TECHNICAL PROBLEMS

SPEAK ON "TECHNICAL PROBLEMS ON BOARD AN AIRCRAFT". FOLLOW THE CHECKLIST

- the most common technical problems in flight
- effect of technical problems on the flight
- pilots' requests and actions in case of a technical problem
- technical problems that cause an aircraft diversion/ return to the departure aerodrome
- kinds of technical problems assessed as emergency
- controller's actions in case of emergency on board an aircraft
- the best principles of ATC assistance to the pilot in distress
- arrangements on the ground for a successful landing of emergency traffic
- services alerted in case of emergency
- equipment and vehicles prepared on ground in case of an emergency landing
- situation connected with a technical problem you have had / heard about

(from "Steps to Proficiency" Test Preparation)

KEY WORDS & PHRASES

- technical problem/ issue /fault/malfunction/ /failure
- happen/occur/take place during the flight
- face/experience a technical problem
- deteriorate/turn/develop into emergency
- depend on the nature/extent of the problem
- assess the situation/potential risks
- warning device/light/signal/system/sign
- computer failure/breakdown
- engine vibration/flameout/separation/failure/fire/stall
- electrical short circuit
- fuel starvation/exhaustion/shortage/ leak/contamination
- hydraulic failure/loss/fluid/pressure/pump
- jammed door/flight controls/flaps/slats/ailerons/control surfaces
- depressurized cabin/ aircraft

POTENTIAL TECHNICAL PROBLEMS

Different kind of technical failures can happen on aircraft, such as engine failure, pressurization issue, loss of hydraulics, landing gear problems, electrical fault, fuel issues (fuel leak, shortage or contamination), computer malfunction and so on. Any technical problem can develop into an in-flight emergency and cause return or diversion to alternate.

All aircraft systems are interconnected, so a new breakdown may follow and cause a new problem for aircraft systems and devices. For example, engine failure may have serious consequences for an aircraft as it will reduce aircraft power and ability to operate normal flight. Engine failure can lead to loss of electrical power, navigational system, communication system, loss of cabin pressure and manual gear extension.

Electrical failure is often accompanied by other malfunctions such as an indication failure and flight management computer problems. Pilots can lose radio- navigation,

communication and ILS equipment, but he worst scenario is an on- board fire caused by electrical fault.

Hydraulic system drives flight controls such as ailerons, rudder, stabilizer, elevators, flaps, slats, landing gear and brakes. If something goes wrong with hydraulics, aircraft flight characteristics may degrade, for example, the aircraft may have problems with control and pilots will have to fly manually. Loss of nose wheel steering makes it difficult or impossible to clear the runway after landing.

POSSIBLE CAUSES

Technical failures may be caused by different reasons. They include structural damage, metal fatigue, poor maintenance or operational errors. Also technical problems may result from hidden manufacturing defects, acts of sabotage or terrorism.

PILOT ACTIONS

Though pilots are trained to cope with non-standard situations, they experience stress and high workload facing a failure in flight. Pilots' actions include flying the aircraft, running checklists, assessing the situation, coordinating with ATC and making a right decision. Any technical problem can grow into a major issue, which will deteriorate aircraft flying performance, lead to multiple failures and difficulties with aircraft control. In such situations pilots may require vectors, immediate descent, diversion to the nearest alternate, priority approach or landing, technical or emergency assistance upon arrival. That actually depends on the stage of flight and extent of the problem.

ATC ASSISTANCE

Air traffic controllers should consider strain and time pressure which the pilots experience under the circumstances. Controllers should follow the ASSIST code: ACKNOWLEDGE – acknowledge emergency status, nature of the problem and intentions; SEPARATE - separate the aircraft from other traffic, clear the airspace to give it room to maneuver; SILENCE - impose radio silence if necessary; INFORM - notify authorities and all, concerned (adjacent sectors, emergency and airport services) according to the local procedures; SUPPORT - provide maximum assistance to the pilots, facilitate rerouting and diversion by coordinating a direct path; TIME – give the pilots time to resolve, or improve the situation.

EMERGENCY PROCEDURES AND EQUIPMENT

The emergency aircraft is given priority over other traffic, including stopping departures and delaying or diverting other arriving traffic. In case of emergency landing at an aerodrome, the standard procedure is to activate "full emergency". It means immediate sending Rescue and Fire Fighting Services for fire extinguishing and passengers transportation.

Use of facilities for rapid evacuation such as axes, generators, ladders, airbags when the doors are jammed, may help people to survive the accident. Fire Fighting vehicles carry water and foam concentrate to put out fire. Towing equipment may be needed as the runway will be blocked by disabled aircraft. In case of injuries, traumas, burns and other medical issues caused

by emergency landing, medical staff, ambulances and sometimes “air ambulances” (light aircraft or helicopter to deliver patients from remote locations) are on standby. In the event of ditching, emergency survival equipment (life vests, rafts, boats, ferries and vessels) will also become necessary.

PREVENTIVE MEASURES

Safety improvements in aircraft have been implemented to reduce technical risks (for example, aircraft systems have been duplicated or triplicated). However, it is almost impossible to prevent all failures. So, good aircraft inspection and maintenance by technicians are essential to minimize the possibilities of technical failures. To prevent aircraft system malfunctions a careful preflight inspection is required. During taxi, pilots must verify operation and accuracy of all flight instruments. They must ensure that all systems are operational. Besides, pilots must closely monitor the work of all aircraft systems and indications in flight.

Nature of technical problem	***Impact on other systems and equipment***	***ATC actions***
• Engine failure	•inability to operate normal flight •aircraft power reducing and control difficulties • loss of electrical power/ communication system/cabin pressure • manual gear extension.	• follow ASSIST principle • acknowledge the problem • find out pilot’s intentions • clear the space around the emergency aircraft • inform other aircraft of emergency descent in the area • if needed, impose radio silence condition • inform pilots about next suitable aerodrome, alternate aerodrome details and weather • inform the supervisor and all units concerned • facilitate rerouting and ensure priority for landing •alert medical, emergency and Search and Rescue service (if required) • in case of forced landing, record last known position and time
• Electrical system failure	• aircraft performance degradation •loss of radio- navigation/ communication equipment/ flight management computer •avionics system failure •gear extension problems •indication failure or wrong readouts •in- flight fire	
• Hydraulic system failure	• loss of control and maneuverability •extending/retracting landing gear difficulties • inability to extend/retract flaps and slats	

	•loss of autopilot and RVSM capability •loss of nose wheel steering •reduced braking capability	
•Loss of pressurization	•aerodynamic characteristics degradation • aircraft control problems •damage to aircraft systems and devices •air conditioning system problem •bleed air system problem	