Flight Advisor Corner by Hobie Tomlinson

August 2012 **Flying Multi-Engine Aircraft (Pt. III)**

Continuing our series on flying FAR Part 23 (CFR 14, Chapter 1, Subchapter C, and Part 23) certified, small multi-engine airplanes, we will now begin looking at some of the issues involved in a multi-engine transition course and then start going through a typical General Aviation Manufactures Association (GAMA) standard format Airplane Flight Manual (AFM) issued for FAR Part 23 certificated airplanes.

TECNAM'S New P2006T M/E Trainer

(Two, Liquid Cooled, Rotax 912S3 Engines producing 98 HP each)

AirVenture 2012 @ Oshkosh, WI. – (MTOW 2,599 Lbs.) ***Hobie Tomlinson Image***

FAR Part 23 Airworthiness Standards for normal, utility, aerobatic, and commuter category airplanes came into existence with the conversion from the old Civil Air Regulations (CAR) Part 3 to the current Federal Aviation Regulations (FAR) Part 23 on February 1, 1965. Aircraft, which were initially certified under the old CAR 3, were "grandfathered in" and later versions can still carry CAR 3 certification. Some manufacturers certified later variants of their aircraft under FAR part 23 and these aircraft

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carry a dual CAR 3 / FAR Part 23 certification. Aircraft certified after the implementation of FAR Part 23 are certified under just Part 23.

CAR 3 certified aircraft relied primarily on aircraft placards to convey operational information to the pilots. Initially, there was little other published information. Aircraft which were used by the military, both during and after WWII, had government operation manuals developed for the flight crews. Aircraft Manufacturers began publishing operating manuals for their civil aircraft after WWII; although, the earlier ones were very sparse by modern standards. These gradually evolved into "Owner's Manuals" in the 1950s and beyond and were the ancestor of the current AFMs. Some examples of small, multi-engine aircraft, which are certified under the old CAR 3, are the Hawker/Beechcraft D18S (Twin Beech), the Cessna 310N, and the Piper PA23-250C (Aztec). For CAR 3 certified aircraft, additional information on their operating limitations may be obtained by accessing the Type Certificate Data Sheets located at the following FAA Resource Center:

http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgMakeModel.nsf/MainFrame?OpenFrameSet

When FAR Part 23 came into existence on February 1, 1965, Pilot Operating Handbooks (POH) were established by the manufacturers to replace the older documents. These were later standardized by the General Aviation Manufacturer's Association (GAMA) which held its formal organizational meeting on January 2, 1970 in Washington, DC. Founded from the Aerospace Industry Association of America's Utility Aircraft Council, the association's mission is "To Foster and Advance the General Welfare, Safety, Interests and Activities of General Aviation."

In February 1977, the FAA accepted GAMA Publication 1, "*Specification for Pilot Operating Handbooks"* (POHs). This publication became the standard for development of POHs by the general aviation community. This first publication was followed closely thereafter by GAMA's "*Specification for Manufacturer's Maintenance Data Handbooks"* for aircraft maintenance technicians (AMTs), which was published in early 1978. Thus, the POH became the FAA Approved Airplane Flight Manual (AFM) for aircraft certified under FAR Part 23.

Transition Aircraft such as the Hawker/Beechcraft BE-58 (Baron), Cessna 310R, and Piper PA-31 (Navajo) carry dual certification under both the old CAR 3 and the new FAR Part 23, while later aircraft such as the Hawker/Beechcraft BE-76 (Duchess) and Piper PA-44 (Seminole) were originally certified under the New FAR Part 23. Very Light, Multi-Engine Jet Aircraft such as the Cessna 525 (CJ Series) and Eclipse Aerospace, Inc. EA500 are also certified under FAR Part 23.

The Diversity of Aircraft now being certified under FAR Part 23 far exceeds anything that was imagined when FAR Part 23 came into being on February 1, 1965. This is leading the FAA to consider a rewrite of FAR Part 23 to include the technological advances employed by the new types of aircraft which are now being presented for

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certification under FAR Part 23. The current budget realities of the FAA will certainly hinder this project, but I think it is the direction in which the FAA would like to proceed.

The Pilots Operating Handbooks (POHs) / FAA Approved Airplane Flight Manuals (AFMs) are the starting place for beginning a Multi-Engine transition course. Whenever we look at Aviation Safety, Training, or Proficiency, we not only want to consider the relevant Federal Aviation Regulations but also look at the Industry's "Best Practices" on the subject. Because of the high cost of operating these type airplanes and the risk exposure caused by improper performance of simulated (or real) emergency procedures, it is very important to start each flight training period with a solid knowledge of Aircraft Systems, Aircraft Performance and Limitations, and Aircraft Operating Procedures (Normal, Abnormal, and Emergency). It is also very important for the instructor to provide and use a well-defined flight lesson profile as well as providing a good safety briefing.

Industry "Best Practices" in training is to start with a through Ground School. It then moves though a Cockpit Procedures Trainer (CPT), the Simulator, and finally concludes with training in the Aircraft. With turbojets, which usually have a Level D, full flight simulator (FFS) available, all flight training – including the certification flight test – is completed in the simulator. Simulators allow emergency procedures to be actually performed without the associated risk of performing those maneuvers in the aircraft. Thus all new pilots to that particular type of aircraft are fully certified before they ever set foot in the real aircraft.

Aircraft Training is then usually comprised of 25 hours of supervised (i.e. "mentored") flying under the tutelage of a certified Instructor/Evaluator and/or Check Airman. Pilots receiving their first turbojet type rating in a simulator (and who do not meet the prerequisite experience requirements for an initial simulator type rating) will need to log 25 Hrs Initial Operating Experience (IOE) performing the duties of a PIC under the supervision of a qualified Pilot in Command (PIC). This must occur before they are allowed to apply for removal of the Second in Command (SIC) limitation which will be placed on their new type rating – 14 CFR Part 61.64(f) (2) & (g).

Small, Piston Multi-Engine Airplanes do not have full flight simulators available because of the extreme cost of these devices, which cannot be justified in this segment of the training market. However, a new generation of simulators is becoming available from both Redbird and Fresca. The top end of these devices resides in the $100K range and includes accurate cockpit layouts, fully functioning systems, excellent visuals, control loading (accurate tactile feedback to simulator control inputs), and even motion.

These Light Aircraft Simulators are fully FAA certified as either Advanced Aviation Training Devices (AATDs) or Level 4 thru 6 Flight Training Devices (FTDs). They are indeed very impressive and effective training devices; however, their cost still limits their use to high volume training centers, usually Aviation Colleges. Even if you are already rated, some training time in these devices would be highly beneficial should the opportunity ever present itself.

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The Training Course Outline (TCO) for the typical multi-engine transition course will thus assume a simulator is not available and will use the aircraft. It will start out with a thorough ground school course on the aircraft, using the AFM. This will include Aircraft General Items, Aircraft Limitations, Normal, Abnormal, and Emergency Procedures (Including the Applicable Flight Profiles), Aircraft Performance (Including Weight and Balance Procedures), Aircraft Systems (Including any Aircraft Aftermarket Modifications in the AFM Supplement Section) and the Handling, Servicing and Maintenance responsibilities of the Pilot.

The Aircraft Itself will be used as a Cockpit Procedures Trainer while sitting static on the ground. The aircraft is powered by a ground power unit and all systems, which can be safely operated on the ground, are used in the context of a simulated flight profile. This is an excellent training procedure in that it develops muscle memory, proper flow procedures and allows systems use/training to be integrated into a typical flight profile. At the completion of this training the student should know four things about every instrument, switch, or control in the cockpit.

These four things are as follows:

- Where it is located – Can I touch it without looking?
- What does it do – Which aircraft system is it a part of?
- When do I use it – What phase of flight or system operation requires its use?
- What do I do if it doesn't work – What is the backup (alternate) method to perform this function?

Once Adequate PTS Knowledge is obtained, the actual flight training will commence. I usually recommend the first flight be used as a diagnostic flight evaluation with an unfamiliar student. This consists of a normal Aircraft Checkout/Flight Review type profile to assess what the student's underlying ability level is. If the level of their underlying ability proves to be inadequate for entry into a multi-engine transition course, I have sometimes suggested returning to a single engine aircraft to do the required remedial training. This solution is a lot cheaper for a student who is trying to manage the high costs of a multi-engine transition course. If cost is not a factor, and the individual wants to do the required remedial training in the multi-engine aircraft, we press on. This situation typically presents itself with students who have been flying for several years since their last rating and have allowed their proficiency level to significantly degrade. It can also occur with someone who has received poor quality initial training to begin with, especially a person who received much unstructured and airplane/airport specific training in their initial course. *Getting students to unlearn bad habits is one of the toughest tasks any flight instructor is ever faced with!* (i.e. Remember Primacy?)

The GAMA Format AFM will be in the following format:

- Section I . . . . . .General
- Section II . . . . . Limitations

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- Section III . . . . . Emergency Procedures
- Section IV . . . . . Normal Procedures
- Section V . . . . . Performance
- Section VI . . . . . Weight and Balance/Equipment List
- Section VII . . . . . .Systems Description
- Section VIII . . . . . Handling, Servicing, and Maintenance
- Section IX . . . . . Supplements
- Section X . . . . . Safety Information

Before Starting our discussion of the AFM, I want to discuss the subject of Required Equipment (14 CFR Part 91.205) and Minimum Equipment List (14 CFR Part 91.213), as I find it one of the least known and/or understood sections of Part 91. Should you be fortunate enough to be transitioning to a non-piston (i.e. turboprop or turbojet) powered aircraft, this section of the FAR requires some special attention. Incidentally, this section equally applies to both single engine and multi-engine aircraft.

14 CFR Part 91.213 (Inoperative Instruments and Equipment) states the following:

a) Except as provided in paragraph (d) of this section, no person may take off an aircraft with inoperative instruments or equipment installed unless the following conditions are met: (*This means that otherwise, everything installed in/on the aircraft must be operating properly for a legal take off to commence*.)

1) An approved **Minimum Equipment List (MEL)** exits for that aircraft. (*This means that the Aircraft Manufacturer must have obtained and provide you with an FAA approved **Master Minimum Equipment List, MMEL,** for your type aircraft.)*

2) The aircraft has within it a **Letter of Authorization (LOA),** *issued by the FAA Flight Standards District Office (FSDO)* having jurisdiction over the area in which the operator is located, authorizing operation of the aircraft under the MEL. The letter of authorization may be obtained by written request of the airworthiness certificate holder. *(This means that you, as the aircraft owner/operator, must request this LOA from your local FAA FSDO.)* The Minimum equipment list and the letter of authorization constitute a supplemental type certificate for the aircraft.

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Note: The owner/operator must use the MMEL provided by the aircraft manufacturer to create a "tailored" MEL which is specific to the installed equipment in your particular S/N aircraft. This "tailored" MEL is then submitted to your local FSDO along with a letter requesting approval to use your "tailored" MEL. When your local FSDO approves your "tailored" MEL, they will then issue you a letter of authorization to use your specific MEL. *(Your specific MEL and this letter of authorization must then reside in the aircraft.)*

3) The Approved MEL must:

   i. Be prepared in accordance with the limitations in paragraph (b) of this section.

   ii. Provide for the operation of the aircraft with the instruments and equipment in an inoperable condition.

4) The aircraft records available to the pilot must include an entry describing the inoperable instruments and equipment.

5) The aircraft is operated under all applicable conditions and limitations contained in the MEL and the letter authorizing the use of the list.

b) The following instruments and equipment may not be included in a MEL:

1) Instruments and equipment that are either specifically or otherwise required by the airworthiness requirements under which the aircraft is type certificated and which are essential for safe operations under all operating conditions. *(Typically the Manufacturer's MMEL complies with this requirement.)*

2) Instruments and equipment required by an airworthiness directive (AD) to be in operable condition unless the AD provides otherwise.

3) Instruments and equipment required for specific operations by this part. *(i.e. Mode C transponder for Class A, B or C airspace, deicing equipment for flight in forecast icing conditions and/or Radar for operations in areas of predicted convective weather, etc.)*

c) A person authorized to use an approved MEL issued for a specific aircraft under subpart K or this part, part 121, 125, of 135 of this chapter must use that MEL to comply with the requirements of this section.

d) Except for operations conducted in accordance with paragraph (a) of (c) of this section, a person may takeoff an aircraft in operations conducted under this part *(FAR Part 91)* with inoperative instruments and equipment without an approved

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MEL provided: *(Note: This is the exemption from a MEL requirement for Piston-powered aircraft..)*

1) The flight operation is conducted in a –

    i. Non-turbine powered *(i.e. Piston)* airplane for which a MMEL has not been developed *(by the aircraft manufacturer)* or,

    ii. Non-turbine powered small airplane *(i.e. Maximum Takeoff Gross weight of 12,500 pounds or less)* for which a MMEL has been developed, but a Letter of Authorization has not been obtained from the controlling FSDO. *(i.e. either a "tailored" MEL has not been submitted to the local FAA FSDO by the owner/operator or a LOA has not been received.)*

2) The inoperative instruments and equipment are not –

    i. Part of the VFR-day type certification instruments and equipment prescribed in the applicable airworthiness regulations under which the aircraft was type certificated *(i.e. CAR 3 or FAR Part 23).*

    ii. Indicated as required on the aircraft's equipment list, or on the Kinds of Operations Equipment List for the kind of flight operation being conducted.

    iii. Required by FAR Part 91.205 *(i.e. Visual-Flight Rules – Day, Visual-Flight Rules – Night, and Instrument Flight Rules)* or any other rule of this part for the specific kind of flight operations being conducted. *(i.e. ATC transponder and altitude reporting equipment and use requirements of 14 CFR Part 91.215)*

    iv. Required to be operational by an airworthiness directive (AD)

3) The Inoperative instruments and equipment are –

    i. Removed from the aircraft, the cockpit control placarded *("Removed from Aircraft")* and the maintenance recorded in accordance with 14 CFR Part 43.9; or

    ii. Deactivated and placarded "Inoperative." If deactivation of the inoperative instrument or equipment involves maintenance, it must be accomplished and recorded in accordance with 14 CFR Part 43; and

    iii. A determination made by a pilot, who is certificated and appropriately rated under Part 61 of this chapter, or by a person

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who is certified and appropriately rated to perform maintenance on the aircraft, that the inoperative instruments or equipment does not constitute a hazard to the aircraft.

An aircraft with inoperative instruments *or equipment as provided in paragraph (d) of this section is considered to be in a properly altered condition acceptable to the Administrator*.

e) Notwithstanding any other provision of this section, an aircraft with inoperable instruments or equipment may be operated under a special flight permit *(i.e. "Ferry Permit")* issued in accordance with 14 CFR, Part 21.197 and 21.199.

This looks like a good place to break for this month. Next month we will continue with the series by delving into the FAA Approved Airplane Flight manual.

The rather famous thought for this month is as follows: ***"We cannot solve our problems with the same thinking we used when we created them." – Albert Einstein***

So until next month, be sure to **"Think Right to FliRite!"**

Final "Transport Category" Piston Twin – The Howard 500

AirVenture 2012 @ Oshkosh, WI. – (350 MPH Cruise / 103 MPH Stall / MTOW 35,000 Lbs.)
Hobie Tomlinson Image

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