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On The Cover . . .

Cyril N. Hoyler A'35-SM'45 demonstrated the Minividicon, among other things, at the November meeting of the San Diego Section. The transistorized camera shown generated a complete r-f picture which was displayed on an unmodified conventional receiver tuned

to Channel 2. Mr. Hoyler is holding a Minividicon just above the camera; a standard Vidicon appears to the left of the receiver near the dummy's feet. The rectangular object mounted on the pole in the center of the picture is an adjustable light source.

San Diego



BULLETIN



ACCORDING
TO HOYLER

The Institute of Radio Engineers

SAN DIEGO SECTION

P. O. Box 6474, San Diego 6, Calif.

Last Meeting

One for the Books

Certainly one of the IRE's major functions, which is honored more in the breach than the observance, should be to convey to the non-engineering public some feeling for the philosophy, techniques, and achievements of electronic engineering. Through the courtesy of the Radio Corporation of America, the San Diego Section was able to implement this function for some 225 members and guests at the November meeting. And to implement it with sophistication, charm, and deft humor which radiated at high frequency from **Cyril N. Hoyler A'35-SM'45**, Manager of Technical Relations at RCA Princeton. The result was the most delightful IRE evening of the year.

Mr. Hoyler began with a few slides showing the Princeton laboratories, from their 189-acre manicured lawn to a rat's nest of haywire and breadboards alleged to represent a typical research lab bench. He passed quickly from the where to the what, pointing out the prime concern with electrons (and holes) in motion, in and out of solids, and how they got that way.

The phenomena involving the interplay of electrons and photons were the bases of his first demonstration. The first phenomenon was electroluminescence: electric field applied to phosphor-like material produces photon emission. Mr. Hoyler showed a small electroluminescent panel which glowed greenish-yellow, but advised us that other colors were available. To demonstrate photoconductivity, in which photons knock electrons into the conduction band, permitting current flow, he connected the electroluminescent panel in series with a photoconductive panel across the power source. With the house lights off, the electroluminescent panel remained dark until the speaker shone a flashlight on the photoconductive panel. The stronger the flashlight beam, the brighter the glow.

The next demonstration was a logical extension of the two panels in

series - the light amplifier. Here the panels are placed in contact between two transparent electrodes. A dim image was projected onto one side (photo conductive) of the sandwich, and a much brighter one appeared on the other (electroluminescent). Although relatively high gains are possible, the output signal level is still quite low; presumably the device demonstrated is similar to that described by another RCA Princeton man in the October issue of the Proceedings.

Light amplification was one of three "birthday" presents that **David Sarnoff A'12-M'14-F'17** requested from the Princeton staff for his 50th anniversary with RCA and predecessor companies. The second was the tape recording of color television images, demonstrated in a "perfected" form in New York last month, and the third was all-electronic air-conditioning. Such air-conditioning could be produced without fans or drafts by creating large cold panels along one wall of a room, and depending on convection for circulation. The panels have now been built experimentally, as has a no-moving-parts refrigerator based on the same principle. The principle, of course, is the Peltier effect.

The Peltier effect, in which a junction of dissimilar metals is cooled when a current passes through it in the proper direction, is not new. But only through modern research has it been possible to obtain cooling of the order of 50 degrees or 60 degrees. Mr. Hoyler exhibited several developmental cooling plates (efficiency approximately 25%), and created, in a few minutes, a small piece of ice on a toothpick - which he aptly dubbed an electronic popsicle. The popsicle was freed from the freezing chamber simply by reversing the current briefly to produce a hot rather than a cold junction.

While the popsicle was being frozen, Mr. Hoyler demonstrated Electrofax, which produces permanent images on a zinc-oxide coated paper without chemical development. The material can be handled under normal room illumination, and is ready for exposure after a high static charge has been applied to its surface. This

charge is selectively dispersed by the photons in a briefly-projected image, generating a latent image which becomes visible when the paper is dusted with a black plastic magnetic powder. For permanence, the powder can be fused into the paper in an accessory oven.

The next act in the Hoyler circus displayed new developments in television - specifically a small camera built around the Minividicon, a small vidicon measuring about 1/2 inch by 3 inches. This camera draws 5 watts of 60-cycle power, is completely self-contained, and generates not just a video signal, but a full-fledged modulated r-f carrier that can be picked up on a conventional receiver on channel 2 or 3. The camera exhibited excellent lowlight sensitivity, with a fixed subject.

Mr. Hoyler's impressive finale was devoted to explaining and demonstrating (via tape recording, primarily, as the original equipment is on the bulky side) the music synthesizer developed under **Harry F. Olson A'37-VA'39 SM'48-F'49**. First, the audience was treated to a brief review of musical theory history, from Pythagoras to Helmholtz. Second came a capsule of musical geography, which revealed that 138 different musical scales are or have been used in various parts of the world. Third was a rapid exposure to a few purely sinusoidal sounds, which concluded with the observation that the upper range of human hearing remains at 15 kc until age 40, after which it falls off at a rate of about 1 kc each year. At this point, some middle-aged Senior Members, calculating that they would soon be hearing only pure dc, were seen to pale noticeably.

The six fundamental characteristics of every musical note were then discussed, plotted, and demonstrated: pitch (frequency), timbre (harmonic content), loudness (amplitude), envelope (rise-time, duration, decay-time), portamento (glide), and vibrato (a-m or f-m). In the RCA synthesizer, all of these can be changed more or less at will or to be more specific, they can be changed to create any one of 2⁴⁰ (over a trillion) different sounds. This may not be the answer to the Russian menace, but it is certainly a fascinating device. The characteristics of each desired note are controlled by a punched paper tape; the synthesizer input looks like a cross between a typewriter and a player piano.

The net result of having so many variables at the operator's command

is that the synthesizer can simulate not only any existing musical instrument, but also a number of instruments which are not now, never were, and may never be, invented. Several such imaginary instruments were synthesized, first individually and then tout ensemble, in the first "selection" played back by Mr. Hoyler: Irving Berlin's "Blue Skies." They were never bluer, coming in somewhere between Guy Lombardo and a Trinidadian steel band.

From Berlin to Bach was the synthesizer's next move, producing a Fugue that sounded every bit as though it were being played on a sixteenth-century harpsichord. The BULLETIN suspects, however, that there's more than electronics to the synthesizer's magic, the more consisting primarily of **Herbert Belar** - who codes the input tapes. Mr. Belar claims to have learned just enough about music to convince his parents that he was not cut out to be a violinist; the obvious conclusion, after an exposure to the synthesized performances, is that either he is a master of understatement or his parents were extraordinary skeptics.

It was a quick hop across the years to Chopin and his Polonaise Brillante, played on a synthesized piano. For those in the audience who were old enough to remember movies, this brought back fond memories of Cornel Wilde chasing Merle Oberon (or was it Olivia de Havilland?) through the Arc de Triomphe. For those who were not, it sounded real cool.

Next to get the synthesizer treatment was the pipe organ, as Mr. Belar coded a Hungarian Dance of Brahms with brilliance, if some incongruity. Then there was "Clair de Lune" synthesized in the style of Jose Iturbi, followed (or was it preceded?) by "Clair de Lune" as actually recorded by Iturbi at the piano. While it might be argued that Debussy lost both times, there is no question but that RCA won.

And in the homestretch, RCA put on a superb display, beginning with "Nola" synthesized on an imaginary "bass piano", and came down to the wire with Stephen Foster in the saddle, whipping a hillbilly band through "Camptown Races" and "My Old Kentucky Home." By this time, there was hardly a dry eye in the house. The thunderous applause that met Mr. Hoyler as he stepped down from the platform paid eloquent tribute to a magnificent performance.

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Chairman's Message

Edward J. Moore

Congratulations on a fine turnout for our November 4th meeting. I am sure that all of the 225 or more members and guests attending will agree with me that Mr. Cyril N. Hoyler, Manager of Technical Relations for the David Sarnoff Research Center of the Radio Corporation of America, at Princeton, New Jersey, gave one of the most entertaining and informative lectures and demonstrations on "new adventures in electronics" we have had to date. Hats off to RCA labs for sending out such a well-manned technical and scientific demonstration unit.

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At recent (as well as not-so-recent, one suspects) meetings of the Section's Executive Committee, a recurrent minor-key theme has bemoaned the attendance figures of Section Meetings. With the ingenuity for which engineers are justly famous, Section officers have improvised upon this theme to produce a variety of dazzling solutions. There is a whole repertoire of arias on door prizes, fugues on dinner dances, minuets on bingo, and serenades on "lucky" BULLETINS. There are invidious comparisons in counterpoint between IRE attendance and the attendance of other local organizations. That all this music is so much whistling in the dark was never clearer than at the November Section Meeting.

There is obviously nothing wrong with IRE attendance that good general-interest meetings won't cure. More than two hundred members, wives, and guests (including only token AIEE representation) crowded into NEL despite the fact that it was not the usual meeting night, and that it was even a bowling night. Does anyone suggest that there are 200 people in San Diego who would like to hear, on their own time, about vitreous capacitors or cesium resonances or solid-state framistats? Even the Junior

Chamber might pause at that. Does anyone suggest that 200 otherwise sober citizens will not give up the joys of Twenty-One, Studio One, Badge 714, hearth, and home; hire babysitters, and trek to the wilds of Point Loma to find out what's new in electronic gymnastics, gadgets, sleight-of-hand, and minor miracles? Last month's meeting gives him the lie in the throat, as they used to say.

Now it so happens that those 200-odd curious souls had no way of knowing, beforehand, that they were going to come away from what one of them was heard to call "the best IRE meeting I ever attended." But the important thing to remember is that suddenly, out of almost nowhere, an aura of good feeling towards IRE activities has been created where none existed before. After all, engineers (and even a number of engineers' wives) are only human. And being human, they appreciate a brilliant and entertaining speaker like Cyril Hoyler as much as the next fellow (or maybe even a little more, if they attend technical meetings with some regularity).

This is not to suggest that IRE meetings must always be of broad appeal, for IRE serves the specialist, as well as the human being, in all of us. But the rise of the Professional Groups meets just this challenge in the national IRE, and it should be expected to meet some of the specialist's needs locally as well. There has been much criticism of the PROCEEDINGS on the ground that nobody can understand them any more; perhaps the same is true of many of our Section Meetings. It might be well to consider devoting alternate Meetings to specialized and general-interest topics.

A lot of people in San Diego are thinking, subconsciously at least, rather kindly of the IRE these days. And the hard-working Program Chairman has no intention of allowing all this goodwill to dissipate; this month's (December's) Meeting again brings us a nationally-known good speaker. At the dinner before last month's Meeting, Mr. Hoyler told of his mounting apprehension once during a talk by Ralph Evans, because his turn to speak came next, and Mr. Evans was obviously no one to follow. Now the tables are turned, and Mr. Evans follows Mr. Hoyler. While we cannot envy Mr. Evans, the opportunity which this pair of aces back-to-back has given San Diegans in general, and IRE members in particular, is enviable indeed.