



Designation: F3639 – 23

# Standard Guide for Automatic Flight Control System Technician<sup>1</sup>

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## 1. Scope

1.1 The purpose of this guide is to address the fundamental subject knowledge activities and functions for avionics professionals to be titled Automatic Flight Control System (AFCS) Technician.

1.2 This guide is the basis for the Automatic Flight Control System Technician (AFCS) certification, an endorsement to the Aircraft Electronics Technician (AET) certification. Candidates must be a certified AET to take the certification exam associated with this guide.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

F3060 Terminology for Aircraft

F3245 Guide for Aircraft Electronics Technician Personnel Certification

2.2 *FAA Standards:*<sup>3</sup>

FAA AC43.13-1B Acceptable Methods, Techniques, and Practices – Aircraft Inspection and Repair (with Change 1), 1998

FAA AC43.13-2B Acceptable Methods, Techniques, and Practices – Aircraft Alterations, 2008

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee F46 on Aerospace Personnel and is the direct responsibility of Subcommittee F46.02 on Avionics and Information Technology Endorsements.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from Federal Aviation Administration (FAA), 800 Independence Ave., SW, Washington, DC 20591, <http://www.faa.gov>.

FAA Federal Aviation Regulations for Aviation Maintenance Technicians

FAA-H-8083-30A Aviation Maintenance Technician Handbook – General, 2018

FAA-H-8083-31 Aviation Maintenance Technician Handbook – Airframe Volume 1, 2012

FAA-H-8083-31 Aviation Maintenance Technician Handbook – Airframe Volume 2, 2012

## 3. Terminology

3.1 See Terminology F3060.

3.2 See Guide F3245, Section 6 Core Competencies – Common Maintenance Practices, Fundamentals of On-Equipment Maintenance and Aircraft Fundamentals.

3.3 See Table 1 for knowledge level definitions relating to the education requirements for Automatic Flight Control System (AFCS) technicians.

## 4. Significance and Use

4.1 The guide is intended to be used to assess competencies of qualified individuals who wish to become certified as an Automatic Flight Control System technician through a program such as the National Center for Aerospace and Transportation Technologies (NCATT).

4.2 The guide is intended to be used in concert with a certification provider's structure and materials for management, exam delivery, and candidate preparation.

## 5. Test Knowledge Requirements

5.1 The following subject knowledge areas shall be assessed by levels (referenced in Table 1) of competency in the exam items.

5.2 *Risk Management*—Level 2 can determine and apply the following:

5.2.1 *Safety*—Can identify and apply the safety practices in the workplace in accordance with applicable standards and practices.

5.2.1.1 Reference AET standard for safety.

5.2.1.2 *Maintenance Considerations*—Can describe proper use and provide simple examples of safe practices when associated with the operational considerations (circuit breaker lockout and identifying collars, control locks, control pins and

**TABLE 1 Definition: Knowledge Levels**

Knowledge Levels	
LEVEL 1	A familiarization with the principal elements of the subject. Objectives: <ul style="list-style-type: none"> <li>• The applicant should be familiar with the basic elements of the subject.</li> <li>• The applicant should be able to give a simple description of the whole subject, using common words and examples.</li> <li>• The applicant should be able to use typical terms.</li> </ul>
LEVEL 2	A general knowledge of the theoretical and practical aspects of the subject. <b>An ability to apply that knowledge.</b> Objectives: <ul style="list-style-type: none"> <li>• The applicant should be able to understand the theoretical fundamentals of the subject.</li> <li>• The applicant should be able to give a general description of the subject using, as appropriate, typical examples.</li> <li>• The applicant should be able to use mathematical formulae in conjunction with physical laws describing the subject.</li> <li>• The applicant should be able to read and understand sketches, drawings and schematics describing the subject.</li> <li>• The applicant should be able to apply knowledge in a practical manner using detailed procedures.</li> </ul>
LEVEL 3	A detailed knowledge of the theoretical and practical aspects of the subject. <b>A capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner.</b> Objectives: <ul style="list-style-type: none"> <li>• The applicant should know the theory of the subject and interrelationships with other subjects.</li> <li>• The applicant should be able to give a detailed description of the subject using theoretical fundamentals and specific examples.</li> <li>• The applicant should understand and be able to use mathematical formulae related to the subject.</li> <li>• The applicant should be able to read, understand and prepare sketches, simple drawings and schematics describing the subject.</li> <li>• The applicant should be able to apply knowledge in a practical manner using manufacturer's instructions.</li> <li>• The applicant should be able to interpret results from various sources and measurements and apply corrective action where appropriate.</li> </ul>

rigging pins, control surface movement, electrical/electronic systems, electrostatic sensitive device protection, hydraulic system operation, personal safety practices, servo and anti-servo tabs, and tagging).

### 5.3 General Automatic Flight Control System Knowledge—

Level 1 understands and can describe the following:

5.3.1 Purpose and function of an autopilot system.

5.3.2 The various types of autopilot systems (attitude-based, rate-based, and 1, 2, and 3-axis systems).

5.3.3 Basic autopilot functions and features (roll hold/wing leveler, heading hold, altitude hold, and yaw damper).

5.3.4 Advanced AFCS functions and features (control wheel steering, automatic trim, autothrottle, altitude preselect, flight director, stability augmentation, and navigation following).

#### 5.3.5 Autopilot Modes:

5.3.5.1 Lateral Modes (heading hold, heading select, half-bank, and horizontal navigation).

5.3.5.2 Vertical Modes (altitude hold, altitude select, vertical speed, airspeed, vertical navigation).

5.3.5.3 Flight Director Mode.

5.3.5.4 Helicopter-Specific Modes (auto-hover, helicopter altitude hold, helicopter stability and protection, and radar altitude level-off).

5.3.5.5 Other Modes (autoland and autorecovery).

#### 5.3.6 Emergency, Caution, and Warning Systems:

5.3.6.1 Aural Alerts (tones, spoken phrases).

5.3.6.2 Visual Alerts (annunciators, flags, crew alerting system).

5.3.6.3 Disconnects (automatic, pilot override).

5.3.7 Common Test Equipment (air data, calibration, clutch adjustment, control friction, multimeter, navigation signal generator, and tensiometer).

5.4 System Components—Level 1 understands and can describe the following:

5.4.1 Describe and state the purpose, typical locations, and any considerations related to system components to include the following:

5.4.1.1 Sensing Elements (attitude direction indicator, course deviation indicator, horizontal situation indicator, attitude heading reference system, air data attitude heading reference system, rate gyro, turn and bank indicator, turn coordinator, altitude transducer).

5.4.1.2 Command Elements (flight controller/mode control panel, disconnect switch).

5.4.1.3 Computing Elements (main autopilot computer, flight guidance/flight director computer, yaw damper computer).

5.4.1.4 Output Elements (servos, capstans, actuators).

5.4.1.5 Feedback/Followup Elements (position sensors, followups, transducers).

5.5 Integration—Level 1 understands and can describe the following:

5.5.1 Main System Component Integration (analog/discrete logic versus digital databus interconnectivity).

5.5.2 Navigation Source Switching.

5.5.3 Radio Altimeter Integration.

5.5.4 Power Distribution.

5.5.5 Stick Pusher.

5.5.6 Stick Shaker.

5.6 Integration—Level 2 can determine and apply the following:

5.6.1 Describe how each element listed in 5.6 interacts with the automatic flight control system using block diagrams, wiring diagrams, and operational descriptions.

5.6.1.1 Global Navigation Satellite System (GNSS).

5.6.1.2 Navigation Aids (glide slope, localizer, very high frequency omnidirectional range, tactical air navigation system).

5.6.1.3 Autotrim System.

5.7 System Testing And Calibration—Level 1 understands and can describe the following: