Technology is a fickle temptress. It shows you something radically new and so cool you can’t believe it. Then, just when you make a commitment to whatever today’s must-have gizmo is, it pulls the rug out from under you and — wham — yesterday’s next big thing is tomorrow’s can’t-give-it-away.

Just look at the first cathode ray tubes for EFIS (electronic flight instrument system) and EICAS (engine indication and crew alerting system) displays. Thirty years ago, and yes it has been 30 years since they were introduced, CRTs were all the rage. Whether you were flying a Citation 550 or a 757, if it didn’t have glass, nobody wanted it.

It’s Deja-vu All Over Again

Today, liquid crystal displays are doing to CRTs what CRTs did to mechanical instruments in the early 1980s. Thanks to a combination of diminishing reliability and lack of upgrade capabilities, CRTs are, or will soon become, a significant cause of concern for operators that still have them in their aircraft. The reason is quite simple: CRT technology is obsolete, at least as far as general and commercial aircraft are concerned.

When was the last time you saw a new business aircraft with a CRT EFIS? Or for that matter, when was the last time you went to the electronics store and bought a new television or computer with a CRT in it? It’s been a long, long time.

“An integrated cockpit is one in which all the different components can talk to each other and share data between the certified devices behind the panel.”

“It’s (CRTs) old technology with zero growth capability to display new graphical features like e-charts and XM weather,” explained Mike Beazley, vice president of aftermarket sales for the Honeywell Aerospace Business and General Aviation unit. “In the big picture, the overall concern should be focused around the impending obsolescence of CRTs and the improvement in reliability you get with other options.

“In addition, storage and obsolescence issues are affecting better than 80 percent of the spare parts required to repair and return these units to service. Those issues not only significantly impact the cost of repairs, but also unit turn-time.”
According to Gary Harpster, senior avionics sales manager for Duncan Aviation, “Looking into the near term, supportability is the primary issue with CRT longevity. A lot of DOMs (directors of maintenance) pride themselves on the dispatchability of their aircraft, and owners like this. But when a component like a CRT becomes long in the tooth and reliability becomes an issue, it becomes a sore subject real fast.

“While repair is an option, it’s not as easy as you might think. These units were designed and certified nearly 30 years ago. And when you put them on the bench today, it still has to meet the same criteria as it did when it was new. That’s a huge challenge for many shops.”

Craig Peterson, director of avionics marketing for Rockwell Collins, said, “The specifications for color cockpit CRTs have always been stringent, and very few companies ever pursued this market. With the technology becoming obsolete, the sources of supply have declined to just a couple. Typically, CRTs will last for at least six years in commercial and regional aircraft that are in continuous service.”

The problem identified by these experts was that while you can repair a CRT-based EFIS unit, even the best-intended repair could have significant repercussions to other components that can quickly raise the repair costs.

“You can imagine how faded out a 28-year-old TV would be,” Harpster said. “To meet the original specifications, the technician’s options are to turn up the RGB (red, blue and green) guns or run more juice through the tubes to get the colors up there. But then the colors start to bloom, and you lose sharpness. In addition, when you increase the power, you are putting a huge extra load on the old power supply, which has been at best stable and probably degrading for years. Ultimately, this will shorten its service life even more.”

Speaking of service life, how will you know when the CRTs in your panel are heading for problems?

“Some signs the display is heading for future trouble would be seeing the time to power up the unit getting progressively longer,” Beazley said. “The colors will not be as bright and crisp. And probably the loudest message will be when the first display fails.”

Beazley explained that the displays are manufactured and shipped as part of a complete aircraft set. Once the airframe OEM (original equipment manufacturer) receives them, they are installed on the same aircraft. This means they are all exposed to the same environment, good and bad. When one display fails, the odds skyrocket for a near-term failure to a sibling unit.

**The CRT Replacement Path**

According to Beazley, “For now, CRTs are still being repaired, but the cost for this service will continue to escalate. Additionally, it is estimated that in the 2018 horizon, and even earlier for certain CRT sizes, the source of some of the critical components inside a CRT display will no longer be available. The CRTs just can’t do what today’s large, flat-panel LCD type units can do.”

And while the temptation is to rip out the CRTs at the first sign of trouble and replace them with ramp envy-generating LCD displays, there are a few things to consider.

First, how long do you expect to keep the aircraft? If you’re comfortable with the airplane and it meets every mission goal...
Honeywell offers certified solutions to replace legacy CRTs with LCDs on multiple platforms, as shown here in an Embraer Legacy 600.

CRT DISPLAYS
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the way it is, there are options for bringing things like satellite weather and large-format (iPad) displays into the cockpit without enduring the downtime and high cost of a complete panel retrofit.

But even if you plan on keeping the airplane for only a few more years, now may be the time to start thinking of doing the upgrade, particularly if it will make your airplane more saleable on the open market.

“A consideration that sometimes is overlooked by aircraft owners is the fact that LCD upgrades are often recognized in the Blue Book value of the aircraft, dollar for dollar. So if you go to resale your asset, the upgrade will pay dividends. Too often this is ignored in the decision-making process.”

Harpster agreed and added, “Today, owners are very savvy to the avionics situations. As little as two years ago, we still had brokers saying an aircraft should be worth more because it has EFIS (CRT) in it. Not today. From an upgradeability standpoint, the stuff has no more life left in it. Honestly, an operator would be better off from an upgrade standpoint if he had mechanical instruments in there. If that were the case, it would be a cut-and-dried decision on what to do now.

“Anyone looking to buy an airplane today knows they need to have avionics that are upgradable and displays that can handle emerging technologies. Otherwise, they are buying something that is a very short-term solution. Buyers aren’t going to pay top dollar for that.”

“Today’s LCD-based units have significant advantages by enabling NextGen capabilities, which are huge value drivers for anyone considering a cockpit upgrade,” Peterson said. “This requires high resolution to render the content-rich features like synthetic vision, graphical maps, charts and uplinked weather.”

Beazley also noted a benefit to LCD upgrades not so obvious to the typical operator – weight savings.

“Between removing the heavier CRTs, cooling fans and ducting, you can see savings of 50 pounds or more, and that’s not counting the ability to eliminate printed charts,” he said. “There’s another 30-plus pounds. Also, you’re doubling system reliability, going from 4,000 hours on a typical CRT up to 8,000 hours on an LCD display.”

Other Considerations

No doubt the majority of operators and pilots who fly with CRT displays would love to be able to do a complete panel retrofit. And with the benefits to the LCD upgrade previously noted, particularly the cost of the upgrade recognized in the aircraft value, Beazley added, “Downtime from the installation process can be as little as two weeks, particularly for a Honeywell Primus Elite installation. Obviously, customers
want to give up their aircraft for as little time as possible, and the installation turn-time does not need to be significant."

According to Harpster, "There are very little CRT replacement solutions available other than doing the LCD upgrade. At the end of the day, if a CRT was produced that directly replaced an existing legacy CRT, you might have a new unit but it still needs initial STC (supplemental type certificate) certification. Customers are primarily seeking additional capabilities to enhance their flying environment, as well as charts and weather. Those CRTs won’t paint that picture in the level of details we’re accustomed to in the marketplace, especially if you have an early model.

"For example, I had a guy call me the other day with an early Citation and he wanted to upgrade his avionics. I told him he’s stuck; there isn’t an upgrade STC for that airplane available. His only option is to convince 100 other Citation 550 owners to go in together and find someone to develop an STC for their aircraft. That’s very, very expensive; you are talking millions of dollars potentially. You really need 100 airplanes to begin justifying that expenditure, and not just 100 airplanes. You need 100 airplanes with 100 owners who are willing to make a long-term commitment to that particular aircraft. It’s hard to imagine that many aircraft owners willing to make this kind of commitment to develop an STC."

Ongoing Debates Continue

Recognizing that parts obsolescence is an industry-wide issue affecting several manufacturers, authorized dealers and the end users, the Aircraft Electronics Association’s Strategic Outlook Committee tackled this subject in 2012, along with many other challenges facing the industry. Not surprisingly, the committee endured hours of healthy debate on the subject of parts obsolescence.

The consensus, after several months of meetings and examination, was that industry should establish a best-practices guide to begin the controversial conversation of CRT obsolescence.

Needless to say, this will be a long process with many points of view involved. But the time for a reality check is now. How much longer can manufacturers be expected to support spare parts to keep a dying technology alive? [ ]