Construction and assembly techniques followed in building the second feedthrough were much the same as those followed in the first. The OFHC copper parts were spun and machined to tolerance. All metal parts were brazed with Nioro brazing alloy prior to final assembly. The final assembly, which consisted of ceramic-to-metal seals, was made with the lower melting braze alloy, Cusil.

Letters to the Editor

Prompt publication of brief reports of NEW ideas in measurement and instrumentation or comments on papers appearing in this Journal may be secured by addressing them to this department. No proof will be sent to the authors. Communications should not exceed 500 words in length. The Board of Editors does not hold itself responsible for the opinions expressed by the correspondents.

Self-Sampling System for Measurement of Picosecond Pulse Characteristics

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THE chronotron technique discussed under the above title by Dimitrios C. Agouridis[1] in the December 1962 issue of this Journal is an interesting application of the sampling method. Similar devices yielding fractional nanosecond resolution have appeared in the literature of the past decade.[2,3] The title of the paper, however, conveys the impression that the system proposed by the author is capable of much better pulse-width resolution than the experimental results indicate. Further, the author seems to imply in his opening paragraph that existing oscilloscopes are not capable of significantly higher resolution.

The ultimate time resolution of a chronotron system is directly related to the speed of the detector, and less directly to the width of the sampling pulse. The most common detector for this use consists of one or more semiconductor diodes, hence the time resolution of the scheme proposed by Agouridis is limited by the detector diode characteristics. Since a sampling oscilloscope is limited by its sampling diodes, it appears that the ultimate resolution of a sampling oscilloscope is very nearly the same as that of a chronotron system. It would seem, therefore, that the measurement of picosecond pulse characteristics might be more conveniently accomplished by means of a sampling oscilloscope.

The Tektronix type 661 oscilloscope with the type 4S1 sampling unit and the type 5T1 timing unit is capable of risetimes of 350 psec. This combination has been commercially available for more than a year. The type 4S2 sampling unit and 5T1A timing unit are now available and decrease the risetime of the 661 to 100 psec or less. The type 661 is equipped with an internal pulse generator with a risetime of 50 psec or less. The 661/5T1/4S2 sampling system is therefore capable of approximately ten times the resolution of the self-sampling scheme shown.

Present techniques can be extended to provide sampling systems with greater resolution, but the limitation imposed by diode charge-storage effects make this difficult to achieve. Experimental sampling oscilloscopes and pulse generators, having combined risetimes of 35 psec, have been constructed but are still in the laboratory curiosity stage.

[1] D. C. Agouridis, Rev. Sci. Instr. **33**, 1396 (1962).
[2] S. H. Neddermeyer, E. J. Althaus, W. Allison, and E. R. Schatz, Rev. Sci. Instr. **18**, 488 (1947).
[3] J. Warren Keuffel, Rev. Sci. Instr. **20**, 197 (1948).