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EAI
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New circuits for communications

The success of a modern large-scale communications system depends importantly on the circuits of which it is built. For this reason Bell Telephone Laboratories places great emphasis on exploring new approaches to high-performance, economical circuit design. The circuits illustrated below are but a few examples of recent Bell Laboratories developments that are helping to advance the techniques of communications.

Circuit for mounting inside telephone handset for use by people with impaired hearing. Circuit includes one PNP transistor, provides up to 25 db gain, and has negative feedback for stability and to compensate for variations in component characteristics. Power is derived by taking a small part of direct current supplied to the telephone transmitter. Circuit board is flexible to permit part of conducting path to be bent and entire unit to fit snugly in narrow handset.

High-speed integrated logic package consists of 3 separate flip-flop circuits assembled together on a single header. On the 11-lead ceramic header, all circuit interconnections are made using gold thermocompression bond wires. This device contains 6 transistors (2 are required for each flip-flop) and 12 resistors. The individual flip-flops perform their switching functions with typical operating times of approximately 6 nanoseconds.

Parametric amplifier used in new microwave radio system will provide low-noise amplification to a radio frequency signal which is frequency-modulated by 1200 telephone conversations. It is a reflection type parametric amplifier operating in the 4-gigacycle range, providing approximately 13 db of gain using a varactor diode pumped at approximately 12 giga cycles. Its very low noise figure, typically 3.5 db, permits increased systems capabilities which are used to increase the number of telephone channels per radio channel.

Integrated balanced microwave amplifier makes use of high-frequency germanium transistors for precise wideband applications. Each stage of amplifier (one stage shown) consists of a pair of electrically similar transistors whose inputs and outputs are combined by 3-db couplers. This arrangement eliminates tuning adjustments and provides excellent gain flatness and impedance matching. Multistage amplifiers of this type have been designed to operate with bandwidths of 1000 mc in the 0.5- to 3-gigacycle range, with noise figures of about 6 db.

Compressor circuit used in several telephone carrier systems raises volume of soft voice sounds and lowers volume of loud voice sounds. This new circuit effects a 2-to-1 reduction in dynamic range of a telephone signal, which is then transmitted with an improved signal-to-noise ratio. Nearly perfect compression is achieved over greater than the normal voice range, as a result of circuitry that varies the impedance of two precise silicon diodes. A 3-stage feedback transistor amplifier maintains desired stability and provides the required transmission characteristics.

Thin-film decoder for high-speed pulse code modulation systems converts binary pulse sequences into analog signals. Circuit consists of precision resistor network and multiply-encapsulated control diodes. Precision resistors (pointer) generate reference currents that are switched into resistive ladder network (I-shaped elements at bottom of unit). Output voltage is proportional to binary code applied to diodes. Precision sufficient for decoding 9-digit binary codes is obtained, at code rates up to 12 mc, (108 mb/s pulse rates).

Report from BELL LABORATORIES

Bell Telephone Laboratories
Research and Development Unit of the Bell System

822

SCIENCE, VOL. 150
will speak to you about a greater art, that of cybernetics, which saves, not only souls, but also bodies and possessions, from the greatest dangers." In the Statesman (299b-c), the Stranger suggests to the Younger Socrates that a law be passed to prevent people from "persuading other younger men to essay cybernetics and medicine not according to the laws." And in the Cleitophon (408b), we find "the cybernetics of men, as you, Socrates, often call politics."

Many centuries later, the French mathematician and physicist André Marie Ampère (1775–1836) employed the word "cybernetics" in his great Essai sur la philosophie des sciences (1834). By this, of course, Ampère meant only the "means of governing" people, not Wiener's important new science.

**Panos D. Bardis**

Social Science, University of Toledo, Toledo, Ohio

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**Readers, Foreign and Domestic**

In his letter about the readership of Contributions to Geology ("Who reads the journals?", 17 Sept., p. 1325), R. B. Parker reports that "apparently our foreign readers outnumber the domestic ones by a very large factor," basing that conclusion on the fact that "we see references [to the journal] in many foreign journals, and reprint requests from abroad are numerous." He goes on to say, "The fact that many such requests and references are from respected and influential scientists reflects discredit upon American scientists," and he suggests that American scientists should "spend more time reading and less writing."

One is tempted to ask: How many journals has Parker canvassed in a search for references to Contributions to Geology? And in comparing reprint requests, has he taken into account that many American scientists mail reprints routinely to their colleagues without waiting for requests?

Having been associated with a perhaps similar publication (Tulane Studies in Zoology), I am aware of the tremendous response by institutions in foreign countries to an offer to exchange journals. American journals do not, to my knowledge, make a practice of exchanging. Thus an equally plausible explanation of the large number of foreign reprint requests may be that the distribution system favors them.

I object to the castigation of the reading habits of "American scientists" (presumably of all disciplines) on the basis of an unsubstantiated opinion concerning the reading of one journal primarily of interest to scientists in a single discipline. There may be some truth to Parker's accusation, but it is not supported by the statements in his letter.

**Robert K. Chipman**

University of Vermont, Burlington

Parker concludes from the active foreign readership of Contributions to Geology that "our colleagues in Europe and Asia are apparently vastly better informed than we are." I should like to suggest that exactly the reverse may be indicated. For most scientists serious reading represents an acknowledgement of the need to be informed. Those scientists who are geographically farthest removed from personal contacts with fellow specialists are quite likely to feel the greatest need for journals. It does not necessarily follow that they will become the best informed. Personal observation leads me to the opposite conclusion—that the man who is best informed relies least upon the journals for enlightenment. He is served by a number of other communication channels—personal contacts, conferences, correspondence, preprints—most of them considerably faster and more efficient. There may even be a continuous negative correlation across the spectrum of informedness, leading finally to the nervous neophyte who reads all the journals for fear of missing something.

**Vance Weaver**

2465 Broadway, New York 10025

. . . I should like to ask Parker why he felt it necessary to start yet another journal. I submit that American scientists do read worth-while journals, but that most of them, like me, have more and more difficulty reading through more and more publications to separate the mass of trivia from the relatively few significant contributions to scientific knowledge.

**John Helwig, Jr.**

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2-3. Society of Plastics Engineers, regional technical conf., Newark, N.J. (SPE, 65 Prospect St., Stamford, Conn. 06902)

3-5. Leptospiras intern. colloquium, Antwerp, Belgium. (A. Grate, Inst. de Medicina, Tropicale Prince-Leopold, Antwerp)

3-5. Academy of Psychoanalysis, mid-winter meeting, New York, N.Y. (H. Davidman, 125 E. 65 St., New York 10021)

3-5. American Psychoanalytic Assoc., fall meeting, New York, N.Y. (APA, 1 E. 57 St., New York 10022)

3-4. Macromolecular Metabolism, symp., New York, N.Y. (New York Heart Assoc., 10 Columbus Circle, New York 10019)

5. American Acad. of Dental Medicine, mid-winter annual meeting, New York, N.Y. (S. Conrad, 133-28 228th St., Laurelton, N.Y. 11415)


5-11. American Rheumatism Assoc., congres., Mar del Plata, Argentina. (G. Speyer, 10 Columbus Circle, New York)


6-8. Transmission of Viruses by the Water Route, symp., Cincinnati, Ohio. (G. Berg, U.S. Public Health Service, 4676 Columbus Parkway, Cincinnati 45226)

6-10. Space Communication, Paris, France. (UNESCO, Pl. de Fontenoy, Paris 7th)


7-10. American Soc. of Agricultural Engineers, winter meeting, Chicago, Ill. (J. L. Butt, P.O. Box 229, St. Joseph, Mich.)


8-10. New Concepts in Gynecological Oncology, symp., Hahnemann Medical College and Hospital, Philadelphia, Pa.
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