

Mechanics: Check the engine control cables!

Improperly installed hardware or worn throttle and mixture cables can cause big problems

The problem

- Missing or incorrectly installed securing hardware at the connection of the carburetor or fuel servo can cause throttle and/or mixture cables to not function as intended.
- Original throttle and/or mixture cables that are worn or several decades old, as shown in figure 1, can ultimately fail due to wear or fatigue fracture or a combination thereof.
- Failure of throttle and/or mixture cables or issues with installation and securement of associated hardware can result in a partial or total loss of engine power or the inability to regulate engine power.



Figure 1. Worn throttle cables in need of replacement.

Related accidents

The NTSB has investigated several accidents involving a partial or total loss of engine power due to improperly installed securing hardware or worn throttle and/or mixture cables, including the following:

- The pilot of a Piper PA-28-140 airplane was practicing takeoffs and landings when the engine became unresponsive to throttle inputs, resulting in a forced landing onto a highway where the airplane was substantially damaged. Examination of the engine revealed that the carburetor throttle lever lock nut was only finger-tight, and its cotter pin was absent (see figure 2), which likely resulted in the throttle lever intermittently disengaging from the serrated throttle shaft when the pilot manipulated the throttle. **Partial loss of engine power**



Figure 2. Missing cotter pin and unsecured throttle lever locking nut.

could have been avoided if the mechanic had properly secured the throttle lever lock nut and replaced the missing cotter pin. ([WPR19LA065](#))

- A Cessna U206F airplane lost partial engine power while returning to the airport during a commercial sightseeing flight. The pilots were unable to regain full engine power. As the pilots retarded the throttle to idle, the throttle and about 2 ft of the throttle control cable came out of the control panel. The airplane sustained substantial damage during the forced landing onto a dirt road. A review of the airplane's maintenance logbooks revealed that the throttle cable had been installed more than 20 years before the accident; postaccident examination found that it had separated, as shown in figure 3. Although the airplane's maintenance manual suggested replacing the engine controls (including the throttle cable) at every engine overhaul, the operator had not replaced the accident throttle cable during the previous engine overhaul, which was completed 163 flight hours before the accident. **This accident might have been avoided if the throttle cable had been replaced during the last engine overhaul.** ([WPR17LA144](#))

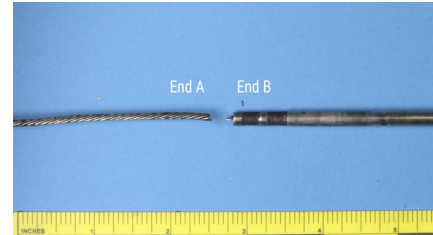


Figure 3. Separated throttle cable.

- A Robinson R-22B helicopter experienced a total loss of engine power while being maneuvered about 3,000 ft above ground level. The pilot entered an autorotation, and the helicopter touched down on a road, struck an unoccupied automobile, and was substantially damaged. Examination of the helicopter revealed that the mixture cable had broken and separated from the mixture bellcrank control arm located on the carburetor. The bellcrank was positioned near the idle/cutoff position, and the spring was inserted in the wrong direction. During an airframe overhaul that was performed about 16 flight hours before the accident, a mechanic's apprentice improperly rigged the mixture-to-bellcrank hardware, which prevented the mixture cable from moving freely and caused it to break (see figure 4). **Had the mechanic properly inspected the apprentice's work, he likely would have discovered the improperly rigged mixture control assembly that led to total loss of engine power.** ([WPR13LA222](#))

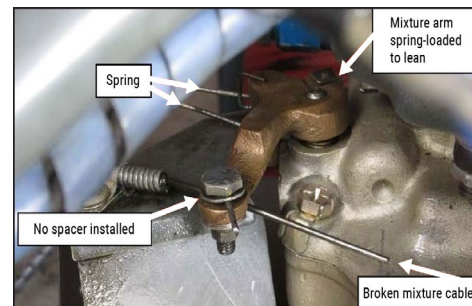


Figure 4. Incorrect installation of spring and hardware and broken mixture cable.

What can you do?

- Follow guidance in Federal Aviation Administration (FAA) Advisory Circulars (AC) on installing and inspecting engine controls, only when there are no manufacturer repair or maintenance instructions.
- Comply with instructions in applicable aircraft maintenance manuals and guidance in [FAA AC 43.13-1B, Appendix D, section \(d\) \(6\)](#).
- Familiarize yourself with [FAA AC 20-143](#), section 5. Inspection Procedure - General, and [FAA AC-20-106](#), section 3-4, Carburetor Inspection Points.
- Double check that securing hardware is in place.
- Replace engine control cables during engine overhaul.

- Remove throttle and/or mixture cables from their sheathing to inspect for corrosion every 100 hours or annually, in accordance with [FAA AC 20-106](#), and replace, if necessary.
- Inspect throttle and/or mixture cables as soon as practical after any report of resistance, binding, or sticking.
- Closely examine maintenance work in these areas, especially if you are supervising a less experienced maintenance technician.

Interested in more information?

- [FAA AC 43.13-1B Appendix D, section \(d\) \(6\)](#) contains acceptable methods, techniques, and practices for inspecting and repairing nonpressurized areas of civil aircraft.
- [FAA AC 20-143, section 5](#), provides guidance on properly inspecting, maintaining, and installing engine controls.
- [FAA AC-20-106, section 3-4](#), describes acceptable techniques and procedures for inspecting aircraft.
- [NTSB Safety Alert, SA-022](#), describes how to carefully follow maintenance and inspection procedures to help prevent aircraft accidents.

NTSB Safety Alerts can be accessed from the [Safety Alerts](#) page at www.nts.gov. For additional information on the NTSB investigations in this alert, access the [public docket](#) using the investigation numbers (NTSB Accident ID) cited above. Use the [CAROL Query](#) to search NTSB safety recommendations and investigations.

The NTSB's Aviation Information Resources web page, <https://www.nts.gov/air>, provides convenient access to NTSB aviation safety products.

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