VIRGINIA DEPARTMENT OF FIRE PROGRAMS

Aviation Firefighting for Structural Firefighters

Chapter 7
Incidents Involving General Aviation Aircraft

7-1

INCIDENTS INVOLVING GENERAL AVIATION AIRCRAFT

Learning Objectives

- Identify some of the more common causes of incidents involving GA aircraft
- Identify some of the factors to consider when responding to a call of an aircraft with an unsafe landing gear indicator
- Identify factors to consider when dealing with engine fires
- Identify factors to consider when dealing with a retractable gear aircraft that has landed with it's gear up

7-2

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Learning Objectives

- Identify acceptable methods for extinguishing wheel fires
- Explain what "pilot error" means
- Identify concerns regarding interior fires in GA aircraft

7-3

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Introduction

- Many things can go wrong with a machine as complex as an airplane, however there are some common causes of incidents that fire departments can plan for
- For example, knowing that aircraft, fuel tankers, and stationary fuel tanks all contain large amounts of fuel, fire companies should be well versed to handle Class B fires

7-4

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Unsafe Landing Gear Indicator

- A common concern with aircraft that has retractable gear
- A false indication, burned out light bulb, switch failure, or other problems cause this situation and a pilot does not know for sure if the landing gear is down and locked
- The pilot will try to recycle and/or shake the gear down
- Often the fire department is called to stand-by
- Most often the landing will be without incident

7-5

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Gear Up Landing

- Unintentional
  - A "belly landing" sometimes cause by simply forgetting to lower the gear
  - Generally there are no injuries or fuel spills and only minor damage to the aircraft
  - Still always be prepared for a worst case scenario

7-6

Gear Up Landing

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7-7

Gear Up Landing

- Intentional
  - Intentional belly landing because of known landing gear problems
  - Pilots will try all options to lower gear first
  - If it is just the nose gear they may try to land on the main gear, shut down the engines and fuel, and let the plane coast to a stop and drop
  - Fire departments are likely to be notified in advance of this situation

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7-8

Engine Fires

- In Flight
  - Limited options for pilot since most small GA aircraft do not have fire suppression systems
  - There are few actions a fire department can take until the aircraft lands
  - If the aircraft has only one engine and it shuts down as a result of the fire, the pilot may still be able to glide the airplane in for a landing

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7-9

Engine Fires

- On the Ground
  - Safety! Approach any aircraft, whether it uses propellers or jets, from the front, at an angle, if wind and terrain permit
  - If the engine is still running avoid the jet or prop blast from the rear and the danger of the intake from the front
  - Safety! A commonly accepted practice is for emergency crews to allow a 30-foot buffer between them and any running aircraft engine

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7-10

Engine Fires

- On the Ground
  - Full PPE and SCBA
  - Good tactical procedures include
    - Protective hose line charged and ready
    - Make sure all survivors are out of the aircraft
    - Attempt to confine fire to immediate area of the engine
    - Identification and evaluation of potential exposures
    - Determine fuel leaks
      - Leaking fuel from an engine on fire can lead to a 3 Dimensional Fuel fire which is very difficult to extinguish

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7-11

Interior Fires

- Interior fires in GA aircraft often occur after a crash or forced landing
- The major concern is to separate the fire from the occupants as quickly as possible
  - This means a combination of removing the occupants rapidly, getting to the fire, confining it, and extinguishing it

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7-12

Interior Fires

- GA Interiors are filled with many combustible materials such as plastic, foam rubber, cloth, and wood paneling
- Safety! Aircraft such as aero medical helicopters may have liquid oxygen on board

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7-13

Interior Fires

- Fire crews must gain quick access and be familiar with how to open doors, windows, and canopies
- Forcible entry should be used as a last resort
- Larger GA aircraft may be pressurized which can cause difficulty in gaining access
- If there is no life hazard, a piercing nozzle may be used

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7-14

Hot Brakes and Wheel Fires

- Hot brakes are generally not a problem once the aircraft has stopped as they should cool down without intervention
- Parts of the engine and wheels may consist of magnesium which burns hot and bright
  - Using water can be dangerous
- Safety! A safer, more acceptable way to handle a metal fire is to use Class D rated extinguishing material

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7-15

Hot Brakes and Wheel Fires

- Some GA aircraft have fusible plugs on the wheels to prevent the tires from violently rupturing from over pressurization when heated
  - Approach from the front or the rear of the aircraft as the sidewalls tend to rupture first

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7-16

Hot Brakes and Wheel Fires

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7-17

Stalls

- A stall is when the aircraft cannot produce enough lift to keep it in the air
- Most GA aircraft are designed so the nose drops when the aircraft stalls
- Pilots are trained and practice recovering from stalls
- Inability to recover from a stall will lead to a crash

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7-18

Undershoots, Overshoots, Groundloops, and Rejected takeoffs

- Undershoot
  - When the aircraft lands or crashes short of the runway

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7-19

Undershoots, Overshoots, Groundloops, and Rejected takeoffs

- Overshoot
  - When the aircraft runs out of runway before the aircraft lands or crashes

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7-20

Undershoots, Overshoots, Groundloops, and Rejected takeoffs

- Groundloop
  - When the pilot loses directional control of the aircraft while on the ground

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7-21

Undershoots, Overshoots, Groundloops, and Rejected takeoffs

- Rejected Takeoffs
  - When the pilot decides it would be unsafe for the aircraft to leave the ground

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7-22

Pilot Error

- An action or inaction by a pilot that may result in an aircraft incident or accident
- Mistakes can include:
  - Fuel Exhaustion
  - Inadequate preflight checks
  - Inadequate flight planning
  - Flying into bad weather
  - Using alcohol or drugs
  - Flying too high without supplemental oxygen

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7-23

Pilot Error

- Fuel Exhaustion
  - A common reason for GA aircraft accidents
  - Fuel calculations are factored based on weight, weather, distance, burn rate, etc.
  - Unexpected weather and other situations may increase the burn rate and GA aircraft may not have fuel indicators
  - Reciprocating engines that use carburetors can develop a condition called "carburetor ice" and pilots can activate a system to prevent this, failure to do so can stop fuel from getting to the engine

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7-24

Pilot Error

- Hypoxia
  - Can happen when unpressurized aircraft fly too high
  - Oxygen deficiency can begin with the pilots night vision deteriorating then mental alertness falls, along with coordination, and impaired judgment
  - This occurs slowly and the pilot may not be aware of the situation

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7-25

Pilot Error

- Unsafe Flying
  - Flying too low without appropriate training can cause the aircraft to fly into terrain, trees, radio towers, or power lines
  - Inexperienced pilots often fly into bad weather or in or under clouds when they are too low for safety

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7-26

Fueling Incidents

- Fueling is generally done with mobile tankers
- The weak link in the chain is anytime a person is involved in transferring fuel from one container to the other
- Very strict regulations govern the fueling process
- Fuel spills are not an uncommon occurrence and generally occur during a fuel transfer operation

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7-27

Animal Strikes

- Aircraft often collide with animals and bird strikes are common while in flight
- Strikes can cause considerable damage and cause the aircraft to crash
- Strikes of animals such as deer or fox on the runway at high speeds can endanger a landing or takeoff

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7-28

Incidents Involving Helicopters

- Engine Malfunction or Failure
  - Helicopters do not generally plummet to the ground when the engine quits
  - They can autorotate if high enough which can allow a pilot to control the decent and safely land

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7-29

Incidents Involving Helicopters

- Tail Rotor Failure
  - If the tail rotor fails, the pilot has limited options to control the aircraft long enough to land
  - There is a good probability that if a catastrophic tail rotor failure does occur, the helicopter will crash

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7-30

Incidents Involving Helicopters

- Main Gearbox Failure
  - Simply put, if the main gearbox that sends power from the engine to the main rotor fails, then the rotor may stop turning
  - A crash is highly probable

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7-31

Incidents Involving Helicopters

- Hydraulic Problems
  - Many medium to large helicopters have hydraulically assisted controls
  - Loss of this system can cause control difficulties

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7-32

Incidents Involving Helicopters

- Fire
  - Some medium to large helicopters may have on board fire protection system
  - Because helicopters use the same kinds of engines as fixed wing aircraft, the same principles of firefighting apply

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7-33

Summary

- Aircraft are complex machines
- The person who controls the aircraft is also complex and can be a cause of problems
- Many situations involving GA aircraft could result in a response form the local structural fire department
- The exact cause of a GA incident is a job for professional inspectors. The information in this section is simply meant to heighten your awareness of situations you may face

7-34