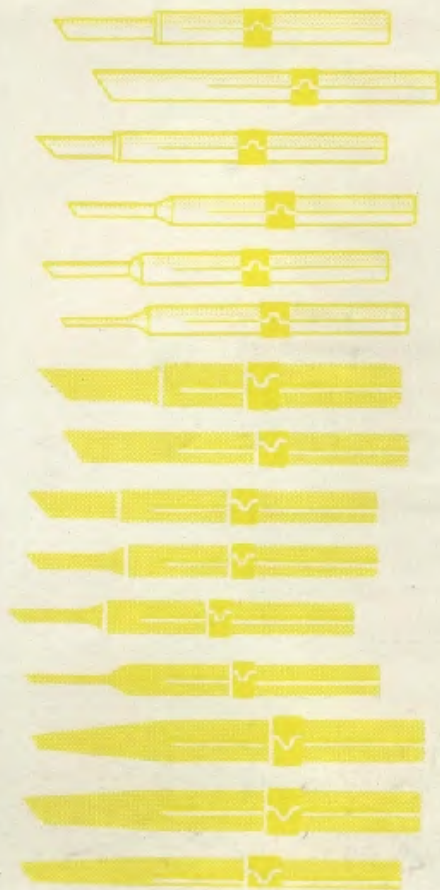


Wireless World

March 1968 Three Shillings

**The world's best loudspeaker?
Large-scale microelectronics**



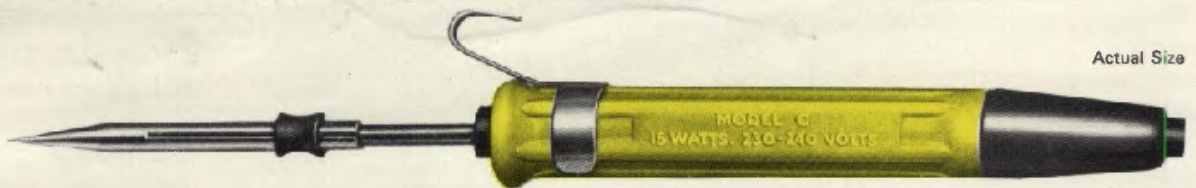


This is the most versatile iron available, for many reasons

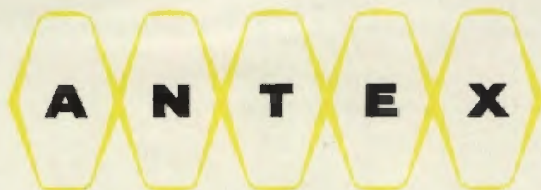
Here are just eighteen

Fit any of the eighteen interchangeable bits to this Antex miniature soldering iron and you have the most versatile iron available for fine precision soldering of miniature and micro miniature assemblies. Fitted with a $\frac{3}{32}$ " Ferraclad bit as standard, the optional bits offer a diverse range of shapes and sizes. The well balanced handle of the CN240 can be seen in electronics factories and production lines throughout the world. It plugs into any mains outlet. And the element at the end of the iron provides perfectly controlled heat, without any danger of overheating components. With a weight of only 1oz, plus its extremely supple flex, the CN240 is light and easy to handle. No transformer is required. The CN240 is only one of a large range of fine precision soldering tools and equipment by Antex. Introduce yourself to Antex by sending for a colour catalogue. Simply send the coupon.

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PRECISION MINIATURE SOLDERING IRONS



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Please send me _____ copies of the Antex
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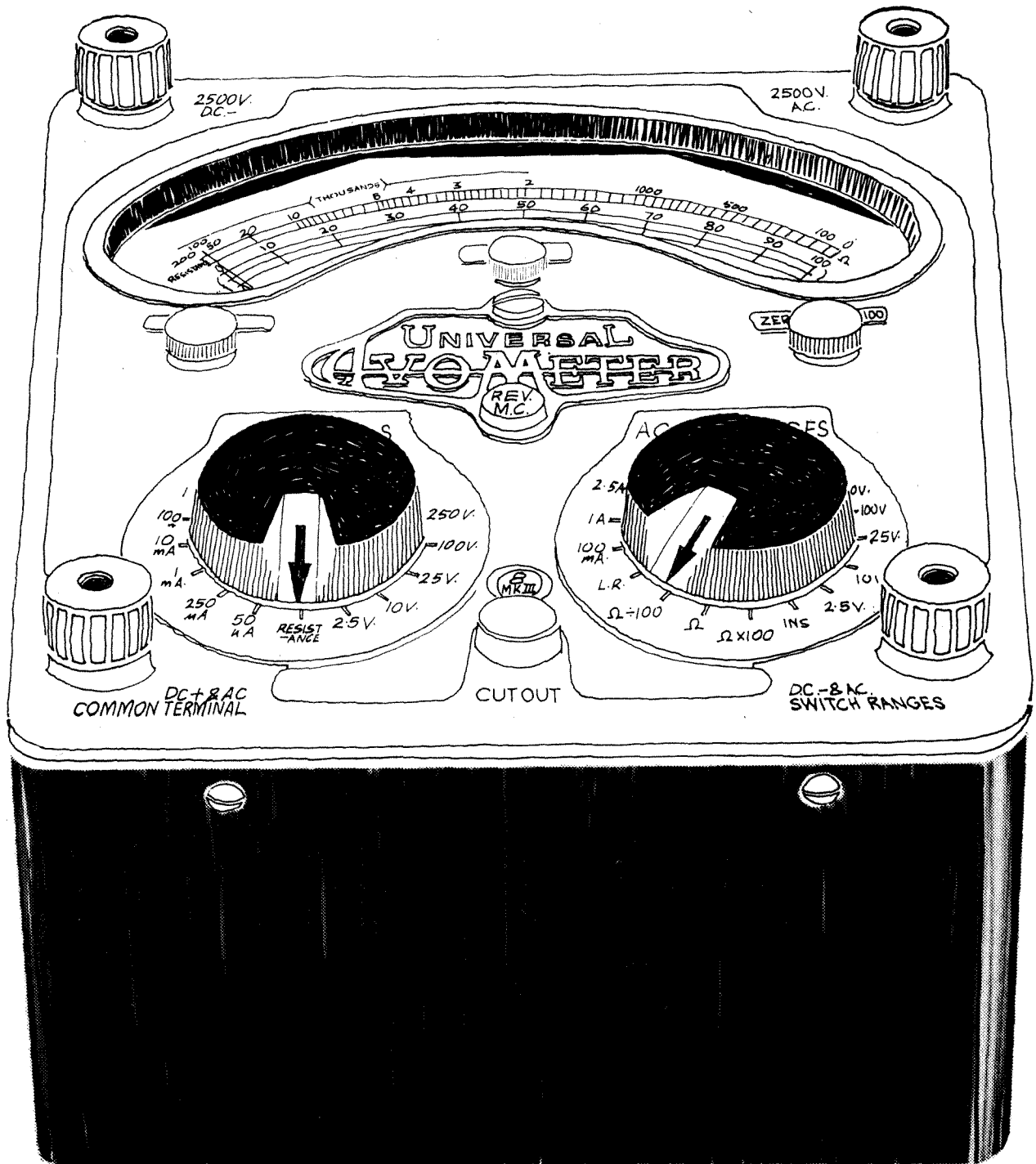
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OK, so you're a knob-twiddler

After all, you're only human, and those two big knobs on the Model 8 Avometer are terribly tempting. Just by twiddling them, you can have over 30 calibrated ranges at your command—11 current, 15 voltage, 5 resistance, and a 30dB power scale. Twiddle yourself a good combination of accuracy (1%fsd/dcA, 2%fsd/dcV, 2½%fsd/ac) and sensitivity (20kΩ/Vdc, 1kΩ/Vac, except 2.5Vac scale 100Ω/V). Plus automatic cut-out, fused ohms circuit, trio of ohms zero-adjustments, reverse-polarity button and anti-parallax mirror. No wonder the Model 8 is the first choice of electronic, radio and TV engineers everywhere. Get yours from your local dealer or direct from Avo Ltd, Avocet House, Dover, Kent. Telephone Dover 2626. Telex 96283.



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A2

BREAK THE SOUND BARRIER



MODEL 488 SONO-BAR



MODEL 419 RANGER II

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WORLD STANDARD WHEREVER
RELIABILITY AND
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WITH PROVED **SHURE** SETTING THE WORLD'S STANDARD IN SOUND
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When the chips are down, and noise levels are high, Shure Noise Cancelling microphones with their exclusive Controlled Magnetic cartridges, distance-discrimination design, and specially tailored response get the message through . . . even when noise level is so high the operator cannot hear himself! They have been field-tested and proved in such ear-shattering environments as: drop forges, helicopters, police power boats, "hard surface" gyms among cheering crowds, motorcycles, jets revving up, fire engines, etc.

SHURE MODEL 488 SONO-BAR
Rugged, impact resistant "Armo-Dur" case. Four types: High or low impedance; transistorized for direct replacement of carbon microphone; and FAA Certified Transistorized Aircraft version.

SHURE MODEL 419 RANGER II
New small size. Only about half the size and weight of conventional mobile communications microphones. Unsurpassed for use with portable or miniaturized equipment.

Please send me details of Shure microphones. Please recommend the best model for use with my equipment.

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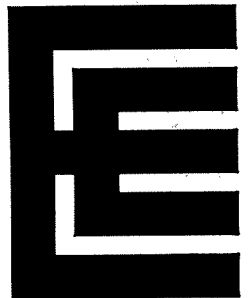
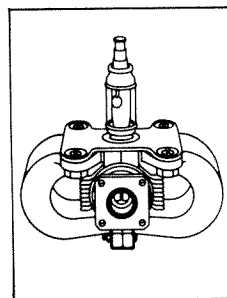
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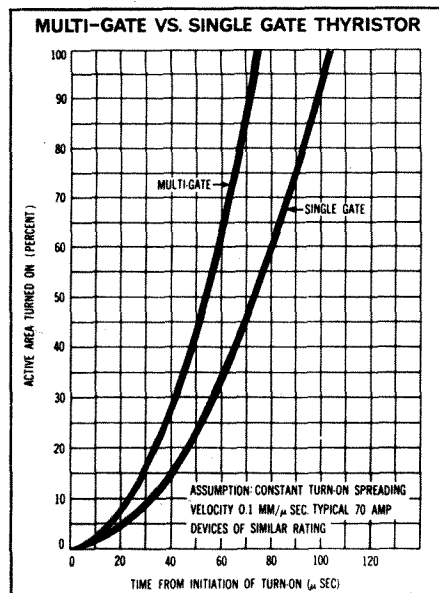
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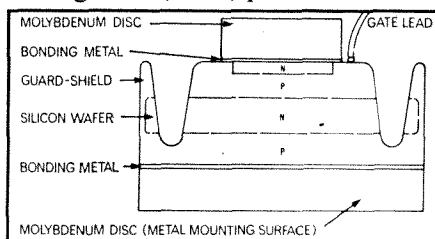
If it's worth 3 minutes of your time to learn the state-of-the-art in Thyristors,

start here: Exclusive Multi-Gate Thyristors When thyristors are to be operated with steeply rising current pulses and/or high repetition rates, great care must be exercised in establishing the operating conditions and selecting the device to be utilized. A self-saturating reactor may be introduced into the circuit to limit the rate-of-rise of current (di/dt); this will permit a conventional high-power thyristor to carry heavy load currents which exhibit high di/dt . Where it is not practical to use such a reactor, which is often bulky and expensive, a thyristor with enhanced turn-on action must be used. Such action can be obtained by providing the thyristor with multiple gates.

IR multi-gate thyristors exhibit reduced turn-on voltage at any given instant during the turn-on period and shorter time for equalization of current flow throughout the entire semiconductor wafer. The consequent reduction in turn-on power losses will permit increased load current to be carried and the device will exhibit faster turn-off time. It will also be able to withstand greater rates of rise of reapplied off-state voltages because of the lower junction temperature at the instant of current commutation.



MIM-Protection IR's epitaxial thyristors offer the exclusive feature of metal-ion migration (MIM) protection.



During manufacture, the silicon wafer for epitaxial thyristors is contoured to improve the high-voltage characteristics of the device. This illustration shows the cross-section of a typical contoured silicon wafer.

Metal-ion migration can occur because of the electrical potential that exists at the junction interfaces at the edge of the wafer. When the device is energised, metal-ions are attracted from the metal mounting surface towards the junction interfaces. Migration may occur even though the wafer has been cleaned by etching and sealed with inert sealers or varnishes. When the minute metallic particles reach the interfaces, they can cause degradation or failure of the device. IR's epitaxial devices employ an exclusive groove etching technique which provides needed contouring and, in addition, builds a guard-shield against metal-ion migration.

Bulk Avalanche Thyristors These devices exhibit true avalanche behaviour in the bulk of the crystal, thus avalanching at approximately the same voltage in both forward and reverse avalanche modes. Bulk avalanche devices are characterised by extremely low leakage current, which is mostly bulk leakage and which does not show any drift or instability under long-term, high-voltage blocking operation. In addition, IR's epitaxial thyristors can be repeatedly broken over into the conduction mode without detrimental effects as long as the power ratings and the rate-of-rise of turn-off current (di/dt) are kept within the listed specifications.

As a result of the epitaxial construction, there is a substantial decrease in the forward

voltage drop during turn-on. This reduces the total power loss during the turn-on action, which in turn reduces the temperature of the device. Therefore IR epitaxial thyristors are well adapted for inclusion in inverter and switching applications.

Ultra Fast Turn-Off Thyristors Early last year IR implemented a major technological breakthrough by going into quantity production at Oxted of thyristors exhibiting turn-off times below 3 microseconds, faster than those yet produced by any other semiconductor manufacturer. To date this claim remains undisputed. The devices designated "RCU" are offered in two current ranges of 8 and 10 amperes (full-cycle-average) with voltage ratings of 50-800 volts PRV/PFV. The turn-off times of all IR "RCU" thyristors are measured at maximum base temperature. The maximum operating frequency of a thyristor circuit is obviously dependent on turn-off time, and introduction of "RCU" thyristors means that high-power inverter circuits may be operated at frequencies in excess of 30 kHz. By utilizing "RCU" thyristors, the inverter designer may subsequently reduce the size and cost of the inverter components used in commutating circuits.

The principal applications for the "RCU" thyristors also include high-frequency induction heating, ultrasonic equipment and d.c.-d.c. converters. Detailed information about the world's leading range of thyristors and how they can solve your specific problems is yours on request from International Rectifier. Just ask.

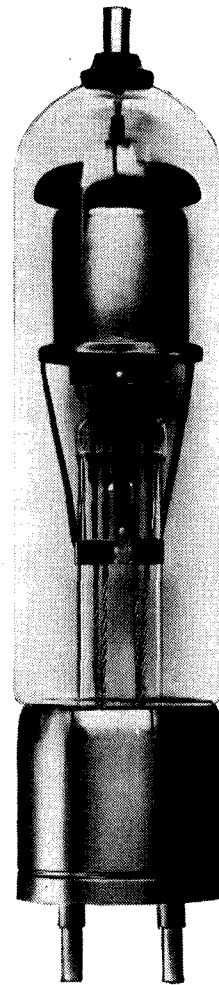
Stop here. Now you know, thanks to



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Mercury Vapour Rectifiers



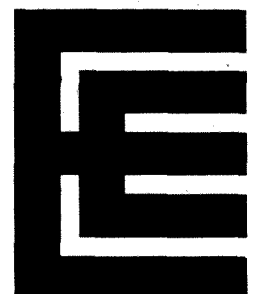
DATA

Type	Service type	Peak inverse voltage max. (kV)	Peak anode current max. (A)	Mean anode current max. (A)	Max. d.c. output 3-phase full wave	
					Voltage (kV)	Current (A)
869B	—	20.0	10.0	2.5	19.0	7.5
AH200	—	20.0	10.0	2.5	19.0	7.5
AH205/ 857B	CV2673	22.0	40.0	10.0	21.0	30.0
AH211A	CV532	16.0	8.0	2.0	15.2	6.0
AH221	CV5 CV1435	20.0	5.0	1.25	19.0	3.75
AH238	CV1629	13.0	5.0	1.25	12.4	3.75
BD10	—	1.0	25.0	8.0	0.95	24.0
BD12*	—	1.0	2 x 50	2 x 16.5	0.95	49.5

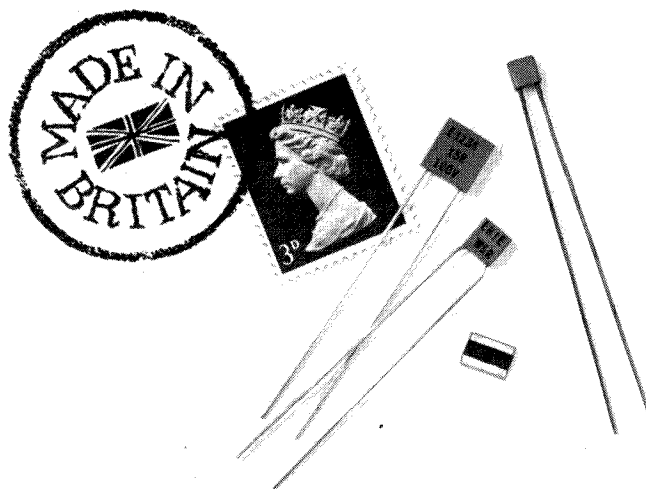
*Full wave rectifier.

This range of Mercury Vapour Rectifiers is available from your local EEV stockist. English Electric Valves production methods ensure the reliability and performance you are looking for and prices are competitive.

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Gothic Electrical Supplies Ltd, Gothic House, Henrietta Street	Birmingham 19 Tel: Central 5060
Harper Robertson Electronics Ltd, 97 St George's Road	Glasgow C3 Tel: Douglas 2711
Smith & Cookson Ltd, 49/57 Bridgewater Street	Liverpool 1 Tel: Royal 3154-7
The Needham Engineering Co. Ltd, P.O. Box 23, Townhead Street	Sheffield 1 Tel: Sheffield 27161
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100 times that of conventional capacitors. It's a rugged little device. The layered construction gives excellent stability and resistance to every form of shock and environmental stress. We manufacture a preferred range, concentrated on the individual requirements of the British designer. There are other configurations available for more complicated designs : glass-encased, precision moulded, phenolic coated, and unencapsulated chips for hybrid integrated circuits.

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*Formerly Erie Resistor Limited.