

## *Key to Communications*

THE ALMOST UNIVERSAL DEMAND for new and more efficient methods of communication has brought about a great increase in the production of telecommunications equipment for television and sound broadcasting, navigational aids and radar installations, public address systems, and mobile radio of all kinds.

The natural result of this has been a greatly increased need for a variety of test and measuring instruments both by

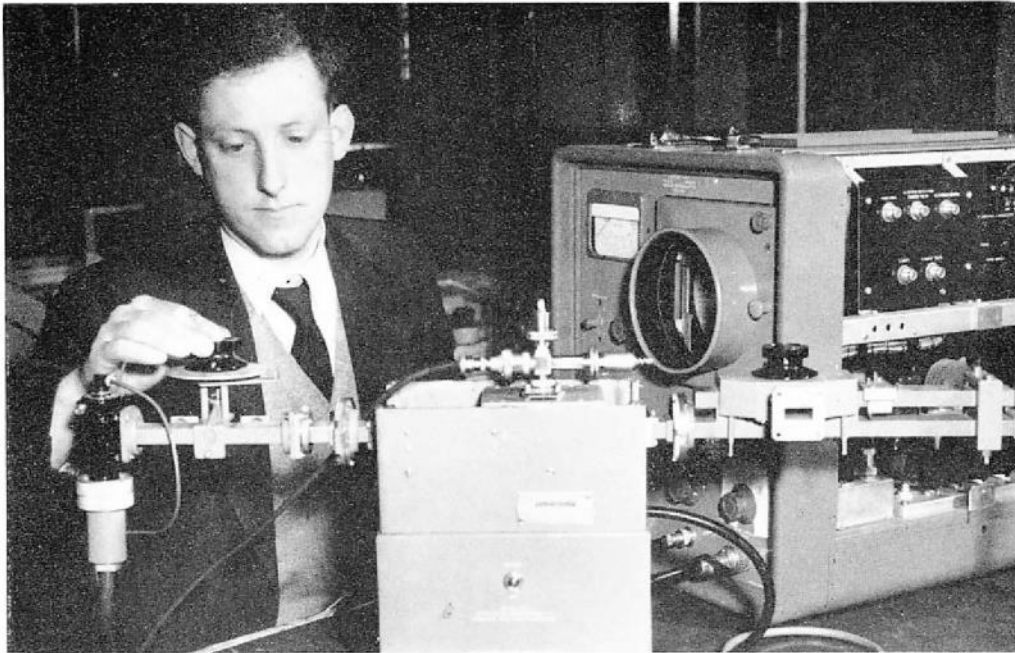
manufacturers and by users concerned with the maintenance of their apparatus.

This is not, however, the only reason which has led to the great expansion of the section of the industry serving telecommunications. In both the commercial and domestic spheres there is a constant demand for higher standards of performance and dependability.

New services have led to the overcrowding of the lower end of the

*M.I. make a wide variety of test equipment for radar. Here we have Harold Skinner and Arthur James calibrating the R.F. Test Set (X-Band) TF 890A/1, a general-purpose instrument for the maintenance of installations operating in the 3-cm band*





*Checking the performance of an Automatic Standing Wave Indicator OA 1081 is Gwynne Stephens, M.I. Design. This equipment—from an original design produced by Baddow Research Laboratories—facilitates rapid waveguide measurements*

frequency spectrum and from this have come the stringent performance specifications for equipment such as is used on long distance point-to-point communication systems, and the allocations of other services to higher frequency bands.

These factors have intensified the demand for measuring instruments; clearly, precision measurement is essential for achieving higher standards, and the shift of services to higher frequencies has led to the adoption of new techniques. In this expanding market, Marconi Instruments are well in the picture; indeed, test equipment made by the Company is an essential tool in the design, manufacture and maintenance of telecommunications equipment, whether it be a midget portable receiver or a giant transmitter.

Turning now to the different types of instrument currently produced, we find the range extremely wide and varied.

For low-frequency apparatus, such as that concerned with the reproduction of speech and music, there are oscillators to provide the equipment under test with an input of known characteristics; power meters to register the output resulting from the known input; and distortion measuring apparatus to give an answer to the questions: 'Is the output of good quality? Is it a faithful reproduction of the input signal? Is it free from hum and other spurious noise components?'

Special complex monitors are required for use at the large transmitter stations. An example is the Marconi F.M. Station Monitor OA 1082, built to meet the special requirements of the B.B.C. for their new VHF service. Thirteen of these equipments were ordered by the B.B.C., and they have already been delivered to various stations throughout the country.

The receiver manufacturer requires



LEFT: For the maintenance of VHF equipment, a wide variety of M.I. test equipment is available. The picture shows Standard Signal Generator TF 144G and F.M./A.M. Signal Generator TF 995A being used in the repair of a mobile unit, one of many employed by a South Wales steel plant. RIGHT: These two instruments, recently introduced by M.I., together provide full facilities for testing mobile transmitter/receiver equipments. John Parkyn, M.I. Design, is using them on the Marconi VHF F.M. Telephone Equipment Type HP 81A

signal generators to allow him to check the tuning of his products and to evaluate sensitivity and bandwidth. To test the final receiver stages producing the sound output, he also requires power meters and distortion measuring apparatus.

The retailer's service department comes into the picture; his need is for simple, inexpensive apparatus, readily portable so that it can be taken to the home of his customer if the need arises.

Many different types of test equipment are necessary to maintain a television service. Special oscilloscopes are used to check the functioning of the complex pulse circuits which ensure synchronism between the beam scanning the screen in the viewer's receiver and the camera initiating the picture. Monitors are needed to maintain the transmitter in correct operation, and apparatus is needed to check and adjust the intricate aerial arrays.

Receiver manufacturers depend on signal generators covering both the bands used by the B.B.C. and the I.T.A.; they use alignment oscilloscopes in the adjustment of the wide-band circuits

used in vision receivers; and to test the video stages they need wide-range oscillators.

Serious design and development work on colour systems is already well under way in this country and a whole new range of instruments have been designed by Marconi engineers to supplement that already existing for monochrome.

The use of small mobile VHF transmitter-receiver sets for short-range speech communications has become almost commonplace in the last few years. The police, fire and ambulance services are extensive users. Aircraft radio providing limited range is closely akin to ground mobile radio, and test instruments applicable to either type of apparatus have been evolved. The field engineer is faced with a complete transmission-reception system and is now provided with light-weight, portable test sets which allow accurate assessment of transmission and reception capabilities.

Recently, it was announced that M.I. had introduced a new range of test equipment for point-to-point communication systems. The facilities provided by these systems are probably the

most important in modern telecommunications, and include international telephone links, telegraph and 'picture by radio' services, all of which operate in the 3- to 30-Mc/s band. The stringent recommendations of the C.C.I.R. (Comité Consultatif International des Radio-Communications), which is the body governing standards in this vital field, make highly accurate test equipment an essential for both manufacturer and operator.

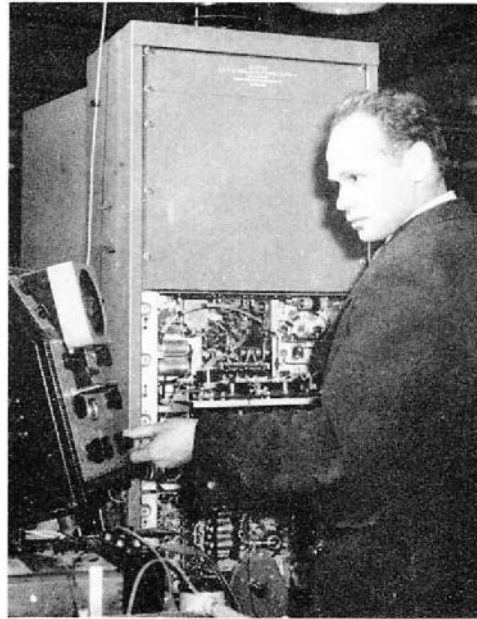
Many of the circuits and methods of operation in use in point-to-point systems are virtually unique in radio practice and demand test equipment specialised to an unusual degree.

The instrument industry has kept pace with the needs of radar manufacturers and users, but because of the extremely high frequencies employed, conventional r.f. circuits are not used. Instead, waveguide circuits are employed and r.f. energy is usually in the form of pulses of extremely short duration. Special instruments have had to be designed, such as microwave power meters which determine the power delivered to the scanner aerial by the radar transmitter, and aerial checking equipment which helps to tell what portion of this power is actually radiated.

Special-purpose signal generators are used to check the sensitivity of the receivers; also, equipment has been produced which generates a variable-range dummy echo to simulate the signal received from a target.

M.I. have taken the design lead in this field, an example of their radar test equipment being the R.F. Test Set TF 890A/1. This instrument is for checking transmitters, receivers and aerial systems.

This survey would not be complete without reference to the very significant contribution made by electronic instruments to the maintenance of telecommunication equipment in use by the armed forces. The needs of the Service



*Millimetre-band test equipment for the Ministry of Supply. Harry Enders, M.I. Calibration, adjusts the output of the Blocking Oscillator*

authorities follow a similar pattern to those of civil users, with the exception that the equipment must be used in very different conditions.

The result has been the production of a whole new range of instruments whose design is based on the very closest co-operation between the manufacturer and Government establishments. These instruments have a full pan-climatic specification, and are built to withstand any amount of rough handling.

As the telecommunications industry continues to grow, its instrumentation partner will increase in stature. Greater and greater accuracy, that is the demand that faces the makers of telecommunications instruments today. In the future, there can be little doubt, this situation will be intensified and instruments will become, as trends already indicate, a paramount factor in the advancement of the complex telecommunications business.