PRACTICAL ELECTRONICS

AUGUST 1968

PRICE 2/6



New Series.....

EXPERIMENTS WITH SOUND LIGHT & COLOUR

VOL. 4 No. 8
August 1968

PRACTICAL ELECTRONICS

EXPERIMENTING

How do you prefer your electronics—as cut and dried designs, or as thought-provoking ideas intended to sow a seed or two for individual cultivation? In other words, are you primarily just a constructor, or an experimenter as well?

The building of electronic circuits can be an enjoyable pastime in itself, even if one is throughout just studiously following a point-to-point wiring diagram. And of course, the underlying purpose is generally to produce a piece of equipment of lasting worth, that will perform some function as ably, at least, as a comparable commercial product, and for a more modest financial outlay!

Such building activities are well rewarding and there is no doubt concerning the widespread popularity of the constructional projects published in this magazine. But mere assembly work does not allow one to extract the full benefit from electronics. Much more in addition is offered to those prepared to experiment for themselves on occasion. There are endless possibilities for innovation in electronics, for discovering yet further applications for old and well tried circuits. This is the very reason why electronics is ever expanding. And make no mistake, it is frequently the amateur who comes up with another bright idea in this field!

Apart from "cut and dried (and tried)" designs, many articles appear regularly in these pages which are aimed more specifically at the experimenter. The ideas and design outlines given are usually sufficient to start the enterprising experimenter off on a new path. Complete success may not always reward these individual efforts, but something useful is bound to be learnt in the process. The diligent experimenter will at any rate develop his faculty to think more deeply about electronics, and who knows, one day a bright idea may well and truly click.

Are *you* getting the most out of the hobby?

F. E. Bennett—*Editor*

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Our September issue will be published on Friday, August 16

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IEA EXHIBITION

For anyone prepared to ask a lot of questions and perhaps prise open one or two cabinets, the International Instruments Electronics and Automation Exhibition can provide quite a wealth of ideas for subsequent trial on the kitchen table. Ideas, rather than actual circuits.

For this is a specifically professional event and, as such, many of the interesting gadgets on display contain components that are presumably commonplace inside industry while virtually unobtainable in Tottenham Court Road. Where a familiar component is shown in a new application, the non-professional visitor finds himself mentally adapting the circuit to some project of his own—and wondering whether "surplus" parts will do.

POINTING THE WAY

This year's show was on a record scale, occupying the full 250,000 square feet of Olympia. To quote David Walker, exhibition chairman, "It is something more than the greatest technical show of its kind. It points the way to a future in which technologies represented at Olympia will have resounding repercussions on the social, industrial, and economic structure of the world."

Inevitably his listeners' thoughts turned to Miss Honeywell, the computer company's robot "saleswoman" making her (or its!) first appearance in Britain —of which more later.

MICROCIRCUIT DEVELOPMENT

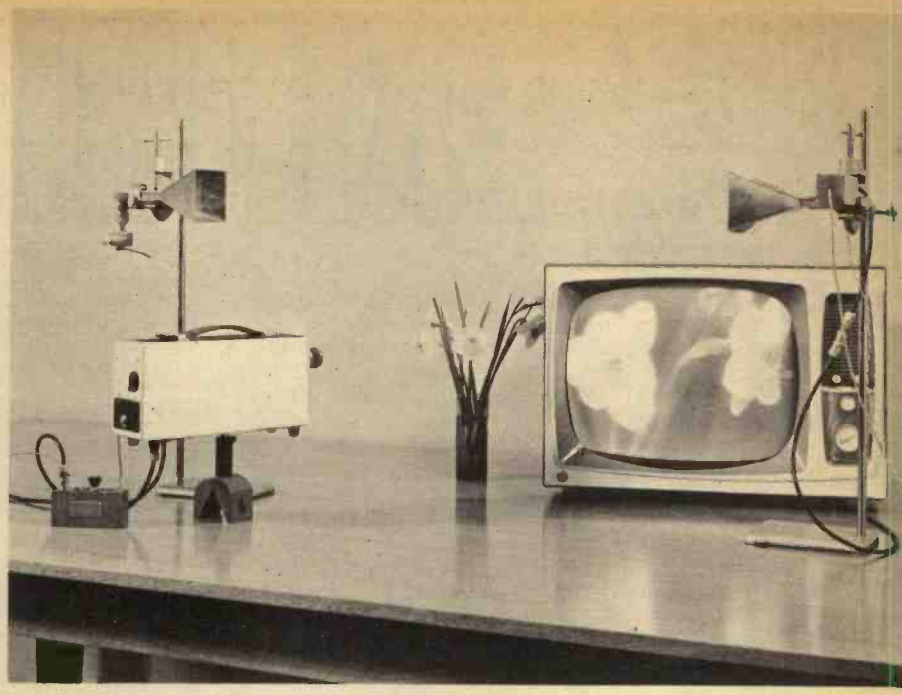
Microcircuits were more abundant than ever at this IEA. As prices tumble in the intense battle of production techniques between British and American manufacturers, the devices are edging steadily into the consumer field.

An example of this was the digital car speedometer shown on the General Instrument (UK) stand. This has no needle, the speed appearing on inch-high numerals. It uses a tiny silicon chip carrying the equivalent of 300 transistors and, according to the producers, should compete with the price of mechanical speedometers in a year's time. Such a design would be quite uneconomic if built with discrete components.

Another motoring application was demonstrated by AB Electronic Components who produce microcircuits for use in Lucas alternator equipment, which is expected to replace the conventional car dynamo. AB make a thick-film passive circuit to which Lucas attach their own semiconductors to make a solid state voltage regulator.

Below, Miss Honeywell gave a convincing demonstration of automation capability, but tended to trip over her own flex





Two Gunn diodes and a bunch of narcissi are major components of this desk-top microwave television link exhibited by Plessey Electronics.

On the left is the camera and transmitter horn. Microwave power is supplied by a solid state Gunn oscillator which is frequency modulated by the camera video signal. The transmitted power is 5mW at a frequency of 9.5GHz.

The receiving horn (right) uses a second Gunn oscillator to drive a balanced diode mixer giving an IF output at 30MHz. This is amplified and detected to provide a video input for the picture monitor. The total power consumption of the microwave link is 5W

MECHANICAL MISS

"Miss Honeywell" offered a walking, if not yet talking, glimpse of what microcircuits might come to mean if they can be further scaled down to the size of brain cells and installed in a suitably agile mechanical carcase. Described by Honeywell as a demonstration of the company's "total automation capability", Miss H. strode about the stand indicating computers, memory systems, and logic modules to the accompaniment of a taped soundtrack and under the command of a man at a control panel. Unlike most women, she didn't have a mind of her own . . . in fact she could be switched off altogether by removing her head.



Above, this dual purpose video-instrumentation recorder from the Precision Instrument (UK) stand can be changed from one function to the other by substituting three circuit cards. A stop-scan facility allows continuous viewing of a single picture frame or piece of data

Mullard were showing a new device for measuring very low voltages and currents—a vibrating capacitor. It could be crudely described as a miniature electrostatic loudspeaker mechanically coupled to a capacitor microphone: the d.c. voltage to be measured is applied between two plates, one fixed and the other vibratory. At the same time a driving voltage at about 6kHz is applied to a further pair of plates, the moving half of which is coupled mechanically to the movable plate of the first pair. The resulting swing in capacitance modulates the unknown voltage, and the resulting alternating voltage is easily amplified and measured. The capacitor, type XL7900, is mounted in an evacuated glass encapsulation with a B9D base. It is not yet in full production.

PIEZOELECTRIC SPARKS

The growing use of special piezoelectric crystals to produce high voltage impulses was demonstrated by Smiths Industries. The high voltage spark created on mechanically deflecting the crystal can be used to ignite all the usual industrial and domestic gases.

English Electric ushered visitors into a darkened room to display the extreme sensitivity of their new Image Isocon television camera tubes Types P850 and P880. By using the scattered return beam from the camera target rather than the specularly reflected component, noise in the black areas of the image is considerably reduced. This allows apparently well-lit pictures to be obtained in conditions where even a tom-cat would stumble.

A development of interest to all large-scale manufacturers was the new soldering bit from the Philips organisation, exhibited by Harrison Clark. It has a 500 micron electrolytic coating within the diameter and a protective nickel coating over the top. Although expensive to produce, it is claimed to be capable of

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On their stand near the main entrance of the exhibition, Racal Research gave the first working demonstration of REDAC—Racal Design and Analysis by Computer—a service now being made available to the whole industry. The computer, an Elliott 4130, is programmed to answer questions on a variety of design problems and to create the analogue equivalent of a "breadboard" to predict filter performance, stray inductance, transistor behaviour, etc.

Another exhibit, the Elliott Automation graphical display, is shortly to be linked with REDAC to streamline the design of printed circuit layouts. According to the literature, "Using the light-pen the designer can communicate the circuit geometry and performance requirements of a circuit board directly to the computer, thus bypassing the conventional data preparation and input stage. A free interchange of information between the computer and the designer can then take place . . ." Could electronics designers be planning their own obsolescence?

MINISTRY EXHIBITS

Among a number of interesting items on the Ministry of Technology's stand was a solid state u.h.f. oscillator containing only one active component. Developed by the Royal Radar Establishment at Malvern, the oscillator consists of a platelet of cadmium sulphide to which a steady voltage is applied. This causes the platelet to resonate mechanically at a high harmonic of its fundamental, producing an alternating current. Frequencies of some 800MHz can be achieved and can be finely tuned simply by varying the applied voltage. Power output can be adjusted by illuminating the platelet.

Another RRE design featured a Gunn diode as the heart of a small, low-cost c.w. doppler radar. Variations of this simple hand-held equipment would have applications in security systems, ship docking, vehicle control (and radar speed traps!), and as an obstacle-detector for the blind.



Below, optical display is one of many new ways to achieve intimate communication with computers. This instrument, the Marconi X2000, is to be used by the Ministry of Transport in its current experiments with computer control of road traffic in West London



Above, another example of computer graphics, the Elliott CRT display has been adopted by the REDAC electronic design service. Changes to a proposed layout or mathematical shape are made with a photoelectric light pen and shape-generating controls

The Ministry's Explosives Research and Development Establishment based at Waltham Abbey contributed the "ERDEfender", a device which protects explosives workers from the aural effects of their endeavours, but allows them to converse normally between bangs. It consists of a pair of highly-sound-proof headphones, each having an integral microphone and amplifier. The amplifiers are designed to saturate at a fixed sound level so that at higher levels (about 95dB) the protective attenuation of the headset becomes effective.

The Royal Aircraft Establishment, Farnborough, provided a good example of heavyweight electronics with a variable speed drive system employing a brushless induction motor supplied at variable voltage and variable frequency by a static inverter. The design has an overall efficiency comparable with d.c. installations, is easier to maintain and has a higher power-to-weight ratio. It has been tested in a 1,000 h.p. diesel locomotive in this country and in a passenger train in the U.S.A.

CANADA'S DEBUT

Canada made her first national appearance at this IEA. The group exhibit, sponsored by a dozen Ontario companies, included products ranging from units for thickness control in steel rolling mills, flaw detection in paper manufacture, monitoring, counting, and digital indication in petro-chemical processing, to aerospace data computers and radio equipment for telemetry, television, and general communications.

The official U.S.A. exhibit covered more than 10,000 sq ft of the National Hall. Of the 42 exhibitors, about a third were showing equipment and tools for electronics manufacture, another third contributed instruments and measuring devices, and the remainder shared automation, data processing, and basic component categories.

A total of 112,393 people visited the six-day IEA, nearly 10,000 of these coming from abroad. The next exhibition will be held at Olympia in May 1970. ★