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Airport electrical equipment and visual aids tests

Iraia Irazabal Remuiñan

Aerodromes inspector’s classroom training and on-the-job training together with review of handbooks and procedures - Bilateral Course

22 – 31 July Myanmar

Your safety is our mission.

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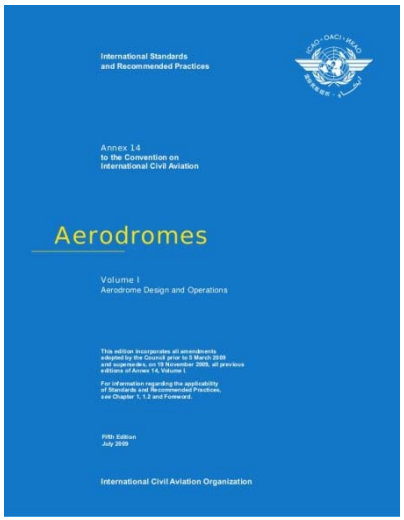
AIRPORT ELECTRICAL EQUIPMENT: REQUIREMENTS

Airport Electrical Equipment: Requirements

Requirements

CS BOOK CHAPTER S: ELECTRICAL SYSTEMS ≈ **Annex 14 chapter 8**



Airport Electrical Equipment: Requirements

CS ADR-DSN.S.875 Electrical power supply systems for air navigation facilities

ED Decision 2014/013/R

(a) Adequate primary power supply should be available at aerodromes for the safe functioning of air navigation facilities.

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

CS ADR-DSN.S.885 System design

ED Decision 2014/013/R

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

Airport Electrical Equipment: Requirements

Primary power supply

Duplicate feeders
(for secondary power supply)

Airport Electrical Equipment: Requirements

CS ADR-DSN.S.875 Electrical power supply systems for air navigation facilities

ED Decision 2014/013/R

(d) The time interval between failure of the primary source of power and the complete restoration of the services required by CS ADR-DSN.S.880(d) should be as short as practicable, except that for visual aids associated with non-precision, precision approach, or take-off runways the requirements of Table S-1 for maximum switch-over times should apply.

Airport Electrical Equipment: Requirements

CS ADR-DSN.S.880 Electrical power supply systems

ED Decision 2017/021/R

(a) For a precision approach runway, a secondary power supply capable of meeting the requirements of Table S-1 for the appropriate category of precision approach runway should be provided. Electric power supply connections to those facilities for which secondary power is required should be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(b) For a runway meant for take-off in runway visual range conditions less than a value of 800 m, a secondary power supply capable of meeting the relevant requirements of Table S-1 should be provided.

(c) At an aerodrome where the primary runway is a non-precision approach runway, a secondary power supply capable of meeting the requirements of Table S-1 should be provided except that a secondary power supply for visual aids need not be provided for more than one non-precision approach runway.

Airport Electrical Equipment: Requirements

Secondary power supply

Automatic connection

Maximum switch-over time

Airport Electrical Equipment: Requirements

CS ADR-DSN.S.880 Electrical power supply systems

ED Decision 2017/021/R

(d) The following aerodrome facilities should be provided with a secondary power supply capable of supplying power when there is a failure of the primary power supply:

(1) the signalling lamp and the minimum lighting necessary to enable air traffic services personnel to carry out their duties;

(2) obstacle lights which are essential to ensure the safe operation of aircraft;

(3) approach, runway and taxiway lighting as specified in CS ADR-DSN.M.625 to CS ADR-DSN.M.745;

(4) meteorological equipment;

(5) essential equipment and facilities for the parking position if provided, in accordance with CS ADR-DSN.M.750(a) and CS ADR-DSN.M.755(a); and

(6) illumination of apron areas over which passengers may walk.

Airport Electrical Equipment: Requirements

CS ADR-DSN.S.875 Electrical power supply systems for air navigation facilities

ED Decision 2014/013/R

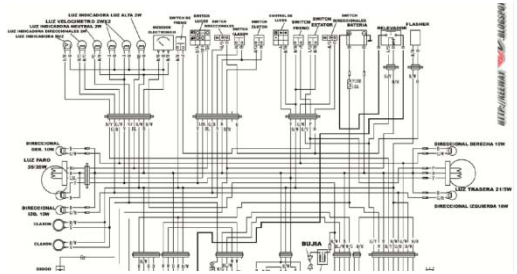
(b) The design and provision of electrical power systems for aerodrome visual and radio navigation aids should be such that an equipment failure should not leave the pilot with inadequate visual and non-visual guidance, or misleading information.

CS ADR-DSN.S.885 System design

ED Decision 2014/013/R

(a) For a runway meant for use in runway visual range conditions less than a value of 550 m, the electrical systems for the power supply, lighting, and control of the lighting systems included in Table S-1 should be so designed that an equipment failure should not leave the pilot with inadequate visual guidance or misleading information.

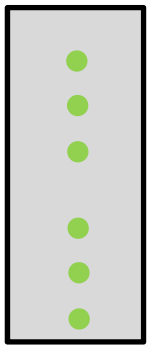
Airport Electrical Equipment: Requirements



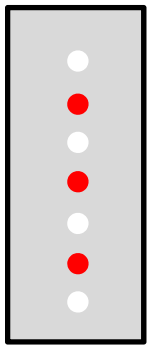
Design

Inadequate visual guidance

= bad guidance



Misleading information



= wrong color code

Airport Electrical Equipment: Requirements

CS ADR-DSN.S.890 Monitoring

ED Decision 2016/027/R

(a) A system of monitoring should be employed to indicate the operational status of the lighting systems.

(b) Where lighting systems are used for aircraft control purposes, such systems should be monitored automatically so as to provide an indication of any fault which may affect the control functions. This information should be automatically relayed to the air traffic service unit.

(c) Where a change in the operational status of lights has occurred, an indication should be provided within two seconds for a stop bar at a runway-holding position and within five seconds for all other types of visual aids.

(d) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table S-1 should be monitored automatically so as to provide an indication when the serviceability level of any element falls below a minimum serviceability level specified in CS ADR-DSN.S.895(c) to (g). This information should be automatically relayed to the maintenance crew.

(e) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table S-1 should be monitored automatically to provide an indication when the serviceability level of any element falls below a minimum level, below which operations should not continue. This information should be automatically relayed to the air traffic services unit and displayed in a prominent position.

Airport Electrical Equipment: Requirements

Monitoring

Beaconing presentation system

Operational status

Airfield status = system output

Serviceability level

VISUAL AIDS TESTS: PREPARATION

Visual Aids Tests: Preparation

Coordination with airport manager

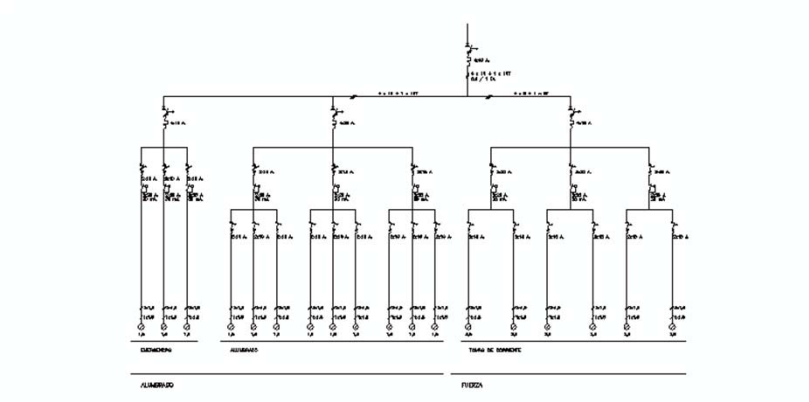
National Authority

Airport manager

Visual Aids Tests: Preparation

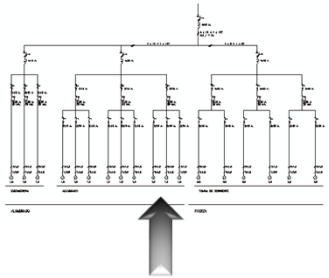
Getting ready for the tests

Study the airport

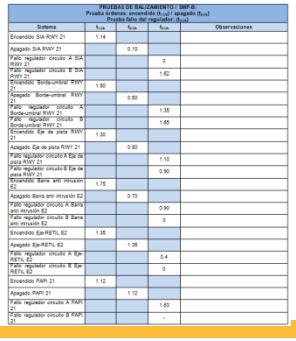


Internal meeting

Visual Aids Tests: Preparation



Equipment for the on-site inspection

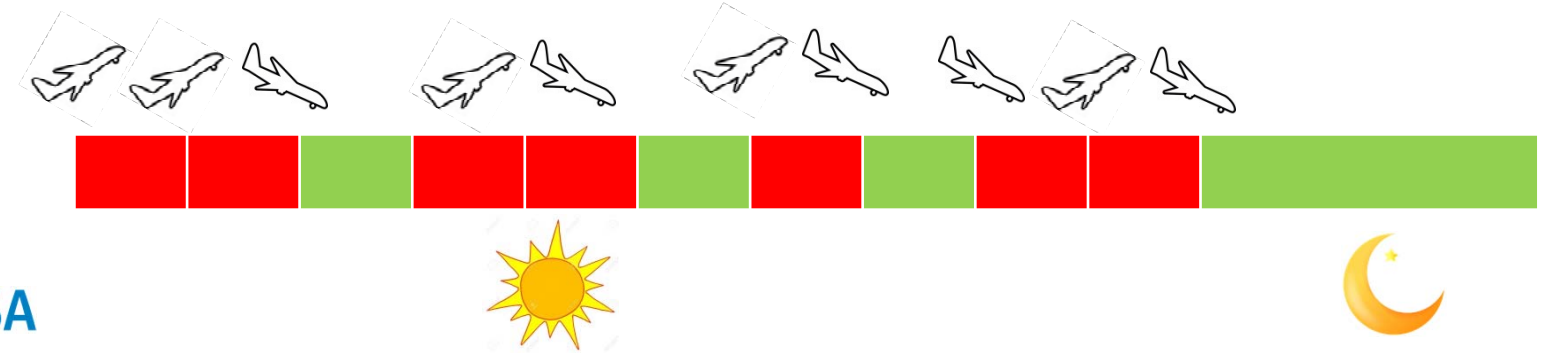


Visual Aids Tests: Preparation

On-site meeting

Final aspects and Questions

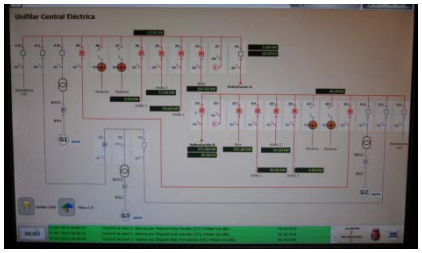
Coordinate traffic windows



Visual Aids Tests: Preparation

Electric power plant

1



Inspector positioning

Control Tower

2

3

Airfield

VISUAL AIDS TESTS:
TESTS 1-5

Visual Aids Tests: Test 1

TEST 1: REGULATOR POWER SUPPLY CUT

CS ADR-DSN.S.890 Monitoring

(a) A system of monitoring should be employed to indicate the operational status of the lighting systems.

(b) Where lighting systems are used for aircraft control purposes, such systems should be monitored automatically so as to provide an indication of any fault which may affect the control functions. This information should be automatically relayed to the air traffic service unit.

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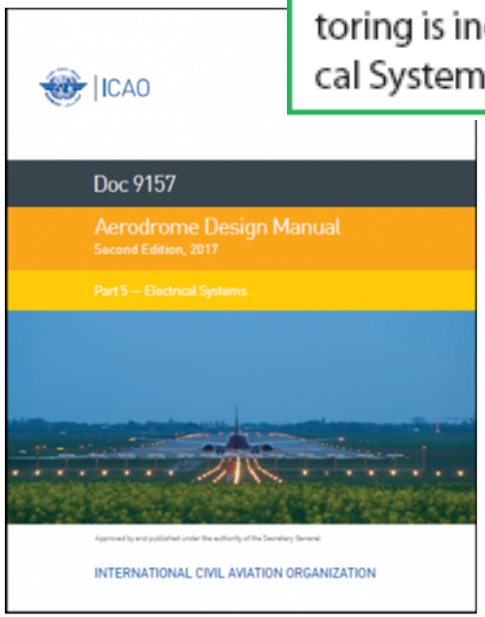
Visual Aids Tests: Test 1

TEST 1: REGULATOR POWER SUPPLY CUT

GM1 ADR-DSN.S.890 Monitoring

Guidance on this subject and on air traffic control interface and visual aids monitoring is included in the ICAO Doc 9157, Aerodrome Design Manual, Part 5, Electrical Systems.



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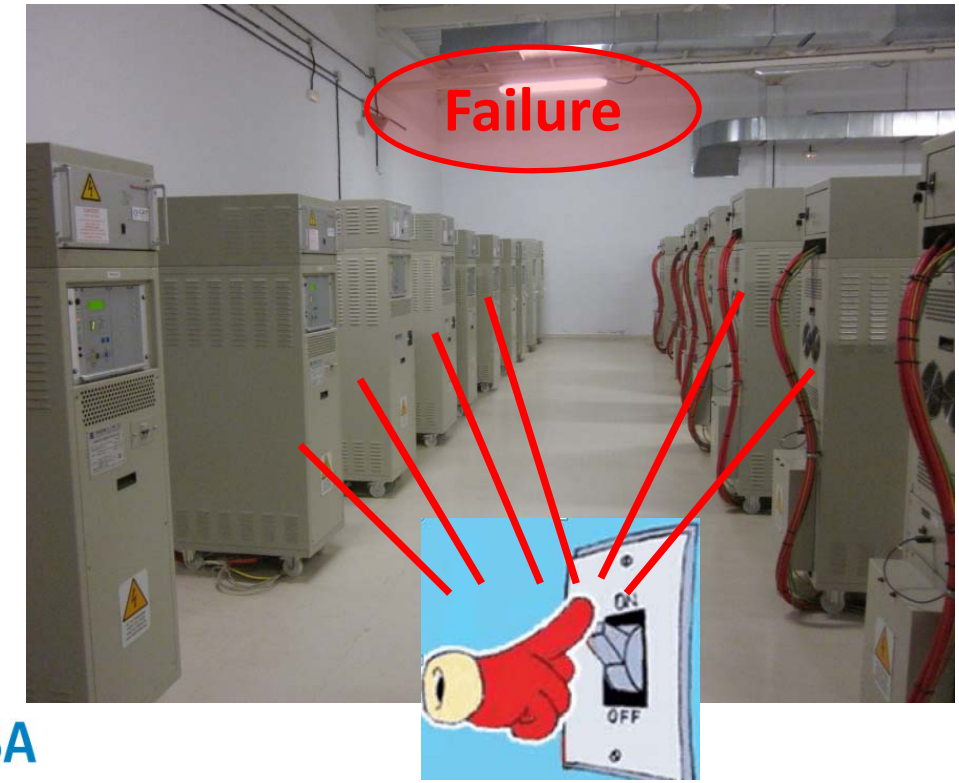
Visual Aids Tests: Test 1

TEST 1: REGULATOR POWER SUPPLY CUT

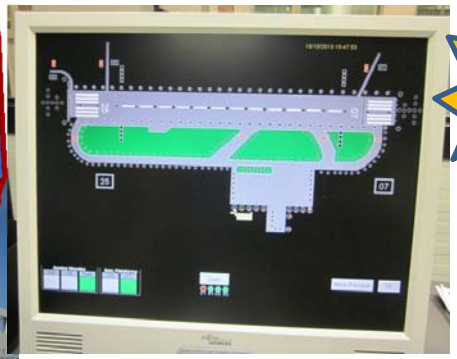


Visual Aids Tests: Test 1

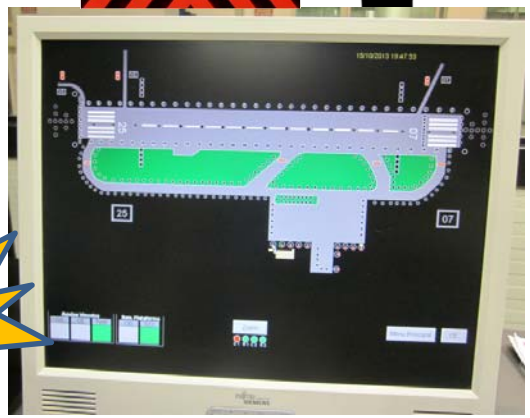
TEST 1: REGULATOR POWER SUPPLY CUT

Visual Aids Tests: Test 1

TEST 1: REGULATOR POWER SUPPLY CUT



t_2

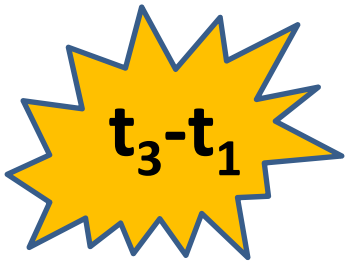


t_3

t_1

Visual Aids Tests: Test 1

TEST 1: REGULATOR POWER SUPPLY CUT



CS ADR-DSN.S.890 Monitoring

(a) A system of monitoring should be employed to indicate the operational status of the lighting systems.

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(c) Where a change in the operational status of lights has occurred, an indication should be provided within two seconds for a stop bar at a runway-holding position and within five seconds for all other types of visual aids.

Visual Aids Tests: Test 2

TEST 2: CONTROLLED CHANGES IN OPERATIONAL STATUS OF LIGHTS

CS ADR-DSN.S.890 Monitoring

(a) A system of monitoring should be employed to indicate the operational status of the lighting systems.

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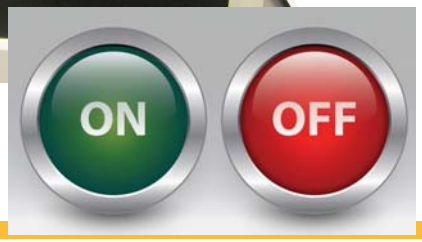
ADR CS CHAPTER S

Visual Aids Tests: Test 2

TEST 2: CONTROLLED CHANGES IN OPERATIONAL STATUS OF LIGHTS

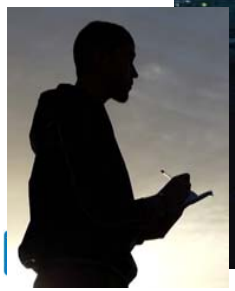
Levels of brightness

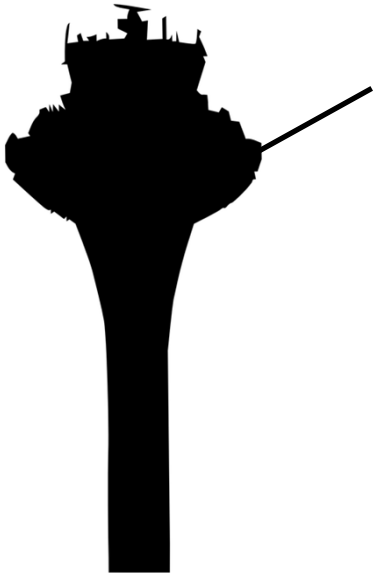


Order

Visual Aids Tests: Test 2

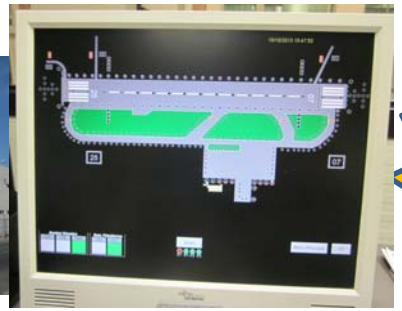
TEST 2: CONTROLLED CHANGES IN OPERATIONAL STATUS OF LIGHTS





Visual Aids Tests: Test 2

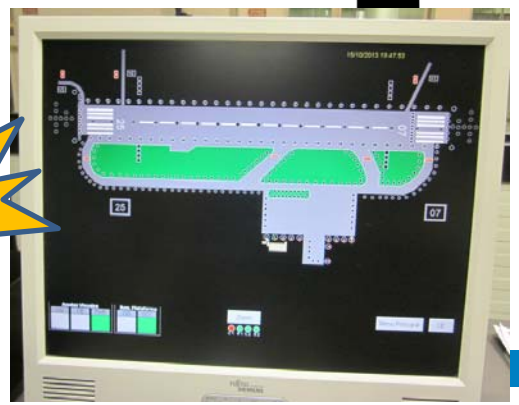
TEST 2: CONTROLLED CHANGES IN OPERATIONAL STATUS OF LIGHTS



t_2

t_1

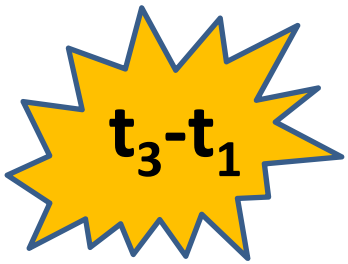
t_3



EASA

Visual Aids Tests: Test 2

TEST 2: CONTROLLED CHANGES IN



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(d) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table S-1 should be monitored automatically so as to provide an indication when the serviceability level of any element falls below a minimum serviceability level specified in CS ADR-DSN.S.895. This information should be automatically relayed to the maintenance crew.

ADR CS CHAPTER S

Visual Aids Tests: Test 1&2

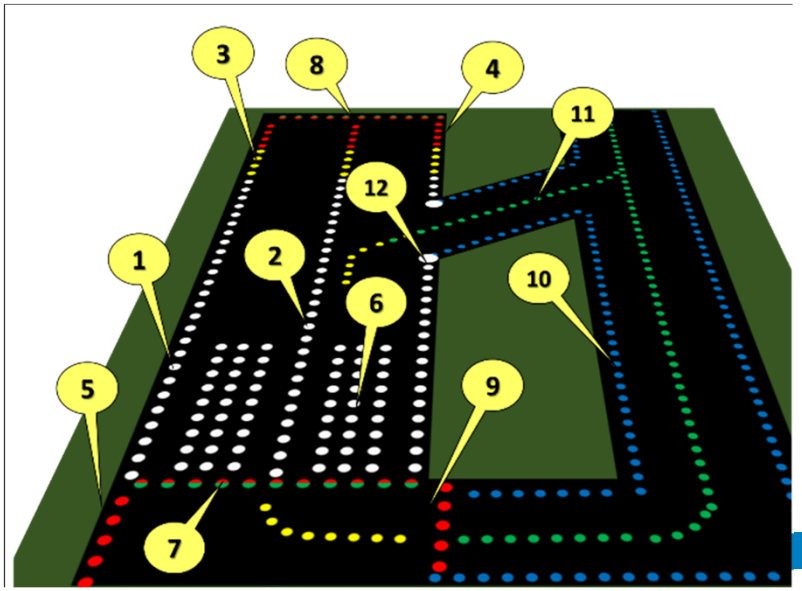
TESTS 1&2 bis: INADEQUATE VISUAL GUIDANCE OR MISLEADING INFORMATION

Visual Aids Tests: Test 1&2

TESTS 1&2 bis: INADEQUATE VISUAL GUIDANCE OR MISLEADING INFORMATION

Visual Aids to check (at least):

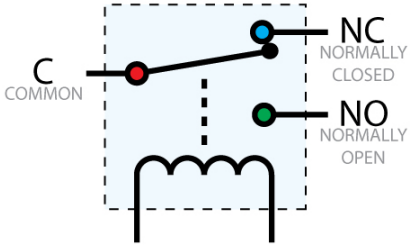
· Approach lighting system
· Runway centre line
· Runway edge
· Runway threshold
· Runway end
· Stop bar (2 at least)
· Taxiway centre line



Visual Aids Tests: Test 3

TEST 3: CONTROL SYSTEM POWER CUT

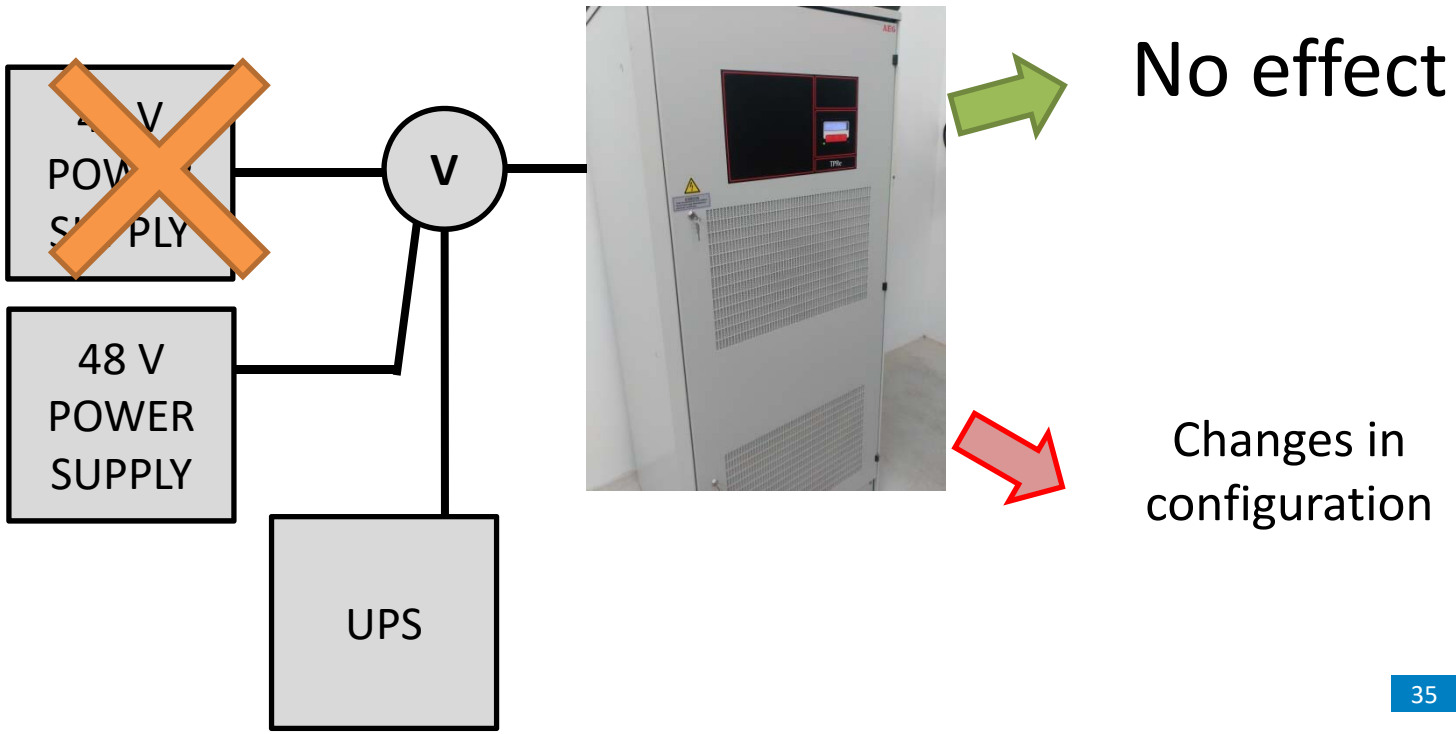
Relay control system



Visual Aids Tests: Test 3

TEST 3: CONTROL SYSTEM POWER CUT

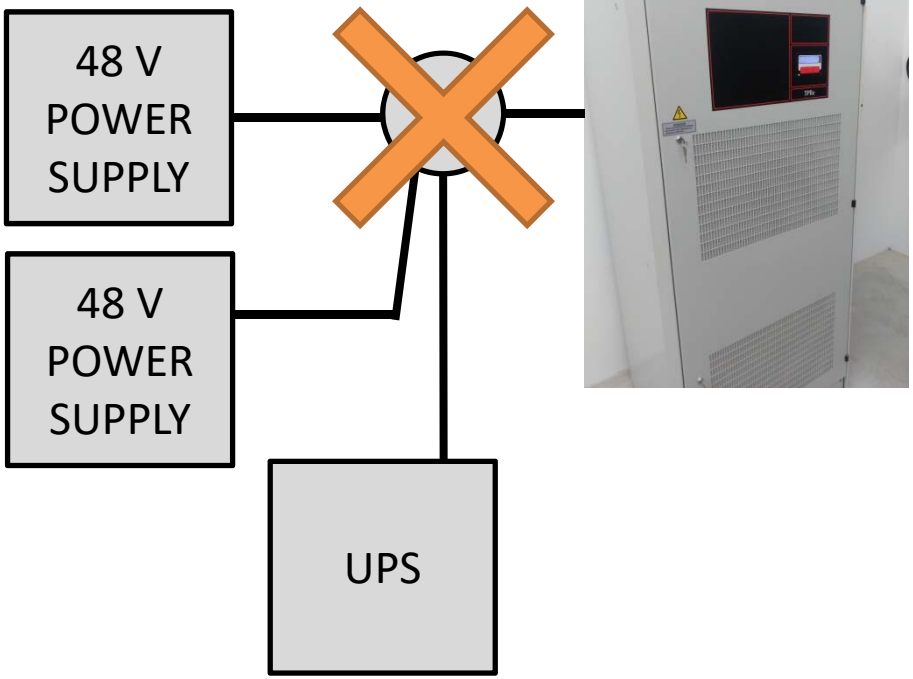
Part 1



Visual Aids Tests: Test 3

TEST 3: CONTROL SYSTEM POWER CUT

Part 2



- ❑ All systems on
- ❑ All systems off
- ❑ Specific configuration

Unknown result/configuration

Visual Aids Tests: Test 4

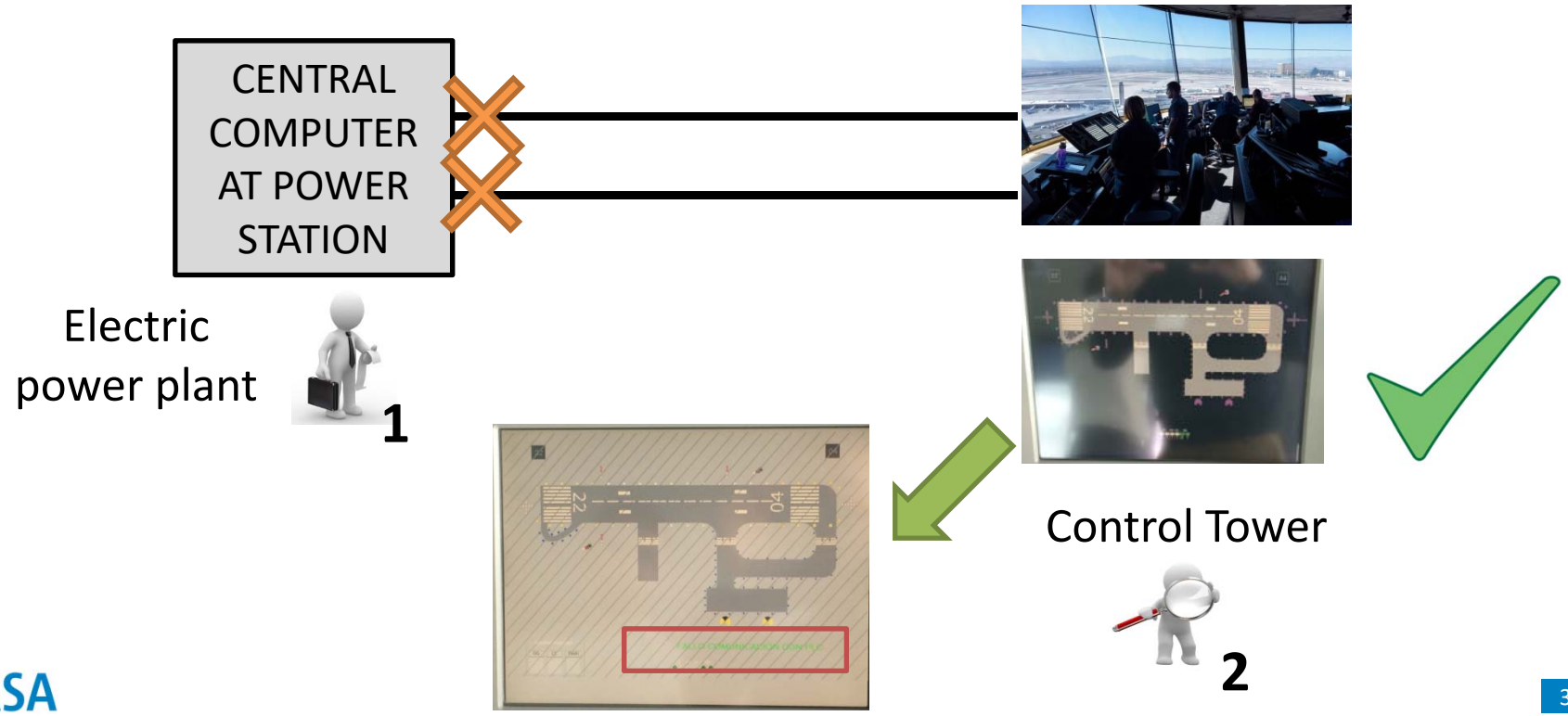
TEST 4: COMMUNICATIONS NET CUT

Control Tower

CENTRAL COMPUTER AT POWER STATION

Visual Aids Tests: Test 4

TEST 4: COMMUNICATIONS NET CUT



Visual Aids Tests: Test 4

TEST 4: COMMUNICATIONS NET CUT

CENTRAL COMPUTER AT POWER STATION

3

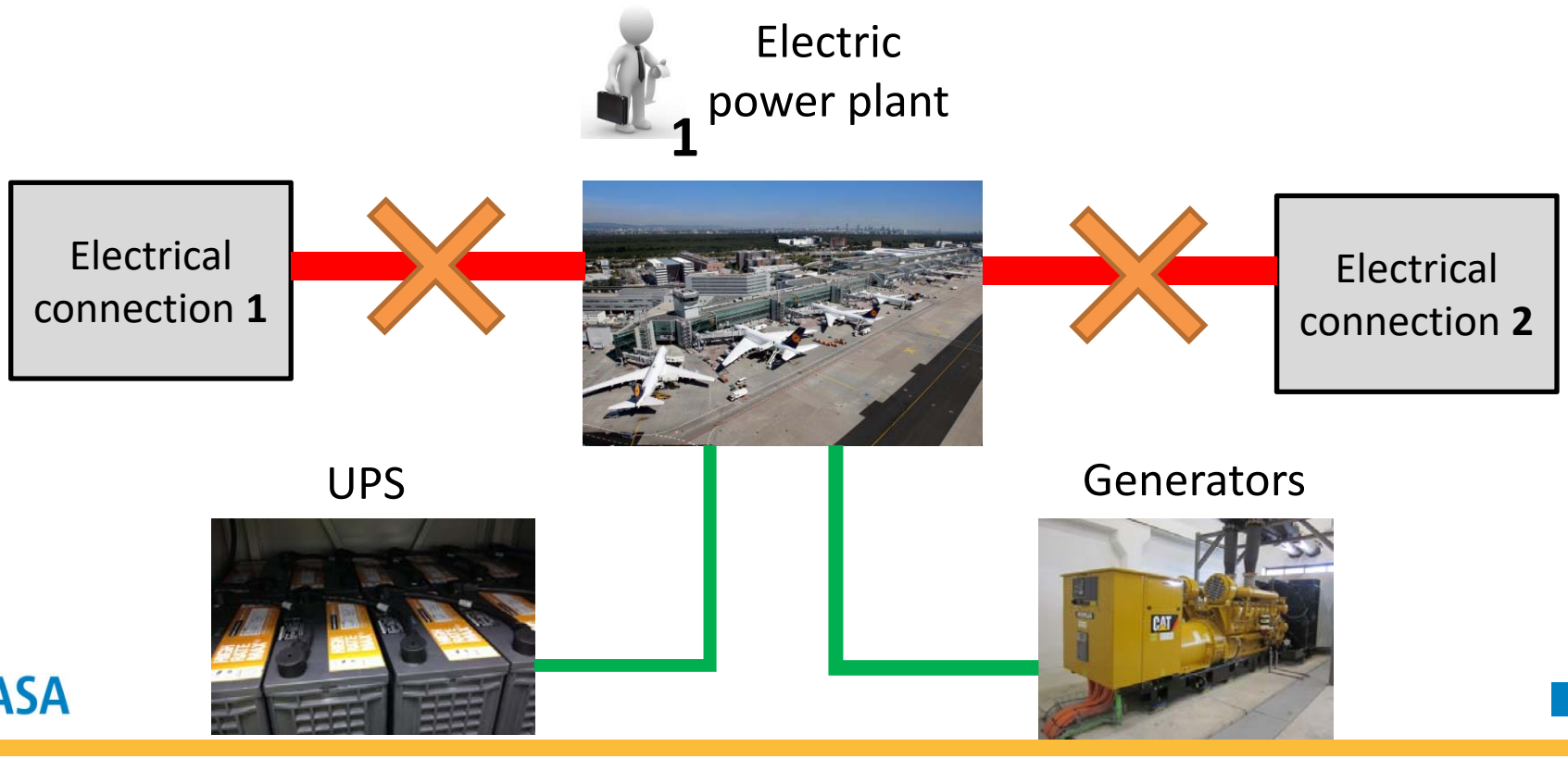
Airfield

Degraded conditions configuration

Defined by airport manager

Visual Aids Tests: Test 2

TEST 5: PRIMARY POWER SUPPLY CUT



Visual Aids Tests: Test 2

TEST 5: PRIMARY POWER SUPPLY CUT

1

Electric
power plant

Visual Aids Tests: Test 2

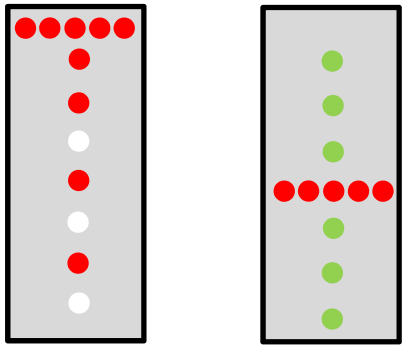
TEST 5: PRIMARY POWER SUPPLY CUT

2

Control Tower

3

Airfield



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