

From The Lab



BY BOB NEVES



Bellcore's Last Stand(ard)

You can't watch ten minutes of TV without seeing an ad for a different telephone company anymore. I drive through three area codes to get to work. I long for the days before you had to dial as many as 20+ digits to get through to someone. We have cell phones, cordless phones, PBXs, ISDNs, satellite phones, calling cards, network switches, fiber-optics and microwave links. Of course, I heard from the "older folks" about the days when you would pick up the phone, crank a dial and ask an operator to connect you. Those days still exist in some foreign countries I've been in, but they seem like ancient history by today's technological standards.

All these trends in telecommunications have created a high demand for new products, and with each new product comes new PWBs (job security). In the past, if you wanted to build telecommunications products you had to comply with the Bellcore specification. Well, times are changing, and so is Bellcore. What we once knew as the Bellcore institution is gone, and a new private organization has taken its place. What we have recently seen published is what I believe to be the last of the Bellcore specifications.

In the printed wiring board industry, we all identify with "The Bellcore Standard" as *the* communications industry specification. Unfortunately, what we know as the Bellcore specification is really just a small part of a large group of documents. The Bellcore specification we identify with is the GR-78-CORE (the specification formerly known as TR-NWT-000078—thank God they got rid of all those zeroes!). This document is titled "Generic Requirements for the Physical Design and Manufacture of Telecommunications Products and

Equipment." It is a subset of the FR-78 group of documents, which is in turn a subset of the FR-2063 "Network Equipment-Building System" family of requirements. Our Bellcore specification, GR-78-CORE, covers the requirements for PWBs, PWAs, backplanes, cables and connectors. Printed board manufacturers need to be concerned with section six of the document. It contains the specific requirements for printed wiring boards. Also of interest are sections thirteen and fourteen which define the qualification and conformance tests required for compliance.

Section six of the GR-78-CORE contains 248 individual paragraphs. These paragraphs are labeled as requirements (R), conditional requirements (CR), objectives (O), conditional objectives (CO), conditions (Cn) and industry practices (IP). These paragraphs are in most cases very similar to the IPC-6012 with some notable additions. Sections 6.1.3.9, 6.2.2.4 and 6.2.2.5 describe the requirements for insulation resistance testing. This testing, commonly known as SIR testing, comprises much of what most people think of as the Bellcore requirements. For more information on SIR testing, see my column in the June 1997 issue of *CircuitTree*.



Just Who Is/Was Bellcore?

Back in the days before deregulation, there was "Ma Bell" or "the phone company" or just "AT&T". It was an institution that was as American as the railroads, prodigy of the famous phone inventor Alexander Graham Bell. It was a monopoly to beat all monopolies. Ma Bell was eventually encouraged to break itself up. It formed the "Seven Baby Bells" or, more formally, the Regional Bell Operating Companies (RBOCs). I've never seen any pictures of Ma Bell, but rumors about her and her relationships with her children abound.

The septuplets, now weaned and separated from their parent, banded together for survival as cooperative siblings and formed a Research and Technical Center. This center was established to meet their combined appetites for new technology and was built around collaboration and cooperation. This new group subsidiary was called BELL COmmunications REsearch, or BELL-CORE, and was established in 1984 when AT&T (Ma Bell) broke up.

Just who are the "Seven Baby Bells?" Ameritech, Bell Atlantic, BellSouth, NYNEX, Pacific Telesis, SBC Communications, and U.S. West.

As siblings will, the babies grew up and began to enter new markets, all the while developing more competitive and divergent strategies. As the fight for long-distance and cable television businesses

Bob Neves is the president of Microtek Laboratories, an independent test facility. Prior to his tenure at Microtek, Bob worked in quality management and engineering in PWB manufacturing. He currently serves as the IPC's Rigid Board General Committee chairman, Rigid Board Test Method Task Group chairman, Laboratory Qualifications (IPC-QL-653) Committee chairman, member of DESC's Tiger Team for MIL-P-RRRRR (MIL-PRF-31032), member of Blue Ribbon Committee for MIL-S-XXXXX (MIL-PRF-5X) and convener of IEC TC52 Working Group 10 Printed Wiring Test Methods. You can reach him by e-mail at BobNeves@thetestlab.com or at the company web site: <http://www.thetestlab.com>.

heated up, the Baby Bells faced a future where they would be competing against each other for the first time. By the mid-1990s, each baby was doing much of its own company-specific research while developing proprietary communications software. Funding for joint projects began to dry up as each feared leaks of competitive business practices to the other. It was decided by the siblings that their group effort, Bellcore, would be put up for sale.

In 1997, Bellcore was sold to SAIC, the largest employee-owned research and engineering company in the United States. What does this sale mean? For one thing, it means technical support on standardization issues has disappeared. The latest version of the GR-78-CORE was published during the sale in September 1997. In the past, if you had a question on a specification, you could call the "engineer in charge" and get an answer. That has proved very difficult to do since the sale and on-going re-organization. A case in point is that we found what we believed were several significant typographical errors in the GR-78-CORE effecting the SIR test and had a difficult time finding someone to give us an answer. When we finally found a contact

(Tony Ali), we were told that these were indeed errors and received a fax from him detailing the corrections. It appears that there is no intent to revise this document, and I'm sure that very few people have this updated information. The corrections we received are inset below:

Corrections to GR-78-CORE:

1. Page 4-9, Note 1: "(1 mm)" should read "(1 μ m)."
2. Page 6-28, R6-189 second line: "10 megohms" should read "104 megohms."
3. Page 13-1, R13-1, Item 3: "13.1.4" should read "13.1.3."
4. Page 13-1, R13-1, Item 4: "13.1.5" should read "13.1.4."
5. Page 13-11, Table 13-5, Resistance to soldering process, for both legend and marking inks as well as for adhesives: "13.2.5" should read "13.2.3."
6. Page 14-6, 14.4.1, Item 2, second line: The first "10 ohms" should read "1013 ohms," and the second "10 ohms" should read "1012 ohms."
7. Page 14-9, Table 14-3, Rows 3 and 4: "3 X 104" megohms should read "7 X 103" megohms.

It is still unclear whether SAIC will continue the standardization effort historically held by Bellcore and whether the telecommunications industry would even adopt standardization generated by a privately owned company. The IPC has begun to take up some of the "standardization slack" left from this change of Bellcore's focus. The IPC has a task group which has generated detailed information on SIR, and the IPC-6012 PWB performance document contains provisions for applying some of the unique telecommunications industry requirements to IPC-6012 PWBs. The telecommunications industry is booming, and I expect that standardization in this area will become more complex and fragmented before consensus is generated again. Stay on top of your customers, as their demands upon you may be soon changing. As you all know, for good or for ill, every baby grows up. Copies of the Bellcore SIR pattern that we generated, along with a copy of the fax we received from Bellcore detailing the changes to the GR-78-CORE are available at no charge on our Web site, <http://www.TheTestLab.com>.