an airport, may be added in remarks, such as MDW 10E. See **Table 2.1** for examples of encoding locations.

Table 2.1. Location Examples.

Pilot Reports Location as:	**Encode as:**
Over Kennedy, New York Airport	/OV_KJFK
5 miles east of Philadelphia, Pennsylvania Airport	/OV_KMXE107025/RM_PHL_5E or, /OV_KPHL090005
Departing Hannibal, MO	/OV_KHAE
Along route from St. Louis to Kansas City, MO	/OV_KSTL-KMKC
10 miles southwest of Reno, Nevada Airport	/OV_KFMG233016/RM_RNO_10SW or, /OV_KRNO225010
30 miles east of St. Louis VORTAC to 15 miles northeast of Kansas City VORTAC	/OV_KSTL090030-KMKC045015
21 degrees and 39 minutes North latitude and 157 degrees and 15 minutes West longitude	/OV_2139N_15715W

2.3.3. Time (/TM_GGgg). Enter the UTC time, GGgg, in hours and minutes, as given by the pilot, when the reported phenomenon was (or phenomena were) encountered or occurred. If a span of time is reported, encode the midpoint; for example, if the report is for 1845Z to 1935Z, encode the midpoint, 1910Z as 1910.

2.3.4. Flight Level (/FLHHH (-HHH)). Enter the aircraft's altitude (flight level), HHH, in hundreds of feet above MSL when the phenomenon was or phenomena were first encountered, or if the altitude is unknown, enter UNKN. If an aircraft was climbing or descending, enter the appropriate contraction (DURC or DURD) in the remarks section. Unless stated, all heights are considered MSL (e.g., /RM DURC OVC005-020 AGL, /RM DURD MOD TB 010-040 AGL). If the condition encountered was within a layer, enter the altitude range of the layer within the appropriate phenomenon TEI or in remarks. There is no space between the FL TEI and the altitude. **Note**: It is the responsibility of the Pilot to Metro Service (PMSV) operator to distinguish low-level MSL heights, versus low-level AGL heights, when gathering data from the pilot.

2.3.5. Type of Aircraft (/TP_AAAA or /TP_UNKN). If the type of aircraft is known, enter aircraft type code as given in FAA Order 7360.1, *Aircraft Type Designators*. Enter UNKN if aircraft type is unknown. Icing and turbulence reports must include aircraft type.

2.3.6. Sky Cover (/SK). A PIREP may include the Sky Cover TEI. Enter the sky condition followed by heights of bases, and applicable, -TOP followed by the height of the tops. For each layer, enter the heights of clouds in hundreds of feet above MSL in three digits and use the cloud cover contractions SKC, FEW, SCT, BKN, or OVC. If cloud cover amounts range between two values, separate the contractions with a hyphen and no spaces (e.g., BKN-OVC). Indicate unknown heights by using UNKN. If the pilot reports he/she is in clouds, enter OVC, and in remarks enter IMC. When more than one layer is reported, separate layers by a slash (/). **Note:** There are no spaces between cloud cover contractions and heights.

2.3.6.1. FORMAT**: /SK_N**s**N**s**N**s **(-**s**N**s**N**s**N**s**) hbhbhb (-TOPh**t**h**t**h**t**)/N**s**N**s**N**s **(-SNsNsNs) hbhbhb, etc.**

2.3.6.2. NsNsNs is the three-letter contraction for the amount of cloud cover, hbhbhb is the height of the base of a layer of clouds in hundreds of feet, and hththt is the height of the top of the layer in hundreds of feet and indicated as TOP and the height hththt. Thus, the code form for cloud amount, base, and tops becomes NsNsNshbhbhb-TOPhththt.

Figure 2.2. Examples of PIREP Sky Cover.

```
/SK_OVC100-TOP110
/SK_OVC065-TOPUNKN/RM IMC
/SK_SCT-BKN050-TOP100
/SK_BKN-OVCUNKN-TOP060/BKN120-TOP150/SKC
/SK_OVC015-TOP035/OVC230-TOPUNKN
/SK_FEW030-TOPUNKN
/SK_SKC
/SK_OVCUNKN-TOP085
```

2.3.7. Weather (/WX). PIREPs may include flight visibility and/or flight weather in this TEI.

2.3.7.1. Flight Visibility (FV). Flight visibility is the first entry in the /WX TEI if reported by the pilot. Enter it as FV followed immediately (no space) by the two-digit visibility value rounded down, if necessary, to the nearest whole statute mile (SM). Append SM to the flight visibility value (e.g., FV03SM) when reported. Use FV99SM to enter a report of unrestricted flight visibility. Overseas organizations using metric system visibility values will encode in kilometers. **(T-0)** Encode unrestricted visibility as FV99.

2.3.7.2. When rounding the visibility value down becomes operationally significant, consider adding a clarifying comment in the Remarks section. For example, a report of 1/2 SM (above airfield minimums) visibility would be rounded down and reported as FV00SM (below minimums); append in remarks the comment IN FLT VIS 1/2 SM. Leave out if unknown or not reported.

2.3.7.3. When entering flight weather into the TEI use one or more of the listed weather types in **Table 2.2**, using the appropriate METAR contraction.

Table 2.2. PIREP Flight Weather Contractions.

WEATHER	**METAR Encode**
Funnel Cloud **(See Note 1)**	FC
Tornado/Waterspout **(See Note 1)**	+FC
Thunderstorm	TS
Fog (visibility < 5/8 SM or 1000 meters)	FG
Mist (visibility ≥ to 5/8 SM or 1000 meters)	BR
Rain/Rain shower	RA/SHRA
Drizzle	DZ
Squall	SQ
Freezing Rain	FZRA
Freezing Drizzle	FZDZ
Hail **(See Note 2)**	GR
Hail Shower **(See Note2)**	SHGR
Snow Pellets	GS
Snow Pellet Showers	SHGS
Ice Pellets/Ice Pellet Showers	PL/SHPL
Snow/Snow Shower	SN/SHSN
Drifting Snow	DRSN
Blowing Snow	BLSN
Snow Grains	SG
Dust	DU
Drifting Dust	DRDU
Blowing Dust	BLDU
Dust storm	DS
Sand	SA
Drifting Sand	DRSA
Blowing Sand	BLSA
Sand storms	SS
Well Developed Dust/Sand Whirls	PO
Haze	HZ
Smoke	FU
Volcanic Ash	VA
Spray	PY
Blowing Spray	BLPY
Notes: 1. FC is entered in the /WX TEI and FUNNEL CLOUD is spelled out in the /RM TEI. +FC is entered in the /WX TEI and TORNADO or WATERSPOUT is spelled out in the /RM TEI. 2. If the size of hail is known, enter in 1/4 inch increments in the /RM TEI.	

2.3.7.3.1. When combining one or more forms of precipitation, report the dominant type first. The proximity qualifier VC (vicinity) may be used in combination only with the abbreviations TS, FG, SH, PO, BLDU, BLSA, and BLSN. Indicate intensity (− for light, no qualifier for moderate, and + for heavy) with precipitation types, except ice crystals, snow pellets, and hail, including those associated with a thunderstorm and those of a showery nature. Encode tornadoes and waterspouts as +FC. Do not ascribe intensity to obscurations of blowing dust, blowing sand, and blowing snow. Only ascribe moderate or heavy intensity to dust storms and sand storms.

2.3.7.4. If reported, enter weather layers (e.g., fog, haze, smoke or dust) with the base and/or top of the layer, encoded in the same manner as cloud cover in the /SK TEI (e.g., FU002-TOP030). When reporting more than one type of weather phenomenon, report the types in the following order: (1) Tornado, Funnel Cloud, or Waterspout, (2) Thunderstorm with or without associated precipitation, (3) Weather phenomena in order of decreasing predominance (i.e., the most dominant reported first). Use separate groups for each type of weather or thunderstorm, and report no more than three groups in one PIREP.

2.3.7.4.1. FORMAT: /WX_(FVvvSM_)ww(_ww)(_ww). The vv is the two-digit flight visibility value and ww is the variable length encoded flight weather.

Figure 2.3. Examples of PIREP In-Flight Weather.

/WX_FV02SM_BR_FU020-TOP030 — In remarks: /RM BR-TOP009
/WX_FV00SM_+TSRAGR
/WX_FV99SM
/WX_FV02SM_VA330
/WX_+FC — In remarks: /RM TORNADO, or WATERSPOUT
/WX_BCFG_VC_W -- (Decoded: Patches of fog between 5 and 10 SM of the report location to the west)

2.3.8. Temperature (/TA). If given the outside air temperature, encode it using two digits in whole degrees Celsius. Prefix sub-zero temperatures with an M; for example, a temperature of –2°C is encoded /TA_M02. If the aircrew reports an uncorrected TA, append the remark, /RM TA IS UNCORRECTED. 00°C is a positive number.

2.3.8.1. FORMAT: /TA_(M)T'T'. T'T' is the two-digit temperature value in whole degrees Celsius.

2.3.9. Wind Direction and Speed (/WV). If reported, encode the direction which the wind is blowing from, in tens of degrees using three digits. A 0 precedes directions less than 100 degrees. For example, code a wind direction of 90 degrees as 090. Enter the wind speed (spot wind) as a two- or three-digit group immediately following the wind direction. Encode the speed in whole knots using the hundreds digit (if not zero) and the tens and units digits. The wind group always ends with KT to indicate that winds are in knots. Encode speeds of less than 10 knots using a leading zero. For example, encode a wind speed of 8 knots as 08KT. Encode a wind speed of 112 knots as 112KT.

2.3.9.1. FORMAT: /WV_dddff(f)KT. The ddd is the three-digit true direction which the wind is blowing from, in tens of degrees and ff(f) is the wind speed in knots, followed by KT.

Figure 2.4. Examples of PIREP In-Flight Wind Direction and Speed.

/WV 26030KT — (Decoded: Wind 260 degrees at 30 knots)
/WV 080110KT — (Decoded: Wind 080 degrees at 110 knots)

2.3.10. Turbulence (/TB). When reported, enter intensity, type, and altitude of turbulence as follows:

2.3.10.1. Duration. If reported, this is the first element to be entered after the space following the TEI. Durations are occasional (OCNL), intermittent (INTMT), and continuous (CONS).

2.3.10.2. Intensity. The reportable intensities are LGT, MOD, SEV, and EXTRM. HVY is not a reportable intensity. Enter a range or variations in intensity as two values separated by a hyphen (e.g., MOD-SEV). If the pilot specifies no turbulence was encountered, enter NEG in the /TB TEI.

2.3.10.3. Type. May be blank, or enter either CAT or CHOP, if reported by the pilot. CAT is Clear Air Turbulence. Encountering this type of turbulence occurs where no clouds are present and commonly applied to high-level turbulence associated with wind shear, often near the jet stream. CAT intensity may be light, moderate, severe, or extreme. CHOP turbulence causes rapid and somewhat rhythmic jolts or bumpiness without appreciable changes in altitude or attitude and may be indicated as either light or moderate. Never report CHOP as severe or extreme.

2.3.10.4. Altitude. Enter the reported turbulence altitude only if it differs from the value reported in /FL, or when reported as a layer with defined or undefined boundaries. When entering a layer, use a hyphen between height values. Enter undefined lower and higher boundary limits as BLO or ABV. Use a slash to separate two or more layers of turbulence.

2.3.10.5. FORMAT: /TB_III (-III)(_CAT or CHOP_)_(hbhbhb-hththt)/III(-III) etc. The III is the intensity of the turbulence and CAT or CHOP are the only two entries for type of turbulence permitted. The hbhbhb group is the base of the turbulence layer, if defined, or BLO or ABV, if undefined; and hththt is the top of a defined layer or the boundary of an undefined layer.

Figure 2.5. Example of PIREP Turbulence.

/TB_EXTRM_350
/TB_MOD-SEV_BLO_080
/TB_LGT_035
/TB_LGT-MOD_CHOP_310-350
/TB_NEG
/TB_ NEG_220-280/MOD_CAT_ABV
/TB_OCNL_MOD_BLO_050

2.3.11. Icing (/IC). Enter reports of icing using the same format to report turbulence (i.e., intensity, type, and altitude(s) of icing conditions).

2.3.11.1. Intensity. Enter TRACE, LGT, MOD, SEV, or ranges covering two values separated by a hyphen. HVY is not a reportable intensity. If the pilot specifies no icing was encountered, enter NEG in the /IC TEI.

2.3.11.2. Type. Enter the reported icing types: RIME, CLR (Clear), or MXD (Mixed).

2.3.11.2.1. RIME — Rough, milky, opaque ice formed by the instantaneous freezing of small supercooled water droplets.

2.3.11.2.2. CLR (Clear) — Glossy, clear, or translucent ice formed by the relatively slow freezing of large supercooled water droplets.

2.3.11.2.3. MXD (Mixed) — A combination of rime and clear icing.

2.3.11.3. Altitude. Enter the reported icing altitude only if it differs from the value reported in /FL, or is reported as a layer with defined or undefined boundaries. When entering a layer, use a hyphen between height values. Enter undefined lower and higher boundary limits as BLO or ABV. Use a slash ("/") to separate two or more layers of icing.

2.3.11.4. FORMAT. /IC_III (-III) _ (type) _ (hbhbhb-hththt)/III (-III) _etc. The III is the intensity of the icing; type is one of the three listed icing types; hbhbhb is the base of the icing layer, if defined, or BLO or ABV, if undefined; and hththt is the top of a defined layer or the boundary of an undefined layer.

Figure 2.6. Example of PIREP Icing.

/IC_TRACE_RIME /IC_LGT-MOD_RIME_085 /IC_MOD_MXD_035-070 /IC_LGT_CLR_015-045/SEV_CLR_ABV_075 /IC_NEG

2.3.12. Remarks (/RM). Data or phenomena following this TEI are considered significant; however, they do not fit in any previously reported TEI or they further define entries reported in other TEIs. Enter correction remarks as the last entry. Report the following phenomena when encountered by pilots. Enter heights only if they differ from /FL.

2.3.12.1. Wind Shear. Low-Level Wind Shear (LLWS) is indicated by rapid air speed fluctuations within 2,000 feet of the earth's surface. When the fluctuation in airspeed is 10 knots or more, the report is classified as an urgent (UUA) PIREP. When LLWS is a reason for issuing an Urgent PIREP, or whenever it is included as an element in any PIREP, enter LLWS as the first remark immediately after the /RM TEI, (e.g., /RM LLWS_-15KT_SFC-003_DURC_RY22_JFK. LLWS may be reported as -, +, or +/-, depending on the effect of the phenomena on the aircraft. If the location of the LLWS encounter is different from the /OV or /FL TEI, then include this information in remarks using the same format(s).

2.3.12.2. FUNNEL CLOUD, TORNADO, and WATERSPOUT. Enter the appropriate term followed by the direction of movement, if reported.

2.3.12.3. Thunderstorm. Enter area coverage descriptions (ISOLD, FEW, SCT, NMRS), or if storms are reported in a line, enter description (LN, SCT LN, BKN LN, SLD LN), if known. Follow the area coverage description with the contraction TS, the location and movement of storms, and type of lightning, if known.

2.3.12.4. Lightning. Enter frequency (OCNL, FRQ, CONS), followed by lightning type (e.g., OCNL LTGIC, FRQ LTGCCCA, CONS LTGICCG, FRQ LTGCA) or combinations, as reported by the pilot.

2.3.12.5. Electric Discharge. Enter DISCHARGE followed by altitude if different from flight level.

2.3.12.6. Condensation Trails (CONTRAILS). Enter CONTRAILS followed by their height if different from the /FL height.

2.3.12.7. Cloud Reports. Report heights of bases and tops encountered in /SK TEI. The remarks section is used for clouds that can be seen but were not encountered during flight, such as CS W, OVC BLO, SCT-BKN ABV, TS E MOV NE, etc.

2.3.12.8. Language/Terminology. The pilot may report information in words or phrases that are non-standard or cannot be encoded, such as very rough or bumpy. If specified phraseology is not adequate, use plain language to enter a description of the phenomena as clearly and concisely as possible. Appropriate remarks made by the pilot that do not fit in any TEI may also be included in remarks section. Some remarks that fall into this category are DURC, DURD, RCA, TOP, TOC, or CONTRAILS.

2.3.12.9. Volcanic Eruption. Indicate volcanic eruption in the remarks section of an Urgent PIREP. (Volcanic ash alone is considered weather phenomena and is included in /WX TEI.) In a report of volcanic activity, include as much information as possible, such as the name of the volcano/mountain, time of observed eruption (if different from /TM entry), location, and any ash cloud observed with the direction of the ash cloud movement. When receiving a report from anyone other than a pilot in the air or on the ground enter aircraft UNKN, flight level UNKN, and indicate in Remarks that the report is UNOFFICIAL. If the report is only for the smell of Sulfur Dioxide (SO2), and no volcanic ash, enter VA into the WX section of the PIREP and place in remarks "SO2 NO ASH" or "SULFUR SMELL NO ASH". Treat reports for SO2 and no ash cloud as non-urgent PIREPs.

2.3.12.10. PIREP Source. For further identification of the source of a PIREP, append the aircraft identification, call sign, or registration number to the Remarks section. Additionally, the facility encoding the PIREP may be added to the end of the remarks (e.g., ZLA CWSU).

2.3.12.11. Remotely Piloted Aircraft (RPA) / Unmanned Aerial Systems (UAS) PIREPS. Except for unmanned aircraft equipped with specialized meteorological sensors, RPA / UAS pilots typically rely on the limited capability of onboard Day TV (DTV)/Infrared (IR) sensors and ground control station (GCS) readouts to detect inflight weather. As a result, observed weather conditions filtered through the "lenses" of RPA / UAS sensors may differ significantly from weather conditions observed by pilots of manned aircraft. To ensure accurate interpretation of weather reported by RPA pilots:

2.3.12.11.1. Only encode objective weather elements (e.g., temperature and wind speed/direction) in the main portion of the text element report.

2.3.12.11.2. Encode subjective weather elements (e.g., sky cover, weather, flight level visibility, turbulence, and icing) observed using onboard sensors in the remarks section of the report.

2.3.12.11.3. Precede subjective weather elements encoded in the remarks section of the report with an estimated remark followed by the type of sensor used to determine subjective weather condition(s) (e.g., "EST DTV" for Day TV, "EST IR" for Infrared (IR) sensor, or "EST GCS").

2.4. PIREP Examples:

2.4.1. Clear-air Turbulence. At 2200Z, a Boeing ® 757-200 pilot reports severe clear-air turbulence between 35,000 and 39,000 feet over Toledo.

Figure 2.7. Example of Clear-Air Turbulence in a PIREP.

CCCC UUA /OV_KTOL/TM_2200/FLUNKN/TP_B752/TB_SEV_CAT_350-390

2.4.2. Dust storms or Sand storms. At 0750Z, a pilot reports a dust storm 35 miles northeast of Midland, Texas, flying at 4,000 feet with a visibility of 3/4 of a mile.

Figure 2.8. Example of Dust Storm in a PIREP.

CCCC UUA /OV_KMAF045035/TM_0750/FL040/TP_UNKN/WX_FV00SM_DS/RM IN FLT VIS 3/4SM

2.4.3. Electric Discharge. A military pilot flying an F-22 Raptor between Richmond, Virginia, and Washington, D.C., reports at 2120Z that the aircraft experienced an electrical discharge 20 miles south of Washington at an altitude of 5,000 feet.

Figure 2.9. Example of an Electric Discharge report in a PIREP.

CCCC UA /OV_KDCA180020/TM_2120/FL050/TP_F22/RM_DISCHARGE

2.4.4. Estimate. At 1630Z, a pilot of a Cessna ® 172 reports a dust storm 20 miles west of Kansas City, Missouri headed for the airport. The visibility at 3,500 feet is 10 miles. The pilot estimates the dust storm will reach the airport within 45 minutes.

Figure 2.10. Example of an Estimated Movement of a Dust Storm.

CCCC UUA /OV_KMKC270020/TM_1630/FL035/TP_C172/WX_FV10SM_DS/ RM DUST STORM_MOV090_EST_KMKC1715

2.4.5. Hail. At 2217Z, the pilot of a Fairchild F27 reports moderate hail, ½ inch in diameter, 10 miles south of Omaha, Nebraska, at an altitude of 3,500 feet.

Figure 2.11. Example of Hail report.

CCCC UUA /OV_KOMA180010/TM_2217/FL035/TP_FA27/WX_GR/RM_HLSTO 1/2

2.4.6. Icing and Corrected Icing PIREP. At 1500Z, the pilot of a Seneca ® reports encountering severe rime icing 5 to 20 miles north of Eugene, Oregon, at 2,000 feet.

Figure 2.12. Example of Corrected Icing PIREP

CCCC UA /OV_KEUG360005-360020/TM_1500/FL020/TP_PA34/IC_MOD_RIME **CCCC UUA /OV_KEUG360005-360020/TM_1501/FL020/TP_PA34/ IC_SEV_RIME/RM_COR 1510**
Notes: The second PIREP issued was transmitted at 1510Z to correct the report from moderate rime to severe rime icing. Notice this phenomenon changed the message to become an urgent versus routine message.

2.4.7. Cloud Cover. At 0000Z, the pilot of a Short 360 reports broken clouds between 3,600 feet and 6,600 feet, 6 miles SE of Honolulu. At 7,000 feet the pilot is between layers with an overcast deck above.

Figure 2.13. Example of Sky Cover PIREP.

CCCC UA /OV_PHNL135006/TM_0000/FL070/TP_SH36/SK_BKN036-TOP066/UNKN_OVC_ABV

2.4.8. Thunderstorm. At 2224Z, a C17 Globemaster III pilot reports an area of thunderstorms 45 miles NW of Dodge City in a north-south direction. The pilot also reports broken TCU cloud bases at 3,000 feet with the layer tops at 15,000 feet and TS tops at 32,000 feet with occasional cloud to cloud and cloud to ground lightning.

Figure 2.14. Example of Thunderstorm PIREP with Lightning Remark.

CCCC UUA /OV_KDDC315045/TM_2224/FLUNKN/TP_C17/SK_BKN030-TOP150/WX_TS/RM_LN_TS_N-S_OCNL_LTGCCCG_TS_TOPS_320

2.4.9. Tornado. At 2314Z, a pilot 35 miles north of Champaign, Illinois reports a tornado moving east northeast. The cloud layer is broken with bases at 3,000 feet. The pilot reports seeing the tornado making intermittent contact with the ground.

Figure 2.15. Example of Tornado PIREP.

CCCC UUA /OV_KCMI360035/TM_2314/FLUNKN/TP_UNKN/SK_BKN030/ WX_+FC/RM_TORNADO_MOV_ENE_INTER_CTC_WITH_GND

2.4.10. Volcanic Eruption and/or Ash. At 2010Z, the pilot of a B-1 crew at 37,000 feet, 75 miles Southwest of Anchorage, reports Mt. Augustine erupted at 2008Z. The pilot also reports an ash cloud 40 miles south of the volcano, moving south-southeast.

Figure 2.16. Example of Volcanic Eruption PIREP.

CCCC UUA /OV_PANC240075/TM_2010/FL370/TP_B1/WX_VA/ RM_VOLCANIC_ERUPTION_2008Z_MT_AUGUSTINE_ASH_40S_MOV_SSE
Note: A report of volcanic eruption/volcanic ash may be received from any source. If the source is other than a pilot in the air or on the ground, the remark section will begin with UNOFFICIAL. **(T-0)**

2.4.11. RPA. At 2300Z, a MQ-1B Predator pilot reports a flight visibility of 5 statute miles and severe clear-air turbulence between 15,000 and 18,000 feet at 33 degrees and 15 minutes North latitude and 105 degrees and 20 minutes West longitude while flying over New Mexico.

Figure 2.17. Example of RPA PIREP.

CCCC UUA /OV_3315N_10520W/TM_2300/ FLUNKN/TP_MQ1B/ RM_EST_DTV_FV05SM_ TB_SEV_CAT_150-180

Chapter 3

SOLAR OPTICAL CODES

3.1. MANOP Heading (Manual Operations). The MANOP heading is used in the transmission of routine and event-level solar messages and is placed in the first line of each message. The code elements of the MANOP are defined in **Table 3.1**.

Table 3.1. MANOP Heading.

Line 1	MMMMMM	MANOP Header: (**See Note 1**)
		SXXX(__) event-level message
		AXXX(__) routine message
		NWXX60 end of day summary
	SSSS	Solar Observatory Identifier
		APLM - Learmonth Solar Observatory
		K7OL - Sagamore Hill Solar Observatory
		KHMN - Holloman Solar Observatory
		PHFF - Kaena Point Solar Observatory
		LISS - San Vito Solar Observatory
	DDHHmm	DD - Day of month (corresponding with HHmm)
		HHmm - Hour and minute (UTC) (**See Note 2**)
	555555	Dummy date/time group (UTC) (**See Note3**)
Notes: 1. Examples are those primarily used by the Solar Observatories. 2. Fixed file times will use DDHHmm format. 3. 555555 will automatically update to the network current date and time by the dissemination system, when used.		

3.2. Solar Flare (FLARE) Code. Use this code to make event-level or routine reports of solar flares as observed with an optical telescope viewing at a wavelength of 6563Å (Hydrogen- alpha).

Figure 3.1. FLARE Code Format.

```
Line 1    MANOP heading
Line 2    FLARE
Line 3    IIiii YMMDD 3//nn
Line 4    11111 qSJJJ GGggL  QXXYY  TIBcc  GGggL 7AAAA  GGggL  9NNNN FBBbb
Line 4a   22222  IBGgg  7AAAA  .....  .....  99999
```

Table 3.2. Solar Code FLARE Report.

Line 1	MANOP Heading			
Line 2	FLARE		Data identifier, alphabetic character	
Line 3	IIiii	Five-digit Solar Observatory Identifier		
	YMMDD	Y	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month (corresponding to flare start time; **See Note 1**)	
	3//nn	3	Numerical filler (3rd group)	
		//	Fillers	
		nn	Number of data lines in this message	
Line 4	11111	Data line indicator (**See Note 1**)		
	qSJJJ	q	Quality of the observation coded according to:	
			1	Very poor
			2	Poor
			3	Fair
			4	Good
			5	Excellent
		S	Status of the report coded according to:	
			1	Preliminary estimate
			2	Final report
			3	Correction
			4	Deletion (**See Note 2**)
		JJJ	Local flare serial number assigned independently by each observatory (normally assigned sequentially by GMT day).	
	GGggL	GGgg	Start time (or time flare was initially observed). Record the hour and minute (GMT).	
		L	Time label coded according to:	
			1	Exact start time
			2	Flare in progress at GGgg (Begin time not observed; flare began before GGgg)
	QXXYY	Q	Quadrant location of the flare coded according to:	
			1	Northeast
			2	Southeast
			3	Southwest
			4	Northwest
		XX	Central Meridian Distance of the flare (whole degrees)	
		YY	Latitude of the flare (whole degrees)	

Line 4 (Cont)	TIBcc	T	Method or type of observation coded according to:	
			1	Visual
			2	Not Used
			3	Solar Radio Burst Locator (SRBL)
			4	Electronic
		I	Flare Importance determined by International Astronomical Union standards and coded according to:	
			0	Subflare (≥ 10 to < 100 millionths) millionths)
			1	Importance One (≥ 100 to < 250 millionths)
			2	Importance Two (≥ 250 to < 600 millionths)
			3	Importance Three (≥ 600 to < 1200 millionths)
			4	Importance Four (≥ 1200) millionths)
		B	Flare brightness coded according to:	
			7	Faint
			8	Normal
			9	Brilliant
		c	First flare characteristic coded according to:	
			0	Visible in white light
			1	Greater than or equal to 20 percent umbral coverage
			2	Parallel ribbon
			3	Associated Loop Prominence (LPS)
			4	Y-shaped ribbon
			5	Several eruptive centers
			6	One or more brilliant points
			7	Associated high speed Dark or Bright Surge on Disk (DSD or BSD)
			8	Flare followed the Disappearance of a Solar Filament (DSF) in the same region
			9	H-alpha emission greater in the blue wing than in the red wing
			/	Filler or not applicable
		c	Second flare characteristic coded according to the preceding table. (**Note:** The table lists flare characteristics in descending order of importance.)	
Line 4 (Cont)	GGggL	GGgg	Time of the maximum brightness of the flare (hour and minutes, GMT)	

		L	Time label coded according to:	
			1	Exact time of maximum brightness
			2	Time of area measurement (since the time of maximum brightness was not observed)
	7AAAA	7	Numerical filler (7th group)	
		AAAA	Corrected flare area in millionths of the solar hemisphere at time of maximum brightness. Use zero(s) as fill.	
	GGggL	GGgg	End time (or time flare was last observed). Record the hour and minute (GMT). **Note:** If coded message is transmitted before the flare has ended (preliminary report), encode ///// for GGggL.	
		L	Time label coded according to:	
			1	Exact end time
			2	Flare in progress at GGgg (end time not observed; flare ended after GGgg)
	9NNNN	9	Numerical filler (9th group)	
		NNNN	SWPC region number; use //// filler when number not known	
	FBBbb	F	Flare threshold expressed as a bin value, i.e., the minimum brightness bin value which has a corrected area of at least 10 millionths of the solar hemisphere to declare sampled activity a flare. Report only the ones unit (e.g., a value of "6" indicates flare threshold = 16). Report "/" if data is not available.	
		BB	Flare brightness level, expressed as a bin value, used to categorize the flare as faint, normal, or brilliant. (**Note:** The corrected area in this brightness bin, added to the area in all bins of greater brightness, has to be at least 10 millionths of the solar hemisphere.) Report "//" if data	
		bb	Maximum flare brightness, expressed as a bin value, detected in the sampled activity without regard to the amount of flare area in that bin. Report "//" if data not available	
Line 4a	22222		Data continuation line indicator (**See Note 3**)	
	IBGgg	I	Secondary flare importance coded according to:	
			0	Subflare
			1	Importance One
			2	Importance Two
			3	Importance Three
			4	Importance Four
		B	Secondary flare brightness coded according to:	

		7	Faint
		8	Normal
		9	Brilliant
	Ggg	Time of the secondary maximum brightness of the flare (last digit of hour and minutes, GMT)	
7AAAA	7	Numerical Filler	
	AAAA	Secondary corrected flare area in millionths of the solar hemisphere	
99999		End of data indicator (include at end of last data line)	

Notes:
1. Do not include data for more than one GMT day in a single message. Repeat lines 4 and 4a as often as necessary. Include data for only one flare on a single data line 4 or 4a.
2. If, a preliminary event-level flare is transmitted in error (e.g., not occurring or not event-level), immediately transmit a deletion using the event header (SXXX_ _, where _ _ is the specific numeric designator for each site) and the deletion code 4, and attach a short PLAIN message stating the event was transmitted in error.
3. Use line 4a to report other flare maxima (if applicable); use the IBGgg and 7AAAA groups as often as necessary, however, use no more than four secondary maxima on a single line 4a. Use the data encoded in groups TIBcc GGggL 7AAAA in line 4 to identify the largest, most energetic maximum. Use the cc, Flare Characteristics, in the TIBcc group in line 4 to describe the most significant maximum. Report a secondary maximum in line 4a in chronological sequence irrespective of the time of the largest, most energetic maximum.

3.3. Solar Disk and Limb Activity Summary (DALAS) Code. Use this code to make event-level and routine reports of activity on the solar disk and/or limb with an optical telescope viewing at a wavelength of 6563Å (Hydrogen-alpha). **Figure 3.2** illustrates the DALAS code format.

Figure 3.2. DALAS Code Format.

Line 1	MANOP heading
Line 2	DALAS
Line 3	IIiii YMMDD 3//nn
Line 4	11111 qSJJJ EEIRR GGggs GGgge TBRAA 9NNNN QXXYY QXXYY QXXYY
Line 4a	22222 WWW/D 3qFFF 99999

Table 3.3. Solar Disk and Limb Activity Summary (DALAS).

Line 1	MANOP Heading			
Line 2	DALAS		Data identifier, alphabetic character	
Line 3	IIiii	Five-digit Solar Observatory Identifier		
	YMMDD	Y	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month (corresponding to activity start time; **See Note 1**)	
	3//nn	3	Numerical filler (3rd group)	
		//	Fillers	
		nn	Number of data lines in this message	
Line 4	11111	Data line indicator (**See Note 1**)		
	qSJJJ	q	Quality of observation coded according to:	
			1	Very poor
			2	Poor
			3	Fair
			4	Good
			5	Excellent
		S	Status of the report coded according to:	
			1	Preliminary estimate
			2	Final report
			3	Correction
			4	Deletion
		JJJ	Local activity serial number assigned independently by each observatory (normally assigned sequentially by GMT day)	
Line 4 (Cont)	EEIRR	EE	Type of activity coded according to:	
			01	Not Used
			02	APR Active Prominence Region
			03	Not Used
			04	BSL Bright Surge on Limb (0.15 solar radius or greater)
			05	EPL Eruptive Prominence on Limb
			06	LPS Loop Prominence System (limb or disk)

			07	SPY Spray
			08	Not Used
			09	Not Used
			10	Not Used
			11	Not Used
			12	Not Used
		I	Index of activity. A subjective estimate of the level of activity for APR, EPL, ADF, or DSF activity, coded according to:	
			1	Active. Prominence fluctuates in brightness or changes shape. Filament varies in darkness, changes shape, or moves.
			2	Non-Eruptive. Prominence or filament disappears, but does not erupt. Represents dissipation in place.
			3	Eruptive. Prominence or filament erupts; filament shows strong doppler shift.
			/	Not applicable. Use for other types of disk and limb activity.
		RR	For limb activity: radial extent above the limb expressed in hundredths of the solar radius. For disk activity: encode heliographic extent (e.g., length) in whole degrees. For combined limb and disk activity: encode radial extent from the feature's point of origin to the outermost extent of the feature, expressed in hundredths of the solar radius. If the location is unclear, use plain language remarks to specify limb or disk activity	
Line 4 (Cont)	GGggs	GGgg	Start time (or time activity was initially observed).	
		s	Time qualifier coded according to:	
			1	Exact start time
			2	In progress; activity started before GGgg
			3	Activity started after GGgg (for features, which disappear, but start time was not observed, report time last observed and this time qualifier).
	GGgge	GGgg	End time (or time activity was last observed). Record the hour and minute (GMT). **Note:** If coded message is transmitted before the activity ended (preliminary report), encode ///// for GGgge.	
		e	Time qualifier coded according to:	

			1	Exact end time
			2	Activity ended before GGgg (for features, which disappear, but exact end time not observed, report time absence was first noticed and this time qualifier)
			3	Activity ended after GGgg (end time not observed, activity was still in progress at GGgg)
	TBRAA	T		Method or type of observation coded according
			1	Visual
			2	Not Used
			3	Not Used
			4	Electronic
		B		Observed amount of Doppler shift in blue wing in tenths of Angstroms
		R		Observed amount of Doppler shift in red wing, in tenths of Angstroms.
			Note: /	-indicates not measured or not applicable
			0	-indicates no shift
			9	-indicates shifts equal to or greater than 0.9 Angstroms
Line 4 (Cont)	TBRAA (Cont)	AA		Associated remarks. Use // as a filler or use any combination of the following:
			1	Flare Associated
			2	Brilliant intensity emission for at least one-third of the time
			3	Normal intensity emission for at least one-third of the time
			0	No other effects
	9NNNN	9		Numerical Filler
		NNNN		SWPC region number. Use //// if not applicable
	QXXYY	Q		Quadrant location of activity coded according to: (**See Note 3**)
			1	Northeast
			2	Southeast
			3	Southwest
			4	Northwest
		XX		Central Meridian Distance in whole degrees
		YY		Latitude of the activity in whole degrees

Line 4a	22222			Data continuation line indicator (permitted only for AFS, ADF, and DSF; **mandatory for DSF**)
	WWW/D	WWW		Mean width of the filament in tenths of a degree (WW.W). Generally reported to the nearest half degree.
		/		Filler
		D		Density— A subjective estimate of the filament's density coded according to:
			1	Faint
			2	Normal
			3	Dark
	3qFFF	3		Numerical filler (3rd group)
		q		Quality— The observability of the filament's fine structure coded according to:
			0	Fine structure unobservable
			1	Fine structure barely visible
			2	Fine structure apparent
			3	Fine structure distinctive
		FFF		Fine structure angle— Report whole degrees measured clockwise from the filament's orientation. Encode as /// if the quality is unobservable (q = 0).
	99999			End of data indicator (include at end of last data line)

Notes:
1. Do not include data for more than one GMT day in a single message. Repeat lines 4 and 4aas often as necessary. Include data for only one phenomenon on a single data line 4 or 4a.
2. For filaments which disappear overnight: Report the last time the filament was observed as the DSF start time, with a time qualifier of s = 3, "Activity started after GGgg"; and the time the filament was first observed to be absent as the DSF end time, with a time qualifier of e = 2, "Activity ended before GGgg". Coordination with other observatories to narrow this time period is permitted. Report the location of the DSF as its position at the time the filament was last visible. As with all other DALAS messages, the date of the message (DD) corresponds to the activity start time. Do not use the DALAS code to report overnight DSF if the period between activity start and end exceeds 24 hours. Instead, report all relevant information about the DSF in a scheduled or unscheduled PLAIN language message.
3. Report DALAS features equal to or less than 5 degrees in length with only one QXXYY group located by the centroid. Use up to three QXXYY groups, as needed, to indicate the two end points and one intermediate point. If more than three QXXYY groups are required to describe a filament, either report the additional groups in an appended plain language message or divide the filament into sections and report them in separate DALAS messages.

3.4. Sunspot (SPOTS) Code. Use this code to make routine reports of sunspots as observed with an optical telescope viewing in integrated (white) light. **(See Note 1)**

Figure 3.3. SPOTS Code Format.

Line 1	MANOP heading
Line 2	SPOTS
Line 3	IIiii YMMDD 3GGgg 4Tqnn
Line 4	11111 2SJJJ QXXYY LLAAA //NNN 6ZPCM 9NNNN 99999

Table 3.4. Sunspot (SPOTS) Codes.

Line 1	MANOP Heading			
Line 2	SPOTS	Data identifier, alphabetic character		
Line 3	IIiii	Five-digit Solar Observatory Identifier		
	YMMDD	Y	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month	
	3GGgg	3	Numerical filler (3rd group)	
		GGgg	Time of the observation midpoint (hour and minutes, GMT)	
	4Tqnn	4	Numerical filler (4th group)	
		T	Method or type of observation coded according to:	
Line 3 (Cont)	4Tqnn (Cont)	T (Cont)	1	Visual
			2	Not Used
			3	Projection
			4	Electronic
		q	Quality of the observation coded according to:	
			1	Very poor
			2	Poor
			3	Fair
			4	Good
			5	Excellent
			6	No observation, weather causes
			7	No observation, equipment problem
			8	No observation, other causes
		nn	Number of data lines contained in this message	
Line 4	1111	Data line indicator (**See Notes 1 and 2**)		
	2SJJJ	2	Numerical filler	
		S	Status of the report coded according to:	

			1 Preliminary estimate
			2 Final report
			3 Correction
			4 Deletion
		JJJ	Local sunspot group number assigned independently by each observatory (not necessarily reported in sequential order within a SPOTS message)
	QXXYY	Q	Quadrant location of the sunspot group coded according
			1 Northeast
			2 Southeast
			3 Southwest
			4 Northwest
		XX	Central Meridian Distance of the sunspot group (whole
		YY	Latitude of the sunspot group (whole degrees)
	LLAAA	LL	Heliographic extent (e.g., length) of the sunspot group (in whole heliographic degrees). The heliographic extent is the distance between the most extreme edges of the two most widely separated spots, measured along the group's major axis, which may not necessarily be parallel to the latitude lines. (Previously referred to as longitudinal extent.)
Line 4 (Cont)	LLAAA (Cont)	AAA	Corrected total area of the sunspot group in tens of millionths of the solar hemisphere. (Example: for 20 millionths, encode 002.)
	//NNN	//	Fillers
		NNN	Number of distinct umbra in the sunspot group. Use zero(s) as fill. (Example: Observation of two distinct sunspots. One spot has a single umbra, while the other has three umbra within the same penumbra. Encode 004.)
	6ZPCM	6	Numerical Filler
		Z	Sunspot Class (based on modified Zurich evolutionary sequence) according to:
			1 A Unipolar; no penumbra; length (normally) less than
			2 B Bipolar; no penumbra; length (normally) 3 degrees
			3 C Bipolar; penumbra on only one pole
			4 D Bipolar; penumbra on both poles; length less than

			5 E	Bipolar; penumbra on both poles; length greater than 10 but less than or equal to 15 degrees
			6 F	Bipolar; penumbra on both poles; length greater than 15 degrees
			7 H	Unipolar; with penumbra
		P	Penumbral Class (based on largest penumbra) according	
			0 x	No penumbra
			1 r	Rudimentary penumbra
			2 s	Small symmetric penumbra
			3 a	Small asymmetric penumbra
			4 h	Large symmetric penumbra
			5 k	Large asymmetric penumbra
		C	Sunspot Distribution within the group according to:	
			/ x	Single spot or unipolar group
			7 o	Open distribution
			8 i	Intermediate distribution
			9 c	Compact distribution
		M	Magnetic classification coded according to:	
			1	Alpha
			2	Beta
			3	Beta-gamma
Line 4 (Cont)	6ZPCM (Cont)	M (Cont)	4	Gamma
			5	Beta-delta
			6	Beta-gamma-delta
			7	Gamma-delta
	9NNNN	9	Numerical filler	
		NNNN	SWPC region number. Use //// if not applicable.	
	99999		End of data indicator	

Notes:

1. When observations reveal no sunspots on the solar disk, transmit a truncated SPOTS report to indicate that observations were possible but no sunspots were visible. This truncated report includes all data through line 3 of the SPOTS code. A typical example of this message is:
For a "fair" quality observation by projection technique with no visible sunspots, the 4Tqnn group would be encoded 43300.

2. Repeat line 4 as often as necessary. Include data for only one sunspot group on a single data line.

Figure 3.4. Example SPOTS Code.

```
AXXX63 APLM DDGGgg
SPOTS
IIiii YMMDD 3GGgg 4Tqnn 99999
```

3.5. Histogram History (HSTRY) Code. Use this code to make routine, automated reports of videometer box data for selected solar regions of interest. Messages contain brightness and uncorrected area data for each minute of the previous hour.

Figure 3.5. HSTRY Code Format.

```
Line 1    MANOP heading
Line 2    HSTRY
Line 3    IIiii YMMDD 3//nn
Line 4    RRRR/ HHMM/  PPABC PPABC...  .....
Line 4a   PPABC PPABC...  .....  99999
```

Table 3.5. Histogram History (HSTRY) Code.

Line 1	MANOP Heading		
Line 2	HSTRY	Data identifier, alphabetic character	
Line 3	IIiii	Five-digit Solar Observatory Identifier	
	YMMDD	Y	Last digit of the year
		MM	Number of the month
		DD	Day of the month
	3//nn	3	Numerical filler (3rd group)
		//	Fillers
Line 3 (Cont)		nn	Number of data lines contained in this message
Line 4	RRRR/	SWPC region number	
	HHMM/	Hour and minute of first data group (GMT)	
	PPABC	PP	Peak brightness (tens of percent of the quiet sun)
		ABC	Plage area (A.B x 10^c millionths of the solar hemisphere)
Line 4a	PPABC	As defined in line 4. Repeat group as necessary to code all data.	
	99999	End of data indicator (include at end of last date line).	
Note: There are 60 PPABC groups in a routine message, one for each minute of the hour. If data are not available for that minute, ///// is encoded. Do not transmit a message if data is not available for the region. Repeat line 4 for multiple region messages.			

3.6. Videometer Box Dimension Outline (BXOUT). Observatories use this code when they are equipped with the AN/FMQ-7 solar optical telescope to report videometer box size and position information.

Figure 3.6. BXOUT Code Format.

```
Line 1   MANOP heading
Line 2   BXOUT
Line 3   IIiii YMMDD 3//nn
Line 4   BOX CENTER REGION CENTER
Line 5   RGN HIGH WIDE P-ANGL RV LAT L O N    P-ANGL   RV LAT LON SEQ
Line 5a   RRRR HHHH WWWW SP.PPP R.RRR TTT   NNN    DDD.D R.RRR YYY XXX
VV/N
Line 6   TIME: SSSSSSSSS.SS (DDD HHMM:  SS) 99999
```

Table 3.6. Videometer Box Dimension Outline (BXOUT).

Line 1	MANOP Heading		
Line 2	BXOUT	Data identifier, alphabetic character	
Line 3	IIIiii	Five-digit Solar Observatory Identifier	
	YMMDD	Y	Last digit of the year
		MM	Number of the month
		DD	Day of the month
	3//nn	3	Numerical filler (3rd group)
		//	Fillers
		nn	Number of data lines contained in this message
Line 4	BOX CENTER		Column header for box center information
	REGION CENTER		Column header for region center information
Line 5	RGN		Column header or Region ID
	HIGH		Column header for height dimension of videometer box
	WIDE		Column header for width dimension of videometer box
	P-ANGL		Column header for position-angle of center of videometer box
	RV		Column header for radius vector to center of videometer box
	LAT		Column header for heliographic latitude at center of videometer box
	LON		Column header for heliographic longitude at center of videometer box
	P-ANGL		Column header for geocentric position angle to center of region
	RV		Column header for radius vector to region center
	LAT		Column header for heliographic latitude at region center
	LON		Column header for heliographic longitude at region center
	SEQ		Column header for identifying region observing sequence position
Line 5a	RRRR		SWPC or (locally defined) region number (**See Note**)
	HHHH		Height of videometer box (arc seconds)
	WWWW		Width of videometer box (arc seconds)
	SP.PPP	S	Sign of the position angle (M=negative, blank=positive)
	P.PPP		Value of the position angle (radians) to box center
	R.RRR		Value of the radius vector to box center
	TTT		Heliographic latitude at box center (e.g., N32)
	NNN		Heliographic longitude at box center (e.g., W60)
	DDD.D		Geocentric position angle to center of region (degrees)
	R.RRR		Value for the radius vector to region center
	YY		Heliographic latitude at region center

	XX		Heliographic longitude at region center
	VV/N	VV	Observing subsequence identifier (transmit "//" if not used)
		/	Filler
		N	Position in the subsequence (transmit "/" if not used)
Line 6	TIME		Header for time of the data
	SSSSSSSSS.SS		Time of data in seconds since start of the year (GMT)
	DDD		Day of the data (Julian Date)
	HHMM:SS		Hour, minute, and second of the data (GMT)
	99999		End of data indicator (include at end of last data line).
NOTE: Repeat line 5a as often as necessary to include all videometer boxes. (Height refers to the television screen used to display image of the sun, not to height above a point on the sun.)			

Chapter 4

SOLAR RADIO CODES

4.1. Discrete Solar Radio Burst (BURST) Code. Use this code to make event-level or routine reports of impulsive, solar radio bursts as measured on a discrete (fixed) frequency radiometer.

Figure 4.1. BURST Code Format.

Line 1	MANOP heading
Line 2	BURST
Line 3	IIiii YMMDD 3ppnn
Line 4	11111 qSLJJ FFabp Tuabp GGbbt GGmmt 7abpp GGeet 9abpp 99999

Table 4.1. Discrete Solar Radio Burst (BURST) Code.

Line 1	MANOP heading			
Line 2	BURST		Data identifier, alphabetic character	
Line 3	IIiii	Five-digit Solar Observatory Identifier		
	YMMDD	Y	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month (corresponding to burst start time; **See Note 1**)	
	3ppnn	3	Numerical filler (3rd group)	
		pp	Highest power of p in the following FFabp peak flux groups **(See Note 2)**	
		nn	Number of data lines in this message	
Line 4	11111		Data line indicator (**See Note 1**)	
	qSLJJ	q	Quality of the observation coded according to:	
			0	Origin of burst uncertain, possible Radio Frequency Interference (RFI)
			1	Uncertain data due to interference from a solar noise storm or RFI
			2	Uncertain data due to equipment problem, weather, or antenna shadowing
			3	Good data, manual reduction
			4	Good data, automatic reduction
		S	Status of the report coded according to:	
			1	Preliminary estimate
			2	Final report
			3	Correction
			4	Deletion **(See Note 3)**

Line 4 (Cont)	qSLJJ (Cont)	L	Time qualifier coded according to **(See Note 4)**:	
			0	Times correct as reported
			1	Start uncertain
			2	Peak uncertain
			3	Start and peak uncertain
			4	End uncertain
			5	End and peak uncertain
		JJ	Local burst serial number assigned independently by each observatory (normally assigned sequentially by GMT day) **(See Notes 5 and 6)**	
	FFabp	FF	Frequency indicator coded according to:	
			00 -Less than 150 MHz	
			11 -150 to 299 MHz (Used for 245 MHz)	
			22 -300 to 499 MHz (Used for 410 MHz)	
			33 -500 to 999 MHz (Used for 610 MHz)	
			44 -1,000 to 1,999 MHz (Used for 1,415 MHz)	
			55 -2,000 to 3,999 MHz (Used for 2,695 MHz)	
			66 -4,000 to 7,999 MHz (Used for 4,995 MHz)	
			77 -8,000 to 11,999 MHz (Used for 8,800 MHz)	
			88 -12,000 to 19,999 MHz (Used for 15,400 MHz)	
			99 -20,000 MHz or greater	
		ab	First two significant figures of the peak flux value observed at a frequency within the range indicated by FF **(See Note 7)**	
		P	Power of 10 applied to "a.b" to give the peak flux value in standard solar flux units (sfu) **(See Note 7)**	
	TUabp	T	Spectral class according to:	
			0	Not Classified
			9	Castelli-U **(See Note 8)**
		U	Type of burst according to:	
			1	NOISE STORM or FLUCTUATIONS
			2	GRADUAL RISE AND FALL (non-impulsive)
			3	IMPULSIVE (less than 500 sfu) **(See Note 9)**
			4	COMPLEX (less than 500 sfu) **(See Note 9)**
			5	GREAT BURST (500 sfu or greater)
			6	COMPLEX GREAT (500 sfu or greater)
		ab	First two significant figures of mean flux value **(See Note 7)**	
		p	Power of 10 applied to "ab" to give the mean flux value in standard sfu units **(See Note 7)**	

Line 4 (Cont)	7abpp	7	Numerical filler (7th group)
		ab	First two significant figures of the integrated flux value from start of burst to time of burst maximum (See Note 10)
		pp	Power of 10 applied to "a.b" to give integrated flux value in standard sfu-sec units (See **Note** 10)
	GGeet		End time (or time burst was last observed). Record the hour, minute, and tenth of minute (GMT): if the end time is unknown or uncertain, use "/" for tenth of minute. **Note:** If coded message is transmitted before the burst has ended (preliminary report),
	9abpp	9	Numerical filler (9th group)
		ab	First two significant figures of the integrated flux value from start of burst to end of burst (See **Note** 10)
		pp	Power of 10 applied to "a.b" to give integrated flux value in standard sfu-sec units (See **Note** 10)
	99999		End of data indicator (include at end of last data line)

Notes:
1. Do not include data for more than one GMT day in a single message. Repeat line 4 as often as necessary. Include data for only one frequency on a single data line.
2. The pp indicator in line 3 is a safeguard should any of the p values be garbled in lines 4. Repeat the highest p value assigned to any of the peak fluxes of the FFabp groups as pp in line 3. For example, if highest p value equals 2, then pp is encoded as 22.
3. If a preliminary event-level burst is transmitted in error (e.g., caused by RFI, not occurring, or not event-level), immediately transmit a deletion using the event header (SXXX_ _, where _ _ is the specific numeric designator for each site) and the deletion code 4, and attach a short PLAIN message stating the event was transmitted in error.
4. This only applies to uncertainty in hours and full minutes. It does not apply to uncertainty in tenths of minutes.
5. JJ is the same number for each frequency reported that, in the analyst's judgment, gives burst information associated with the same event. Noise storms on different frequencies will have separate serial numbers assigned, to facilitate ending the noise storms independently.
6. If a distinctly separate burst is superimposed on a non-impulsive burst, a noise storm, or on the decaying stage of a large burst, treat it as a separate burst and assign a different burst serial number.
7. If, for example, the first two significant figures of a flux reading are 52, then a = 5 and b = 2. If the actual reading is 52 solar flux units (sfu) (1 sfu = 10^{-22} watt*m^-2*Hz^-1), then p = 1 and abp =521 (for 5.2 x 10^{1}). Similarly, if the actual reading is 5200 sfu, then p = 3, and abp = 523 (for 5.2 x 10^{3}). Do not report mean flux for noise storms or fluctuations; instead encode "000". Mean flux estimates for other types of bursts are required, even during manual operations.
8. When a Castelli-U event occurs, continue to report the maximum peaks for each frequency, rather than the peaks used in defining the Castelli-U.
9. Do not report bursts of less than 100 sfu unless they are significant and/or contribute to the understanding of what is occurring. Examples: Gradual Rise and Fall bursts, or bursts that are part of a spectral group, should be reported even when their peaks are less than 100 sfu.
10. The standard unit of integrated flux is the solar flux unit-second, where 1 sfu-sec equals 10^{-22} watt*sec*m^{-2}*Hz^{-1} or 10^{-22} joule*m^{-2}*Hz^{-1}. Encode an integrated flux of 564,000 sfu-sec as 75605 (or 95605), which equals 5.6 x 10^{-17} watt*sec*m^{-2}*Hz^{-1}. Do not report integrated fluxes for noise storms or fluctuations; reporting these fluxes are optional for other types of bursts during manual operations, since they can be computed later from the time and mean flux data in the message. If an integrated flux value is not reported, replace the abpp with ////.

4.2. Spectral Solar Radio Burst (SWEEP) Code. Use this code to make event-level or routine reports of the solar radio spectrum, as measured on a Solar Radio Spectrograph (SRS).

Figure 4.2. SWEEP Code Format.

Line 1	MANOP heading
Line 2	SWEEPS
Line 3	IIiii YMMDD 3//nn
Line 4	11111 cqSJJ GGggt TIfff FFFF/ GGggt 7vvvv PPPRR 99999

Table 4.2. Spectral Solar Radio Burst (SWEEP) Code.

Line 1	MANOP heading			
Line 2	SWEEP		Data identifier, alphabetic character	
Line 3	IIiii	Five-digit Solar Observatory Identifier		
	YMMDD	Y	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month (corresponding to burst start time; **See Note 1**)	
	3//nn	3	Numerical filler (3rd group)	
		pp	Highest power of p in the following FFabp peak flux groups (See **Note** 2)	
		nn	Number of data lines in this message	
Line 4	11111		Data line indicator (**See Note 1**)	
	cqSJJ	c	Certainty of sweep type identification according to:	
			1	Certain
			2	Uncertain
		q	Quality of sweep frequency data coded according to:	
			1	Certain frequency range
			2	Uncertain frequency range
		S	Status of the report coded according to:	
			1	Preliminary estimate
			2	Final report
			3	Correction
			4	Deletion
Line 4 (Cont)	cqSJJ (Cont)	JJ	Local sweep serial number assigned independently by each observatory (normally assigned sequentially by GMT day). (**See Note 2**)	
	GGggt		Start time (or time sweep was initially observed). Record the hour, minute, and tenth of minute (GMT); if start time is unknown or uncertain, use "/" for tenth of minute.	
	TIfff	T	Type of the sweep coded according to:	
			1	(Not Used)
			2	Type II (slow drift) burst

			3	Type III (fast drift) burst; one or more bursts over a period of less than 10 minutes
			4	Type IV (smooth broadband continuum, possibly with Type III and/or Type V bursts superimposed) burst
			5	Type V (continuum tail on a Type III) burst; one or more bursts over a period of less than 10 minutes (may include some pure Type III bursts)
			6	Series of Type III bursts over a period of 10 minutes or more, with no period longer than 30 minutes without activity
			7	Series of Type III and Type V bursts over a period of 10 minutes or more, with no period longer than 30 minutes without activity
			8	Continuum (broadband continuum, possibly with Type III and/or Type V bursts superimposed)
			9	Unclassified activity
		I	Importance of the sweep coded according to:	
			1	Minor
			2	Significant
			3	Major
			/	Data not available
		fff	Low frequency end of sweep (MHz). Use zero(s) as fill.	
	FFFF/	FFFF	High frequency end of sweep (MHz). Use zero(s) as fill.	
		/	Filler	
	GGggt		End time (or time sweep was last observed). Record the hour, minute, and tenth of minute (GMT); if the end time is unknown or uncertain, use "/" for tenth of minute. **Note:** If coded message is transmitted before the sweep has ended (preliminary report), encode ///// for GGggt.	
	7vvvv	7	Numerical filler (7th group)	
		vvvv	Estimated shock velocity for Type II bursts (km/sec). Encode //// if data are not available. Use zero(s) as fill.	
Line 4 (Cont)	PPPRR	PPP	Position angle of source of activity measured eastward from apparent heliographic north. Encode /// if data are not available.	
		RR	Radial distance from the center of the sun to the source of activity in units of tenths of the apparent solar optical radius. Encode "//" if data are not available.	
	99999		End of data indicator (include at end of last data line)	

Notes: 1. Do not include data for more than one GMT day in a single message. Repeat line 4 as often as necessary. Include data for only one spectral burst (sweep) on a single data line. 2. JJ is a unique identification number for each spectral burst reported, even if two or more sweep types are superimposed in time. Report a superimposed sweep separately from other sweep types when it is one or two importance categories higher, or is associated with a discrete frequency burst. Assign the sweep serial numbers separately from the discrete frequency burst serial numbers.

4.3. Integrated Solar Radio Flux (IFLUX) Code. Use this code to report the background component of the solar radio flux as measured on discrete (fixed) frequency radiometers at local noon daily.

Figure 4.3. IFLUX Code Format.

```
Line 1    MANOP heading
Line 2    IFLUX
Line 3    IIiii YMMDD 3GGgg 4S/nn
Line 4    11111 FFFFF  qffff FFFFF  qffff FFFFF  qffff FFFFF  qffff
Line 4a   11111  .....  .....  .....  .....  .....  .....  .....  .....  99999
```

Table 4.3. Integrated Solar Radio Flux (IFLUX) Code.

Line 1	MANOP heading			
Line 2	IFLUX		Data identifier, alphabetic character	
Line 3	IIiii	Five-digit Solar Observatory Identifier		
	YMMDD	Y	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month (corresponding to burst start time; **See Note 1**)	
	3GGgg	3	Numerical filler (3rd group)	
		GGgg	Begin time of the flux measurements (hours and minutes, GMT)	
	4S/nn	4	Numerical filler (4th group)	
		S	Status of the report coded according to:	
			1	Preliminary estimate
			2	Final report
			3	Correction
			4	Deletion
Line 3 (Cont)	4S/nn (Cont)	/	Filler	
		nn	Number of frequencies (e.g., data pairs "FFFFF qffff") reported in this message	
Line 4	11111		Data line indicator (**See Note 1**)	
	FFFFF		Frequency (MHz) at which the following flux measurement was made. Use zero(s) as fill. **(See Note 2)**	

qffff	q	Quality of observation coded according to:	
		1	Good quality
		2	Uncertain quality due to weather
		3	Uncertain quality due to interference
		4	Uncertain quality due to unknown causes
		5	Uncertain quality due to burst in progress
	ffff	Flux (1 solar flux unit (sfu) = 10^{-22}W/m^2/Hz). Use zero(s) as fill.	
99999		End of data indicator (include at end of last data line)	

Notes:

1. A full data line 4 includes 11111 followed by data for four frequencies. The final data line 4a of the message will include 11111 and data for one to four frequencies followed by 99999. Include data for only one "GGgg" time on a single data line 4 or 4a.
2. Transmit a "FFFFF qffff" data group for each operational fixed frequency. If no data are available for a particular frequency, omit the corresponding "FFFFF qffff" data group. If flux values are acquired from each antenna sequentially, vice simultaneously, send separate messages using the applicable "GGgg" times.

Chapter 5

IONOSPHERIC CODES

5.1. Automated Ionospheric Data (IONOS) Code. This code is used to make routine reports of standard parameter data observed by an automated vertical incidence ionosonde.

Figure 5.1. IONOS Code Format.

Line 1	MANOP heading
Line 2	IONOS
Line 3	IIiii YMMDD 3//nn
Line 4	GGgg0 F2F2F2H2H2 F1F1F1H1H1 EEEHEHE EsEsEsMM FmFmYeYeQ
Line 5	ZELpN SELpN AELpN BELpN CELpN DELpN EELpN FELpN GELpN HELpN
Line 6	ZF1pN SF1pN AF1pN BF1pN CF1pN DF1pN EF1pN FF1pN GF1pN HF1pN
Line 7	ZF2pN SF2pN AF2pN BF2pN CF2pN DF2pN EF2pN FF2pN GF2pN HF2pN
Line 8	99999

Table 5.1. Automated Ionospheric Data (IONOS) Code.

Line 1	MANOP Heading			
Line 2	IONOS	Data identifier, alphabetic character		
Line 3	IIiii	Five-digit Solar Observatory Identifier		
	YMMDD	Y	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month	
	3//nn	3	Numerical filler (3rd group)	
		//	Fillers	
		nn	Number of observations **(See Note 1)**	
Line 4	GGgg0	GGgg	Time of observation to nearest minute (GMT)	
		0	Filler	
	F2F2F2H2H2	F2F2F2	Value of foF2 to nearest tenth MHz	
		H2H2	True height of F2 layer maximum in tens of	
	F1F1F1H1H1	F1F1F1	Value of foF1 to nearest tenth MHz	
		H1H1	True Height of F1 layer maximum in tens of	
	EEEHEHE	EEE	Value of foEs to nearest tenth MHz	
		HEHE	True Height of E layer maximum in tens of	
	EsEsEsMM	EsEsEs	Value of foEs to nearest tenth MHz	
		MM	M(3000) factor to nearest tenth	
	FmFmYeYeQ	FmFm	Minimum detected frequency to nearest tenth MHz. A minimum observed frequency (fmin) value greater than 9.9 MHz is replaced by 9.9 MHz.	
Line 4 (Cont)	FmFmYeYeQ (Cont)	YeYe	Half thickness of E-layer (parabolic fit) in kilometers	
		Q	Qualifier: If any of the above data are missing, the reason is indicated according to the following table. Only a reason for the first missing element is coded.	
			1	Blanketing Sporadic E
			2	Non-Deviative Absorption (fmin elevated)
			3	Equipment outage

			4	foF2 greater than equipment upper limit
			5	foF2 less than equipment lower limit
			6	Spread F
			7	foF2 less than foF1
			8	Interference
			9	Deviative Absorption in vicinity of foF2
			0	No qualifier applies
Line 5	XXXpN	XXX	Up to 10 five-character groups, which define the E region electron density profile as determined by the ionosonde's automated data reduction routine (**See Notes 2 and 3**).	
			Each five-character group (XXXpN) provides a quantity required to calculate the electron density profile, using a representation by Chebychev polynomials. All five- character groups have the same structure:	
			Three most significant digits of the respective quantity expressed in scientific notation. Those three digits are represented as "X.XX"	
		P	Sign indicator of XXX and N according to:	
			7	XXX and N negative
			8	XXX negative, N positive
			9	XXX positive, N negative
			0	XXX and N positive
		N	Power of 10 to which XXX is raised	
	ZELpN		Height of E-layer maximum (A_0 in Chebychev polynomials for E-layer); in kilometers, after conversion using above rules	
	SELpN		Start frequency of E-layer; in MHz, after conversion using above rules	
	AELpN		A1, first of up to eight coefficients which define the E-layer segment of the true height profile; in kilometers, after conversion using above rules	

	BELpN	Are the same format as AELpN; they are the coefficients
		A_2, A_3, ..., A_8 in Chebychev polynomials, for E-layer
Line 6		Same as Line 5, but for F1 layer
Line 7		Same as Line 5, but for F2 layer
Line 8	99999	End of data indicator (include at end of last data line).
Notes: 1. Under current polling procedures and software design, there is data for only one ionogram per message (the last hourly or half-hourly ionogram run prior to polling). Therefore, 3//nn will always be coded as 3//01. **(T-3)** 2. The number of coefficients is variable, depending on the complexity of the true height profile. If less than eight coefficients are used for a given layer, the remaining five-character positions are filled with solidi (/). 3. If E, F1, or F2-layer electron density profile data are absent, the whole corresponding line (all ten five-character groups) is filled with solidi (/). In the case where data for all three layers is absent, fill Lines 5, 6, and 7 with solidi.		

5.2. Ionospheric Height (IONHT) Code. Use this code to make routine reports of the virtual height (See **Table 5.2; Note 1**) of the main ionospheric echo (the ordinary, or "O", trace) as a function of frequency, as observed by an automated vertical incidence ionosondes.

Figure 5.2. IONHT Code Format.

Line 1 MANOP heading Line 2 IONHT Line 3 IIiii YMMDD 3/nnn Line 4 GGgg0 FFFHH FFFHH FFFHH .... FFFHH Line 4a FFFHH FFFHH..... 99999

Table 5.2. Ionospheric Height (IONHT) Code.

Line 1	MANOP Heading		
Line 2	IONHT	Data identifier, alphabetic character	
Line 3	IIiii	Five-digit Solar Observatory Identifier	
	YMMDD	YY	Last digit of the year
		MM	Number of the month
		DD	Day of the month
	3//nn	3	Numerical filler (3rd group)
		//	Fillers
		nn	Number of FFFHH data groups in this report
Line 4	GGgg0	GG gg	Time of observation to nearest minute (GMT)
		0	Filler
	FFFHH	FFF	Frequency of observed O-trace reflection to nearest tenth MHz
		HH	Virtual height of O-trace reflection in tens of kilometers
Line 4a	FFFHHH		Repeat FFFHH until all groups are sent. Use ten groups per line. Never exceed 66 characters and spaces per line. (Line 4, due to the GGgg0 group, has a maximum of nine FFFHH groups.) (**See Note 3**)
	99999		End of data indicator (include at end of last data line)

Notes:
1. Virtual height is the apparent height of a reflecting layer. It is determined by multiplying the round trip travel time of the sounder pulse by one-half the speed of light in a vacuum.
2. Under current polling procedures and software design, there is data for only one ionogram per message (the last hourly or half-hourly ionogram run prior to polling).
3. Repeat line 4a as often as is necessary. Send as many frequency-height groups as necessary to define the virtual height profile (normally less than 300). The total number of groups sent must match the number in line 3.

5.3. Total Electron Content and Scintillation (TELSI) Code. This code is used to make routine or special reports of the equivalent total electron content (TEC) and ionospheric scintillation (variability) along paths between GPS/NAVSTAR satellites and an automated Ionospheric Measuring System (IMS) instrument.

Figure 5.3. TELSI Code Format.

Line 1	MANOP heading
Line 2	TELSI
Line 3	IIiii YMMDD 3GGgg 4SRnn 5S1S2S3S4
Line 4	Nnnggddq tttdddeq LLLLLoLoLoLo txtxtxtytytyeq1q2 lllllololo
Line 4a	1sssvvv 2sssvvv 3S1S1S1S2S2S2 lllllololo tstststststs
Line 4b	JJJJTTTS JxJxJxJxTxTxTxS lllllololo JnJnJnJnTnTnTnS lllllololo 8PPPPPxPxPxPnPnPn
Line 5	(Same as Line 4, but used for second satellite in field of view of ground station)
Line 5a	(Same as Line 4a, but used for second satellite in field of view of ground station)
Line 5b	(Same as Line 4b, but used for second satellite in field of view of ground station)
Line 6, 6a, 6b	(Used for a third satellite in view of ground station)
Line 7, 7a, 7b	(Used for a fourth satellite in view of ground station) 99999

Table 5.3. Total Electron Content and Scintillation (TELSI) Code.

Line 1	MANOP Heading			
Line 2	TELSI	Data identifier, alphabetic character		
Line 3	IIIiii	Five-digit Solar Observatory Identifier		
	YMMDD	Y	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month	
	3GGgg	3	Numerical filler (3rd group)	
		GGgg	Ending time of observation period, in hours and minutes, GMT	
Line 3 (Cont)	4SRnn	4	Numerical filler (4th group)	
		S	Data quality indicator coded according to: 0 to 9 (TBD when critical system components are identified.)	
		R	Period of transmission of message coded according to: (**See Note 1**)	
			1	Message transmitted every 15 minutes
			2	Message transmitted every 30 minutes
			3	Message transmitted every 45 minutes
			4	Message transmitted every 60 minutes
		nn	Number of coded lines in message to follow	
	5S1S2S3S4	5	Numerical filler (5th group)	
		S1	Number of satellites reported during first 15-minute interval (coded as "0" if no satellites are present, or as "/" if the interval is not reported)	
		S2	Number of satellites reported during second 15-minute interval (coded as "0" if no satellites are present, or as "/" if the interval is not reported)	
		S3	Number of satellites reported during third 15-minute interval (coded as "0" if no satellites are present, or as "/" if the interval is not reported)	
		S4	Number of satellites reported during fourth 15-minute interval (coded as "0" if no satellites are present, or as "/" if the interval is not reported)	
Lines 4-7	Nnnggddq	N	Line number, coded as 4 corresponding to data set for first satellite, 5 for second satellite, 6 for third satellite, and 7 for fourth satellite (**See Note 2**)	

		nn	Identification number assigned to each GPS/NAVSTAR satellite
		gg	Ending time of the observation —interval in minutes for the data set corresponding to this line. For example, if three 15-minute intervals were reported in a message with an end time of observation equal to 1700, gg would be 30 for the first line (corresponding to 1630), 45 for the second line (1645), and 60 for the third line (1700). (**See Note 3**)
		dd	Interval period of the data set in minutes
		q	Data quality indicator (0 to 9). TBD.
Line 4-7 (Cont)	tttdddeq	ttt	Mean equivalent vertical TEC for the interval period at the centroid Ionospheric Penetration Point (IPP) of the ray path between the satellite and the receiver measured in three significant digits to the nearest tenth (**See Note 4**)
		ddd	Standard deviation from the mean equivalent vertical TEC measured in three significant digits to the nearest tenth
		e	Power of ten (exponent) of the mean equivalent vertical TEC and standard deviation coded according to: (**See Note 6**)
			5 = x 10^{15} electrons/m^2
			6 = x 10^{16} electrons/m^2
			7 = x 10^{17} electrons/m^2
			8 = x 10^{18} electrons/m^2
			9 = x 10^{19} electrons/m^2
		q	Accuracy indicator (0 to 9). TBD for mean TEC over interval
	LLLLLoLoLoLo	LLLL	Latitude of the satellite subtrack at the midpoint of the observation period (interval) measured in degrees to the nearest tenth (**See Note 5**)
		LoLoLoLo	Longitude of the satellite subtrack at the midpoint of the observation period (interval) measured in degrees to the nearest tenth (**See Note 5**)
	txtxtxtytytyeq1q2	txtxtx	Maximum equivalent vertical TEC within the interval period measured at the IPP between the satellite and receiver in three significant digits to the nearest tenth (**See Note 4**)

		tytyty	Minimum equivalent vertical TEC within the interval period measured at the IPP between the satellite and receiver in three significant digits to the nearest tenth (**See Note 4**)
		e	Power of ten (exponent) of the maximum and minimum equivalent vertical TEC code according to: (**See Note 7**)
			5 = x 10^{15} electrons/m^2
			6 = x 10^{16} electrons/m^2
			7 = x 10^{17} electrons/m^2
			8 = x 10^{18} electrons/m^2
			9 = x 10^{19} electrons/m^2
		q1q2	Accuracy indicators (0 to 9). TBD for max and min TEC during observation interval
Line 4-7 (Cont)	llllolololo	llll	Latitude of IPP location coincident with TEC maximum measured in degrees to the nearest tenth (**See Note 5**)
		lolololo	Longitude of IPP location coincident with TEC maximum measured in degrees to the nearest tenth (**See Note 5**)
Lines 4a-7a	1sssvvv	1	Numerical filler (1st group) which identifies data associated with 1.2 GHz satellite signals
		sss	Mean Amplitude Scintillation Index (S4) at 1.2 GHz averaged over the observation interval measured as a ratio of the standard deviation of received signal power to the mean received power measured to nearest hundredth of a unit (s.ss) (See Note 8)
		vvv	Standard deviation of the mean Amplitude Scintillation Index (S4) at 1.6 GHz, measured to the nearest hundredth of a unit (v.vv)
	2sssvvv	2	Numerical filler (2nd group) which identifies data associated with 1.6 GHz satellite signals

		sss	Mean Amplitude Scintillation Index (S4) at 1.2 GHz averaged over the observation interval measured as a ratio of the standard deviation of received signal power to the mean received power measured to nearest hundredth of a unit (s.ss) (**See Note 8**)
		vvv	Standard deviation of the mean Amplitude Scintillation Index (S4) at 1.6 GHz, measured to the nearest hundredth of a unit (v.vv)
	3S1S1S1S2S2S2	3	Numerical filler (3rd group)
		S1S1S1	Maximum Amplitude Scintillation Index (S4) at 1.2 GHz measured to nearest hundredth of a unit (S1.S1S1)
		S2S2S2	Maximum Amplitude Scintillation Index (S4) at 1.6
			GHz measured to nearest hundredth of a unit (S2.S2S2)
	lllllolololo	llll	Latitude of IPP location coincident with S4 maximum measured at 1.2 GHz in degrees to nearest tenth (**See Notes 5 and 9**)
		lolololo	Longitude of IPP location coincident with S4 maximum measured at 1.2 GHz in degrees to nearest tenth (**See Notes 5 and 9**)
	tstststststs		Time at which maximum S4 was observed during the observation period (HHMMSS, GMT)
Lines 4b-7b	JJJJTTTS	JJJJ	Mean Phase Scintillation Index (sigma-sub-delta- phi) defined as the standard deviation of the measured differential phase in hundredth of radians (JJ.JJ) over the observation interval (**See Note 8**)
		TTT	Mean spectral strength obtained from measuring differential carrier phase advances between 1.6 GHz and 1.2 GHz frequencies in tenths of decibels (dB) (TT.T)
		S	Sign of spectral strength (0=positive, 1=negative)

	JxJxJxJxTxTxTxS	JxJxJxJx	Phase Scintillation Index measured in hundredths of radians (JxJx.JxJx) at the maximum spectral strength (TxTxTx) (**See Note 10**)
		TxTxTx	Maximum spectral strength in tenths of decibels (dB) (TxTx.Tx) (**See Note 10**)
		S	Sign of spectral strength (0=positive, 1=negative)
	llllllolololo	llll	Latitude of IPP location coincident with the worst case identified by maximum spectral strength parameter (TxTxTx) measured in degrees to nearest tenth (**See Note 5**)
		lolololo	Longitude of IPP location coincident with the worst case identified by maximum spectral strength parameter (TxTxTx) measured in degrees to nearest tenth (**See Note 5**)
	JnJnJnJnTnTnTnS	JnJnJnJn	Phase Scintillation Index measured in hundredths of radians (JnJn.JnJn) at the minimum slope parameter (PnPnPn)
		TnTnTn	Spectral strength in tenths of dBs (TnTn.Tn) for minimum slope parameter (PnPnPn)
		S	Sign of spectral strength (0=positive, 1=negative)
	llllllolololo	llll	Latitude of IPP coincident with the worst case identified by minimum slope parameter (PnPnPn) measured in degrees to the nearest tenth (**See Note 5**)
		lolololo	Longitude of IPP coincident with the worst case identified by minimum slope parameter (PnPnPn) measured in degrees to the nearest tenth (**See Note 5**)
	8PPPPxPxPxPnPnPn	8	Numerical filler
		PPP	Slope parameter associated with the mean Phase Scintillation Index measured in units to nearest hundredth (P.PP)
Lines 4b-7b	8PPPPxPxPxPnPnPn (Cont)	PxPxPx	Slope parameter associated with the worst case due to maximum spectral strength (TxTxTx) measured in units to nearest hundredth (Px.PxPx)

		PnPnPn	Minimum slope parameter associated with the worst measured in units to nearest hundredth (**See Note 10**)
	99999		End of data indicator (include at end of last data line).

Notes:

1. For messages sent at 15-minute periods of transmission, report only one 15-minute data set. For messages transmitted every 30 minutes, report only two 15-minute data sets (observation intervals). Messages transmitted once per hour would contain four 15-minute data sets.
2. Use lines 5 through 7 only when needed to report data from a constellation of 2, 3, or 4 satellites within the field of view of the IMS during the reporting period of the messages.
3. Repeat lines 4 through 7 for each data set corresponding to a time interval within the message. For example, a message transmitted once per hour containing four 15-minute data sets and 4 satellites within the field of view for the entire period would have 3 lines for each 15-minute period for satellite 1 (Lines 4, 4a, 4b), 3 lines for each 15-minute period for satellite 2 (Lines 5, 5a, 5b), etc. Thus, 3 lines per satellite per period, for 4 satellites, for 4 periods, would equate to 48 lines.
4. The Ionospheric Penetration Point (IPP) is defined to be where the ray path between the GPS/NAVSTAR satellite and the IMS intersects 350 km altitude (typically in the F-region).
5. Express latitudes and longitudes to the nearest tenth of a degree. Longitudes run from 0 to 359.9 degrees west of Greenwich. Latitudes run from -90.0 to +90.0, the sign being distinguished by the first coded character (0=positive, 1=negative). Examples: 0675 is 67.5N; while 1675 is 67.5S.
6. If the standard deviation (ddd) is lower by a factor of 10 from the TEC, encode ddd as 0dd (which is two significant digits to nearest tenth) in order to raise the exponent by one. For example, if TEC equals 25.2×10^{16} and the standard deviation is 31.1×10^{15}, then tttddde is 2520316. If ddd is out of range (too low or high), encode as //9 or //0 respectively.
7. If the minimum (tytyty) TEC is lower by a factor of 10 from the maximum TEC, encode tytyty as 0tyty (which is two significant digits to nearest tenth) in order to raise the exponent by one. For example, if TEC (maximum) equals 35.2×10^{16} and TEC (minimum) is 98.1×10^{15}, encode txtxtxtytytye as 3520986. If TEC (minimum) is two orders of magnitude lower, encode as 00ty to raise exponent by two; e.g., 98.1×10^{14} is reported as 009. If TEC minimum is out of range, encode as //9.
8. Locations of the mean Amplitude Scintillation Index (S4) and mean Phase Scintillation Index (sigma-sub-delta-phi) are assumed to be at the same location (IPP) as the mean TEC (tttddde) group in Line 4.
9. The maximum S4 measured at 1.6 GHz should be in approximately the same location as the maximum S4 at 1.2 GHz.
10. The maximum spectral strength (TxTxTx) and the minimum slope parameter (PnPnPn) derived from the differential carrier phase advances between the two satellite frequencies (1.6 GHz and 1.2 GHz) are considered the worst cases for the occurrence of phase scintillation.

Chapter 6

SPECIAL CODES

6.1. Event (EVENT) Code. Use this code for rapid reporting of real-time solar and geophysical events. The activity being reported has a unique identifier depending on the type of data. **NOTE:** the EVENT code (not to be confused with an encoded message such as BURST that is event-level) is transmitted when responding to a REQST from the SpaceWOC. Send an event code (EVENT) response to all instrument observatories when your observations do not meet event criteria reported by another site. For example, if Sagamore Hill transmits an event-level burst of 4000sfu on 245 MHz, and the 245 MHz burst at Kaena Point has reached a maximum of only 120sfu, then transmit a RADNS. If not on the sun, respond with a RADNO. These same guidelines apply to optical (SOON) responses. RSTN and SOON sites on the sun should respond only once with the appropriate activity condition. The purpose of the EVENT Code is the rapid exchange of brief event information (or lack of it). The valuable information needed at the forecast centers is the coded preliminary burst, sweep, flare or DALAS messages. EVENT coded data should not be sent when the actual messages are available, and repeated EVENT Code transmissions should be minimized.

Figure 6.1. EVENT Code Format.

Line 1	MANOP heading 555555
Line 2	EVENT
Line 3	IIiii 21/01
Line 4	11111 EEEEE 99999

Table 6.1. Event (EVENT) Code .

Line 1	MANOP Heading		
	555555	Dummy date/time group (GMT)	
Line 2	EVENT	Data identifier, alphabetic character	
Line 3	IIiii	Five-digit Solar Observatory Identifier	
	21/01	2	Numerical filler (2nd group)
		1	Status of report (1=preliminary estimate)
		/	Filler
		01	Number of data lines that follow (always one)
Line 4	11111		Data line indicator
	EEEEE		Event type indicator coded according to RAD(II), SWP(II), FLA(II), LOOP(I), and LIMB(I) (**See Note 1**)
	RAD(II)	RAD	Radio burst information at any fixed frequency (**See Note 2**)
		(II)	Status of burst as follows:

			NO	No observation possible
			NE	No radio burst activity occurring
			NS	Burst occurring, but does not meet event criteria
Line 4 (Cont)	RAD(II) (Cont)	(II) (Cont)	//	No Longer Reported
			05	Burst equal to or greater than 5,000 sfu, but less than 10,000 sfu reported (regardless of whether RAD// has already been reported)
			11	Burst equal to or greater than 10,000 sfu (reported regardless of whether RAD// or RAD05 has already been reported)
			55	Burst equal to or greater than 50,000 sfu (reported regardless of whether RAD05 or RAD11 has already been reported)
			00	Burst equals or exceeds 100 percent above background on 2695 MHz (tenflare)
			CU	Castelli "U" shaped burst spectral characteristics
			IF	No Longer Reported
	SWP(II)	SWP	Radio burst information at sweep frequencies	
		(II)	Status of burst as follows:	
			NO	No observation possible
			NA	Data not yet observable (**See Note 3**)
			NS	No activity, or activity does not meet event criteria
			22	Type II burst observed
			44	Type IV burst observed
	FLA(II)	FLA	Solar flare indicator **(See Note 4)**	
		(II)	Status of flare as follows:	
			NO	No observation possible
			NE	No flare occurring
			NS	Flare activity does not meet event criteria
			//	2B, 3F, 3N, 3B, 4F, 4N, or 4B flare observed
	LOOP(I)	LOOP	Solar loop prominence event observed (**See Note 5**)	
		(I)	Status of event as follows:	
			D	Loops seen primarily against solar disk

			E	Loops seen primarily against east solar limb
			W	Loops seen primarily against west solar limb
	LIMB(I)	LIMB	Solar energetic limb event (0.15 solar radius or greater from point of origin) observed (**See Note 5**)	
		(I)	Status of event as follows:	
			E	Located on east solar limb
			W	Located on west solar limb
Line 4 (Cont)	XR(FFI)	XR	Solar X-ray event indicator (**See Note 6**)	
			Status of event as follows:	
			NO/	No observation in real-time
			NS/	No event criteria enhancement
		(FFI)	If an event was detected, then: FF = Lower and upper limit of X-ray channel to the nearest Angstrom. (Example: FF = 8 refer to the GOES 1 to 8 Angstrom channel.)	
			I = X-ray flux trend according to:	
			I	Flux increasing and above event threshold
			S	Flux steady at or near maximum
			E	Flux ended, values below event threshold
	FALSE		False Alarm. Used only by the forecast center to indicate that an XR (FFI) event is a false alarm.	
	REQST		Request. Used only by the forecast center if indications of a possible event in progress are received from outside sources, or to exercise the rapid response capability of the observatory network. Observing sites will respond with appropriate messages. **(T-3)**	

	99999	End of data indicator (include at end of last data line).
Notes: 1. RAD (II), SWP(II), FLA(II), LOOP(I), and LIMB(I) may be encoded in any order within a single EVENT code message. Repeat these event-type indicator groups in a message to report multiple phenomena (e.g., RAD05 RADCU). No more than eight groups may be included in a single message. 2. Do not report a combination of RAD05, RAD11, or RAD55 in the same message. Report RAD00 and RADCU regardless of whether RAD05, RAD11, or RAD55 have already been reported. Report RAD00 and RADCU only once per burst. 3. SWP (II) data are not immediately available. Transmit reports as soon as an accurate determination of sweep type is made. 4. To initially report a flare event, an optical-only observatory in automatic mode (computer is able to analyze data and generate messages) will transmit a preliminary FLARE code message in place of the EVENT code "FLA//" message. **(T-3)** Combined optical-radio observatories are not required to (but may) include a "FLA//" in an all-sensor EVENT code message under these circumstances. Since there is only one flare event threshold (i.e., exceeding 0N), do not transmit another "FLA//" message when a flare increases classification (for example, when it goes from a 1N to a 1B or a 2B). However, an extra FLARE code preliminary message, before the mandatory post maximum preliminary, would be appropriate. 5. Omit the LOOP(I) and/or LIMB(I) group(s) if they do not apply. Report LOOP(I) and LIMB(I) only once per event. If a loop prominence event or an energetic limb event is still in progress when a new all-sensor EVENT code message must be transmitted for any reason, the solar analyst may (depending on the exact circumstances) find it appropriate to append a Plain Language Code (PLAIN) (see paragraph 6.3) stating that loops or limb event activity is still in progress. 6. X-ray event messages do not require a response from the observatories.		

6.2. Event Acknowledgment (AKNOW) Code. This message is generated by the forecast center to acknowledge receipt of event messages (SXXX_ _ MANOP) and to provide a quality and system acceptance assessment of the messages.

Figure 6.2. AKNOW Code Format.

Line 1	MANOP heading 555555
Line 2	TTTTT
Line 3	11111 AKNOW XXXXX 99999

Table 6.2. Event Acknowledgment (AKNOW) Code.

Line 1	MANOP Heading	SXXX7(_) KSFC, where (_) corresponds to the origin of the acknowledged message:	
		0	San Vito Solar Observatory
		1	Sagamore Hill Solar Observatory
		2	Holloman Solar Observatory
		3	Kaena Point Solar Observatory
		4	Learmonth Solar Observatory
	555555	Dummy date/time group (GMT)	
Line 2	TTTTT	Message type being acknowledged: "FLARE", "DALAS", "BURST", "SWEEP" or "EVENT".	
Line 3	11111	Data line indicator	
	AKNOW XXXXX	Acknowledgment remark. If the message was received error-free and accepted by the forecast center computer system, the remark will read AKNOW GOOD. If the message was received, but rejected due to a data error and/or other cause, the remark will read AKNOW BAD LINE (YY) where (YY) is coded as:	
		00	Message appears good, but system problems at the forecast center prevented acceptance; retransmit message
		03 to 99	Approximate line number on which an error was detected; check message, correct, and retransmit
	99999	End of data indicator (include at end of last data line)	

6.3. Plain Language (PLAIN) Code. Use this code to report optical, radio, and geophysical data and/or operational information not reportable by another code, or to expand or explain data reported in another code. Transmit PLAIN messages separately or appended to other coded messages.

Figure 6.3. PLAIN Code Format.

Line 1	MANOP heading
Line 2	PLAIN
Line 3	(Plain language text)
Line 3a	(Plain language text)
Line 4	99999

Table 6.3. Plain Language (PLAIN) Code.

Line 1	MANOP Heading	
Line 2	PLAIN	Data identifier, alphabetic character
Line 3	(text)	Non-decoded alphabetic character word descriptions; not more than 69 characters per line
Line 3a	(text)	Continuation of line 3, repeat as often as necessary
Line 4	99999	End of data indicator (include at end of last data line)

6.4. Patrol Status (STATS) Code. Use this code to report patrol start or stop times for an observatory's optical, radio, and/or geophysical observing equipment. Transmit messages as soon as feasible after both opening and closing the observatory, and as needed to report changing operating conditions throughout the day.

Figure 6.4. STATS Code Format.

```
Line 1    MANOP heading
Line 2    STATS
Line 3    IIiii YMMDD STTnn
Line 4    11111 GGggM  jEEOI jEEOI jEEOI jEEOI .....  .....
Line 4a   22222 jEEOI jEEOI .....  .....  .....  99999
Line 5    33333 GGggM  jFFOI jFFOI jFFOI jFFOI .....  .....
Line 5a   44444 jFFOI jFFOI .....  .....  .....  99999
Line 6    55555 GGggM  jHHOI jHHOI jHHOI jHHOI .....  .....
Line 6a   66666 jHHOI jHHOI .....  .....  .....  99999
```

Table 6.4. Patrol Status (STATS) Code.

Line 1	MANOP Heading (**See Note 1**)			
Line 2	STATS	Data identifier, alphabetic character		
Line 3	IIIiii	Five-digit Solar Observatory Identifier		
	YYMMDD	YY	Last digit of the year	
		MM	Number of the month	
		DD	Day of the month	
	STTnn	S	Status of the report coded according to:	
			1	Not Used
			2	Final Report
			3	Correction
			4	Not Used
		TT	Type of sensor system coded according to: (**See Note 1**)	
			01	Optical (SOON)
			02	Radio (Radio Solar Telescope Network, RSTN)
			03	Geophysical (or other non-SOON or RSTN) instrument
		nn	Number of data lines contained in this message	
Line 4	11111	Optical (SOON) data line indicator (**See note 2**)		
	GGggM	GG	Hour of valid time (UTC)	
		Gg	Minutes of valid time (UTC)	
		M	Method of observation coded according to: (**See Note 3**)	
			1	Automatic
			2	Semi-automatic
	jEEOI	j	Status of equipment coded according to:	
			0	On at sunrise
			1	Inoperative/weather at sunrise
			2	On at interim time between sunrise and sunset
			3	Off at interim time between sunrise and sunset
			4	Off at sunset
		EE	System/equipment indicator coded according to: (**See Notes 4 and 5)**	
			01	Computer
			02	Internet Network
			03	Defense Switched Network (DSN)
			04	Commercial phones
			05	AN/FMQ-7 (all SOON subsystems)
			06	Hydrogen-alpha system
			07	Spectrograph system
			09	White light system
			//	All systems/equipment
		O	Expected outage time coded according to:	
			1	Less than 30 minutes

			2	30 minutes to less than 60 minutes
			3	1 hour to less than 4 hours
			4	4 hours to less than 8 hours
			5	8 hours, or more
			9	Unknown
			/	Not Applicable
		I	Reason the system/equipment is inoperative coded according to:	
			1	Weather
			2	Equipment problems
			3	Routine maintenance
			4	Power failure
			5	Calibrations
			6	Local obstructions
			9	Unknown
			/	Not Applicable
	99999	End of data indicator (put only at end of last data line)		
Line 4a	22222	Continuation line indicator for optical (SOON) data; the jEEOI groups in line 4a must pertain to the same GGggM given in line 4		
	99999	End of data indicator (put only at end of last data line)		
Line 5	33333	Radio (RSTN) data line indicator (**See Note 6**)		
	GGggM	GG	Hour of valid time (UTC)	
		Gg	Minutes of valid time (UTC)	
		M	Method of observation coded according to:	
			1	Automatic
			3	Manual
	jFFOI	j	Status of equipment coded according to:	
			0	On at sunrise
			1	Inoperative at sunrise
			2	On at interim time between sunrise and sunset
			3	Off at interim time between sunrise and sunset
			4	Off at sunset
		FF	Frequency/equipment indicator coded according to: (**See Notes 4 and 5)**	
			01	Computer
			02	Internet Network
			03	DSN
			04	Commercial phones
			10	FRR-95 (all discrete frequency radiometers and SRS)
			11	Radiometer at 150 to 299 MHz (Used for 245 MHz)
			22	Radiometer at 300 to 499 MHz (Used for 410 MHz)
			33	Radiometer at500 to 999 MHz (Used for 610 MHz)
			44	Radiometer at1,000 to 1,999 MHz (Used for 1,415

				MHz)
			55	Radiometer at 2,000 to 3,999 MHz (Used for 2,695 MHz)
			66	Radiometer at 4,000 to 7,999 MHz (Used for 4,995 MHz)
			77	Radiometer at 8,000 to 11,999 MHz (Used for 8,800 MHz)
			88	Radiometer at 12,000 to 19,999 MHz (Used for 15,400 MHz)
			19	Solar Radio Spectrograph (SRS)
			//	All systems/equipment
		O	Expected outage time coded according to:	
			1	Less than 30 minutes
			2	30 minutes to less than 60 minutes
			3	1 hour to less than 4 hours
			4	4 hours to less than 8 hours
			5	8 hours, or more
			9	Unknown
			/	Not Applicable
		I	Reason the system/equipment is inoperative coded according to:	
			1	Weather
			2	Equipment problems
			3	Routine maintenance
			4	Power failure
			5	Calibrations
			6	Local obstructions
			7	Radio Frequency Interference (RFI)
			9	Unknown
			/	Not Applicable
	99999	End of data indicator (put only at end of last data line)		
Line 5a	44444	Continuation line indicator for radio (RSTN) data; the jFFOI groups in line 5a must pertain to the same GGggM given in line 5		
	99999	End of data indicator (put only at end of last data line)		
Line 6	55555	Geophysical (non-SOON or RSTN) instrument data line indicator (**See Note 7**)		
	GGggM	GG	Hour of valid time (UTC)	
		Gg	Minutes of valid time (UTC)	
		M	Method of observation coded according to:	
			1	Automatic
			3	Manual
	jHHOI	j	Status of equipment coded according to:	
			5	On at time of GGggM group
			6	Off at time of GGggM group
		HH	System/equipment indicator coded according to:	
			91	Ionosonde (Digital Ionospheric Sounding System

				or manual ionosonde)
			92	Magnetometer
			93	Neutron Monitor
			94	Riometer
			95	IMS
		O	Expected outage time coded according to:	
			1	Less than 30 minutes
			2	30 minutes to less than 60 minutes
			3	1 hour to less than 4 hours
			4	4 hours to less than 8 hours
			5	8 hours, or more
			9	Unknown
			/	Not Applicable
		I	Reason the system/equipment is inoperative coded according to:	
			1	Weather
			2	Equipment problems
			3	Routine maintenance
			4	Power failure
			5	Calibrations
			6	Local obstructions
			7	Radio Frequency Interference (RFI)
			9	Unknown
			/	Not Applicable
	99999	End of data indicator (put only at end of last data line)		
Line 6a	66666	Continuation line indicator for geophysical (or other non-SOON or RSTN) instruments; the jHHOI groups in line 6a must pertain to the same GGggM given in line 6		
	99999	End of data indicator (put only at end of last data line)		

Notes:

1. Do not combine optical, radio, and geophysical instruments in a single STATS message. Send each system status in separate messages, using the MANOP headers appropriate to the data type: AXXX61 for optical, AXXX71 for radio, and SXXX6_ for ionospheric. If old STATS messages are transmitted (e.g., to update 2d Weather Squadron), the current status must be retransmitted after sending the old messages is completed, since it is the last received message that updates the forecast center status displays.
2. Repeat lines 4 and 4a as often as necessary, but do not include data for more than one UTC day in a single message. Data line 4 contains the 11111 and GGggM groups, and a maximum of 7 jEEOI groups. Data line 4a contains the 22222 group and a maximum of 8 jEEOI groups.
3. At a SOON site the method of observation ("M") may change (from semiautomatic to automatic, or vice versa) without any system/equipment item changing status. This may occur when light levels improve in the morning, making automatic operations possible, and again later in the evening when declining light levels may make automatic operations impossible. In such situations, the analyst must send a STATS message with a single jEEOI group of 206// (the 206// group is required for decode purposes at the forecast center, not because the status of the Hydrogen-alpha system (EE = 06) has changed). **(T-1)** For example,

a SOON site opened in semi-automatic mode; when light levels improve sufficiently to support automatic operations, the analyst would transmit the example message in **Figure 6.5** even though no systems/equipment changed status.
4. Report the status of all installed systems/equipment, in numerical order (e.g., // or 01, 02, 03,
...), in the first STATS message of the observing day. For SOON, analysts may report 05 (FMQ-
7, all SOON subsystems) in place of 06 to 09 if these items have the same status, expected outage time, and reason for outage. For RSTN, analysts may report 10 (FRR-95, all discrete frequency radiometers and SRS) in place of 11 to 88 and 19 if these items have the same status, expected outage time, and reason for outage. For example see **Figure 6.6** for a SOON site that opens with the computer, commercial phones, and spectrograph inoperative; site has no DSN capability installed.
Report outages "by exception"; to do so, first indicate all items are operational, then (in the same message) indicate the non-operational item(s) using the same time. See example in **Figure 6.7.**
5. After the first STATS message of the observing day, it is only necessary to report the systems/equipment that change status during the day. For example in **Figure 6.8** the computer is repaired, but there are no other changes. STATS reportable internet network, DSN, or commercial phone outage is intended to reflect a site-wide outage in send, receive, or both. The fact that a single phone instrument/line or teletype printer is out of service is not reportable by STATS. For example, at a dual SOON/RSTN site, if SOON has no internet network capability, but RSTN does, the outage is not reportable by STATS. At a dual site, the SOON and RSTN analysts should not both report a site-wide internet network, DSN, or commercial phone outage. In fact, for a dual site, use only a SOON STATS message (e.g., 11111 or 22222 line entry) to update these three items. The same is not true for computers. It is possible for one side to have a computer outage and the other side to be in automatic mode, so the SOON and RSTN computers are treated separately. For this reason, a computer outage that affects both SOON and RSTN is reported in both a SOON and a RSTN STATS message.
6. Repeat lines 5 and 5a as often as necessary, but do not include data for more than one UTC day in a single message. Data line 5 contains the 33333 and GGggM groups, and a maximum of seven jFFOI groups. Data line 5a contains the 44444 group and a maximum of eight jFFOI groups.
7. Repeat lines 6 and 6a as often as necessary, but do not include data for more than one UTC day in a single message. For example, report status of an ionosonde and an IMS in the same STATS message using two lines 6. Data line 6 contains the 55555 and GGggM groups, and a maximum of seven jHHOI groups. Data line 6a contains the 66666 group and a maximum of eight jHHOI groups.

Figure 6.5. Example of STATS Message to change status from Semiautomatic to Automatic.

STATS
IIiii 20226 20101
11111 17401 206// 99999

Figure 6.6. Example of STATS Message for inoperative communications at site

```
STATS
IIiii 20226 20102
11111 17252 10192 002// 10442
22222 006// 10752 008// 009// 99999
```

Figure 6.7. Example of STATS Message for Equipment Outage.

```
STATS
IIiii 20226 20101
11111 17252 0//// 10192 10442 10752 99999
```

Figure 6.8. Example of STATS Message for Equipment Status Change.

```
STATS
IIiii 20226 20101
11111 18301 201// 99999
```

Chapter 7

OTHER CODES

7.1. Target Weather Information Reporting (TARWI) Code. This is the standard NATO meteorological code for in -flight use by strike aircrews providing in-flight weather information. NATO Meteorological Codes Manual AWP-4(B) provides procedures for encoding and use of TARWI information.

7.2. Effective Downwind Messages (EDMs) and Chemical Downwind Messages (CDMs). Processes and procedures for encoding and decoding EDMs and CDMs for chemical, biological, radiological and nuclear (CBRN) operations are in Air Force Tactics, Techniques, and Procedures (Interservice) (AFTTP[I]) 3-2.56, *Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance.*

MARK D. KELLY, Lt Gen, USAF
Deputy Chief of Staff, Operations

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFPD 15-1, *Weather Operations,* 12 November 2015

AFH 11-203 V2, *Weather For Aircrews – Products and Services,* 21 May 2018

AFI 15-128, *Air Force Weather Roles and Responsibilities,* 07 February 2011

AFMAN 15-111, *Surface Weather Observations,* 21 January 2016

AFMAN 15-129 V1, *Air and Space Weather Operations – Characterization,* 21 March 2017

AFMAN 15-129 V2, *Air and Space Weather Operations – Exploitation,* 26 June 2008

AFMAN 33-363, *Management of Records*, 30 May 2018

AFTTP(I) 3-2.56, Change 1, *Multiservice Tactics, Techniques, and Procedures for Chemical Biological, Radiological, and Nuclear Contamination Avoidance,* 02 February 2006

FAA Order JO 7340.2, *Contractions,* 06 March 2018

FAA Order JO 7350.9, *Location Identifiers,* 18 July 2018

FAA Order JO 7360.1, *Aircraft Type Designators,* 23 April 2018

Federal Meteorological Handbook No. 12 (FCM-H12), *United States Meteorological Codes and Coding Practices,* 1 January 2013

NATO AWP-4(B), *NATO Meteorological Codes Manual*

World Meteorological Organization (WMO) *Manual on Codes*, No. 306, Volume 1.I, Part A

Adopted Forms

AF Form 847, *Recommendation for Change of Publication*

Abbreviations and Acronyms

Minus (-)—Light Intensity

Plus (+)—Heavy Intensity

ABV—Above

ADF—Active Dark Filament

AFMAN—Air Force Manual

AFS—Arch Filament System

AGL—Above Ground Level

AKNOW—Event Acknowledgement Code

APR—Active Prominence Region

ASR—Active Surge Region

BC—Patches

BKN—Broken

BL—Blowing

BLO—Below

BR—Mist

BSD—Bright Surge on Disk

BURST—Discrete Solar Radio Burst

BXOUT—Videometer Box Dimension Outline

CA—Cloud to air

CAT—Category

CB—Cumulonimbus

CBRN—Chemical, Biological, Radiological, Nuclear

CC—Cirrocumulus, or Cloud to cloud lightning

CG—Cloud to ground

CHOP—Turbulence type characterized by rapid, rhythmic jolts

CLR—Clear

CONS—Continuous

CONTRAILS—Condensation trails

COR—Correction To A Previously Disseminated Report

CS—Cirrostratus

CU—Characterization Unit

DALAS—Solar Disk and Limb Activity Summary Code

dB—Decibel

DoD—Department Of Defense

DR—Low Drifting

DS—Dust-storm

DSD—Dark Surge on Disk

DSF—Disappearance of a Solar Filament

DSN—Defense Switched Network

DU—Widespread Dust

DURC—During Climb

DURD—During Descent

DZ—Drizzle

EDM—Effective Downwind Message

EPL—Eruptive Prominence on Limb

EST—Estimate, Estimated

EVENT—Event Code

EXTRM—Extreme

FAA—Federal Aviation Administration

FALSE—False Alarm

FC—Funnel Cloud

+FC—Tornado or Waterspout

FEW—Few

FG—Fog

FITL—Forecaster in the Loop

FLARE—Solar Flare Code

FLIP—Flight Information Publication

Fmin—Minimum Observed Frequency

foEs—Sporadic E Critical Frequency

fo F1—F1 Region Critical Frequency

fo F2—F2 Region Critical Frequency

FRQ—Frequent

FU—Smoke

FZ—Freezing

G—Gust

GHz—Giga Hertz (109 Hz)

GMT—Greenwich Mean Time

GPS/NAVSTAR—Global Positioning System/Navigation, Surveillance, Tracking, and Reporting

GR—Hail

GS—Snow Pellets

HLSTO—Hailstone(s)

HSTRY—Histogram History Code

HVY—Heavy

Hz—Hertz

HZ—Haze

IC—Ice Crystals, In-Cloud Lightning

IFLUX—Integrated Solar Radio Flux Code

IMC—Instrument Meteorological Conditions

IMS—Ionospheric Measuring System

INTMT—Intermittent

IONHT—Ionospheric Height Code

IONOS—Automated Ionospheric Data Code

IPP—Ionospheric Penetration Point

KT—Knots

LAST—Last Forecast Before A Break In Coverage At A Manual Station

LGT—Light

LLWS—Low level wind shear

LN—Line

LPS—Loop Prominence

LTG—Lightning

LYR—Layer

M—Meters, Sub-zero temperatures

MANOP—Manual Operations

METAR—Aviation Routine Weather Report

MHz—Mega Hertz (106 Hz)

MI—Shallow

MOD—Moderate

MOV—Moved/Moving/Movement

MSL—Mean Sea Level

OMTNS—Over Mountains

MXD—Mixed

NATO—North Atlantic Treaty Organization

NAVAID—Navigational aids

NE—Northeast

NEG—Negative

NMRS—Numerous

NSW—No Significant Weather

NW—Northwest

OCNL—Occasional

OVC—Overcast

PIREP—Pilot Weather Report

PL—Ice Pellets

PLAIN—Plain Language Code

PO—Dust/Sand Whirls

PY—Spray

RA—Rain

RCA—Reach Cruising Altitude

RFI—Radio Frequency Interference

RSTN—Radio Solar Telescope Network

S4—Mean Amplitude Scintillation Index

SA—Sand

SCT—Scattered

Sec—Second

SEV—Severe

SFC—Surface

Sfu—Solar Flux Units

SG—Snow Grains

SH—Shower(s)

Sigma—sub-delta-phi —Mean Phase Scintillation Index

SKC—Sky Clear

SLD—Solid

SM—Statute Miles

SN—Snow

SOON—Solar Observing Optical Network

SPOTS—Sunspot Code

SPY—Spray

SQ—Squall

SRBL—Solar Radio Burst Locator

SRS—Solar Radio Spectrograph

SS—Sand storm

STATS—Patrol Status Code

STN—Station

SWEEP—Spectral Solar Radio Burst Code

SWPC—Space Weather Prediction Center

TAF—Terminal Aerodrome Forecast

TARWI—Target Weather Information Reporting Code

TBD—To Be Determined

TCU—Towering Cumulus

TEC—Total Electron Current

TEI—Text Element Indicator

TELSI—Total Electron Content and Scintillation Code

TOC—Top of Climb

TOP—Top of Clouds

TS—Thunderstorm

UA—TEI used in routine PIREP

UNKN—Unknown PIREP TEI

UP—Unknown Precipitation

US—United States

USAF—United States Air Force

UTC—Coordinated Universal Time

UUA—TEI used in urgent PIREP

V—Variable

VA—Volcanic Ash

VAAC—Volcanic Ash Advisory Center

VC—Vicinity

VHF—Very High Frequency

VIS—Visibility

VOR—Very high frequency omnidirectional range station

VORTAC—Very high frequency omnidirectional range station/tactical air navigation

VRB—Variable

VV—Vertical Visibility

WMO—World Meteorological Organization

WND—Wind

XR—Solar X-ray Event Indicator

Terms

Bulletin Heading—A combination of letters and numbers that describe the contents of a bulletin, including the data type, geographical location, four-letter identifier of the originator and a date-time group. (e.g. MANOP heading)

Contrails (Condensation trails)—A visible cloud streak, usually brilliant white in color, which trails behind an aircraft or other vehicle in flight under certain conditions.

File Time—The time a weather message or bulletin is scheduled to be transmitted. Expressed either as a specific time or as a specific time block during which the message is transmitted.

Four-letter identifier—A specifically authorized four-letter code assigned to a location and documented by International Civil Aviation Organization.

Issue Time—Time the last agency was notified. Exclude follow-up notifications when determining issue time.

Limited Duty Station—A weather station that provides less than 24-hour a day forecast service.

NAVAID—An electronic navigation aid facility, specifically limited to VHF Omni-Directional Radio Range (VOR), or combined VHF Omni-Directional Radio Range/Tactical Air Navigation (VORTAC) facilities.

Pilot Report—A report of in-flight weather provided by an aircraft crewmember.

Text Element Indicator (TEI)—A two-letter contraction with slash used in the standard PIREP message to identify the elements being reported.

Vicinity—Used to report present weather phenomena when greater than 5 but less than or equal to 10 statute miles of the station.