

Schedule 22

Part F –

Aviation Meteorological Services

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SUBPART A: GENERAL

22.601 APPLICABILITY

- a) The meteorological Authority shall be designated by the Authority; and will provide the meteorological service for air navigation for The Bahamas in accordance with Annex 3 and with these regulations.
- b) The objective of meteorological service for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation.
- c) This objective shall be achieved by supplying a meteorological services to the following users ("the users"):
 - i. aircraft operators;
 - ii. flight crew members;
 - iii. ATS units;
 - iv. search and rescue services units;
 - v. airport and aerodrome managements and others concerned with the conduct or development of international air navigation, with the meteorological information necessary for the performance of their respective functions.
- d) The meteorological Authority shall comply with the requirements of the World Meteorological Organization in respect of qualifications and training of meteorological personnel providing service for international air navigation.

22.603 DEFINITIONS

The definitions of the terms used in this Part are as follows:

Aerodrome climatological summary. Concise summary of specified meteorological elements at an aerodrome, based on statistical data.

Aerodrome climatological table. Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome.

Aerodrome elevation. The elevation of the highest point of the landing area.

Aerodrome meteorological office. An office designated to provide meteorological service for aerodromes serving international air navigation.

Aerodrome reference point. The designated geographical location of an aerodrome.

Aeronautical fixed service (AFS). A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

Aeronautical fixed telecommunication network (AFTN). A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics.

Aeronautical meteorological station. A station designated to make observations and meteorological reports for use in international air navigation.

Aeronautical mobile service (RR S1.32). A mobile service between aeronautical stations and aircraft stations, or between aircraft stations whereby survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical telecommunication station. A station in the aeronautical telecommunication service.

Aircraft observation. The evaluation of one or more meteorological elements made from an aircraft in flight.

AIRMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

Briefing. Oral commentary on existing and/or expected meteorological conditions.

Cloud of operational significance. A cloud with the height of cloud base below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, or a cumulonimbus cloud or a towering cumulus cloud at any height.

Consultation. Discussion with a meteorologist or another qualified person of existing and/or expected meteorological conditions relating to flight operations; a discussion includes answers to questions.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the Earth, measured from mean sea level.

Extended range operation. Any flight by an aeroplane with 2 turbine engines where the flight time at the one engine inoperative cruise speed (in ISA and still air conditions), from a point on the route to an adequate alternate aerodrome, is greater than the threshold time approved by the State of the Operator.

Flight documentation. Written or printed documents, including charts or forms, containing meteorological information for a flight.

Forecast. A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

GAMET area forecast. An area forecast in abbreviated plain language for low-level flights for a flight information region or sub-area thereof, prepared by the meteorological office designated by the Meteorological Authority concerned and exchanged with Meteorological offices in adjacent flight information regions, as agreed between the Meteorological Authorities concerned.

Grid point data in digital form. Computer processed meteorological data for a set of regularly spaced points on a chart, for transmission from a meteorological computer to another computer in a code form suitable for automated use.

International airways volcano watch (IAVW). International arrangements for monitoring and providing warnings to aircraft of volcanic ash in the atmosphere.

Meteorological Authority. The Authority providing or arranging for the provision of meteorological service for international air navigation on behalf of a Contracting State.

Meteorological bulletin. A text comprising meteorological information preceded by an appropriate heading.

Meteorological office. An office designated to provide meteorological service for international air navigation.

Meteorological satellite. An artificial Earth satellite making meteorological observations and transmitting these observations to Earth.

Observation (meteorological). The evaluation of one or more meteorological elements.

Operational planning. The planning of flight operations by an operator.

Prevailing visibility. The greatest visibility value, observed in accordance with the definition of “visibility”, which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.

Prognostic chart. A forecast of a specified meteorological element(s) for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart.

Quality assurance. Part of quality management focused on providing confidence that quality requirements will be fulfilled (ISO 9000*).

Quality control. Part of quality management focused on fulfilling quality requirements (ISO 9000*).

Regional air navigation agreement. Agreement approved by the Council of ICAO normally on the advice of a regional air navigation meeting.

Rescue coordination centre. A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

SIGMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations.

Standard isobaric surface. An isobaric surface used on a worldwide basis for representing and analysing the conditions in the atmosphere.

Threshold. The beginning of that portion of the runway usable for landing.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Tropical cyclone. Generic term for a non-frontal synoptic-scale cyclone originating over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation.

Tropical cyclone advisory centre (TCAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, world area forecast centres and

international OPMET databanks regarding the position, forecast direction and speed of movement, central pressure and maximum surface wind of tropical cyclones.

Upper-air chart. A meteorological chart relating to a specified upper-air surface or layer of the atmosphere.

Volcanic ash advisory centre (VAAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres and international OPMET databanks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions.

VOLMET. Meteorological information for aircraft in flight.

Data link-VOLMET (D-VOLMET). Provision of current aerodrome routine meteorological reports (METAR) and aerodrome special meteorological reports (SPECI), aerodrome forecasts (TAF), SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET via data link.

VOLMET broadcast. Provision, as appropriate, of current METAR, SPECI, TAF and SIGMET by means of continuous and repetitive voice broadcasts.

World area forecast centre (WAFC). A meteorological centre designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States by appropriate means as part of the aeronautical fixed service.

World area forecast system (WAFS). A worldwide system by which world area forecast centres provide aeronautical meteorological en-route forecasts in uniform standardized formats.

SUBPART B: METEOROLOGICAL SERVICES OPERATIONAL REQUIREMENTS

22.605 NOTIFICATIONS REQUIRED FROM OPERATORS

- a) An operator requiring meteorological service or changes in existing meteorological service shall notify the Meteorological Authority or the aerodrome meteorological office concerned sufficiently in advance when:
 - 1) new routes or new types of operations are planned;
 - 2) changes of a lasting character are to be made in scheduled operations; and
 - 3) other changes, affecting the provision of meteorological service, are planned.

Such information shall contain all details necessary for the planning of appropriate arrangements by the meteorological Authority.

- b) The aerodrome meteorological office shall be notified by the operator or a flight crew member:
 - 1) of flight schedules;
 - 2) when non-scheduled flights are to be operated; and
 - 3) when flights are delayed, advanced or cancelled.

22.607 SUPPLY, USE AND QUALITY MANAGEMENT OF METEOROLOGICAL INFORMATION

- a) Close liaison shall be maintained between those concerned with the supply and those who are concerned with the use of meteorological information on matters which affect the provision of meteorological service for international air navigation.
- b) In order to meet the objective of meteorological service for international air navigation, the meteorological Authority shall establish and implement a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to the users.
- c) The quality system shall provide the users with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, as well as the accuracy of measurements, observations and forecasts.
 - d) When the quality system indicates that meteorological information to be supplied to the users does not comply with the stated requirements, and automatic error correction procedures are not appropriate, the information referred to under paragraph (c) shall not be supplied to the users unless it is validated with the originator.
- d) The meteorological information supplied to the users shall be consistent with Human Factors principles and shall be in forms which require a minimum of interpretation by the users and in conformance with these regulations.

22.609 AERODROME METEOROLOGICAL OFFICES

- a) The Meteorological Authority shall establish one or more aerodrome and/or other Meteorological offices in The Bahamas, which shall be adequate for the provision of the meteorological service required to satisfy the needs of international air navigation.
- b) An aerodrome meteorological office shall carry out all or some of the following functions as necessary to meet the needs of flight operations at the aerodromes:
 - 1) prepare and/or obtain forecasts and other relevant information for flights with which it is concerned, the extent of its responsibilities to prepare forecasts shall be related to the local availability and use of en-route and aerodrome forecast material received from other offices;
 - 2) prepare and/or obtain forecasts of local meteorological conditions;
 - 3) maintain a continuous survey of meteorological conditions over the aerodromes for which it is designated to prepare forecasts;
 - 4) provide briefing, consultation and flight documentation to flight crew members and/or other flight operations personnel;
 - 5) supply other meteorological information to aeronautical users;
 - 6) display the available meteorological information;
 - 7) exchange meteorological information with other aerodrome meteorological offices; and
 - 8) supply information received on pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, to its associated ATS units, aeronautical information service units and meteorological watch office as agreed between the meteorological, aeronautical information service and ATS authorities concerned.
- c) The aerodromes for which landing forecasts are required shall be as determined by regional air navigation agreement.
- d) For aerodromes without an aerodrome meteorological offices located at the aerodrome:
 - 1) the meteorological Authority concerned shall designate one or more aerodrome meteorological office(s) to supply meteorological information as required; and
 - 2) shall establish the means by which such information can be supplied to the aerodromes concerned.

22.611 METEOROLOGICAL WATCH OFFICES

- a) If The Bahamas has accepted the responsibility for providing ATS within a flight information region or a control area, then the Meteorological Authority shall establish, on the basis of regional air navigation agreement, such meteorological watch office(s).
- b) A meteorological watch office shall:
 - 1) maintain continuous watch over meteorological conditions affecting flight operations within its area of responsibility;
 - 2) prepare SIGMET and other information relating to its area of responsibility;
 - 3) supply SIGMET information and, as required, other meteorological information to associated ATS units;
 - 4) disseminate SIGMET information;
 - 5) when required by regional air navigation agreement:
 - i. prepare AIRMET information related to its area of responsibility;
 - ii. supply AIRMET information to associated ATS units; and

- iii. disseminate AIRMET information;
- 6) supply information received on pre-eruption volcanic activity, a volcanic eruption and volcanic ash cloud for which a SIGMET has not already been issued, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to its associated VAAC as determined by regional air navigation agreement; and
- 7) supply information received concerning the release of radioactive materials into the atmosphere, in the area for which it maintains watch or adjacent areas, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to aeronautical information service units, as agreed between the meteorological and appropriate civil aviation authorities concerned.
- 8) The information shall comprise location, date and time of the release, and forecast trajectories of the radioactive materials.

SUBPART C: METEOROLOGICAL OBSERVATIONS AND REPORTS

22.613 AERONAUTICAL METEOROLOGICAL STATIONS AND OBSERVATIONS

- a) The Meteorological Authority shall establish at aerodromes in The Bahamas such aeronautical Meteorological stations as it determines to be necessary; which stations may comprise separate stations or may be combined within a synoptic station.
- b) Aeronautical meteorological stations shall make routine observations at fixed intervals.
- c) At aerodromes, the routine observations shall be supplemented by special observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and/or air temperature.
- d) The meteorological Authority shall arrange for its aeronautical meteorological stations to be inspected at sufficiently frequent intervals to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and that the exposure of the instruments has not changed significantly.
- e) At aerodromes which can be used for Category II and CAT III instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dewpoint temperatures and atmospheric pressure shall be installed to support approach and landing and takeoff operations.

These devices referred to under paragraph (c) shall be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations.

The design of integrated automatic systems shall observe Human Factors principles and include back-up procedure.

- f) The observations shall form the basis for the preparation of reports to be disseminated at the aerodrome of origin and of reports to be disseminated beyond the aerodrome of origin.
- g) An agreement between the Meteorological Authority and the appropriate ATS Authority shall be established to cover the following:
 - 1) the provision in ATS units of displays related to integrated automatic systems;
 - 2) the calibration and maintenance of these displays/instruments;
 - 3) the use to be made of these displays/instruments by ATS personnel;
 - 4) as and where necessary, supplementary visual observations if and when made by ATS personnel to update or supplement the information supplied by the meteorological station;
 - 5) meteorological information obtained from aircraft taking off or landing; and
 - 6) if available, meteorological information obtained from ground weather radar.

22.615 AGREEMENT BETWEEN AIR TRAFFIC SERVICES AUTHORITIES AND METEOROLOGICAL AUTHORITIES

An agreement between the meteorological Authority and the appropriate ATS Authority should be established to cover, amongst other things:

- i. the provision in air traffic services units of displays related to integrated automatic systems;
- ii. the calibration and maintenance of these displays/instruments;
- iii. the use to be made of these displays/instruments by air traffic services personnel;
- iv. as and where necessary, supplementary visual observations (for example, of meteorological phenomena of operational significance in the climb-out and approach areas) if and when made by air traffic services personnel to update or supplement the information supplied by the meteorological station;
- v. meteorological information obtained from aircraft taking off or landing (for example, on wind shear); and
- vi. if available, meteorological information obtained from ground weather radar.

22.617 ROUTINE OBSERVATIONS AND REPORTS

- a) At aerodromes, routine observations shall be made throughout the 24 hours each day except as otherwise agreed between the Meteorological Authority, the appropriate ATS Authority and the operator concerned. The observations referred to under paragraph (a) shall be made at intervals of one hour, or if determined by regional air navigation agreement, at intervals of one half-hour.
- b) Reports of routine observations shall be issued as:
 - i. local routine reports, only for dissemination at the aerodrome of origin (intended for arriving and departing aircraft); and
 - ii. METAR for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET).
- c) At aerodromes that are not operational throughout 24 hours, METAR shall be issued prior to the aerodrome resuming operations in accordance with regional air navigation agreement.

22.619 SPECIAL OBSERVATIONS AND REPORTS

- a) A list of criteria for special observations shall be established by the Meteorological Authority in consultation with the appropriate ATS Authority, aircraft operators and other concerned parties and users.
- b) Reports of special observations shall be issued as:
 - i. local special reports, only for dissemination at the aerodrome of origin (intended for arriving and departing aircraft); and
 - ii. SPECI for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET) unless METAR are issued at half hourly intervals.
- c) Aerodromes that are not operational throughout 24 hours, following resumption of the issuance of METAR, SPECI shall be issued, as necessary.

22.621 CONTENTS OF REPORTS

- a) Local routine and special reports and METAR and SPECI shall contain the following elements in the order indicated:
 - i. identification of the type of report;
 - ii. location indicator;
 - iii. time of the observation;
 - iv. identification of an automated or missing report, when applicable;
 - v. surface wind direction and speed;
 - vi. visibility;
 - vii. runway visual range, when applicable;
 - viii. present weather;
 - ix. cloud amount, cloud type (only for cumulonimbus and towering cumulus clouds) and height of cloud base or, where measured, vertical visibility;
 - x. air temperature and dew-point temperature; and
 - xi. QNH and, when applicable, QFE (QFE included only in local routine and special reports).
- b) Optional elements included under supplementary information shall be included in METAR and SPECI in accordance with regional air navigation agreement.

22.623 OBSERVING AND REPORTING METEOROLOGICAL ELEMENTS

- a) Surface wind - The mean direction and the mean speed of the surface wind shall be measured, as well as significant variations of the wind direction and speed, and reported in degrees true and metres per second (or knots), respectively.
- b) Visibility - The visibility as defined shall be measured or observed, and reported in metres or kilometres.
- c) Runway visual range - Runway visual range shall be assessed on all runways intended for Category II and III instrument approach and landing operations.
- d) The runway visual range, assessed in accordance with (c) above shall be reported in metres throughout periods when either the visibility or the runway visual range is less than 1500 m.
- e) Runway visual range assessments shall be representative of:
 - i. the touchdown zone of the runway intended for non-precision or Category I instrument approach and landing operations;
 - ii. the touchdown zone and the mid-point of the runway intended for Category II instrument approach and landing operations; and
 - iii. the touchdown zone, the mid-point and stop-end of the runway intended for Category III instrument approach and landing operations.
- f) The units providing air traffic service and aeronautical information service for an aerodrome shall be kept informed without delay of changes in the serviceability status of the automated equipment used for assessing runway visual range.
- g) Present weather - The present weather occurring at the aerodrome shall be observed and reported as necessary. The following present weather phenomena shall be identified, as a minimum: rain, drizzle, snow

and freezing precipitation (including intensity thereof), haze, mist, fog, freezing fog and thunderstorms (including thunderstorms in the vicinity).

- h) Clouds - Cloud amount, cloud type and height of cloud base shall be observed and reported as necessary to describe the clouds of operational significance. When the sky is obscured, vertical visibility shall be observed and reported, where measured, in lieu of cloud amount, cloud type and height of cloud base. The height of cloud base and vertical visibility shall be reported in metres (or feet).
- i) Air temperature and dew-point temperature - The air temperature and the dew-point temperature shall be measured and reported in degrees Celsius.
- j) Atmospheric pressure - The atmospheric pressure shall be measured, and QNH and QFE values shall be computed and reported in hectopascals.
- k) Local routine and special reports and METAR and SPECI from automatic observing systems shall be identified with the word "AUTO".

SUBPART D: AIRCRAFT OBSERVATIONS AND REPORTS

22.625 ROUTINE AIRCRAFT OBSERVATIONS – DESIGNATIONS

- a) The following aircraft observations shall be made:
 - i. routine aircraft observations during en-route and climb-out phases of the flight for aircraft equipped with air-ground data link ; and
 - ii. special and other non-routine aircraft observations during any phase of the flight.
- b) When air-ground data link is used and automatic dependent surveillance (ADS) or secondary surveillance radar (SSR) Mode S is being applied, automated routine observations shall be made every 15 minutes during the en-route phase and every 30 seconds during the climb-out phase for the first 10 minutes of the flight.
- c) In the case of air routes with high-density air traffic, an aircraft from among the aircraft operating at each flight level shall be designated, at approximately hourly intervals, to make routine observations in accordance with sub-regulation 22.680(b).
- d) The designation procedures referred to under paragraph (c) shall be subject to regional air navigation agreement.
- e) In the case of the requirement to report during the climb-out phase, an aircraft shall be designated, at approximately hourly intervals, at each aerodrome to make routine observations in accordance with sub-regulation (b) above.
- f) Aircraft not equipped with air-ground data link are exempted from making routine aircraft observations.

22.627 SPECIAL AIRCRAFT OBSERVATIONS

- a) Special observations shall be made by all aircraft whenever the following conditions are encountered or observed:
 - i. moderate or severe turbulence; or
 - ii. moderate or severe icing; or
 - iii. severe mountain wave; or
 - iv. thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines; or
 - v. thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines; or
 - vi. heavy dust storm or heavy sandstorm; or
 - vii. volcanic ash cloud; or
 - viii. pre-eruption volcanic activity or a volcanic eruption.
- b) When other meteorological conditions not listed under paragraph (a) are encountered and which, in the opinion of the pilot-in-command, may affect the safety or markedly affect the efficiency of other aircraft operations, the pilot-in-command shall advise the appropriate ATS unit as soon as practicable.

22.629 REPORTING OF AIRCRAFT OBSERVATIONS DURING FLIGHT

- a) Aircraft observations shall be reported by air-ground data link. Where air-ground data link is not available or appropriate, special and other non-routine aircraft observations during flight shall be reported by voice communications.
- b) Aircraft observations shall be reported during flight at the time the observation is made or as soon thereafter as is practicable.
- c) Aircraft observations shall be reported as air-reports.
- d) The meteorological Authority shall make arrangements with the appropriate ATS Authority to ensure that on receipt by the ATS units of special air-reports by voice communication of:
 - i. special air-reports by voice communications, the ATS units relay them without delay to their associated meteorological watch office; and
 - ii. routine and special air-reports by data link communications, the ATS units relay them without delay to their associated meteorological watch office and WAFCs and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

22.631 RECORDING AND POST-FLIGHT REPORTING OF AIRCRAFT OBSERVATIONS OF VOLCANIC ACTIVITY

- a) Special aircraft observations of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud shall be recorded on the special air-report of volcanic activity form. A copy of the form shall be included with the flight documentation provided to flights operating on routes which, in the opinion of the meteorological Authority could be affected by volcanic ash clouds.

SUBPART E: FORECASTS

22.633 AERODROME FORECASTS

- a) An aerodrome forecast shall be prepared on the basis of regional air navigation agreement by the meteorological office designated by the meteorological Authority.
- b) An aerodrome forecast shall be issued at a specified time not earlier than one hour prior to the beginning of its validity period and consist of a concise statement of the expected meteorological conditions at an aerodrome for a specified period.
- c) Aerodrome forecasts and amendments thereto shall be issued as TAF and include the following information in the order indicated:
 - i. identification of the type of forecast;
 - ii. location indicator;
 - iii. time of issue of forecast;
 - iv. identification of a missing forecast, when applicable;
 - v. date and period of validity of forecast;
 - vi. identification of a cancelled forecast, when applicable;
 - vii. surface wind;
 - viii. visibility;
 - ix. weather;
 - x. cloud;
 - xi. expected significant changes to one or more of these elements during the period of validity; and
 - xii. optional elements shall be included in TAF in accordance with regional air navigation agreement.
- d) Aerodrome meteorological offices preparing TAF shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly.
- e) The length of the forecast messages and the number of changes indicated in the forecast shall be kept to a minimum.
- f) TAF that cannot be kept under continuous review shall be cancelled.
- g) The period of validity of a routine TAF shall not be less than 6 hours nor more than 30 hours; the period of validity shall be determined by regional air navigation agreement. Routine TAF valid for less than 12 hours shall be issued every 3 hours and those valid for 12 to 30 hours shall be issued every 6 hours.
- h) When issuing TAF, meteorological offices shall ensure that not more than one TAF is valid at an aerodrome at any given time.

22.635 LANDING FORECASTS

- a) A landing forecast shall be prepared by the aerodrome meteorological office designated by the meteorological Authority concerned as determined by regional air navigation agreement; the forecasts are intended to meet the requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

- b) Landing forecasts shall be prepared in the form of a trend forecast.
- c) A trend forecast shall consist of a concise statement of the expected significant changes in the meteorological conditions at that aerodrome to be appended to a local routine or local special report, or a METAR or SPECI.
- d) The period of validity of a trend forecast shall be 2 hours from the time of the report which forms part of the landing forecast.

22.637 FORECASTS FOR TAKE-OFF

A forecast for take-off shall be prepared by the aerodrome meteorological office designated by the meteorological Authority concerned if required by agreement between the meteorological Authority and operators.

22.639 AREA FORECASTS FOR LOW-LEVEL FLIGHTS

- a) When the density of traffic operating below flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) warrants the routine issue and dissemination of area forecasts for such operations, the frequency of issue, the form and the fixed time or period of validity of those forecasts and the criteria for amendments thereto shall be determined by the meteorological Authority in consultation with the users.
- b) When the density of traffic operating below flight level 100 warrants the issuance of AIRMET information, area forecasts for such operations shall be prepared in a format agreed upon between the meteorological authorities concerned.
- c) When abbreviated plain language is used, the forecast shall be prepared as a GAMET area forecast, employing approved ICAO abbreviations and numerical values;
- d) when chart form is used, the forecast shall be prepared as a combination of forecasts of upper wind and upper-air temperature, and of SIGWX phenomena.
- e) The area forecasts shall be issued to cover the layer between the ground and flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) and shall contain information on en-route weather phenomena hazardous to lowlevel flights, in support of the issuance of AIRMET information, and additional information required by low-level flights.
- f) Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be issued every 6 hours for a period of validity of 6 hours and transmitted to meteorological watch offices and/or aerodrome meteorological offices concerned not later than 1 hour prior to the beginning of their validity period.

22.641 SIGMET INFORMATION

- a) SIGMET information shall be issued by a meteorological watch office and shall give a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather phenomena, which may affect the safety of aircraft operations, and of the development of those phenomena in time and space.

- b) SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.
- c) The period of validity of a SIGMET message shall be not more than 4 hours. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, the period of validity shall be extended up to 6 hours.
- d) Close coordination shall be maintained between the meteorological watch office and the associated area control centre/flight information centre to ensure that information on volcanic ash included in SIGMET and NOTAM messages is consistent.
- e) SIGMET messages shall be issued not more than 4 hours before the commencement of the period of validity.
- f) In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, these messages shall be issued as soon as practicable but not more than 12 hours before the commencement of the period of validity.
- g) SIGMET messages for volcanic ash and tropical cyclones shall be updated at least every 6 hours.

22.643 AIRMET INFORMATION

- a) AIRMET information shall be issued by a meteorological watch office in accordance with regional air navigation agreement, taking into account the density of air traffic operating below flight level 100.
- b) AIRMET information shall give a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather phenomena, which have not been included in Section I of the area forecast for low-level flights and which may affect the safety of low-level flights, and of the development of those phenomena in time and space.
- c) AIRMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.
- d) The period of validity of an AIRMET message shall be not more than 4 hours.

22.645 AERODROME WARNINGS

- a) Aerodrome warnings shall be issued by the aerodrome meteorological office and shall give concise information of meteorological conditions which could adversely affect aircraft on the ground, including parked aircraft, and the aerodrome facilities and services.
- b) Aerodrome warnings shall be cancelled when the conditions are no longer occurring and/or no longer expected to occur at the aerodrome.

22.647 WIND SHEAR WARNINGS AND ALERTS

- a) Wind shear warnings shall be prepared by the aerodrome meteorological office designated by the meteorological Authority for aerodromes where wind shear is considered a factor, in accordance with local arrangements with the appropriate ATS unit and operators concerned.
- b) Wind shear warnings shall give concise information on the observed or expected existence of wind shear which could adversely affect aircraft on the approach path or take-off path or during circling approach between runway level and 500 m (1 600 ft.) above that level and aircraft on the runway during the landing roll or take-off run.
- c) Where local topography has been shown to produce significant wind shears at heights in excess of 500 m (1 600 ft.) above runway level, then 500 m (1 600 ft.) shall not be considered restrictive.
- d) At aerodromes where wind shear is detected by automated, ground-based, wind shear remote-sensing or detection equipment, wind shear alerts generated by these systems shall be issued. Wind shear alerts shall give concise, up-to-date information related to the observed existence of wind shear involving a headwind/tailwind change of 7.5 m/s (15 kt) or more which could adversely affect aircraft on the final approach path or initial take-off path and aircraft on the runway during the landing roll or take-off run.

22.649 PROVISION OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

Aeronautical climatological information required for the planning of flight operations shall be prepared in the form of aerodrome climatological tables and aerodrome climatological summaries. Such information shall be supplied to aeronautical users as agreed between the meteorological Authority and those users.

22.651 COPIES OF METEOROLOGICAL OBSERVATIONAL DATA

The meteorological Authority, on request and to the extent practicable, shall make available to any meteorological Authority, to operators and to others concerned with the application of meteorology to international air navigation, meteorological observational data required for research, investigation or operational analysis.

22.653 PROVISION OF SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

- a) Meteorological information shall be supplied to operators and flight crew members for:
 - (1) pre-flight planning by operators;
 - (2) in-flight re-planning by operators using centralized operational control of flight operations;
 - (3) use by flight crew members before departure; and
 - (4) aircraft in flight.
- b) Meteorological information supplied to operators and flight crew members shall cover the flight in respect of time, altitude and geographical extent.
- c) The information referred to under paragraph (b) shall relate to appropriate fixed times, or periods of time, and shall extend to the aerodrome of intended landing, also covering the meteorological conditions expected between the aerodrome of intended landing and alternate aerodromes designated by the operator.

- d) Meteorological information supplied to operators and flight crew members shall be up to date and include the following information, as established by meteorological Authority in consultation with operators concerned:
- (1) forecasts of:
 - i. upper wind and upper-air temperature;
 - ii. upper-air humidity;
 - iii. geopotential altitude of flight levels;
 - iv. flight level and temperature of tropopause;
 - v. direction, speed and flight level of maximum wind; and
 - vi. SIGWX phenomena;
 - (2) METAR or SPECI (including trend forecasts as issued in accordance with regional air navigation agreement) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
 - (3) TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
 - (4) forecasts for take-off;
 - (5) SIGMET information and appropriate special air-reports relevant to the whole route;
 - (6) volcanic ash and tropical cyclone advisory information relevant to the whole route;
 - i. subject to regional air navigation agreement, GAMET area forecast and/or area forecasts for low-level flights in chart form prepared in support of the issuance of AIRMET information, and AIRMET information for low-level flights relevant to the whole route;
 - ii. aerodrome warnings for the local aerodrome;
 - iii. meteorological satellite images; and
 - iv. ground-based weather radar information.
- e) Forecasts listed under paragraph (c) (i) above shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological Authority and the operator concerned.
- f) When forecasts are identified as being originated by the WAFCs, no modifications shall be made to their meteorological content.
- g) Charts generated from the digital forecasts provided by the WAFCs shall be made available, as required by operators, for fixed areas of coverage as shown in Annex 3 Appendix 8, Figures A8-1, A8-2 and A8-3.
- h) When forecasts of upper wind and upper-air temperature listed under 11.1.31.3a)1) are supplied in chart form, they shall be fixed time prognostic charts for flight levels as specified in Annex 3 Appendix 2, 1.2.2 a).
- i) When forecasts of SIGWX phenomena are supplied in chart form, they shall be fixed time prognostic charts for an atmospheric layer limited by flight levels as specified in Annex 3, Appendix 2, 1.3.2 and Appendix 5, 4.3.2. The forecasts of upper wind and upper-air temperature and of SIGWX phenomena above flight level 100 requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as they become available, but not later than 3 hours before departure.
- j) Other meteorological information requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as is practicable.

- k) Meteorological Authority who is tasked to provide service for operators and flight crew members shall when necessary initiate coordinating action with the meteorological authorities of other States with a view to obtaining from them the reports and/or forecasts required.
- l) Meteorological information shall be supplied to operators and flight crew members at the location to be determined by the meteorological Authority, after consultation with the operators and at the time to be agreed upon between the aerodrome meteorological office and the operator concerned.
- m) The service for pre-flight planning shall be confined to flights originating within the territory of the State concerned.
- n) At an aerodrome without a meteorological office at the aerodrome, arrangements for the supply of meteorological information shall be as agreed upon between the meteorological Authority and the operator concerned.

22.655 BRIEFING, CONSULTATION AND DISPLAY

- a) Briefing and/or consultation shall be provided, on request, to flight crew members and/or other flight operations personnel.
- b) The purpose briefing and /or consultation shall be to supply the latest available information on existing and expected meteorological conditions along the route to be flown, at the aerodrome of intended landing, alternate aerodromes and other aerodromes as relevant, either to explain and amplify the information contained in the flight documentation or, if so agreed between the meteorological Authority and the operator, in lieu of flight documentation.
- c) Meteorological information used for briefing, consultation and display shall include any or all of the information listed in sub-regulation (c) below.
- d) If the aerodrome meteorological office expresses an opinion on the development of the meteorological conditions at an aerodrome which differs appreciably from the aerodrome forecast included in the flight documentation, the attention of flight crew members shall be drawn to the divergence.
- e) The portion of the briefing dealing with the divergence shall be recorded at the time of briefing and this record shall be made available to the operator.
- f) The required briefing, consultation, display and/or flight documentation shall normally be provided by the aerodrome meteorological office associated with the aerodrome of departure.
- g) At an aerodrome where these services are not available, arrangements to meet the requirement of flight crew members shall be agreed upon between the Meteorological Authority and the operator concerned.
- h) In exceptional circumstances, such as an undue delay, the aerodrome meteorological office associated with the aerodrome shall provide or, if that is not practicable, arrange for the provision of a new briefing, consultation and/or flight documentation as necessary.

22.657 FLIGHT DOCUMENTATION

- a) Flight documentation to be made available shall comprise information listed under sub-regulation 23.250(c)(i)(1), (ii), (iii), (v), (vi) and, if appropriate, (vii).
- b) Whenever it becomes apparent that the meteorological information to be included in the flight documentation will differ materially from that made available for pre-flight planning and in-flight re-planning, the operator shall be advised immediately and, if practicable, be supplied with the revised information as agreed between the operator and the aerodrome meteorological office concerned.
- c) Meteorological Authority shall retain information supplied to flight crew members, either as printed copies or in computer files, for a period of at least 30 days from the date of issue.
- d) This information shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed.

22.659 AUTOMATED PRE-FLIGHT INFORMATION SYSTEMS FOR BRIEFING, CONSULTATION, FLIGHT PLANNING AND FLIGHT DOCUMENTATION

- a) Where meteorological Authority uses automated pre-flight information systems to supply and display meteorological information to operators and flight crew members for self-briefing, flight planning and flight documentation purposes, the information supplied and displayed shall comply with the relevant provisions in sub-regulations 22.650 to 22.660 inclusive.
- b) Where automated pre-flight information systems are used to provide for a harmonized, common point of access to meteorological information and AIS information by operators, flight crew members and other aeronautical personnel concerned, the meteorological Authority shall remain responsible for the quality control and quality management of meteorological information provided by means of such systems

22.661 INFORMATION FOR AIRCRAFT IN FLIGHT

- a) Meteorological information for use by aircraft in flight shall be supplied by a meteorological office to its associated ATS unit and through D-VOLMET or VOLMET broadcasts as determined by regional air navigation agreement. Meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between the meteorological Authority or authorities and the operator concerned.
- b) Meteorological information for use by aircraft in flight shall be supplied to ATS units in accordance with the specifications of Annex 3, Chapter 10.
- c) Meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts in accordance with the specifications of Annex 3, Chapter 11.

22.663 INFORMATION FOR ATS UNITS

- a) The meteorological Authority shall designate a meteorological office to be associated with each ATS units. The associated meteorological office shall, after coordination with the ATS units, supply, or arrange for the supply of, up-to-date meteorological information to the units as necessary for the conduct of their functions.

- b) If applicable, the associated meteorological office for a flight information centre or an area control centre shall be a meteorological watch office.
- c) Any meteorological information requested by an ATS unit in connection with an aircraft emergency shall be supplied as rapidly as possible.

22.665 INFORMATION FOR SEARCH AND RESCUE SERVICES UNITS

- a) Meteorological offices designated by the meteorological Authority in accordance with regional air navigation agreement shall supply search and rescue services units with the meteorological information they require in a form established by mutual agreement.
- b) For that purpose, the designated meteorological office shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

22.667 INFORMATION FOR AIS UNITS

- a) The meteorological Authority, in coordination with the Authority shall arrange for the supply of up-to-date meteorological information to relevant AIS units, as necessary, for the conduct of their functions.

22.669 REQUIREMENTS FOR COMMUNICATIONS

- (a) Suitable telecommunications facilities shall be made available to permit aerodrome meteorological offices and, as necessary, aeronautical meteorological stations to supply the required meteorological information to ATS units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control units and the ATE stations serving these aerodromes.
- (b) Suitable telecommunications facilities shall be made available to permit world area forecast centres to supply the required world area forecast system products to aerodrome meteorological offices, meteorological authorities and other users.
- (c) Telecommunications facilities between aerodrome meteorological offices and, as necessary, aeronautical meteorological stations and aerodrome control towers or approach control units shall permit communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds.
- (d) Suitable telecommunications facilities shall be made available to permit meteorological offices to exchange operational meteorological information with other meteorological offices.

SUBPART E: FORECASTS

22.671 USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS AND THE PUBLIC INTERNET — METEOROLOGICAL BULLETINS

- (a) Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall be originated by the appropriate meteorological office or aeronautical meteorological station.

22.673 USE OF AERONAUTICAL MOBILE SERVICE COMMUNICATIONS

- (a) The content and format of meteorological information transmitted to aircraft and by aircraft shall be consistent with the provisions of this regulation.

22.675 USE OF AERONAUTICAL DATA LINK SERVICE —CONTENTS OF D-VOLMET

- (a) D-VOLMET shall contain current METAR and SPECI, together with trend forecasts where available, TAF and SIGMET, special air-reports not covered by a SIGMET, and where available, AIRMET.

22.677 USE OF AERONAUTICAL BROADCASTING SERVICE —CONTENTS OF VOLMET BROADCASTS

- (a) Continuous VOLMET broadcasts, normally on very high frequencies (VHF), shall contain current METAR and SPECI, together with trend forecasts where available.
- (b) Scheduled VOLMET broadcasts, normally on high frequencies (HF), shall contain current METAR and SPECI, together with trend forecasts where available and, where so determined by regional air navigation agreement, TAF and SIGMET.

End of Schedule 22 – Part F