

Mil-Std-1553 Is NOT Dead!

Test Systems Tells You Why

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No doubt our modern systems demand increased data volume and ever-increasing bandwidth. Regardless, Mil-Std-1553 is far from being dead! In this high-tech age, new technologies and standards seem to go obsolete even before the ink dries. It is amazing that Mil-Std-1553 is still alive and thriving after 45 years.

The 30,000 military aircraft using 1553 with a total number of 1553 terminals (including stores) close to 1 million account for the most numerous applications of 1553. In addition, the venerable 1553 is used in helicopters, land vehicles, tanks, surface and subsurface ships, International Space Station and even in some commercial applications like rail and oil drilling.

The extensive use of 1553 in these platforms and applications with decades of service life ahead will ensure that 1553 will be employed and supported for many years to come. And, for many new space applications (satellites and launch vehicles) that don't require the higher bandwidth, 1553 appears to be the data bus of choice because of its robustness, high reliability and deterministic nature.

The longevity of 1553 doesn't come without challenges. It causes two significant problems. One problem is the loss of "tribal knowledge." Many engineers who have spent their careers working with 1553 in the last 45 years are leaving the industry, or have left, and the real knowledge and experience of 1553 is leaving with them. It is important to bring the "newbies" up to speed on 1553 with its requirements and options. That is why we at Test Systems continue to teach our [Mil-Std-1553 Training Seminar](#) with live, hands-on Lab Sessions.

*Most everyone in the military and aerospace community **knows of** Mil-Std-1553. However, very few **really know** Mil-Std-1553. That lack of knowledge can be **very costly**.*

The other significant problem is that 1553 is ubiquitous with so many good parts available to use in the design of terminals. Why is this a problem? Some conclude that with all these good and proven parts available, problems are so unlikely that they bypass proper testing. After all, "It works on the bench!" Just because a terminal "talks" 1553, or is even working in a system, doesn't mean it meets all the requirements of 1553. Facts are, 1553 has a lot of margin built-in which contributes to its robustness and high reliability. The margin wasn't put in to tolerate sloppy designs – although it helps! **The only way to verify a terminal fully meets Mil-Std-1553 requirements is to test it.** And the best tool available to verify that a remote terminal meets the requirements of 1553 is the RT Validation Test Plan. This is what we do in our [Validation Testing Service](#).

In our 30+ years of testing remote terminals for clients, we have found all kinds of problems, even in terminals using “proven” or “certified” off-the-shelf parts. Problems range from using the wrong parts or using the right parts incorrectly, to problems that would seem to be unrelated to 1553. Mil-Std-1553 has several aspects where design changes that improve one characteristic worsen a seemingly unrelated attribute, causing degraded performance that may not be immediately evident. You can imagine that many of these potential problems tend to relate to lack of knowledge and experience with Mil-Std-1553. And, as we’ve cautioned, that lack of knowledge can be very costly.

A Few Problems in 1553 Terminal Design Using Off-The-Shelf Parts

- **Wrong parts, e.g., transformers**
- **Right parts, Improper usage**
 - Wrong transformer taps
 - Improper Protocol Chip initialization or configuration
- **Seemly Unrelated Items**
 - Power supply issues
 - Inadequate bypassing around critical components
 - PWB trace widths and signal routing
- **And more!**

You definitely should not skip full RT Validation Testing, even as difficult as this may be. One must verify that all the Mil-Std-1553 requirements are satisfied. They were put there for a reason. When you perform RT validation testing, not only will you verify your unit meets the 1553 requirements, but you also minimize the risk of your terminal interfering with the rest of the system operation. And that helps ensure that the entire system will most effectively accomplish its mission for decades to come, just as is Mil-Std-1553.

Leroy Earhart founded TEST SYSTEMS, Inc. in 1979 and has been exclusively providing support for Mil-Std-1553 ever since. Mr. Earhart was part of the original Test Plan Task Group in the SAE organization that developed the RT Validation Test Plan and a number of other test plans for Mil-Std-1553.

TEST SYSTEMS, Inc. provides unique Mil-Std-1553 Training Seminars (onsite and in Phoenix AZ) and an independent RT Validation Testing Service. Our Training Seminars provide a comprehensive discussion of Mil-Std-1553 and includes hands-on lab sessions. Our approved RT Validation Testing Service tests remote terminals to the requirements of Mil-Std-1553. Our clients include the Air Force, Navy, Army, Marines, Coast Guard, NASA, and numerous American and international manufacturers of 1553 terminals. For more information, see our website at www.testsystems.com, or call 602-861-1010.