

can be done without lines as well as loop lines round the country. Very, very exhaustive tests have been done both day and night, at periods during the day and periods during the night, and you can see the rate of error of detected and undetected errors.

Mr. A. F. George: Although the questioner was talking about telephone circuits, I have some interesting figures here concerning telegraph circuits and the checks we have made during the night, when we conducted our test program. I find that in three cases in particular the results agree with American experience. First, the figures show that for our Paris office during the day we made 5,000 inquiries and we had 139 detected errors; during the night we made nearly 12,000 and had only 54 detected errors. In the case of Dusseldorf during the day we made 3,800 inquiries and we received 31 detected errors; during the night we made 14,000 and received 33 detected errors.—There is a big difference there.—Finally, at Stavanger, 2,000 inquiries during the day with 127 detected errors; 9,800 at night with only 4 detected errors. So you see there is a lot to support the view that circuits do appear to be more reliable during the night than during the daytime, probably because all the mechanics are in bed, I should imagine.

Mr. K. L. Smith (IBM (U.K.) Ltd.): There is no mystery about the time dependence of the occurrence of errors on public telephone circuits. These errors are caused mainly by interference from the exchange switching equipment and reach a maximum rate during the busy periods for this equipment in the middle of the morning and afternoon working periods. The quietest period and lowest error rates occur between 12 noon and 2 p.m. or at night.

Private circuits do not show the same marked time dependence unless they are routed near switching equipment.

The suggestion to send idle signals between successive

blocks of data is not permitted by the G.P.O. for periods exceeding one minute to avoid unreasonable overloading of multi-channel equipment. One of our customers using Data Transceivers experienced excessive errors due to suspected break-in by telephone operators. These ladies seem to become fascinated by the sound of data signals. His solution was to invite them to visit his installation, see and hear the Data Transceivers in operation and witness the effect of operator break-in on error rates.

Mr. W. S. Ryan: Regarding the last speaker, the telephone service has a lot of subscribers, both male and female, and they can be handled in different ways. When we have a particularly difficult subscriber we invite him to come round and see our telephone exchange. We then send him home quite happy.

Could I add just one point on Post Office policy here? I think one of the speakers did make the point that operators come on the line and cause interference. The last speaker has also made the point that during the busy hours there is also interference between circuits. This, of course, is quite true but the percentage of interference is small, as I think both our speakers today have made quite clear. The Post Office is very keen to keep it small and, if possible, to get it smaller. Consequently we are very chary about allowing any manufacturer's equipment to be put on any of our circuits until they have been very thoroughly tested indeed. You see, we are concerned with supplying a telephone and telegraph service for the whole of the country, in fact for the whole of the world as far as the telecommunications is concerned, while the manufacturer of data-transmission equipment is concerned with selling a very small quantity of very specialized equipment to very few customers. We have to protect the majority, at least for the time being.

Book review

The Encyclopedia of Electronics, edited by CHARLES SUSSKIND, 1962; 974 pages. (New York: Reinhold Publishing Co.)

This volume of almost 1,000 pages contains an alphabetically arranged collection of over 500 articles by more than 400 authors. Some of the authors are better known than others and it is noted that most are resident in the U.S.A. The articles refer to both technical and associated topics and include two dozen short biographies of outstanding contributors to the progress of electronics.

There may be a need for such a book but it is clear that all tastes will not be satisfied by the present edition. Many will enjoy browsing through the interesting, well presented and easily read contents. Others, no doubt, would have preferred a reference book with more emphasis on a restricted range of topics and with much more frequent reference to the literature.

For the purpose of this encyclopedia, electronics is interpreted to include, besides its more obvious sections, many subjects which could equally well be classified as pure or applied science or engineering. Thus mathematicians may be a little surprised that there are articles on Boolean algebra, Complex notation, Fourier analysis, integrals and transforms, Matrices, Probability, and Vectors.

It is claimed that *The Encyclopedia of Electronics* is "an immediate reference to all of electronics" and "is designed to

answer questions on every aspect of the subject." Nevertheless the index has some omissions. *Punch-through* is indexed but the breakdown mechanism *avalanche* is not (although it occurs on p. 882). The only reference to *time-base* would appear to be *time-base stability, in magnetic recording*. AND, OR, NOR circuits are described under *Logical circuits* but are not indexed separately.

There is a national flavour about certain sections. Thus we are told that air-traffic control is the responsibility of the Federal Aviation Agency (p. 7). The section on Digital Computers (pp. 183–85) includes only machines of U.S.A. origin. The application of Doppler Shift to navigation is illustrated by the U.S.N. Transit Navigation System (p. 194). The Economics of the Electronics Industry (p. 200) quotes only U.S.A. statistics and it is presumed that billion is the U.S. version (i.e. 10^9) and not the British version (i.e. 10^{12}).

The articles entitled Analog computers (pp. 20–4), Computers (pp. 133–41), Digital computers and instrumentation (pp. 182–89), may interest those already, or about to be, concerned with the machines themselves. Applications are also described in the sections on Data Processing (pp. 171–73), Linear Programming (pp. 415–16), Medical Electronics (pp. 460–65), Monte Carlo Method (pp. 497–99), Operations Research (pp. 566–68), Translation by Machine (pp. 885–86).

S. KIRKBY