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ADS-B System Installation Tips

1. Get the approving airworthiness authority involved as soon as possible

The time to notify the local FAA FSDO inspector or military airworthiness authority of a required field or installation approval action is as early as possible in the installation process. Even when an ADS-B installation will be accomplished under FAA approved STC guidance, the installer will can avoid later issues and possible airworthiness revocation by fully informing the reviewing FSDO inspector as to how the new system interfaces with legacy systems.

2. Know the basis of installation (STC or Field Approval)

While an AML STC may allow installation of ADS-B avionics in a broad range of aircraft, field approvals for those aircraft not listed must be carefully coordinated with the supporting FSDO and ACO. Field approvals - as with STC-based installations - must examine the degree of integration with legacy systems, such as GPS, etc. While a follow-on field approval may use the existing AML STC data package to support the request, the installer may have to submit other information, such as interface descriptions with legacy systems, etc., for the approving inspector to make a final determination.

3. Review and understand all of the installation guidance and airworthiness instructions for the ADS-B system and any affected legacy systems

Installation manuals often contain information that is located in appendices, drawing notes, or the Approved Flight Manual Supplement. Changes to legacy systems, such as connection of a VFR or IFR GPS to the ADS-B display, merit a close look to ensure that the basis of airworthiness for the GPS system is not adversely affected. Examples of changes to a legacy system might be:

- a. Addition of an antenna splitter to the legacy GPS system, which might require replacement of an older, lower-gain component with one that will provide adequate performance when the output is split
- b. Fitting GPS frequency notch filters to existing VHF communications radios
- c. Addition of a suppression system to minimize issues with spurious transponder replies

4. Develop a detailed installation plan that clearly shows the connectivity between ADS-B data link, display, and other aircraft systems

Many issues that arise during an installation can be identified early in the planning process. The need for power adaptors, serialized altitude encoder or converter, data converters, or upgrades to existing antennas should be determined before the aircraft is removed from service, both to keep installation time and cost to a minimum, and to avoid designed-in incompatibilities.

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5. Understand where the ADS-B system and legacy components will go once installed

Physically adapting the system to the available space may require significant effort and possible separate FAA field approval action. An example of this might be fitting a standard GA panel mounted MFD (6-1/4" width) into the narrower standard aircraft console rack (5-3/4" width). This effort could involve changes to existing systems, such as wiring harnesses, mounting bracket configuration, and disturbance of other, previously approved installations (e.g., flight data recorder).

6. Plan the antenna system for best performance

The ADS-B system requires the addition of two or more new antennas on most aircraft, and these are likely to have to compete for exterior real estate with legacy systems such as transponders, DME systems, and VHF communications radios. Some other considerations include:

- a. Planned attenuation for GPS antenna systems when installed with satellite communications systems
- b. Replacement of certain unshielded cables (e.g., cabin speaker) with cabling that is more resistant to radio frequency interference

7. Read and comply with the provisions of the FAA Approved Flight Manual Supplement(s)

An AFMS often contains required installation actions such as addition of placards or other markings (e.g., circuit breaker labels), all of which must be complied with before release of the aircraft for service.

8. Properly document the installation

Troubleshooting and repair actions are more easily accomplished where a complete description of the ADS-B system is available; therefore, system drawings, installation logs, and other record of aircraft modification should be retained with the aircraft maintenance logbooks.

9. Prior to returning the aircraft to service, conduct all required ground and flight checks and programming actions, then document the results

While the installation manuals for ADS-B system components detail the required checks necessary to return the aircraft to service, legacy systems should also be tested to ensure that their operation is not impaired. Part of this process is to ensure that the appropriate data link and display options are enabled/disabled within each ADS-B and legacy component. Examples of programming options include:

- a. Enabling ADS-B/TIS-B traffic and FIS-B weather on the multi-function display
- b. Assigning and enabling data ports for encoder and GPS position data

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c. Enabling enhanced (e.g., data feed to moving map) services from the GPS receiver to the MFD

10. Coordinate with Operations to ensure a common understanding of ADS-B system functions and required operator actions in use

Many maintenance squawks can be avoided by ensuring that maintainers and operators both have a common understanding of avionics system operational procedures. One example of this is the moving map and terrain clearance features of certain moving map displays are not active until activation of a 'DIRECT TO' waypoint or flight plan in the GPS. Lack of understanding concerning this seemingly minor operational procedure might generate repeated "moving map intermittent" squawks from pilots, followed by "could not duplicate; aircraft returned to service" by maintainers. The key to this common education effort is to ensure that the training material used for both mechanics and pilots covers basic installation, operation, and troubleshooting procedures, as well as key preflight procedures.