FADEC (Full Authority Digital Engine Control) (SCF-SE-48) Notes
2017/5-1-106 (I) PP

Abstract: Lasting 10 to 15 minutes, this presentation acquaints the audience with new engine control technology

Format: Information Briefing - Power Point presentation

Required Personnel – FAASTeam Program Manager or designated FAASTeam Rep (s)

Optional Personnel – CFIs and DPEs who can speak on electronic/digital engine control

AFS 850 Support:

In addition to this guidance document, a Power Point presentation that supports the program is provided. FPMs and presenters are encouraged to customize this presentation to reflect each individual program.

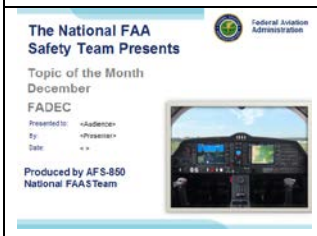
Appendix I – Equipment and Staging

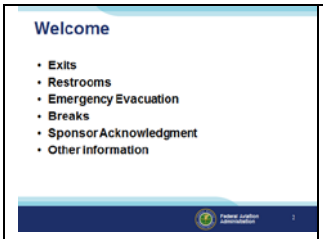
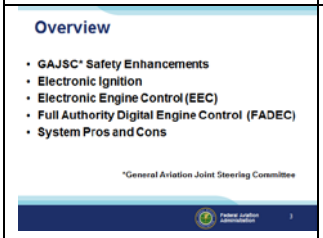
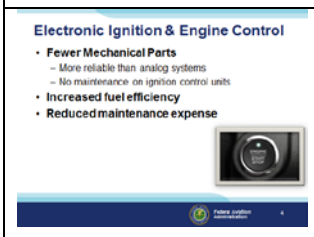
Equipment:

- Projection Screen & Video Projector suitable for expected audience
    - Remote computer/projector control available at lectern or presenter location
        - In lieu of remote – detail a Rep to computer/projector control.
- Presentation Computer
    - **Note:** It is strongly suggested that the entire program reside on this computer.
- Back up Projector/Computer/Media as available.
- PA system suitable for expected audience
    - Microphones for Moderator and Panel
        - Optional Microphone (s) for audience
- Lectern (optional)

Staging:

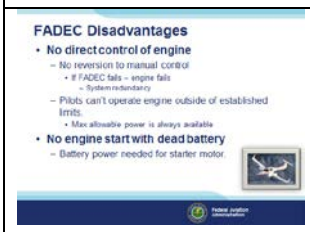
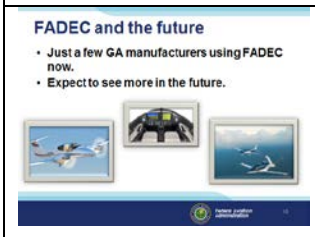
- Arrange the projection screen for maximum visibility from the audience.
- Equip with PA microphones
- Place Lectern to one side of screen. This will be used by presenters and moderator

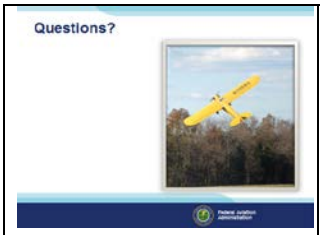
Slides	Script
	**Slide 1** **2017/5-1-106 (I) PP** Original Author: J. Steuernagle March 2017 POC: K. CloverAFS-850 Operations Lead Office 562-888-2020 **Presentation Note:** *This is the title slide for **FADEC*** *Presentation notes (stage direction and presentation suggestions) will be preceded by a* **Bold header**: *the notes themselves will be in Italic fonts.* ***Program control instructions** will be in bold fonts and look like this:* (Click) *for building information within a slide; or this:* (Next Slide) *for slide advance.* *Some slides may contain background information that supports the concepts presented in the program.* *Background information will always appear last and will be preceded by a bold* **Background:** *identification.* *We have included a script of suggested dialog with each slide. Presenters may read the script or modify it to suit their own presentation style.* *The production team hope you and your audience will enjoy the show. Break a leg!* **(Next Slide)**

	**Slide 2** **Presentation Note:** *Here's where you can discuss venue logistics, acknowledge sponsors, and deliver other information you want your audience to know in the beginning.* *You can add slides after this one to fit your situation.* **(Next Slide)**
	**Slide 3** In this presentation we'll talk a little bit about recommendations from a work group that studies loss of control. The General Aviation Joint Steering Committee or GAJSC is a government/industry group that studies GA accidents and makes recommendations for adoption of what they call safety enhancements. One of their safety enhancements involves electronic engine control that ranges from electronic ignition, through Electronic Engine Control to Full Authority Digital Engine Control or FADEC. We'll define each of these systems and discuss their advantages and disadvantages as we proceed. **Presentation Note:** *If you'll be discussing additional items, add them to this list* **(Next Slide)**
	**Slide 4** Whether we realize it or not – most cars today are benefiting from Electronic Ignition and Electronic Engine Control technology. If you press a button to start and stop your car – you've got EEC on board. Evaluating

	input from engine and environment sensors hundreds of times per second, the EEC keeps your engine running at peak efficiency for your operational environment. And those same sensors can provide valuable input as to the health of your power plant. If problems are detected you'll see an indication – usually a service light – on your panel. Fewer mechanical parts means longer service intervals and reduced maintenance expense. **(Next Slide)**
	**Slide 5** As with automobiles fewer mechanical parts equals increased reliability which, in turn, increases maintenance intervals and reduces maintenance expense. You'll also see increased fuel efficiency but, to get all the benefits from digital technology you'll have to cede at least some engine control to computers. There are a couple of ways to do that. The first way is through Electronic Engine Control. **(Next Slide)**
	**Slide 6** With Electronic Engine Control we get electronic ignition and some computer control such as ignition timing and air/fuel mixture.

	(Next Slide)
	**Slide 7** Full Authority Digital Engine Control means just that. There is no direct pilot control over the engine and no reversionary mode to manual control. So if the FADEC fails – the engine fails. System redundancy makes it much less likely for a FADEC system to fail than a traditional magneto system. FADEC also features diagnostic processes that constantly monitor the health and well being of your power plant. The diagnostics are very good at defining small problems before they become big ones. **(Next Slide)**
	**Slide 8** FADEC shares advantages with Electronic Ignition and Electronic Engine Control systems but it takes power management several steps further. FADEC combines throttle, prop, and mixture controls into a single control. Every throttle setting at any altitude results in the optimum Power/Prop RPM/Mixture combination. This enables pilots to realize fuel economy that would only have been dreamed of previously. Automatic engine performance monitoring constantly provides over-speed and over-boos protection throughout the operational range. Pilots can command maximum power and the system will deliver just that and no more. There is no possibility of exceeding limitations to get out of a tight situation. And 24/7 performance monitoring also provides vital diagnostic data with respect to engine

	health. FADEC definitely let's operators see small problems before they become big ones. It's not surprising that FADEC delivers big returns in increased fuel efficiency and reduced maintenance expense. **(Next Slide)**
	**<u>Slide 9</u>** Pilots used to managing their engines directly will likely view FADEC's exclusive – full authority – engine control with suspician at first but with experience they'll learn to trust the system. Hardest to get used to is the fact that the system provides no reversion to manual control. Quite simply; if FADEC fails – the engine fails. System redundancy including redundant system power makes it extremely unlikely that engine control will be lost though. A double magneto failure is statistically more likely. Occasionally pilots have run engines beyond operational limits in order to get out of tight situations. That can't happen with FADEC. Maximum allowable power for any flight level is always available but no more than that. Also, you'll need sufficient electrical power to start and run your engine. Hand propping definitely won't work with FADEC. **(Next Slide)**
	**<u>Slide 10</u>** Although just a few GA manufacturers are using FADEC now, we can expect to see many more in the future. **(Next Slide)**



Slide 11

Presentation Note: *You may wish to provide your contact information and main FSDO phone number here. Modify with*

Your information or leave blank.

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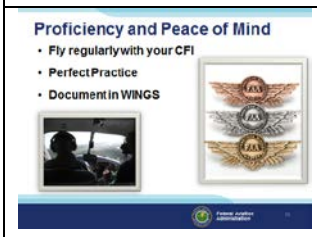

Slide 12

There's nothing like the feeling you get when you know you're playing your A game and in order to do that you need a good coach **(Click)**

So fly regularly with a CFI who will challenge you to review what you know, explore new horizons, and to always do your best. Of course you'll have to dedicate time and money to your proficiency program but it's well worth it for the peace of mind that comes with confidence. **(Click)**

Vince Lombardi, the famous football coach said, "Practice does not make perfect. Only perfect practice makes perfect." For pilots that means flying with precision. On course, on altitude, on speed all the time. **(Click)**

And be sure to document your achievement in the Wings Proficiency Program. It's a great way to stay on top of your game and keep you flight review current.

(Next Slide)

	**Slide 13** Your presence here shows that you are vital members of our General Aviation Safety Community. The high standards you keep and the examples you set are a great credit to you and to GA. Thank you for attending. **(Next Slide)**
	**Slide 14** **(The End)**