



SAFETY ALERT 2018-09

Issue 01

Date of Issue: 31st July 2018

SUBJECT:

RESILIENCE OF AERODROME AND ANSP ELECTRICAL POWER SUPPLY SYSTEMS

REFERENCE PUBLICATIONS:

CAR VIII

CAR IX

REASON:

The safe and secure performance of flight safety depends on the continuing availability and reliability of electrical systems and subsystems including the electrical power generating systems. Improperly or carelessly sized, installed, or maintained a s(sub)system can be a source of both immediate and potential danger. The continued availability and performance of electrical (sub)systems depends on: (1) the capability of an organisation to maintain a strategic planning and monitoring of the electrical load analysis required to provide the service(s) it is accountable for and (2) the knowledge and technique of the staff who can make the strategic planning and monitoring effective and efficient.

Unfortunately, several recent events have occurred where the failure of electrical systems supporting safety critical equipment (e.g. full power loss to the Airfield Ground Lighting (AGL) systems, or the Air Traffic Control (ATC) facilities) has caused disruption of the air navigation services at various UAE airports which in result led to suspension of operations at the airport and delays in the traffic.

Notwithstanding that the GCAA recognises that the problem is complex to solve (because so many stakeholders are involved), the GCAA will strive to ensure that each party under its jurisdiction develops a resilience to any loss in full or part of the electrical power supply at its facilities.

This Safety Alert is issued to:

- a) Convey to Aerodrome Certificate holders and Air Navigation Service Providers the concern of the GCAA related to the recent occurrence of failure of the air navigation services due to loss of electrical power; and
- b) Inform them that the GCAA will be initiating special oversight activities on this matter to increase awareness and ultimately prevent such re-occurrence;
- c) Recommend them about basic principles to ensure that each organisation develops and maintains a resilience to any loss in full or part of the electrical power supply at its facilities

RECOMMENDATIONS:

Aerodromes and Air Navigation Service Providers should:

- a) Review and adjust their system to ensure their effective compliance with the applicable requirement (Appendix I refers);



- b) Document their means of compliance with the applicable requirements;
- c) Ensure that their documentation includes an General Description of all Electrical Systems and Electrical Load Analysis (ELA) which is a means to confirm that the various power sources can satisfactorily supply electrical power to necessary infrastructure and equipment during normal and abnormal operation under the most severe operating conditions as identified in the analysis (e.g. LVP and hot temperature) and confirm that the limits of the power supplies are never exceeded;
- d) Adapt the design and architecture of their existing electrical power supply system to increase reliability and availability of electrical power for every critical service;
- e) Establish Service Level Agreements (SLA) with their service providers to ensure an uninterruptable and resilient supply of their own services and establish means to review and monitor the SLAs;
- f) Ensure appropriate maintenance requirements, preparedness and associated plans/practices/testing, including regular assessments of the lifespan of equipment;
- g) Ensure that their management of change process includes means to ensure that the ELA is still valid and appropriate to the any change within the organisation (e.g. change of ATCO station, or bulbs in the airfield);
- h) Ensure that staff involved in electrical system design and maintenance are qualified and competent;
- i) Investigate any occurrence related to its electrical systems even if the occurrence has not resulted in an accident, serious incident, or other safety occurrence and implement any identified corrective actions; and
- j) Ensure that essential and critical equipment and supply systems remain secured at all times from any unlawful acts, including physical protection where required.

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APPENDIX I – REGULATORY FRAMEWORK

The electrical infrastructure for safety critical systems shall be compliant with the regulations in CAR VIII and CAR IX. The most relevant paragraphs are replicated below:

CAR VIII 4.10 d.3.g

a) The equipment required by CARs 4.10.(c).4, 4.10.(c).5, 4.10.(d).1, 4.10.(d).2 and 4.10.(d).3, shall have a level of reliability, availability and redundancy that minimises the possibility of failure, non-availability, or significant degradation of performance.

CAR VIII 4.A.5.12

b) Secondary Power Supply

- 1. Secondary power supply shall be provided to maintain continuity of communications services during LVP.*
- 2. The following facilities shall be supplied with secondary power:*
 - i. RTF equipment;*
 - ii. Telephone equipment;*
 - iii. Any data link equipment used in support of LVO.*

CAR VIII 5.16.b.4

a) Each aeronautical facility listed in the applicant's exposition is installed with suitable power supplies and means to ensure continuity of operation appropriate to the needs of the ATC unit or radio navigation service being supported;

CAR VIII 5.24

b) Information requiring immediate notification to the Air Traffic Service unit includes:

- 1. Failure or irregular operation of part or all of the CNS systems; and*
- 2. Failure of the normal or secondary power supply.*

CAR IX 4.16.11

Electrical Power Supply Systems for Air Navigation Facilities

Note: The safety of operations at aerodromes depends on the quality of the supplied power. The total electrical power supply system may include connections to one or more external sources of electric power supply, one or more local generating facilities and to a distribution network including transformers and switchgear. Many other aerodrome facilities supplied from the same system need to be taken into account while planning the electrical power system at aerodromes.

4.16.11.1 Adequate primary power supply shall be available at aerodromes for the safe functioning of air navigation facilities.

4.16.11.2 The design and provision of electrical power systems for aerodrome visual and radio navigation aids shall be such that an equipment failure will not leave the pilot with inadequate visual and non-visual guidance or misleading information.



Note: The design and installation of the electrical systems need to take into consideration factors that can lead to malfunction, such as electromagnetic disturbances, line losses, power quality, etc. Additional guidance is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 5.

4.16.11.3 Electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

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4.16.11.10 The following aerodrome facilities shall be provided with a secondary power supply capable of supplying power when there is a failure of the primary power supply:

a) the signalling lamp, voice communication management system and minimum lighting necessary to enable air traffic services personnel to carry out their duties;

Note: The requirement for minimum lighting may be met by other than electrical means.

b) Radio navigation aids and ground elements of communication systems;

c) Meteorological equipment;

d) Approach, runway and taxiway lighting as specified in 4.16.11.6 to 4.16.11.9;

e) All obstacle lights which, in the opinion of the Appropriate Authority, are essential to ensure the safe operation of aircraft;

f) Essential equipment and facilities for the aerodrome responding emergency agencies;

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4.16.11.11 Requirements for a secondary power supply shall be met by either of the following:

a) Independent public power, which is a source of power supplying the aerodrome service from a substation other than the normal substation through a transmission line following a route different from the normal power supply route and such that the possibility of a simultaneous failure of the normal and independent public power supplies is extremely remote; or

b) Standby power unit(s), which are engine generators, batteries, etc., from which electric power can be obtained.

Note: Guidance on electrical systems is included in the Aerodrome Design Manual (Doc 9157), Part 5.

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Note: Guidance on means of providing this protection is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 5.

4.16.12.2 Where the secondary power supply of an aerodrome is provided by the use of duplicate feeders, such supplies shall be physically and electrically separate so as to ensure the required level of availability and independence.