approved by the FAA. The TCO must contain student enrollment prerequisites, detailed description of each lesson including standards and objectives, expected accomplishments and standards for each stage of training, and a description of the checks and tests used to measure a student's accomplishments. FAA-approved pilot school certificates must be renewed every 2 years. Renewal is contingent upon proof of continued high quality instruction and a minimum level of instructional activity. Training at an FAA certificated pilot school is structured. Because of this structured environment, the CFRs allow graduates of these pilot schools to meet the certification experience requirements of 14 CFR part 61 with less flight time. Many FAA certificated pilot schools have designated pilot examiners (DPEs) on their staff to administer FAA practical tests. Some schools have been granted examining authority by the FAA. A school with examining authority for a particular course or courses has the authority to recommend its graduates for pilot certificates or ratings without further testing by the FAA. A list of FAA certificated pilot schools and their training courses can be found in Advisory Circular (AC) 140-2, *FAA Certificated Pilot School Directory*.

FAA-approved training centers are certificated under 14 CFR part 142. Training centers, like certificated pilot schools, operate in a structured environment with approved courses and curricula, and stringent standards for personnel, equipment, facilities, operating procedures and record keeping. Training centers certificated under 14 CFR part 142, however, specialize in the use of flight simulation (flight simulators and flight training devices) in their training courses.

The overwhelming majority of flying schools in the United States are not certificated by the FAA. These schools operate under the provisions of 14 CFR part 61. Many of these non-certificated flying schools offer excellent training, and meet or exceed the standards required of FAA-approved pilot schools. Flight instructors employed by non-certificated flying schools, as well as independent flight instructors, must meet the same basic 14 CFR part 61 flight instructor requirements for certification and renewal as those flight instructors employed by FAA certificated pilot schools. In the end, any training program is dependent upon the quality of the ground and flight instruction a student pilot receives.

PRACTICAL TEST STANDARDS
Practical tests for FAA pilot certificates and associated ratings are administered by FAA inspectors and designated pilot examiners in accordance with FAA-developed practical test standards (PTS). [Figure 1-3] 14 CFR part 61 specifies the areas of operation in which knowledge and skill must be demonstrated by the applicant. The CFRs provide the flexibility to permit the FAA to publish practical test standards containing the areas of operation and specific tasks in which competence must be demonstrated. The FAA requires that all practical tests be conducted in accordance with the appropriate practical test standards and the policies set forth in the Introduction section of the practical test standard book.

It must be emphasized that the practical test standards book is a testing document rather than a teaching document. An appropriately rated flight instructor is responsible for training a pilot applicant to acceptable standards in all subject matter areas, procedures, and maneuvers included in the tasks within each area of operation in the appropriate practical test standard. The pilot applicant should be familiar with this book and refer to the standards it contains during training. However, the practical test standard book is not intended to be used as a training syllabus. It contains the standards to which maneuvers/procedures on FAA practical tests must be performed and the FAA policies governing the administration of practical tests. Descriptions of tasks, and information on how to perform maneuvers and procedures are contained in reference and teaching documents such as this handbook. A list of reference documents is contained in the Introduction section of each practical test standard book.

Practical test standards may be downloaded from the Regulatory Support Division's, AFS-600, Web site at **http://afs600.faa.gov**. Printed copies of practical test standards can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. The official online bookstore Web site for the U.S. Government Printing Office is **www.access.gpo.gov**.

FLIGHT SAFETY PRACTICES
In the interest of safety and good habit pattern formation, there are certain basic flight safety practices and procedures that must be emphasized by the flight instructor, and adhered to by both instructor and student, beginning with the very first dual instruction flight. These include, but are not limited to, collision avoidance procedures including proper scanning techniques and clearing procedures, runway incursion avoidance, stall awareness, positive transfer of controls, and cockpit workload management.

COLLISION AVOIDANCE
All pilots must be alert to the potential for midair collision and near midair collisions. The general operating and flight rules in 14 CFR part 91 set forth the concept of "See and Avoid." This concept requires that vigilance shall be maintained at all times, by each person operating an aircraft regardless of whether the operation is conducted under instrument
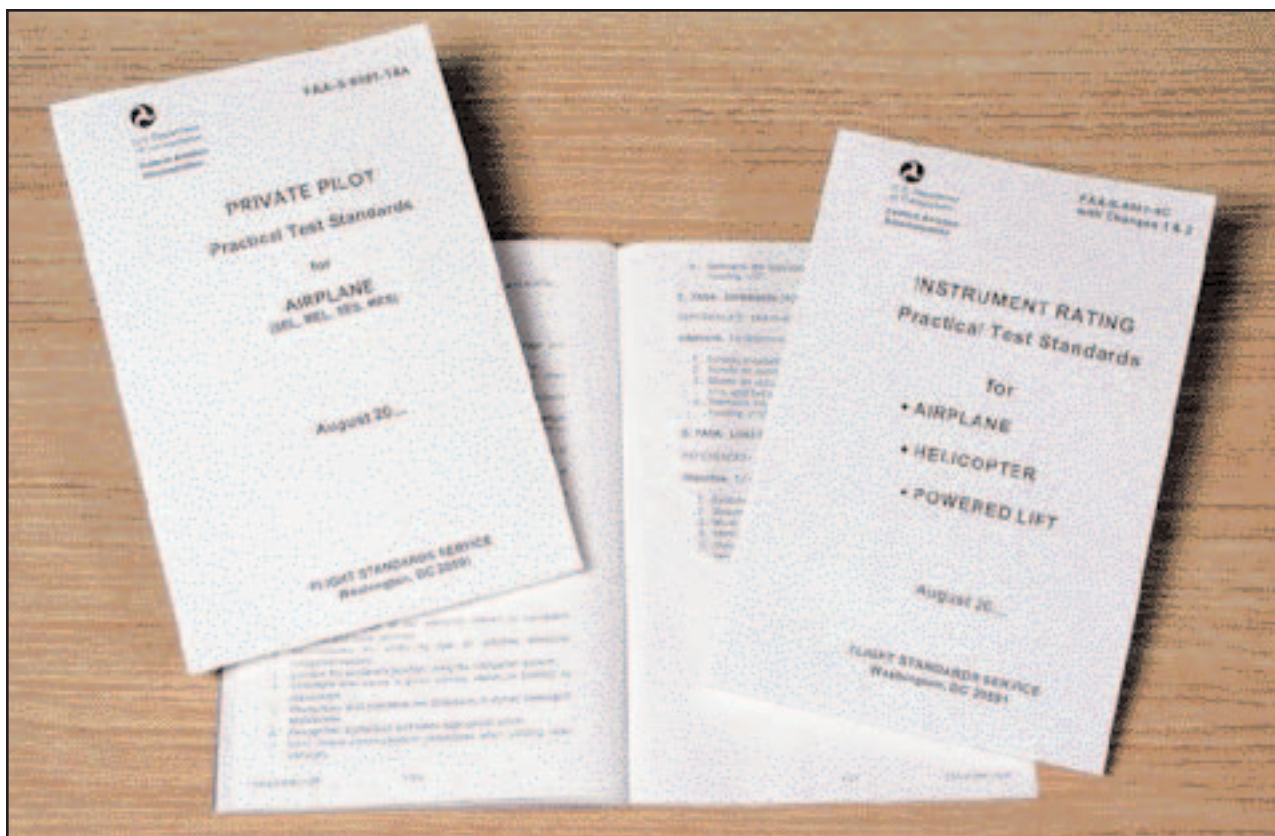
Figure 1-3. PTS books.

flight rules (IFR) or visual flight rules (VFR). Pilots should also keep in mind their responsibility for continuously maintaining a vigilant lookout regardless of the type of aircraft being flown and the purpose of the flight. Most midair collision accidents and reported near midair collision incidents occur in good VFR weather conditions and during the hours of daylight. Most of these accident/incidents occur within 5 miles of an airport and/or near navigation aids.

The "See and Avoid" concept relies on knowledge of the limitations of the human eye, and the use of proper visual scanning techniques to help compensate for these limitations. The importance of, and the proper techniques for, visual scanning should be taught to a student pilot at the very beginning of flight training. The competent flight instructor should be familiar with the visual scanning and collision avoidance information contained in Advisory Circular (AC) 90-48, *Pilots' Role in Collision Avoidance*, and the *Aeronautical Information Manual* (AIM).

There are many different types of clearing procedures. Most are centered around the use of clearing turns. The essential idea of the clearing turn is to be certain that the next maneuver is not going to proceed into another airplane's flightpath. Some pilot training programs have hard and fast rules, such as requiring two 90°

turns in opposite directions before executing any training maneuver. Other types of clearing procedures may be developed by individual flight instructors. Whatever the preferred method, the flight instructor should teach the beginning student an effective clearing procedure and insist on its use. The student pilot should execute the appropriate clearing procedure before all turns and before executing any training maneuver. Proper clearing procedures, combined with proper visual scanning techniques, are the most effective strategy for collision avoidance.

RUNWAY INCURSION AVOIDANCE

A runway incursion is any occurrence at an airport involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in a loss of separation with an aircraft taking off, landing, or intending to land. The three major areas contributing to runway incursions are:

•   Communications,

•   Airport knowledge, and

•   Cockpit procedures for maintaining orientation.

Taxi operations require constant vigilance by the entire flight crew, not just the pilot taxiing the airplane. This is especially true during flight training operations. Both the student pilot and the flight instructor need to be continually aware of the movement and location of

other aircraft and ground vehicles on the airport movement area. Many flight training activities are conducted at non-tower controlled airports. The absence of an operating airport control tower creates a need for increased vigilance on the part of pilots operating at those airports.

Planning, clear communications, and enhanced situational awareness during airport surface operations will reduce the potential for surface incidents. Safe aircraft operations can be accomplished and incidents eliminated if the pilot is properly trained early on and, throughout his/her flying career, accomplishes standard taxi operating procedures and practices. This requires the development of the formalized teaching of safe operating practices during taxi operations. The flight instructor is the key to this teaching. The flight instructor should instill in the student an awareness of the potential for runway incursion, and should emphasize the runway incursion avoidance procedures contained in Advisory Circular (AC) 91-73, Part 91 *Pilot and Flightcrew Procedures During Taxi Operations and Part 135 Single-Pilot Operations*.

STALL AWARENESS
14 CFR part 61 requires that a student pilot receive and log flight training in stalls and stall recoveries prior to solo flight. During this training, the flight instructor should emphasize that the direct cause of every stall is an excessive angle of attack. The student pilot should fully understand that there are any number of flight maneuvers which may produce an increase in the wing's angle of attack, but the stall does not occur until the angle of attack becomes excessive. This "critical" angle of attack varies from 16 to 20° depending on the airplane design.

The flight instructor must emphasize that low speed is not necessary to produce a stall. The wing can be brought to an excessive angle of attack at any speed. High pitch attitude is not an absolute indication of proximity to a stall. Some airplanes are capable of vertical flight with a corresponding low angle of attack. Most airplanes are quite capable of stalling at a level or near level pitch attitude.

The key to stall awareness is the pilot's ability to visualize the wing's angle of attack in any particular circumstance, and thereby be able to estimate his/her margin of safety above stall. This is a learned skill that must be acquired early in flight training and carried through the pilot's entire flying career. The pilot must understand and appreciate factors such as airspeed, pitch attitude, load factor, relative wind, power setting, and aircraft configuration in order to develop a reasonably accurate mental picture of the wing's angle of attack at any particular time. It is essential to flight safety that a pilot take into consideration this visualization of the wing's angle of attack prior to entering any flight maneuver.

USE OF CHECKLISTS
Checklists have been the foundation of pilot standardization and cockpit safety for years. The checklist is an aid to the memory and helps to ensure that critical items necessary for the safe operation of aircraft are not overlooked or forgotten. However, checklists are of no value if the pilot is not committed to its use. Without discipline and dedication to using the checklist at the appropriate times, the odds are on the side of error. Pilots who fail to take the checklist seriously become complacent and the only thing they can rely on is memory.

The importance of consistent use of checklists cannot be overstated in pilot training. A major objective in primary flight training is to establish habit patterns that will serve pilots well throughout their entire flying career. The flight instructor must promote a positive attitude toward the use of checklists, and the student pilot must realize its importance. At a minimum, prepared checklists should be used for the following phases of flight.

- Preflight Inspection.
- Before Engine Start.
- Engine Starting.
- Before Taxiing.
- Before Takeoff.
- After Takeoff.
- Cruise.
- Descent.
- Before Landing.
- After Landing.
- Engine Shutdown and Securing.

POSITIVE TRANSFER OF CONTROLS
During flight training, there must always be a clear understanding between the student and flight instructor of who has control of the aircraft. Prior to any dual training flight, a briefing should be conducted that includes the procedure for the exchange of flight controls. The following three-step process for the exchange of flight controls is highly recommended.

When a flight instructor wishes the student to take control of the aircraft, he/she should say to the student, "You have the flight controls." The student should acknowledge immediately by saying, "I have the flight controls." The flight instructor confirms by
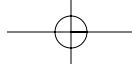
again saying, "You have the flight controls." Part of the procedure should be a visual check to ensure that the other person actually has the flight controls. When returning the controls to the flight instructor, the student should follow the same procedure the instructor used when giving control to the student. The student should stay on the controls until the instructor says: "I have the flight controls." There should never be any doubt as to who is flying the airplane at any one time. Numerous accidents have occurred due to a lack of communication or misunderstanding as to who actually had control of the aircraft, particularly between students and flight instructors. Establishing the above procedure during initial training will ensure the formation of a very beneficial habit pattern.