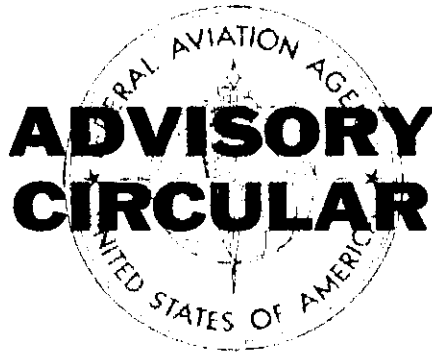


Federal Aviation Agency



AC NO: AC 90-18
AIR TRAFFIC CONTROL AND GENERAL OPERATIONS
EFFECTIVE : 10/21/64

SUBJECT : LARGE PROPELLER-DRIVEN AIRCRAFT TRAINING PROGRAM - GENERAL AVIATION

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1. PURPOSE. The Federal Aviation Agency has on numerous occasions been asked to assist executive operators in establishing a training program designed to upgrade pilot proficiency. This circular recommends areas of coverage for initial and recurrent training of general aviation pilots in large propeller-driven aircraft. It further outlines procedures for the executive operator to follow if he desires to designate a company check pilot.
 2. GENERAL.
 - a. The increased use of large propeller-driven aircraft, the ever-increasing complexity of aircraft systems, and the anticipated lowering of IFR approach minimums have resulted in the need for guidelines relative to initial and recurrent pilot training in these aircraft. We anticipate that both initial and recurrent training will be given by the manufacturer, professional training organizations, sales organizations, and executive operators. We believe this advisory circular will assist these organizations in establishing large propeller-driven aircraft training programs.
 - b. Although recurrent training and proficiency flight checks are presently not required by regulation, the complexity of modern large propeller-driven aircraft, together with the complex traffic system in which they are operated, makes such training highly desirable. This training becomes particularly important to many pilots since it usually provides their only opportunity to practice emergency procedures. Familiarity with emergency procedures is fundamental for safe operation of modern, complex aircraft.
 - c. There is no intent to imply here that the minimum number of hours suggested for training (Attachment 1, page 1) is adequate for all pilots. The time shown is based on training programs which have been conducted for initial and recurrent training in the specified aircraft.
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3. GROUND SCHOOL SUBJECTS FOR INITIAL AND RECURRENT TRAINING PROGRAMS.

- a. The following outline is primarily a checklist which may be used by training organizations in establishing training programs for initial and recurrent training on large propeller-driven aircraft. All subject areas and specific items are not necessarily applicable to the recommended training for each particular aircraft and no attempt is made to specify or relate subject matters to a particular aircraft. Inspectors qualified in the aircraft are available for counsel on problems in the establishing and conduct of a particular training program.
- b. The suggested items for coverage have been compiled from several sources of expert knowledge and experience in the large propeller-driven aircraft training field, including the training programs of several air carriers who have experienced considerable success in their training endeavors.

(1) Company Orientation and Policies.

- (a) Organizational structure
- (b) Issuance of flight manuals and equipment
- (c) Crew duties and responsibilities
 - 1 Preflight
 - 2 Inflight
 - 3 Postflight
 - 4 Emergencies
 - 5 Accidents
 - 6 Intoxicants
 - 7 Authority - pilot-in-command and second-in-command

(2) Civil Air Regulations, Civil Aeronautics Manuals, and Federal Aviation Regulations, as Applicable.

- (a) CAR/CAM 4b, Airplane Airworthiness. (Items pertaining to performance)
- (b) Special Regulations SR-422, Turbine Powered Transport Category Airplanes of SR-422 Current Design. (Items pertaining to performance)
- (c) Federal Aviation Regulations Parts 91, 61, and 67.
- (d) CAR/CAM 4a, Airplane Airworthiness. (Non-T Category)
- (e) CAR/CAM 9, Aircraft Airworthiness; Limited Category.

(3) Navigation.

- (a) The globe - size, shape, movement and time
- (b) Charts and limitations
- (c) Computer and its use
- (d) Basic principles of dead-reckoning navigation
- (e) Celestial navigation
- (f) Radio navigation - Loran and radar, Doppler
- (g) Single-heading navigation
- (h) Pressure pattern flight planning
- (i) Emergency aids to navigation - VHF-DP and HF-DP
- (j) Navigational publications - Flight Information Manual, Airman's Guide, NOTAMS, etc.
- (k) Flight plans and procedures
- (l) En route requirements and procedures
- (m) Continental and oceanic control
- (n) Traffic control, ADIZ, restricted and prohibited areas
- (o) Fuel requirements and cruise control
- (p) Approach procedures and plates - ASR, PAR, ILS, DME, LF/MF, VOR, ADF
- (q) Approach and landing minimums

(4) Meteorology.

- (a) Physics and properties of the atmosphere
- (b) Air mass analysis
- (c) Adiabatic processes
- (d) Temperature - Dewpoint and humidity
- (e) Frontal weather systems
- (f) Pressure systems
- (g) Precipitation - Rain, freezing rain, snow, sleet, hail, and ice
- (h) Clouds and fog
- (i) Winds - Including jet stream
- (j) Turbulence and adverse weather - Thunderstorms, tornadoes and hurricanes, clear air turbulence
- (k) Upper air soundings
- (l) U.S. Weather Bureau reports and forecasts
- (m) Interpretation of weather data
- (n) Flight principles of pressure patterns
- (o) Pilot inflight weather reports
- (p) High altitude weather
- (q) Interpretation of weather - Prognostic charts

(5) Communications.

- (a) Crew communication
 - 1 Normal flight

2 Emergency

- (b) Air traffic control clearance copying
- (c) Continental morse code copying practice

(6) Air Traffic Control.

- (a) Types of clearances and flight plans
- (b) ADIZ DVFR clearances and reports
- (c) Types of approaches and holding procedures
- (d) Protection afforded
- (e) Acceptable tolerances
- (f) Flight plan cancellations
- (g) Search and rescue protection
- (h) Transponder - IFF usage
- (i) Weather radar and traffic control radar
- (j) Manuals and publications
 - 1 Flight Information Manual
 - 2 Airman's Guide
 - 3 Air Traffic Control Procedures Handbook, AT P 7110.1A

(7) Emergencies.

- (a) Determination and declaration
- (b) Codes and signals
- (c) Available aids and assistance
- (d) Drills and procedures for:
 - 1 Ditching
 - 2 Aircraft evacuations
 - 3 Firefighting
 - 4 Smoke evacuation
 - 5 Fuel dumping
 - 6 Hydraulic failure
 - 7 Gear extension and retraction failure
 - 8 Intentional gear collapse
 - 9 Decompression
 - 10 Navigational equipment failure

(8) Operations.

- (a) Aircraft manuals and charts
- (b) Weight and balance
- (c) Flight planning and dispatching
- (d) Ground handling and passenger protection
- (e) Cruise control - Maximum range procedures
- (f) Ferry flights
- (g) High altitude physiology
- (h) Turbulence penetration
- (i) Deicing and anti-icing procedures

(9) Flight Manual.

- (a) Certificate limitations
- (b) Normal procedures
- (c) Emergency procedures
- (d) Performance data

(10) Equipment.

- (a) General description
- (b) Performance and limitations
- (c) Powerplants
- (d) Systems
 - 1 Fuel
 - 2 Oil
 - 3 Hydraulic
 - 4 Pneumatic
 - 5 Water injection
 - 6 Heating
 - 7 Cooling
 - 8 Pressurization
 - 9 Autopilot
 - 10 Radio and radar
 - 11 Electrical
 - 12 Vacuum
 - 13 Ignition
 - 14 Oxygen
 - 15 Induction
 - 16 Ice elimination
 - 17 Instruments
 - 18 Control
- (e) Oxygen equipment
- (f) Emergency equipment
- (g) Emergency systems and procedures

(11) Desirable Familiarization Assignments.

- (a) Airport traffic control tower
- (b) Air route traffic control center
- (c) En route line flights for initial training
- (d) Maintenance facilities
- (e) U.S. Weather Bureau

4. FLIGHT TRAINING MANEUVERS FOR INITIAL, TRANSITION, AND RECURRENT TRAINING.

- a. The maneuvers listed in this advisory circular will, if properly presented and mastered, prepare the pilot for the required type rating or the recommended proficiency check.

- b. All maneuvers are not pertinent to all aircraft. Only those applicable need be included in the specific curriculum.
- c. A safe operational altitude should be established for each maneuver.
- d. The use of a checklist is recommended.
- e. The asterisks indicate those maneuvers for which an instrument hood should be utilized after VFR proficiency has been attained.
- f. The curriculum should include at least the following:
 - (1) Briefing session
 - (2) Preflight inspection of the aircraft
 - (3) Engine starting
 - (4) Taxiing
 - (5) Takeoffs
 - (a) Normal
 - (b) Crosswind
 - (c) Night
 - (d) Aborted
 - (e) Simulated engine failure
 - 1 Takeoffs at the authorized maximum takeoff weight (or as near thereto as practicable) with simulated failure of the critical engine; such failure to occur as closely as practical to the critical engine speed V_1 and climbout as closely as possible to takeoff safety speed V_2
 - (f) *Takeoffs with hood used after becoming airborne but prior to reaching 100 feet altitude
 - (g) Noise abatement procedures
 - (6) *Climb and climbing turns
 - (7) *Maneuvers - Minimum Speed. Minimum airspeed for maneuvering should be a precomputed airspeed ten knots above stall or buffet speed, or stick shaker speed as related to aircraft gross weight configuration and with the flaps in takeoff, approach, and landing position in straight and level flight and in turns.
- g. *Approach to Stalls. Approaches to stalls should be accomplished from straight flight and turns with gear and flaps in clean, takeoff, approach, and landing configuration. Approaches to stalls with asymmetric power should be included in the training program. Prior to executing this maneuver the stall speed, buffet speed, or stick shaker speed should be determined as related to aircraft gross weight, configuration, and altitude. This maneuver is an approach to a stall. It is not recommended that the aircraft be allowed to stall, shake or slow down below the initial buffet or stick shaker speed any more than is necessary for recognition of stall warning.

- h. *Rapid Descent and Pullup. A minimum descent of 1,000 feet is recommended to provide time for stabilization of airspeed and rate of descent.
- i. Engine-Out Procedures and Familiarization.
- (1) *Inflight engine shutdown
 - (2) *Manual feathering of propeller
 - (3) *Autofeathering of propeller
 - (4) *Restarting after feathering
 - (5) In two-engine aircraft, simulate engine failure during:
 - (a) Takeoff
 - (b) Climb
 - (c) Cruise
 - (d) Approach
 - (e) Go-around
 - (f) Landing
 - 1 The use of reverse thrust should be practiced on engine-out landings in accordance with aircraft manual when aircraft is so equipped.
 - (6) In four-engine aircraft, simulate failure of two engines with gear and flaps in:
 - (a) En route climb configuration
 - (b) Approach configuration
 - (c) Landing configuration
 - (7) The following maneuvers and procedures should be conducted:
 - (a) At the authorized maximum takeoff weight (or as near thereto as practicable) takeoff with simulated failure of the critical engine; such failure to take place as closely as possible to the critical engine failure speed V_1 and climbout as closely as practical to takeoff safety speed V_2 ,
 - (b) At the authorized maximum landing weight (or as near thereto as practicable) flight in four-engine airplanes with the most critical engine combination of two engines inoperative, or operating at zero thrust,
 - (c) At the authorized maximum landing weight (or as near thereto as practicable) in the landing configuration, accomplish a go-around at a safe altitude with the critical engine inoperative, or operating at zero thrust.
- j. Speed Brake. Proficiency in all use of speed brakes with particular emphasis on effectiveness of high speed.
- k. *Elevator Trim.
- (1) Procedures to be used for runaway elevator trim

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- (2) Procedures to be used for landing and "go-around" with stuck elevator trim

1. Overspeed Warning.

- (1) Overspeed warning system
- (2) Any other method used to warn the pilot of approach to the high speed limit

m. *Recovery from Unusual Attitudes. The aircraft should be placed in attitudes unusual to normal flight and the recovery made to straight and level flight. Such attitudes may be one of the various combinations of noseup, nosedown, power-on, power-off, and 45° bank right or left. Particular care should be taken to preclude allowing the airplane to exceed any placarded speed, designed load, or any other limitations in the flight manual.

n. *Emergency Descent. Maneuver should be terminated as soon as feasible after the proper configuration and preselected airspeed have been established. Instruction and practice should be included in both the low drag - high speed and maximum drag - low speed configurations.

o. *Traffic Control Procedures.

- (1) Area departure
- (2) Holding procedures - high and low altitudes
- (3) Proper use of radio
- (4) Airport traffic patterns

p. *Instrument Approach, Missed Approach, and Orientation Procedures for ILS, VOR, ADF, LFR, DME, PAR, ASR, TACAN.

- (1) Instruction and practice in the conduct of instrument approaches using each of the above facilities to the lowest landing minimum authorized.
- (2) Use of autopilot, approach coupler, flight director, or integrated flight instrument systems down to the lowest landing minimum for which pilot and equipment are eligible.
- (3) Instruction in procedures to be followed in the event any part of the system becomes inoperative.

q. Landings.

- (1) Normal
- (2) Night
- (3) Crosswind
- (4) Zero flap
- (5) Maneuvering to landing with simulated failure of:

- (a) One engine on two-engine aircraft
- (b) Two engines, same side on four-engine aircraft
- (c) Any combination of two engines on three-engine aircraft
- (6) Maneuvering to a landing under circling landing minimum conditions
- (7) Aborted approaches - go-arounds
- (8) Noise abatement procedures for landing

r. Systems Use.

- (1) Anti-icing
- (2) Deicing
- (3) Pressurization and air conditioning
- (4) Fuel and oil
- (5) Cockpit and aircraft lighting
- (6) Navigational and communication
- (7) Flight instrumentation
- (8) Hydraulic - pneumatic
- (9) Electrical
- (10) Control
- (11) Ignition
- (12) Oxygen
- (13) Fire control

s. Inflight Emergency Procedures. Emphasis should be placed on analysis of emergency before resorting to emergency action.

- (1) Powerplant fire
- (2) Heater and cargo compartment - fire detector and fire-smoke removal
- (3) Powerplant failure
- (4) Cabin fire-smoke removal
- (5) Flight instrument power failure
- (6) Electrical fires and failures
- (7) Pneumatic failure
- (8) Hydraulic system failures
- (9) Boost off flight procedures
- (10) Emergency decompression
- (11) Fuel dumping
- (12) Navigation equipment failure
- (13) Over-gross landing procedure
- (14) Weather emergencies
 - (a) Simulated icing
 - (b) Instruction on light and heavy icing procedures
 - (c) Instruction on procedures for flying in turbulence

t. Ground Emergencies.

- (1) Emergency evacuation
- (2) Brake fire
- (3) Use of emergency brake
- (4) Engine and fuselage fires

- (5) Battery overheat
- (6) Ditching drill

5. COMPANY CHECK PILOT.

- a. Executive aircraft operators are encouraged to establish programs for recurrent flight training and proficiency checking of their pilots. Some operators may desire to contract with professional training organizations or the manufacturer for this training and proficiency checking; others may wish to establish their own programs. If the operator establishes such a program and selects a pilot in its organization to act as its company check pilot, an FAA operations inspector will, if requested, cooperate by counseling the selected pilot on methods and procedures used in the conduct of proficiency checks. Also, if the operator desires, the inspector will conduct a proficiency check of the selected pilot and observe one or more flight checks given by him. When satisfied that the company-selected check pilot understands and is skilled in methods and procedures for the conduct of proficiency checks, the inspector will so advise the operator in writing.
- b. Several operators utilizing like aircraft may desire to establish a cooperative training program and select a member pilot as a check pilot. An FAA operations inspector will cooperate in the same manner as outlined in paragraph 5.a. above to assist in this program.
- c. When an operator initiates such a program, the personality, experience, and skill of the selected pilot should be carefully evaluated. Experience standards have been established for check pilots who perform similar duties in other segments of the aviation industry. A review of these standards suggests at least the following:
 - (1) A commercial pilot's certificate with instrument rating and type rating in the aircraft utilized.
 - (2) 100 hours pilot-in-command in the type of aircraft in which he will conduct proficiency checks.

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FAA Advisory Circular AC 90-18
Large Propeller-Driven Aircraft Training Program - General Aviation
Dated 10/21/64

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George S. Moore
Director
Flight Standards Service

ATTACHMENT 1. SUGGESTED MINIMUM HOURS OF TRAINING

AC 90-18
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INITIAL

RECURRENT TRAINING
(or six-month check)

Operational
Ground School
in
Conjunction
with Flight

Systems Ground School

Flight

Ground School

Flight

*PC

**2C

PC 2C

PC 2C

PC 2C

	*PC	**2C		PC	2C	PC	2C	PC	2C
Convair 240/340/440	60	60	20	15	10	16	16	Recurrent flight training to be conducted as necessary to satisfactorily pass six-month proficiency check.	
Allison Convair	80	80	20	15	10 (5 if 240/ 340/440 qualified)	20	20		
Martin 202/404	60	60	20	15	10	16	16		
Grumman Gulfstream	80	80	20	15	10 (or 10 + 5 simula- tor)	20	20		
Fairchild F-27	80	80	20	15	10	20	20		
Douglas DC-3	40	40	20	10	6	16	16		
Douglas DC-4	60	60	20	15	10	16	16		
Viscount Douglas DC-6/7	80	80	20	15	10	20	20		
Lockheed (Lodestar) Learstar, PV1	40	40	20	10	6	16	16		
Lockheed 188	120	120	40	20	10	24	24		
Howard 500	60	60	20	15	10	20	20		

*PC - Pilot-in-command
**2C - Second-in-command

