

Putting a notch into digital sound

Digital audio tape offers the possibility of making crystal-clear copies of recordings, with none of the background hiss typically heard on tape. However, that possibility alarms the recording industry, which has been championing an electronic system designed to prevent people from freely copying recorded music. After five months of tests done at the request of three congressional subcommittees trying to resolve conflicting claims, the National Bureau of Standards (NBS) in Gaithersburg, Md., last week concluded that the proposed copy-prevention scheme "does not achieve its stated purpose." Moreover, some listeners can hear a difference in sound quality.

The copy-prevention system, developed by CBS Records in Milford, Conn., and known as Copy-code, involves electronically filtering out a narrow band of frequencies from any recorded music. This "notch" in the recording is centered at 3,840 hertz, a frequency that lies between the highest B-flat and B notes on an 88-key piano. Circuitry in the tape recorder would scan incoming signals and stop the machine from recording if the notch were detected.

NBS researchers found that such a copy-prevention system is not foolproof. Sometimes the system allows notched music to be recorded, and sometimes it fails to record music that is not notched. Moreover, NBS engineers designed and constructed five different circuits that could be attached to a tape recorder to defeat the copy-prevention system. According to NBS, a competent electronics

technician could build any of these circuits for about \$100 in parts.

Because the system requires the deletion of certain frequencies from a recording, another key question was whether a listener can readily hear the difference. A series of listening tests showed that for some listeners and for some musical selections the inclusion of the notch has a discernible effect.

The effects of the notch are "extremely subtle," says Irwin Pollack of the University of Michigan in Ann Arbor, who conducted the listening tests. "I reject the extreme position that the [system's] action is so evident and pervasive that it will be immediately recognized by unsophisticated listeners. I also reject the extreme position that the [system's] action is so benevolent that it cannot be detected." However, there is enough of a difference to warrant caution about allowing such electronic tampering.

"The record industry and the electronics industry have strived for the last 20 or 30 years to get towards perfect reproduction of sound," says Gary Shapiro of the Home Recording Rights Coalition in Washington, D.C. The proposed copy-prevention system represents a step backward, he says.

The Recording Industry Association of America, also based in Washington, D.C., says it accepts the NBS results. But the association plans to continue pressing Congress for some form of copy-protection or compensation. — I. Peterson

FDA warns aspirin makers

Stressing the preliminary nature of a recent study showing aspirin's prevention of first heart attacks, Food and Drug Administration (FDA) Commissioner Frank E. Young told aspirin manufacturers last week that advertisements making such claims would be considered "mislabeling" and could lead to federal regulatory action. Young met with manufacturers at FDA's headquarters in Rockville, Md., to discuss industry's response to two studies released in January. The U.S. study found a marked decrease in the incidence of first heart attacks among men taking aspirin every other day (SN: 1/30/88, p.68). A smaller study by British scientists, however, failed to find any benefits (SN: 2/6/88, p.84). Young warned the industry representatives that the FDA will not make a final decision on the appropriate guidelines to physicians until further studies are done and questions answered about an increase in strokes among test subjects taking aspirin. In a prepared statement, Young said the manufacturers "agreed to exercise voluntary restraint and refrain from further promotion of the study results" pending the final results. □

U.S. education: Failing in science?

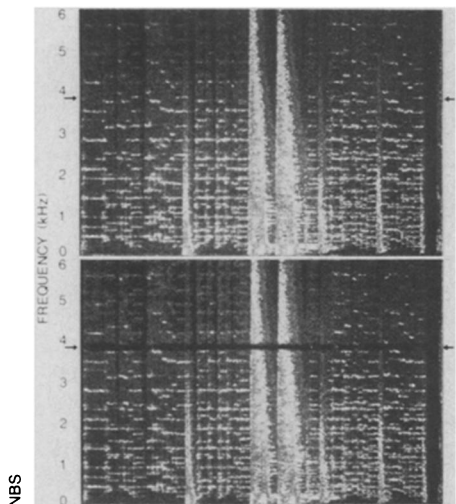
U.S. science and math education at the primary and secondary levels is foundering, according to two new surveys released last week by the National Science Foundation. Preliminary results from one survey comparing students' science and math achievement in 17 countries ranked U.S. students fair to poor. A second, U.S.-only study identified worrisome trends in both the nation's teaching practices and its science-teacher education.

The multi-nation study, conducted by the International Association for the Evaluation of Educational Achievement, an association of research centers, compared students' performance on special standardized tests at the roughly fifth-, ninth- and twelfth-grade levels. The study looked at approximately 150 students at each of these levels in each country. While U.S. fifth-graders ranked eighth among 15 responding nations, U.S. ninth-graders tied with those in Thailand and Singapore for fourteenth place in a field of 17 responding nations.

But these are grade levels at which all students are taking the same courses. What about the high-achieving science "specialists" — high school seniors taking an optional second year of advanced biology, chemistry or physics? Among the 13 countries responding — Australia, English-speaking Canada, England, Finland, Hong Kong, Hungary, Italy, Japan, Norway, Poland, Singapore, Sweden and the United States — U.S. students placed last in biology, eleventh in chemistry and ninth in physics.

What should concern U.S. education policymakers, says Richard N. Wolf of Teachers College at Columbia University in New York City, who was one of the survey's two U.S. coordinators, is "this apparent progressive decline" in science achievement: from the middle-ranking younger grades — which include even below-average students — to older science specialists.

Bill C. Aldridge, executive director of the Washington, D.C.-based National Science Teachers Association, describes the low rankings given the best U.S. science students as "pretty distressing." Nevertheless, he says, their international standing "is very easy to understand if you look at the other [nations'] curricula." Topping the survey's list for twelfth-grade science specialists were Hong Kong, England and Singapore — nations where these students take only science and math courses. Such curricula are in sharp contrast to a more varied training given U.S. students. (Wolf, who studied this "two-cultures phenomenon" in British Commonwealth countries, says he found that by offering only literature or science in upper grades, "you often had scientists



This pair of spectrographs demonstrates the effect of a proposed copy-prevention system on a 70-second segment of Copland's composition "Fanfare for the Common Man." The system functions by filtering out a narrow range of frequencies, as indicated by the thin, black band across the lower spectrograph.