

FITS Generic Multi-engine Flight Instructor Add-On Syllabus



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SECTION 1 – INTRODUCTION

How to use this Syllabus

This syllabus is the generic version of a FAA Industry Training Standards (FITS) accepted multi-engine flight instructor add-on training course. This generic syllabus is a guide for you to use in developing your specific FITS curriculum. This FITS Syllabus is intended as a guide for aircraft manufacturers, training providers, and flight schools to use in developing a specific FITS curriculum for their aircraft, geographic region, and customer base. This syllabus is unique in several ways. First, it is a syllabus that uses real-world scenarios as the foundation of the training. Flight maneuvers are still a vital part of flight training and flight maneuvers are a part of this syllabus, but the use of real-world scenarios is used to enhance development of pilot decision-making skills. The syllabus presents situations and circumstances that pilots face everyday as learning experiences and lessons. The primary tenant of FITS training is that you prepare for the real world of flying, by acting as an instructor while in training. Therefore, throughout the syllabus, the pilot in training (PT) will take on different tasks or jobs just as if they were already certificated multi-engine instructors. The second important unique feature of this syllabus and of FITS training is that it is all competency based. When the pilot in training (PT) masters a particular skill area in the syllabus, he/she moves on regardless of how much time it takes to reach that point of mastery. This means that each lesson does not necessarily equal one flight. It may take several flights before the PT masters the elements of the lesson and is ready to move on to the next lesson. Consequently, the amount of total flight hours a PT has when the syllabus is completed may be more or less than the minimum times under current aviation regulations. Please note that FITS training is conducted under the current 14 CFR's. Although philosophically, FITS is competency based, many training organizations must still require their students to meet the FAA minimum training hours. Courses under 14 CFR Parts 142 and 141.55(d) may be approved to train to competency and not require a minimum number of hours.

Regulations

This generic syllabus is adaptable to 14 CFR Parts 142, 141, or 61. Please refer to the appropriate regulations for your specific curriculum requirements.

FITS Acceptance

FITS acceptance is achieved by developing your specific curriculum and submitting it to your local Flight Standards District Office for operations under 14 CFR Part 61, 141, and 142. If you are an OEM (Original Equipment Manufacturer, you should submit your curriculum to the FAA FITS Program Manager, AFS-800, Federal Aviation Administration, 800 Independence Ave. SW, Washington, DC 20591. A cover letter explaining exactly for what courses you are requesting FITS acceptance and under what regulations should accompany the curriculum. *Use of the FITS logo:* Once accepted, you are free to use the FITS Logo on all accepted curriculums and in

advertising about this particular curriculum. The FITS logo cannot be used in relationship to non-FITS products.

The Four Levels of FITS Acceptance

1. Accepted FITS Flight Syllabus: Will contain all the tenets of FITS and will include flight in an aircraft or at least an Advanced Training Device. Examples of this type of syllabus include initial, transition, and recurrent training syllabi.
2. Accepted FITS Syllabus (No flight): It is not intended to teach the pilot in training (PT) psychomotor pilot skills or full cockpit/aircraft integration in a specific aircraft. It has intended to enhance certain skill sets of the PT. Application of this level of acceptance may be to teach the PT how to use a new glass cockpit display or develop better Single Pilot Resource Management (SRM) skills. A FITS Accepted Syllabus will also contain all the tenets of FITS. A live instructor will lead the training.
3. Accepted FITS Self-Learning Program: This acceptance is between the FITS Accepted Syllabus and FITS Supporting Material. It may be either an interactive CD or on-line course on a specific application or subject. The purpose of this training is to learn a specific piece of equipment or enhance a specific higher order thinking skill. Scenario training and/or testing is required. Since a live instructor is not required, Learner Centered Grading may not be applicable.
 - a. If the program is for a piece of equipment (i.e. GPS), the equipment should act like the actual piece of equipment during the interaction with the equipment as much as feasible. After basic training on the equipment, scenarios should be used to demonstrate PT proficiency and knowledge.
 - b. For non-equipment programs (i.e. ADM development) scenarios with multi-string testing should be used.
4. Accepted FITS Supporting Material: These products do not meet the training tenets of FITS (i.e. may not be scenario based), but the subject is integral to FITS. These products could be accepted on their own technical merit, but only as a part of an Accepted FITS Flight Syllabus or FITS Syllabus. For example, a CBI on risk management could be accepted as and used as a module in a FITS accepted transition syllabus. Original equipment manufacturers (Cessna, Cirrus, Eclipse, etc.) or developers of training materials (Sporty's, Jeppesen, King Schools, etc.) normally develop Accepted FITS Supporting Material.

SECTION 2 – FITS TERMINOLOGY

Automation Bias – The relative willingness of the pilot to trust and utilize automated systems.

Automation Competence – The demonstrated ability to understand and operate the automated systems installed in the aircraft.

Automation Management – The demonstrated ability to control and navigate an aircraft by means of the automated systems installed in the aircraft.

Automated Navigation leg – A flight of 30 minutes or more conducted between two airports in which the aircraft is controlled primarily by the autopilot and the on board navigation systems.

Automation Surprise – Occurs when the automation behaves in a manner that is different from what the operator is expecting.

Candidate Assessment – A system of critical thinking and skill evaluations designed to assess a pilot in training's readiness to begin training at the required level.

Critical Safety Tasks/Events – Those mission related tasks/events that if not accomplished quickly and accurately may result in damage to the aircraft or loss of life.

Data link Situational Awareness Systems – Systems that feed real-time information to the cockpit on weather, traffic, terrain, and flight planning. This information may be displayed on the PFD, MFD, or on other related cockpit displays.

Emergency Escape Maneuver – A maneuver (or series of maneuvers) performed manually or with the aid of the aircraft's automated systems that will allow a pilot to escape successfully from an unanticipated flight into Instrument Meteorological Conditions (IMC) or other life-threatening situations.

IFR Automated Navigation Leg – A leg flown on autopilot beginning from 500 ft AGL on departure (unless the limitations of the autopilot require a higher altitude, then from that altitude) until reaching the decision altitude or missed approach point on the instrument approach (unless the limitations of the autopilot require a higher altitude, then from that altitude). If a missed approach is flown, it will also be flown using the autopilot and on-board navigation systems.

Light Turbine TAA – is a jet or turboprop Technically Advance Aircraft (TAA) certified for single-pilot operations, weighing 12,500 lbs or less, that may be equipped with cabin pressurization, and may be capable of operating in Class A airspace on normal mission profiles.

Mission Related Tasks – Those tasks required for safe and effective operations within the aircraft's certificated performance envelope.

Multi-Function Display MFD – Any display that combines primarily navigation, systems, and situational awareness information onto a single electronic display.

Primary Flight Display (PFD) – Any display that combines the primary six flight instruments, plus other related navigation and situational awareness information into a single electronic display.

Proficiency-Based Qualification – Aviation task qualification based on demonstrated performance rather than other flight time or experience.

Scenario Based Training – A training system that uses a highly structured script of real-world experiences to address flight-training objectives in an operational environment. Such training can include initial training, transition training, upgrade training, recurrent training, and special training. The appropriate term should appear with the term "Scenario Based," e.g., "Scenario Based Transition Training," to reflect the specific application.

Simulation Training Only – Any use of animation and/or actual representations of aircraft systems to simulate the flight environment. Pilot in training interaction with the simulation and task fidelity for the task to be performed are required for effective simulation.

Single Pilot Resource Management (SRM) – The art and science of managing all resources (both on-board the aircraft and from outside sources) available to a single pilot (prior and during flight) to ensure the successful outcome of the flight is never in doubt.

Technically Advanced Aircraft (TAA) – A General Aviation aircraft that contains the following design features: Advanced automated cockpit such as MFD or PFD or other variations of a Glass Cockpit, or a traditional cockpit with GPS navigation capability, moving map display and autopilot. It includes aircraft used in both VFR and IFR operations, with systems certified to either VFR or IFR standards. TAA's may also have automated engine and systems management. **VFR Automated Navigation Leg** – A leg flown on autopilot from 1,000 ft AGL on the departure until entry to the 45-degree leg in the VFR pattern.

SECTION 3 – TRAINING PHILOSOPHY

FITS Training is a scenario-based approach to training pilots. It emphasizes the development of critical thinking and flight management skills, rather than solely on traditional maneuver-based skills. The goal of this training philosophy is the accelerated acquisition of higher-level decision-making skills. Such skills are necessary to prevent pilot-induced accidents.

FITS Training Goals

- Higher Order Thinking Skills
- Aeronautical Decision Making
- Situational Awareness
- Pattern Recognition (Emergency Procedures) and Judgment Skills
- Automation Competence
- Planning and Execution
- Procedural Knowledge
- Psychomotor (Hand-Eye Coordination) Skills
- Risk Management
- Task Management
- Automation Management
- Controlled Flight into Terrain (CFIT) Awareness

Previous training philosophies assumed that newly certified pilots generally remain in the local area until their aviation skills are refined. This is no longer true with the advent of Technically Advanced Aircraft (TAA). Offering superior avionics and performance capabilities, these aircraft travel faster and further than their predecessors do. As a result, a growing number of entry-level pilots are suddenly capable of long distance/high speed travel—and its inherent challenges. Flights of this nature routinely span diverse weather systems and topography requiring advanced flight planning and operational skills. Advanced cockpits and avionics, while generally considered enhancements, require increased technical knowledge, and finely tuned automation competence. Without these skills, the potential for an increased number of pilot-induced accidents is daunting. A different method of training is required to accelerate the acquisition of these skills during the training process.

Research has proven that learning is enhanced when training is realistic. In addition, the underlying skills needed to make good judgments and decisions are teachable. Both the military and commercial airlines have embraced these principles through the integration of Line Oriented Flight Training (LOFT) and Crew Resource Management (CRM) training into their qualification programs. Both LOFT and CRM lessons mimic real-life scenarios as a means to expose pilots to realistic operations and critical decision-making opportunities. The most significant shift in these programs has been the movement from traditional maneuver-based training to incorporate training that is scenario-based.

Maneuver-based training emphasizes the mastery of individual tasks or elements. Regulations, as well as Practical Test Standards (PTS), drive completion standards. Flight hours and the ability to fly within specified tolerances determine competence. The emphasis is on development of motor skills to accomplish satisfactorily individual maneuvers. Only limited emphasis is placed on decision-making. As a result, when the newly trained pilot flies in the real-world environment, he or she is inadequately prepared to make crucial decisions. Scenario Based Training (SBT) and Single Pilot Resource Management (SRM) are similar to LOFT and CRM training. However, each is tailored to the pilot's training needs. These techniques use the same individual tasks that are found in Maneuver Based Training, but script them into scenarios that mimic real-life cross-country travel. By emphasizing the goal of flying safely, the pilot in training correlates the importance of individual training maneuvers to safe mission accomplishment. In addition, the instructor continuously interjects "What If?" discussions as a means to provide the trainee with increased exposure to proper decision-making. Because the "What If?" discussions are in reference to the scenario, there is a clear connection between decisions made and the final outcome. The "What If?" discussions are designed to accelerate the development of decision-making skills by posing situations for the pilot in training to consider. Once again, research has shown these types of discussions help build judgment and offset low experience.

Questions or situations posed by the instructor must be open-ended (rather than requiring only rote or one-line responses). In addition, the instructor guides the pilot in training through the decision process by: 1) Posing a question or situation that engages the pilot in training in some form of decision-making activity. 2) Examining the decisions made. 3) Exploring other ways to solve the problem. 4) Evaluating which way is best. For example, when the pilot in training is given a simulated engine failure, the instructor might ask questions such as: "What should we do now?" Or, "Why did you pick that place to land?" Or, "Is there a better choice?" Or, "Which place is the safest?" Or, "Why?" These questions force the pilot in training to focus on the decision process. This accelerates the acquisition of improved judgment, which is simply the decision-making process resulting from experience. It is not innate. All of our life experiences mold the judgment tendencies we bring to our flight situations. By introducing decision-making opportunities into routine training lessons, we speed-up acquisition of experience, thus enhancing judgment.

For further information, please reference "Aeronautical Decision Making" in the FAA Aviation Instructor's Handbook.

SECTION 4 – TEACHING METHODS

Scenario Based Training

For Scenario Based Training (SBT) to be effective there must be a purpose for the flight and consequences if it is not completed as planned. It is vital that the pilot in training and the Instructor communicate the following information well in advance of every training flight:

- Purpose of flight
- Scenario destination(s)
- Desired pilot in training learning outcomes
- Desired level of pilot in training performance
- Desired level of automation assistance
- Possible in-flight scenario changes (during later stages of the program)

With the guidance of the Instructor, the pilot in training should make the flight scenario as realistic as possible. This means the pilot in training will know where they are going and what will transpire during the flight. While the actual flight may deviate from the original plan, it allows the pilot in training to be placed in a realistic scenario.

Scenario Planning – Prior to the flight, the Instructor will brief the scenario to be planned. The Instructor will review the plan and offer guidance on how to make the lesson more effective. Discussion, in part, will reflect ways in which the Instructor can most effectively draw out a pilot in training's knowledge and decision processes. This enables the Instructor to analyze and evaluate the pilot in training's level of understanding. After discussion with the Instructor, the pilot in training will plan the flight to include:

- Reason to go flying
- Route
- Destination(s)
- Weather
- NOTAMs
- Desired pilot in training learning outcomes
- Possible alternate scenarios and emergency procedures

Example of Scenario Based Training

Consider the following example: During traditional MBT, the Instructor provides a detailed explanation on how to control for wind drift. The explanation includes a thorough coverage of heading, speed, angle of bank, altitude, terrain, and wind direction plus velocity. The explanation is followed by a demonstration and repeated practice of a specific flight maneuver, such as turns around a point or S turns across the road until the maneuver can be consistently accomplished in a safe and effective manner within a

specified limit of heading, altitude, and airspeed. ***At the end of this lesson, the pilot in training is only capable of performing the maneuver.***

Now, consider a different example: The pilot in training is asked to plan for the arrival at a specific uncontrolled airport. The planning should take into consideration the possible wind conditions, arrival paths, airport information and communication procedures, available runways, recommended traffic patterns, courses of action, and preparation for unexpected situations. Upon arrival at the airport the pilot in training makes decisions (with guidance and feedback as necessary) to safely enter and fly the traffic pattern using proper wind drift correction techniques. This is followed by a discussion of what was done, why it was done, the consequences, and other possible courses of action and how it applies to other airports. ***At the end of this lesson, the pilot in training is capable of explaining the safe arrival at any uncontrolled airport in any wind condition.***

The first example is one of traditional learning, where the focus is on the maneuver. The second is an example of scenario-based training, where the focus is on real world performance. Many course developers in flight training have built on the former option. Traditional training methods in many instances are giving way to more realistic and fluid forms of learning. The aviation industry is moving from traditional knowledge-related learning outcomes to an emphasis on increased internalized learning in which learners are able to assess situations and appropriately react. Knowledge components are becoming an important side effect of a dynamic learning experience.

Reality is the ultimate learning situation and scenario-based training attempts to get as close as possible to this ideal. In simple terms, scenario-based training addresses learning that occurs in a context or situation. It is based on the concept of situated cognition, which is the idea that knowledge cannot be known and fully understood independent of its context. ***In other words, we learn better, the more realistic the situations are and the more we are counted on to perform.***

Michael Hebron, a well-known golf instructor, suggests that there is little the expert can do in the way of teaching the learner particular motions of the golf swing. Instead, learning has to be experiential and feedback based only a handful of basic principles are involved. The same goes, he says, for any and all kinds of learning. ***“It’s about learning, not about golf.”***

Scenario-based training (SBT) is similar to the experiential model of learning. The adherents of experiential learning are fairly adamant about how people learn. ***They would tell us that learning seldom takes place by rote.*** Learning occurs because we immerse ourselves in a situation in which we are forced to perform. We get feedback from our environment and adjust our behavior. We do this automatically and with such frequency in a compressed timeframe that we hardly notice, we are going through a learning process. Indeed, we may not even be able to recite particular principles or describe how and why we engaged in a specific behavior. Yet, we are still able to replicate the behavior with increasing skill as we practice. If we could ask Mark

MacGuire to map out the actions that describe how he hits a home run, he would probably look at us dumbfounded and say, "I just do it." On the other hand, I am sure Mark MacGuire could describe in detail the size and characteristics of every one of the baseball diamonds he was playing in as well as the strengths, weaknesses and common practices of every one of the pitchers he faced.

Developing Scenario-Based Training

Scenario-based training best fits an open philosophy of blended and multiple learning solutions in which change and experience are valued and the lines between training and performance improvement are blurred. For scenario-based training to be effective, it must generally follow a performance improvement imperative. The focus is on improved outcomes rather than the acquisition of knowledge and skills. Success requires a blended, performance-based, and reinforced solution.

An athletic exercise such as Basketball might prove to be a very good example. Clearly, the team's objective is to win, which means scoring more points than the other team. That is the performance objective. Each member of the team also has personal performance goals. The coach can stand at a blackboard and explain defensive and offensive diagrams with players, the rules of the game, and so forth. By doing that, he has identified a set of teach subjects (rules and play patterns) that are best delivered in a traditional fashion.

On the other hand, the application of these subjects and the level of proficiency required in their use can only be learned on the court. The scenario in this example is a scrimmage. During a typical scrimmage, experienced players are mixed with non-experienced players and matched against a similarly constituted practice team. The two teams play a game, and the coaches stop the action at appropriate intervals to offer feedback. Learning takes place in a highly iterative fashion often without the player realizing that specific bits of learning are taking place. The scrimmage provides a player with the opportunity to make several decisions, engage in complex and fast-paced behaviors, and immediately see impact. The coach may have some general ideas of basketball in mind and perhaps some specific learning objectives for the day, but in most cases does not know precisely which of them will be addressed during the scrimmage – that depends on the flow of practice.

Similarly, most flight training consists of both kinds of subjects: those amenable to traditional instructional design techniques and those better approached through scenario-based training. Neither is very useful without the other. Before a learner can engage in a scenario, he or she needs some basic subject knowledge and skill. However, the strongest adherents of the scenario-based approach suggest very little subject knowledge is needed in order to take advantage of SBT. **The main point is that knowledge without application is worth very little.**

The first step in the scenario design process is to engage a number of subject matter experts in a series of discovery sessions and interactive meetings for the purpose of identifying issues and learning objectives including higher-level and performance objectives. With clearly identified learning objectives, appropriate techniques and where to use they can be specified. In the basketball example, players need some rudimentary knowledge of the game and basic skill in order to make the practice session efficient and effective. Consequently, the required knowledge and skill objects need to be integrated into the actual sessions of practice. So, like a train pulling a number of boxcars, a traditional piece of learning precedes or is integrated into a scenario, with the scenario dictating what information is covered in the traditional piece. If, as described in the scrimmage session above, you do not precisely know what will come up in the practice, you should not waste time in the traditional preparation. It is more efficient to share very basic principles and devote your resources to preparing to teach any situation that may arise. What is important, however, is to establish the boundaries of the scenarios. These are done using performance-based learning objectives (Internalized Responses) as opposed to knowledge-based learning objectives, and are worded as performance objectives rather than skill-based behavior objectives.

For example, in the traditional, more repetitive, intensive flight training sessions, objectives are knowledge-based and tend to be specific and limited. On the other hand, in scenario-based training we are simply trying to determine whether the learner has the minimum necessary knowledge/skill to qualify for the scenario. With scenario-based objectives, we are looking for performance behaviors and indicators of internalized responses, which are usually situational recognition indicators.

We can see this clearly illustrated in an automobile driver-training example (Table 1). The traditional Behavior (skill) objective is knowledge based and the SBT Performance objective is performance-based (responses, which are situational recognition indicators).

Table 1: Driving Learning Objectives

Knowledge		Behavior (Skill)
Traditional	<p>Know what a STOP sign and a Railroad crossing sign look like and what they mean.</p> <p>Describe the correct parallel parking procedure</p>	<p>Drive an automatic shift car on a county road over a 2-mile route with one RR crossing and 2 full stops.</p> <p>Maneuver the automobile into a normal parallel parking space between 2 other cars.</p>
Internalized Response		Performance
Scenario-Based	<p>Appropriately apply the rules of the road for driving in the local area in moderate traffic.</p> <p>Determine the shortest route and apply the appropriate procedures for driving in heavy and complex traffic conditions.</p>	<p>Drive from your garage to the Shopping Center on the same side of town</p> <p>Drive from your garage to a specified address in another town over 50 miles away on the Interstate and an Expressway system.</p>

Scenario design sessions should resemble focus groups in which participants work through a series of issues, from broad scenario outlines to very specific scenario details. Direct participants to address two general areas: content and style.

Sessions to determine content usually ask participants to:

- Share experiences about the subject event
- Describe desirable outcomes
- Share best practices or known instances of consistent achievement of the desired outcomes
- Create indicators of successful outcomes
- Create strategies expected to lead to successful outcomes
- Establish descriptions of successful and unsuccessful performance behaviors related to these strategies (note that outcome measures and performance behaviors will constitute the evaluative criteria for assessing performance in the scenario).

After the content discussion, ask participants to review the look, feel, and flow of the scenario. This is much like the process used for instructional design. Develop a storyboard with a general beginning and end, using the boundaries established earlier. Talk through the scenario in the session and, through iteration, create a flow script from the results.

With these two elements in place, you can begin the actual construction of the scenario. A subcommittee of Flight Instructors and subject matter experts (SMEs) should review and revise the scenario to fit into the whole course of instruction.

Scenarios are meant to be real situations. In an ideal world, an assessment team would evaluate behavior and agree on several critical performance dimensions. The key indicators should come from the initial SMEs, in which they also create strategies expected to lead to successful outcomes and establish descriptions of successful and unsuccessful performance behaviors. Outcome measures and performance behaviors will constitute the evaluative criteria for assessing performance in the scenario.

Examples of indicators of successful outcomes are whether an airplane arrived and was secured at the destination airport and how safe were all aspects of the flight or were there any regulatory violations. Strategies are clusters of internally consistent behaviors directed toward the achievement of a goal. Performance behaviors are the key behaviors in those strategies. Establishing these dimensions should be a group process and is usually completed in the subject matter expert design session.

Review, obtain learner feedback, and revise. All learning, even the most traditional, is iterative. The key to creating a useful scenario is to see it as a learning experience for the designers as well as the learners. This means that results and comments about the learning experience are shared with the SMEs and the designer so that they can review and modify the scenarios as necessary. Obtain open –ended qualitative data from the learner and the Flight Instructor about the experience and review the data with the SME's and the designer.

Based on this kind of feedback, scenarios can be revised to better target the learner population. That process mirrors the original design steps. There are some cautions, however, in the revision process. First, there is an old saying: “It doesn’t take a cannon to blow away a tin can.” Basically, revisions should not needlessly complicate the scenario or the technology needed to employ it. It is crucial to weigh the risks of complication against the genuine learning needs. Before any revision, affirm the original purpose statement and the categorization of learning elements.

Also, do not let principles and main points become diluted by revisions. It is tempting to add more items and nuances in a scenario, but doing so further complicates the learning process. Save complexity for a full-scale “capstone” experience. Remember, adding an item in traditional learning complicates the learning process in a linear fashion. In scenarios, complication grows non-linearly with the addition of learning items. So, beware. A rule of thumb is to reduce rather than increase principles and main points in a revision.

Always review success and failure paths for realism. Remember that any change in a scenario item complicates all items on the path following it. Any time a decision node is altered, chances are that the decision nodes and information items following it must change. With every revision, follow and ensure the consistency of associated paths.

Finally, remember that traditional learning elements should service the scenario-based learning elements, which are situated in a real context and based on the idea that knowledge cannot be known and fully understood independent of its context. It is

essential to place boundaries around scenarios to make the transitions between scenarios and traditional learning as efficient as possible.

Table 2: The Main Points

- Scenario-based training (SBT) is situated in a real context and is based on the idea that knowledge cannot be known and fully understood independent of its context.
- SBT accords with a performance improvement and behavior change philosophy of the learning function.
- SBT is different from traditional instructional design and one must be aware of the differences to employ successfully SBT.
- All learning solutions should employ both traditional and scenario-based training.
- Traditional learning elements should service the scenario-based training elements.
- It is essential to place boundaries around scenarios to make the transitions between scenarios and traditional learning as efficient as possible.
- Use interactive discovery techniques with subject matter experts (SMEs) and designers to establish the purpose and outcomes of scenarios create the scenarios, appropriate strategies, and performance behaviors, and develop learner evaluation criteria.
- SBT occurs by following success and failure paths through a realistic situation. Typically, these paths must be limited to stress the main learning objective. Otherwise, the scenario can become too complex and unwieldy.
- • Open-ended qualitative learner feedback is the key to successful scenario revision, but revisions should not further complicate the scenario unless highly justified.

Kindley, R. (2002). *Scenario-Based E-Learning: A Step Beyond Traditional E-Learning*. Retrieved 02/02/05 from <http://www.learningcircuits.org/2002/may2002/kindley.html>

Single Pilot Resource Management

Single Pilot Resource Management (SRM) is defined as the art and science of managing all the resources (both on-board the aircraft and from outside sources) available to a single-pilot (prior and during flight) to ensure that the successful outcome of the flight is never in doubt. Most of us remember a favorite Instructor from our past that showed us the best way to solve in-flight problems and unforeseen circumstances. The FITS team has combined much of this collective CFI body of knowledge with some innovative teaching methods to give pilots practical tools to teach aeronautical decision-making and judgment. SRM includes the concepts of Aeronautical Decision Making (ADM), Risk Management (RM), Task Management (TM), Automation Management (AM), Controlled Flight Into Terrain (CFIT) Awareness, and Situational Awareness (SA). SRM training helps the pilot maintain situational awareness by managing the automation and associated aircraft control and navigation tasks. This enables the pilot to accurately assess and manage risk and make accurate and timely decisions. ***This is what SRM is all about, helping pilots learn how to gather information, analyze it, and make decisions.***

Teaching pilots to identify problems, analyze the information, and make informed and timely decisions is one of the most difficult tasks for Instructors. By way of comparison, the training of specific maneuvers is fairly straightforward and reasonably easy to understand. We explain, demonstrate, and practice a maneuver until proficiency is

achieved. We are teaching the pilot in training **“what to think”** about each maneuver, and signs them off when they demonstrate proficiency. Teaching judgment is harder. Now we are faced with teaching the pilot in training **“how to think”** in the endless variety of situations, they may encounter while flying out in the “real world.” Often, they learn this by watching Instructors. They observe reactions, and more importantly, actions, during flight situations and they often adapt the styles of the Instructor to their own personalities.

Pilots in training may range from 100-hour VFR-only pilots, all the way to multi-thousand hours ATP’s. The strength of this format is that the participants learn not only from their Flight Instructor, but from each other as well. The collective knowledge of many pilots, when guided by an experienced CFI, is much greater than the knowledge of each participant, including the Flight Instructor. In these scenarios, there are no right answers, rather each pilot is expected to analyze each situation in light of their experience level, personal minimums, and current physical and mental readiness level, and make their own decision.

The SRM scenarios, developed by the FITS team, incorporate several maneuvers and flight situations into realistic flight scenarios. The scenarios are much like the Line Oriented Flight Training (LOFT) employed by the major corporate and airline training organizations for years. Table 3 gives an example of the performance, standards, and conditions using SRM.

Table 3: Single Pilot Resource Management (SRM)

Performance The training task is:	Standards The pilot in training will:	Conditions The training is conducted during:
1. Task Management (TM)	Prioritize and select the most appropriate tasks (or series of tasks) to ensure successful completion of the training scenario.	Note: All tasks under SRM will be embedded into the curriculum and the training will occur selectively during all phases of training. SRM will be graded as it occurs during the training scenario syllabus.
2. Automation Management (AM)	Program and utilize the most appropriate and useful modes of cockpit automation to ensure successful completion of the training scenario.	Note: All tasks under SRM will be embedded into the curriculum and the training will occur selectively during all phases of training. SRM will be graded as it occurs during the training scenario syllabus.
3. Risk Management (RM) and Aeronautical Decision-Making (ADM)	Consistently make informed decisions in a timely manner based on the task at hand and a thorough knowledge and use of all available resources.	Note: All tasks under SRM will be embedded into the curriculum and the training will occur selectively during all phases of training. SRM will be graded as it occurs during the training scenario syllabus.

4. Situational Awareness (SA)	Be aware of all factors such as traffic, weather, fuel state, aircraft mechanical condition, and pilot fatigue level that may have an impact on the successful completion of the training scenario.	Note: All tasks under SRM will be embedded into the curriculum and the training will occur selectively during all phases of training. SRM will be graded as it occurs during the training scenario syllabus.
5. Controlled Flight Into Terrain (CFIT) Awareness	Understand, describe, and apply techniques to avoid CFIT encounters: a. During inadvertent encounters with IMC during VFR flight. b. During system and navigation failures and physiological incidents during IFR flight.	Note: All tasks under SRM will be embedded into the curriculum and the training will occur selectively during all phases of training. SRM will be graded as it occurs during the training scenario syllabus.

The “5P” Check

SRM sounds good on paper, however, it requires a way for pilots to understand and deploy it in their daily flights. This practical application is called the “Five P’s (5P’s)” The 5P’s consist of “the Plan, the Plane, the Pilot, the Passengers, and the Programming.” Each of these areas consists of a set of challenges and opportunities that face a single pilot. And each can substantially increase or decrease the risk of successfully completing the flight based on the pilot’s ability to make informed and timely decisions. The 5P’s are used to evaluate the pilot’s current situation at key decision points during the flight, or when an emergency arises. These decision points include, pre-flight, pre-takeoff, hourly or at the midpoint of the flight, pre-descent, and just prior to the final approach fix or for VFR operations, just prior to entering the traffic pattern.

The 5P’s are based on the idea that the pilots have essentially five variables that impact his or her environment and that can cause the pilot to make a single critical decision, or several less critical decisions, that when added together can create a critical outcome. These variables are the Plan, the Plane, the Pilot, the Passengers, and the Programming. The authors of the FITS concept felt that current decision-making models tended to be reactionary in nature. A change has to occur and be detected to drive a risk management decision by the pilot. For instance, many pilots ascribe to the use of risk management sheets that are filled out by the pilot prior to takeoff. These catalog risks that may be encountered that day and turn them into numerical values. If the total exceeds a certain level, the flight is altered or cancelled. Informal research shows that while these are useful documents for teaching risk factors, they are almost never used outside of formal training programs. The number of pilots who use them before each flight approaches zero. The 5P concept is an attempt to take the information contained in those sheets and in the other available models and operationalize it.

The 5P concept relies on the pilot to adopt a “scheduled” review of the critical variables at points in the flight where decisions are most likely to be effective. For instance, the easiest point to cancel a flight due to bad weather is before the pilot and passengers

walk out the door and load the aircraft. So the first decision point is Pre-Flight in the flight planning room, where all the information is readily available to make a sound decision, and where communication and FBO services are readily available to make alternate travel plans.

The second easiest point in the flight to make a critical safety decision is just prior to takeoff. Few pilots have ever had to make an “emergency take-off.” While the point of the 5P check is to help you fly, the correct application of the 5P before takeoff is to assist in making a reasoned go-no-go decision based on all the information available. That decision will usually be to “go,” with certain restrictions and changes, but may also be a “no-go.” The key point is that these two points in the process of flying are critical go-no go points on each flight.

The third place to review the 5Ps is at the mid point of the flight. Often, pilots may wait until the ATIS is in range to check weather, yet at this point in the flight many good options have already passed behind the aircraft and pilot. Additionally, fatigue and low altitude hypoxia serve to rob the pilot of much of their energy by the end of a long and tiring flight day. This leads to a transition from a decision-making mode to an acceptance mode on the part of the pilot. If the flight is longer than 2 hours, the 5P check should be conducted hourly.

The last two decision points are just prior to decent into the terminal area and just prior to the final approach fix, or if VFR just prior to entering the traffic pattern, as preparations for landing commence. Most pilots execute approaches with the expectation that they will land out of the approach every time. A healthier approach requires the pilot to assume that changing conditions (the 5Ps again) will cause the pilot to divert or execute the missed approach on every approach. This keeps the pilot alert to all manner of conditions that may increase risk and threaten the safe conduct of the flight. Diverting from cruise altitude saves fuel, allows unhurried use of the autopilot, and is less reactive in nature. Diverting from the final approach fix, while more difficult, still allows the pilot to plan and coordinate better, rather than executing a futile missed approach. Now let us look in detail at each of the “Five P’s.”

The Plan

The “Plan” can also be called the mission or the task. It contains the basic elements of cross country planning, weather, route, fuel, publications currency, etc. Unlike risk management sheets that pilot fill out before a flight, the “Plan” should be reviewed and updated several times during the course of the flight. A delayed takeoff due to maintenance, fast moving weather, and a short notice Temporary Flight Restriction (TFR) may all radically alter the plan. Several excellent flight planning software packages are available that automates this process, allowing the pilot additional time to evaluate and make decisions. Some include real time and graphical TFR depictions. The “plan” is not just about the flight plan, but the entire days events surrounding the flight and allowing the pilot to accomplish the mission. The plan is always being updated and modified and is especially responsive to changes in the other four remaining P’s. If

for no other reason, the 5P check reminds the pilot that the day's flight plan is real life and subject to change at any time.

Obviously, the weather is a huge part of any "plan." The addition of real time data link weather information give the TAA pilot a real advantage in inclement weather, but only if the pilot is trained to retrieve, and evaluate the weather in real time without sacrificing situational awareness. And of course, weather information should drive a decision, even if that decision is to continue on the current "plan." Pilots of aircraft without datalink weather should get updated weather in-flight through a Flight Service Station and/or Flight Watch.

The Plane

Both the "plan" and the "plane" are fairly familiar to most pilots. The "plane" consists of the usual array of mechanical and cosmetic issues that every aircraft pilot, owner, or operator can identify. For example, Is everything working properly? Is the fuel situation where you expected it to be at that point? Are you using anti-ice equipment? However, with the advent of the Technically Advanced Aircraft (TAA), the "plane" has expanded to include database currency, automation status, and emergency backup systems that were unknown a few years ago. Much has been written about single pilot IFR flight both with, and without, an autopilot. While this is a personal decision, it is just that, a decision. Low IFR in a non-autopilot equipped aircraft may depend on several of the other "P's" we will discuss. Pilot proficiency, currency, and fatigue are among them. The TAA offers many new capabilities and simplifies the basic flying tasks, but only if the pilot is properly trained and all the equipment is working as advertised.

The Pilot

This is an area all pilots are learning more and more about each day. Flying, especially when used for business transportation, can expose the pilot to high altitude flying, long distance and endurance, and weather that is more challenging. Technically Advance Aircraft (TAA), simply due to their advanced capabilities can expose a pilot to even more of these stresses. The traditional "IMSAFE" checklist is a good start. However, each of these factors must be taken in consideration of the cumulative effect of all of them together and the insidious effects of low altitude hypoxia. The authors informal survey of TAA pilots show that almost half fly with pulse oxymeters to display the effects of low altitude hypoxia in a graphic manner.

The combination of late night, pilot fatigue, and the effects of sustained flight above 5,000 feet may cause pilots to become less discerning, less critical of information, less decisive and more compliant and accepting. Just as the most critical portion of the flight approaches (for instance a night instrument approach, in the weather, after a four-hour flight) the pilot's guard is down the most. The "5P" process emphasizes that pilot recognize the physiological situation they are placing themselves in at the end of the flight, before they even takeoff, and continue to update their condition as the flight

progresses. Once identified, the pilot is in an infinitely better place to make alternate plans that lessen the effect of these factors and provide a safer solution.

The Passengers

One of the key differences between CRM and SRM is the way passengers interact with the pilot. In the airline industry, the passengers have entered into a contractual agreement with the pilots company with a clearly defined set of possible outcomes. In corporate aviation, the relationship between crew and passengers is much closer, yet is still governed by a set of operating guidelines and the more formal lines of corporate authority. However, the pilot of a highly capable single engine aircraft has entered into a very personal relationship with the passengers, in fact, they sit within an arms reach all of the time.

It may be easy, especially in business travel, for the desire of the passengers to make airline connections or important business meetings to enter into the pilot's decision-making loop. If this is done in a healthy and open way, it is a very positive thing. However, this is not always the case. For instance, imagine a flight to Dulles Airport and the passengers, both close friends and business partners, need to get to Washington D.C. for an important meeting. The weather is VFR all the way to southern Virginia then turns to low IFR as the pilot approaches Dulles. A pilot employing the 5P approach might consider reserving a rental car at an airport in northern North Carolina or southern Virginia to coincide with a refueling stop. Thus, the passengers have a way to get to Washington, and the pilot has an out to avoid being pressured into continuing the flight if the conditions do not improve.

Passengers can also be pilots. The old joke says that when four Certified Flight Instructors (CFI) board a light general aviation, a NOTAM should be posted. There is some truth to this. If no one is designated as pilot in command and unplanned circumstances arise, the decision-making styles of four self-confident CFI's may come into conflict. Another situation arises when an owner pilot flies with a former CFI in the right seat on a business trip. Unless a clear relationship is defined and briefed prior to the flight, the owner pilot may feel some pressure to perform for the Individual Learning Manager (possibly beyond his or her capability), and the Individual Learning Manager may feel inhibited from intervening in small decisions until it is clearly evident that the pilot is making poor decisions. This is actually a CRM situation and requires clear pre-flight understanding of roles, responsibilities, and communication. Non-Pilots can also cause the pilot to review the SRM process.

Pilots need to understand that non-pilots may not understand the level of risk involved in the flight. There is an element of risk in every flight. That is why SRM calls it risk management not risk elimination. While a pilot may feel comfortable with the risk present in a night IFR flight, the passengers may not and may manifest this during the flight. The human reaction to fear and uncertainty is as varied as the shapes of our ears. Some become quiet, some talk incessantly, and in extreme cases anger and fear are

strongly manifested. This may be the last thing the pilot needs to deal with while shooting the ILS to 400 feet and a mile visibility at midnight.

.A pilot employing SRM should ensure that the passengers are involved in the decision-making and given tasks and duties to keep them busy and involved. If, upon a factual description of the risks present, the passengers decide to buy an airline ticket or rent a car, then a good decision has generally been made. This discussion also allows the pilot to move past what he or she “thinks” the passengers want to do and find out what they “actually” want to do. This removes a load of self-induced pressure from the pilot.

The Programming

The TAA adds an entirely new dimension to the way General Aviation aircraft are flown. The Glass Cockpit, GPS, and Autopilot are tremendous boons to reduce pilot workload and increase pilot situational awareness. And frankly, the programming and operation of these devices is fairly simple and straightforward. However, unlike the analog instruments they replace, they tend to capture the pilot’s attention and hold it for long periods of time (like a desktop computer). To avoid this phenomenon, the pilot should plan in advance, when and where the programming for approaches, route changes, and airport information gathering should be accomplished...as well as times it should not. Pilot familiarity with the equipment, the route, the local air traffic controls environment, and his or her own capabilities vis-à-vis the automation should drive when, where, and how the automation is programmed and used.

The pilot should also consider what his or her capabilities are in response to last minute changes of the approach (and the reprogramming required) and ability to make large-scale changes (a re-route for instance) while hand flying the aircraft. Since formats are not standardized, simply moving from one manufacturer’s equipment to another should give the pilot pause and require more conservative planning and decisions.

The SRM Decision Process

The SRM process is simple. At least five times, before and during the flight, the pilot should review and consider the “Plan, the Plane, the Pilot, the Passengers, and the Programming” and make the appropriate decision required by the current situation. It is often said that failure to make a decision is a decision. Under SRM and the 5P’s, even the decision to make no changes to the current plan, is made through a careful consideration of all the risk factors present.

Example of Single Pilot Resource Management

The teaching of SRM is best accomplished in a seminar environment. Recently, the authors conducted a set of classroom seminars that presented real time flight scenarios to a room full of qualified pilots of varied experiences. The first scenario presented was a night MVFR/IFR flight from St Augustine Florida to Washington Dulles Airport. The

original “**Plan**” called for a non-stop flight with a 45-minute fuel reserve. The “**Plane**” was a well-equipped TAA with a minor navigation light problem that delayed departure by an hour. The “**Passengers**” were one pilot and one non-pilot. The non-pilot seemed nervous about the trip and a little ill. Both passengers needed to get to Washington DC for an important meeting the next day. The “**Pilot**” had spent a full day at a flight refresher clinic, including a two-hour flight and a three-hour class, and felt reasonably refreshed at the 5 PM departure time. And finally, the GPS/MFD, the “**Programming**,” combination looked like it would make the flight a snap. However, there were questions about the currency of the database that required the pilot’s attention.

The discussion that followed revolved around the reliability of the weather data, the fatigue of the pilot landing at Dulles at 9 PM, alternate ways to get the passengers to their meeting, minimum requirements for aircraft night flight, and a more complete understanding of the benefits and challenges posed by GPS programming and database currency. The 5p’s ensured that each pilot looked at the entire picture prior to making the critical decisions that would lay the groundwork for success or failure over four hours later in Washington.

Predictably, the destination weather deteriorated slowly as the flight proceeded northbound. The pilot’s fatigue level, low altitude/long duration hypoxia, a succession of minor annoyances caused by the airplane and the passengers, began to become a factor. Again, the pilots applied the 5p’s, and many decided to land short of Washington Dulles, check the weather, and secure a rental car as a backup for the Monday morning meeting (in fact many decided this prior to takeoff).

For the purposes of the discussion, this aircraft was equipped with a ballistic parachute system. For those that proceeded to Dulles, the scenario ended with a spatial disorientation incident at 1500 feet, 10 miles short of the airport caused by pilot fatigue, latent hypoxia, and failure to use the autopilot. For many, it was the first time they had considered all the options available, and the criticality of quick and accurate decisions. In the background, another instructor began calling out altitudes and speeds as the aircraft descended to the ground, providing an added dose of realism and pressure. Should the class initiate an unusual attitude recovery, and if it did not work should they attempt another? How much will the passengers help or hinder the pilots thought processes? When, and how, should the ballistic parachute system be deployed, and what are its limitations. This scenario sparked questions about the capabilities and limitations of the autopilot, cockpit automation, and the parachute system. More importantly, it caused the pilots in the room to examine how they should gather critical information, assess the risks inherent in the flight, and take timely action. All agreed that a few accurate decisions before and during the early part of the flight reduced the risk to pilot and passengers.

All these questions were discussed in a lively thirty-minute session following the scenario. In this type of Scenario Based Training, the group discussion is just as important as the actual situation, for it is during the discussion that the pilots are most ready to learn, and begin to develop a mental model of how they might react to

situations. Instead of encountering a once in a lifetime, life or death, situation alone on the proverbial dark and stormy night, the participants could examine how the situation had developed, understand the options available to them, and begin to develop a general plan of action well ahead of time.

Learner Centered Grading

The third component of the FITS training method, following each flight scenario, is to use the concept of “learner-centered grading.” Learner centered grading includes two parts: learner self-assessment and a detailed debrief by the instructor. The purpose of the self-assessment is to stimulate growth in the learner’s thought processes and, in turn, behaviors. The self-assessment is followed by an in-depth discussion between the instructor and the pilot in training which compares the instructor ratings to the pilot in training’s self-assessment.

To improve learning, it is recommended that learners prepare to learn from their experiences both before and after key events. This preparation should increase learning and enhance future performance. Pre-briefs are essential for setting goals. During key events, especially those that require high levels of attention, there may be little time for learning; most individuals allocate the bulk of their cognitive resources to performing the actual task; however, they may also dedicate some cognitive resources to self-monitoring, learning, and correction.

How facilitation and feedback occur is important to the learning process. In order for feedback to be useful for both informational and motivational purposes, it should be designed systematically. For example, the facilitator (Flight Instructor) should avoid lecturing the learner, and should withhold their observations and opinions of the exercise until the learner has given their opinion. The use of closed-ended questions may stymie the usefulness of the feedback process as well, as they encourage one-word/yes/no types of answers that do not elicit opinions of performance or suggestions for improvement. It is more effective to use open-ended questions that probe the learner to assess their own performance. Allotting enough time for the feedback is also important. Debriefs that are rushed often turn into one-way “lectures” due to time constraints.

Referring to prior pre-briefs when conducting subsequent debriefs provides a sense of continuity, reliability, and consistency, all of which are desirable attributes of a feedback source. Reminding learners of goals and lessons learned from prior exercises helps them plan for future events. Learners may also be more receptive to feedback during a debrief if they were appraised of the goal criteria in a pre-brief.

The FITS approach utilizes scenarios to teach Single Pilot Resource Management (SRM) while simultaneously teaching individual tasks such as landings and takeoffs. The authors quickly realized that this required a new approach to the pilot in training's performance measurement. Traditional grading approaches are generally teacher centered and measure performance against an empirical standard. The following example of a traditional flight syllabus demonstrates.

Table 4: A Traditional Grading Scale

<ul style="list-style-type: none"> . Excellent - the pilot in training has performed in an excellent manner . Good – the pilot in training has exceeded basic requirements . Satisfactory – the pilot in training has met basic standards . Marginal – the pilot in training has failed to perform the task standards . Unsatisfactory – the pilot in training has demonstrated significant performance difficulties

Table 5: A Traditional Lesson

Lesson Tasks	Lesson Sub Tasks	Lesson Grading
<ul style="list-style-type: none"> . Flight Planning 	<ul style="list-style-type: none"> . Flight Planning . Weight and Balance and Aircraft Performance Calculations 	<ul style="list-style-type: none"> . U, M, S, G, E . U, M, S, G, E
<ul style="list-style-type: none"> . Normal Preflight and Cockpit Procedures 	<ul style="list-style-type: none"> . Normal Pre-Takeoff Checklist Procedures . GPS/Avionics Programming . MFD /PFD Setup 	<ul style="list-style-type: none"> . U, M, S, G, E . U, M, S, G, E . U, M, S, G, E

This type of grading scale (See Table 4), or something similar, is in wide use throughout the aviation training industry. While it appears to be based on published standards, in reality it is often used as a tool to determine pilot in training progress and provide motivation. Thus, on the first lesson a pilot in training may receive an “Excellent” grade for attempting to plan the flight and accomplishing the weight and balance with a few minor errors. However, by the third flight, that same performance may only earn a “Satisfactory” grade due to lack of pilot in training progress (***note that while performance remained the same, the grade changed***). Additionally, the Flight Instructor awards the grade based on his or her observation of the pilot in training's performance. This observation, while accurate, may not be based on an understanding of the pilot in training's level of knowledge and understanding of the task. Lastly, the pilot in training has been conditioned since grade school to look at grades as a reward for performance and may feel that there is a link between grades earned and their self-esteem. In reality, none of this aids pilot in training performance in any meaningful way.

The learner centered grading approach addresses the above concerns. First, the grade is now a “Desired Scenario Outcome.” These outcomes describe pilot in training-learning behavior in readily identifiable and measurable terms. They reflect the pilot in training's ability to see, understand, and apply the skills and tasks that are learned to the scenario.

For instance, a pilot in training who can “explain” a successful landing has achieved the basic level of competence to begin the learning process. Once the pilot in training can “explain” the effect of crosswind and speed reduction on rudder effectiveness, they have achieved a level of learning that will allow for meaningful “Practice.” The “Perform” level denotes unsupervised practice and self-correction of errors. These grades are equally applicable to the first scenario to the last since they are not lesson dependent.

The grade of “Manage/Decide” is used solely for SRM grading and the grade of “Perform” is used solely for task grading. A pilot in training who is becoming proficient at aeronautical decision-making and risk management would be graded first at the “Explain” level, then at the “Practice”, and finally at the “Manage/Decide” level. A Manage/Decide or Perform grade does not describe perfection. Rather, these grades simply show a proficient pilot who corrects their own errors so that the outcome of the flight is never in doubt. Realistically, this is the performance level we desire. All pilots make mistakes, it is in learning to identify and correct mistakes that they become proficient pilots.

Desired Outcomes

The objective of scenario-based training is a change in the thought processes, habits, and behaviors of the pilot in training during the planning and execution of the scenario. Since the training is learner centered, the success of the training is measured in the following desired pilot in training outcomes.

(a) Maneuver Grades (Tasks)

- Describe – at the completion of the scenario, the PT will be able to describe the physical characteristics and cognitive elements of the scenario activities. *Instructor assistance is required to execute successfully the maneuver.*
- Explain –at the completion of the scenario, the PT will be able to describe the scenario activity and understand the underlying concepts, principles, and procedures that comprise the activity. *Significant instructor effort will be required to execute successfully the maneuver.*
- Practice – at the completion of the scenario the pilot in training will be able to plan and execute the scenario. *Coaching, instruction, and/or assistance from the CFI will correct deviations and errors identified by the CFI.*
- Perform – at the completion of the scenario, the PT will be able to perform the activity without assistance from the CFI. *Errors and deviations will be identified and corrected by the PT in an expeditious manner. At no time will the successful completion of the activity be in doubt. (“Perform” will be used to signify that the PT is satisfactorily demonstrating proficiency in traditional piloting and systems operation skills)*
- Not Observed – Any event not accomplished or required

(b) Single Pilot Resource Management (SRM) Grades

- Explain – the pilot in training can verbally identify, describe, and understand the risks inherent in the flight scenario. *The pilot in training will need to be prompted to identify risks and make decisions.*
- Practice –the pilot in training is able to identify, understand, and apply SRM principles to the actual flight situation. *Coaching, instruction, and/or assistance from the CFI will quickly correct minor deviations and errors identified by the CFI.* The pilot in training will be an active decision maker.
- Manage/Decide - the pilot in training can correctly gather the most important data available both within and outside the cockpit, identify possible courses of action, evaluate the risk inherent in each course of action, and make the appropriate decision. *Instructor intervention is not required for the safe completion of the flight.*
- Not Observed – Any event not accomplished or required

Grading will be conducted independently by the pilot in training and the instructor, and then compared during the post flight critique.

Learner centered grading (outcomes assessment) is a vital part of the FITS concept. Previous syllabi and curriculum have depended on a grading scale designed to maximize pilot in training management and ease of instructor use. Thus the traditional: “excellent, good, fair, poor” or “exceeds standards, meets standards, needs more training” often meet the instructor’s needs but not the needs of the pilot in training. The learner centered grading described above is a way for the instructor and pilot in training to determine the pilot in training’s level of knowledge and understanding. “Perform” is used to describe proficiency in a skill item such as an approach or landing. “Manage-Decide” is used to describe proficiency in the SRM area such as ADM. Describe, explain, and practice are used to describe pilot in training learning levels below proficiency in both.

Grading should be progressive. During each flight, the pilot in training should achieve a new level of learning (e.g. flight one, the automation management area, might be a “describe” item by flight three a “practice” item, and by flight five a “manage-decide” item.

Example of Learner Centered Grading

Immediately after landing, and before beginning the critique, Flight Instructor Linda asks her pilot in training Brian to grade his performance for the day. Being asked to grade himself is a new experience but he goes along with it. The flight scenario had been a two-leg IFR scenario to a busy class B airport about 60 miles to the east. Brian had felt he had done well in keeping up with programming the GPS and the MFD until he reached the approach phase. He had attempted to program the ILS for runway 7L and had actually flown part of the approach until ATC asked him to execute a missed approach.

When he went to place a grade in that block he noticed that the grades were different. Instead of satisfactory or unsatisfactory he found, “Describe, Explain, Practice, and Perform.” He decided he was at the Perform level since he had not made any mistakes.

When Linda returned Brian discovered that she had graded his flight as well, with a similar grade sheet. Most of their grades appeared to match until the item labeled “programming the approach.” Here, where he had placed a “Perform” Linda had placed an “Explain.” This immediately sparked a discussion. As it turned out, Brian had selected the correct approach, but he had not activated it. Before Linda could intervene, traffic dictated a go around. Her explain grade told Brian that he did not really understand how the GPS worked and he agreed. Now, learning could occur.

In Table 6, the desired outcome table denotes a pilot in training near the beginning of training and the grades reflect proficiency of the pilot in training to an expected level of performance in each of these areas. These grades are not self-esteem related since they do not describe a recognized level of prestige (such as A+ or “Outstanding”), rather a level of performance. You cannot flunk a lesson. However, you can fail to demonstrate the required flight and SRM skills. By reflecting on the lesson and grading his or her own performance, the pilot in training becomes actively involved in the critique process. Pilot in training participation in the process also reduces the self-esteem issue. But most importantly, this establishes the habit of healthy reflection and self-criticism that marks most competent pilots.

Table 6: Learner Centered Scenario Grading-Desired Outcome Table

Scenario Activities	Scenario Sub Activities	Desired Scenario Outcome
Flight Planning	<ol style="list-style-type: none"> 1. Scenario Planning 2. Weight and Balance and Aircraft Performance Calculations 3. Preflight SRM Briefing 4. Decision making and risk management 	<ol style="list-style-type: none"> 1. Perform 2. Perform 3. Perform 4. Explain/Practice
Normal Preflight and Cockpit procedures	<ol style="list-style-type: none"> 1. Normal Pre-Takeoff Checklist Procedures 2. GPS Programming 3. MFD Setup 4. PFD Setup 	<ol style="list-style-type: none"> 1. Perform 2. Explain/Practice 3. Practice 4. Explain/Practice
Engine Start and Taxi Procedures	<ol style="list-style-type: none"> 1. Engine Start 2. Taxi 3. SRM/Situational Awareness 	<ol style="list-style-type: none"> 1. Perform 2. Perform 3. Explain/Practice
Before Takeoff Checks	<ol style="list-style-type: none"> 1. Normal and Abnormal Indications 2. Aircraft Automation Management 3. Aeronautical Decision Making and Risk management 	<ol style="list-style-type: none"> 1. Perform 2. Explain/Practice 3. Manage/Decide

SECTION 5 – FITS MULTI-ENGINE FLIGHT INSTRUCTOR CERTIFICATION SYLLABUS

Introduction

To the Pilot-in-Training (PT) and Instructor

This Multi-engine Flight Instructor Add-On (MEI) Syllabus is unique in several ways that you should be familiar with as you use the syllabus to acquire the FAA Multi-engine Flight Instructor Add-On. First, this syllabus assumes the PT hold a Certified Flight Instructor Certificate; however the PT may or may not be familiar scenario-based training as described in the FAA/Industry Training Standards (FITS) documents. Second, it is a syllabus that uses real-world scenarios as the foundation of the training. Consequently, the flight instructor (not the PT) will need to play the part of a student. When this is the case he/she is referred to as the “simulated student.” This generic syllabus follows the FITS accepted training method. It has to be used as a guide for developing your own FITS accepted syllabus that fits your specific flight school, aircraft, and environment. Flight maneuvers are still a vital part of flight training and flight maneuvers are a part of this syllabus, but real-world scenarios are used to enhance the pilot’s decision-making skills. The syllabus presents situations and circumstances that MEIs face every day as learning experiences and lessons. The primary tenet of FITS training is that you prepare for the real world of MEI instruction, by acting as a MEI while in training. Therefore, throughout the syllabus, the pilot in training (PT) will take on different tasks or jobs just as if they were already a MEI. The third important unique feature of this syllabus, and of FITS training, is that it is all competency based. The times shown in each lesson are target times and should not be considered the minimum or maximum ground/flight time for the lesson. When the PT masters a particular skill area in the syllabus, they move on regardless of how much time it takes to reach that point of mastery. This means that each lesson does not necessarily equal one flight. It may take several flights before the PT masters the elements of the lesson and is ready to move on to the next lesson. Consequently, the amount of total flight hours a PT has when the syllabus is completed may be more or less than the minimum times under current aviation regulations. Please note that FITS is conducted under the current rules. Although philosophically, FITS is competency based, many training organizations must still require their students to meet the FAA minimum training hours. Courses under 14 CFR Parts 142 and 141.55(d) may be approved to train to a standard without meeting FAA minimum hours.

Using of Decision-Making scenarios in flight training

The PT, in this syllabus, is the Certified Flight Instructor (CFI) seeking the Multi-engine Flight Instructor (MEI) Add-On. Thus, the PT will be the CFI learning how to develop and use effective scenario-based learning. The PT will be asked to assume various instructional situations and asked to develop and use scenario-based learning to teach a student in the various situations. In other words, the PT will be placed in a scenario, instructional situation, where the PT is instructing a multi-engine student and the PT will

be expected to use a scenario to teach the student. The following discussion addresses how the MEI could use the decision-making scenario method.

For years, good flight instructors have incorporated some form of scenario-based learning into their flight training. Usually during a flight the CFI would tell the PT that something has occurred, such as deteriorating weather, an aircraft malfunction, or air traffic delay. The PT is to assume that the occurrence is actually real and to act accordingly. The PT might decide to divert to a different airport after the CFI tells them that the weather at their destination is poor. The PT may decide to change from the original plan and flies to a different airport. The difference between that and FITS is that FITS also incorporates the consequences of the failure to arrive at the originally planned airport. If a PT decides to fly to an alternate airport instead of the original destination because the CFI “makes up” a story that the weather is bad, then that alone does not consider the consequences of that decision. What if, rather than a training flight, the flight to the original destination was to deliver a human organ for transplant – the decision to divert to an alternate airport could have the consequence of the patient dying that was awaiting the transplant. If the pilot understood that their decision has actual life or death consequences, then the decision to divert will be more difficult. In the real world, these are the type of decisions a pilot faces everyday – so in this syllabus we train the pilot to be ready to make those decisions. For these reasons, most of the lessons in this syllabus are actual “missions” that carry with them actual reasons for the flight and actual consequences for the decisions the pilot will make. The lessons are not “scripted” to the point that every outcome is known in advance. The PT and flight instructor must be flexible enough to accept this fact. Different PTs will make different decisions, and these different decisions will alter the outcome of each flight. Using real world scenarios as part of flight training does not in any way diminish the need for pilots to also have good “stick and rudder” skills. Pilots will always need the skills, for instance, to land in a crosswind (although enhanced decision skills will prevent them from attempting a dangerous crosswind landing in the first place!). The lessons in this syllabus therefore are all part “mission” training and part “maneuvers” training on a sliding scale. None of the lessons in this syllabus are 100% mission and none are 100% maneuvers. The amount that any lesson is mission-based or maneuver-based is determined by the completion standards of that lesson.

The Pilot-In-Training Plays a Role in Grading the Lesson

Again, the PT training will learn how to use student-centered grading through instruction and through participation in a student-centered grading process during the course of this training.

Student Centered grading means that after each flight, the PT and instructor will have a discussion of the items that were encountered on the flight and each will evaluate the items. The PT will judge her/his own performance. The instructor, likewise will judge the PT's performance and then the PT and instructor will compare evaluations. There will be items that both the PTs and instructor will agree were performed well and other that both agree could use improvement. Inevitably, the PT and instructor's evaluations will

disagree. This will be a great opportunity to discuss alternate methods, solutions, and techniques that could have been used by the PT to produce a more favorable outcome to the lesson. Mission based flight lessons can have multiple outcomes that are “correct.” The PT and instructor will discuss if the outcome of the flight was a safe outcome – which is the primary concern of any flight.

Beyond the basic safety of the flight, the PT and instructor will discuss if the outcome could have been even better – optimized. The instructor will use a “rubric” to grade the lessons based on what is an unacceptable outcome, versus a range of possible acceptable outcomes. A “rubric” might be defined, as a set of criteria that aids the instructor in evaluating an outcome as objectively as possible when there are multiple correct answers, which is often the true in aeronautical decision-making. This does not mean that some answers are better than others are, they just are not incorrect. Learning to choose a good solution or the best solution to an in-flight problem is judgment training. Judgment training is an integral part of FITS training.

The Format of Each Lesson

Each lesson in this syllabus will have the same format. The PT and instructor should read the format information before the flight and as preparation for the flight. Each lesson will have:

1. Heading
2. Scenario
3. Lesson Objectives
4. Pre Briefing
5. Completion Standards
6. Desire Outcome Grade Sheet
7. Debriefing
8. Notes to the Instructor

Syllabus Shuffle

This FITS Multi-engine Flight Instructor Certification Syllabus has one unique feature. It contains two “learning strands.” The strands are: Analyze Performance and Practice Teaching. A PT does not have to complete one strand before beginning on another. The syllabus is designed to be “shuffled” and to allow maximum flexibility to meet training requirements. There are some prerequisite lessons that must follow in a particular order, but most lessons can come in any order. If an instructor and PT had previously completed ground lessons 4 through 6 and are scheduled for flight lesson 7 or 8 today, but the weather at the destination prevents that lesson, the instructor could switch and conduct lesson 9 or flight lesson 12. Remember that the PT is acquiring teaching skills rather than motor skills; thus, completing the Analyze Performance strand is not necessary before practicing instruction in the Practice Teaching strands.

Multi-engine Flight Instructor Certification Syllabus

Ground Lesson 1	Flight Lesson 11
Ground Lesson 2	Flight Lesson 12
Flight Lesson 3	Flight Lesson 13
Flight Lesson 4	Flight Lesson 14
Ground Lesson 5	Flight Lesson 15
Ground Lesson 6	Flight Lesson 16
Ground Lesson 7	Ground Lesson 17
Flight Lesson 8	Flight Lesson 18
Flight Lesson 9	Flight Lesson 19 Performance Check
Flight Lesson 10 Performance Check	FAA Practical Test Preparation

Analyze Performance

Practice Teaching

Ground lessons are Knowledge Acquisition Lessons and must come before the Flight Lesson/s in respective columns. Flight lessons within a column can be completed in any order once the ground lessons for the column are completed. Columns of lessons may be started and/or completed in any order. Lessons 19 is the final training lessons before the FAA practical test, lesson 20 the FAA Multi-engine Airplane Practical Test. Typically, the assigned instructor will conduct ground lesson 17 and flight lesson 18, a senior flight instructor will conduct flight lesson 19, and a FAA pilot examiner or designed examiner will complete flight lesson 20.

FITS Multi-engine Flight Instructor Certification Curriculum Outline

I. Analyze the Performance Elements and Flight Characteristics of the Multi-engines Aircraft

Objectives of lessons 1 through 10: During this block of training the PT will learn to analyze effectively the performance elements and flight characteristics of the tasks, which are outlined in the lesson content. In addition, the PT will develop the ability to perform all of the tasks and procedures that are outlined in the Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards.

Completion Standards for lessons 1 through 10: At the completion of this block of training, the PT will be able to analyze effectively the performance elements that make up the flight characteristics of the tasks outlined in these lessons. In addition, from the right seat, the PT will be able to perform all the tasks in accordance with the Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards.

Ground Lesson 1
 Ground Lesson 2
 Flight Lesson 3
 Flight Lesson 4
 Ground Lesson 5
 Ground Lesson 6
 Ground Lesson 7
 Flight Lesson 8

Flight Lesson 9
Flight Lesson 10 Performance Check

II. Practice Multi-engine Ground and Flight Instruction

Objectives of lessons 11 through 20: During this block of training the PT will continue the teaching process involved with multi-engine flight instruction. A variety of practice ground and flight instruction lessons are used. The PT will continue to develop the aeronautical knowledge and skill necessary to meet the requirement to instruct applicants for multi-engine land class ratings.

Completion Standards for lessons 11 through 20: At the completion of this block of training the PT will exhibit the proficiency and skill necessary to give effective multi-engine flight instruction while demonstrating a multi-engine task or procedure as outlined in the current and appropriate Practical Test Standards. The PT's explanation during the demonstration must be clear, concise, technically accurate, and complete. In addition, the PT's performance will meet or exceed the performance standards as outlined in the current Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards.

Flight Lesson 11
Flight Lesson 12
Flight Lesson 13
Flight Lesson 14
Flight Lesson 15
Flight Lesson 16
Ground Lesson 17
Flight Lesson 18
Flight Lesson 19 Performance Check
FAA Practical Test Preparation Guide

Lesson Preparation and Flight Multi-engines – Lesson 1
Review Certificates and Documents Outlined in the Instructor Multi-engine Practical
Test and Multi-engine Aircraft Systems – Mission
GND Lesson 1 (Approximate lesson time 3.0 hours)

Scenario:

You are a MEI preparing a commercial pilot for the multi-engine oral examination. This is the last review prior to the Multi-engine Practical examination that is scheduled for tomorrow morning with a FAA examiner. The oral is scheduled in first thing tomorrow morning and the flight portion is scheduled just after lunch. Your student is the son of your boss and has not shown good understanding of the regulation as they relate to multi-engine flight and of the resource management concept. The boss fired the last instructor for providing his son with miss-information on his first attempt at the Commercial Pilot Practical Test. The boss is grooming his son to become the chief flight instructor in his FAA approved flight school. This means that you are responsible for teaching his son about scenario-based training, learner centered grading, and single pilot resource management.

Lesson Objective:

The purpose of this lesson is to provide the PT with an overview of the Multi-engine Flight Instructor Certification Course (Airplane) and to introduce scenario-based training; learner centered grading and single pilot resource management (SRM).

Multi-engine systems are also included in this lesson. Aircraft systems provide many SRM discussion opportunities. They are also an important part of the oral evaluation.

This lesson will also include discussions on the use and understanding of the safety policies and procedures appropriate to multi-engine airplane operations.

Pre Briefing:

The instructor will take the lead in discussing the multi-engine flight instructor certification and practical test standards, while the PT will lead the aircraft systems and safety policies and procedures discussions.

Completion Standards:

This lesson is complete when the PT is able to meet the desired outcomes listed on the desired outcome grade sheet below. The PT will demonstrate an understanding of the aircraft system typically found in multi-engine aircraft. The PT will also demonstrate the ability to incorporate aeronautical decision-making scenarios when discussing aircraft systems as well as safety policies and procedures that may be appropriate to actual multi-engine flight.

Desired Outcome Grade Sheet:

Lesson 01 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Demonstration of SRM	Effectively managed all resources available related to the ground lesson	Explain							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Explain							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Explain							
	Discussed and demonstrated proper task management throughout the flight lesson	Explain							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Explain							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Explain							
	Effectively managed the flight a CFI-Multi Engine	Explain							
Certification and Documents	Understands the FITS scenario based training concept and learner centered grading	Practice							
	Understands the concept of student led training	Practice							
	Understands the concept of learner centered grading	Practice							
	Understands the completion standards for the course	Practice							
	Understands the role that the Practical Test Standards have in their training	Practice							
	Understands the use of the Practical Test Standards through the application of certification scenarios	Practice							
Systems	Primary flight controls and trim	Practice							
	Pitot static/vacuum system and associated instruments	Practice							
	Wing flaps, leading edge devices, and spoilers	Practice							
	Powerplant, including controls, indicators, cooling, and fire protection.	Practice							
	Fuel, oil, and hydraulic systems	Practice							
	Environmental systems including heater and air conditioning	Practice							

	Avionics systems including HSI, PFD, MFD, Autopilot, GPS, and Annunciators	Practice									
Safety Policies and Procedures	Understands the role that the Safety Policies and Procedures have in their training	Perform									
	Properly applies the policies and procedures through discussions that include scenarios that may occur in actual multi-engine flight training	Perform									
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Explain									
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Explain									
	Discussed and is able to explain assessing the risk of a student and flight lesson	Explain									
	Discussed and is able to explain factors that affect decision making	Explain									
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Explain									

Debriefing:

Initially the de-briefing will be lead by the instructor until the PT learns how LCG and de-briefing are conducted. The instructor will continue to take the lead in the de-briefing, but will slowly transfer the role to the PT. The PT will be learning how to use LCG and the de-briefing as a tool to enhance his/her own learning and as a tool to enhance the learning of his/her subsequent students.

Assignment for lesson 2:

1. Review recommended airspeeds and configuration for normal, abnormal, and emergency operations.
2. Develop scenario-based lesson plan on:
 - A. Normal takeoffs and landings
 - B. Maneuvering during slow flight and V_{MC}
 - C. Steep turns

Notes to the Instructor:

The Notes to the Instructor should be on a separate page for easy removal for use by the instructor during the lesson and omission from the PT's package.

For lesson one the instructor sets up the circumstances for the PT. The PT will be acting as a multi-engine flight instructor and prepare a scenario-based plan of action for the PT will be providing in training situation.

If the PT has not been trained under a FITS accepted course, assist the PT in developing scenario-based lesson plans and/or provide the PT with examples of plans of action using scenarios. Remember that the lesson should always contain two primary objectives (a) the desired flight training and (b) the aeronautical decision-making (ADM) training. The flight training must include the desired outcomes with a grading sheet. Remind the PT that the grading sheet should serve, as a briefing guide for the PT's de-briefing.

For the instructor, since the multi-engine flight instructor certification course also includes ADM training for the PT, the instructor should query the PT about other scenarios the PT could have used in this situation, lead a discussion on the merits of the various scenarios, and have the PT select which scenario is best. This teaching method will not only provide ADM training but it will help the PT learn how to develop scenarios for scenario-based training. Of course, this teaching method can be used on any of the maneuvers in the lesson de-briefing to interject ADM training with other desired outcomes listed on the Desired Outcome Grading Sheet provide above.

Lesson Preparation and Flight Multi-engines – Lesson 2
Review for Multi-engine Practical Test – Mission
GND Lesson 2 (Approximate lesson time 3.0 hours)

Scenario:

You are a MEI conducting a final ground review with a private pilot who is preparing for the Multi-engine Practical Test. You have never flown with the student before. The student, private pilot, has done the ground and flight training for the multi-engine rating with an instructor from a different flight school. The flight school does not have a strong reputation for the quality of instruction it provides. The instructor at the other flight school was a new hire and only recently became an instructor.

Lesson Objective:

The purpose of this lesson is to ensure the PT possesses an instructor level of knowledge of multi-engine flight procedures including airspeeds and configuration for normal, abnormal, and emergency operations; normal takeoffs and landings; maneuvering during slow flight and V_{MC} ; and steep turns. The Flight Instructor will lead a discussion on the tasks listed including multi-engine aircraft systems, and incorporating task, risk, and automation management as it pertains to multi-engine flight.

Pre Briefing:

The instructor will lead the discussions of the desired outcome shown as practice while the PT will lead the discussions of the desired outcomes shown as perform.

Completion Standards:

This lesson is complete when the PT is able to meet the desired outcomes listed in the learning objectives table below. The PT will demonstrate the ability of incorporating aeronautical decision-making scenarios that may occur in multi-engine flight when discussing multi-engine flight procedures.

Desired Outcome Grade Sheet:

Lesson 02 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Demonstration of SRM	Effectively managed all resources available related to the ground lesson	Explain							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Explain							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Explain							
	Discussed and demonstrated proper task management throughout the ground lesson	Explain							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Explain							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Explain							
	Effectively managed the flight a CFI-Multi Engine	Explain							
Multi-engine Operations	Airspeed and configuration								
	Normal operations	Practice							
	Abnormal operations	Practice							
	Emergency operations	Practice							
	Aircraft Preflight	Practice							
	Normal takeoffs and landings	Practice							
	Maneuvering during slow flight and V_{MC}	Practice							
	Steep Turns	Practice							
Systems	Landing gear	Practice							
	Propellers, including controls and indicators	Practice							
	Electrical systems	Practice							
	Deicing and anti-icing systems	Practice							
	Any system unique to the airplane being flown	Practice							
Aircraft Limitations	Pilot Operating Handbook	Practice							
	Minimum Equipments Lists	Practice							
	Any limitation unique to the airplane being flown	Practice							
Logging flight time	Pilot in command time - acting versus logging	Perform							
	14 CFR 61.51 versus Part 1	Practice							
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Explain							

	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Explain								
	Discussed and is able to explain assessing the risk of a student and ground lesson	Explain								
	Discussed and is able to explain factors that affect decision making	Explain								
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and ground lessons to emphasize risk management and single pilot resource management	Explain								

Debriefing:

The de-briefing will be lead by the instructor until the PT learns how LCG and de-briefing are conducted. The instructor will continue to take the lead in the de-briefing, but will slowly transfer the role to the PT. The PT will be learning how to use LCG and the de-briefing as a tool to enhance his/her own learning and as a tool to enhance the learning of his/her subsequent students.

Assignment for Lesson 3:

1. Checklist usage – flow patterns
2. Weight and balance, and performance charts
3. Develop lesson plan on stalls

Notes to the Instructor:

The Notes to the Instructor should be on a separate page for easy removal for use by the instructor during the lesson and omission from the PT's package.

This syllabus assumes the PT holds a flight instructor certificate and a multi-engine rating, but it does not assume that the PT has received scenario-based instruction and ADM training and been graded under a LCG system. In other words, the syllabus does not assume that the PT has been trained under a FITS accepted syllabus previously. Therefore, it is being suggested the PT be given and receive ADM training and the PT be shown how to develop and use scenario-based training both in the way the PT is trained and how the PT will provide the simulated training in the situations described in the lesson scenario. In fact, the PT may need the teaching method modeled in the first couple of lesson of this syllabus and gradually assume a larger role in preparing a scenario-based plan of action. This is best done before the PT is practicing his or her teaching in the next strand.

The scenario in this lesson calls for a final ground review before a Private Pilot takes a multi-engine practical test. The scenario was chosen for this lesson because it gave the PT a set of circumstances that the typical multi-engine instructor could be faced with, it establishes consequences, and it suggest the necessary level of the desired outcome for completion. The instructor's pass rate will be affected the student's success on the practical test. The scenario also provides a setting for the PT to demonstrate his or her knowledge and the opportunity to practice his or her teaching abilities. That is, the PT should be conducting a general overview of multi-engine aircraft systems and operations, and identifying areas of weakness (weaknesses shown by the simulated student) for more detailed discussions. If the PT is not proficient in using scenarios, LCG, and SRM training techniques, you will need to demonstrate these techniques occasionally.

Lesson Preparation and Flight Multi-engines – Lesson 3
Light Twin Demonstration Flight – Mission
FLT Lesson 3 (Approximate lesson time 2.0 hours)

AIRPLANE – MEL

Scenario:

You are a MEI conducting a light twin training flight with a private pilot working toward getting a multi-engine certificate. You will be introducing aircraft preflight, checklist usage, steep turns, maneuvering during slow flight, stalls, and normal takeoffs and landings. The student is a low time private pilot without an instrument rating.

Lesson Objective:

The purpose of this lesson is for the PT to learn to effectively perform and analyze the performance elements involved in multi-engine maneuvers and procedures appropriate for two engine operations. Also, the purpose is for the PT to understand how to determine proper descent planning needed for higher performance aircraft.

Pre Briefing:

The instructor will lead the discussions of the lesson plans while the PT will lead the discussions of the subject covered in the lesson plans. The instructor may still need to guide the postflight discussion; however, the PT should be taking the lead more with each lesson.

Aircraft performance, and weight and balance have been covered in previous ground briefing; however, they have not been done in preparation for an actual flight. This is the simulated student's first multi-engine flight but you have flown with the student during her private training. She is a good student who finally mastered steep turns and has not had any problems with them since. Typically, the student acquires mastery of a maneuver quickly when the maneuver is demonstrated correctly and the demonstration correlates with the ground discussion about the maneuver.

Completion Standards:

This lesson is complete when the PT is able to exhibit the knowledge and skills necessary to analyze the listed multi-engine maneuvers and procedures appropriate for two engine operations. The PT will be able to explain the principles and techniques of execution, while demonstrating the listed maneuvers and procedures in accordance with the current and appropriate Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards. Also, the PT will demonstrate an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desired Outcome Grade Sheet:

Lesson 03 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Weight and balance	Practice							
	Prior planning and performance	Practice							
	Descent planning	Practice							
	Review lesson plan on steep turns	Practice							
	Review lesson plan on stalls and maneuvering during slow flight	Practice							
	Review lesson plan on normal takeoffs and landings	Practice							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Practice							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Practice							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Practice							
	Discussed and demonstrated proper task management throughout the flight lesson	Practice							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Practice							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Practice							
	Effectively managed the flight as a CFI-Multi Engine	Practice							
Introduction	Checklist usage – flow patterns	Practice							
	Stalls – Power off (full or imminent)	Practice							
	Stalls – Power of (full or imminent)	Practice							
	Descent planning	Practice							
Review	Aircraft Preflight	Practice							
	Maneuvering during slow flight and V_{MC}	Practice							
	Steep turns	Practice							
	Normal takeoffs and landings	Practice							
Post-flight discussion	Critique student performance, preview next lesson, and make study assignment	Practice							
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Practice							

	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Practice									
	Discussed and is able to explain assessing the risk of a student and flight lesson	Practice									
	Discussed and is able to explain factors that affect decision making	Practice									
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Practice									

Debriefing:

The PT will lead a debriefing of the simulated student using a LCG approach and jointly the instructor and PT will debrief the PT's performance. The instructor should not hesitate to demonstrate good debriefing practices and techniques.

Assignment for Lesson 4:

Develop lesson plans on:

- A. Systems and equipment malfunctions to include annunciate panel/lights
- B. Short-field takeoffs and landings

Notes to the Instructor:

You may need to remind the PT that the scenario for this lesson suggested that the simulated student needed correctly execute maneuvers to progress. This should influence the student's as well as the PT's debriefing. This scenario have consequences, as all scenarios should.

Again, the scenario provides a set of circumstances for the instruction, a Private Pilot working on a multi-engine certification. In this scenario, the focus has changed from doing a general overview to teach specific tasks. The PT should prepare written lesson plans for these tasks. The lesson plans should include scenario, LCG, and SRM training techniques. Demonstrate as necessary how these techniques can be use to develop thinking skills and discuss how they enhance learning. Thinking skills are developed through solving problems and rehearsal while learning is enhanced through learning in context. For more information on developing these concepts, review the front-end material in this syllabus and/or the material on the FAA/FITS website.

Lesson Preparation and Flight Multi-engines – Lesson 4
Private Pilot Multi-engine Training Lesson – Mission
FLT Lesson 4 (Approximate lesson time 1.5 hours)

AIRPLANE – MEL

Scenario:

You are a MEI conducting an introduction to multi-engine airplane commercial pilot. You have flown with the student before. The student is a good student that participates actively in guided discussions about normal, abnormal, and emergency situation. The pilot is a new private pilot who has not flown outside of the training environment; thus, has very limited experience and has never experienced an actual emergency.

Lesson Objective:

The PT will practice instruction to a simulated student by developing lesson plans on steep turns, maneuvering during slow flight and V_{MC} , stalls, normal takeoffs and landings, aircraft systems, system malfunctions, and emergency landings. The PT will also present a multi-engines cockpit check to the simulated student. The instruction will correlate decision making into the tasks by discussing task, risk, and automation management as it applies to actual multi-engine flight.

This lesson also includes a discussion of incorporating aeronautical decision-making and risk management into multi-engine instruction through the development of scenarios.

Pre Briefing:

The instruction in this case is one of a series of lessons that will lead the commercial pilot to obtaining a multi-engine airplane rating. Due to the student's limited experience outside of the training environment, you should emphasize aeronautical decision-making and judgment development during the discussions of the system and equipment malfunctions.

Completion Standards:

This practice flight instruction lesson is complete when the PT is able to meet the desired outcomes listed in the learning objectives table below. Furthermore, the PT will exhibit the knowledge and skills necessary to analyze the listed multi-engine maneuvers and procedures appropriate for two engine operations. The PT will be able to explain the principles and procedures of execution, while demonstrating the listed maneuvers and procedures in accordance with the current and appropriate Private and Commercial Multi-engine and Flight Instructor Multi-engine PTS. The PT will also demonstrate the ability of presenting aeronautical decision-making scenarios that may occur in actual

multi-engine flight when presenting aircraft flight multi-engines and the multi-engine cockpit check.

The Flight Instructor may lead a discussion on aeronautical decision-making and the application of scenarios in ground and flight training to emphasize thinking skills development.

Desired Outcome Grade Sheet:

Lesson 04 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Prior planning and weight and balance	Practice							
	Review lesson plan on system and equipment malfunctions	Practice							
	Review lesson plan on short-filed takeoffs and landings	Practice							
	Recovery procedures for unintentional spins	Practice							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Practice							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Practice							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Practice							
	Discussed and demonstrated proper task management throughout the flight lesson	Practice							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Practice							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Practice							
	Effectively managed the flight a CFI-Multi Engine	Practice							
Introduction	System and equipment malfunctions								
	- Emergency checklist	Practice							
	- Engine roughness or overheat	Practice							
	- Loss of oil pressure	Practice							
	- Smoke and fire	Practice							
	- Encountering icing conditions	Practice							
	- Crossfeed operations	Practice							
	- Emergency descent	Practice							
	- Electrical system malfunctions	Practice							
- Landing gear malfunctions	Practice								

	- Wing flap malfunctions	Practice																	
	- Inadvertent door opening	Practice																	
	Emergency landing	Practice																	
	- Precautionary – with power	Practice																	
	- Precautionary – without power	Practice																	
	Short-field takeoffs and landings	Practice																	
Review	Checklist usage – flow patterns	Perform																	
	Steep turns	Perform																	
	Maneuvering during slow flight and V_{MC}	Perform																	
	Stalls – power off (full or imminent)	Perform																	
	Stalls – power on (full or imminent)	Perform																	
	Normal takeoffs and landings	Perform																	
Post-flight Discussion	Critique student performance, preview next lesson, and make study assignment	Practice																	
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Practice																	
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Practice																	
	Discussed and is able to explain assessing the risk of a student and flight lesson	Practice																	
	Discussed and is able to explain factors that affect decision making	Practice																	
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Practice																	

Debriefing:

Use LCG techniques to emphasize critical thinking skills development and capture learning opportunities. Learning opportunities occur when the student is given a chance to gain insight about a point, topic, concept, or theory.

Assignment for Lesson 5

Lesson Plan Preparation

- Navigation Equipment
- Intercepting and Tracking Navigational Systems and DME Arcs

Notes to the Instructor:

By this lesson, the PT should be able to conduct guided discussions on the material covered in the lesson and present several “what if” scenarios to be considered and discussed. As the PT practices his/her judgment training teaching methods, the quality of the discussions should improve. Once the PT begins to improve, tell the PT that this is the process he/she will use to teach judgment and to develop critical thinking skills with his/her “students.”

This syllabus will continue to emphasize importance of teaching thinking skills and techniques for teaching them. You always have two objectives in this area; that is, you are teaching your student (the PT) judgment and you are teaching the PT to teach thinking skills. For more information on teaching thinking skills, see the front-end material and/or the FAA/FITS website.

There are several differences presented in the scenario provided in this scenario. First, the “student” pilot is a Commercial Pilot. The Commercial Pilot Practical Test requires a different set of skills and likely means the “student” has more experience. Discussions should be less academic and more actual experience based. The PT should consider adjusting the scenarios he or she is providing to the “student” to type of flying the “student” is actually doing where possible. Second, the “student” is a good student. This means that you are not trying to fix a problem but rather you are trying to expand the “student” knowledge. The PT should look for opportunities to challenge the “student” to consider alternative solutions, discuss which is best, and consider under what circumstances it is best. Ask the question, “are there circumstances that the best answer isn’t the best answer?” Finally, this is a flight lesson rather than a ground lesson. The PT is demonstrating his or her ability to fly commercial maneuvers while practicing multi-engine flight instruction. Any weakness observed in the accomplishment of the commercial maneuvers should be corrected before progressing to the next strand. Additionally, the PT should be using instructional methods that promote the development of thinking skills and are technically correct.

How do you ensure that the PT accomplishes all of the lesson objectives? Discuss this question with the PT. One technique is to write out a detailed scenario-based plan of action. For instructors that are not proficient in using scenarios, LCG, and SRM techniques, this may be necessary. Since the flight seldom goes as planned, the instructor should also carry a copy of the Desired Outcome Grading Sheet. Writing out the plan of action allows the instructor to think through one way the lesson could be done. This should help the instructor revise the plan to the actual flight while the Desired Outcome Grading Sheet provides a checklist of tasks. Discuss this with the PT. This discussion could be used to develop the PT’s thinking skills; that is, having the PT consider alternative plans of action and choosing which is best.

Lesson Preparation and Flight Multi-engines – Lesson 5
Practice Ground Instruction – Mission
GND Lesson 5 (Approximate lesson time 2.5 hours)

Scenario:

You are a MEI instructing with a private pilot working on a multi-engine certificate. The student has had difficulty controlling the airplane and airspeed during inoperative engine situations. You are now on the second emergencies and systems malfunctions lesson where you are reviewing engine failure operations.

Lesson Objective:

The PT will practice ground instruction to a simulated student by developing lesson plans and presenting inoperative engine procedures including inoperative maneuvering and V_{MC} Demonstration. Also, the PT will gain operational knowledge of safety factors concerning multi-engine instructing. The ground instruction will correlate decision making into the tasks by discussing task, risk, and automation management as it applies to multi-engine flight.

Pre Briefing:

The material presented in presentations must be effectively presented. An effective presentation would be one that presents the material in a realistic context and it is tailored to the simulated student's needs and interest. Using problems as the bases for learning will enhance the learning as well as foster the development of critical thinking skills in the student.

Completion Standards:

This practice ground instruction lesson is complete when the PT is able to meet the desired outcomes listed on the desired outcome grade sheet and when the PT has effectively presented the material outlined in the lesson content. Also, the PT will demonstrate the ability of presenting aeronautical decision-making scenarios that may occur in multi-engine flight when presenting inoperative engine procedures.

Desired Outcome Grade Sheet:

Lesson 05 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Demonstration of SRM	Effectively managed all resources available related to the ground lesson	Practice							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Practice							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Practice							
	Discussed and demonstrated proper task management throughout the ground lesson	Practice							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Practice							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Practice							
	Effectively managed the flight CFI-Multi Engine	Practice							
Lesson Plan Presentation	Identifying and maneuvering with inoperative engine								
	- Minimum safe altitude	Practice							
	- Maintaining proper pitch and bank altitudes	Practice							
	- Yaw roll and pitch	Practice							
	- Zero sideslip	Practice							
	- Critical engine	Practice							
	- Climbs, turns, descents, and straight and level	Practice							
	- Identification of inoperative engine	Practice							
	- Verification of inoperative engine	Practice							
	- Securing of inoperative engine	Practice							
	- Part 23 on climb performance	Practice							
	V _{MC} demonstration								
	- V _{MC}	Practice							
	- V _{MCA}	Practice							
	- V _{MCG}	Practice							
	- Part 23, 149, and 23.1545(b)(5)(6)	Practice							
	- Factors effecting V _{MC}	Practice							
	- V _{MC} versus stall speed	Practice							
- Indications for recovery	Practice								
- Engine failure in flight	Practice								
Instructor safety considerations	Limitation of controls during V _{MC} demonstration	Perform							
	V _{MCA} versus stall	Perform							

Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Practice										
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Practice										
	Discussed and is able to explain assessing the risk of a student and ground lesson	Practice										
	Discussed and is able to explain factors that affect decision making	Practice										
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and ground lessons to emphasize risk management and single pilot resource management	Practice										

Debriefing:

LCG techniques should be used during the debriefing to practice their use and to enhance learning. The PT should be able to assess accurately his/her own performance. One of the objectives of LCG is to develop the “student’s” awareness of his/her own learning. In part, this is done by making the “student” aware of the desired outcomes for the lesson and then having the “student” evaluate his/her own performance after the lesson. Accepting responsibility and controlling one’s own learning is an important ability in a pilot’s career. A pilot needs to be able to identify when they need to review or study; in other words, a pilot needs to know when their aeronautical knowledge needs to be improved. A pilot also needs to know how to learn. The PT should frequently refer to source materials during the debriefings and have his or her “student” refer to source materials.

Assignment for Lesson 6

Lesson Plan Preparation

- Demonstrating the effects of various airspeeds and configurations during engine inoperative performance
- Engine failure during takeoff before V_{MC}

Notes to the Instructor:

The PT will be learning through example and through teaching. Participate actively in guided discussion with the PT to allow the PT to develop and practice this teaching method.

As suggested in the debriefing section above, a pilot needs to be or to become a self-learner. That is, a pilot need to know when they need to study and they need to how to study effectively. LCG supports the process of teaching the pilot to become a self-learner by involving the “student” in the learning process and by having the “student” evaluate his/her own performance. As you progress through this syllabus, have the PT accept more responsibility for his/her own learning; that is, have the PT lead the discussion on what he needs and will be doing on the lesson. What he needs to be working on. This will require the PT to have a clear mental picture of how each tasks in the lesson is to be done (know the desired outcome of each tasks). A well-prepared student typically does much better than an unprepared student does. This is one of the ways that LCG enhances the learning process. This process needs to be explained to the PT so the PT can utilize the teaching technique in his/her instruction.

This scenario gives the PT a Private Pilot that is having trouble with aircraft control during engine inoperative operations. You should play this out during the course of the lesson and have the PT analyze your performance for common errors, and then discuss possible training activities that might correct the simulated student’s performance. Since there are many possible problems and solutions, this situation provides an opportunity for you to help the PT develop his/her own thinking skills. A guided discussion teaching method can be used here to engage the PT in exploring the possible options. Then have the PT consider which is best. You could take this one-step further by having the PT defend position on which is best and explain why he or she thinks it is best. This could lead to a lengthy discussion, which could identify weakness in the PT’s understanding of the learning process and identify areas where the areas where the PT needs to do more study.

Lesson Preparation and Flight Multi-engines – Lesson 6
Practice Ground Instruction – Mission
GND Lesson 6 (Approximate lesson time 2.0 hours)

Scenario:

You are a MEI instructing with a commercial pilot working on a multi-engine certification. The simulated student has previously completed several multi-engine lessons, but is being introduced to engine failures in multi-engine airplanes during the next lesson.

Lesson Objective:

The PT will practice ground instruction to a simulated “student” by developing lesson plans and presenting on the effects of various airspeeds and configurations during engine inoperative performance, engine failure during takeoff before V_{MC} , and engine failure during takeoff after V_{MC} . The ground instruction will correlate decision making into the tasks by discussing task, risk, and automation management as it applies to multi-engine flight.

Completion Standards:

This practice ground instruction lesson is complete when the PT is able to meet the desired outcomes listed on the grade sheet. The PT will demonstrate the ability of presenting aeronautical decision-making scenarios that may occur in a multi-engine aircraft with an inoperative engine emphasizing airplane performance and control. Additionally, the PT must effectively present the material outlined on the desired outcome grade sheet to complete successfully this lesson.

Desired Outcome Grade Sheet:

Lesson 06 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Demonstration of SRM	Effectively managed all resources available related to the ground lesson	Practice							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Practice							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Practice							
	Discussed and demonstrated proper task management throughout the ground lesson	Practice							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Practice							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Practice							
	Effectively managed the flight CFI-Multi Engine	Practice							
Lesson Plan Presentation	Demonstrating the effects of various airspeeds and configurations during engine inoperative performance								
	- Proper altitude	Practice							
	- Importance of reducing drag	Practice							
	- Importance of maintaining and establishing proper airspeed	Practice							
	- Importance of proper pitch and bank attitude and coordination of controls	Practice							
	- Discuss configuration demonstration	Practice							
	Engine failure during takeoff before V_{MC}								
	- Proper prior planning	Practice							
	- Takeoff briefing	Practice							
	- Use of checklist	Practice							
	- Aborted takeoff	Practice							
	- How to maintain control	Practice							
	- Proper use of brakes	Practice							
	Engine failure during takeoff after V_{MC}								
	- Proper prior planning	Practice							
	- Takeoff weight graph and associated conditions	Practice							
	- Takeoff briefing	Practice							
- Accelerate stop distance	Practice								
- Accelerate go	Practice								
- Inoperative engine rate of climb chart	Practice								

Instructor safety considerations	Safe airspeeds and techniques to intentionally fail an engine during the takeoff roll	Perform																
	Directional control issues	Practice																
	Recovering if the student fails to respond to the failure	Practice																
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide																
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide																
	Discussed and is able to explain assessing the risk of a student and ground lesson	Manage/Decide																
	Discussed and is able to explain factors that affect decision making	Manage/Decide																
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and ground lessons to emphasize risk management and single pilot resource management	Manage/Decide																

Debriefing:

The PT will lead the post flight discussion using a learning method that engages the “student” in learning. The “student” should be encouraged to refer to source materials to teach the “student” how and where to find the information he or she needs. Have the “student” consider several solutions to the problems presented in this lesson. The “student’s” ability to think up possible solutions can be increased through drill and practice. Having the “student” select the best solutions will teach the “student” to judge or evaluate as well as expand the “student’s” exposure to the problems in various situations. This will better prepare the “student” for future problem solving situations.

Assignment for Lesson 7

Lesson Plan development on:

- Engine failure after liftoff, climb, cruise, and descent
- Approach and landing with inoperative engine

Notes to the Instructor:

While the PT is gaining teaching experience, he/she should also be gaining experience using LCG techniques. Additionally, the PT should be gaining experience teaching aeronautical decision-making skills and developing the scenario-based lesson plans to support the development of the ADM skills.

You should be using the technique describe in the debriefing above to teach critical thinking skills to the PT while the PT is learning to use them to teach his or her “students.” If the PT has not be trained under a FITS accepted training program, you may need to demonstrate the method frequently and discuss the training method it’s self. Examples of how judgment and decision-making can be included in this lesson are: the PT could have the “student” consider various situations and the various responses to engine failures, for example. Similarly, you could have the PT discuss various situations he or she could present to the “student.” In both cases, the PT or “student” is solving a problem, considering options, and choosing which option is best. This technique provides the learner the opportunity to practice and enhance judgment and decision-making.

Engine failures and other aircraft system malfunctions are the “trigger events.” As discussed in the front-end material, they are used to trigger responses from the “student” or PT. During ground lessons, they are good launch points for a guided discussion. The guided discussion or similar instructional method should expand the learner’s knowledge of the malfunction or failure and it should provide an opportunity for decision-making practice. Many students will ask for “school solutions” which you should avoid providing; however, if a “school solution” must be provided, qualify your answer by saying that this solution may be the best answer only in this specific situation. Then ask the student if he can think of other situations where another solution may be better. Challenging your student to consider thought provoking questions is an excellent teaching technique.

Lesson Preparation and Flight Multi-engines – Lesson 7
Practice Ground Instruction – Mission
GND Lesson 7 (Approximate lesson time 1.5 hours)

Scenario:

You are a MEI instructing a private pilot working on a multi-engine rating. This is the private pilot's first lesson on engine failures after liftoff, climb, cruise, and descent and approach and landing with an inoperative engine. Previously the private pilot showed a good understanding of maintaining the proper airspeed during inoperative engine operations and showed good control of the airplane during engine failures.

Lesson Objective:

The purpose of this lesson is for the PT to practice multi-engine instruction to a simulated student. The "student" is a multi-engine student in the early portions of the Multi-engine Rating training with emphasis on engine failures and approaches and landings with an inoperative engine.

Prebriefing:

The PT will lead the lesson presentation. The PT is responsible for the creation and presentation of the lesson's scenario and plan of action that meets the objectives of the lesson.

Completion Standards:

This lesson is complete when the PT is able to meet the desired outcomes listed on the grade sheet below. The PT will demonstrate the ability to manage safely the ground lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management. Again, the lesson will be successfully completed when the PT has effectively presented the material outlined on the desired outcome grade sheet.

Desired Outcome Grade Sheet:

Lesson 07 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Demonstration of SRM	Effectively managed all resources available related to the ground lesson	Practice							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Practice							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Practice							
	Discussed and demonstrated proper task management throughout the ground lesson	Practice							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Practice							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Practice							
	Effectively managed the flight CFI-Multi Engine	Practice							
Lesson plan presentation	Engine failure after liftoff, climb, cruise, and descent								
	- Proper prior planning	Practice							
	- Take off briefing	Practice							
	- Inoperative engine rate of climb chart with associated conditions	Perform							
	- Use of checklist	Practice							
	- Engine failure above V_R – takeoff continued	Practice							
	- Engine failure above V_R – takeoff aborted	Practice							
	- Engine failure in flight – speed above V_{MC}	Perform							
	- Engine failure in flight – speed below V_{MC}	Perform							
	Approach and landing with inoperative engine								
	- Use of checklist	Practice							
	- Proper configuration, reduction of drag, and adjustment of engine controls	Practice							
	- Maintaining best engine inoperative airspeed	Practice							
	- Threshold crossing speed	Practice							
- Maintaining control	Practice								

Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide										
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide										
	Discussed and is able to explain assessing the risk of a student and ground lesson	Manage/Decide										
	Discussed and is able to explain factors that affect decision making	Manage/Decide										
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and ground lessons to emphasize risk management and single pilot resource management	Manage/Decide										

Debriefing:

The debriefing should continue to emphasize effective instruction, which includes the material required in the desired outcome grade sheet. The debriefing should cover the PT's debriefing of the simulated "student's" performance as well as the PT's performance.

Assignment for Lesson 8

Review standardization (target airspeeds and power settings) and checklist

Notes to the Instructor:

Encourage the PT to use the guided discussion teaching method during his/her presentations, if the PT is not already doing so. When the PT does use the guided discussion, does the PT offer meaningful alternatives to the student? Can the PT provide plausible explanations for the various alternatives?

The PT should develop a scenario that would be something that his or her "student" might actually attempt to do and lesson plans for each of the items listed in the lesson preparation section of the Desired Outcomes Grading Sheet. The lesson plans should support effective instruction as well as opportunities to drill and practice decision-making.

Lesson Preparation and Flight Multi-engines – Lesson 8
Practice Flight Instruction – Mission
FLT Lesson 8 (Approximate lesson time 1.5 hours)

FLIGHT TRAINING DEVICE/AIRPLANE-MEL

Scenario:

You are a MEI instructing with a commercial pilot working on a multi-engine rating. The simulated pilot is a multi-engine student in the early portions of their multi-engine training who is being introduced to the engine failures and instrument approaches.

Lesson Objective:

The purpose of this lesson is for the PT to practice multi-engine instruction to a simulated student in a flight training device, where available, prior to getting into an airplane. During the lesson, inoperative engine emergencies will be introduced in visual and instrument conditions. In addition, instrument approaches with all engines operating and inoperative engine will be introduced.

The PT should begin to develop the aeronautical knowledge, skills, and decision-making necessary to meet the requirements to instruct applicants for multi-engine land class ratings.

Pre Briefing:

The PT will lead the briefings for this lesson. The PT is responsible for the creation and presentation of the lesson's scenario and plan of action that meets the objectives of the lesson with emphasis in engine failures and instrument approaches with all engines operating and inoperative engine. The PT should utilize the flight-training device effectively in this practice flight lesson.

Completion Standards:

This lesson is complete when the PT is able to meet the desired outcomes listed in the desired outcome grade sheet. The completion of this lesson, the PT will exhibit adequate knowledge and skills necessary to analyze the listed maneuvers and procedures appropriate for engine inoperative operations. Also, the student will be able to explain the principles and techniques of execution, while demonstrating the listed maneuvers and procedures. The PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desired Outcome Grade Sheet:

Lesson 08 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Prior planning	Perform							
	Review inoperative engine emergency procedures	Perform							
Demonstration of SRM	Effectively managed all resources available related to the ground lesson	Practice							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Practice							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Practice							
	Discussed and demonstrated proper task management throughout the ground lesson	Practice							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Practice							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Practice							
	Effectively managed the flight CFI-Multi Engine	Practice							
	Effectively managed all resources available related to the ground lesson	Practice							
Introduction	Engine failure above V_R – takeoff aborted	Practice							
	Engine failure above V_R – takeoff continued	Practice							
	Engine failure in flight – speed above V_{MC}	Practice							
	Engine failure in flight – speed below V_{MC}	Practice							
	Instrument approach – all engines operating	Practice							
	Instrument approach – one engines inoperative	Practice							
	Approach and landing with an engine inoperative	Practice							
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform							

Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide									
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide									
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide									
	Discussed and is able to explain factors that affect decision making	Manage/Decide									
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide									

Debriefing:

The PT will debrief the simulated pilot's performance and should lead the debriefing of his or her own performance. The PT should discuss the places within the lesson where the student's understanding of the items introduced in this lesson can be broadened.

Assignment for Lesson 9

Review maneuvers and procedures appropriate for engine inoperative operations.

Notes to the Instructor:

At this point, the PT should be practicing good decision-making teaching techniques.

The PT should be providing the scenario for lesson that is appropriate for a Commercial Pilot working on a multi-engine rating. If the PT chooses to use a scenario from the FAA/FITS website, have the PT change the scenario to fit a specific geographic location. In other words, have the PT adopt the scenario for his or her own use. Geographic considerations could be mountain, weather, or special use airspace, to name a few. Scenarios to address specific training problems are considered in the next strand while this strand just deals with learning to use effective and realistic scenarios. Realistic scenarios for the simulated student; that is, a scenario that the simulated pilot may actually fly.

This lesson follows two ground lesson covering engine failures and gives the PT the opportunity to demonstrate the concepts taught on the ground. It also provides the simulated pilot an opportunity to apply and practice these concepts.

It is unlikely that every engine malfunction or failure can be taken to a logical conclusion; that is, flown to an ideal airport when the airplane lands for repair. This should be discussed in the briefings so the “student” understands we will do some in-flight repairs, which are not realistic. During the debriefing, carry the malfunction or failure to an appropriate conclusion and incorporate decision-making training (are there other ways to handle this malfunction or failure, which is best, etc.).

Lesson Preparation and Flight Multi-engines – Lesson 9
Practice Flight Instruction – Mission
FLT Lesson 9 (Approximate lesson time 1.5 hours)

AIRPLANE – MEL

Scenario:

You are a MEI instructing with a private pilot working on a multi-engine rating. Again, the simulated private pilot is a multi-engine student in the early portions of their multi-engine training who is reviewing previously introduced and is being introduced to the tasks listed in the Desired Outcomes Grading Sheet.

Lesson Objective:

The PT will practice flight instruction to a simulated private pilot by developing lesson plans with emphasis in engine failures and instrument approaches with all engines operating and inoperative engine. The ground instruction will correlate decision making into the tasks by discussing task, risk, and automation management as it applies to multi-engine flight.

Pre Briefing:

During this flight, the PT will review in preparation for a progress check as well as gain the knowledge and skills necessary to analyze the listed maneuvers and procedures appropriate for engine inoperative operations.

Completion Standards:

This practice flight instruction lesson is complete when the PT is able to meet the desired outcomes listed in the desired outcome grade sheet and must exhibit adequate knowledge and skills necessary to analyze the performed maneuver. Additionally, the PT will be able to explain the principles and techniques of execution, while demonstrating the performed maneuvers and procedures in accordance with the current Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards. The PT will demonstrate the ability of presenting aeronautical decision-making scenarios that may occur in multi-engine flight.

Desired Outcome Grade Sheet:

Lesson 09 Desired Outcome Grade Sheet			Task Grades				SRM Grades		
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight Discussion	Proper Preflight Planning	Perform							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Review	Checklist usage – flow patterns	Perform							
	Systems and equipment malfunctions	Perform							
	Maneuvering with inoperative engine	Perform							
	V _{MC} demonstration	Perform							
	Aborted takeoff (slower than 50% of V _{MC})	Perform							
	Engine failure above V _R – takeoff continued (above 600ft AGL)	Perform							
	Engine failure in flight (above 600ft AGL)	Perform							
	Instrument approach –all engines operating	Perform							
	Instrument approach – inoperative engine	Perform							
	Approach and landing with all engines operating	Perform							
	Approach and landing with inoperative engine	Perform							
Any additional areas that the instructor feels necessary to prepare the student for a progress check	Perform								
Introduction	Demonstrating the effects of various airspeeds and configurations during engine inoperative performance	Perform							

Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform										
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide										
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide										
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide										
	Discussed and is able to explain factors that affect decision making	Manage/Decide										
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide										

Debriefing:

The debriefing should be lead by the PT and the instructor should actively participate in the discussions. Alternative solutions to the in-flight situation should be discussed and judged. Consider how the solution to an engine failure could be different if the performance characteristics of the airplane were different or you were in a different airplane for example.

Assignment for Lesson 10

Review key elements of the maneuvers and procedures of the current Private and Commercial Multi-engine PTS.

Notes to the Instructor:

During this lesson, the PT will review in preparation for the progress check to follow.

The instructor should not hesitate to ask engaging questions during the PT lead pre and postflight discussions to explore appropriate topics in-depth. In some cases, you may simply want to ensure that the PT has an adequate understanding of a topic, in other cases you may be modeling the instructional method to demonstrate how effective teaching technique is, and finally, you can reinforce the importance of the postflight debriefing.

This lesson as the previous lesson will likely present a series of engine failures, which does not allow each failure to be carried to a realistic conclusion. That is, an engine failure after takeoff should mean that you would land and repair the airplane, end of flight. We want to continue the lesson, so we terminate the emergency and move to the next item. Explain this is not realistic to the “student” and have the student discuss what should have been done with such an emergency in real life. You can practice decision-making by having the student discuss other ways the emergency could have been handled and then discussing which solution is best (drilling and practicing decision-making).

Discuss the various ways you could “trigger” an engine failure immediately after takeoff, which method is best, and when is it best. Discuss how an appropriate response in one airplane may not be the best response in a different airplane. Some light twin airplanes are not capable of flight with high-density altitudes, but some are. Similar discussions should be done with each of the malfunctions and failures covered in this lesson.

The PT should be challenging his or her “student” to think by asking for other ways each of the malfunctions and failures could have been handled and then judging the appropriateness of each option.

In the two paragraphs above, the PT is given an opportunity to develop or enhance thinking skills while the PT’s student is given the opportunity in the latter. The process in developing judgment skill is to improve the ability to analyze, synthesis, and evaluate by drilling and practicing.

Lesson Preparation and Flight Multi-engine – Lesson 10
Progress/Performance Check – Mission
FLT Lesson 10 (Approximate lesson time – Oral 1.5 hours – Flight 1.2 hours)

AIRPLANE – MEL

Scenario:

The check pilot will assign the settings for the instruction the PT is to present. Subsequently, the PT will develop an instructional scenario for the assigned setting. The check pilot may choose to assign different settings for each lesson plan the PT is to present or he/she may assign one setting for all.

Lesson Objective:

The purpose of this lesson is for the check pilot to determine that the PT has acquired the understanding and ability to perform and analyze selected multi-engine and inoperative engine maneuvers to a skill level that meets or exceeds the current Private Multi-engine, Commercial Multi-engine, and Flight Instructor Multi-engine Practical Test Standards.

The PT is responsible for the creation and presentation of the lesson's scenario and plan of action that meets the objectives assigned by the check pilot.

Completion Standards:

This lesson is complete when the PT is able to meet the desired outcomes listed on the grade sheet below and exhibits a working knowledge and proficiency by performing and explaining the key elements of the maneuvers or procedures chosen by the check pilot. The PT's performance will meet or exceed that of the current Commercial Multi-engine PTS. The PT will also demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Evaluation – Oral Portion

The student should show progress toward managing, teaching, and performing the tasks required by the Flight Instructor Multi-engine Practical Test Standards. See a current version of the Flight Instructor Practical Test Standards for specific oral tasks that must be covered on a practical test.

Desired Outcome Grade Sheet:

Lesson 10 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Oral Examination	Explain the key elements of the maneuvers or procedures of the current Private and Commercial Multi-engine PTS.	Practice							
Preflight Discussion	PT will brief the student and the instructor	Perform							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Manage/Decide							

Evaluation – Flight Portion

The student should show progress toward explaining, managing, teaching, and performing the tasks required by the Flight Instructor Multi-engine Practical Test Standards. See a current version of the Flight Instructor Practical Test Standards for specific flight tasks that must be covered on a practical test.

Desired Outcome Grade Sheet:

Lesson 10 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight Discussion	PT will brief the student and the instructor	Perform							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Flight Evaluation	Checklist usage – flow patterns	Perform							
	Systems and equipment malfunctions	Perform							
	Maneuvering with inoperative engine	Perform							
	V _{MC} demonstration	Perform							
	Aborted takeoff (slower than 50% of V _{MC})	Perform							
	Engine failure above V _R – takeoff continued (above 600ft AGL)	Perform							
	Engine failure in flight (above 600ft AGL)	Perform							
	Instrument approach – inoperative engine	Perform							
	Approach and landing with all engines operating	Perform							
	Approach and landing with inoperative engine	Perform							

	Any additional areas that the instructor feels necessary to prepare the student for a progress check	Perform											
	Demonstrating the effects of various airspeeds and configurations during engine inoperative performance	Perform											
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform											
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide											
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide											
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide											
	Discussed and is able to explain factors that affect decision making	Manage/Decide											
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide											

Debriefing:

The PT will debrief the simulated student using a LCG process. Subsequently, the check pilot will provide a formative assessment of the PT's performance including the debriefing of the simulated student.

Assignment for Lesson 11

- Prepare lesson plan for normal, crosswind, and short-field takeoffs and climbs, maneuvering during slow flight and stalls, normal, crosswind, and short-field approaches and landings.
- Review identification of common student errors and suggested proper corrective actions.

Notes to the Instructor:

The assigned instructor is responsible for making the next lesson assignment.

For this lesson, a non-assigned instructor is to verify the PT's progress. Accomplish this by doing a practice practical test that covers the items listed in the ground and flight Desired Outcomes Grading Sheets. The progress/performance check should be a scenario or series of scenarios that covers the listed items. Multiple scenarios can be effective and efficient during ground evaluations because malfunctions and failures can be taken to a logical conclusion without the lengthy turn-around required for actual flight. Yes, responses or actions should be taken to a logical conclusion. If a diversion is required, then divert. The check pilot will need to provide the PT with the circumstance or circumstances around which the PT is to use for the lesson plans to be presented and evaluation as well as the type of flight demonstrations that are to be performed for evaluation.

To evaluate the PT's SRM skills, the check pilot should develop "trigger events" that will require the PT to make decisions. Such "trigger events" will likely cause a need for changes to the original plan of action. Grade the PT's responses to the "trigger events" as well as his or her effectiveness in providing good instruction. If the check pilot is also providing instruction on this lesson, the check pilot can discuss other responses the PT could have used and discuss which is best. If instruction is not to be given during the evaluation, suggestions could be offered during the debriefing or provided to the assigned instructor as to how the PT's responses or decisions could have been better.

Multi-engine Instruction – Lesson 11
Multi-engine Flight Instruction – Mission
FLT Lesson 11 (Approximate lesson time 1.5 hours)

AIRPLANE – MEL

Scenario:

You are a MEI instructing with a private pilot working on a multi-engine rating. The simulated private pilot is on his/her initial multi-engine flight. The simulated student has 100 hours of total time with 3 hours of actual instrument time.

Lesson Objective:

During this lesson, the PT will learn to teach effectively normal, crosswind, and short field takeoff and climbs, maneuvering during slow flight and stalls, normal, crosswind, and short-field approaches and landings. In addition, the PT will be able to identify common student errors and suggest proper corrective action.

Pre Briefing:

The PT will lead all briefing for this lesson. The PT will discuss task, risk, and automation management as it pertains to takeoffs and climbs, approaches and landings, and maneuvering during slow flight.

Completion Standards:

This lesson is complete when the PT is able to meet the desired outcomes listed on the grade sheet including demonstrate the proper instructional procedures for conducting a flight lesson for the listed maneuvers in a multi-engine airplane. The explanation will include the identification of common student errors and the proper corrective action. Each of the maneuvers will be demonstrated in accordance with the current Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards. In addition, the PT will demonstrate the ability to incorporating aeronautical decision-making scenarios that may occur in multi-engine flight.

Desire Outcome Grade Sheet:

Lesson 11 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Briefing will be preformed by the PT	Perform							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight CFI-Multi Engine	Manage/Decide							
Introduction	Checklist usage – flow patterns	Practice							
	Preflight	Practice							
	Engine starting	Practice							
	Taxi and engine run-up	Practice							
	Normal and crosswind takeoffs and climbs	Practice							
	Steep turns	Practice							
	Stall recognition and recovery procedures	Practice							
	- power off (full or imminent)	Practice							
	- power on (full or imminent)	Practice							
	Maneuvering during slow flight – in various configurations, bank angles, and speeds	Practice							
	Normal and crosswind approach and landing	Practice							
	Identification of Common Student Errors	Practice							
	Short-field takeoffs and climbs	Practice							
	Short-field approach and landing	Practice							
Zero flap approach and landing	Practice								
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform							

Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide									
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide									
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide									
	Discussed and is able to explain factors that affect decision making	Manage/Decide									
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide									

Debriefing:

The PT will lead debrief the simulated student's performance during this lesson. The debriefing will cover appropriate instruction on the items included in the review and introduction sections of the Desired Outcome Grade Sheet. The instruction will use a teaching method that supports the development of thinking and judgment skills such as the guided discussion.

The instructor will debrief the PT's instructor performance.

Assignment for Lesson 12

Prepare lesson plan for simulated engine failure, equipment malfunctions, and other in flight emergencies.

Notes to the Instructor:

Lesson 11 is the first lesson of strand 2. During this strand the PT will be practicing ground and flight instruction, which typically means that, you are acting as a student; in this lesson, you are a private student working on a multi-engine rating. Where possible, attempt to respond as a student would to the PT's instruction and include common errors. The scenario also says that the student is a low time pilot with almost no actual instrument experience. These factures should influence your performance as a simulated student. Your debriefing must include feedback on the effectiveness of the PT's instruction, identification, and correction of common errors, and thinking and judgment training.

The emphasis in this strand shifts to the PT's teaching effectiveness; that is, the tasks listed in the Desired Outcome Grade Sheet are now graded on teaching rather than on flight performance. The Desired Performance of the PT has been reset accordingly. This does not mean that the PT's flight skills are not important but they are not the primary focus of this stand. When the PT's flight skills affects teaching effectiveness, it should be noted, discussed, and corrected.

The PT must develop the scenario he/she will use to complete the flight lesson around the basic information provided in the above paragraph. If the PT does not have experience developing flight-training scenarios, he or she may need assistance but will be expected to master this teaching skill before the final check. Training scenario should be realistic and authentic for the targeted "student." In this lesson, what type of flying is this low time pilot doing? The Pt may need to invent a purpose for the flight based on his/her own flight interests or may explore your interest so he/she learns how to target his/her student.

Additionally, you should be helping the PT to become a self-learner or to become a better self-learner. To this end, is the PT recognizing his or her own weaknesses and seeking assistance in correcting those weaknesses? Does the PT know how and where to find appropriate resources?

Multi-engine Instruction – Lesson 12
Practice Flight Instruction – Mission
FLT Lesson 12 (Approximate lesson time 1.5 hours)

Flight Training Device

Scenario:

You are a MEI instructing with a private pilot working on a multi-engine rating. You will be introducing simulated engine failures, equipment malfunctions, and other in flight emergencies.

Lesson Objective:

During this lesson, the PT will learn to simulate effectively engine failures, equipment malfunctions, and other in flight emergencies from the right seat.

The PT is responsible for the creation and presentation of the lesson's scenario and plan of action that meets the objectives of the lesson. The PT will make proper decisions in managing the flight lesson and safety of flight.

Pre Briefing:

The PT will lead the briefings and will develop scenario-based lesson plans to meet the lesson objectives.

Completion Standards:

This practice flight instruction lesson is complete when the PT is able to demonstrate the proper instructional procedures for conducting a flight lesson on engine failures and system and equipment malfunctions. The PT will also demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desire Outcome Grade Sheet:

Lesson 12 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Inoperative engine procedures with emphasis on how to safely fail engines	Practice							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Review	Checklist usage – flow patterns	Perform							
Introduction	Aborted takeoff (slower than 50% of V_{MC})	Practice							
	Engine failure above V_R – takeoff continued (above 600ft AGL)	Practice							
	Engine failure in flight (above 1000ft AGL) – use of mixture	Practice							
	Engine failure in flight (above 4000ft AGL) – secure and restart	Practice							
	Engine failure in climb, cruise, and descent	Practice							
	Approach and landing with inoperative engine	Practice							
	System and equipment malfunctions	Practice							
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform							
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide							

	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/ Decide								
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/ Decide								
	Discussed and is able to explain factors that affect decision making	Manage/ Decide								
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/ Decide								

Debriefing:

Again, the PT will lead the debriefing using LCG techniques. The debriefing of the simulated student’s performance should be clearly separate from the debriefing of the PT’s performance.

Assignment for Lesson 13

Prepare lesson plan for simulated engine failure, equipment malfunctions, and other in flight emergencies with close attention to safety of flight.

Notes to the Instructor:

Specific systems and equipment malfunctions are not listed due to the variety of systems and failure possibilities in different makes and models of aircraft. However, the PT should be directed to develop a situation that clearly allows the planned flight to be continued, another situation that clearly needs a diversion, and a third situation where it is questionable whether the flight can be continued or should be terminated.

The guidance in the debriefing section of this lesson calls for separate debriefings for the simulated student’s performance and the PT’s performance. This may be done by allowing the PT to complete the simulated student’s debriefing before beginning the debriefing of the PT. The PT should drill and practice debriefing skills incorporating judgment and thinking skills training to learn to debrief efficiently and effectively. This does not mean that you cannot interrupt the PT’s debriefing to instruct the PT on debriefing techniques and practices.

Give the PT the opportunity to try different techniques during the course of this lesson. At the completion of the lesson, discuss alternative teaching techniques that enhance learning and develop thinking skills (judgment). The PT should determine which technique is best practice and explain why. The instructor could follow the PT’s discussion with a guided discussion to introduce additional techniques and further

consider “best practices.” Remember you should not give the PT the “correct answer,” you may however offer several “what if” questions or similar questions to guide the PT to “best practices.” Also remember the PT may not be aware of the safety concerns involved in a particular technique, a discussion of these concerns may help the PT understand why one technique is better than another is or why it is better in particular situation. Likewise the PT many not be aware of or may not have considered the standard operating procedures at your training facility or for a specific airplane.

The electrical system in most airplanes offers a wide range of malfunctions and emergencies which can promote a better understanding of aircraft systems as well as numerous opportunities practice judgment and decision-making; that is, to develop thinking skills. For example, how is the airplane affected when a single alternator fails? Can all of the airplane’s electrical systems be used? Can the flight be continued or is a diversion needed? The action taken in response to an alternator failure can be graded under ADM as well as under system knowledge, and it can be discussed during the postflight discussion to develop or enhance thinking skills. Different airplanes will have different specific actions required or recommended in their emergency or abnormal procedures operations.

Multi-engine Instruction – Lesson 13
Practice Flight Instruction – Mission
FLT Lesson 13 (Approximate lesson time 1.5 hours)

AIRPLANE – MEL

Scenario:

You are a MEI instructing with a private pilot working on a multi-engine rating.

Lesson Objective:

During this lesson, the PT will learn to simulate effectively engine failures, equipment malfunctions, and other in flight emergencies from the right seat. The PT will also make proper decisions in managing the flight lesson and safety of flight.

Pre Briefing:

The PT will lead all briefing and prepare scenario-based lesson plans that meet the learning objectives of this lesson.

Completion Standards:

This practice flight instruction lesson is complete when the PT is able to meet the desired outcomes listed on the grade sheet as well as effectively teach maneuvering with inoperative engine, V_{MC} demonstration and the effects of various airspeeds and configurations during engine inoperative performance. In addition, the PT will demonstrate proficiency to the practice instruction of maneuvers listed for review. The PT will be able to identify common errors and suggest proper corrective action. Finally, the PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desired Outcome Grade Sheet:

Lesson 13 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Inoperative engine procedures with emphasis on how to safely fail engines	Practice							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							

	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide																	
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide																	
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide																	
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide																	
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide																	
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide																	
Review	Checklist usage – flow patterns	Perform																	
	Aborted takeoff (slower than 50% of V_{MC})	Practice																	
	Engine failure above V_R – takeoff continued (above 600ft AGL)	Practice																	
	Engine failure in flight (above 1000ft AGL) – use of mixture	Practice																	
	Engine failure in flight (above 4000ft AGL) – secure and restart	Practice																	
	Engine failure in climb, cruise, and descent	Practice																	
	Approach and landing with inoperative engine	Practice																	
	System and equipment malfunctions	Practice																	
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform																	
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide																	
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide																	
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide																	
	Discussed and is able to explain factors that affect decision making	Manage/Decide																	
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide																	

Debriefing:

The PT will lead the postflight debriefing and use effective debriefing techniques that promote learning and that develop thinking skills. The PT should debrief his/her performance as a multi-engine instructor.

Assignment for Lesson 14

Prepare lesson plan for simulated engine failure, V_{MC} demonstration and the effects of various airspeeds and configurations during engine inoperative performance.

Notes to the Instructor:

The debriefing should use a LCG process. The PT should be practicing the guided discussion method and offering meaningful alternatives with complete explanations.

Remember there two parts to the debriefing one debriefing for the simulated student's performance and one for the PT's performance. Both parts need to include judgment training.

The scenario in this lesson like the previous lesson has a Private Pilot working on a multi-engine rating; however, in this lesson the "student" is not being introduced to simulated engine failures but is practicing handling multi-engine emergencies. The ground instruction should reflect this is a subsequent flight lesson. The scenario developed by the PT to do this lesson should be different than the one used in lesson 12. The debriefing should build on the discussions used in lesson 12. Practice judgment training by presenting additional solutions to the emergencies and/or other settings, discussing the merits of the new solutions, and then choose the best solutions. The more "what if" situations the student has considered the better prepared the student should be to handle a real emergency under whatever conditions it occurs.

As the simulated student, you will need to manage the instructional challenges you give the PT to allow the PT to complete the lesson. This means you may need to do some maneuvers well while others are done with several "common errors." As you proceed through the syllabus, you may overload the PT to teach him/her to manage the lesson flow. The PT will need to learn to move on when the student's need more instruction than time allows. This guidance is only one way this issue can be handled and it is not meant to suggest that it is the only way it could be handled.

Multi-engine Instruction – Lesson 14
Practice Flight Instruction – Mission
FLT Lesson 14 (Approximate lesson time 1.5 hours)

AIRPLANE – MEL

Scenario:

You are a MEI instructing with a commercial pilot working on a multi-engine rating. The student has an instrument rating and over 100 hours of actual instrument time. The student has recently been hired by a freight company that wants him to fly their twin.

Lesson Objective:

During this lesson, the PT will effectively teach maneuvering with inoperative engine, V_{MC} demonstration and the effects of various airspeeds and configurations during engine inoperative performance. The PT will demonstrate proficiency in the practice instruction of maneuvers listed for review. The Pt will be able to identify common errors and suggest proper corrective action. In addition, the PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Pre Briefing:

The PT is responsible for the creation and presentation of the lesson's scenario and plan of action that meets the objectives of the lesson. The PT will make proper decisions in managing the flight lesson and safety of flight.

Completion Standards:

At the completion of this lesson, the PT will demonstrate the proper instructional procedures for conducting a flight lesson for the maneuvers listed on the grade sheet in a Multi-engine airplane. The explanation will include the identification of common student errors and the proper corrective action. Each of the maneuvers will be demonstrated in accordance with the current Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards. In addition, the PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desired Outcome Grade Sheet:

Lesson 14 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Preflight briefing will be performed by the PT	Practice							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Review	Checklist usage – flow patterns	Perform							
	System and equipment malfunctions	Perform							
	Maneuvering with inoperative engine	Practice							
	Aborted takeoff (slower than 50% V _{MC})	Practice							
	Engine failure above V _R – takeoff continued (above 600ft AGL)	Practice							
	Engine failure in flight	Practice							
	Engine failure on an instrument approach	Practice							
	Approach and landing with inoperative engine	Practice							
	V _{MC} demonstration	Practice							
	Demonstrating the effects of various airspeeds and configurations during engine inoperative performance	Practice							
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform							
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide							

	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/ Decide								
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/ Decide								
	Discussed and is able to explain factors that affect decision making	Manage/ Decide								
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/ Decide								

Debriefing:

The PT will conduct a thorough debriefing of the flight using LCG techniques. This briefing should be followed by a debriefing of the PT's performance as an instructor. The debriefings must include judgment training. The judgment training may come from topics discussed during the LCG including items that were graded differently or graded below the stated Desired Outcome. The judgment training may be a part of an expanded discussion of any of the system malfunctions presented or any event occurring during the flight. Discussing events or items in context enhances learning.

Assignment for Lesson 15

Prepare scenario-based lesson plans for all items selected by the PT. The PT may select items he/she would like more practice on or items that will help build confidence.

Notes to the Instructor:

The instructor should use lesson 15 to review any items needing additional work. You should work with the PT on the selection of items to be covered on the next lesson. Accurately assessing one's personal progress is an important part of self-learning. Discussing the PT personal assessment will help the PT learn to assess his/her performance better. You may need to discuss ways the PT may improve his/her knowledge and where he/she can resource materials. This may be a good place to discuss the importance of a professional library and the types of materials that should be in an instructor's library.

It may not be possible to complete extensive reviews of every item on the Desired Outcome Grading Sheet; therefore, it may be a good time to discuss techniques for managing flight lessons. Some techniques may include time management, prioritization, effective pre- and post-briefings, etc.

Multi-engine Instruction– Lesson 15
Instructional Flight – Mission
FLT Lesson 15 (Approximate lesson time 1.5 hours)

Scenario:

You are a MEI instructing with a private pilot working on a multi-engine rating. The student's father owns a twin and the student wants to be able to fly his father's airplane.

Lesson Objective:

During this lesson, the PT will continue to review and effectively teach maneuvers and procedures outlined in the Flight Instructor Multi-engine Practical Test Standards. The PT will demonstrate proficiency in the practice instruction of the outlined maneuvers. The PT will be able to identify common errors and suggest effective corrective action. In addition, the PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Pre Briefing:

The PT will conduct the briefing for this lesson on the instructor's assigned topics.

Completion Standards:

At the completion of this lesson, the PT will demonstrate the proper instructional procedures for conducting a flight lesson for the maneuvers listed on the grade sheet in a Multi-engine airplane. The explanation will include the identification of common student errors and the proper corrective action. Each of the maneuvers will be demonstrated in accordance with the current Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards. In addition, the PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desired Outcome Grade Sheet:

Lesson 15 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Preflight briefing will be performed by the PT	Perform							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Review	Checklist usage – flow patterns	Perform							
	Short-field takeoffs and climbs	Perform							
	V _{MC} demonstration	Perform							
	The effects of various airspeeds and configurations during engine inoperative performance	Perform							
	Aborted takeoff (slower than 50% V _{MC})	Perform							
	Engine failure above V _R – takeoff continued (above 600ft AGL)	Perform							
	Engine failure in flight	Perform							
	Engine failure on an instrument approach	Perform							
	Approach and landing with inoperative engine	Perform							
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform							
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide							

	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/ Decide								
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/ Decide								
	Discussed and is able to explain factors that affect decision making	Manage/ Decide								
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/ Decide								

Debriefing:

Debrief the simulated pilot’s performance emphasize on the correction of common errors using effective LCG techniques. Then debrief your performance as a multi-engine instructor. The instructor, of the PT, should wrap up the debriefing with a comprehensive review of the PT’s performance including his/her debriefing of the flight as well as the assessment of his/her performance throughout the flight.

Assignment for Lesson 16

Prepare instructor assigned lesson plan.

Notes to the Instructor:

Lesson 16 is one of two lessons designed to make final preparations for the FAA Multi-engine Practical Test. The PT should actively participate in the selection of the lesson plans to be assigned for the lesson 16. As a self-learner, the PT should be able to identify and be seeking appropriate corrective action, training, to master all areas needing additional work. You may assist the PT with the selection of activities as needed; particular, activities that the PT does well to build confidence and comfort.

This lesson should emphasize Private Pilot Multi-engine requirements. The PT’s scenario and lessons plans should focus on these. Lesson 18 covers the Commercial Multi-engine requirements.

The PT should demonstrate that he/she has a good handle on managing the flight activities so all items are adequately covered. You should commit commons errors as the simulated pilot while the PT practices his/her flight instruction. You should balance the instructional challenges with the need to complete all flight activities while assessing the PT’s management skills. In other words, the burden of completing the lesson should rest with the PT and you should test his/her management skills.

Multi-engine Instruction– Lesson 16
Practice Flight Instruction – Mission
FLT Lesson 16 (Approximate lesson time 1.5 hours)

AIRPLANE – MEL

Scenario:

You are a MEI instructing with a private pilot working on a multi-engine rating. This is the private pilot's first multi-engine cross-country flight. The private pilot has trouble maintaining control of the airplane during inoperative engine operations. The private pilot doesn't appear to be considering the effects of the power loss and loss of performance when an engine fails.

Lesson Objective:

During this lesson, the PT will continue to review and effectively teach previously learned maneuvers and procedures as outlined in the Flight Instructor Multi-engine Practical Test Standards. The PT will demonstrate proficiency in the practice instruction of the outlined maneuvers. The PT will be able to identify common errors and suggest effective corrective action. In addition, the PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Pre Briefing:

The PT will lead all briefings for this lesson. The instructor should also cover others area he/she feels are appropriate from earlier lessons.

Completion Standards:

At the completion of this lesson, the PT will demonstrate the proper instructional procedures for conducting a flight lesson for the maneuvers listed on the grade sheet in a multi-engine airplane. The explanation will include the identification of common student errors and the proper corrective action. Each of the maneuvers will be demonstrated in accordance with the current Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards. In addition, the PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desired Outcome Grade Sheet:

Lesson 16 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Preflight briefing will be performed by the PT	Perform							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Review	Checklist usage – flow patterns	Perform							
	Normal and crosswind takeoffs and climbs	Perform							
	Short-field takeoffs and climbs	Perform							
	Steep turns	Perform							
	Maneuvering during slow flight – in various configurations, bank angles, and airspeeds	Perform							
	Stall recognition and recovery procedures	Perform							
	- power off (full or imminent)	Perform							
	- power on (full or imminent)	Perform							
	V _{MC} demonstration	Perform							
	Demonstrating the effects of various airspeeds and configurations during engine inoperative performance	Perform							
	Systems and equipment malfunctions	Perform							
	Identifying and maneuvering with inoperative engine	Perform							
	Engine failure during takeoff before V _{MC}	Perform							
	Engine failure after V _R (above 600ft AGL)	Perform							
Engine failure in cruise flight	Perform								

	Engine failure during an instrument approach	Perform											
	Approach and landing with inoperative engine	Perform											
	Short-field approach and landing	Perform											
	Zero flap approach and landing	Perform											
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform											
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide											
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide											
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide											
	Discussed and is able to explain factors that affect decision making	Manage/Decide											
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide											

Debriefing:

The PT will lead a comprehensive debriefing of the flight and his/her own performance. The debriefing will cover common errors and decision-making. The simulated student should clearly understand the range of options that could be taken to resolve in-flight situations as well as how to complete successfully the flight after a “trigger event” has occurred. At end of the PT’s debriefing of the simulated student’s performance, the simulated student should clearly understand his/her performance is progressing and how it measured up to the desired completion level. The simulated student should also understand what needs to be done to correct any problems and improve him/she own performance.

The debriefing of the PT’s performance should be the last item covered including his/her effectiveness of instruction, management of the flight and training activities, effectiveness of decision-making training, and effectiveness of decision-making during the flight. The PT should clearly understand his/her progress and level of performance toward the desired outcome for the lesson.

Assignment for Lesson 17

Certificates and documents, and other areas that the instructor feels are necessary to prepare the PT for the practical test. Get inputs from the PT on which areas are needed, the PT should be aware of what his/her training needs are.

Notes to the Instructor:

Continue to work on areas that need improvement before the FAA Practical Test. The responsibility for completing the review of all items listed in the Desired Outcomes Grading Sheet is the PT's. You should ensure that the PT understands where the lesson flow can be improved to increase the PT's efficiency and effectiveness. The preflight briefing should establish which of the review items need to be demonstrated and which ones only need to be practiced by the simulated pilot.

Include common errors that can lead to expanded debriefing. Use this method to cover more situations that can be covered in the normal training program. Have the PT use guided discussion or other thinking skills development teaching methods during the expanded debriefing to promote thinking skills and cover options (possible alternative solutions) not used in flight or covered earlier. Allow the PT to explore possible solutions to a logical conclusion and to consider which solution is best. Once a best solution is determined, suggest a different setting, and ask the PT if the solution is still best.

Not being able to complete the listed items required in a lesson may occur for several reasons. The student is not flying well. Remember that you may quickly overload the PT with excessive use of common errors, if you are not testing the PT's ability to handle such an overload, you should keep the errors to an appropriate level. The plan of action within the PT's scenario may waist too much time. Discuss this with the PT. The student or the instructor is not prepared. Appropriate assignment should be made before every lesson. Remind the PT that it is his/her responsibility to be prepared for each lesson.

Multi-engine Instruction– Lesson 17
Practice Ground Instruction – Mission
GND Lesson 17 (Approximate lesson time 1.5 hours)

Scenario:

You are a MEI instructing with a private pilot working on a multi-engine rating. The student is preparing for his Multi-engine Practical Test.

Lesson Objective:

During the lesson the PT will review certificates and documents, and other areas that the PT and instructor feel are necessary to prepare the PT for the practical test.

Pre Briefing:

All briefings will be lead by the PT. The instructor should also cover others area he/she feels are appropriate from earlier lessons.

Completion Standards:

The PT demonstrates an instructional knowledge and skill level that meets or exceeds the criteria as set forth in the current Private and Commercial Multi-engine and Flight instructor Multi-engine Practical Test Standards. The PT will also demonstrate the ability to manage safely the ground lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desire Outcome Grade Sheet:

Lesson 17 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Demonstration of SRM	Effectively managed all resources available related to the ground lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the ground lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
FAR 61	Instructor limitations	Practice							
	Additional ratings	Practice							
	Instrument PTS as it relates to a multi-engine rating	Practice							
Review	Review in preparation for the multi-engine instructor practical test	Perform							
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide							
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide							
	Discussed and is able to explain assessing the risk of a student and ground lesson	Manage/Decide							
	Discussed and is able to explain factors that affect decision making	Manage/Decide							
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and ground lessons to emphasize risk management and single pilot resource management	Manage/Decide							

Debriefing:

The PT should lead the debriefing of the simulated pilot's performance and his/her own performance. The debriefing should cover all differences in the grades, all items graded below the desired outcome shown on the Desired Outcomes Grading Sheet, and any areas where the "student's" knowledge and decision-making skills may be enhanced through guided discussions. You may wrap up the debriefing with an exploration of alternative plans of action and other possible solutions to the challenges and problems encountered. This discussion can be both a demonstration of an effective teaching method (method for teaching thinking skills) and an opportunity to enhance the PT's thinking skills.

Assignment for Lesson 18

Federal Aviation Regulations

Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards

Notes to the Instructor:

The PT should be incorporating effective aeronautical decision-making training in each presentation. This is the final ground lesson before the practical test. Alternative teaching methods and or different ways to handle various instructional problems should be discussed. The PT's instruction should be technically correct and effective. The PT should be incorporating judgment practice and drill for thinking skills development.

Since the scenario in this lesson states that the "student" is a Private Pilot, the PT should be presenting ground lessons for a private pilot working on a multi-engine rating. The scenario does not establish any other instructional guidance. You may vary the instructional challenges through the lesson by changing the "student's" problems. For example, you may say that the "student" is having problems with aircraft control during engine failure operations or the "student" is progress very well and becoming over confident. Remember that the PT is a Certified Flight Instructor working on a multi-engine add-on; therefore, should be able to handle various instructional challenges. Practicing various instructional challenges will better prepare the PT. Discussing the various instructional method that can be used to instruct this "student" and selecting which one may be best, could provide the PT with an opportunity to practice his/her thinking skills.

You and the PT should work together determining which topics will be presented for this lesson. Mix strong and weak topics to practice the weak topics and to build confidence with the strong topics. Following this lesson the PT should be ready for the Oral portion of the practical test.

Multi-engine Instruction– Lesson 18
Review for Practical Test – Mission
FLT Lesson 18 (Approximate lesson time 1.5 hours)

AIRPLANE – MEL

Scenario:

You are a MEI instructing with a commercial pilot getting ready of the Multi-engine Practical Test.

Lesson Objective:

During this flight lesson, the student will review areas that the instructor feels are necessary to prepare for the performance check.

Pre Briefing:

The PT will lead all briefings.

Completion Standards:

The PT will demonstrate an instructional knowledge and skill level that meets or exceeds the criteria for the addition of a Multi-engine rating to his/her Flight Instructor Certificate, as set forth in the current Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards. The PT will also demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Desire Outcome Grade Sheet:

Lesson 18 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Preflight briefing will be performed by the PT	Perform							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Review	Review areas outlined in the Private and Commercial Multi-engine and Multi-engine Instructor PTSs that the instructor feels necessary to prepare for the Practical Test.	Perform							
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform							
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide							
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide							
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide							
	Discussed and is able to explain factors that affect decision making	Manage/Decide							

	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/ Decide								
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Debriefing:

The PT will lead the debriefings using effective teaching methods that promote critical thinking skills and enhance learning; for example, guided discussion. The PT should discuss alternative methods to deal with in-flight situation, which solution is best, and have the simulated student select which is best, and then discuss when the best solution may not be best; in other words, practice thinking, and judgment skills.

Assignment for Lesson 19

The next flight is a practice practical test. Review as required. The PT should identify the topics and areas he/she needs to review. The PT should also be able to describe where he/she will be able to find the material that is needed.

Notes to the Instructor:

Make assignment as necessary. This is the last flight before a practice practical test and reviews the Commercial Pilot maneuvers, while lesson 16 focused on the Private Pilot maneuvers. The next lesson, a practice practical test will include the Private, Commercial, and Multi-engine practical tests.

The PT should be aware of his/her own strengths and weakness. The PT should be selecting the items he/she wants to review. The PT should be responsible for managing the flow of the flight and ensuring that all desired items are completed. The PT should be engaging the simulated student in discussions that promote thinking skills. Finally, the PT should be leading the briefing and debriefings using effective teaching methods.

Specific training maneuvers have not been provided since the number of options is so large. The PT should be providing the detailed scenario (lesson plan) that he/she will use with the simulated student. Does the PT's scenario present a realistic and authentic purpose for the flight?

Are there any topics the PT needs additional work in to be prepared for the practical test? If not, work with the check pilot to make appropriate assignments for the practice practical test.

Multi-engine Instruction– Lesson 19
Local Evaluation Flight – Mission
FLT Lesson 19 (Approximate lesson time - Oral 2.0 hours – Flight 1.5 hours)

PRACTICE PRATICAL TEST– AIRPLANE – MEL

Scenario:

The scenario will be assigned by the check pilot.

Lesson Objective:

The Chief Flight Instructor or designee shall evaluate that the student has the ability to perform the tasks in the Flight Instructor Multi-engine Airplane Practical Test Standards. The student will perform as the PT and the local evaluation check pilot will serve as the Pilot in Training.

This lesson will be conducted as an IFR cross-country flight consisting of a minimum of two legs. The PT is responsible for creating the flight portion scenario and plan of action. The scenario and plan of action should be reviewed and discussed prior to the flight. The local evaluation check pilot has final authority as to the actual scenario and plan of action that will be used.

The PT will manage all phases of the flight lesson. During the flight portion, the local evalutaion check-pilot may deviate from the original scenario for the PT to teach, manage, and perform. The PT will make proper decisions in managing the flight and safety of flight.

Pre Briefing:

The PT will lead all briefings for this lesson.

Completion Standards:

The PT will demonstrate an instructional knowledge and skill level that meets or exceeds the criteria for the addition of a Multi-engine rating to his/her Flight Instructor Certificate, as set forth in the current Private and Commercial Multi-engine and Flight Instructor Multi-engine Practical Test Standards. The PT will also demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Evaluation – Oral Portion

The student must be able to manage, teach, and perform the tasks required by the Flight Instructor Multi-engine Practical Test Standards. See a current version of the Flight Instructor Practical Test Standards for specific oral tasks that must be covered on a practical test.

Desire Outcome Grade Sheet:

			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Lesson 19									
Desired Outcome Grade Sheet									
Scenario Activities	Task	Desired Performance							
Preflight briefing	Preflight briefing will be performed by the PT	Perform							
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide							
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide							
Oral Examination	Discuss areas outlined in the Multi-engine Instructor PTS	Perform							
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform							
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide							
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide							
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide							

	Discussed and is able to explain factors that affect decision making	Manage/Decide								
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide								

Evaluation – Flight Portion

The student must be able to explain, manage, teach, and perform the tasks required by the Flight Instructor Multi-engine Practical Test Standards. See a current version of the Flight Instructor Practical Test Standards for specific flight tasks that must be covered on a practical test.

It is not intended that the student be tested on every procedure or maneuver within each pilot operation, but only those considered necessary by the Chief Instructor or their designee to determine competency in each pilot operation.

Desire Outcome Grade Sheet:

			Task Grades					SRM Grades		
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice	Manage/Decide
Lesson 19										
Desired Outcome Grade Sheet										
Scenario Activities	Task	Desired Performance								
Preflight briefing	Preflight briefing will be performed by the PT	Perform								
Demonstration of SRM	Effectively managed all resources available related to the flight lesson	Manage/Decide								
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide								
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide								
	Discussed and demonstrated proper task management throughout the flight lesson	Manage/Decide								
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide								
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide								
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide								

Evaluation flight	Perform areas outlined in the Multi-engine Instructor PTS	Perform											
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform											
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide											
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide											
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide											
	Discussed and is able to explain factors that affect decision making	Manage/Decide											
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide											

Debriefing:

Discuss and correct any areas of weakness and direct specific areas of review as required.

Notes to the Instructor:

Review the Applicant's Practical Test Checklist outlined in the Flight Instructor Multi-engine Practical Test Standards and review all paperwork for the FAA practical test.

Multi-engine Instruction– Lesson 20
Flight Instructor Multi-engine Practical Test – Mission
FLT Lesson 20 (Approximate lesson time - Oral 2.0 hours – Flight 1.5 hours)

MULTI-ENGINE INSTRUCTOR PRACTICAL TEST – AIRPLANE – MEL

Scenario:

Scenario assigned by check pilot.

Lesson Objective:

The PT will manage all phases of the flight lesson. During the flight portion, the local evaluation check pilot may deviate from the original scenario during the flight portion for the PT to teach, manage, and perform. The PT will make proper decisions in managing the flight and safety of flight.

Pre Briefing:

Note: this is a guide to help prepare the applicant with the proper paperwork and necessary items for the FAA practical test: however, the applicant should always consult current PTS and Advisory Circulars when preparing for the practical test.

1. Personal records
 - a. Pilot Certificate
 - b. Medical Certificate
 - c. Picture Id
 - d. Completed 8710 Form
 - e. Log book showing appropriate flight training and a minimum of 15 hours of pilot in command time.
 - f. Appropriate logbook endorsement for the addition of a multi-engine rating to a flight instructor certificate.
 - g. If applicable
 - i. A letter of discontinuance
 - ii. A notice of disapproval
 - iii. Approved school graduation certificate
 - iv. Examiners fee
2. Equipment
 - a. Current Private and Commercial Multi-engine PTS
 - b. Current Instrument PTS
 - c. Current Flight Instructor Multi-engine PTS
 - d. Current FAR/AIM
 - e. Current Checklist
 - f. Advisor Circular 61-65
 - g. Other reference materials such as
 - i. Airplane Flying Handbook

- ii. A multi-engine reference book
 - h. Current Aeronautical Charts
 - i. Flight Computer and Plotter
 - j. Flight Plan Form and Flight Log
 - k. Current Airport Facility Directory
 - l. View Limiting Device
3. Review the Applicant's Practical Test Checklist in the Flight Instructor Multi-Engine PTS

Completion Standards:

This local evaluation check is complete when the PT is able to complete the tasks required in the Flight Instructor Multi-engine Practical Test Standards. The PT will demonstrate the ability to manage safely the flight lesson through an acceptable use of aeronautical decision-making, risk management, and single pilot resource management.

Evaluation – Oral Portion

The student must be able to manage, teach, and perform the tasks required by the Flight Instructor Multi-engine Practical Test Standards. See a current version of the Flight Instructor Practical Test Standards for specific oral tasks that must be covered on a practical test.

Desire Outcome Grade Sheet:

Lesson 20 Desired Outcome Grade Sheet			Task Grades					SRM Grades	
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice
Scenario Activities	Task	Desired Performance							
Preflight briefing	Preflight briefing will be performed by the PT	Perform							
Demonstration of SRM	Effectively managed all resources available related to the oral evaluation	Manage/Decide							
	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide							
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide							
	Discussed and demonstrated proper task management throughout the oral evaluation	Manage/Decide							
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide							

	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide										
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide										
Review	Review areas outlined in the Private and Commercial Multi-engine and Multi-engine Instructor PTSs that the instructor feels necessary to prepare for the Practical Test.	Perform										
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform										
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide										
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide										
	Discussed and is able to explain assessing the risk of a student and oral evaluation	Manage/Decide										
	Discussed and is able to explain factors that affect decision making	Manage/Decide										
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and lessons to emphasize risk management and single pilot resource management	Manage/Decide										

Evaluation – Flight Portion

The student must be able to explain, manage, teach, and perform the tasks required by the Flight Instructor Multi-engine Practical Test Standards. See a current version of the Flight Instructor Practical Test Standards for specific flight tasks that must be covered on a practical test.

Desire Outcome Grade Sheet:

			Task Grades					SRM Grades		
			Not Observed	Describe	Explain	Practice	Perform	Explain	Practice	Manage/Decide
Lesson 20										
Desired Outcome Grade Sheet										
Scenario Activities	Task	Desired Performance								
Preflight briefing	Preflight briefing will be performed by the PT	Perform								
Demonstration of SRM	Effectively managed all resources available related to the flight	Manage/Decide								

	Discussed and demonstrated the proper use of automation management in all phases of flight	Manage/Decide												
	Identified and discussed areas of risk and made proper decisions in managing those situation	Manage/Decide												
	Discussed and demonstrated proper task management throughout the flight	Manage/Decide												
	Exercised proper aeronautical decision making and risk management while maintaining positional and situational awareness	Manage/Decide												
	Discussed and demonstrated the avoidance of controlled flight into terrain	Manage/Decide												
	Effectively managed the flight a CFI-Multi Engine	Manage/Decide												
Evaluation flight	Perform areas outlined in the Multi-engine Instructor PTS	Perform												
Postflight Discussion	Critique student performance, preview next lesson, and make study assignment	Perform												
Aeronautical Decision Making	Discussed and is able to explain aeronautical decision making at an instructor level as outlined in the Aviation Instructor's Handbook	Manage/Decide												
	Discussed and is able to explain the 5Ps and the use of the PAVE and DECIDE model into multi-engine flight training	Manage/Decide												
	Discussed and is able to explain assessing the risk of a student and flight lesson	Manage/Decide												
	Discussed and is able to explain factors that affect decision making	Manage/Decide												
	Discussed and is able to explain incorporating aeronautical decision making scenarios into ground briefings and flight lessons to emphasize risk management and single pilot resource management	Manage/Decide												

Debriefing:

Check pilot should debrief the PT as required.