

APPENDIX 3

LIGHTNING STRIKES

General

1. Lightning strikes usually result in two types of damage, that caused by the actual strikes, and that caused by the discharge of static electricity which follows the strike. It is also possible that heavy static discharges may occur without the aircraft having been struck by lightning. Further, it is possible that certain aircraft components may become strongly magnetised, it being probable that during the lightning discharge heavy electrical currents flow in the metal airframe structure. The magnetic field produced by such electric current is the cause of magnetisation, this being an undesirable factor in the vicinity of a compass.

2. A lightning strike usually causes burning of small circular holes of approximately $\frac{1}{8}$ inch diameter, which may be clustered in one locality or scattered over a large area; results may also be indicated by burnt or discoloured skin, or rivets. Evidence of lightning strikes usually appear more prevalent in the

fuselage nose section, and outer leading edges.

3. The effects of static discharge may occur as localized pitting or burning and may even result in circular holes of approximately $\frac{1}{8}$ inch diameter. Evidence of static discharge usually appears more prevalent on trailing edges, under the lower aft fuselage area, radio aerials and the main plane extremities, also on the fin and tail plane tips and trailing edges.

Examination procedure

4. Whenever a lightning strike or static electricity discharge is reported, or if it is suspected that these conditions may have been encountered, the aircraft must be examined for evidence of such, as tabulated subsequently, at the first opportunity following the incident. It is emphasised, however, that where the term "Examine" is used, the signs of damage being primarily sought are

those of lightning strikes and static discharge as defined in para. 2 and 3 respectively. The examination is divided into the following two categories:—

- (1) *Preliminary Examination* — intended only for en-route aircraft landing away from base, to be followed upon return to base by:—
- (2) *Comprehensive Examination* — this is the normal procedure and is to be carried out at base on termination of flight.

Note . . .

The two examination categories do not imply that the repair of known damage may be deferred. The deferment of such repair will be dependent on the current repair scheme for the area of the aircraft affected and/or the effect of the damage on the airworthiness of the aircraft.

PRELIMINARY EXAMINATION (En-route aircraft)

| Item No. | Item | Operation |
|----------|---|---|
| 1 | (a) Ejection seats (b) Canopy jettison system { | Ensure rendered safe. |
| 2 | Fuselage exterior | Examine, paying particular attention to the nose section, air-intakes, windscreen structure and rear fuselage underside. |
| 3 | Main and tail plane surfaces and surfaces of aerofoil controls including trimming tabs and airbrake | Examine, paying particular attention to outer leading edges, trailing edges, root-ends and hinge areas of control surfaces. |
| 4 | External tanks (<i>if fitted</i>) | Examine. |
| 5 | (a) Main-wheel units (b) Nose-wheel unit { | <i>If extended at time of incident.</i> Examine, paying particular attention to lower portions. |
| 6 | All flying controls, including flaps, airbrake and trimming controls | Operate each system through full range and ensure smooth freedom of movement. |
| 7 | Fire extinguishers | Check to ensure extinguisher has not been discharged. |
| 8 | Navigation lamps | Operate and ensure functioning correctly. |
| 9 | All aerials | Examine. |
| 10 | (a) Radio and Radar equipment (b) Navigation equipment { | Operate and ensure functioning correctly. |

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COMPREHENSIVE EXAMINATION (Normal procedure)

| Item No. | Item | Operation |
|----------|---|---|
| AIRFRAME | | |
| 1 | (a) Ejection seats (b) Canopy jettison system | Ensure rendered safe. |
| 2 | (a) Main plane root fairings (b) Undersurface access panels (c) Tail unit root fairings | (1) Remove. (2) Examine. |
| 3 | Front fuselage | Examine, paying particular attention to the windscreen structure, air-intakes, nose-wheel doors and undersurface. |
| 4 | Rear fuselage | Examine, paying particular attention to the undersurface and aft extremity. (Static discharge is usually indicated by a series of small holes along the underside at approximately the centre line.) |
| 5 | (a) Tail plane (b) Fin | Examine, paying particular attention to the trailing edges, tips and hinge areas. |
| 6 | Aerofoil control surfaces including trimming tabs | (1) Examine, paying particular attention to the trailing edges. (2) Examine hinge assemblies, as far as practicable. If signs of static discharge or pitting are found, the examination is to be extended to include trim jack and all bearing points in the respective control system. (3) Move the controls through their full range of travel and ensure freedom of movement and smooth operation. |
| 7 | Main planes | Examine, paying particular attention to the outer leading edges, inboard undersurfaces, trailing edges, hinge areas, skin joints and pitot head area. |
| 8 | External tanks (<i>if fitted</i>) | Examine. |
| 9 | Flaps | (1) Examine, paying particular attention to the trailing edges. (2) Examine hinge assemblies. If signs of static discharge or pitting are found, the examination must be extended to include all bearing points in the flap control system. (3) Operate the flap system through full range of travel and ensure smooth operation. |
| 10 | Air brake assemblies | (1) Extend and examine. (2) Examine all hinge assemblies and bearings. If signs of static discharge or pitting are found, extend the examination to the operating jack bearings. (3) Operate the air brake and ensure full and free movement and smooth operation. |

| Item No. | Item | Operation |
|----------|--|---|
| 11 | (a) Main-wheel units (b) Nose-wheel unit } | <i>If extended at time of incident.</i> Examine, paying particular attention to the lower parts of the shock absorber struts and wheels. |
| 12 | Aircraft general | If any aerials (or other protuberances) have broken away during incident, examine for incidental damage. |
| | | ELECTRICAL |
| 13 | External and interior lighting, indicators and warning lamps | Operate and ensure functioning correctly. |
| | | ENGINE |
| 14 | Fire extinguishers | Check to ensure extinguisher has not been discharged. |
| | | INSTRUMENTS |
| 15 | Standby compass | Carry out check swing. |
| 16 | Gyro compass or navigation display <i>(as fitted)</i> | Test for correct functioning. |
| | | ARMAMENT <i>(if fitted)</i> |
| 17 | Stores <i>(if carried)</i> | Remove for examination and test |
| 18 | Release systems | Test for correct functioning. |
| | | Note . . . |
| | | <i>Reference must also be made to A.M.O. 'A' 188/1959 and A.P.3158, Vol. 2, Leaflet B.22 for the effect of lightning strikes on aircraft compasses.</i> |
| | | RADIO AND RADAR |
| 19 | Aerials | Examine. |
| 20 | All connectors (aerials to trans/rec) | (1) Disconnect. (2) Examine, particularly end connections. (3) Check for continuity and leakage from conductor to outer screen. |
| 21 | Aerial switch unit <i>(if fitted)</i> | (1) Examine, particularly connections and contacts. (2) Check for continuity and leakage from conductor to outer screen in both energized and de-energized conditions. |
| 22 | All connectors | Reconnect. |
| 23 | Installations | Operate and ensure functioning correctly. |

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