This manual implements AFPD 15-1, *Atmospheric and Space Environmental Support*. It implements the United States Air Force (USAF) coding practices for the World Meteorological Organization (WMO) Aerodrome Forecast Code, FM 51, and other codes that are not covered in the WMO Manual on Codes No. 306. This manual provides encoding instructions for weather codes mandated for use by Air Force weather organizations and applies to all Active and Reserve Component organizations conducting weather operations, including government-contracted weather operations if stated in the Statement of Work (SOW) or Performance Work Statement (PWS). The reporting requirements in this directive are exempt from licensing in accordance with (IAW) paragraph (para) 2.11.10 of Air Force Instruction (AFI) 33-324, The Information Collections and Reports Management Program: Controlling Internal, Public and Interagency Air Force Information Collections. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF IMT 847, Recommendation for Change of Publication; route AF IMT 847s from the field through the appropriate functional chain of command. Major Commands (MAJCOM), Field Operating Agencies (FOAs), and Direct Reporting Units (DRUs) send one copy of implementing instructions to AF/A3O-WP, 1490 Air Force Pentagon, Washington, DC 20330-1490 for review and coordination.

Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located at **https://www.my.af.mil/gcss-af61a/afrims/afrims/**. This publication applies to Air Force Reserve Command (AFRC) units and to the Air National Guard (ANG). **RELEASABILITY:** There are no releasability restrictions on this publication.

SUMMARY OF CHANGES

This document is substantially revised and must be completely reviewed. The codes in this manual are those mandated for use by Air Force weather organizations. It includes the addition of dates to TAF code change groups and maximum and minimum temperatures. Latitude and longitude have been added to the PIREP section for use with Unmanned Aerial Vehicles or for over water locations. The following codes were removed from this manual: AIREPS.

Chapter 1

AIR FORCE TERMINAL AERODROME FORECAST CODE

1.1. General. 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, *Air and Space Weather Operations – Roles and Responsibilities* and AFMAN 15-129, *Aerospace Weather Operations – Processes and Procedures*.

1.1.1. Unless otherwise specified, forecast elements in the main body of the forecast text (clouds, weather, wind, etc.) apply to the area within a 5 statute mile (8,000 meters) radius of the center of the aerodrome. See paragraph 1.3.4.4.2.1. for weather in the "vicinity" (between 5 statute miles/8000 meters and 10 statute miles/16 kilometers) of the aerodrome center.

1.1.2. Forecast elements represent the most probable conditions expected during the forecast period and in the forecast area. Times of occurrence or changes (as indicated by $YYGGG_eG_e$ or $YYGGgg$) represent specific times when conditions are expected to occur.

1.2. Code Format. The Operational Weather Squadrons (OWSs) and other applicable Air Force weather organizations issue TAFs based on the USAF coding practices of the WMO Aerodrome Forecast Code, FM 51, which is based on the Aviation Routine Weather Report (METAR) code (see AFMAN 15-111, *Surface Weather Observations*). Definitions and coding conventions for construction of w'w' groups (Table 1.2) are found in AFMAN 15-111.

1.3. TAF Encoding.

1.3.1. TAF Code Format. Use the following format for encoding TAFs:

MESSAGE HEADING
CCCC TAF (AMD) YYG_1G_1/YYG_2G_2 $dddffGf_mf_m$KT VVVV w'w' $N_sN_sN_sh_sh_sh_s$CC or
$VVh_sh_sh_s$ or SKC (WS$h_xh_xh_x$/dddfffKT or WSCONDS) ($6I_ch_ih_ih_it_L$)   ($5Bh_Bh_Bh_Bt_L$)
$QNHP_1P_1P_1P_1$INS   (Remarks)
TTTTT $YYGGG_eG_e$ or $YYGG/YYG_eG_e$ $dddffGf_mf_m$KT…same as above… (Remarks)
$T(M)T_FT_F/YYG_FG_F$Z $T(M)T_FT_F/YYG_FG_F$Z   (AMD, COR, or AMD COR) YYGGgg
(Limited Forecast Service Indicator [FNXXT/QCYY]).

1.3.1.1. Groups in parentheses are used only as condition exists or as required.

1.3.1.2. The forecast maximum/minimum temperature groups $T(M)T_FT_F/YYG_FG_F$Z will be entered on the last line of the TAF before the forecast modifier and date/time (e.g., COR 271615, AMD 141232, AMD COR 041815).

1.3.1.3. The icing and/or turbulence group is entered only when required by paragraphs 1.3.4.7 and 1.3.4.8.

1.3.1.4. Automated Dissemination Software (ADS) does not currently support placement of the Non-Convective Low-Level Wind Shear (WS$h_xh_xh_x$/dddfffKT or WSCONDS) group in the body of the forecast. Until the ADS software is upgraded, organizations will place the WS$h_xh_xh_x$/dddfffKT or WSCONDS in the remarks section.

1.3.2. Example TAF. The following is an Air Force weather TAF example for Barksdale AFB, LA with explanations and definitions of the code format:

KBAD TAF 0116/0216 03008KT 0800 PRFG FEW000 BKN005 BKN012 QNH3001INS FG FEW000
TEMPO 0118/0121 14012G18KT 3200 -SN BLSN FEW000 OVC006 620065 SN FEW000
FM012145 15012G20KT 9999 NSW SCT030 QNH2992INS
BECMG 0123/0124 15012G20KT 3200 -SN BLSN FEW000 OVC004 620046 QNH2983INS SN FEW000
TEMPO 0201/0203 13015G25KT 0200 -FZDZ FG VV001 660001 650109 T03/0121Z TM01/0212Z;

1.3.2.1. The forecast is for Barksdale AFB, LA (KBAD), valid from 011600Z to 021600Z. 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 1,200 feet. The lowest altimeter setting between 011600Z and 012144Z will be 30.01 inches of mercury. There is a fog-induced surface-based partial obscuration from 1/8 to 2/8 coverage.

1.3.2.2. Between 011800Z and 012100Z, conditions will vary temporarily (frequently but for short periods) to winds from 140 degrees at 12 knots gusting to 18 knots, visibility 3,200 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), overcast at 600 feet (the ceiling), and light rime icing from 600 to 5,600 feet above ground level (AGL). There is a snow-induced surface-based partial obscuration from 1/8 to 2/8 coverage.

1.3.2.3. Beginning at 012145Z, conditions will change to wind from 150 degrees at 12 knots gusting to 20 knots; unrestricted visibility 9,999 meters or grater, no significant weather, sky cover scattered at 3,000 feet and the minimum altimeter setting from 012146Z until 012400Z will be 29.92 inches of mercury.

1.3.2.4. Between 012300Z and 012400Z, conditions will become wind from 150 degrees at 12 knots gusting to 20 knots; visibility 3,200 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 is overcast at 400 feet. There will be light rime icing from 400 to 6,400 feet AGL and the lowest altimeter setting from 020000Z until 021600Z will be 29.83 inches of mercury. There is a snow-induced surface based partial obscuration from 1/8 to 2/8 in coverage.

1.3.2.5. Between 020100Z and 020300Z, conditions will 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 1,000 feet AGL and moderate icing in cloud (rime) from 1,000 feet AGL up to 10,000 feet AGL. The forecast maximum temperature is 03°C at 012100Z and the forecast minimum temperature is forecast minus 01°C at 021200Z.

1.3.3. Example Corrected (COR) TAF. The following is an example of a corrected (COR) forecast for Ramstein AB, Germany:

**ETAR TAF AMD 0116/0215 28012G25KT 8000 -RASN SCT006 BKN015 OVC020 620208
540009 QNH2960INS**
**BECMG 0118/0119 27012KT 9999 NSW SCT015 BKN020 620208 540009 QNH2965INS
T15/0120Z T04/0211Z COR 011615;**

1.3.3.1. The forecast is for Ramstein AB, Germany (ETAR), valid from 011500Z to 021500Z. The initial conditions (011500Z to 011900Z) are for winds from 280 degrees at 12 knots gusting to 25 knots, visibility 8,000 meters in light rain and snow, sky cover is scattered at 600 feet, broken at 1,500 feet, and overcast at 2,000 feet. There will be light rime icing in cloud between 2,000 and 10,000 feet AGL and light to moderate in cloud turbulence from surface to 9,000 feet AGL. Lowest altimeter setting from 011500Z to 011900Z will be 29.60 inches of mercury.

1.3.3.2. Between 011800Z and 011900Z, the initial condition will change gradually to winds from 270 degrees at 12 knots, visibility more than 9,000 meters; no significant weather, sky cover scattered at 1,500 feet and broken at 2,000 feet. Icing and turbulence will remain as forecast by the initial condition, and the lowest altimeter setting from 011900Z to 021500Z will be 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. This is a corrected forecast, with the correction issued at 011615Z.

1.3.4. Specification of Symbolic Letters.

1.3.4.1. Message Heading (CCCC TAF [AMD] YYG_1G_1/YYG_2G_2). The message heading consists of:

1.3.4.1.1. Location identifier (CCCC).

1.3.4.1.2. Message identifier of TAF.

1.3.4.1.3. Modifier for an amended, delayed, or corrected TAF (AMD). Do not use the modifiers RTD, COR, or AMD COR in the first line of the body of any TAF. Delays or corrections to TAFS will be identified by including the "AMD" modifier in the first line of the body of the TAF. As necessary append a correction date and time in the remarks on the last line of the TAF.

1.3.4.1.4. Valid Period (YYG_1G_1/YYG_2G_2). The valid period consists of the current day of the month (YY) and the 24-hour period of the forecast beginning time (G_1G_1) and ending time (G_2G_2) in whole hours, except for amended TAFs. All times are in Coordinated Universal Time (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. If the 0318/0418Z TAF is amended at 2131Z, the valid period would be 0321/0418Z. The exact date time of the amendment will be indicated in the TAF remarks (See paragraph 1.3.5).

1.3.4.2. Wind Group ($dddffGf_mf_mKT$). Surface wind direction, speed and gusts, if any.

1.3.4.2.1. Wind direction (ddd). Forecast true wind direction (from which wind is blowing) to the nearest 10 degrees. If direction will vary more than 60 degrees, encode the "prevailing" direction for "ddd" and append the limits of variability to

remarks (e.g., "WND 270V350"). Although a direction should be forecast whenever determined, there may be situations in which a "prevailing" direction cannot be forecast; in these rare cases, "VRB" may be encoded for "ddd."

1.3.4.2.1.1. When wind will be calm, encode dddff as "00000."

1.3.4.2.1.2. When wind speed will be 6 knots or less and a direction cannot be determined, encode dddff as "VRBff."

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

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

1.3.4.2.3. Gusts (Gf_mf_m). Forecast speed or gusts, in whole knots. Encode gusts when they will exceed a mean speed (ff) of 10 knots or more, by 5 knots or more. Encode gusts of 100 knots or more in three digits.

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

1.3.4.3. 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 as 9 kilometers (9,000 meters) or less. If visibility will alternate frequently from one significant value to another, describe the situation with a TEMPO group; do not use variable visibility remarks.

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
7/8	1,400	-	5,000
-	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

1.3.4.4. Forecast Weather and Obscuration Group (w'w'). Forecast weather and obscuration definitions for construction of w'w' groups (Table 1.2) are found in AFMAN 15-111.

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 dust/sand whirls, dust devils and 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** Small Hail and/or 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

1.3.4.4.1. The predominant forecast weather (w'w') groups will be constructed 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).

1.3.4.4.1.1. Only one w'w' group is normally included in any one forecast period unless one group will not adequately describe the forecast situation. Limit w'w' 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 aircraft operations.

1.3.4.4.1.2. FC (Funnel Cloud) takes precedence over all other w'w' groups and

will always be forecast as "at the station" and not in the vicinity.

1.3.4.4.2. The proximity qualifier VC (in the vicinity) is used to forecast weather phenomena occurring between 5 statute miles/8000 meters to 10 statute miles/16 kilometers from the center of the aerodrome.

1.3.4.4.2.1. 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). VC will be placed before (no space) the precipitation, obscuration, or other weather phenomena entry (i.e., VCSH, VCPO). Intensity qualifiers will not be encoded with VC. Forecast weather in the vicinity will be the last entry in the weather (w'w') group.

1.3.4.4.3. When a predominant forecast condition with an encoded w'w' group 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, is expected to end).

1.3.4.4.4. Forecast Volcanic Ash (VA) regardless of restrictions to visibility.

1.3.4.4.5. Squall. When a squall (SQ) is forecast as weather phenomena (Table 1.2), ensure the forecast wind speed and gust meet squall definition criteria (See Attachment 1).

1.3.4.5. Cloud and Obscuration Group ($N_sN_sN_sh_sh_sh_sCC$). Report as often as necessary to indicate all forecast cloud layers. Arrange groups in ascending order of cloud bases AGL (i.e., lowest base first). Encode "SKC" to forecast clear skies.

1.3.4.5.1. Cloud Amount ($N_sN_sN_s$). The cloud amount will be 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). The three-letter abbreviations are followed, without a space, by the height of the base of the cloud layer (mass) $h_sh_sh_s$. 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. No layer can be assigned a sky cover less than a lower layer.

1.3.4.5.1.1. When the sky will be totally obscured, encode $VVh_sh_sh_s$, where "VV" is the indicator and $h_sh_sh_s$ is the vertical visibility in hundreds of feet.

1.3.4.5.2. Ceiling Height. A ceiling is defined as the height above the earth's surface of the lowest layer reported as broken or overcast; or the vertical visibility into an indefinite ceiling. All layers and obscuring phenomena are considered to be opaque. Therefore, a ceiling remark in the TAF is not needed.

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

1.3.4.5.4. 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. Surface-based partial obscurations will not be considered a ceiling.

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

1.3.4.5.6. Height of Cloud Base ($h_s h_s h_s$). 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)
$\leq$ 50 feet	Round down to 000 feet
> 50 feet but $\leq$ 5,000 feet	To the nearest 100 feet
> 5,000 feet but $\leq$ 10,000 feet	To the nearest 500 feet
> 10,000 feet	To the nearest 1,000 feet

1.3.4.5.7. 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 ($h_s h_s h$) without a space.

1.3.4.5.7.1. 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). The following example shows the use of the CB contraction:

**CCCC TAF 1016/1116Z 24025G35KT 0800 TSRA BKN035CB OVC080 QNH2978INS
BECMG 1017/1018 27010G15KT 9999 VCTS FEW040CB SCT080 QNH2989INS
BECMG 1019/1020 31012KT 9999 NSW SCT080 QNH2995INS T14/1022Z T09/1113Z**

1.3.4.6. Non-Convective Low-Level Wind Shear Group (WS$h_x h_x h_x$/dddfffKT or WSCONDS). Use this group only to forecast wind shear not associated with convective activity from the surface up to and including 2,000 feet AGL. Wind shear is a potentially hazardous problem for aircraft preparing for approach to, or take-off, from aerodromes. Include forecasts of non-convective wind shear on an as-needed basis to focus the attention of the pilot on existing or expected wind shear problems. To indicate wind shear when complete information cannot reliably forecast with high confidence, use "WSCONDS". Omit this group when no low-level wind shear is forecast.

1.3.4.6.1. Non-convective low-level wind shear forecasts will be encoded in the following format:

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

1.3.4.6.1.2. $h_x h_x h_x$. Forecast height of the wind shear in hundreds of feet AGL.

1.3.4.6.1.3. ddd. Forecast wind direction, in tens of degrees true, above the indicated height. VRB will not be used in the non-convective low-level wind shear forecast group.

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

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

1.3.4.6.1.6. WSCONDS. Optional, less specific, low-level wind shear indicator not associated with the turbulence group ($5Bh_Bh_Bh_Bt_L$).

1.3.4.6.2. Non-convective low-level wind shear forecasts will be included in the TAF, when expected, as the last group (i.e., after the cloud 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.

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

CCCC TAF 0116/0216 03008KT 0800 PRFG FEW000 BKN005 BKN012 WS015/12035KT QNH3001INS FG FEW000
TEMPO 0118/0120 14012G18KT 3200 -SN BLSN FEW000 OVC006 620065 SN FEW000
FM012130 15012G20KT 9999 NSW SCT030 QNH2992INS
BECMG0123/0124 15012G20KT 3200 -SN BLSN FEW000 OVC004 620046 QNH2983INS
SN FEW000 T08/0119Z TM04/0211Z

1.3.4.6.3.1. In this TAF, non-convective low-level wind shear is forecasted at 1,500 feet from 120 degrees at 35 knots from 011600Z until the beginning of the next FM group at 012130Z.

1.3.4.7. Icing Group ($6I_ch_ih_ih_it_L$). 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:

1.3.4.7.1. 6. Icing group indicator.

1.3.4.7.2. I_c. Type of icing from Table 1.5. When more than one type is expected within the same layer, encode the highest code figure.

1.3.4.7.3. $h_ih_ih_i$. Height of base of icing layer in hundreds of feet AGL (Table 1.4).

1.3.4.7.4. t_L. Thickness of the icing layer in thousands of feet from Table 1.6. When a layer is forecast 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).**

1.3.4.8. Turbulence group ($5Bh_Bh_Bh_Bt_L$). 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. Omit when no turbulence is forecast. Format turbulence groups as:

1.3.4.8.1. 5. Turbulence group indicator.

1.3.4.8.2. B. Turbulence type and intensity from Table 1.7.

1.3.4.8.3. $h_Bh_Bh_B$. Forecast height of the turbulence layer in hundreds of feet AGL (Table 1.4).

1.3.4.8.4. t_L. Thickness of the turbulence layer in thousands of feet from Table 1.6. When a layer is forecast 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 (See Note).

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 MSL provided the forecast in the TAF is consistent with turbulence products of the theater OWS and/or AFWA. Priorities permitting, coordinate any deviations from the OWS/AFWA forecast of moderate or greater intensity.

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
Etc.	Etc.	Etc.
099	2,970	9,900
100	3,000	10,000
110	3,300	11,000
120	3,600	12,000
Etc.	Etc.	Etc.
990	29,700	99,000
999	30,000 or more	100,000 or more

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.
Code Figure	**Turbulence Type and Intensity**
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.	

1.3.4.9. Lowest Altimeter group ($QNHP_1P_1P_1P_1INS$). 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:

1.3.4.9.1. QNH. Altimeter setting in inches of mercury indicator.

1.3.4.9.2. $P_2P_2P_2P_2$. Forecast lowest altimeter setting.

1.3.4.9.3. INS. Units indicator for inches of mercury.

1.3.5. TAF Remarks. For weather and obscurations use the alphabetic abbreviations in Table 1.2. Use FAAO 7340.1, *Federal Aviation Administration Order, Contractions*, for all

others. Relate operationally significant forecast elements to geographical features whenever possible (e.g., "FG OVR RIVER E"), (WND 06010KT AFT 19). Start/end times for conditions described in remarks are permitted (e.g., "SHRA OMTNS E 14-19"). Do not add a "Z" to these times. The Forecast Maximum and Minimum Temperature groups (T [M] T_FT_F/YYG_FG_FZ) are the only remark allowed adding a "Z" in the remarks section. Ensure start/end times are not confused with other numerical values. Do not use the terms "OCNL", "VC", or "CB" in remarks. The remarks section will not be used as a substitute for a BECMG or TEMPO group. Encode remarks in the following order of entry:

1.3.5.1. Non-Convective Low-Level Wind Shear. If the organization's ADS software does not support placement of the Non-Convective Low-Level Wind Shear ($WSh_xh_xh_x$/dddfffKT or WSCONDS) group in the body of the forecast, encode the wind shear forecast as the first remark.

1.3.5.2. Forecast Maximum and Minimum Temperature groups (T [M] T_FT_F/YYG_FG_FZ). This group provides a mechanism to forecast a two-digit temperature (T_FT_F: whole degrees Celsius) in the TAF code for specific times. Organizations encode the forecast maximum (first entry) and minimum temperature (last entry) for the valid period of the TAF. In addition, organizations may add additional temperature groups based on operational significance. Format temperature groups as:

1.3.5.2.1. T. Temperature remark indicator.

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

1.3.5.2.3. YY. The 2 digit day of the month.

1.3.5.2.4. G_FG_F. The valid time to the nearest whole hour UTC of the temperature forecast.

1.3.5.2.5. Z. Abbreviation for Coordinated Universal Time (UTC).

1.3.5.2.6. Example maximum/minimum temperature groups:

T17/0721Z T08/0812Z - forecast maximum temperature is 17°C at 072100Z and forecast minimum temperature is 8°C at 081200Z.

T00/1418Z TM09/1507Z - forecast maximum temperature is 0°C at 141800Z and forecast minimum temperature is minus 9°C at 150700Z.

1.3.5.3. DENEB. Organizations with a fog dispersal capability, include in remarks, "DENEB" and a statement of expected dispersal results (i.e., post dispersal ceiling and visibility) whenever the forecast text includes visibility restrictions due to fog (e.g., "DENEB SCT010 4,800 BR"). The main text of the TAF will reflect expected conditions without regard to dispersal activities.

1.3.5.4. AMD, COR, or AMD COR YYGGgg. Append this group to identify an amended TAF (AMD), a corrected TAF (COR), or a corrected TAF amendment (AMD COR). The YYGGgg is the date and time (UTC) the amendment or correction was issued (encode without a "Z"). Issue amendments for the entire remaining period of the TAF. When issuing a correction, repeat the entire text (as corrected) of the original TAF.

1.3.5.4.1. The AMD, COR, or AMD COR indicators can be used individually or together. For example, the last entry of a 0112/0212 TAF amended at 011410 would be AMD 011410. The last entry of a TAF correction issued at 011420 to a TAF amendment issued at 011410 would be AMD COR 011420. **Note:** If AMD, COR, or AMD COR are used with the remark LAST NO AMDS AFT YYGG NEXT YYGG, the modifier and time will be entered before the remark. Example: AMD 311830 LAST NO AMDS AFT 3120 NEXT 0211.

1.3.5.5. Limited-Duty and Automated Sensor Remarks. Include one of the following remarks in the TAF for limited-duty locations (i.e., less than 24-hour per day operations with no weather personnel on duty). The "YY" is the day of the month UTC and "GG" is the time to the nearest whole hour UTC.

1.3.5.5.1. LAST NO AMDS AFT YYGG NEXT YYGG. This remark is used when the airfield is closed, a TAF is not required, or there are no operational automated sensors.

1.3.5.5.2. LIMITED METWATCH YYGG TIL YYGG. Used when an airfield is open and there is no available observation or when an airfield is closed and an automated sensing system is in use.

1.3.6. Change Groups (TTTTT). Use BECMG YYGG/YYG$_e$G$_e$, TEMPO YYGG/YYG$_e$G$_e$, and FMYYGGgg 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 YYG$_e$G$_e$). TEMPO groups may be used to forecast a change in any or all forecast groups and will be followed by a description of all the elements (except non-convective low-level wind shear and QNH groups), for which a change is forecast to occur intermittently from YYGG to YYG$_e$G$_e$. FM change groups must include all encoded elements. Start a new line of text for each change group. Several change groups may be encoded to properly identify the forecast conditions. To keep the forecast intent clear and unambiguous, the use of change groups should be done with care and kept to changes which are operationally significant to airfield operations. Overlapping of forecast periods should be avoided. Use caution when using too many BECMG and TEMPO change groups between FMYYGGgg groups. In order to avoid confusion, keep the intent of the forecast simple.

1.3.6.1. From (FMYYGGgg). The time indicator YYGGgg in the form of FMYYGGgg will be 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 condition forecast in this group. This forecast line shall contain all elements of a predominate forecast line. For example, if the TAF period is 1909/2009 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, 200900 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. In this case, forecast minutes should be used. 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.

1.3.6.2. Becoming (BECMG). The change-indicator group TTTTT YYGG/YYG$_e$G$_e$ in the form of BECMG YYGG/YYG$_e$G$_e$ will be 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 solidus separating a two-digit date (YY) and a two-digit ending time (G_eG_e) in whole hours. The time period described by a BECMG group will usually be for one hour and never exceed two hours. This change to the predominant conditions will be followed by a description of all elements for which the change is forecast. The forecast conditions encoded after the BECMG YYGG/YYG$_e$G$_e$ group are those elements expected to prevail from the ending time of this change group (G_eG_e) to the ending time of the forecast period (YYG$_2$G$_2$) and the forecasted conditions must occur in less than 30 minutes after the YYG$_e$G$_e$ group. When using the BECMG group to forecast a change in one or more elements, the entire element(s) must be repeated. 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 must be repeated, not just the ceiling layer.

1.3.6.3. Temporary (TEMPO). The change-indicator group TTTTT YYGG/YYG$_e$G$_e$ in the form of TEMPO YYGG/YYG$_e$G$_e$ group will be used to indicate temporary fluctuations to the forecast meteorological conditions. Conditions described by the TEMPO group must occur once during the time period, will last less than one hour, and cover less than half of the period indicated by the date YY and time GG to the date YY and time G_eG_e. Exception: Organizations will allow 1 hour 15 minutes for thunderstorms. 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 conditions forecast in the TEMPO group last more than an hour or are expected to last more than half of the period indicated by the time YYGG to YYG$_e$G$_e$, then the temporary condition will be considered to be predominant and entered in the initial forecast period or following a FMYYGGgg or BECMG group.

Chapter 2

PILOT WEATHER REPORT (PIREP) CODE

2.1. General. This chapter contains instructions for encoding pilot weather reports (PIREPs) in a standard format to facilitate processing, transmission, storage, and retrieval of reports of in-flight weather occurrences. Procedures for requesting, recording, and disseminating PIREPs are defined in AFMAN 15-129.

2.2. PIREP Code Definitions.

2.2.1. PIREP. A report of meteorological phenomena encountered by aircraft in flight.

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

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

2.3. Encoding PIREPS. Place the appropriate data received from a pilot either in the air or on the ground, or from a reliable source on the ground, in a standard format for dissemination. Each report will:

2.3.1. Identify the type of report and each element in the report by a TEI.

2.3.2. Include as a minimum, the transmitting organization, entries for message type, location, time, flight level, type of aircraft, and at least one other element.

2.3.3. Describe location with reference to a VHF NAVAID, the four-letter airport identifier (KQ identifiers will not be used), or under certain circumstances as identified in paragraph 2.4.2 using latitude/longitude.

2.3.4. Use only authorized contractions and aircraft designators, listed FAAO 7350.7, *Federal Aviation Administration Order, Location Identifiers*, FAAO 7340.1, *Federal Aviation Administration Order, Contractions* and authorized four-letter location identifiers. Where plain language is called for, authorized contractions and abbreviations should be used. However, in no case should an essential remark be omitted due to lack of readily available contractions.

2.3.5. Omit TEIs for unreported or unknown elements other than those in paragraph 2.3.2. If one of the required TEIs is unknown, enter "UNKN" for that element.

2.3.6. Correcting a PIREP. To correct an original PIREP, add 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.

2.4. 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 solidus ("/") 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 depict the format of optional entries.

    2.4.1. Message Type (UUA or UA). Indicates that an urgent (UUA) or routine (UA) pilot report follows. Use UUA whenever any of the following are reported:

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

        2.4.1.2. Thunderstorms (see note below).

        2.4.1.3. Tropical cyclones.

        2.4.1.4. Squall line.

        2.4.1.5. Severe icing.

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

        2.4.1.7. Mountain wave turbulence.

        2.4.1.8. Widespread dust storm and sand storm.

        2.4.1.9. Low-Level Wind Shear (LLWS). When the fluctuation in airspeed is 10 knots or more.

        2.4.1.10. Hail (GR or GS).

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

        2.4.1.12. Any condition that, in the judgment of the person entering the PIREP into the system, would present an extreme hazard to flight. **NOTE:** The requirement for thunderstorms refers to the occurrence of an area of widespread activity, thunderstorms along a line with little or no space between individual storms, or thunderstorms embedded in cloud layers or concealed by haze. It does not refer to isolated or scattered thunderstorms not embedded in clouds or concealed in haze.

    2.4.2. 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), an airport using the four-letter location identifier, or latitude/longitude from overseas/over water locations where it is impractical to report using distance and direction from a NAVAID. In

the case of Unmanned Aerial Systems (UASs), latitude/longitude may be used anywhere in the world. **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, the identifier is followed 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.

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

2.4.2.2. 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 will be recorded using degrees and minutes North/South and East/West. Do not use contractions such as "DURGC" or statements such as "AT TOP OF CLIMB" in this field. These may be added as Remarks (/RM). A further explanation of distance, reference 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

2.4.3. 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."

2.4.4. Flight Level (/FLHHH(-HHH). Enter the aircraft's altitude (flight level), HHH, in hundreds of feet above mean sea level (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 (i.e., /RM DURC OVC005-020 AGL, /RM DURD MOD TB 010-040 AGL). If the condition was encountered 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 PMSV operator to distinguish low-level MSL heights, versus low-level AGL heights, when gathering data from the pilot.

2.4.5. Type of Aircraft (/TP_AAAA or /TP_UNKN). If the type of aircraft is unknown, enter UNKN; otherwise enter the aircraft type designator (i.e., B777, F22, etc). The proper coding of this TEI is critical for the accurate interpretation and utilization of PIREPs, in particular those of icing or turbulence. FAAO 7340.1, *Federal Aviation Administration Order, Contractions, Chapter Five,* "*Aircraft Type Designators*" provides all recognized aircraft designators for use in PIREPs as agreed to between the FAA and ICAO. The type designators are limited to four alphanumeric characters.

2.4.6. 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 mean sea level (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 solidus ("/"). **NOTE:** There are no spaces between cloud cover contractions and heights.

2.4.6.1. **FORMAT: /SK_$N_sN_sN_s$(-$_sN_sN_sN_s$)$h_bh_bh_b$(-TOP$h_th_th_t$)/$N_sN_sN_s$(-$_sN_sN_sN_s$)$h_bh_bh_b$, etc.**

2.4.6.2. $N_sN_sN_s$ is the three-letter contraction for the amount of cloud cover, $h_bh_bh_b$ is the height of the base of a layer of clouds in hundreds of feet, and $h_th_th_t$ is the height of the top of the layer in hundreds of feet and is indicated as "TOP" and the height $h_th_th_t$. Thus, the code form for cloud amount, base, and tops becomes $N_sN_sN_sh_bh_bh_b$-TOP$h_th_th_t$.

2.4.6.3. Examples:

/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-TOPS085

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

2.4.7.1. Flight Visibility (FV). If reported by the pilot, flight visibility will be the first entry in the "/WX" TEI. 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). When a flight visibility value is reported, append "SM" to the value (e.g., FV03SM). Use FV99SM to enter a report of unrestricted flight visibility. Overseas organizations using metric system visibility values will encode in kilometers. Encode unrestricted visibility as FV99.

2.4.7.2. When the visibility value being rounded 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.

2.4.7.3. Weather. Enter 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 $\geq$ to 5/8 SM or 1000 meters)	BR
Rain/Rain shower	RA/SHRA
Drizzle	DZ
Squall	SQ
Freezing Rain	FZRA
Freezing Drizzle	FZDZ
Hail 1/4 inch diameter or larger **(See note 2)**	GR
Hail Shower **(See note 2)**	SHGR
Small Hail/Snow Pellets (< 1/4 inch diameter)	GS
Small Hail Showers/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

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.

    2.4.7.3.1. If more than one form of precipitation is combined in the report, 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 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.

    2.4.7.4. Enter weather layers (i.e., fog, haze, smoke or dust) with the base and/or top of the layer, if reported, encoded in the same manner as cloud cover in the /SK TEI (e.g., FU002-TOP030). If more than one type of weather is reported, 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. Coding present weather and the use of qualifiers/descriptors is based on Federal Meteorological Handbook 1 (FMH-1), *Surface Weather Observations and Reports.* Further details are in AFMAN 15-111, *Surface Weather Observations.*

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

        2.4.7.4.2. Examples:

/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)

    2.4.8. Temperature (/TA). If the outside air temperature is reported, 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.

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

    2.4.9. Wind Direction and Speed (/WV). If reported, encode the wind direction **from** which the wind is blowing in tens of degrees using three digits. Directions less than 100 degrees are preceded by a "0." For example, a wind direction of 90 degrees is coded 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 reported in knots. Speeds of less than 10 knots are encoded using a leading zero. For example, a wind speed of 8 knots is encoded 08KT. A wind speed of 112 knots is encoded 112KT.

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

2.4.9.2. Examples:

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

2.4.10. Turbulence (/TB). If reported, intensity, type, and altitude of turbulence are entered as follows:

2.4.10.1. Intensity. This is the first element reported after the space following the TEI. 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 turbulence was forecast at any level, but none was encountered, enter NEG in the /TB TEI.

2.4.10.2. Type. May be blank, or enter either "CAT" or "CHOP," if reported by the pilot. CAT is Clear Air Turbulence. This type of turbulence is encountered in air where no clouds are present and is commonly applied to high-level turbulence associated with wind shear, often in the vicinity of 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.

2.4.10.3. Altitude. Enter the reported turbulence 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. Undefined lower and higher boundary limits are entered as BLO or ABV. Use a solidus to separate two or more layers of turbulence.

2.4.10.4. FORMAT: /TB_III(-III)(_CAT or CHOP_)_($h_b h_b h_b$-$h_t h_t h_t$)/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 $h_b h_b h_b$ group is the base of the turbulence layer, if defined, or BLO or ABV, if undefined; and $h_t h_t h_t$ is the top of a defined layer or the boundary of an undefined layer.

2.4.10.5. Examples:

/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

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

2.4.11.1. Intensity. Enter TRACE, LGT, MOD, SEV, or ranges covering two values separated by a hyphen. HVY is not a reportable intensity. If icing was forecast at any level, but none was encountered, enter NEG in the /IC TEI.

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

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

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

2.4.11.2.3. MXD (Mixed) - A combination of rime and clear icing.

2.4.11.3. 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. Undefined lower and higher boundary limits are entered as BLO or ABV. Use a solidus ("/") to separate two or more layers of icing.

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

2.4.11.5. Examples:

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

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

2.4.12.1. 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, (i.e., /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).

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

2.4.12.3. Thunderstorm.   Enter areal 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 areal coverage description with the contraction TS, the location and movement of storms, and type of lightning, if known.

2.4.12.4. 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.

2.4.12.5. Electric Discharge.   Enter "DISCHARGE" followed by altitude if different than flight level.

2.4.12.6. Contrails. Enter "CONTRAILS" followed by their height if different from the /FL height.

2.4.12.7. 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.

2.4.12.8. Language/Terminology. The pilot may report information in words or phrases that are non-standard or can not 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.

2.4.12.9. 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. If the report is received from 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."

2.4.12.10. PIREP Source. For further identification of the source of a PIREP, the aircraft identification, call sign, or registration number may be added to the Remarks.

    2.4.12.10.1. The facility encoding the PIREP may be added to the end of the remarks, e.g., "ZLA CWSU."

2.5. PIREP Examples:

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

CCCC UUA/OV_KTOL/TM_2200/FLUNKN/TP_B757/TB_SEV_CAT_350-390

2.5.2. 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.

CCCC UUA/OV_KMAF045035/TM_0750/FL040/TP_UNKN/WX_FV01SM_DS

2.5.3. Electric Discharge. A military pilot flying a Boeing 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.

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

2.5.4. 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.

CCCC UUA/OV_KMKC270020/TM_1630/FL035/TP_C172/WX_FV_10SM_DS/
RM DUST STORM_MOV090_EST_KMKC1715

2.5.5. Smoke Layer. At 1500Z, a pilot of a DeHavilland 7 reports that there is a smoke layer from 2,000 to 6,500 feet over the field at Pittsburgh.

CCCC UA/OV_KPIT/TM_1500/FLUNKN/TP_DH7/WX_FU020-065

2.5.6. Hail. At 2217Z, the pilot of a Fairchild F27 reports moderate hail, 1/2" in diameter, 10 miles south of Omaha, Nebraska, at an altitude of 3,500 feet.

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

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

CCCC UA/OV_KEUG360005-360020/TM_1500/FL020/TP_PA34/IC_MOD_RIME

CCCC UUA/OV_KEUG360005-360020/TM_1500/FL020/TP_PA34/
IC_SEV_RIME/RM_COR 1510

NOTE: 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.

2.5.8. Cloud Cover. At 0000Z, the pilot of a Shorts 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 over cast deck above.

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

2.5.9. Thunderstorm. At 2224Z, a pilot reports an area of thunderstorms 45 miles NW of Dodge City in a north-south direction. Broken TCU cloud bases are at 3,000 feet with the layer tops at 15,000 feet and TS tops at 32,000 feet. Occasional cloud to cloud and cloud to ground lightning is observed. Type of aircraft is a McDonnell-Douglas DC-9/80.

CCCC UUA/OV_KDDC315045/TM_2224/FLUNKN/TP_MD8/SK_BKN030-
TOP150/WX_TS/RM_LN_TS_N-S_OCNL_LTGCCCG_TS_TOPS_320

NOTE: In this example, the person entering the PIREP into the system considered the thunderstorm conditions significant enough to present an extreme hazard to flight. The PIREP was entered as an Urgent report using the UUA message type.

2.5.10. 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 tornado is observed to be making intermittent contact with the ground.

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

2.5.11. Turbulence (not clear air). At 1850Z, the pilot of a Convair 580 flying at 10,000 feet through Donner Summit Pass reports to Reno, Nevada, that light turbulence is being encountered.

CCCC UA/OV_KRNO250035/TM_1850/FL100/TP_CV58/TB_LGT/ RM_DONNER_SUMMIT_PASS

2.5.12. Wind. At 1445Z, the military pilot of an OV1 Mohawk encountered an 82-knot wind 30 miles west of Bismarck at 6,000 feet MSL, true wind direction 80 degrees.

CCCC UA/OV_KBIS270030/TM_1445/FL060/TP_OV1/WV_08082KT

2.5.13. Volcanic Eruption and/or Ash. At 2010Z, the pilot of a McDonnell Douglas DC10 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.

CCCC UUA/OV_PANC240075/TM_2010/FL370/TP_DC10/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."

Chapter 3

SOLAR OPTICAL CODES

3.1. MANOP Heading (Manual Operations). The MANOP heading is used in the transmission of routine and event-level messages.

Line 1 MMMMMM SSSS DDHHmm or 555555

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 ICAO:
			APLM -Learmonth Solar Observatory
			K7OL -Sagamore Hill Solar Observatory
			KHMN -Holloman Solar Observatory
			PHFF -Palehua Solar Observatory
			LISS -San Vito Solar Observatory
	DDHHmm	DD	Day of month (corresponding with HHmm)
		HHmm	Hour and minute (GMT) (**See Note 2**)
	555555		Dummy date/time group (GMT) (**See Note 3**)

NOTES:
1. Examples are those primarily used by the Solar Observatories.
2. Fixed file times will use DDHHmm format.
3. 555555, when used, will automatically be updated to current date and time by the AWN.

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

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	II	World Meteorological Organization block Number
		iii	World Meteorological Organization station Number
	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 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
			1	Importance One
			2	Importance Two
			3	Importance Three
			4	Importance Four
		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 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	SEC 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 must have 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 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, must be at least 10 millionths of the solar hemisphere.) Report "//" if data not available.
		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:
		B	0	Subflare
			1	Importance One
			2	Importance Two
			3	Importance Three
			4	Importance Four
			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 secondary maxima in line 4a in chronological sequence irrespective of the time of the largest, most energetic maximum.

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

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	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	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	EEIRR	EE	Type of activity coded according to:	
			01	ASR Active Surge Region (less than 0.15 solar radius)
			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	AFS Arch Filament System
			09	ADF Active Dark Filament
			10	DSF Disappearing Solar Filament (**See Note 2**)
			11	DSD Dark Surge on Disk
			12	BSD Bright Surge on Disk

		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 (i.e., 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
	GGggs	GGgg	Start time (or time activity was initially observed). Record hour and minute, GMT.
		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).
Line 4 (Cont'd)	GGgge	GGgg	End time (or time activity was last observed). Record 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 to:
			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
		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	SEC 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 4a as 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) must correspond to the activity start time. If the period between activity start and end exceeds 24 hours, the DALAS code can not be used to report the overnight DSF. Instead, report all relevant information about the DSF in a scheduled or unscheduled PLAIN language message.

3. DALAS features equal to or less than 5 degrees in length may be reported with only one QXXYY group located by the centroid. As needed, up to three QXXYY groups may be used to indicate the two end points and one intermediate point. If more than three QXXYY groups are required to adequately 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 Code (SPOTS). Use this code to make routine reports of sunspots as observed with an optical telescope viewing in integrated (white) light. **(See Note 1)**

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 Codes(SPOTS).

Line 1	MANOP Heading			
Line 2	SPOTS	Data identifier, alphabetic character		
Line 3	IIiii	II	World Meteorological Organization block number	
		iii	World Meteorological Organization station number	
	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:	
			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 obervation, 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 to:	
			1	Northeast
			2	Southeast
			3	Southwest
			4	Northwest
		XX	Central Meridian Distance of the sunspot group (whole degrees)	
		YY	Latitude of the sunspot group (whole degrees)	
	LLAAA	LL	Heliographic extent (i.e., length) of the sunspot group (in whole heliographic degrees). The heliographic extent is defined as the distance between the most extreme edges of the two most widely separated spots, measured along the group's major axis, which may n ot necessarily be parallel to the latitude lines. (Previously referred to as longitudinal extent.)	
		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: Two distinct sunspots are observed. One spot has a single umbra, while the other has three umbra within the same penumbra. Encode 004.)	
Line 4 (Cont)	6ZPCM	6	Numerical Filler	
		Z	Sunspot Class (based on modified Zurich evolutionary sequence) according to:	
			1 A	Unipolar; no penumbra; length (normally) less than 3 heliographic degrees
			2 B	Bipolar; no penumbra; length (normally) 3 degrees or greater
			3 C	Bipolar; penumbra on only one pole
			4 D	Bipolar; penumbra on both poles; length less than or equal to 10 degrees
			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 greath than 15 degrees
			7 H	Unipolar; with penumbra

		P	Penumbral Class (based on largest penumbra) according to:	
			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
			4	Gamma
			5	Beta-delta
			6	Beta-gamma-delta
			7	Gamma-delta
	9NNNN	9	Numerical filler	
		NNNN N	SEC 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:

AXXX63 APLM DDGGgg

SPOTS

IIiii YMMDD 3GGgg 4Tqnn 99999

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.

3.5. Histogram History Code (HSTRY). This code is used 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.

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 Code (HSTRY).

Line 1	MANOP Heading		
Line 2	HSTRY	Data identifier, alphabetic character	
Line 3	IIiii	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	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	RRRR/	SEC 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 10c 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. If data are not available for the region, no message is transmitted. Repeat line 4 for multiple region messages.

3.6. Videometer Box Dimension Outline (BXOUT). This code is used by observatories equipped with the AN/FMQ-7 solar optical telescope to report videometer box size and position information.

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 LON   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	II	World Meteorological Organization block number	
		iii	World Meteorological Organization station number	
	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		
Line 5 (Cont)	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	SEC 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 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 Code (BURST). Use this code to make event-level or routine reports of impulsive, solar radio bursts as measured on a discrete (fixed) frequency radiometer.

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 Code (BURST).

Line 1	MANOP heading		
Line 2	BURST		Data identifier, alphabetic character
Line 3	IIiii	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	YMMDD	Y	Last digit ofthr 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)**

		L	Time qualifier coded according to **(See Note 4)**:	
			0	Times correct as reported
Line 4 (Cont)	(Cont)	(Cont)	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:	
			0	-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 Classsified
			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 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), encode ///// for GGeet.
	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 tenth 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), 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. Bursts of less than 50 sfu will not normally be reported 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 50 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 or 10^{-22} joule/m^2/Hz. 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. 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 Code (SWEEP). Use this code to make event-level or routine reports of the solar radio spectrum, as measured on a Solar Radio Spectrograph (SRS).

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

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

Line 1	MANOP heading		
Line 2	SWEEP		Data identifier, alphabetic character
Line 3	IIiii	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	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 identifaction 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

		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 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) 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
Line 4 (Cont)	(Cont)	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 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.

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

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 Code (IFLUX).

Line 1	MANOP heading		
Line 2	IFLUX		Data identifier, alphabetic character
Line 3	IIiii	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	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

		/		Filler
		nn		Number of frequencies (i.e., 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) = 10-22W/m2/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 Code (IONOS). This code is used to make routine reports of standard parameter data observed by an automated vertical incidence ionosonde.

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 Code (IONOS).

Line 1	MANOP Heading		
Line 2	IONOS	Data identifier, alphabetic character	
Line 3	IIiii	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	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 kilometers
	F1F1F1H1H1	F1F1F1	Value of foF1 to nearest tenth MHz
		H1H1	True Height of F1 layer maximum in tens of kilometers
	EEEHEHE	EEE	Value of foEs to nearest tenth MHz
		HEHE	True Height of E layer maximum in tens of kilometers
	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 will be replaced by 9.9 MHz.

Line 4 (Cont)	(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 will be 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
Line 5 (Cont)	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 will be 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.

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) will be filled with solidi (/). In the case where data for all three layers are absent, Lines 5, 6, and 7 will all be filled with solidi.

5.2. Ionospheric Height Code (IONHT). This code is used to make routine reports of the virtual height (**See 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.

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 Code (IONHT).

Line 1	MANOP Heading		
Line 2	IONHT	Data identifier, alphabetic character	
Line 3	IIiii	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	YMMDD	YY	Last digit of the year
		MM	Number of the month
		DD	Day of the month
Line 3 (Cont)	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 will be 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 Code (TELSI). 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.

Line 1   MANOP heading
Line 2   TELSI
Line 3   IIiii YMMDD 3GGgg 4SRnn 5S1S2S3S4
Line 4   Nnnggddq tttdddeq LLLLLoLoLoLo txtxtxtytytyeq1q2 lllllolololo
Line 4a   1sssvvv 2sssvvv 3S1S1S1S1S2S2S2 lllllolololo tstststststs
Line 4b   JJJJTTTS JxJxJxJxTxTxTxS lllllolololo JnJnJnJnTnTnTnS lllllolololo 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 Code (TELSI).

Line 1	MANOP Heading		
Line 2	TELSI	Data identifier, alphabetic character	
Line 3	IIIiii	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	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
	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
Line 4-7 (Cont)	(Cont)	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.

	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
			$6 = x\ 10^{16}$ electrons
			$7 = x\ 10^{17}$ electrons
			$8 = x\ 10^{18}$ electrons
			$9 = x\ 10^{19}$ electrons
		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**)

Line 4-7 (Cont)	(Cont)	e	Power of then (exponent) of the maximum and minimum equivalent vertical TEC code according to: (**See Note 7**)
			$5 = \times 10^{15}$ electrons
			$6 = \times 10^{16}$ electrons
			$7 = \times 10^{17}$ electrons
			$8 = \times 10^{18}$ electrons
			$9 = \times 10^{19}$ electrons
		q1q2	Accuracy indicators (0 to 9). TBD for max and min TEC during observation interval
	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)
Line	(Cont)	S2S2S2	Maximum Amplitude Scintillation Index (S4) at 1.6

4a-7a (Cont)			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)
	lllllolololo	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)

Lines 4b-7b (Cont)	lllllolololo	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)
		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, only one 15-minute data set would be reported. For messages transmitted every 30 minutes, only two 15-minute data sets (observation intervals) would be reported. Messages transmitted once per hour would contain four 15-minute data sets.

2. Lines 5 through 7 are only used 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. Lines 4 through 7 are repeated 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. Latitudes and longitudes are expressed 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; i.e., 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.

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 Code (EVENT). 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 SEOC/forecast center. An event code (EVENT) response should also be sent by a similar instrument observatory (e.g., radio or optical), when your observations do not meet event criteria that is reported by another site. For example, if Sagamore Hill transmits an event-level burst of 4000sfus on 245 MHz, and your 245 MHz burst at Palehua has reached a maximum of only 120sfus, then you would transmit a RADNS. If you have already sent an event-level burst message, do not respond with an IP (in progress). If you are 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.

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

Table 6.1. Event Code (EVENT).

Line 1	MANOP Heading		
	555555	Dummy date/time group (GMT)	
Line 2	EVENT	Data identifier, alphabetic character	
Line 3	IIiii	II	World Meteorological Organization block number
		iii	World Meteorological Organization station number
	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**)	
Line 4 (Cont)	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
			//	Burst equal to or greater than 1,500 solar flux units (sfu), but less than 5,000 sfu
			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)
			00	Burst equals or exceeds 100 percent above background on 2695 MHz (tenflare)
			CU	Castelli "U" shaped burst spectral characteristics
			IF	Radio burst with integrated flux of 100,000 sfu-seconds or more (reported only in automated mode)
	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
			//	Zero brilliance (0B) flare or greater 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
Line 4 (Cont)	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

	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 refers 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.	
	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. These event type indicator groups may be repeated in a message to report multiple phenomena (e.g., RAD05 RADCU RADIF). No more than eight groups may be included in a single message.
2. Do not report a combination of RAD//, RAD05, or RAD11 in the same message. Report RAD00, RADCU, and RADIF regardless of whether RAD//, RAD05, or RAD11 have already been reported. Report RAD00, RADCU, and RADIF 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. 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. There is no "in progress (IP)" option for these groups. So, 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 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 Code (AKNOW). This message is generated by the forecast center to acknowledge receipt of event, SXXX_ _ MANOP, messages and to provide a quality and system acceptance assessment of the messages.

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

Table 6.2. Event Acknowledgment Code (AKNOW).

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	Ramey Solar Observatory
		3	Holloman Solar Observatory
		4	Palehua Solar Observatory
		5	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:	
Line 3 (Cont)	(Cont)	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 Code (PLAIN). Use this code to report astrogeophysical data and/or operational information not reportable by another code, or to expand or explain data reported in another code. PLAIN messages may be transmitted separately or appended to other coded messages.

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 Code (PLAIN).

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 Code (STATS). 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.

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 Code (STATS).

Line 1	MANOP Heading (**See Note 1**)			
Line 2	STATS	Data identifier, alphabetic character		
Line 3	IIIiii	II	World Meteorological Organization block number	
		iii	World Meteorological Organization station number	
	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-Solar Observing Optical Network)
			02	Radio (RSTN-Radio Solar Telescope Network)
			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 (GMT)	
		gg	Minutes of valid time (GMT)	
		M	Method of observation coded according to: (**See Note 3**)	
			1	Automatic
			2	Semiautomatic
	jEEOI	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
		EE	System/equipment indicator coded according to: (**See Notes 4 and 5**)	
			01	Computer
			02	Automated Weather Network (AWN)
			03	Defense Switching Network (DSN)
			04	Commercial phones
			05	FMQ-7 (all SOON subsystems)
			06	Hydrogen-alpha system
Line 4 (Cont)	(Cont)	(Cont)	07	Spectrograph system
			08	Digital Image Processing System (DIPS)
			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	One hour to less than 4 hours
			4	Four hours to less than 8 hours
			5	Eight 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 (GMT)	
		gg	Minutes of valid time (GMT)	
		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
Line 5 (Cont)	(Cont)	FF	Frequency/equipment indicator coded according to: (See Notes 4 and 5)	
			01	Computer
			02	Automated Weather Network (AWN)
			03	Defense Switching Network (DSN)
			04	Commercial phones
			10	FRR-95 (all discrete frequency radiometers and SRS)
			11	Radiometer at 150 to 299 MHz
			22	Radiometer at 300 to 499 MHz
			33	Radiometer at 500 to 999 MHz
			44	Radiometer at 1,000 to 1,999 MHz

			55	Radiometer at 2,000 to 3,999 MHz
			66	Radiometer at 4,000 to 7,999 MHz
			77	Radiometer at 8,000 to 11,999 MHz
			88	Radiometer at 12,000 to 19,999 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	One hour to less than 4 hours
			4	Four hours to less than 8 hours
			5	Eight 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 (GMT)	
		gg	Minutes of valid time (GMT)	
		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 (DISS 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	One hour to less than 4 hours
			4	Four hours to less than 8 hours
			5	Eight 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
Line 6 (Cont)	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 (include 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 the 55th Space 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 GMT day in a single message. Data line 4 contains the 11111 and GGggM groups, and a maximum of seven jEEOI groups. Data line 4a contains the 22222 group and a maximum of eight 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.) For example, a SOON site opened in semiautomatic mode; when light levels improve sufficiently to support automatic operations, the analyst would transmit the following message, even though no systems/equipment changed status:

> STATS
> IIiii 20226 20101
> 11111 17401 206// 99999

4. Report the status of all installed systems/equipment, in numerical order (i.e., // 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, a SOON site opens with the computer, commercial phones, and spectrograph inoperative; site has no Defense Switching Network (DSN) capability installed:

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

Outages can be reported "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. The above example could be coded:

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

5. After the first STATS message of the observing day, it is only necessary to report the systems/equipment which change status during the day. For example, continuing from the example above, computer repaired, but no other changes:

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

A STATS reportable AWN, 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 AWN 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 AWN, DSN, or commercial phone outage. In fact, for a dual site, only a SOON STATS message (i.e., 11111 or 22222 line entry) can be used 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 must be 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 GMT 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 GMT day in a single message. For example, status of an ionosonde and an IMS can be reported 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.

Chapter 7

OTHER CODES

7.1. Forward Area Limited Observing Program (FALOP). The FALOP is an Army G2-directed (Deputy, Chief of Staff, Intelligence) program outlined in Army Field Manual 34-81, under which maneuver brigade and armored cavalry regiment (ACR) and battalion and squadron S2 (Intelligence officer) personnel collect forward area weather information and transmit this data to the supporting USAF weather organization. Also, Air Force Combat Control Teams (CCT), Tactical Air Control Party (TACP), and Special Tactic Teams (STT) are frequently trained in providing FALOP observations to their supporting weather organization.

7.1.1. The Army uses these observations to support Army weapon systems; Nuclear, Biological, and Chemical (NBC) planning and operations; terrain analysis; and Intelligence Preparation of the Battlefield (IPB).

7.1.2. The weather organization uses this information in preparing tailored tactical weather support products

7.2. Target Weather Information Reporting Code (TARWI). This is the Standard NATO meteorological code for in flight use by strike aircrews in providing in-flight weather information. Encoding procedures and use can be found in the NATO Meteorological Codes Manual AWP-4(A).

PHILIP M. BREEDLOVE, Lt Gen, USAF
DCS, Operations, Plans & Requirements

Attachment 1

GLOSSARY OF REFERENCE AND SUPPORTING INFORMATION

References

DoD Flight Information Publications (FLIPS)

AFDD 1, Air Force Basic Doctrine

AFPD 15-1, *Atmospheric and Space Environmental Support*

AFI 15-128, Air and Space Weather Operations – Roles and Responsibilities

AFMAN 15-111, *Surface Weather Observations*

AFMAN 15-129*, Aerospace Weather Operations – Processes and Procedures*

AFMAN 33-322, Vol. 4, *Records Disposition Schedule*

FAAO 7340.1, *Federal Aviation Administration Order, Contractions*

FAAO 7350.7, *Federal Aviation Administration Order, Location Identifiers*

Federal Meteorological Handbook No. 1 (FMH-1), *Surface Weather Observations and Reports*

Federal Meteorological Handbook No. 2 (FMH-2), *Surface Synoptic Codes*

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

FM 34-81, *Weather Support for Army Tactical Operations*

National Weather Service (NWS), *Operations Manual, Chapter 31*

National Weather Service Training Center Home Page

NAVMETOCCOMINST 3143.1F, *Terminal Aerodrome Forecast (TAF) Code*

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

World Meteorological Organization (WMO) Manual on Codes 306, Part A, Alphanumeric Codes

Abbreviations and Acronyms

-—Light Intensity

+—Heavy Intensity

ABV—Above

ADF—Active Dark Filament

AFS—Arch Filament System

AFWA—Air Force Weather Agency

AKNOW—Event Acknowledgement Code

APR—Active Prominence Region

ACR—Armored Cavalry Regiment

ASR—Active Surge Region

AWN—Automated Weather Network

BC—Patches (Descriptor used with FG)

BKN—Broken (used to describe cloud cover or weather phenomena)

BL—Blowing (descriptor used with DU, SA or SN)

BLO—Below

BR—Mist

BSD—Bright Surge on Disk

BURST—Discrete Solar Radio Burst

BXOUT—Videometer Box Dimension Outline

CA—Cloud to air (lightning)

CB—Cumulonimbus

CC—Cirrocumulus, or Cloud to cloud lightning

CG—Cloud to ground (lightning)

CHOP—Turbulence type characterized by rapid, rhythmic jolts

CIG—Ceiling

CLR—Clear (icing)

CONS—Continuous

CONTRAILS—Condensation trails

COR—Correction To A Previously Disseminated Report

CS—Cirrostratus

DALAS—Solar Disk and Limb Activity Summary Code

dB—Decibel

DIPS—Digital Image Processing System

DoD—Department Of Defense

DR—Low Drifting (descriptor used with DU, SA, or SN)

DS—Dust-storm

DSD—Dark Surge on Disk

DSF—Disappearance of a Solar Filament

DSN—Defense Switching Network

DTG—Date-Time Group

DU—Widespread Dust

DZ—Drizzle

E—East

ENE—East Northeast

EPL—Eruptive Prominence on Limb

ESE—East Southeast

EST—Estimate, Estimated

EVENT—Event Code

EXTRM—Extreme (used to modify turbulence

FAA—Federal Aviation Administration

FALOP—Forward Area Limited Observing Program

FALSE—False Alarm

FC—Funnel Cloud

+FC—Tornado or Waterspout

FEW—Few (used to describe cloud cover or weather phenomena)

FG—Fog

FLARE—Solar Flare Code

FLIP—Flight Information Publication

FMH-1—Federal Meteorological Handbook No.1, *Surface Weather Observations & Reports*

fmin—Minimum Observed Frequency

foEs—Sporadic E Critical Frequency

foF1—F1 Region Critical Frequency

foF2—F2 Region Critical Frequency

FRQ—Frequent

FU—Smoke

FZ—Freezing (descriptor used with precipitation or fog)

G—Gust

G2—Assistant Chief of Staff (Intelligence)

GHz—Giga Hertz (10^9 Hz)

GMT—Greenwich Mean Time

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

GR—Hail of 1/4 inch or more

GS—Small Hail and/or Snow Pellets (less than 1/4 inch)

HLSTO—Hailstone(s)

HSTRY—Histogram History Code

HVY—Heavy (used in PIREP remarks to modify precipitation)

Hz—Hertz

HZ—Haze

IC—Ice Crystals, In-Cloud Lightning

ICAO—International Civil Aviation Organization

IFLUX—Integrated Solar Radio Flux Code

IMC—Instrument Meteorological Conditions

IMS—Ionospheric Measuring System

IPB—Intelligence Preparation of the Battlefield

INTER—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(used to modify turbulence or icing)

LLWS—Low level wind shear

LN—Line (used to describe thunderstorm formations in remarks of a PIREP)

LPS—Loop Prominence

LTG—Lightning

LYR—Layer (of clouds)

m—Meters

M—Sub-zero temperature

MAJCOM—Major Command

MANOP—Manual Operations

METAR—Aviation Routine Weather Report

METT-T—Mission, Enemy, Terrain, Troops, and Time Available

MHz—Mega Hertz (10^6 Hz)

MI—Shallow

MOD—Moderate

MOV—Moved/Moving/Movement

MSL—Mean Sea Level

MT—Mountains

MXD—Mixed - A type of icing characterized as a combination of clear and rime ice

N—North

NAVAID—Navigational aids (JPI-02)

NBC—Nuclear, Biological, and Chemical

NE—Northeast

NIL—Transmitted When Report Not Ready On Time

NMRS—Numerous (used to describe weather phenomena in remarks of a PIREP)

NTFS—New Tactical Forecast System

NW—Northwest

NWS—National Weather Service

OCNL—Occasional

OVC—Overcast

OWS—Operational Weather Squadron

PIREP—Pilot Weather Report

PL—Ice Pellets

PLAIN—Plain Language Code

PO—Dust/Sand Whirls (Dust Devils)

PY—Spray

R—Right (With Reference To Runway Designation)

RA—Rain

RFI—Radio Frequency Interference

RSTN—Radio Solar Telescope Network

S—South

S2—Intelligence Officer

S4—Mean Amplitude Scintillation Index

SA—Sand

SCSL— Stratocumulus Standing Lenticular

SCT—Scattered

SE—Southeast

sec—Second

SEC—Space Environment Center

SEV—Severe (intensity modifier used with turbulence and icing in PIREPs)

SFC—Surface

sfu—Solar Flux Units

SG—Snow Grains

SH—Shower(s) (descriptor used with RA, SN, PE, GS, or GR)

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

SKC—Sky Clear

SLD—Solid (used to describe weather phenomena in remarks of PIREPs)

SM—Statute Miles

SN—Snow

SOON—Solar Observing Optical Network

SP—Snow Pellets

SPOTS—Sunspot Code

SPY—Spray

SQ—Squall

SRBL—Solar Radio Burst Locator

SRS— Solar Radio Spectograph

SS—Sand storm

STATS—Patrol Status Code

STN—Station

SW—Southwest

SWEEP—Spectral Solar Radio Burst Code

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 (used in PIREPs)

TOP—Top of Clouds (used in PIREPs)

TS—Thunderstorm

TWR—Tower

UA—TEI used in routine PIREP

UNKN—Unknown PIREP TEI

UP—Unknown Precipitation

US—United States

UTC—Coordinated Universal Time

UTM—Universal Transverse Mercator

UUA—TEI used in urgent PIREP

V—Variable

VA—Volcanic Ash

VC—Vicinity (proximity qualifier)

VHF—Very High Frequency

VIS—Visibility

VOR—Very high frequency omnidirectional range station (JPI-02)

VORTAC—Very high frequency omnidirectional range station/tactical air navigation (JPI-02)

VRB—Variable

VV—Vertical Visibility

W—West

WMO—World Meteorological Organization

WND—Wind

WF—Weather Flight

WSHFT—Wind Shift

XR—Solar X-ray Event Indicator

Terms

Automated Weather Network—A global communications network used for collecting and distributing alphanumeric environmental/weather data and Notices to Airmen.

Aviation Routine Weather Report—The WMO code format used worldwide to code weather observations.

Bulletin Heading—A combination of letters and numbers that describe the contents of a bulletin, including the data type, geographical location, ICAO identifier of the originator and a date-time group.

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 a specific time block during which the message will be transmitted.

ICAO Identifier—A specifically authorized four-letter identifier assigned to a location and documented in ICAO Document 7910.ICAO.

International Civil Aviation Organization—A United Nations organization specializing in matters dealing with international aviation and navigation.

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.

Severe Thunderstorm—The simultaneous occurrence of a thunderstorm (descriptor TS), in conjunction with hail (GR) greater than or equal to 3/4" diameter and/or surface wind greater than or equal to 50 knots.

Squall—A strong wind characterized by a sudden onset in which the wind speed increases at least 16 knots and is sustained at 22 knots or more for at least one minute.

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

Vicinity—Used to report present weather phenomena when between 5 (8000 meters) and 10 statute miles (16 kilometers) of the station.