

Getting the Lead Out: Tips for Driving the Removal of Non-Functioning Equipment

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General avionics consumers present an interesting dilemma. They want to buy avionics, which in this day and age almost immediately comes with a five-figure price tag for the price of the avionics and the installation costs. They also want the equipment to work right the first time and be installed as inexpensively as possible.

This dichotomy in needs and desires, which run counter to the needs of the avionics shop, presents the average shop with some headaches.

By using the right balance of reasons, along with concessions, such as break-even pricing, you can close the sale and get the owner onboard with the best course of action.

One of those headaches has to do with legacy equipment and wiring. This gear ranges from the obsolete to the non-functional or, in some cases, both. It takes up important space in the cockpit, which could be used to make an installation easier. It also doesn't make the customer's plane any nicer looking or generally any better, which makes your shop's initiative to get this equipment — which amounts to dead weight in the cockpit — into your estimates and out of the plane.

In some cases, shops have found by educating consumers, they can be more effective at driving their own needs into the estimates. The key is to provide the right information so the interests of the customer coincide with those of the avionics shop, and

to leverage a new level of synergy in which the customer wants to get “the lead out” of his plane.

Let's run through the primary reasons the average pilot should want to get this equipment out of the plane. The reasons range from improving safety to improving utility. By using the right balance of reasons, along with concessions, such as break-even pricing, you can close the sale and get the owner onboard with the best course of action.

Space: The Finite Frontier

Anyone who has worked around airplanes knows the real estate in the cockpit — whether on the face of the instrument panel or the back of the plane where remote boxes can be installed — is finite.

If all the remote unit space available is taken, you need to resort to other locations to house remote boxes or remove the non-used gear. Similarly, if the panel space is full, you need to find other ways to house avionics so the pilot can reach and use them effectively.

Performing a pre-estimate inspection of the typical installation areas and panel space in the aircraft can help identify this conflict early in the estimation process. To be effective in

this role, the estimator needs a good knowledge of what each remote box supports as well as the telltale signs of failed or abandoned equipment. This information allows the estimator to provide the customer with the pluses and minuses of removing legacy equipment.

One key to identifying which supporting gear is no longer needed is to look at what is in the panel, then compare it to the names on the remote boxes found installed in various locations of the plane. If you see an ARC remote module without any ARC equipment in the panel, chances are you have found a non-functional, deadweight load in the avionics bay.

Wiring Runs and Impacts

The same problems exist for wiring runs in a plane. Looking to the accessible parts of the aircraft structure, you often see how full the wiring runs are, which can provide you with hints about where your estimate needs to be heading.

Full runs mean bigger headaches for ensuring the wires have the right capacity. In some cases, the wires will have to be re-routed to an alternative, more expensive path.

A fair number of planes have a substantial amount of wiring installed that is no longer in use. One of the largest contributors to this issue was the venerable ADF receiver. Looking at the ADF, there was typically the receiver, at times a remote unit, the indicator and the sense antenna. The cabling to the sense antenna tended to run in the

3/8-inch to 5/8-inch diameter range.

To save money, some shops have cut off the connectors and left the cabling in place. That was fine at the time, but if you now are faced with limited space and need to run two WAAS antenna wires aft through the fuselage, getting out this dead wiring can save you from expensive hassles.

Tips and Selling Points

From a review of the finite space available and the cost of working around or having to remove equipment, it is clear legacy and non-functional equipment can add to your expense in an installation and, if not found early in the process, may have an impact on your ability to complete the work on schedule.

The best defense to avoid these problems is usually a good offense: Help customers understand why they should get this equipment and wiring out of their cockpits. There are a myriad of reasons that, depending on the plane, take on greater or lesser importance. Knowing these reasons and how to apply them enables you to educate your customers and help them conclude that removing such equipment is in their best interests.

Power On?

There have been a few cases in which old remote power supplies have been found in the back of planes still in service and still drawing amps from the electrical system. While the intent in removing avionics from service is to render them harmless, sneak circuits can feed current backward through other sources and bring otherwise dead equipment to life.

It is reasonable to assume no avionics shop would allow a plane to return to service in such a condition. While we could speculate on how this happens, it is more important to know it can happen and it can cause problems.

For example, a plane with a generator-based electrical system would be at greater risk than an alternator-based system because generators generally cannot carry as much load as an alternator. By the same token, an alternator-based system would be equally at risk during high-load situations or on systems with a marginal margin in the load profile.

Removing legacy equipment and unused wiring from the plane eliminates this vulnerability in one simple-to-verify action because the equipment cannot draw power if it is no longer installed in the plane.

Because a shop generally cannot tell which wires are energized and loaded unless each one is checked, removing legacy equipment will help speed the calculation review of the loading on wiring. It also can result in the ability to use a lighter gauge wire, saving the customer money. It likely will save your shop time on working through the AC 43.13-1B load calculations and de-rating process, which must be used when you bundle wires together.

Every hour your technician spends working on a project is billable, so reducing this burden of work also can reduce the price of the avionics installation, albeit incrementally.

Clean Installation

Removing legacy gear from the cockpit makes the installation process smoother. Unless the installation is minor and is restricted to the control panel, your shop will be removing much of the access panels and covers to complete the installation anyway.

This is a sunken investment on the part of the customer, which makes it in his best interest to have your shop perform some general "housekeeping" with the wiring at the same time.

Ask customers what they intend to do with their avionics in the future. In general, most pilots want to upgrade to better avionics. Looking at the problem

of old wiring and avionics, it is less expensive to remove them now rather than in the future. Labor rates generally do not go down over time; so there is no better time than the present to perform this type of work.

When there is no reasonable space in the stack, you'll have to cut holes in the existing instrument panel for an avionics installation. There is also the potential need for doublers to compensate for the loss of structural strength. Even with the pre-made, ATI-size punches available, this will take time and money, which could be avoided if the customer took out their defunct panel-mount units.

Strategic Avionics Removal

Looking at the scope of the job, you may be able to point out some areas where the new equipment overlaps with the old equipment.

For example, if your customer is planning to install a good GPS receiver and has an ADF and/or a DME onboard, you can point out that the new GPS generally will take over the functions of both of these devices, making them redundant and unnecessary in the cockpit. By removing these devices, you can leverage the panel space into what the customer wants to install without having to cut expensive holes in the instrument panel.

Better yet, if the equipment is still functioning and can be removed in good condition, you can turn the equipment over to the customer to sell. In such cases, a quick functional test prior to removal can help provide the correct tagging to ensure the status of the equipment is properly understood by both you and your customer.

Antenna space also plays a key role in this discussion. Leaving an unneeded antenna on the outside of the plane increases drag and decreases fuel efficiency. Leaving an old antenna in place, then adding one or more new

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antennas, which further increase drag and decrease fuel economy, is even more of a concern.

Given the current price of avgas, a plane flying 150 knots on average, burning 15 gallons per hour, could squeeze out an extra 2 knots by eliminating an antenna and realize a savings in a 200-hour flying year of \$13. While this is a paltry sum, if you add in two or three other unused antennas or trade off antennas instead of adding to the antenna farm, this savings can grow more substantial.

The advantage to this approach is, your shop will have a cleaner slate during the installation process. As a result, the shop has a better chance of completing the work on time and within the original budget stated for the project. Generally, the results of such an approach are happy customers because you stayed within the estimates and delivered the installation on time.

Improve Useful Load

One area every plane can use help with is in the amount of useful load available. Older planes originally equipped with vacuum-tube radios are the ones with the most to gain.

Some original power supplies weigh in excess of eight points, so removing two of them and the associated wiring from the plane can increase the useful load by as much as 18 to 20 pounds.

That extra useful load can be utilized to carry more passengers or baggage, and when not running at capacity, can improve the performance of the airplane by reducing the angle of attack of the wing and the drag experienced by the airplane. This is another efficiency measure through which the plane can perform incrementally better and the pilot can save on avgas.

Reduce Problems During Installation

Another important reason removing dead equipment should be a priority for both customers and shops is the potential to avoid interferences and problems during the installation.

Old gear can throw off harmonics, which can cause problems if not properly isolated from the aircraft electrical bus or antenna network. Current flow through wires can wreck havoc with indicators, making them behave erratically and requiring troubleshooting to detect the problems.

From the perspective of the shop, this process is difficult because it is hard to imagine the scope of what is causing the problem. Generally, it will take at least an hour or two on a good day to determine what the going-forward actions should be to resolve the problem and to take the necessary actions to complete the troubleshooting process.

In general, when a shop owner finds the existing legacy gear in the airplane was a challenge to the installation, he is less than sympathetic about absorbing the cost into his business.

Looking at the concerns of legacy equipment, it is easy to see a discussion of the available options is an important part of the avionics installation process. By taking a proactive approach in educating customers to the risks and rewards of this effort, you can provide insight for the customer and align the shop's needs and customer's desires into an easy-to-understand and digest package. While this will not be sufficient in all cases, it is enough to get all but the most steadfast aligned and improve your shop's delivery and cost performance in the process. □