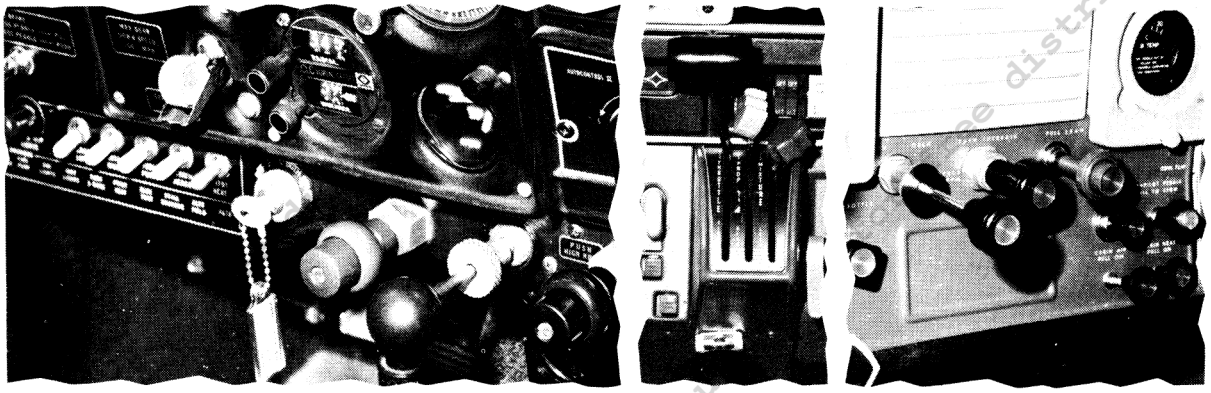
U.S. DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration

VFR PILOT EXAM-O-GRAM NO. 58

PILOT INDUCED ACCIDENTS



PILOTS SOMETIMES PULL THE WRONG HANDLE OR FLIP THE WRONG SWITCH

The purpose of this Exam-O-Gram is to show how a lack of knowledge, inadequate preflight preparation, carelessness, confusion, and distractions have contributed to accidents. A study of many General Aviation Accident reports indicates that an alarming number of experienced pilots, as well as inexperienced pilots were involved in accidents that resulted from "inadequate preflight preparation and/or planning."

FAA written tests contain questions directly related to many of the conditions and factors that have caused accidents. All of the following are subject matter areas of aeronautical knowledge covered in written tests:

Preflight planning; use of the carburetor heat/mixture/throttle/propeller controls; pilot privileges/limitations; aircraft cruise performance charts; aircraft loading; fuel consumption; the effect of strong headwinds on aircraft range; etc.

Lack of knowledge in these subjects, combined with inadequate preflight preparation and careless flying habits, virtually assures that pilot error will be a significant factor in a high percentage of aircraft accidents. Also, some persons become involved in accidents by attempting to fly an airplane when: (1) there are pressing problems unrelated to flying on their minds; (2) they are not sufficiently alert; (3) their proficiency is marginal; or (4) they are not thoroughly familiar with or "at home" in the airplane being flown.

Experienced pilots as well as student pilots can benefit from the review of accident reports. We should all learn from the mistakes of others, yet it seems many persons must make the same costly mistakes themselves before they really learn. Reading the case reports which follow should make it clear that accidents are often related to a lack of knowledge, in addition to one or more of the factors mentioned above.

IMPROPER USE OF POWERPLANT CONTROLS

HOW HAS A LACK OF KNOWLEDGE OF USING THE MIXTURE CONTROL APPARENTLY CONTRIBUTED TO AIRCRAFT ACCIDENTS? Although pilots are familiar with stopping the engine after a flight by placing the mixture control in idle cutoff, some persons apparently are not familiar with how an engine responds in flight as this control is being moved toward the idle cutoff position. This is true when operating with high-power settings, and also during glides with the throttle closed as the propeller continues to windmill with the mixture in idle cutoff.

Reports for a 3-year period showed that an average of 16 accidents occurred each year as a result of pilots unintentionally pulling a wrong handle--the mixture control instead of the intended control. There were 38 "mismanagement of mixture control" accidents reported for a period of 2 1/2 years for just one popular make airplane. These pilot-induced emergencies were caused by pilots unintentionally creating complete power failures through improper use of the mixture control. Accident reports recite much the same story as the excerpts which follow:

★ "A student pilot on a solo cross-country flight was cruising at 6,500 feet, and being unfamiliar with the mixture control, made no attempt to lean out the mixture. When the engine started to run rough the student assumed the problem to be carburetor ice. After applying what he thought was carburetor heat--the engine sputtered and quit. After an emergency landing was made, the accident investigating team found the mixture control in the full lean (idle cutoff) position."

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★ "When the aircraft was removed from the river, the mixture control was in the "idle cutoff" position. The pilot stated that he closed the throttle and thought he applied full carburetor heat. When the engine seemed to be idling too slowly the throttle was advanced but the engine did not respond. The pilot assumed a fuel tank was empty and hurriedly switched tanks, and since this didn't solve the problem, an emergency landing was attempted on the river bank."

★ "A business executive accompanied by two passengers departed on a business trip in a single-engine airplane. Soon after takeoff the pilot experienced complete power failure, and the airplane was landed straight ahead outside the airport. Investigation revealed the mixture control positioned three-fourths of the way to full lean. The pilot stated that he was monitoring the tachometer and manifold pressure gauge and didn't notice which control he used to change the prop pitch."

Pilots should visually check a control prior to operating it, but this is not always practiced. During takeoffs and landings many pilots manipulate controls by touch while monitoring other traffic, communicating with the tower, or scanning instruments. When a pilot is not mindful of which knob, lever, switch, or handle his hands are touching, the stage is set for a pilot-induced emergency. This is especially true when the pilot's attention is diverted by some unusual circumstance or outside distraction.

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HOW HAVE FLIGHT INSTRUCTORS BEEN INVOLVED IN MISUSE OF THE MIXTURE CONTROL ACCIDENTS?

There were seven accidents of this type involving one popular make single-engine trainer, in a 1 1/2 year period. The following are "Brief Descriptions" of several of the accidents:

★ 1. "Instructor pulled mixture control for simulated emergency and engine would not restart."

★ 2. "Flight instructor moved mixture control to idle cutoff position to simulate engine failure. Could not get engine restarted. Battery was dead and alternator was inoperative."

★ 3. "Flight instructor pulled mixture control to idle cutoff to simulate engine failure at 800 feet. Engine did not respond when control was placed in RICH."

There were five similar accidents involving flight instructors in 1975. Two of these concerned light twin-engine aircraft - one on final approach and the other on takeoff at 20 feet AGL.

NOTE: The FAA inspector training policy for simulating partial or complete power malfunctions in single-engine aircraft is by smooth use of the throttle ONLY. The objective of simulated power malfunctions is not to shock the students but to train them in proper procedures and control of the aircraft.

WHAT MAY HAPPEN WHEN PILOTS ATTEMPT TO FLY AIRPLANES WITH WHICH THEY ARE NOT FAMILIAR?

★ "Shortly after lift-off the student pilot experienced a reduction in power and pulled a handle to apply carburetor heat. The airplane continued to lose power and was landed outside the airport boundary.

The Student Pilot Certificate had been endorsed for operating a similar earlier model (carburetor equipped) airplane of the same make that was being flown. The student had never flown an airplane equipped with fuel injection, a fuel boost pump, or a controllable pitch propeller, though the airplane involved in the accident was so equipped. Investigation revealed that the fuel boost pump was in the LOW operating position whereas the checklist specified that it be turned OFF during takeoff. The cabin heat control was in the full ON position and the student guessed that was the handle he pulled!"

Select One - Carefully.

WHAT ARE SOME OF THE MORE COMMON PILOT-INDUCED ACCIDENTS THAT HAVE RESULTED FROM USING THE WRONG HANDLE OR SWITCH?

Retracting the gear instead of the flaps after landing; retracting the gear while attempting to lock the parking brakes; turning off the ignition toggle switches while attempting to turn on the landing lights; etc.

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INADEQUATE PREFLIGHT PREPARATION AND/OR PLANNING

WHAT ARE THE HAZARDS OF NOT COMPLETING CERTAIN COCKPIT DUTIES?

Pilots who start one flight operation or procedure, and proceed to another operation before completing the first, may become involved in an accident simply because the first task was never completed. The following examples are typical:

Example 1.- A pilot of a multiengine airplane decides to check the operation of the crossfeed while taxiing from the ramp prior to takeoff. After placing the selector in the crossfeed position the pilot is distracted by a question from a passenger, another aircraft taxiing close by, or radio communications. The pilot intended to switch the fuel selectors back to the main fuel tanks after determining that the crossfeed was operating properly, but failed to do so because of the distractions.

Example 2.- Airplane "A" is on the downwind leg of the traffic pattern when airplane "B" squeezes in the pattern ahead of "A." The pilot of airplane "A" had started to perform the prelanding cockpit check when this distraction occurred. In a situation like this, unfortunately, some persons react with anger which sets the stage for a gear-up landing or a more serious accident.

INADEQUATE PREFLIGHT?

★ ATP Pilot -- Ran off the runway.
Remarks -- Movement of copilot's right rudder pedal obstructed by a whiskey bottle.

★ Private Pilot -- Collided with parked aircraft.
Remarks -- Did not remove right wing tiedown, started to taxi, tried to cut mixture control, but opened throttle.

HOW MIGHT AN INCOMPLETE PRETAKEOFF CHECK RESULT IN FUEL STARVATION?

Here is the way it happened to one pilot.

★ "An experienced private pilot flying his own airplane departed an airport with full fuel tanks. After a stopover of several hours at a nearby airport, the pilot hurriedly taxied to a runway for takeoff.

Airplane lost power at an altitude of approximately 50 feet on takeoff and settled back to surface. With only 437 feet of runway remaining, pilot was unable to stop, but chain link fence at field boundary turned the trick. Pilot was unable to recall position of fuel selector before takeoff, but noted that it was in OFF position after the accident. He stated that he had never turned fuel to the OFF position at the end of a flight."

This is an example of why a pilot should carefully check an airplane before each flight and not assume that it will remain just the same as it was on a previous flight. Many airports have people hanging around who enjoy climbing in airplanes, moving the controls, and flipping switches.

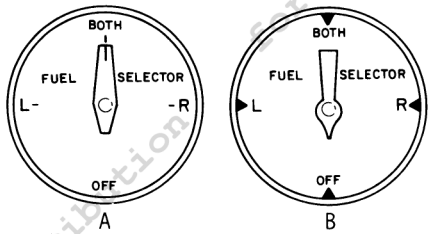
WHY DO MANY "FUEL STARVATION" ACCIDENTS OCCUR EVEN THOUGH THERE IS AMPLE FUEL ABOARD?

A common cause of engine failure is mismanagement of the fuel system. This happens frequently when the engine is fed fuel from one tank at a time.

Each year an alarming number of accidents result from pilots running a fuel tank dry. In their haste and anxiety to make an emergency landing, pilots are often back on the ground before realizing no attempt was made to switch to a tank containing fuel. In a recent year there were 59 accidents of this type.

The following accident excerpt illustrates the hazards of performing certain maneuvers while operating on one tank that contains a low level quantity of fuel.

★ "On a spiral descent from 7,500 feet engine quit and airplane landed in a field and hit a fence. Pilot had started flight with fuel only in left wing tank. The spiral down with left wing low caused the little remaining fuel to move away from tank opening to fuel line, which resulted in engine stoppage."



Being Familiar with Fuel Selector Valve "A" Could Lead to Trouble When Operating an Airplane Equipped with One Like "B"

FUEL STARVATION (Continued)

The pilot in command must always be alert and aware of the actions of other occupants of the airplane, as this fuel starvation accident reveals:

★ "The engine quit during climb out after takeoff and the pilot discovered the fuel had been turned off. His wife decided there was too much air blowing on her feet and used the fuel selector handle to turn off the cabin air vents. It worked! In less than a minute there was no air blowing on her feet."

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DOES FUEL EXHAUSTION HAVE THE SAME MEANING AS FUEL STARVATION?

No; fuel exhaustion means all the usable fuel aboard the aircraft has been consumed. Accidents such as these are of great concern in General Aviation, because they usually result from inadequate preflight preparation or planning and pilots not being familiar with the operating limitations of their equipment. There were 75 accidents attributed to fuel exhaustion in 1975. In recent years, some pilots operating in mountainous areas of western states have encountered fuel exhaustion before reaching their destination. Fuel exhaustion accidents resulted after they had been flying with 40-50 knot headwinds or had drifted off course in strong crosswinds. Some were operating at high altitudes without leaning the mixture, while others failed to refer to the Aircraft Cruise Performance charts and other data. For this reason, FAA written tests contain test items related to these subject areas.

BRIEF DESCRIPTION OF A TYPICAL FUEL EXHAUSTION ACCIDENT

★ "Engine quit because of fuel exhaustion 3 miles short of destination with forced landing in unsuitable terrain. Contributing factors were: (1) Improper flight planning, (2) relying on fuel gauges rather than manufacturer's fuel consumption figures, (3) overflying several suitable airports where additional fuel could have been obtained, (4) adverse weather conditions and strong headwinds."

IS THE PRACTICE OF RUNNING A FUEL TANK DRY BEFORE SWITCHING TANKS CONSIDERED A SAFE PROCEDURE?

No; some aircraft engine manufacturers recommend never running a fuel tank dry as a routine procedure. When the fuel selector remains on an empty tank which has run dry, the engine-driven fuel pump draws air into the fuel system and causes vapor lock. This is also true when an electric fuel boost pump is operated with the fuel selector on an empty tank. Fuel injection equipped engines, in particular, are vulnerable to vapor lock when the fuel selector is positioned on an empty tank.

BE ALERT, KNOW YOUR LIMITATIONS AND THE LIMITATIONS OF YOUR EQUIPMENT. LEARN FROM THE MISTAKES OF OTHERS AND AVOID SIMILAR ACCIDENTS.

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