



A 4-metre transmitter powered by a single Mallory mercury cell is being implanted in the rhino's horn, the single-turn aerial will be accommodated in a groove cut around the horn. After implantation the damage is made good with glass fibre and quick-setting resin. The electronic equipment was designed by the Council of Scientific and Industrial Research, Pretoria, in order that they may keep track of individual animals.

This means that a direct connection exists between this bare external metal and one side of the mains socket, an extremely dangerous situation. Also any external devices connected to the powered equipment, such as tape recorders, extension loudspeakers and earphones, are also likely to become live.

The moral? Do not try to save a few shillings, buy a reputable make at a fair price and satisfy yourself that the circuit arrangements are adequate.

Push-button telephone chips

In the April issue, in this section, the push-button touch-tone method of dialling was discussed. Pushing a button corresponding to a digit resulted in two tones being transmitted to the exchange for decoding. Push-button dialling is quicker and more convenient than the normal dial we use today, and with the touch-tone system it is possible to use the telephone to switch on equipment, from a remote point, merely by tapping out the required code after connection to the premises has been established.

A major disadvantage of the touch-tone system is the need for additional equipment at the telephone exchange to decode the tones.

The present method of dialling in this country is called the Strowger system. If the digit nine is dialled the telephone transmits nine pulses, one after the other, which are counted by the exchange equipment. A push-button telephone, to be compatible with the Strowger system and not demand any alteration in exchange equipment, must also transmit an identical serial pulse train.

It would indeed be difficult and expensive to design a push-button that, by mechanical means, caused nine pulses to be transmitted when it was pressed. But using digital methods such a task can easily be accomplished. The digit nine can be represented by four binary digits.

Pressing the button nine could result in the four bistables in a counter being set in the condition representing nine. A gating system could then allow pulses to the counter to cause it to count backwards: nine, eight, seven . . . until zero is reached, the gating system could then be arranged to cut off the supply of pulses to the counter. Nine pulses would have been fed to the counter and these could also be transmitted to the exchange at a speed compatible with the equipment in use there.

Similar methods to these are now being used in m.o.s. (metal-oxide-silicon) integrated circuits being produced by Marconi-Elliott and by T.M.C. These circuits store all the digits of a telephone number fed to them by push-buttons and transmit them in serial form to the Strowger exchange equipment.

The logic design for the Marconi-Elliott integrated circuit was carried out by the telephone division of G.E.C. and the chip design and layout was done by Marconi-Elliott Microelectronics.

T.M.C. adopted a different approach and designed the whole thing themselves including the structural details of the microcircuitry.

Both systems consist of two chips the difference being in the interconnections, the encapsulations, the logic design and the number of external discrete components required.

The Marconi-Elliott chips are mounted on the push-button unit to form an integral unit, whilst in the T.M.C. unit two circuit cards are employed in addition to the push-button unit.

The use of these m.o.s. dialling systems does not allow coded information from the push-buttons to be used to actuate external devices as is the case with the touch-tone system. It is said by exponents of the m.o.s. system that this does not matter much any way as any amount of data can be sent along the telephone lines by external equipment once connection has been established. An advantage of the m.o.s. system is that often used numbers could be stored in binary form in a small digital store

(an m.o.s. read/write memory chip) so that these numbers can be dialled automatically on pressing a single button.

Just recently T.M.C. have announced an order for £0.5M worth of their m.o.s. equipment that will be used by operators in telephone exchanges.

Aerial for 1-3cm communications

Radio communication in the 3cm to 7mm wavelength region, normally used only for radar, is one possibility to be investigated with an unusual steerable aerial mounted on the roof of Birmingham University's new Electrical Engineering building. This region, 10GHz to 40GHz, would accommodate 5,000 television or 7 million telephone channels, but, of course, the waves are subject to atmospheric absorption and propagation is dependent on the weather. Radio meteorology is, in fact, another field of research for which the aerial will be used. Being sited in the environs of a large city, the aerial is surrounded by sources of man-made interference, but this was a deliberate choice, to permit study of communication in the presence of such interference. Apart from terrestrial communications, the aerial will allow research into the possibility of cities and smaller urban communities having their own satellite terminals. (Next year there will be geo-stationary satellites in orbit working in the 1-3cm region.)

Built by Husband & Co. and Markham & Co. Ltd., the aerial is unusual because it has an offset Cassegrain configuration. The main parabolic reflector, which is 20ft in diameter, can be considered as a piece cut out of the side of the reflector of a larger parabolic aerial. Hence the small hyperbolic sub-reflector is not within the beam of the main bowl. This means, for one thing, that the small reflector does not

The aerial on the roof of Birmingham University.

