



METHODOLOGY OF PRACTICAL TRAINING FOR PILOTS ON FLIGHT SIMULATOR BITD ME

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Abstract. The main aim of this article was to create a special training methodology for the Beechcraft Baron BE-58 two-engine air simulator Elite S-612 BITD (ME). The paper contains a basic description of the simulator. The following is a complete description of simulator, navigation, and engine instruments, their use and setup. For the practical part, a complete training syllabus adapted to the simulator was created, and practical model exercises based on real flight exercises were developed and created. The pilot thus gets complete preparation for IFR flying on a real airplane.

Keywords: Flight simulator, flight training on simulator, instrument flight rules, methodology of practical flight training, BITD ME

1. INTRODUCTION

The Faculty of Aeronautics has two flight simulators for two different types of airplanes: Cessna 172 RG and Beechcraft Baron BE-58. Thanks to the innovations of these simulators, it was necessary to create and process for each simulator the methodology of the mandatory acts and also the methodology of airborne practical IFR training. In general, flight simulators are not primarily used for single VFR flying, because feedback on controls is often not like a real one. Therefore, most of these simulators are mainly used to practice normal or emergency procedures and procedures during IFR flights. It is advisable to start an IFR training on an air simulator because the pilot is less stressed than a real flight, and it is also financially more advantageous. This topic is all the more up to date that there was no such training syllabus for both simulators located on the flight department at the Technical University in Košice. The exercises in this work are thoroughly consulted and appropriately chosen for simulator training. The number of hours of total training is, of course, much smaller than the actual airplane curricula. The simulator's advantage is that we cannot practically wait for anything and fly any exercise, regardless of the real weather out there. Each exercise in this paper is then specifically selected and explained. There is an appropriate number of hours designed for the pupil's own experience. Lessons may, depending on the situation, be adjusted. At the beginning of each exercise, there is a point-by-step description of how to start the exercise itself and how to do it yourself. For each exercise, an exemplary example of its execution is chosen, whether it is the basic techniques of pilotage on twin-engine airplanes, various departures, arrivals and departures from controlled airports, or liner flights.

Each exercise contains different flight and navigation parameter images to display on the exercises and, of course, flight, climb, and departure activities also have maps for a specific task.

2. FLIGHT SIMULATOR ELITE S-612 BITD (ME)

Elite in English means the Electronic IFR Training Environment or "Electronic Training Environment or Instrument Flight Instrument" was developed by ELITE Simulation Solutions to meet

JAR-FSTD criteria. Overall in Europe, it is the best-selling and the most affordable of the sold simulators. Because its acquisition cost is low compared to other training devices, and while this simulator provides the optimal elements and means to meet either basic or advanced methods of pilots' instrument flight training, this training environment is the most sought after training tool for future pilots. The simulator comes from ELITE Simulation Solutions, a global provider of this hardware and software. The simulator can be ordered in two or three variants, either in a single engine version for the Cessna 172RG type or in a twin-engine version for Beechcraft Baron BE-58 and Piper Seneca III respectively. The cockpit is fully adaptable to both types, and the avionic adjustment does not last for more than 5 minutes, allowing for a short time to change the simulator configuration to the aircraft type according to the client's requirements. The BITD is also equipped with a simple control area. What, however, has the disadvantage that this device does not have dual control. It consists of a closed and spacious cab with a separate instructional position that is fully integrated with the simulator. Also included is the complete official production and original documentation according to JAR-STD 4A, including the QTG (Qualification Test Guide) test for a particular aircraft type. Another disadvantage is that external visual scenery is only available for an extra charge because JAR-STF 4A is not required or is part of the extra equipment. The Faculty of Aircraft of the Technical University in Košice provided two such facilities with an external visual scenery. These devices meet the most demanding client requirements in today's market for certified simulators in all class categories.



Figure 1 Elite simulator Be-58 ME

2.1. Beechcraft Baron Be-58

Beechcraft Baron BE-58 is a light, twin-engine airplane made by Beechcraft. The first model was introduced in 1961 and is based on the development of the Travel Air project, which brought the Model 50 Twin Bonanza to the world. This predecessor of the Beechcraft Baron 58 was a small twin-engine airplane designed for efficient business-to-business transport in 1951. The first model 58 was powered by two IO-470-L six-cylinder engines that produced up to 260 hp at 2625 rpm. The first Baron 58 was introduced in 1969 and was produced until 2004. It was available in 4 to 6 seat versions. The power is provided by two engines, each with the power of 285 horsepower Continental IO-520. There are more recent models like the Baron B58P, the overhead cab and the 2 turbocharged Continental TSIO-520-L engines. These models have been produced around the world. Due to good aerodynamic characteristics, relatively low consumption, easy operation and a maximum speed of 380 km / h, this airplane is suitable for pilots training for twin-engined airplanes. That's why Elite BITD has a version modified to this type of airplane. [3]

2.2. Autopilot in BE-58

Autopilot in the Elite S-612 BITD (ME) simulator - Beechcraft Baron BE-58 is a simple 2-axis autopilot with height presetting. That means we can only control the wing and the elevator. This autopilot does not allow the control of the direction indicator and the engine. The autopilot consists of two parts: the control panel and the height adjustment panel and the climb speed. [3]

3. CREATING EXERCISES – BASIC MODULE – QUALIFICATION IR(A) (ME)

Theoretical instruction: Before the applicant starts training to acquire the IR (A) (ME) qualification, it is necessary to undergo thorough theoretical training and familiarize himself with the aircraft on which the training will be conducted, as well as regulations, meteorology and radionavigation. It then serves as a theoretical training course for IR (A) (ME) qualification, which consists of:

1. Aviation Law - Applicants must be aware of the laws and regulations that are an essential part of aviation operations. They must not deliberately violate them, unless this is contrary to the threat to life. [1]
2. Airframe and Systems - Applicants must familiarize themselves with the airplane on which the IR (A) Module Course is to be conducted, control their aerodynamic properties, know how their airplane is managing at different stages of the flight, and also have a basic overview of the materials used to build the airplane and to know their specific characteristics. This includes aircraft systems such as fuel system, hydraulic system, brake system and so on. To know how they work, what are their advantages and disadvantages. [1]
3. Apparatus - Applicants must familiarize themselves with all devices on board an airplane. They need to know what they are doing, what they see, or what they determine and how they work. They need to know their values when they are normal and when they deviate normally. [1]
4. Flight scheduling and monitoring - Applicants must familiarize themselves with flight planning with all related tasks. They must learn to work with IFR maps and airport IFR maps, including landing and departure and IFR routes. They also need to learn how to properly fly the IFR flight plan on a specific aircraft. [1]
5. Human Performance and Limitations - The applicants must be aware of the feelings he / she can experience during flight phases related to night and instrument flight, what complications may occur and how to avoid them. [1]
6. Meteorology - Applicants must have basic knowledge of meteorological phenomena that occur or may occur in the area, must be able to describe them and assess whether they are favorable or dangerous for the flight. [1]
7. Radionavigation - Here the applicants are familiar with the use of radionavigation in practice, they will acquire basic knowledge of airplane navigation only on the basis of instruments. [1]
8. Communication - In this section, the applicants will acquire the basic habits for correct and fluid communication that takes place during instrument flight. They will acquire new words and phrases that are essential for these specific flights. [1]

3.1. Exercise outline

Phase I. – Basic flight module

The basic module for multi-engine airplane equipment will consist of ground preparation, where the pilot before each exercise will learn about specific activities for the flight. The basic one is called because in this part the pilot still gets used to the airplane and is getting acquainted with it. Therefore, basic flight practices such as bends, climbs, descents, etc. are included in this section. An important part is also correct entry and waiting in holding patterns. The pilot must familiarize himself with every possible entry so that he can arrange in real time. The pilot is also familiar with the basic practice of flying by the courses to and from the radio. The pilot should already have the basics of this knowledge

and know how to use it. It also learns about the procedures for missed approach, so what to do if the approach or a given track fails for any reason, or the steering tower is not allowed.

Table 1 Basic flight module

Number of exercise	Contents	Number of flights	Number of hours	Total
1	Ground preparation		5:00	
2	Climbing, descending, maintaining heights, maintaining speeds and direction. Bars 15 ° - 20 °. Fitting of given courses, descending and rising curves.	2	1:00	2:00
3	Embedding NDB and VOR under different courses, input, output, and roll-out, ILS, VOR / DME.	2	1:00	2:00
4	Climbing, descending, removing unusual positions, simulated horizon disturbance and directional flywheel.	2	1:00	2:00
5	Directional bends and basic procedures for missed approach.	2	1:00	2:00
6	Emergency procedures	2	1:00	2:00
TOTAL PHASE I.		10		10:00

Phase II. Procedural flight module

In the Flight Procedural Flight Module, the Pilot has the role of learning and acquainting with flying IFR. Pilot will focus mainly on ILS and VOR / DME and 2NDB descents in this part of the training. The ground preparation will include the basics of track and instrument maps reading at the airport, the principles of navigation device operation, and instrument flight theory. Specific exercises will be selected to teach the pilot to fly to almost every airport in almost every weather conditions. Also, after completing the training, the pilot will not have a problem with reading and understanding the route maps, approaching and departing maps of any specific airports. The syllabus is designed so that the pilot starts training with simple basic elements at airports where there is no high frequency of operation and instrument approaches are not demanding for the novice and do not require great experience and a great deal of hours off. Then it is up to the pilot himself and his taste to learn to gain the same experience. The advantage of an flight simulator is that we can set up almost any airport from around the world. Then we will just download the maps what we need. This allows us to get closer to the airport before the actual flight, without unnecessary stress or a past experience. [4]

Table 2 Procedural flight module

Number of exercise	Contents	Number of flights	Number of hours	Total
7	Ground preparation		7:00	
8	ILS, VOR / DME approach.	3	1:00	3:00
9	Navigation flights	4	2:30	10:00
TOTAL PHASE I.		10		10:00
TOTAL PHASE II.		7		13:00
TOTAL		17		23:00

4. CONCLUSION

Since the Flight Department at the Faculty of Aeronautics at the Technical University in Košice has two types of Elite S-612 BITD simulators, namely Beechcraft Baron BE-58 and Cessna 172RG, it was necessary to create a specific and specific instrument training methodology for each of them. The paper builds on the realistic syllabus of multi-engine airplane training and is modified to a particular type of simulator. In this case, it was necessary to reduce the number of hours compared to actual training and to change or cancel certain exercises that did not match or were not compatible with simulator training. After creating mandatory actions, standards and emergency procedures for this type of simulator, there was not such an outline. In developing this work, the author relied heavily on his practical knowledge of instrument flying. All the exercises that are included in this paper have been realistically tested and mastered either on real airplanes or simulators.

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