THE CROWDED AIR

M.I. and Bandwidth Conservation

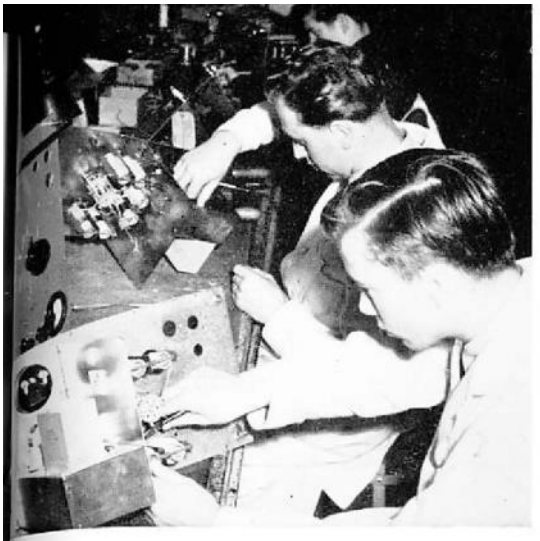
YOU'RE LISTENING to your favourite radio programme. Suddenly, a foreign station pushes its way in and demands your attention. You are not amused. The fight for aerial supremacy continues for some time. At last the home side wins and you relax once more but, alas, before long your ears are assailed by a high-pitched whistle. What a set! It's about time, you think, that these long-haired backroom boys produced a trouble-free receiver.

Don't blame the set. The trouble lies in too many broadcasting stations operating in a pint-sized range of broadcast bands. As a result, there is an urgent need for bandwidth conservation. The bandwidth, of course, is the band of frequencies on which a signal is actually transmitted. Each transmitter requires a different area of the available frequency spectrum and the "spread" in the case of a long or medium wave broadcasting service is approximately 10 kc/s. And when the stations are too close together, a powerful transmitter will blast out its weaker neighbour, encroaching on its territory.

Radio broadcasting is only one side of the question which, incidentally, is of the greatest significance to Marconi Instruments, the Company's equipment being extensively used in easing the problem. Whilst a radio broadcast transmitter uses 10 kc/s bandwidth, television hungrily claims five hundred times as much. And, unfortunately, the whole of the available frequency spectrum known to radio engineers is not available, or indeed suitable, for transmitting these services, as many electronic devices have to be fitted in to their appropriate channels. And as the number of electronic applications increase, so of necessity the best utilisation of the available frequency spectrum is becoming of paramount importance.

We are now witnessing this country's attempt to overcome the difficulties—by building new transmitters operating in a new frequency band altogether. On 2 May, the first public transmission of the B.B.C.'s new service was radiated on wavelengths of approximately 3 metres, from Wrotham in Kent. Soon,

Arthur Partridge, Machine Shop, adjusts the condenser unit of a TF 370F Universal Wavemeter



LEFT: *John Strickland, Bob Trim, and Michael Mullins, Assembly, work on the TF 370F Universal Wavemeter*

BELOW LEFT: *Martin Dewey and Bill Goode, Calibration, working on the H.F. Field Strength and Radio Noise Measuring Equipment TF 1055. Martin is aligning the R.F. stages, whilst Bill is taking measurements of the input impedance*

many more V.H.F. transmitters up and down the country will supplement the existing medium wave stations.

Colour television transmitting will bring its problems. At first sight, it would seem as if three times the normal bandwidth would be required for the three pictures, each of a different primary colour. However, a tremendous research programme has been carried out in the U.S.A. and this country—M.W.T. being particularly active in this respect—to keep bandwidth requirements down to a minimum. This research has proved that it is possible to cut down bandwidth and still retain acceptable definition.

When we look at radar, we find the situation just as complex. For instance, when it was first introduced there was ample unused space available in the centrimetric bands. Now the number of stations has considerably increased, and the improvement in definition has only been obtained at the expense of increased bandwidth requirements for each particular unit. Microwave links are also in the field, so the air is becoming uncomfortably crowded.

Marconi Instruments equipment has been mentioned. This Company makes the test apparatus which enables radio engineers to make precise measurements on these very things. There is a growing need for greater accuracy in frequency measurements and a desire to know how the energy of any one particular transmission is distributed about its centre or carrier frequency. Indeed, in a band which is cluttered by transmissions of one kind or another, it is only by being able to make precise measurements that any form of control can be imparted, or for that matter, one thing be sorted out from another.

M.I. precision types of absorption and heterodyne wavemeters, which permit frequency measurements to be made to a high degree of accuracy, are well known in this field. And for super-accuracy measurements there is the Frequency Measuring Equipment TME2 with an accuracy of one part in a hundred million while for "Field Strength" measurements we have the TME18 and the TF 1054 and TF 1055 equipments.

LEFT: *An R.F. Test Set TF 890A going through Final Test. Dick Mapplebeck checks the frequency of the internal wavemeter against a known standard.* RIGHT: *Walter Elkin, Design, checks the transmission field strength of the F.M. transmitter at Wrotham by means of the TF 995A/1 F.M./A.M. Signal Generator and the TF 801A/1 Signal Generator*

Extensively used also are the "Spectrum Analysers" for investigating the distribution of energy with frequency, particularly with reference to the study of the energy/frequency distribution in the pulsing of magnetrons and klystrons operating in radar equipment.

To sum up, then, M.I. are producing test apparatus which enables engineers to sort order out of chaos, thereby improving the standard of radio engineering techniques. The results affect us all, whether we are radio engineers or just non-technical types who like to know that when we switch on the radio, we can enjoy it—free from interference.

The Fishscope

AN ELECTRONIC fish-finding device which greatly magnifies the "view" of the fish below has been announced by the Edo Corporation of New York. Already in use and producing very good results, it is known as the Fishscope, and is distributed in Canada by the Canadian Marconi Company.

The Fishscope is similar in character to the Fischlupe, marketed for a time by the M.I.M.C. Co. in this country. It employs the same basic principle as that of an echometer, sending out sound impulses to a range of 250 fathoms and receiving them after reflection from the sea-bed and from intervening fish shoals. Instead of receiving soundings on a paper record or by a light flash against a graduated scale, however, the Fishscope employs a cathode-ray tube similar to that used in radar. The light trace on the display shows at a position corresponding on the scale to the depth at which the fish are lying, and once a shoal has been located the equipment can be "focused" to a sector of ten fathoms, thus greatly magnifying the echo signals.

This twenty-five times magnification gives the captain a very clear idea of the size and density of the shoal, and in good conditions his experienced eye can distinguish between the various types of trace markings attributable to different species of fish.