GHANA
CIVIL AVIATION AUTHORITY

ADVISORY CIRCULAR
AC-20-002

DEVELOPING OF TRAINING PROGRAM FOR TECHNICAL STAFF PROVIDING METEOROLOGICAL SERVICES FOR AIR NAVIGATION

SECTION 1 - GENERAL

1. PURPOSE

This Advisory Circular (AC) is to provide general information and guidance on development of a training program for technical staff providing meteorological services foe air navigation.

2. STATUS OF THE ADVISORY CIRCULAR

This AC is an original issuance.

3. BACKGROUND

The setting up of the development of a training program for the technical staff is to provide and equip them with the prerequisite knowledge to discharge their duties to ensure safe air navigation.

4. APPLICABILITY

This AC is applicable to Meteorological Service Providers providing Meteorological Services for Air Navigation in Ghana.

5. RELATED DIRECTIVIES

This AC is related to the Part 20 – Meteorological Services for International Air Navigation of the Ghana Civil Aviation (Air Navigation Services) Directives.

6. RELATED READING MATERIAL

A. ICAO Doc 8896 – Manual of Aeronautical Practice

B. ICAO Annex 3 – Meteorological Service for International Air Navigation

C. The Manual of ANS Standards, Part 1 Section 3 – MET

D. WMO No. 49. Technical Regulations

E. WMO No. 258, Guide for the Education and Training of Personnel in Meteorology and Operational Hydrology

7. ACRONYMS

AC	-	Advisory Circular
ANS	-	Air Navigation Service
ATS	-	Air Traffic Services
ANSP	-	Air Navigation Service Provider
GCAA	-	Ghana Civil Aviation Authority
GCAD	-	Ghana Civil Aviation Directives
DG	-	Director General
GMA	-	Ghana Meteorological Agency
ICAO	-	International Civil Aviation Organization
MET	-	Meteorological Services
WMO	-	World Meteorological Organization

SECTION B - GUIDANCE AND PROCEDURES

8. GENERAL

A. Meteorological services for air navigation shall be provided by the designated Meteorological Authority. Details of the services provided are included in the Part 20 of the Ghana Civil Aviation Directives 2018 and CAA Manual of ANS Standards, Part 1 Section regulations. A suitable number of meteorological offices, watch offices and other meteorological stations shall be established to provide information required for operational planning, flight operations, and the protection of aeronautical equipment on the ground and for various other aeronautical users.

B. The information provided includes observations and reports of actual weather conditions at aerodromes and forecasts. This information is

made available at aerodrome meteorological offices and is disseminated as appropriate to aeronautical users including operators, flight crew members, air traffic services units, search and rescue units, airport management and others concerned with the conduct, or development of air navigation.

C. Each member shall ensure that the designated Meteorological Authority complies requirements of the Civil Aviation Authority and the World Meteorological Organization in respect of qualifications and training of meteorological personnel providing service for air navigation.

D. The Civil Aviation Authority is hereby recommending a systematic approach the provision of training to technical staff engaged in the provision of meteorological services for air navigation.

9. CATEGORIES OF PERSONNEL TO BE TRAINED

A. The following categories of personnel are covered by this circular:

i. Aeronautical Meteorological Observer (technician)

ii. Aeronautical Meteorological Forecasters/meteorologists

Note: Aeronautical MET Forecasters should be either:

1. *WMO Meteorologists or*
2. *Experienced WMO Class 11 forecasters qualified before January 2005*

B. **Minimum Academic Qualification**

i. Meteorologist / Aeronautical Meteorological Forecaster: a person who holds a University degree or equivalent; has acquired an appropriate level of knowledge of mathematics, physics, chemistry and computer science, and has completed the Basic Instruction Package for Meteorologists (BIP-MT

ii. Aeronautical Meteorological Observer (technician) : a person who has completed the Basic Instruction Package for Meteorological Technicians (BIP-MT)

C. **Approved Training Organizations**

A number of organizations provide training in aviation meteorology. The CAA shall recognize training conducted at any approved training organization.

D. **Requirement for Training**

i. Aeronautical Meteorological Forecasters (Meteorologist)

The basic education and training of meteorological personnel engaged in the provision of Meteorological forecasts for aeronautical purposes is similar to that of all meteorological personnel engaged in operational weather forecasting. Details on the required knowledge and skills are given in WMO – No. 258, volume 1 – Meteorology, chapter 3. However, for AMF, the weather forecasting instruction should be supplemented by special courses in aviation knowledge and procedures for meteorological service to international air navigation.

Particular emphasis is to be placed on the study, analysis and forecasting of the influence of the atmosphere on the operation of aircraft. Particular hazardous weather phenomenon to be considered include: low visibility and/or low cloud at aerodromes; low-level wind shear; turbulence (including clear-air turbulence); thunderstorms; upper wind and temperatures; jet streams and tropopause.

Syllabi for these subjects are given in section 3.4.5 below, which reiterates the provisions of WMO- No. 49 and WMO-No. 258 and Part 20 of the Ghana Civil Aviation (ANS) Directives.

The time taken to acquire this aeronautical meteorology specialization will primarily depend on the prior meteorological training experience of the individual trainee. As a guide, an experienced forecaster from an alternate specialization would likely require around 60 hours tuition combined with some two to some six weeks' supervised on-the-job experience in order to perform completely as an aeronautical forecaster.

However, for a trainee with very little forecasting experience, the aeronautical specialization would likely require a minimum of around 240 hours tuition combined with some three to nine months' supervised on-the-job experience. In order to gain the maximum benefit of the on-the-job experience, this period should encompass situations where the trainee will be exposed to both hazardous situations where the trainee will be exposed to both hazardous and non-hazardous weather conditions.

ii. Knowledge and Skills Requirements in Weather Forecasting.

1. Forecasters working in meteorological offices serving international air navigation must have the knowledge and skills to maintain an appropriate weather watch, to analyze the weather situation and to prepare and communicate weather forecasts.

2. The guidance below is recommended by the CAA and WMO:
    a. Atmospheric processes and phenomena: Know and be able to explain the main atmospheric processes and phenomena from the planetary to local scales; and know the region-specific weather phenomena, and be able to interpret the major meso-local scale particuliarities of the atmospheric dynamics over the assigned area.

b. Analyzing and monitoring the weather: Analyze and interpret synoptic charts, diagrams and graphics; integrate all available data to produce a consolidated diagnosis; perform real-time weather monitoring, utilizing all available remote sensing technologies such as radar surveillance and satellite imagery; constantly monitor the actual weather evolution, particularly the severe weather aspects associated with microclimates in the assigned area.

c. Weather forecasting: Know and be able to apply weather forecasting principles, methods and techniques; understand the operation of NWP models; and be able to utilize their strengths while being aware of their weaknesses. Verify, interpret and use NWP output; adding value to model or guidelines forecasts where appropriate.

d. User-specific forecasts and warnings: Elaborate and distribute regional/local and user specific forecasts; verify the ongoing forecasts; identify errors and amend erroneous forecasts as appropriate; issue warnings ; and provide reliable emergency services. Comprehend users' needs and risks-taking limitations.

e. Information technology and data processing: Know and be able to use the operational system technology; and understand and be able to apply basic operating system functions, data processing and visualization technology.

iii. Specific Knowledge and Skills for Aeronautical Forecaster

In addition to the general weather analysis and forecasting skills, an aeronautical forecaster is required to have skills in diagnosing and forecasting aviation specific phenomena, knowledge and skills in the use of aviation specific codes and practices, as well as an appreciation of the impact of their forecasts on aviation operations.

iv. These, recommended by CAA, are summarized below:

1. Weather phenomena: Understand the weather phenomena hazardous to aviation, and their analysis and forecasting; understand which meteorological parameters are crucial for the safety and regular operations of aviation user groups.
2. Aviation specific phenomena: Enable to forecast turbulence, wind shear, and other hazardous weather.
3. Meteorological Codes: Know all aeronautical meteorological codes, and criteria applied for warnings and change groups in TAFS and TREND forecasts; follow the standard regulations contained in WMO Technical Regulations Part 20 of Ghana Civil Aviation (ANS) Directives.
4. Satellite and RADAR interpretation: Know how to interpret satellite and radar imagery, including analysis of the evolution of convective systems and tropical storms, and wind shear.
5. Weather Forecasting: Know and apply standard methods, techniques, and other numerical tools for forecasting low clouds, winds (including gusts). Fog and reduced visibility, thunderstorms, heavy precipitation, mountain waves and turbulence.

v. Special air-reports: Be able to assess special air-reports and ,if appropriate, issue the corresponding SIGMET message.

vi. Aviation Operations: Know meteorological aspects of flight planning; definitions; procedures for meteorological services for international air navigation; Air Traffic Services; Aerodromes;

- Aeronautical Information Services and Aeronautical telecommunications.

vii. WMO and CAA documentations: Familiarize with the documents contained in the reference list.

E. **Competency Requirements in Aeronautical Meteorology**

i. Job competency may vary from country to country and job to job but the following are the minimum generic competencies that should be demonstrated by all aeronautical forecasters.
ii. Perform weather watch and monitoring, including the ability to detect and forecast hazards relevant to the aviation community.
iii. Derive forecast and warning products to the standards required by the user community
iv. Communicate effectively: Using appropriate language with aeronautical users, including oral briefings to pilots and dispatchers as necessary
v. Tailor meteorological products and services to aviation operations, in accordance with local aviation procedures and regulatory requirements.

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