ALL NEW RECEIVERS : PRICES & DETAILS

Television and SHORT-WAVE WORLD

OCTOBER 1938
No. 128. Vol. XI.

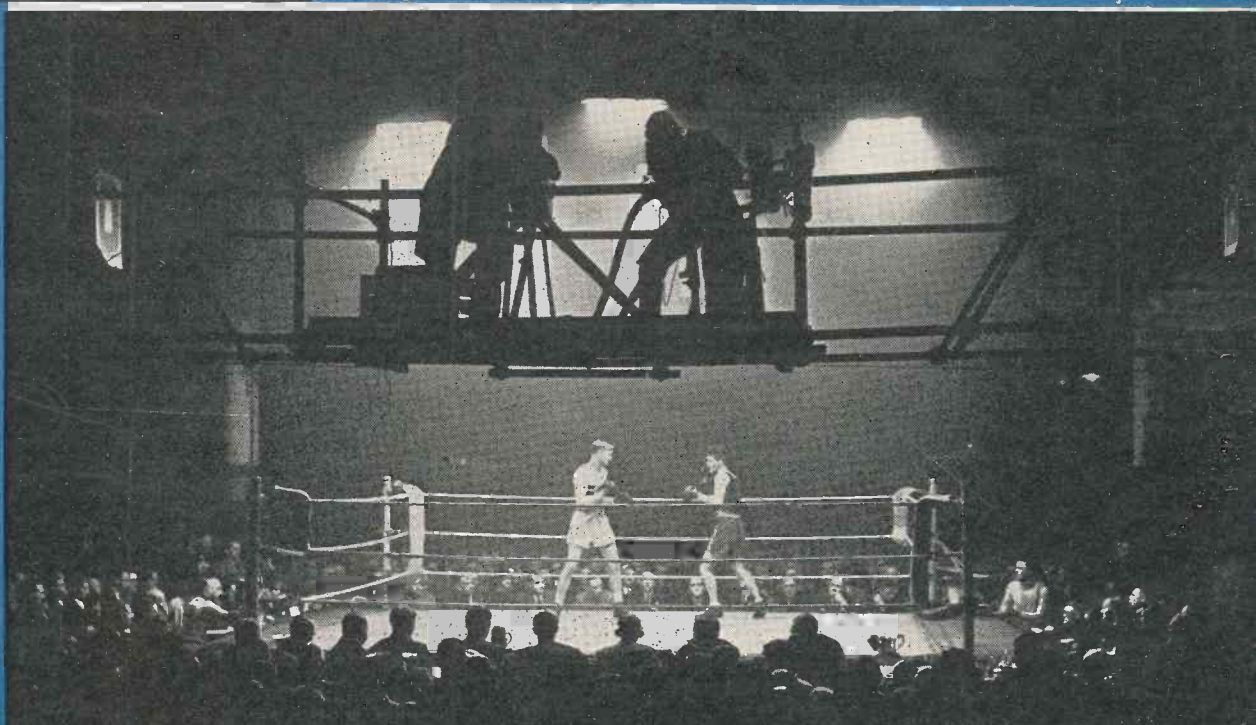
1/-

COMPACT PORTABLE TELEVISION AERIALS

BUILDING CHEAP OSCILLO-SCOPE

SHORT WAVES

REMOTE CONTROL BY RADIO



TELEVISION MUST HAVE NEWS VALUE!

SINGLE-VALVE 2-BAND TRANSMITTER

5-METRE CRYSTAL CONTROL RECEIVER FOR 5-8 METRES

BERNARD JONES PUBLICATIONS LTD.
CHANSITOR HOUSE. CHANCERY LANE
LONDON W.C.2.

THE FIRST TELEVISION JOURNAL IN THE WORLD

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NEW!

...ME BASE

...hyratron tube time base ...last year; and it is now ...mA for the medium-size ... Voltages remain high, ... in the thyratron anode ...ion, when electrostatic ...e of anode resistance and high ...or the scanning amplifier valves, ... may be obtained without ...n wave-form.

... mA at 1,000 volts may be obtained ... H.150, used in voltage-doubler with an ...0 mA. The voltage-doubler reservoir capacities should ... 0.4 to 0.5 mfd. each, and should be capable of withstanding at least 850 volts peak.

It will be noticed that by using the Westinghouse system for the above output, the transformer secondary winding is far safer from breakdown, owing to the comparatively low voltage employed. Were a full-wave valve rectifier in use here, the requisite secondary voltage would be 1,000-0-1,000, totalling 2,000, or over three times that required when using the Westinghouse Metal Rectifier. In addition to affording greater safety from accidental shock, the lower potential between secondary windings, and between such windings and frame, results in a cheaper, smaller and more reliable transformer.

For outputs above 10mA it will be necessary to employ an additional pair of H.150 rectifiers wired in parallel with above; or to employ, alternatively, one of the larger output rectifiers as used for H.T. supply to receivers. If, upon grounds of ecomony in space, he extra pair of H types in parallel is preferred, the transformer should be designed to carry at least 50% extra current; the capacity of the voltage-doubler condensers should be doubled, and care must be taken to make all paralleling connections perfectly sound in order to avoid unbalanced resistance joints, as such joints would cause unequal distribution of the load. (See page 19.)

30

H.T. SUPPLY TO PICTURE-SHIFT CIRCUIT

An output of 250 to 300 volts 4 to 5 mA is usually required for this circuit, and a suitable rectifier is the H.75, which may be used in the half-wave circuit shown below.

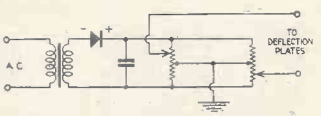

FIG. 28

RESTORATION OF D.C. COMPONENT

The circuit shown below indicates a particular application where the use of metal rectifiers provides a marked saving in space, and in cases in which the C.R. tube anode is earthed, also an increase in safety. The use of valve rectifiers in the positions shown necessitates highly insulated heater windings, which would still be somewhat dangerous.

FIG. 29

It will be seen that this circuit provides double modulation to the tube (modulating both shield and 1st anode) and restores the D.C. component of the picture signal which normally is lost between the output of the video-frequency amplifier valve, and the shield of the C.R. tube.

31

The enlarged 1939 edition of "The All Metal Way" includes a special chapter on television as well as up-to-date information on all rectification problems.

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No. 128 VOL. XI OCTOBER, 1938

TELEVISION and SHORT-WAVE WORLD

Special Features

TELEVISION AND SHORT-WAVE WORLD

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COMMENT OF THE MONTH

This Year's Receivers: Facts and Figures

ON another page of this issue we give details and prices of all the commercial receivers at present on the market. An analysis of these particulars throw an interesting light on the position of television to-day, and it indicates very clearly what amazing progress is being made and the faith that manufacturers have in the future possibilities of television, even though when at the time their production programmes were made the public response seemed poor.

In all there are twenty-two firms who are manufacturing television receivers, and the number of different models available to the public is sixty-four. The introduction this year of small screen receivers has naturally had an effect on the averages of picture size and price. Excluding the large projection type instruments, the average screen size, taking the largest dimension, is $8\frac{3}{4}$ inches; but the most general screen size, as reference to the table will show, is 10 inches by 8 inches. When price is studied in conjunction with screen size, it will be appreciated that it bears out a contention that we have repeatedly made in these pages—that price reduction is only possible at the present juncture by a reduction of picture size, and there is no indication of any other solution of the price question within sight. The average price, again excluding the projection receivers which are in a class by themselves, works out at £58 17s. 6d. This figure, however, does not exactly represent the price of a television receiver as such, for many models include all-wave radio and, in some cases, an autoradiogram in addition, features which would probably make a difference of 25 to 30 per cent. Thirty-two of the models listed include all-wave radio, twenty-six are television and sound only, and there are an additional seven of other types. Instruments in which the picture is directly viewed find more favour than the indirectly viewed type, for of the former there are forty-two, and only nineteen of the latter.

Official Status for Radio Amateurs

THE most important aspect of the recently developed scheme to make use of amateur transmitters and experimenters in time of national emergency is that the British amateur will, in future, have a semi-official status on the lines of the American amateur fraternity.

Although the Post Office make a particular point of issuing licences for experimental use only it has been felt in many quarters that the many thousands of amateurs in this country should be employed to advantage by being trained so that they would be able to take their part in National defence when required.

The R.A.F. Civilian Wireless Reserve will ultimately consist of 7,000 amateurs who will be trained up to Service requirements. In this way the standard of operating amongst British amateurs should be greatly improved and while the country will have the services of 7,000 trained amateurs it seems that the amateurs themselves will also gain by this arrangement.

In future those who join the Civilian Wireless Reserve will have a special call sign and in time be affiliated to the R.A.F. Signal Section.

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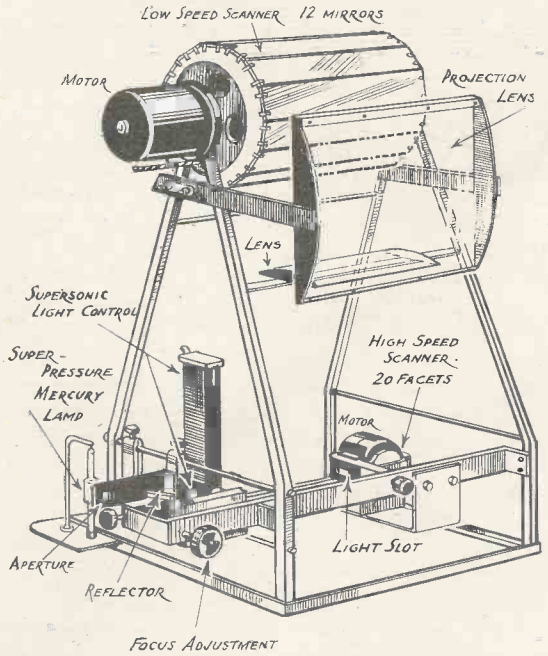
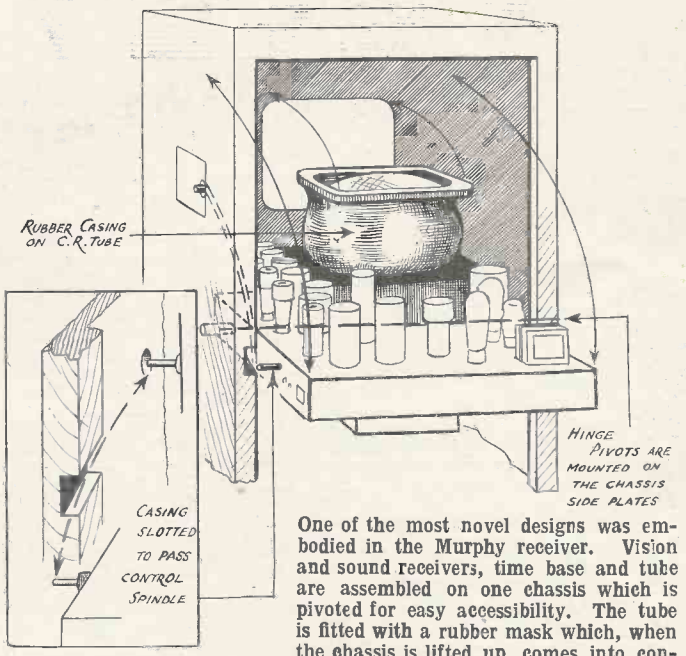
SKETCHED AT THE SHOW

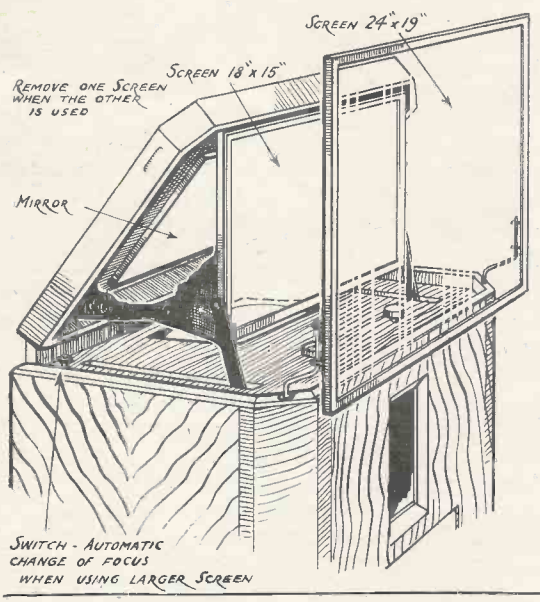
NOVELTIES IN 1938-1939 DESIGN

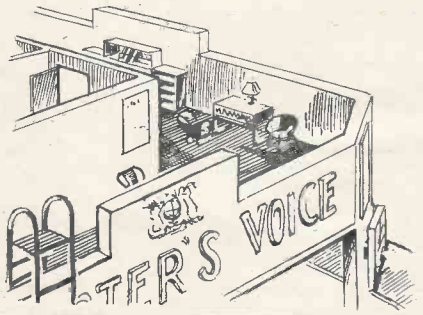


The optical layout of the Scophony Home Receiver as this sketch shows is quite simple and the parts used are surprisingly few.



One of the most novel designs was embodied in the Murphy receiver. Vision and sound receivers, time base and tube are assembled on one chassis which is pivoted for easy accessibility. The tube is fitted with a rubber mask which, when the chassis is lifted up, comes into contact with the glass window.





Two stand designs (left) Cossor go all Spanish. (Below) View of top deck of H.M.V. stand used as offices and fitted with a companion ladder as fire escape.

(Left) The novel arrangement for alternative screen size adopted by the Baird Company in their projection receiver. The large screen is entirely separate from the cabinet but the smaller one automatically comes into position when the lid is raised.

THE TELEVISION SOCIETY

THE opening meeting of the Twelfth Session of the Television Society will be held on Tuesday, October 11, at 7 p.m., in the Physics Lecture Theatre, University College, Gower Street, W.C.1, when a discussion will take place on: "German v. British Television."

Readers who visited the television exhibition at Olympia are cordially invited to attend, and tickets of admission can be obtained from the Lecture Secretary—G. Parr, Esq., 68 Compton Road, Winchmore Hill, London, N.21, or from the General Secretary—J. J. Denton, Esq., 25 Lisburne Road, Hampstead, London, N.W.3.

The speakers will be:—L. Marsland Gander, Esq. (*Daily Telegraph* Radio Correspondent), E. H. Traub, Esq. (International Television Corporation), K. S. Davies, Esq. (Messrs. Murphy Radio, Ltd.), and others.

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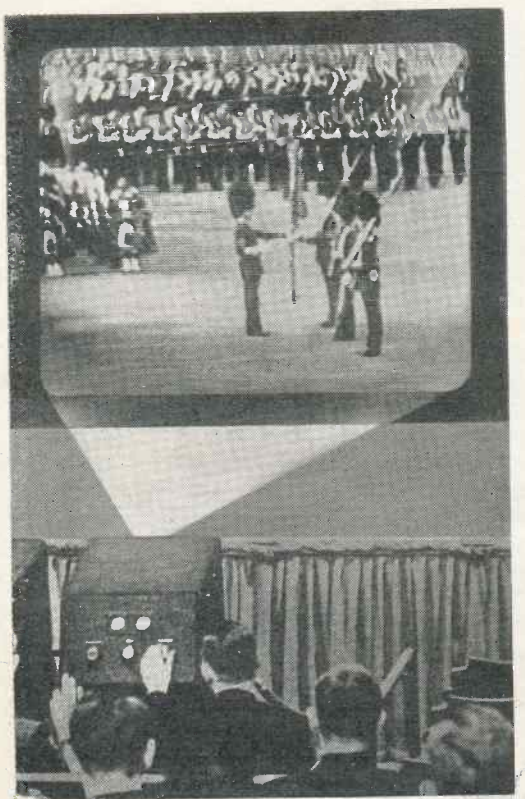
TELEVISION MUST HAVE NEWS VALUE!

A CANDID CRITICISM OF THE TELEVISION SERVICE —WITH SOME SUGGESTIONS BY THE EDITOR

QUITE recently we have been told officially: (1) that it is now the avowed object of the B.B.C. to make television a great national industry, (2) that the staff at Alexandra Palace at present numbers approximately 400 (which icludes 24 producers), and (3) that the old theatre at the palace is to be converted into a studio.

These points are of interest. The first indicates a definite change of attitude on the part of the B.B.C. towards television which hitherto has met with a great deal of opposition at Broadcasting House. As the chairman of the Radio Manufacturers' Association Television Development Sub-Committee said recently: "It was amazing that all restraint had fallen from the B.B.C." The second and third points are likely to impress, and it is with regard to these that it will be interesting to speculate how they will affect the future development of television and influence the public to buy receivers.

During the first twelve months of the television service from Alexandra Palace the staff numbered something less than a hundred. Comparison of the programmes then and now, however, does not reveal any remarkable difference. That is, they were approximately the same type and the same ideas, generally speaking, obtained. Admittedly they were not so finished and the effects in general were not so good. They did not, in fact, come up to the same technical standard as at present, which was probably due to the then lack of experience in a new technique.



A successful O.B. Trooping the Colour as seen at the Baird projection demonstration.

It would be useless to deny that the television entertainment so far offered to the public has, up to the present, made any considerable appeal and yet programme development proceeds, and apparently is intended to continue upon the same lines. The trouble is not with television; it is the comparison with the cinema. The cinema can provide programmes of a standard that television can never hope to attain even with an army of producers and the best studio facilities that could possibly be devised. A six-minute showing of a film is regarded as a very good day's work in a studio; how then is it possible, or even conceivable, that television programmes can be produced three or four times a week which have even a fraction of the entertainment value of a fifth-rate film? With television no retakes and no editing are possible and the money that can be spent on any one production compared with film production is a trifle.

Costly Productions

There is a limited amount of money available for television, however it is spent, and the amount available in the future will inevitably depend upon public interest. The present indications are that this money is being spent on building up a ponderous machine that will have no other purpose or possibilities of providing programmes other than those of a type which up to the present have failed to create any real enthusiasm. Improvement will be effected with improved studio facilities, but it will never result in real entertainment as the cinema-going public regards it to-day.

Cabaret occupies a large proportion of programme time and, of course, it really comprises a series of variety turns. Variety as a rule is poor entertainment when shown by film and it suffers still more by the limitations of television. Revues almost come into the same category and in both cases repetition is unavoidable. Both are useful to a limited extent but it would appear that they largely account, both

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A CONTINUOUS PROGRAMME OF NEWS AND ENTERTAINMENT

directly and indirectly, for heavy expenditure which they do not warrant.

The Alexandra Palace staff have worked under difficult and arduous conditions. There have been difficulties on account of lack of space and lack of money. These troubles are being overcome; but when conditions are improved will there be any material increase in public interest? We think not so long as the same ideas prevail. When the service commenced we were told that it was not intended to imitate either the cinema or the theatre. It has done both—feebly, and it is probably due to the fact that the executives have been drawn from film and stage. Entertainment that is unsuited to the medium can never be an entire success. Whatever standard of perfection is attained in production and presentation it is bound to fail to make any real impression on the public particularly when in course of time the novelty interest wears off.

Television has its limitations despite the high degree of technical development that has been reached, and it is clearly necessary to recognise these limitations before embarking upon costly schemes to which it cannot do justice.

Transmission Times

There is a promise of increased time of transmission and periods of four hours a day are mentioned. How are these hours to be filled if present ideas continue to prevail? They will either be surfeit or repetition and the machine must become more and more ponderous in order to cope with the increased demand. The B.B.C. authorities must ask themselves: "Can we ever attain real success if present ideas and methods are allowed further to develop on the present lines?" "Can justice be done to a medium which is entirely unique and which has possibilities not possessed by any other?" The answers must surely be "No."

Continuous Programmes

What is the alternative. Primarily the television service should be a *utility* service with a secondary backing of entertainment. Alexandra Palace should be on the air from 1 p.m. to 11 p.m. each day. It should transmit every item of interest that the Press is able to show in picture form so that whenever a viewer switched on he would be sure of some item of topical interest or some entertainment. The service should be such that no average person could afford to be without it. Repetition in each day's transmissions would not be of any consequence but the transmission times should be divided into periods and the newer matter presented as it became available with certain times devoted to entertainment. There should be something for most of the people all the time. The potential audience is immense.

Red-Hot News

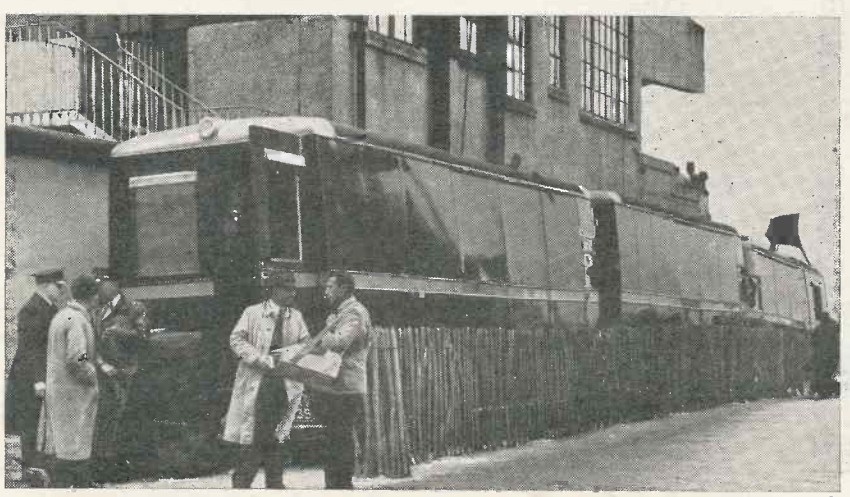
Actual happenings should be televised at the actual time whenever possible and films should be made for later transmission on the same day. There should be no difficulty in keeping the transmission going for the period mentioned for present programme time limitations are almost entirely due to the time necessary for production and all which that entails. For the provision of such a picture news service recourse would have to be made to a large extent to films and it would be quite feasible to station film units in different parts of the country and rush the films through to Alexandra Palace. Up to the present outside broadcasts have been chiefly of events of national importance and considerable enterprise has been shown, but the O.B.'s have not been developed sufficiently. There are thousands of events which would lend themselves to a flash news service if accompanied by suitable commentary.

Better Film Transmission

Film would of necessity play a large part in such a service and better methods of transmission than the present system should be employed; in fact even with the limited use of film at present an improvement is long overdue and the apparatus is available.

There would, of course, be difficulties in the provision of such a service, but the technical possibilities necessary for its development exist in the camera, film, facsimile radio transmission, television and rapid transit. If inspiration is to be sought it should be looked for from the daily Press and not the cinema nor the theatre.

Finally, there should be close co-operation between Broadcasting House and Alexandra Palace and a liaison department created with very wide powers which could effectively overrule any obstructionist ideas. Large sections of programmes from both departments lend themselves to joint transmission and closer co-operation, both as regards publicity and programme material, would ultimately be of inestimable value to broadcasting as a whole.



The mobile unit at Epsom for the Derby transmission.

Transmitting Chokes

High-frequency chokes for transmitting use are always important, so we are pleased to find that Premiers now have a choke which they are going to sell as a standard product. It was thought at first that amateurs might not appreciate the advantages of this choke so it was used only in their own transmitters. As, however, there has been a demand from amateurs, these chokes are to be marketed at 4s. 6d. They will carry 500 mA. and will operate up to 200 metres.

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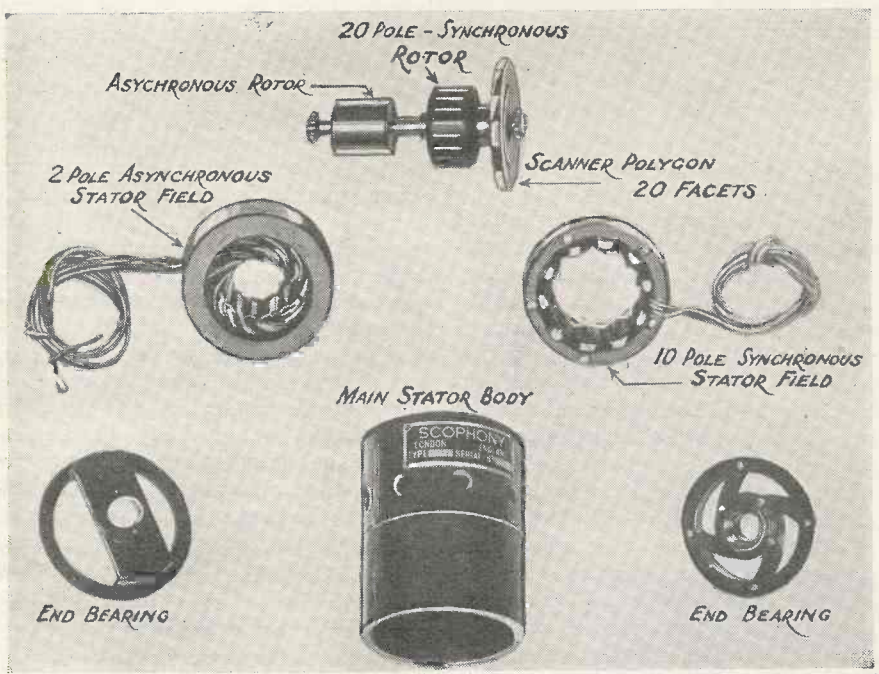
THE DESIGN OF A 30,000-R.P.M. SYNCHRONOUS MOTOR

A PROBLEM OF MECHANICAL-OPTICAL HIGH-DEFINITION TELEVISION

THE problem of driving a high-speed scanner in a mechanical optical type of receiver at a speed of rather more than 30,000 revolutions per minute and maintaining this in exact synchronism with the transmitter is no small one. It was, however, a problem with which Scophony engineers were faced, and it was the last of the many in the Scophony system to be solved. It had, of course, been possible to develop other parts of the system and prove their practicability by tying a local transmitter and receiver together on the same mains supply, an arrangement which enabled the optical side to be developed under suitable conditions; a solution of the major problem was absolutely essential.



The chief parts of the Scophony high-speed scanner motor.

30,375 R.P.M.

In the Scophony system a 20-faced polygon is used as the high-speed scanning member. For 405-line definition and 25 pictures per second the speed of rotation, since there is no optical multiplication of scan in this system, must be $\frac{10,125}{20}$ rev./sec., or 30,375 R.P.M.

The speed, of course, must be so controlled that the polygon remains in synchronism with the line frequency of the received signal and the phase displacement with respect to the signal must be small. If the maximum permissible phase shift is equivalent to one picture element the phase shift must not be greater than $\frac{360}{500 \times 20}$ degrees or 3-3/5 minutes of arc.

There was also the question of driving, and it was concluded that the motor must be driven by valve oscillators using as small a power as possible.

Experimental work was conducted over a period of several months and several methods of solution suggested themselves. Firstly, a synchronous induction motor might be designed to operate from polyphase currents derived from the line frequency. For the actual line frequency (10,125 cycles), a 40-pole motor would be required. This, however, would be very cumbersome and expensive to build. A sub-multiple of this frequency of the line frequency might, however, be used with a reduction in the number of poles, but here another disadvantage arises. Any synchronous motor has a small residual phase variation with the supply frequency. This is of the order of several electrical minutes of arc. For a 40-pole motor supplied with 10,125 cycles, 18 electrical minutes can be tolerated, but at 506.25 cycles using a two-pole motor only .9 electrical minutes of arc phase variation is permissible. Further, all synchronous induction motors have a low efficiency and a widely varying impedance when running up to speed, so that it is difficult to match the motor to the driving valves.

A Combination Motor

Finally, it was decided to separate the two functions required, and a design was evolved which comprised a high-efficiency induction motor and a high-efficiency synchronous phonic wheel on the same spindle. The induction motor is a two-pole squirrel cage motor wound to operate from a 3-phase supply at some 520 cycles. This section merely supplies the torque required to overcome friction and windage, and maintain the motor at approximately the correct speed.

Synchronism is obtained by means of a 20-pole phonic wheel, running in a 10-pole stator, and mounted on the same shaft. The winding on this stator is tuned to resonance at the signal frequency, and D.C. is passed through the winding of a value equal to the peak A.C. current, so that the magnetic flux remains unidirectional. High-frequency iron is used in this section of the motor, and no pains have been spared to produce a unit with the minimum losses. At best the efficiency is of the order of 40 per cent. Both sections of the motor can handle an input of 50 watts.

Phonic wheel motors have a tendency to hunt, and considering the running motor as a stationary state oscillating about its mean speed, it is clear that the only damping the system can have is the change of torque with speed and the change of load with speed. The load is almost entirely composed of windage which varies about as the cube of the speed. This alone is insufficient to damp out

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quickly any disturbance to the system and two effects are, therefore, used to increase the damping; (1) the induction section is designed to have a very rapidly falling torque/speed characteristic near synchronism; (2) the phonic stator is tuned to resonance when in synchronism.

Any change in phase, therefore, alters the inductance of the winding and so detunes it resulting in a reduction in A.C. current and consequently in torque.

Mechanical Considerations

Ball bearings of a special type are employed, and in order to reduce noise and vibration these are mounted in rubber and the phonic wheel is filled in with bakelite composition so that so far as possible all moving parts have smooth contours. Both from noise considerations and in order to lessen wear the rotor must be extremely accurately balanced dynamically. The accuracy required is of the order of 1 milligram-cm. No machines are obtainable commercially to balance these limits, and it was, therefore, necessary to develop one specially for this purpose.

A motor is in the course of development in which the two sections of the motor are combined. This will result in a lower moment of inertia of the rotor and correspondingly smaller power requirements for accurate synchronisation. It will also permit of a considerable reduction in size and consequently noise.

THE B.B.C. DEPUTY-GENERAL'S TELEVISION BROADCAST

ON the eve of the radio exhibition (August 23), Mr. C. G. Graves, Deputy-General of the B.B.C., in the course of a broadcast talk, said:—

"Television is the most exciting subject in broadcasting to-day, but few can have realised the extent of recent progress. Some people regard the whole thing as a fairy story. Others, impressed by early experiments, and without later experience of viewing, talk only about its great future. Make no mistake about it, television is established in *this* country. Remarkable strides have been made in the technique of transmission, in the programmes and in receivers.

Extension of Service

" The range of the present transmitter is proved to be greater than was expected. Although a thirty-mile radius is regarded as the service area of the station, many private viewers outside that area are receiving the programmes regularly and well. We are in touch with people near Northampton, in Norwich, Ipswich, Oxford, Tunbridge Wells, Brighton, Bournemouth and near Malvern, who get excellent reception.

" We are looking forward to the time when television can be extended to other parts of the country. The problem of carrying the programmes to Birmingham, or some other important centre, either by cable or by wireless link isn't an easy one. At the present the B.B.C. is eagerly awaiting the result of experiments which the Post Office are to carry out. In any case, it will take time and money, but we know that difficulties *will* be overcome, so we can look forward ultimately to a national television service.

" Meanwhile, we have just procured a second mobile unit for outside broadcasts, which will be used at Olympia, and increase the number of outside broadcasts in the programmes. And we shall shortly be embarking on a scheme for the conversion of the old theatre at Alexandra Palace into a large television studio. Television is very costly in time and in money, but when that studio is complete we shall again extend the programme hours.

" In television, Great Britain, with its established home service, has a two-year lead on any other country. American and other foreign friends of ours are impressed by what has been done here. We are creating a great national industry."

Mention of " Television and Short-wave World " when corresponding with advertisers will ensure prompt attention.

Television in Colour

TELEVISION in colour has been demonstrated by Baird, using a mechanical-optical system, but up to the present, and so far as we are aware, no attempt has been made to realise colour television by cathode-ray tube methods. Any such realisation is closely bound up in the production of suitable luminescent substances.

A television receiving apparatus could be constructed which is provided with three projection type cathode-ray tubes, the screens of which are made to fluoresce respectively in the three primary colours, red, green and blue-violet. Phosphors at present available reproduce the three primary colours with a fair degree of accuracy. The red primary is reproduced by zinc phosphate or a zinc cadmium sulphide, the green by Willemite and the blue by zinc sulphide with a silver phosphorogen.

Although these phosphors do not cover the entire range required, there is little doubt that, when a more exact match is required, suitable phosphors can be produced. At the transmitting end the scene televised is scanned through three colour filters corresponding to the three primary colours, using suitable photo-electric cells. The three images are reproduced on the three corresponding cathode-ray tubes and can be transmitted consecutively, the persistent visual impressions yielding the required combination. Colour balance can be controlled by variation of the current and/or voltage in each of the three tubes. The three televised images are combined by projection and thrown on to a screen.

(LEVY & WEST)

How to Use the Cathode-ray Tube. —This little book by J. H. Reyner explains in simple language the operating principles and the use of the cathode-ray oscilloscope. Primarily, it is intended for the radio service engineer and it will enable him to become familiar with the more general uses of the oscilloscope in testing radio receivers. The booket, which contains 40 pages, with paper cover, is well illustrated and is priced at 1s. It may be obtained from the author at Furzehill Laboratories, Boreham Wood.

" La Kermesse Héroïque " ("The Heroic Sex") which will be televised in the afternoon of October 7 and the evening of October 11 won the French and the Italian awards for the best film of the year and had a record run at a West End cinema.

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1938-39 TELEVISION RECEIVERS

PRINCIPAL FEATURES & PRICES OF ALL COMMERCIAL SETS

Picture Size.	Maker.	Type.	Cabinet.	Price.	System.
24 ins. × 20 ins.	Scophony.	Sound and vision.	Console.	£231 0 0	Mechanical.
6 ft. × 5 ft.	Scophony.	Sound and vision	—	Rental	Mechanical.
24 ins. × 20 ins.	Ekco.	Sound and vision	Console.	231 0 0	Mechanical.
22 ins. × 18 ins.	H.M.V.	Television sound, all-wave radio.	Console.	210 0 0	Cathode-ray projection.
22 ins. × 18 ins.	Marconiphone.	Television sound, all-wave radio	Console.	210 0 0	Cathode-ray projection.
24 ins. × 19 ins. or 18 ins. × 15 ins.	Baird.	Television sound, P.B. all-wave radio.	Console.	157 10 0	Cathode-ray projection.
18 ins. × 15 ins.	Pye.	Television sound, all-wave radio.	Console.	204 15 0	Cathode-ray projection.
18 ins. × 14½ ins.	Philips.	Television sound, all-wave radio.	Console.	126 0 0	Cathode-ray projection.
13½ ins. × 11 ins.	Baird.	Television sound, all-wave radio.	Auto-radiogram.	126 0 0	Cathode-ray indirectly viewed
13½ ins. × 11 ins.	G.E.C.	Television sound, all-wave radio.	Console.	73 10 0	Cathode-ray indirectly viewed
12 ins. × 9½ ins.	Cossor.	Television sound, all-wave radio.	Console.	50 8 0	Cathode-ray directly viewed.
10¼ ins. × 8¼ ins.	Ultra.	Sound and vision.	Console.	39 18 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Baird.	Television sound, all-wave radio.	Radiogram.	75 12 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	Baird.	Television sound, all-wave radio.	Console.	49 7 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Burndept.	Television sound, all-wave radio.	Table.	46 4 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Cossor.	Sound and vision.	Console.	50 0 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Cossor.	Television sound, med. and long.	Auto-radiogram.	94 10 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Dynatron.	Television sound, med. and long.	Console.	73 10 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Ekco.	Television sound, all-wave radio.	Auto-radiogram.	173 5 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Ferranti.	Sound and vision.	Console.	51 9 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Ferranti.	Television sound, all-wave radio.	Console.	63 0 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	G.E.C.	Sound and vision.	Console.	52 10 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	G.E.C.	Television sound, all-wave radio.	Console.	63 0 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	H.M.V.	Sound and vision.	Console.	38 17 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	H.M.V.	Television sound, all-wave radio.	Auto-radiogram.	126 0 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	H.M.V.	Television sound, all-wave radio.	Console.	84 0 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	K.-B.	Television sound, all-wave radio.	Console.	63 0 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	K.-B.	Television sound, all-wave radio	Console.	57 15 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	Marconiphone.	Sound and vision.	Console.	46 4 0	Cathode-ray directly viewed.
10 ins. × 8 ins.	Marconiphone.	Television sound, all-wave radio.	Auto-radiogram.	126 0 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	Marconiphone.	Television sound, all-wave radio.	Console.	84 0 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	Marconiphone.	Television sound, all-wave radio.	Console.	84 0 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	Pilot.	Sound and vision.	Console.	63 0 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	R.G.D.	Television sound, med. and long.	Radiogram.	68 5 0	T.65.
10 ins. × 8 ins.	R.G.D.	Television sound, all-wave radio.	Auto-radiogram.	136 10 0	Cathode-ray indirectly viewed
10 ins. × 8 ins.	R.G.D.	Television sound, all-wave radio.	Console.	94 10 0	382R.
10 ins. × 8 ins.	Tannoy.	Sound and vision.	Console.	78 15 0	382.
10 ins. × 8 ins.	Vidor.	Sound and vision.	Auto-radiogram.	89 5 0	Cathode-ray directly viewed.
9 ins. × 7¼ ins.	McMichael.	Sound and vision.	Console.	42 0 0	Cathode-ray directly viewed.
9 ins. × 7 ins.	Murphy.	Sound and vision.	Console.	63 0 0	Cathode-ray indirectly viewed
8¼ ins. × 6½ ins.	Cossor.	Sound and vision.	Console.	65 0 0	Cathode-ray indirectly viewed
7¾ ins. × 6¼ ins.	Baird.	Sound and vision.	Table.	47 5 0	Cathode-ray directly viewed.
7¾ ins. × 6¼ ins.	Baird.	Sound and vision.	Console.	39 18 0	Cathode-ray directly viewed.
7¾ ins. × 6¼ ins.	Marconiphone.	Sound and vision.	Table.	36 15 0	Cathode-ray directly viewed.
7¾ ins. × 6¼ ins.	Ultra.	Sound and vision.	Console.	47 5 0	Cathode-ray directly viewed.
7½ ins. × 6¼ ins.	Beethoven.	Television sound, all-wave radio.	Table.	29 8 0	Cathode-ray directly viewed.
7½ ins. × 6 ins.	H.M.V.	Television sound, all-wave radio.	Console.	50 8 0	Cathode-ray directly viewed.
7½ ins. × 6 ins.	Marconiphone.	Television sound, all-wave radio.	Console.	47 5 0	Cathode-ray directly viewed.
7½ ins. × 6 ins.	Murphy.	Television sound, all-wave radio.	Console.	47 5 0	Cathode-ray directly viewed.
7½ ins. × 6 ins.	Murphy.	Sound and vision.	Console.	45 0 0	Cathode-ray directly viewed.
7¼ ins. × 5¾ ins.	G.E.C.	Vision only.	Table.	30 0 0	Cathode-ray directly viewed.
7½ ins. × 5¾ ins.	Invicta.	Sound and vision.	Table.	24 3 0	Cathode-ray directly viewed.
7½ ins. × 5¾ ins.	Pye.	Television sound, all-wave radio.	Auto-radiogram.	32 11 0	Cathode-ray directly viewed.
7½ ins. × 5¾ ins.	Pye.	Sound and vision.	Table.	68 5 0	Cathode-ray directly viewed.
7 ins. × 5½ ins.	K.-B.	Sound and vision.	Table.	31 10 0	Cathode-ray directly viewed.
6¼ ins. × 5 ins.	Marconiphone.	Television sound, all-wave radio.	Table.	31 10 0	Cathode-ray directly viewed.
5 ins. × 4 ins.	Cossor.	Sound and vision.	Table.	36 15 0	Cathode-ray directly viewed.
5 ins. × 4 ins.	Cossor.	Sound and vision.	Table.	27 6 0	Cathode-ray directly viewed.
6¼ ins. × 5 ins.	H.M.V.	Television sound, all-wave radio.	Table.	24 3 0	Cathode-ray directly viewed.
4¾ ins. × 4 ins.	Marconiphone.	Television sound, all-wave.	Table.	36 15 0	Cathode-ray directly viewed.
4 ins. × 3⅜ ins.	Pye.	Television sound, med. and long.	Table.	30 9 0	Cathode-ray directly viewed.
4 ins. × 3⅜ ins.	Pye.	Vision only.	Table.	30 9 0	Cathode-ray directly viewed.
4¾ ins. × 4 ins.	H.M.V.	Television sound, all-wave radio.	Table.	22 1 0	Cathode-ray directly viewed.
4 ins. × 3⅜ ins.	Invicta.	Vision only.	Table.	30 9 0	Cathode-ray directly viewed.
			Table.	22 11 6	Cathode-ray directly viewed.

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RADIO RETAILERS AND TELEVISION

THE COMING OF A BIG NEW INDUSTRY

DURING Radiolympia a convention for radio retailers was called by the Radio Manufacturers' Association to discuss the marketing of television receivers and explain to the retailers the position of television to-day.

The speakers were:

Sir Frank E. Smith, K.C.B., C.B.E. (Deputy Chairman of the Television Advisory Committee), chairman.

Sir Stephen Tallents, K.C.M.G., C.B., C.B.E. (B.B.C. Controller of Public Relations).

Sir Noel Ashbridge, B.Sc., M.I.E.E. (Controller of B.B.C. Engineering Division).

C. O. Stanley (Chairman of the R.M.A. Television Development Sub-Committee).

T. Rigby Taylor (a retailer).

Major L. H. Peter, M.C., A.F.C., M.I.E.E. (Chairman of the Radio Manufacturers' Association);

and at the conclusion of their speeches other speakers from among the 1,500 retailers present expressed their opinions which were of a generally favourable nature.

A Big New Industry

Sir Frank Smith said that all present were concerned with establishing a real television industry. "The Government," he said, "had now full confidence in the future of television and it could be expected that before long the Television Advisory Committee would be able to recommend an extension of the service to certain cities and towns in the provinces.

"Manufacturers were to be congratulated on their courage, for they had already spent hundreds of thousands of pounds in development and research."

He mentioned that the Alexandra Palace transmitter had now been in existence for over eighteen months, during which period 100,000 televisors should have been sold. In fact, not 10,000 were in use: why? We want the answer, he said.

The Television Advisory Committee had been in close touch with the R.M.A. and they were convinced that it was not quality of transmission, size of picture or the entertainment value of the programme that had held up sales. It was, he said, that the public did not realise what it was missing. If they could be made to realise this, there would be a satisfactory public response.

Sir Stephen Tallents said that at the B.B.C. they were convinced believers in the imminent success of a country-wide television service. A year ago the staff at Alexandra Palace was so hard-pressed that a holiday was arranged for them all in August, but to-day there were nearly 400 people at Alexandra Palace and the number of producers had been increased from twelve to twenty-four.

One of the chief problems was that of letting people see television, for when they did they would all become enthusiasts. He pointed out that a quarter of the population are inside the existing service area and represented one of the most prosperous sections of the community.

Permanent Standards

Sir Noel Ashbridge emphasised the permanence of existing television technical standards and he said that apart from the guarantee by the Television Advisory Committee of no change within a certain period, it was his opinion that no change was likely for a great number of years. As far as wavelengths were concerned the recent Cairo Conference had confirmed the present television wavebands, and he emphasised that a great number of technical improvements could be made without changing the present transmission standards.

Very soon the B.B.C. would have an incomparably better studio with the latest types of equipment. He suggested that dealers must take particular care to fix aerials properly. As far as interference was concerned, local post offices would now deal with interference on television as well as on ordinary sound receivers.

C. O. Stanley, speaking on behalf of the manufacturers, said that the R.M.A. a year ago had formed a sub-committee (of which he was chairman) to plan the development of the new industry and the fostering of television in the trade.

Television was a peepshow at Olympia two years ago; the public don't know that television is an entertainment and has been stabilised. It was up to the dealers to convert the public.

Referring to the recent broadcast of C. G. Graves, B.B.C. Deputy-Director General, he said that it was amazing that all restraint had fallen from the B.B.C.

The replacement market, he said, will one day be a television one, but they did not want it overnight. Some time in the future, the radio market would turn over to television and it was up to dealers to get the intermediate period under way. Every dealer was an investor in the radio industry and should take some hand in television propaganda in order to share in the eventual profits.

Manufacturers had worked with a common purpose and common point of view and had made losses over television. He addressed the convention in no state of artificial optimism and urged dealers to hasten the time when television would be profitable and big business.

More Programmes

T. Rigby Taylor, speaking as a representative retailer, said that outside interference was one of the major problems, which applied both in home and showroom demonstrations. From the B.B.C. they wanted additional programmes—four hours a day—the cost of which might be covered by an additional licence. He suggested a closer tie-up between sound and television programmes and that the Regional and National programmes should be televised between 6 p.m. and 10 p.m. on alternate evenings, also that announcements of evening television programmes should be made in the news bulletins. Dealers must be prepared to undertake some pioneer work. Shop demonstrations were not good enough; home demonstrations were essential.

Please mention "Television and Short-wave World" when corresponding with advertisers.

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Scannings and Reflections

DUKE OF KENT AT TELEVISION DINNER

A "FESTIVAL Television Dinner" is to be given by the Royal Photographic Society. H.R.H. the Duke of Kent, who is greatly interested in the work of the Society, is to preside at the dinner. In addition to H.R.H., the speakers will include the Rt. Hon. Leslie Burgin, Minister of Transport, and Mr. J. B. Priestley, the famous novelist. A special toast will be proposed from Alexandra Palace, and delivered through television sets at the banquet.

The technical arrangements for this unique event are being made by the Television Committee of the Radio Manufacturers' Association in collaboration with the B.B.C. Television sets will be placed before each group of guests, and they will be entertained during dinner by that evening's programme.

THE TELEVISION STUDIO AT OLYMPIA

Approximately one-third of the visitors to Olympia visited the television studio, and it is probable that there would have been more but many were deterred by the sight of the long queue and the consequent amount of time needed to pass round.

LARGE SCREEN AND COLOUR TELEVISION

During the course of a conversation at Radiolympia, Mr. J. L. Baird said, "I am working on two main lines of research. One is television in the cinema. We have already equipped three cinemas in London with apparatus which shows pictures on a screen 8 ft. by 6 ft. We cannot give public performances of the B.B.C. programmes in these places at the present moment because the B.B.C. claims that this would be an infringement of their copyright. We have applied for permission, but have been refused. I think it would be most helpful if this permission were given, because it would stimulate public interest in television, which would ultimately lead to a wider demand for home television sets, and the possibility of meeting that demand at a lower price than is at present economically possible.

"Much research will be necessary before colour television is practical politics. The technical difficulties we have to overcome are a simplification of the complicated apparatus, a more natural colour and better definition."

INTERNATIONAL TELEVISION MEETING

An international television meeting was held in the Physical Building of the F.I.T., 34 Gloriastrasse, Zurich, 7, between September 19 and 21. A number of lectures were given, and among the speakers were Mr. L. M. Myers and Mr. E. H. Traub, who are well known in British television circles, and as contributors to this journal.

TELEVISED TRAGEDIES

Two tragedies were recently televised in New York. One case was when experimental outdoor panning shots were being made from the R.A.C. building, and a typist fell from the window of the 11th floor of a building which came within the range of the camera. The picture of the unhappy event was, however, not seen beyond the control room, as the transmission was being made on a closed circuit.

The second case was when a deranged youth held New York in suspense for several hours by threatening to jump, and finally doing so from the 17th floor of a Fifth Avenue hotel immediately in range of a R.C.A. laboratory camera which faced the hotel. A photograph of this image, showing the jump, has been published in several New York journals.

FOOTBALL MATCHES TO BE TELEVISED

The mobile television unit will again visit Arsenal Stadium on October 26, for televising the Arsenal v. Rest of Europe Match. The game is being televised by the courtesy of the Football Association and the Arsenal Football Club.

Three cameras, which will be situated in the stand, should allow viewers to follow closely the run of the play. Close-ups will be given by the use of telephoto lenses. Transmission from Highbury to Alexandra Palace will be by radio link.

MECHANICAL TELEVISION IN U.S.A.

Television with a mechanical scanner was demonstrated last month to members of the Institute of Radio Engineers by Kolorama Laboratories, at Irvington, New Jersey. A test news reel was projected upon a 3 ft. by 4 ft. screen from the rear. Images were said to be reasonably clear, and black and white; 225 lines were used, interlaced 2 to 1, giving 112½ lines per frame, with 24 frames per second. It is claimed by the company that when perfected the pictures will be comparable with 441 line systems, and as the frequencies employed will be consequently less, a much longer wavelength can be used giving greater coverage.

RECEPTION IN THE WEST

The Alexandra Palace transmissions have been received in Taunton by Mr. G. J. Small, a wireless engineer of the town. Mr. Small has an experimental receiver. The Test Match was seen very clearly.

THE NEW DIRECTOR-GENERAL AT OLYMPIA

Mr. F. W. Ogilvie, new Director-General of the B.B.C., and Mrs. Ogilvie, paid a visit to Radiolympia on September 2 and inspected the television studio. They were received by members of the Radio Manufacturers' Association, and at the end of the visit Mr. Ogilvie said that what had particularly struck them was that television had become a reality in the home and was now available at greatly reduced prices.

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DO YOU REALISE HOW GOOD TELEVISION RECEPTION IS TO-DAY,

ESPECIALLY

BAIRD TELEVISION

PROVE THIS BY ASKING FOR A DEMONSTRATION OF THE NEW BAIRD MODELS

As the world pioneers of television, Baird Television Ltd., have been in the forefront of progress with every important development in television. Not the least of these is receiver design, for the very first set to show a real television picture was demonstrated by Baird in 1926. With new and up-to-date factory accommodation the company's technical resources have been widened and unequalled research facilities provided. This has culminated in the development of the finest television receivers for domestic receiving purposes. The new range of models has been graded to meet the varying needs of a rapidly expanding viewing public and each set is the best in its class that television has to offer to-day. See them in operation at the leading radio dealers —names and addresses furnished on request.

THE NAME BAIRD SYNONYMOUS WITH TELEVISION

Send for New 16 Page Catalogue

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G.E.C.

CATHODE RAY MONITOR TUBES

For oscillograph and other applications

Two small high vacuum cathode ray tubes are now available, and will undoubtedly find many applications in radio servicing and industrial work where a visual means of studying transient or recurrent operations is required.

TYPES AVAILABLE:

TYPE 4051

A small tube particularly suitable where economy in space is essential. Gives a brilliant spot without the necessity for high operating voltages.

INDIRECTLY HEATED CATHODE.

Heater Voltage	4.0
Heater Current	0.8 amp.
Accelerator Voltage (A2)	250 to 500 v. max.
Focusing Electrode (A1)	50 to 100 v.
Control Electrode (Modulator)	0 to −20 v.

Screen : Medium persistence type, green fluorescence.

DIMENSIONS:

Maximum Overall Length	160 mm.
Screen Diameter	39 mm. (1½″ app)

Separate connections to each of the four deflector plates.

LIST PRICE 45/-

TYPE 4081

Similar to type 4051, but with larger screen diameter, with only a slight increase in overall length. The short length models for economy in size of apparatus and facilitates shielding. Also suitable for use without the necessity for high operating voltages.

INDIRECTLY HEATED CATHODE.

Heater Voltage	4.0
Heater Current	0.8 amp.
Accelerator Voltage (A2)	400 to 800 v. max.
Focusing Electrode (A1)	80 to 200 v. max.
Control Electrode (Modulator)	0 to −40 v.

Screen : Medium persistence type, green fluorescence.

DIMENSIONS:

Maximum Overall Length	190 mm.
Screen Diameter	70 mm. (2¾″ app)

Separate connections to each of the four deflector plates.

LIST PRICE 55/-

There is an ever-expanding scope for the use of cathode ray tubes in all branches of industry. Enquiries regarding special applications will be welcomed.

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

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MORE SCANNINGS

DEMAND FOR RECEIVERS

Sales of television receivers at Olympia, it was stated, exceeded expectations. Television, undoubtedly, was *the* feature of the show, and the demonstration aroused intense public interest.

Plans have been made by the manufacturers to produce the number of television receivers which a careful estimate indicates the public will require before the spring of 1939, and the television committee of the R.M.A. is confident that the public will not be disappointed in the matter of deliveries.

Mr. C. O. Stanley, Chairman of the Radio Manufacturers' Television Development Committee, said: "Compared with a year ago, the public interest in television has changed in character from a 'novelty' interest to the interest of people who wish to purchase."

OVERTIME ON RECEIVER PRODUCTION

Orders for G.E.C. television sets have come in so well that the factories at Coventry are working overtime. "At the outset of the Show we were able to supply sets on demand," a G.E.C. official stated, "but now we are having to have five to seven days' notice. If orders continue at this rate, we shall need from ten to fourteen days. All the original stock of two of our models are already depleted. These are the 37-guinea console model, and the 23-guinea vision-unit. A factor that has influenced sales is that people realise that prices are now so reasonable that they cannot be expected to fall again for a long time."

RECEPTION IN YORKSHIRE

The Alexandra Palace programmes have been received by Mr. Bagshaw, radio engineer, at Dore, near Sheffield, 160 miles from the Alexandra Palace transmitting station. Mr. Bagshaw has been investigating the possibilities of long-distance television for a considerable time. Dore Moor is almost an ideal site, as it is 750 ft. above sea-level and remote from roads and electrical interference.

VISIT TO R.A.F. AERODROME

The training of R.A.F. pilots will be televised by courtesy of the Air Ministry, about the middle of October, when one of the B.B.C. mobile units will spend a day at an aerodrome near London. Viewers will then be able to watch fighter planes at close quarters and see pilots under instruction operating the controls.

A BOXING BAN ON TELEVISION

Mr. Sydney Hulls, promoter of the Jack Doyle-Eddie Phillips fight at Harringay in September, refused to allow the contest to be televised despite a cash offer from the B.B.C. Mr. Hulls said he regarded the televising of fights a serious menace to the boxing promoter as set-owners invite parties to watch these big events, and they are usually the people who can easily afford to pay for the best seats.

OUTSIDE BROADCASTS AFTER DARK

Outside television broadcasts have been largely confined to hours of daylight when, of course, most of the major sporting events are taking place, but the B.B.C. staff at Alexandra Palace realise that many set owners are not able to tune in during the day, and are therefore planning a series of outside events which can be included in the evening transmission.

One of the first was the Television Ball in the Pinewood Club on September 23 and 24. Later it is hoped to televise boxing matches from the National Sporting Club premises at Earl's Court, and to set up the cameras at Harringay and Wembley for ice hockey and similar sports.

SCOPHONY IN U.S.A.

Mr. Solomon Sagall, the managing director of Scophony, Ltd., is going to the United States at the end of this month to introduce Scophony television and with the intention of forming a Scophony Corporation of America, backed by American financial and cinema interests.

FRENCH STANDARDISATION

The French Minister of Radio has announced that the system of transmission employed by the television service in France will remain substantially unaltered until July 1, 1941.

TELEVISING TELEVISION

On October 22, viewers will be shown how the mobile units take their pictures 20 miles from the Alexandra Palace, transmit them to the control room at A.P. and then broadcast them.

THE CINEMA AND TELEVISION

The Cinema Exhibitors' Association are pressing for some concerted action regarding the use of films for television. The matter, it is contended, has assumed such importance that it will undoubtedly figure on C.E.A. branch agendas as a major subject of discussion. A proposal is on foot to approach the Kinema Renters' Society, newsreels and the television companies for the purpose of watching the interests of the kinema industry.

BRITISH TRANSMITTER FOR RUSSIA

The Scophony transmitter made to the order of the Russian Government was despatched last month. The apparatus comprises a complete high-definition film transmitter and special synchronising apparatus. It is to be installed in Leningrad.

CRYSTAL PALACE MOTOR RACING

Crystal Palace will again provide a thrilling outside feature for viewers on the afternoon of October 8. On that Saturday afternoon a stern struggle will be fought out between the well-known motor racing "aces" Arthur Dobson and B. Bira who is, of course, Prince Birabongse of Siam, while the Imperial Trophy Race will also be staged for Britain and Continental drivers. In both these events cameras will follow the progress of the cars as they hurtle round the track, and an effects microphone will be placed at each camera position to pick up the roar of the cars and convey the exciting atmosphere of such contests.

"LONDON WALL"

A cross section of life in a solicitor's office, together with the hopes and fears of those who work there, will be portrayed in the presentation of "London Wall" to be televised in the evening of October 8 and the afternoon of October 12. Production is by Michael Barry.

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. . . . . AND MORE REFLECTIONS

MORE OUTSIDE BROADCASTS

It is most gratifying to know that there are to be a greater number of outside broadcasts. It is hardly to be expected that cabaret shows and similar entertainments can be produced day in and day out to compete with films. Viewers' interest is always greater in productions that are of a topical nature or that cannot be seen at a cinema. Between October 22 and 28, there is going to be a festival of outside broadcasts.

On October 19, by permission of the Air Ministry, there will be a tour of the R.A.F. aerodromes at North Weald. The latest types of 'plane will be shown, some of them actually when travelling at high speed. Conversations between pilots and aerodrome officials will also be heard. This is the type of television programme which should do much to increase interest amongst the general public.

SUN SPOT EFFECTS

A taste of what may happen around 1940 was obtained on September 20 when all radio communication between South Africa and the outside world was interrupted for a period of three hours. During this time it was impossible to send or receive transmissions to and from South Africa even with highly concentrated beam aerials.

The Post Office are erecting a new station at Rochester while their American counterparts are also installing beam transmitters with aerials covering only a narrow arc. In this way, they hope to be able to counteract sun spot effects which may probably make short-wave reception over long distances particularly unreliable after 1940.

USING MICRO WAVES

The Post Office engineers have for a considerable time been experimenting with micro waves in an endeavour to find out just how reliable these transmitters would be for point-to-point communication. The results of their investigations have proved most interesting, not only from the point of view of communication, but also from the television angle. It is considered highly probable that the ultimate solution of television in this country will be a large number of widely separated stations in all parts of the country linked together by micro-wave intermediate beam stations. This will overcome the need for expensive cables which so far have not proved entirely satisfactory for television relaying.

TOPICAL TELEVISION BROADCASTS

An excellent example of how television should be used was the transmission showing the return of the Prime Minister from Germany. The outside television units were rushed to the Airport and viewers were able to see Mr. Chamberlain step from the aeroplane and heard his first remarks on arriving back from his political talks with Herr Hitler. This type of broadcast is appreciated by viewers and it is to be hoped that it is only the first of many of a similar nature.

NEW TELEVISION POST

A new post is shortly to be created at Alexandra Palace with the title of Television Public Relations Officer. Under the jurisdiction of this office it is proposed to organise a staff of B.B.C. lecturers on television to undertake propaganda and to co-operate with dealers in order to increase the interest generally in this country.

BRITISH v. AMERICAN VALVES

Congratuulations are due to British valve makers as a whole who are now showing what they can do in the production of special valves. For some considerable time high-slope valves designed primarily for television receivers have been exported to America for use in their experimental receivers. British cathode-ray tubes are also being exported to American amateurs owing to the fact that the average low-price American tube still produces a picture with a greenish hue. The highlight, however, of the British valve manufacturers' programme is the production of valves for the British transmitting amateur, which in many cases have characteristics equal to or above the level of their American equivalents.

A TELEVISION STATION IN BRIGHTON ?

Radio dealers in Brighton, Hove and other parts of Sussex are agitating for a television station to serve their area. It is explained that there is more than the usual amount of interest in television in Brighton despite the fact that it is considerably outside the service area and only receivers in particularly good spots are capable of producing good pictures. It is only fair to point out, however, that the possibilities of a station in or near Brighton are remote, for such a station would dissipate half of its radiation over the English Channel.

FRENCH TELEVISION

The French Radio Minister, M. Julien, announced that transmission characteristics have now been arranged and will be unchanged until July 1, 1941. The French Radio dealers who were a little pessimistic about the possibilities of a service covering Paris have now changed their views and hope that before very long a large number of manufacturers will be in a position to supply television units. However, the possibility of British competition has not been disregarded for it is realised that the average British receiver can very easily be modified to pick up pictures transmitted from the Eiffel Tower. The transmission characteristics decided upon are as follows:—

Vision wavelength, 6.52 m. (46 mc.).
Sound wavelength, 7.14 m (42 mc.).
Polarity of transmission, positive.
No. of pictures, 50 interlaced per sec.
No. of lines, between 440 and 445.
Picture proportion, 5/4 width/height.
Duration of line, synch. signals 18%.
Duration of frame synch. signals .15 lines per interlaced section (about 7%).

TELEVISION IN AMERICA

N.B.C. representative in England, Fred Bate, puts forward the view that it will be many years before television is on a commercial basis in America. He thinks that as American listeners are far more critical than British listeners, owing to the enormous amount of competitive entertainment available, they will not appreciate the wonders of television until it is on a par with the best that the cinema can offer. His opinion is that the average American will not appreciate the difficulties that television designers have overcome in order to produce pictures of the present degree of perfection. Naturally there cannot be a service until it can be commercialised unless the broadcasting concerns feel particularly philanthropic.

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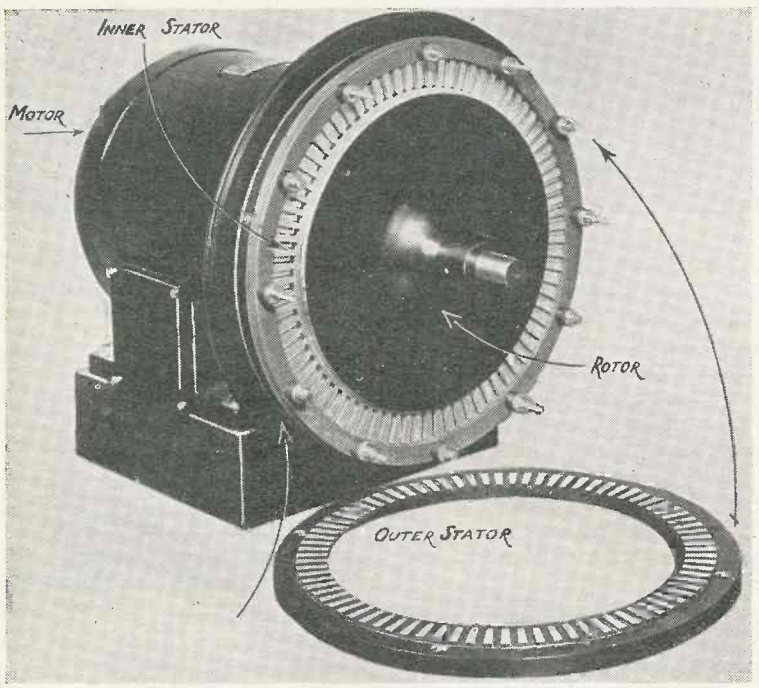
A NEW MASTER GENERATOR FOR SYNCHRONISING SIGNALS



The parts of the Synch. Signal Generator

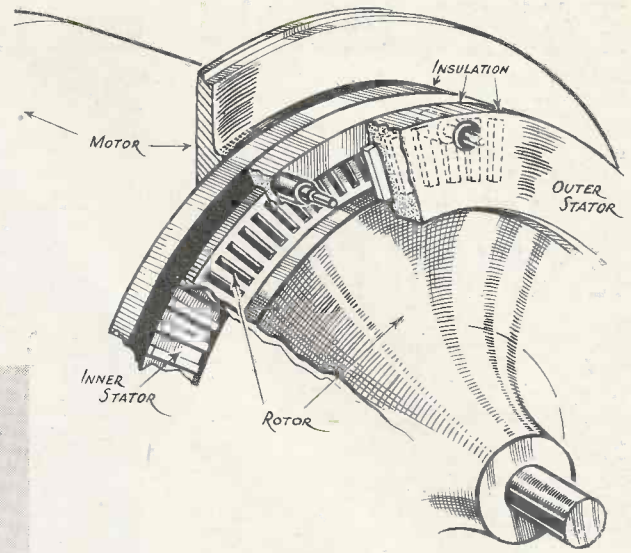


Diagram showing the working principle of the Master Generator.

ACCURATE timing of the transmitted synchronising signals is essential for high-definition television systems. These signals usually are derived from a master generator working at line frequency or double line frequency, the framing pulses being derived from this frequency by sub-division. It is desirable that the frame pulses should be synchronised to the mains supply and show only negligible phase variations with the mains frequency. This is advantageous because smoothing requirements are then not so exacting.

To generate the master frequency, two methods are in general use. In one a free oscillator is used, automatically tuned so that the frame pulse, obtained by sub-divisions, remains in constant phase relation with the supply mains. In the second, use is made of an apertured disc with a lamp and photo-cell, the disc being driven by a synchronous motor from the supply mains.

Electronic Generators

Signal generators employing electronic methods are made in two types. In one the time constant of the automatic tuning system is small (of the order of 0.2 sec.). This results in very fast and erratic phase modulation of the oscillator output.

There are several reasons for this frequency variation, one is that the automatic tuning system corrects the frequency of the master generator only if the phase difference relative to the mains frequency is of a certain minimum value. The correction acts only after a considerable displacement has taken place. In general the correction takes place quickly, and in the form of over-correction. The result is a kind of oscillation around a mean position.

In the second type of electronic generator a high time constant coupling is used. This reduces the frequency variation to about 10 cycles per second/per second at the line frequency, but the phase drift at frame frequency cannot be tolerated. In this case the frequency of the oscillations around the mean position is reduced, but the amplitude of these is increased.

Mechanical Generators

The mechanical generator using the simple apertured disc suffers from mechanical irregularities in manufacture. For instance, a disc having 405 holes designed to rotate at 1,500 r.p.m. requires the angular spacing of the holes to be 6.4 seconds of arc for one element accuracy. Inaccurate placing of the holes results in the lines of the picture being displaced in time.

In addition to this irregular error, regular errors occur, due to holes in the disc not having been placed along an exact circle or the disc itself not running quite true on the shaft. When these errors are present the produced signal is not a single frequency, but a small band of frequencies (irregular placing) which are phase-modulated with a frequency which corresponds to the revolutions of the disc per second.

A New Generator

A new type of generator, operating on novel principles, has been developed by Scophony engineers, this consists of a rotating disc carrying teeth on its periphery running between two stationary rings also

(*Continued on page* 615)

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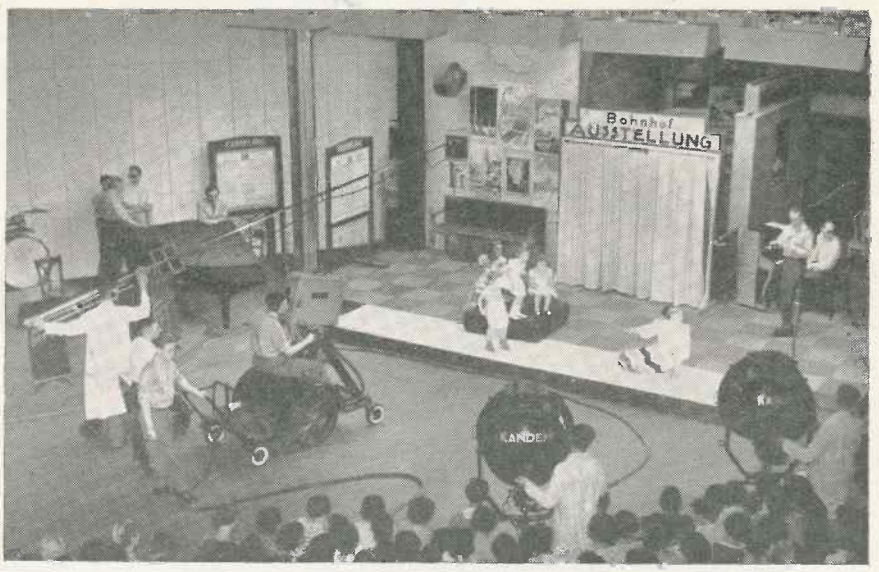
TELEVISION AT THE BERLIN EXHIBITION

PART II

By E. H. Traub

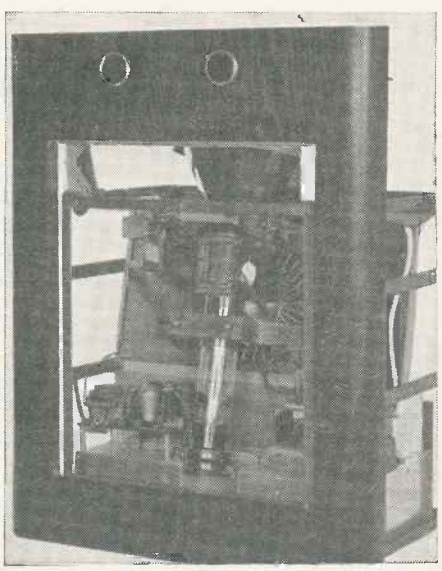
The first part of this article, published last month, dealt almost exclusively with the exhibits of Fernseh A. G. This second article, therefore, is devoted to a review of the other exhibits at the Berlin Radio Exhibition.



Telefunken

A NUMBER of transmitters made by this firm were installed in the Exhibition. Firstly there were some Iconoscope cameras in use on a ramp outside the hall for transmitting street scenes. The pictures received from these cameras were regarded by experts as being of extremely high standard of quality.

A new type of film transmitter was also working; this used a projection cathode-ray as scanner, similar in conception to the Cossor transmitter, which was shown at South Kensington last year, with the exception that



Interior view of the Telefunken "Block" receiver.

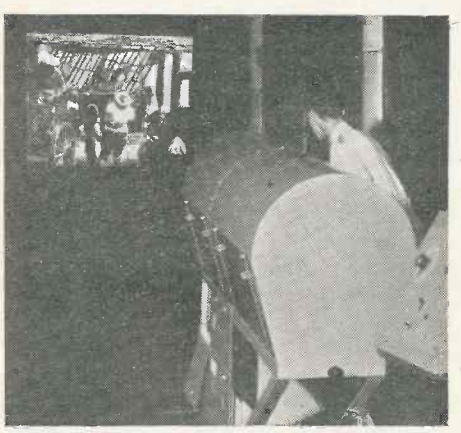
an Arcadia type of film projector was used to give optical compensation for the continuous film movement.

This transmitter is very simple in construction and gave excellent results. The adoption of this type of transmitter by Telefunken in favour of the Iconoscope film transmitter used hitherto is important; it means that Iconoscopes are now regarded in Germany as being unsuitable devices for film transmission. The writer, amongst others, has been stressing this for years, and it is gratifying to see that German technical opinion agrees with this view. One can only hope that the B.B.C. will at last take the hint and get rid of their very unsatisfactory Iconoscope film transmitters and instal either a mechanical transmitter or some other form of electronic scanners, which are free from all shading errors inherent in the Iconoscope.

Another interesting transmitter of Telefunken was a spot-light transmitter for 441 lines, using a projection cathode-ray tube as scanner. It is a remarkable tribute to modern photo-cell technique that such a transmitter is at all possible to-day. Incidently the pictures received from this transmitter were quite free from "noise."

A whole range of receivers were exhibited from the smallest type of home receiver up to the big screen projectors. Firstly there was the small table model home receiver, which was illustrated last month. This receiver is intended for cheap mass production and uses a 9 in. cathode-ray tube. The receiver is really a "vision unit," as no complete sound receiver is incorporated, but only a frequency changer, the output of which is fed into a standard radio receiver.

Another type of receiver was a standard upright model, which gave sepia pictures, which had, however, very good definition, interlacing and half tone values. An experimental model which was also demonstrated, had a cathode-ray tube over 2 ft. in diameter, giving a large bright black and white picture. This tube must be regarded as an amazing piece of glass blowing, as it was not unduly large in relation to its diameter; the anode voltage was 20,000. In addition to this a projection type of home receiver was shown, giving a picture 16 in. by 20 in., projected on to a white screen on the inside of the lid of the set. The picture on this, however, appeared to be rather soft and



The Telefunken big-screen projector.

of no very great illumination. The so-called block receiver which was first shown last year, was also demonstrated in an improved form.

In a separate theatre set apart for this purpose three big screen pictures

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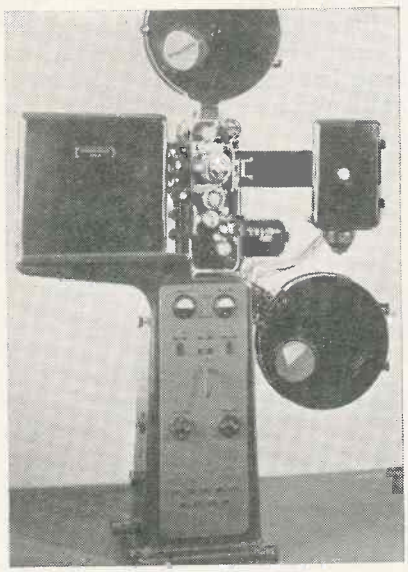
THE GERMAN POST OFFICE AND TELEVISION

were shown working side by side. These pictures were on an average about 5 ft. by 6 ft. in size. Two were projected from the front, and one from the back through a ground glass screen. Of the two projection types, one used a concave mirror, and the other a projection lens. The concave mirror picture was bright, but obviously not so well defined as the picture from the other two projectors.



Fernseh film transmitter employing a Farnsworth image dissector.

The brightness of all these pictures was quite reasonable, and adequate for ordinary purposes.

Lorenz

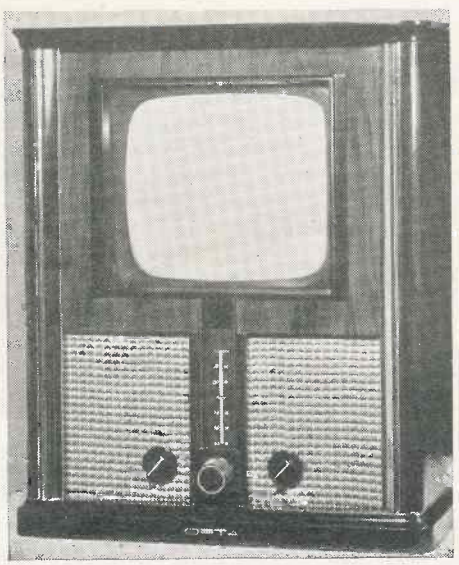
Two types of home receiver were shown by the Lorenz firm. One small, but extremely compact home receiver, used a tube about 13 in. in diameter, which was remarkably short for its size. Another model used a big tube about 18 in. in diameter, with the tube mounted upright. This model also included an all-wave radio receiver. The pictures were bright, but the definition did not come up to the standard of the pictures shown by Fernseh and Telefunken. In addition two big screen pictures were demonstrated. Of these it could only be said that both the definition and brightness were quite inadequate.

Loewe

Loewe showed new models of their home receiver, which gave very good pictures in all respects. These pictures were operated from Loewe's own mechanical transmitter, using a disc. A remarkable feature about this receiver was the great compactness of the amplifying and other radio equipment associated with it. The home receiver was also shown in larger forms of cabinet, incorporating an all-wave receiver and gramophone. In addition a cathode-ray projection receiver was demonstrated giving a picture 16 in. by 20 in. The brightness and definition of this projected picture were very good. The picture, however, was rather blue in colour, and the screen rather directional.

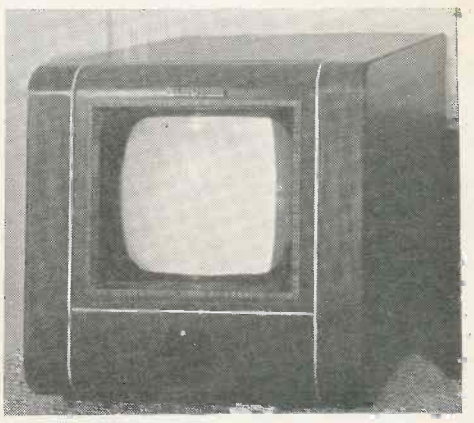
German Post Office

The Post Office stand contained a considerable amount of equipment, some of which was of great interest. First there was a model transmitting van, containing complete camera equipment for Iconoscope cameras, and also a low-power radio transmitter. The power supply was derived from a generator situated in a small trailer, which could be drawn behind the van. The interesting part about this equipment is, that it is possible to transmit pictures whilst the equipment is in motion. Inside the van everything is very compactly built, and as a whole this van is a fine engineering feat. A further item of technical interest at the Post Office stand was a demonstration of colour television. The system shown cannot be regarded as true colour television, as the transmission was from a specially transmitted film in which alternate frames of the film were differently tinted. Technical details were not disclosed, but the receiver appeared to be a projection cathode-ray tube or possibly two tubes, the images of which were superimposed on the screen. In any case the results were not very impressive.



Loewe home receiver.

A Kerr cell was also demonstrated showing that it is possible to change the colour of light transmitted through the cell by varying the voltage. In addition to these above-mentioned items, the Post Office had in operation a number of transmitters, which had been bought from commercial firms, and also a number of receivers. Three receivers which had definitely been constructed in the Post Office were also shown working. The results on these, however, were such that it is really surprising that in 1938 pictures of such poor quality are demonstrated at a public exhibition.



The Telefunken small home receiver

There was also a television studio in the Exhibition, which was built in the form of a stage. The equipment used on the stage was supplied by Fernseh A.G. Televising took place practically all day, and as can be seen from the photograph, the public were able to have a good view of the studio in operation. It was, however, remarkable that only one camera was in use on the stage at a time, and also that the lighting system was extremely primitive; the results were not very good. It is quite obvious that in transmission technique the Germans have a lot to learn from the B.B.C.

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RECENT TELEVISION DEVELOPMENTS

A RECORD OF PATENTS AND PROGRESS

Specially Compiled for this Journal

Patentees: V. Zeitline, A. Zeitline and V. Kliatchko :: Farnsworth Television Inc :: Fernseh Akt. :: Radio Akt. and D. S. Loewe :: Schophony, Ltd. and H. W. Lee

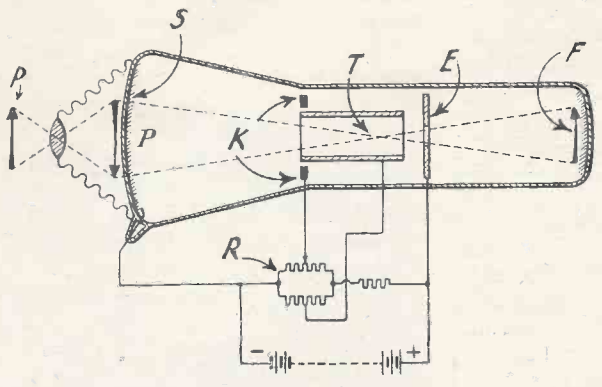
Focusing the Electron Stream

(Patent No. 486,204.)

THE Figure shows an electron discharge tube in which the light from an external object P is first projected on to a light-sensitive screen S so that a stream of electrons is produced. These are then focused by an electron-optical lens T and an accelerating electrode E on to a fluorescent screen F.

In such an arrangement the electrically-charged tube T, which serves as the electron "lens" acts rather differently upon the electrons which pass along its central axis to those which travel to one side or other of the centre. In other words, it is slightly "astigmatic" and therefore produces a correspondingly distorted image on the second screen F.

To remedy this, a ring K is mounted near, but slightly spaced away from, one end of the tube T, and carries a biasing voltage which can be varied by adjusting the tapping point R. The electrostatic field between the ring K and the end of the tube T tends to move the electron stream more towards the centre of the tube, and so removes the astigmatism without otherwise affecting the focal-length of the lens.—*V. Zeitline, A. Zeitline,* and *V. Kliatchko.*



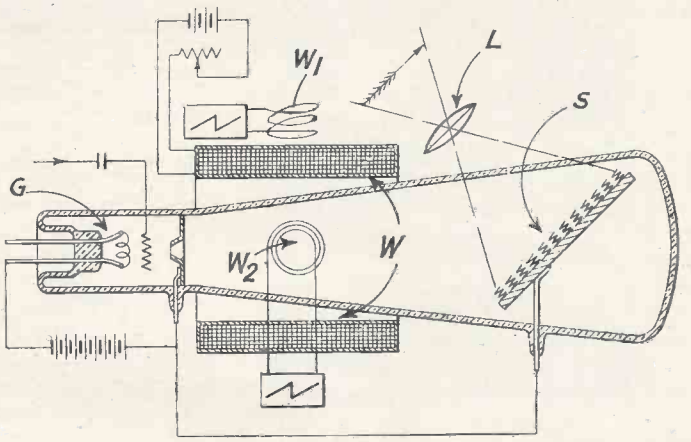
Focusing the electron stream. Patent No. 486,204.

Incandescent Pictures

(Patent No. 486,373.)

Relates to a television receiver of the projection type in which the picture is reproduced on an incandescent screen S, which is formed of a large number of extremely fine wire spirals extending a short distance above the scanning surface. The wires are originally less than one-thousandth of an inch in diameter, and, after being assembled, are subjected to treatment by hot sodium nitrate. This makes them much finer still, so that they will rapidly be raised to incandescence by the action of the electron stream. Also they cool rapidly by radiation, as distinct from conduction which would cause the details of the picture to "spread" and spoil definition.

The electron stream from the "gun" G of the cathode-ray tube is focused by an external magnetic coil W and is deflected by scanning coils W1, W2. Its impact upon the screen S raises the small spirals to red or white heat, according to the varying tone values of the original picture. The screen is set at an angle, as shown, so that the incandescent picture can be projected through a magnifying lens L on to an external viewing screen.—*Farnsworth Television, Inc.*

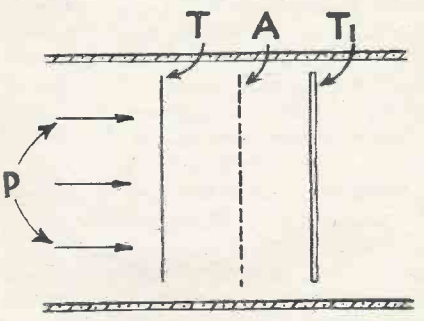


Producing incandescent pictures. Patent No. 486,373.

Electron Multipiers

(Patent No. 468,437.)

In order to amplify an electron stream of large cross-section, as is sometimes necessary in television, the first electrode T of the electron-multiplier is made of metal foil, which is transparent to primary electrons P moving at high speed.



Electron multiplier. Patent No. 486,437.

As soon as the electrons get through, they are accelerated by a mesh anode A carrying a high positive voltage, and pass through it on to a "target" electrode T1, where secondary electrons are liberated. These, in turn, are subjected to the high positive voltage on A and pass back towards the first electrode T.

By the time they reach the latter,

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their speed has dropped below the point at which that electrode is permeable. The impact, however, produces a fresh supply of secondary electrons, which are similarly attracted back to the target T1. This to-and-fro movement continues until a large secondary-emission current has been built up inside the " enclosed " space between the target electrodes T and T1, which are connected to an external tuned circuit.—*Fernseh Akt.*

Intensifying the Picture

(Patent No. 486,750.)

An image of a picture is projected, in the first instance, on to a photo-electric cathode at the end of one limb of a three-legged tube. Electrons liberated by the action of the light are then projected by the action of an external magnetic field on to a second electrode, situated at the end of another leg of the same tube. This second electrode is coated with an emissive substance and is also indirectly heated, so that it produces a copious supply of secondary electrons.

The latter are finally projected by the action of the external magnetic field on to a luminescent screen located at the end of the third leg of the tube, where the intense stream of secondary emission produces a more brilliant copy of the original picture. Interference between the stream of primary and secondary electrons is prevented by the fact that they pass through the magnetic control field in opposite directions, and are therefore deflected away from each other.—*Radio-Akt D. S. Loewe.*

Light-control

(Patent No. 487,240.)

The variation of light intensity likely to occur when televising an outdoor scene, for example as between bright sunlight and an " overcast " sky, is too great to be followed faithfully by the photo-sensitive devices at present known. Usually they are worked at full capacity in order to preserve the ordinary contrast values between the different details of each picture, so that there is no margin left to deal with the changes which occur from time to time in the average brightness or background illumination of the scene being televised.

In order to overcome this difficulty, the intenstiy of the light originally projected on to the photo-sensitive screen of a cathode-ray transmitter is automaticlly controlled, and attenuated when necessary, so as to leave the P.E. cells something in hand to follow, and changes in overall illumination. The method is applicable either when televising a prolonged out-of-doors event, or when transmitting from a cinema film.

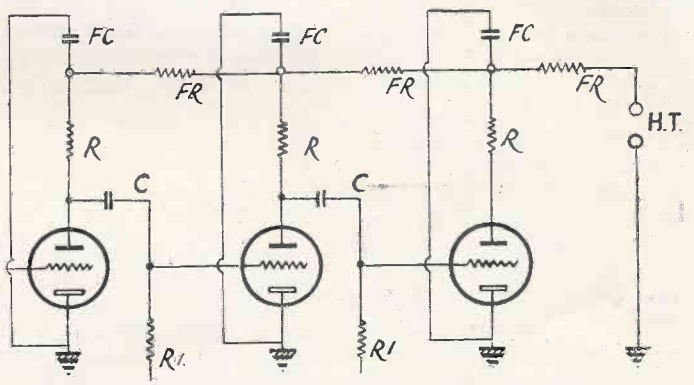
In practice, a semi-transparent mirror is used to deflect some of the original light away from the sensitive mosaic screen of the cathode-ray transmitter. The deflected light is then applied to an auxiliary photo-electric cell, the amplified output from which is used to regulate the transparency of a Kerr cell placed in the path of the original light before it reaches the photo-sensitive screen. The Kerr cell thus acts as a " choke " on the original brightness of the picture and by keeping it within limits gives the photo-sensitive cells a chance to respond to any subsequent change in the general illumination.—*Radio-Akt D. S. Loewe.*

Eliminating Mains Ripple

(Patent No. 487,242.)

Since the amplifying stages of a television receiver must be capable of handling frequencies at least as low as those used for " framing," that is, frequencies of the order of 25 cycles, they are peculiarly liable to be affected by any ripple or fluctuation in the mains-supply voltage. This produces unpleasant variations in the light intensity of the received picture.

The figure shows how this cause of disturbance can be eliminated. The ordinary resistance-capacity elements R, C, R1 coupling successive valves are combined with " graded " filter resistances and capacities shown at FR and FC. The values of the various elements are so chosen that any temporary increase in the anode voltage of one valve, due to fluctuations in the supply voltage, automatically produces a compensating drop in the voltage transferred across the coupling to the grid of the next valve. In this way the effect of any fluctuations present in the H.T. mains-supply is automatically wiped out.—*Radio-Akt D. S. Loewe.*



Method of eliminating mains ripple. Patent No. 487,242

Rotating-drum Scanners

(Patent No. 487,318.)

In order to increase the angle through which a beam of light is thrown, as it passes over each mirror in a rotating-drum scanner, the light, after it has been reflected by one mirror, is passed through an optical system comprising a pair of lenses and a totally-reflecting prism, so that it is returned to another mirror—in advance of the first—on the same drum.

If each lens in the intermediate optical system has the same focal length, the angle of divergence of the ray as it leaves the second mirror will be twice as great as when it left the first.

By using an optical system with a magnification of less than unity, the angular deviation or " scanning angle " imparted to the original beam of light can be reduced instead of increased. The arrangement will, for instance, allow the drum to be rotated at a lower speed than would otherwise be necessary to produce the same result.—*Scophony, Ltd.*, and *H. W. Lee.*

In the July issue the number of a patent on Television by Secondary Emission, by H. G. Lubszynski, was given as 471,563. This number should be 481,563.

Summary of other Television Patents

(Patent No. 484,099.)

A multi-stage electron-multiplier in which the resistance potentiometer for biasing the target electrodes is mounted inside the glass bulb.—*Marconi's Wireless Telegraph Co., Ltd.*

(*Continued on page iii of cover.*)

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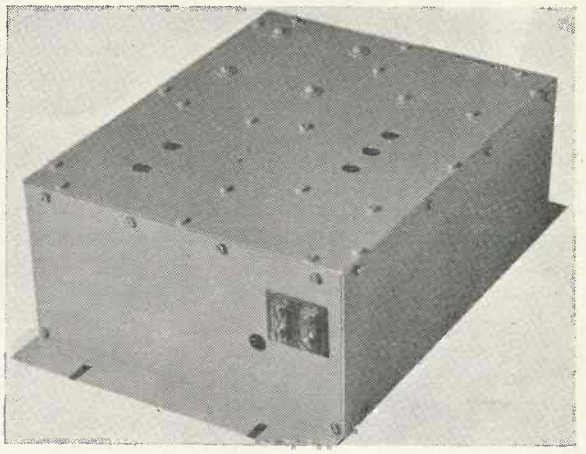
INCREASING RECEPTION RANGE

By S. West.

A description is given here of an efficient television pre-amplifier unit which is easily attached to normal television receivers and effects a marked improvement in the range; there is also a considerable reduction of interference with its use.



The pre-amplifier is quite compact.

IT is now generally appreciated that the service area for the television transmitter at Alexandra Palace is considerably in excess of the original conservative estimate. It is essential, however, if consistent reception is to be enjoyed at large distances, that sensitive apparatus be employed.

The writer has, over an extended period, conducted tests with various forms of pre-amplifiers, the object being to increase the range of the normal type of television receiver.

A pre-amplifier is a unit comprising one or more R.F. stages, preferably entirely self-contained, i.e., it includes its own power supply and is necessarily as compact as is possible compatible with efficiency. This latter consideration is dictated by the general desirability for installing the unit at a distance of several feet from the main receiver. This is in the interest of maintaining stable operation with any class of receiver.

The design considerations are somewhat conflicting. The arrangement must possess a comparatively broad frequency characteristic in order to admit both the sound and vision carriers without appreciable attenuation and the noise level must be low. At the same time if tangible benefit is to be derived the gain must be of fair magnitude. All these matters are not easy of achievement.

With a unit of this type evolved, extensive measurement tests revealed that to possess the above desirable points, consideration must be given to the question of ensuring the best match to the various types of receiver with which the unit is likely to be employed. If a mismatch exists a great deal of the good work is, so to speak, undone.

This problem in practice is not difficult of solution, for with the majority of receivers, both commercial and home-constructed, ability on the part of the amplifier to feed efficiently into an 80-ohm or 100-ohm load only is required.

In the pre-amplifier to which these notes pertain a very simple device is employed entailing only the tightening of a screw to adjust the unit to suit the input of either of the general class of input circuits above-mentioned; furthermore, the adjustment takes care of arrangements such as those in which a concentric feed is employed with the outer shield earthed.

How the Pre-amplifier is Used

A further advantage is derived from such an arrangement for, where it is conveniently possible to insert the pre-amplifier unit in the aerial feeder, the arrangements permit this to be done for any form of feeder whether it is of the concentric class of lead or the popular Belling-Lee transmission line.

For example, the feeder may enter an upstairs window, in which case the unit can be installed at this point, often effecting some desirable reduction of interference pick up because of this.

This reduction of interference is brought about by the fact that with the extra gain due to the pre-amplifier the gain control of the main vision receiver is operated at a lower setting, the signal strength on the feeder between the amplifier and the main receiver being at a materially higher intensity than the actual signal at the aerial. In brief it is the equivalent of providing a higher signal voltage in an imaginary aerial at the point where the pre-amplifier is situated.

With a unit designed which performed well under a number of stringent tests a great deal of consideration was given to the question of its final commercial form, from the point of view of the type of housing likely to prove most suitable for general use.

The essential need for a compact form has been already intimated. The question to be settled was whether it was desirable to render the unit waterproof, thereby permitting its installation almost anywhere.

It was finally decided that in view of the expense and difficulty in effecting this such a course was not warranted, especially as the information had been elicited from the extensive production tests that no very definite advantage was derived from installing the unit close up to the actual antenna.

Where interference is encountered it is sufficient to instal the unit in an upstairs room and from there the feeder can be brought in any convenient manner. This feed line between the pre-amplifier and main receiver can consist of either Belling-Lee transmission line or Telcon concentric feeder.

A standard unit on the lines indicated and shown by the photograph is now available. The price is £6 6s. complete with all valves. It is operated entirely from the mains, adjustment being provided to suit voltages between 200-250 volts at 50 cycles. The actual external dimensions are 9 in. by 7 in. by $3\frac{3}{4}$ in. To facilitate fixing, convenient lugs to take ordinary wood screws are arranged. The construction is very solid and the unit is finished in grey cellulose.

To give some indication of the capabilities of this unit it can be

(*Continued on page 612.*)

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Telegossip

A Causerie of Fact, Comment and Criticism

By L. Marsland Gander

"TELEVISION is making very definite progress towards a national service." Major L. H. Peter, chairman of the Radio Manufacturers' Association, made this optimistic remark when I asked him the other day about sales of receivers. The Television Committee of the R.M.A. aimed at selling 15,000 televisors by next March. All the indications are that, wars and rumours of war permitting, this figure will be exceeded.

This is the most cheerful news of television I have written since the Alexandra Palace station began to transmit two years ago. Radiolympia aroused for the first time a buying interest which has caused the manufacturers to think in terms of mass production. And, speaking candidly, the demand has taken the manufacturers by surprise. Existing stocks of the new models have been sold.

Major Peter told me that he is preparing figures for the Television Advisory Committee which will give that body the most pleasant surprise it has had for a long time.

So far, so good. But are B.B.C. developments keeping pace? I say, without any attempt to allocate responsibility among the various parties—the B.B.C., the Advisory Committee and the Government—that unfortunately programme developments are not altogether keeping pace. It may be six months and it may be a year before the theatre at Alexandra Palace is converted into a studio. Yet this theatre was taken over by the B.B.C. soon after the Palace premises were first acquired two years ago. Chiefly for financial reasons the scheme of conversion has hung fire ever since.

The New Studios

I believe, however, that in the meantime various alternative schemes for providing new studios elsewhere have been considered. Now that the money has been somewhat reluctantly and belatedly produced, the old patchwork policy of converting the theatre has been adopted once more. I thought we all knew by now that television presentation is going to cost a lot of money; the sooner that is acknowledged by all parties concerned the better.

I hear that the design of this theatre studio has now ben approved and orders placed for the equipment. The plan somewhat resembles that adopted for German film studios.

The whole floor is to be levelled, and the existing stage will be removed. Five separate "stages" (in the film sense) will then be arranged round a control unit. This unit will consist of a tiered structure where the sound and vision mixing will be done and from which the producers will be able to obtain a clear and uninterrupted view of all the individual stages. Besides the producers this control unit will provide accommodation for sound and vision "mixers" and technical operators.

I gather that the idea is to be able, if necessary, to use all five sets in one production. There may be some snags in the arrangement. For instance, the lighting on one may interfere with that on another. But the urgent necessity of the moment is to push on with the scheme and provide the programme makers with more studio accommodation.

Good progress has been made with the re-equipment of Studio No. 2. No date is yet given for its completion, but it should be ready fairly soon. Viewers think at once of extension of programme time when there is talk of extra studio accommodation, but the intermediate benefits will be more opportunities for camera rehearsals, leading to more finished productions. At present the only chance for a camera rehearsal is on the day of transmission. Many flaws and crudities could be "ironed out" with better rehearsal facilities.

Another forward step has been the acquisition of four rehearsal rooms at the B.B.C.'s publication department in High Street, Marylebone. Hitherto rehearsals have been conducted all over the place—at theatres, restaurants, in private flats, etc. These four rooms will not, of course, entirely settle the problem, but they will be a help.

Central Control

In the meantime the new Central Control Room has actually come into use. During Olympia it was used to co-ordinate the programmes which during one afternoon came from several different sources—the Zoo, Olympia and Alexandra Palace, for example. It should mean greater smoothness and celerity in programme presentation.

When the whole scheme of reconstruction is finished programmes will be fed into this control centre from the three separate studios and from any point on the television cable network throughout the London area.

The television studio at Olympia was rigged up in about three weeks. It was a rush job and a temporary affair, yet if there was a single breakdown during the whole exhibition I did not hear of it. But what I did hear was the jubilation among the B.B.C.. staff at Olympia when it was necessary for Radiolympia to apologise for a breakdown at Alexandra Palace! So when slow motion development plans are under way at Muswell Hill I hope somebody will remember this story.

O.B's.

The new mobile unit was used at the Oval for the Test match and the old one at Olympia. Afterwards the new vans were returned to Hayes for finishing touches and used again for the first time for the Centenary programmes from Euston Station. I mention this because I personally have not been able to distinguish much difference in the quality of transmission between the new and old and I wondered if other viewers had shared the experience.

I imagined that with two units at his disposal for outside broadcasts Mr. Philip Dorté would be hard put to it to find sufficient programme material of the right kind. However, he strenuously denies any difficulty and tells me that he has a long list of coming events sufficient to keep the vans fully occupied. It was enterprising to pack off one outfit to Heston at very short notice to televise the return of Mr. Chamberlain from his visit to Berchtesgaden.

This sort of intensely topical transmission is worth half-a-dozen prearranged visits here and there.

Though the B.B.C. is friendly with the Football Association, I understand that the Footbal League will in no circumstances permit the televising of Leagues matches. The number of soccer matches which will be available will therefore be strictly

(*Continued in third column of next page.*)

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"INCREASING RECEPTION RANGE"

(*Continued from page 610*)

stated that a number of tests have been conducted used in conjunction with various types of vision receivers. In every case the improvement was very marked.

These tests were extended to embrace all difficult examples. Where interference was bad considerable benefit was derived from the installation but the particular value of the unit lies in its ability, when used in conjunction with a normal vision receiver which is providing only thin pictures, to augment the weak signal tremendously, it being possible fully to modulate the tube resulting in excellent black and white pictures with the main receiver gain control reduced.

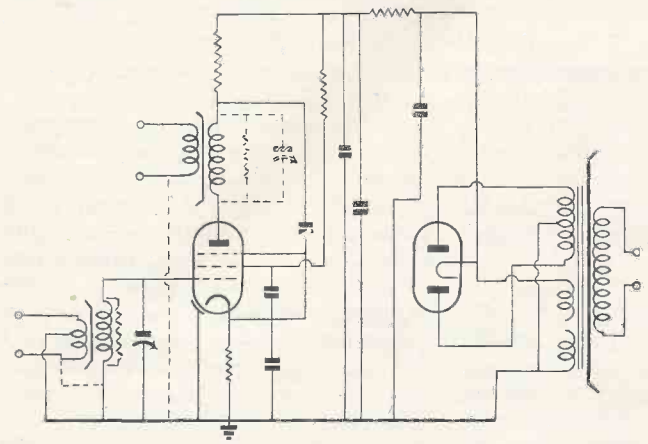
It is entirely suitable for use with all forms of vision receivers. No special precautions need to be observed when connecting it to a T.R.F. type of receiver. Due to the efficient shielding and special output arrangements coupled with the care taken to ensure that no R.F. is permitted to emerge via the main connection perfect stability is ensured.

Two other types of unit are available. The first of these is a highly sensitive arrangement to permit the use of normal vision receivers at ranges up to 100 miles. It is, in general, not suited for use with the T.R.F. type of receiver and is primarily intended to precede a superheterodyne type wherein not more than 2 R.F. stages are included.

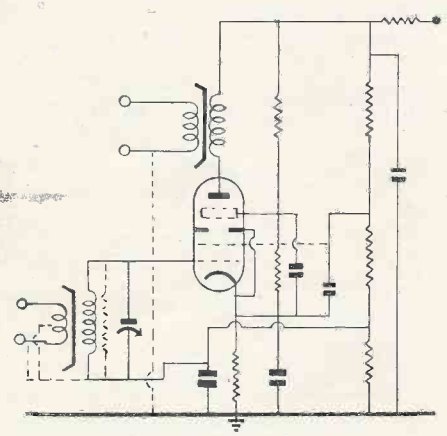
The other unit is intended for use in small flat installations or where it is desired to operate up to twelve receivers from a common antenna without detracting from the performance of each.

SUITABLE CIRCUITS FOR PRE-AMPLIFIERS

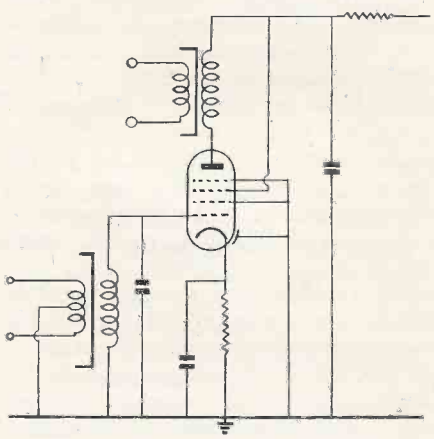
Single-stage circuits only are shown for purposes of simplicity.



A comparatively normal arrangement ; gain is with careful design about 17 db.



A high-gain arrangement, a worth while increase of signal is secured from a single stage using this arrangement.



A low-gain pre-amplifier which possesses the merit of contributing practically no inherent noise and is therefore suited for use with high-gain vision units.

"TELEGOSSIP"

(*Continued from previous page*)

limited, probably confined to charity games, internationals, and possibly (but by no means certainly) the Cup Final.

Speedway racing is ruled out because the lighting is not satisfactory for television. And, incidentally, this question of lighting outside broadcasts at night is causing a few headaches at A.P. To permit the televising of an item of such doubtful programme value as a visit to a Palais de Danse it was estimated that it would be necessary to provide 150 kilowatts of lighting—consisting of 30 five-kilowatt lamps.

Greyhound racing is out, not only for reasons of policy but also because of the same lighting problem. Certain boxing contests will be televised, such as the weekly N.S.C. bouts at Earls Court, but the promoters of big fights are now becoming shy of television and demanding terms which the B.B.C. is unwilling to concede. Hence the breakdown of negotiations to televise the Phillips-Doyle contest.

I hear that negotiations, likely to be successful, are proceeding for the televising of ice hockey from Wembley, Harringay and Earls Court throughout the season. In the meantime advance plans have been made for broadcasts from one place and another almost every day.

The Air Ministry has agreed to demonstrate the balloon barrage on October 27. Two lorries and trailers, carrying balloons, hydrogen cylinders and full equipment will proceed to the Palace grounds there to give a special performance. On October 28 there will be an A.R.P. demonstration, full details of which have not yet been decided.

I hear that the Radio Manufacturers are most anxious for the Government to press on with legislation to prevent interference with television and broadcasting. A new Radio Bill is in course of preparation bringing up to date the Wireless Telegraphy Act of 1904 and incorporating special clauses to deal with the interference question. But we have been promised this Act so long that the manufacturers are getting restive. Interference in its various forms is one of the biggest snags in television reception particularly in districts outside the normal service area. Now television has begun to forge ahead something must be done to stop the interference.

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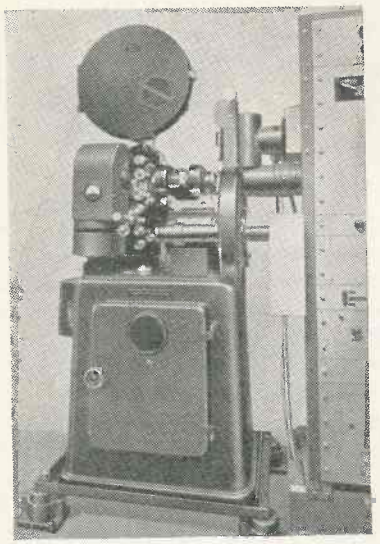
TELEVISION AND SHORT-WAVE WORLD

THE NEW FERNSEH MECHANICAL FILM SCANNER

By K. Thöm

A description of the Fernseh transmitter and a consideration of the technical problems involved in its design.



Fernseh mechanical film scanner for 441 lines.

THE mechanical scanner, with spiral hole disc, is the result of rather long and steady development. At the Berlin Radio Exhibition, 1935, the Fernseh A.C. showed a mechanical film scanner giving 320 lines, 25 frames, the highest definition obtained at that time.

The movable television camera of the German G.P.O., used since 1936 for transmitting news by means of the intermediate film method, is also equipped with a mechanical scanner by Fernseh A.G. At the Exhibition, 1936, Fernseh showed a scanner giving 375 lines, 50 frames/sec. The development led to the mechanical scanner of 1937 conforming to the new standard of 441 lines, 50 frames/sec. This was the first German mechanical scanner for the new standard.

Description of Apparatus

Fig. 1 shows, schematically, the elements of the scanner and the optical paths. The A.C. fed lamp *a* has a rectangular field corresponding to the shape of the film. It is contained in an air and water cooled case. Through the condenser *c* and the correcting system *d*, a zone of the film window *f* is illuminated through a slit of the disc *e*. The film window is projected via a second optical correcting system *g*, and the objectives *h* and *i* on the spiral hole disc *k*. The disc rotates in the evacuated case *l*. The rays of light penetrating through *k* are focused on the secondary emission photo-cell *n*, with the aid of a lens *m*.

Close by, above the system for light modulation, is a second optical beam (indicated at *o* and *m*) for generating the line synchronising impulses by means of holes in the disc *k* concentric to the spiral.

The parts *q* permit accurate adjustments of the size of the projection on the disc, and compensation of film shrinkage while transmitting.

Scanning with Multiple Spiral

If a film containing 25 pictures/sec. is to be scanned with a 50-line system, each picture has to be scanned twice in 1/25 sec. The first frame contains the lines 1, 3, 5, 7, the second one the lines 2, 4, 6. As the intermittent film-movement as used in projectors involves too short scanning times, a continuous film-movement is used. To produce the interlacing the spiral of the disc rises during rotation in opposite direction to the movement of the film.

Owing to the large number of lines, the holes had to be arranged on a multiple spiral. A six-fold spiral was chosen. To expose only one spiral at a time an aperture disc rotating with the velocity of the film was used.

Fig. 2 shows, schematically, the opposite motion of the film and aperture projection. The lens *q*, representing objectives *h* and *i*, reverses the direction of motion *r* and *s* of the film *t*, and the aperture disc *u* when projecting on the spiral disc, so that the film and spiral disc *v* move in opposite directions, and aperture disc and scanning disc *v* in the same direction.

The inner three-fold spiral scans with its holes 1, 3, 5 . . . 441 the whole film picture *l* in 1/50 sec., while the edge 2 of the picture moves from the middle of the film window to its lower edge. In the following 1/50 sec. the outer three-fold spiral (holes 2, 4, 6 . . . 440) scans the picture at the points not scanned so far, while one half of it moves outside the film window.

The motors for film movement, slit aperture disc and spiral hole disc are synchronous, fed from the same A.C. supply. The phase adjustment of the film is accomplished while running by a mechanical gear. The phase of the aperture disc motor is set by a rotation of the motor field coils.

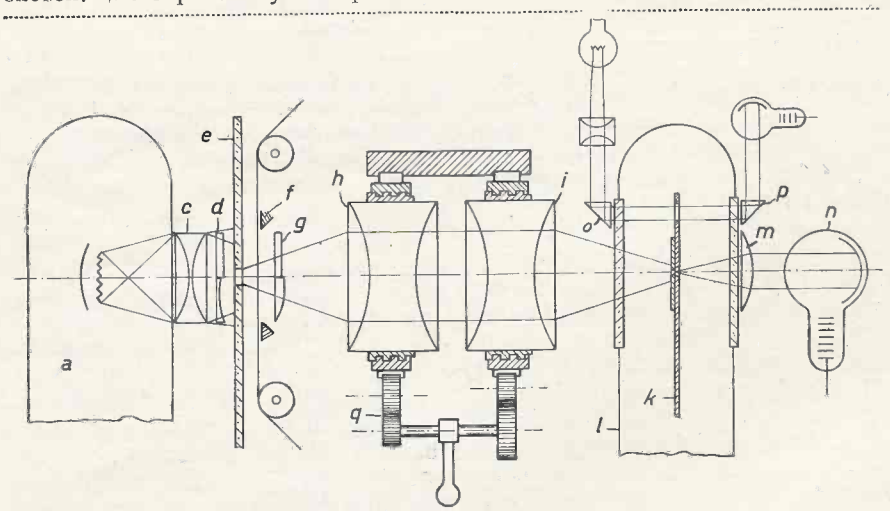


Fig. 1. Diagram of optical paths in mechanical film scanner for 441 lines

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The Scanning Disc and Its Holes

The dimensions and revolutions per second of the scanning disc have a lower limit mainly determined by the smallest dimensions of the scanning holes that can be produced alternately. The construction is based on the resolution in 441 lines and the number of picture points in a line corresponding to the shape of the picture.

Holes of 0.04 mm. diameter can be produced with sufficient accuracy. The accuracy of holes used for scanning is mostly influenced by ridge formation, i.e., canal-effect of the hole. By suitable choice of foils of thickness of a few μ (10^{-3} mm.) and special apparatus, holes have been produced that differ not more than 2 per cent. in transmitted light, provided the angle of incidence does not exceed 40°. The brightness differences produced by this variation are not visible in the picture, as they fall within the limits of the "Schrot effect," 1-3 per cent. the maximum amplitude of "White."[2]

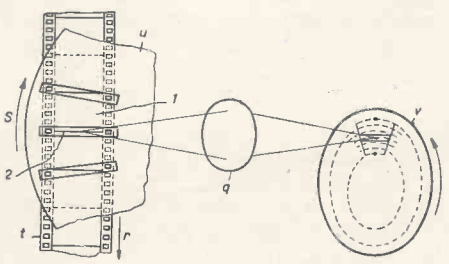

Fig. 2. Diagram of diversion of motion of film, aperture disc and scanning disc.

On the basis of B = 0.04 mm. as width of scanning hole, the velocity of the picture point V_B is given by

$$V_B = \frac{B \cdot Z^2 \cdot n_b}{f},$$

where Z is the number of lines, n_b the number of ranges of picture, f a form factor which equals 0.808 for a line recess of 10 per cent., and a picture size of 19 × 21.5 mm. The circumference of the multiple spiral $U = V_B/n_b$ = 9.6 m. A maximum permissible speed of 9,000 revs. per minute permits the use of a 6-fold spiral which necessitates a disc of about 50 cm. diameter.

To obtain a picture of good formation, and to avoid distortions inside and at the edge of the received picture the portions of the scanning holes must not deviate from their true theoretical value by more than a few *arc-seconds*, and *a few* μ in radial distance. A picture point corresponds to an angle of 32 sec. The position of the holes is alternate to t 5 in. in the actual disc that is, the largest inaccuracy can be $\frac{1}{3}$ picture point, or for a received picture of 38 × 43 cm. an inaccuracy of 0.3 mm., which is not perceptible in practice. The radial deviation can be reduced three times as much and is smaller than the error due to the running of the film.

A further source of errors is the deformation of the scanning disc during running which can, however, be compensated largely by choice of disc material, and taking the synch-pulses in the immediate neighbourhood of the hole that is just travelling across the film.

The scanning hole should be a square with sides of 0.04 mm. to produce equal resolution in both directions of the picture. However, as the human eye is less sensitive in vertical than in horizontal resolution, the use of a rectangular shape is advisable. The slightly smaller resolution in vertical direction is also justified because on account of the inter-line-vibration a certain minimum viewing distance is necessary. The resolution in line direction is considerably increased by a smaller width of the scanning hole. A very good picture reproduction is possible by the film scanner, described with a rectangular scanning hole which corresponds to a theoretical resolution of 600 elements in the direction of the line, and 370 elements in the direction of picture. Even with a frequency band of 2 megacycles this gives a better picture than the square scanning hole.

Optical Picture Correction

The picture field on the scanning disc has a trapezoidal shape which is reproduced as square at the receiving end. This aberration would be hardly visible on account of the large diameter of the disc and the small angular distance between the holes; however, in interlaced scanning one line is produced by the inner set, the other line by the outer set of spirals. Fig. 3 shows the resulting error in exaggerated form. The distortion of the received picture is compensated by a simple optical system, through which the picture is projected on the outer three-fold spiral, enlarged to correspond with the average hole velocity. The same optical system corrects the scanning paths of different curvature of both spirals. Fig. 3e shows the differently enlarged two halves of the picture.

Film Shrinkage

The permissible film shrinkage amounts to 1 per cent., i.e., two films may deviate in picture height by 0.19 mm. max. As in the interlaced scanning, every picture is scanned twice, an opposite motion of the film to the scanning spiral is necessary. While the gradient of spiral is easily determined, the movement of the film depends on the shrinkage. The average shrinkage has been determined to 0.45 per cent. ± 0.2 per cent., i.e., ± 0.038 mm. The height of a picture point of a line is 0.043 mm. (441 lines). The vertical resolution is, therefore, reduced by 50 per cent. in practice. Fig. 4 shows the influence of shrinkage when reproducing a sloping edge. To compensate this error the projecting objectives of the new scanner are connected by a gear, thus enabling the adjustment of a picture of *equal* size on the scanning disc for *every* film by operating *one* handle.

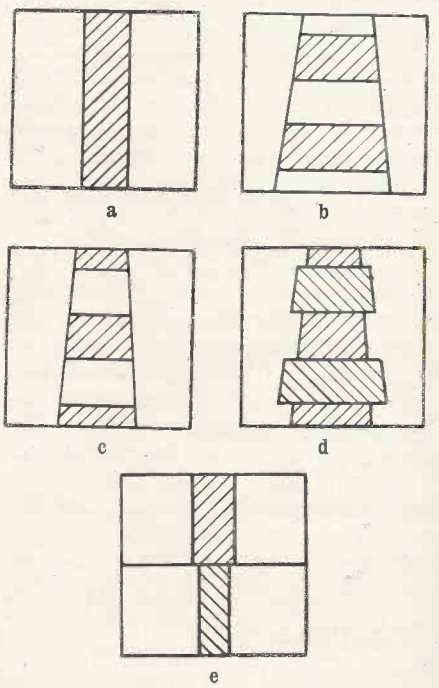

Fig. 3. Compensation of trapezoidal error.
(a) Picture to be scanned.
(b) First frame.
(c) Interlaced frame.
(d) Received picture without compensation.
(e) Effect of compensating optical device.

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Brightness Compensation of the Interlace

In interlaced scanning the brightness of the two interlaced frames which constitute each picture has to be nearly identical, otherwise "shimmer" is produced that causes a considerable decrease in picture quality. On account of using a filament lamp instead of the arc, it has been possible —for the first time— to compensate for brightness difference between interlaced frames completely. This is done by the optical system *d* Fj. (1). The previously mentioned different magnification of the two halves of the film window between film window and scanning disc produces uneven distribution of light and, therefore, uneven losses at the edge; these are compensated as well. The brightness compensation is helped materially by the use of fixed apertures and an appropriate condenser design.

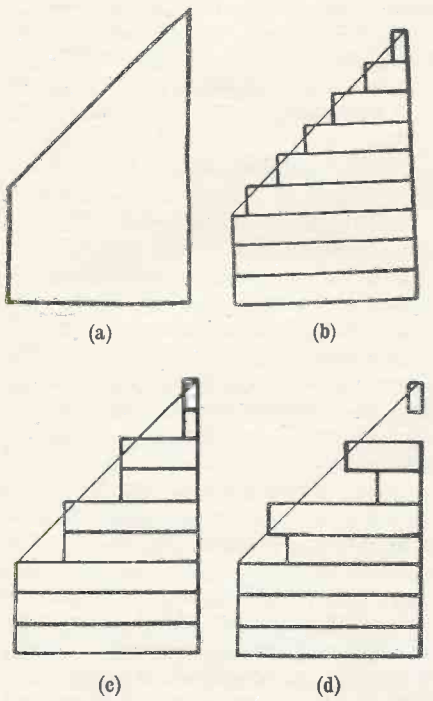

Fig. 4. Effect of film shrinkage

(a) Picture to be scanned.
(b) Reproduction with correct adjustment of picture size.
(c) Reproduction with uncompensated film shrinkage of 0.15%
(d) Reproduction with uncompensated film shrinkage of 0.3%

"A NEW MASTER GENERATOR FOR SYNCHRONISING SIGNALS"

(*Continued from page* 605)

having teeth. The working principle is the change in capacity of the stators when the rotor revolves. The teeth are cut on an optical dividing head to an accuracy of 6 seconds, but owing to the large number of teeth uniformly placed around the periphery of the disc, all simultaneously contributing to the output, any angular inaccuracies in the teeth cancel out. Also, eccentricity in the mounting of either stator or rotor does not have any effect on the regularity of the signal.

In order to compare the maximum frequency variation of the Scophony generator with that of the other generators, tests were made using as a standard a magneto-striction oscillator having a stability of one part in several hundred thousand. Measurements of these records show the maximum variation recorded for the Scophony generator to be *less than 2 cycles per second* at 10,125 cycles. The variation is of the order of the variation of the mains frequency against absolute time represented by the magneto-striction oscillator. The maximum phase drift of the frame pulse derived from it is of the order of 10^{-4} seconds or .5 per cent.

A transmitted signal with a very small rate of change is advantageous in the case of cathode-ray receivers, and is essential with mechanical receivers.

With the former, if the rate of change of the line frequency is small, the power required to synchronise the time-base at the receiver is also small, resulting in better synchronisation. Also, it is important that the horizontal and vertical scanning frequencies should be in a definite relation to each other, otherwise faulty interlacing will result.

The Scophony master synchronising generator can be made for any practical number of lines and can be added to any existing synchronising equipment.

Ensure obtaining "Television and Short-wave World" regularly by placing an order with your newsagent.

NAMES AND ADDRESSES OF MANUFACTURERS OF TELEVISION RECEIVERS LISTED ON PAGE 598.

BAIRD TELEVISION, LTD., Worsley Bridge Road, Lower Sydenham, S.E.26. Phone: Hither Green 4600.
BEETHOVEN ELECTRICAL EQUIPMENT, LTD., Beethoven Works, Chase Road, N. Acton, N.W.10. Phone: Willesden 2336.
BURNDEPT, LTD., Light Gun Factory, Erith, Kent. Phone: Erith 3080.
A. C. COSSOR, LTD., Cossor House, Highbury Grove, N.5. Phone: Canonbury 1234.
DYNATRON RADIO, LTD., Perfecta Works, Ray Lea Road, Maidenhead. Phone: Maidenhead 1211.
E. K. COLE, LTD., Ekco Works, Southend-on-Sea. Phone: Southend 49491.
FERRANTI, LTD., Electrical Engineers, Moston, Manchester, 10. Phone (London): Temple Bar 6666.
GENERAL ELECTRIC COMPANY, LTD., Magnet House, Kingsway, W.C.2. Phone: Temple Bar 8000.
THE GRAMOPHONE COMPANY, LTD. (H.M.V.), 108, Clerkenwell Road, E.C. Phone: Clerkenwell 1280.
INVICTA RADIO, LTD., Radio Works, Parkhurst Road, N.7. Phone: North 3883.
KOLSTER-BRANDES, LTD., Cray Works, Sidcup, Kent. Phone: Foots Cray 3333.
McMICHAEL RADIO, LTD., Wrexham Road, Slough, Bucks. Phone (London): Temple Bar 6988.
MARCONIPHONE COMPANY, LTD., Radio House, 210-212, Tottenham Court Road, W.1. Phone: Museum 4144.
MURPHY RADIO, LTD., Broadwater Road, Welwyn Garden City, Herts. Phone: Welwyn Garden 800.
PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2. Phone: Gerrard 7777.
PILOT RADIO, LTD., 87, Park Royal Road, N. Acton, N.W.10. Phone: Willesden 7353.
PYE, LTD., Radio Works, Cambridge. Phone (London): Holborn 5384.
RADIO GRAMOPHONE DEVELOPMENT CO., LTD., Globe Works, Newtown Row, Birmingham, 6. Phone: Holborn 7360.
SCOPHONY, LTD., Thornwood Lodge, Campden Hill, W.8. Phone: Park 9494.
TANNOY PRODUCTS (Guy R. Fountain, Ltd.), Canterbury Grove, W. Norwood, S.E.27. Phone: Gypsy Hill 1131.
ULTRA ELECTRIC, LTD., Western Avenue, Acton, W.3. Phone: Acorn 3434.
VIDOR, LTD., West Street, Erith, Kent. Phone: Erith 3080.

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Our Readers' Views

Correspondence is invited. The Editor does not necessarily agree with views expressed by readers which are published on this page.

Cinema Comparison

SIR,

Your editorial (analysing the reasons why the demand for television receivers is not greater) exposes a serious defect: " . . . studio productions certainly do not bear comparison with the cinema."

Is not this the reason why the sale of television receivers is leaden-footed? If the standard of presentation is inferior to that of the cinema then a negative attitude to television is inevitable. Improve that standard and we have an improvement of the public's acceptance of television. A negative attitude becomes positive.

Until May of this year I had been away in the country for many months. On my return to London I was told by a " sound " engineer (now general manager of a film studio) to make it my business to see a demonstration of television and witness (a) its technical perfection, and (b) *its obvious need for intelligent use of cinema technique.* I saw one of their productions—a play. My friend was right.

G.A.C. (London, N.W.).

Broadcasting and Television

SIR,

I read with great interest your editorial as I too am interested in the problem of the unpopularity of television. I have thought a great deal about this problem and, as you ask for a solution, here is mine. The presence of broadcasting is the reason, according to my way of thinking.

There are two ways in which broadcasting helps to make television unpopular.

Firstly, there are very few people who sit down in front of a sound receiver especially to listen to a programme. The average person switches on his receiver, tunes in to the programme he wishes to hear and then picks up a popular magazine or newspaper and commences to idly turn over the pages reading little bits here and there and looking at the pictures. When viewing, one must sit before the receivers and concentrate upon watching the screen and listening to the sound.

Now for the second way in which broadcasting has influenced television. In opposition to my first reason there is this. In the early days of broadcasting, one had to sit near the loudspeaker and concentrate to hear the programme to satisfaction. But people do not want to do anything like that to-day, because broadcasting has already been developed to as near perfection as possible. I think the average man can get all the enjoyment he wants from his radio. If he wishes to waste an evening he can go to the pictures or theatre. In the early days of broadcasting, however, there was only the theatre for good entertainment for the cinema was not developed to the extent that it is to-day. Thus, there was a much greater demand for receivers than there is to-day for televisors.

F. W. COSH (2CIT)
(Bramley, Leeds).

Poor Demonstrations

SIR,

I was particularly interested in the " Comment of the Month " article which appeared in the August issue of your magazine. I feel that every point mentioned has a good basis of fact. In answer to your question as to whether any reader could give the real reason for extremely bad television sales, may I add one thing which I feel sure has a good deal to do with it, i.e., lack of interest: at least that is what I have found with my friends. You ask them: "Have you seen a set working in the home or radio shop?" and they answer, " Oh, no, but I saw one about two years ago in a public demonstration (probably at the back of a large crowd) and I didn't think much of it." So many supposedly sane people judge a set on a few minutes' experience of viewing and under bad conditions.

I feel certain that the show will spread interest and enthusiasm. The B.B.C. and manufacturers have made a magnificent effort to popularise television. The price question doesn't come into it now.

But what did strike me at the show was that certain makers were selling combined all-wave radio and television sets with very small screens. Surely a bigger screen set, which only got vision signals and the accompanying sound, selling at the same price, would have been more appropriate? Ninety-nine people out of a hundred who are going to buy a television set already own a wireless and would much rather get a reasonable size picture than a very small one plus an all-wave radio. I was glad to see that only a few firms did this.

N. L. BENT (Harrow).

Interference from Aircraft

SIR,

You may be interested to hear of my experiences in U.S.W. and television reception, in view of the fact that I live in Croham Valley, South Croydon, which valley is followed by the majority of aeroplanes leaving the airport—usually flying fairly low.

The interference is very serious indeed and can completely ruin a programme, particularly during the transmission of a play. I am referring, of course, to the interference caused by reflection of the signal and not to ignition interference, which, although noticeable, is not bad enough to matter if one can use an aerial with reflector in between the air route and Alexandra Palace.

The interference caused by reflection has the effect of giving alternatively a very light and very dark picture, also a double picture and sometimes upsetting synchronisation. On sound the interference takes the form of very rapid fading.

I do not know to what extent the B.B.C. are aware of this interference, but it must have a very serious effect on the sale of television sets in Croydon or similar districts, especially if there are any 'planes flying overhead during demonstration.

ROGER F. C. CROWLEY,
(South Croydon).

The London Transmitting Society have a very active membership for although membership is free intending members must obtain either a full call or AA call before they can be admitted.

In this way the club is made up of active members who are all doing good work in amateur radio. The Hon. Secretary would like to hear from intending members who should write to F. Bell, Esq., Colin Close, Colindale.

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Cinema Antagonism to Television

Antagonism of the cinema exhibitors towards television seems to be increasing. Film renters and the film producers are, it appears, somewhat less concerned than the exhibitors, but naturally lend a sympathetic ear to their customers. The General Council of the Cinematograph Exhibitors' Association is being urged to form a joint committee with other sections of the trade to check the efforts of the B.B.C. to obtain new films. A ban on the supplying of new films (except news reels) to the B.B.C. for television purposes has existed for some time, but now it seems some of the exhibitors are still dissatisfied and claim that in certain cases old films may be more successful than new ones.

The B.B.C. recently circumvented the ban by obtaining a French film, "Man of the Moment," starring Maurice Chevalier, a new film which had been exhibited in the West End but had not been generally released.

For obtaining a brand new feature film the B.B.C. deserve warmest concongratulations.

There is urgent need for more good fiction films in the programmes and whatever may be the outcome of the present B.B.C. v. Trade battle the B.B.C. must obtain them somehow. Another French film, "The Heroic Sex," which won French and Italian awards, will be shown shortly.

Transmitting Valves

There appears to be a revival of interest in low-power transmission. This interest has been so marked during the past year that the General Electric Company have produced a range of valves with 2-volt heaters of a type essentially for transmitting use.

The PT7 transmitting pentode, suitable for suppressor grid modulation, is priced at 20s. This valve has a 2-volt, 0.3-amp. heater and will stand 240 volts on the anode, with a dissipation of 3 watts. There is also a triode, type DET9, with a similar heater to withstand 250 volts on the anode with a dissipation of 3.75 watts. This valve, type DET9, is priced at 19s. Constructors could embody both these valves in portable and normal low power equipment knowing full well that they would obtain a high degree of efficiency. It is also very pleasing to find that a British valve maker can produce a valve in direct competition to the American manufacturers having slightly better characteristics and a much lower price. The Osram KT8 transmitting tetrode is very similar to the American RK-39. It has a 6.3-volt, 1.27-ampere oxide coated filament; will stand 600 volts on the anode and 300 volts on the screen with an anode dissipation of 25 watts. This valve can be used as a power amplifier, doubler, sub-amplifier, and even crystal oscillator. It is priced at 22s. 6d.

The Television Trader

A booklet has been published by *The Wireless and Electrical Trader* to enable radio dealers and service engineers to acquire a knowledge of sales methods and service repairs applicable to television.

The booklet contains much information on receiver principles, and the tracing and curing of faults. Photographic illustrations of the waveforms encountered at various points in a typical receiver are given and the booklet will be found of real practical use.

It is priced at 1s., post free, and is fully illustrated with photographs and diagrams.

Service and the Electrical Trades Union

Radio service engineers have decided to organise themselves in their own interests. As their work grows more complex with each successive year's technical development, so does their weekly average working time increase. A sixty-hour week, it is stated, is commonplace and, in winter, eighty-hour weeks are not at all rare.

Service engineers who are interested can obtain full particulars from W. Stevens, Area Official, Electrical Trades Union, 1-7 Rugby Chambers, 2 Rugby Street, W.C.1.

Book Review

The Perception of Light, by W. W. Wright, D.Sc., A.R.C.S. (Blackie & Son, Ltd., price 6s.). This book is described as an analysis of visual phenomena in relation to technical problems and illumination. More plainly, it is a study of light sensations under different conditions of illumination, and deals with such matters as visual acuity, discrimination, contrasts, dark adaptations, visual limits, vision at night, in fog, theatres, cinemas, and television studios. All those who are interested in problems of vision and illumination, will find this book, which is non-mathematical, of value.

Courses in Radio and Television

A SERIES of instructional courses have been arranged by The Polytechnic. The courses have been arranged to give those engaged or interested in radio, television or talking film work, a thorough training in the principles and technique of high-frequency engineering. Approved courses are recognised by the Institution of Electrical Engineers and the Board of Education for the award of the Ordinary National Certificate. The courses also prepare for the City and Guilds of London Institute examinations in radio communication. Full particulars can be obtained from the Electrical Engineering Department (Telecommunications Section), The Polytechnic, 307-311 Regent Street, London, W.1.

Sudden Death of Q.S.T. Editor

It is with deep regret that we record the unfortunate death of Ross A. Hull, the well-known American amateur and Editor of the official A.R.R.L. organ Q.S.T. His death took place on Tuesday, September 6, as the result of coming into contact with a 6,000-volt supply cable when carrying out experimental work with his equipment.

American amateur transmitting stations were off the air on that date as a token of respect, but European stations were not aware of the tragedy until later in the week owing to bad conditions that existed.

De-luxe Sound Equipment

A most interesting manual has been prepared by Sound Sales, Ltd., which covers all types of sound equipment. Amateurs who already know a little of the work done by this company will be very surprised at the full scope of the production of public address equipment.

A number of high quality amplifiers including a tri-channel arrangement are described in detail while there are also three very fine loudspeakers of the high quality type.

In the component section are many interesting items such as a four-band tuner, microphones, chokes, transformers of all kinds and variable selectivity I.F. transformers of the high "Q" type.

This booklet is of the utmost value to those interested in high quality sound reproduction, transmitting and all phases of general radio.

The address of Sound Sales, Ltd., is Marlborough Road, Upper Holloway, N.19.

www.americanradiohistory.com

A Portable Oscilloscope

The portable oscilloscope described in this article uses the new Osram 1½ in. cathode-ray tube, and has been designed on commercial lines. It is sufficiently compact to be carried in a service engineer's case and will be a useful addition to the experimenter's test bench.

IN designing portable oscilloscopes the convenience of carrying is the principal factor in determining the layout. The majority of commercial types are self-contained, with the mains unit mounted behind the tube. This makes the even distribution of weight difficult to obtain, and with a "naked" tube, such as the Osram 1½ in., there is a risk of interference from the mains unit if special precautions are not taken to shield the tube.

By mounting the mains unit in a separate box, the overall dimensions of the oscilloscope can be kept to a minimum, and the total weight is not appreciably increased. There is the disadvantage of handling two units instead of one, but this is outweighed by the fact that both are of the smallest possible dimensions and can be packed in an ordinary suit-case. The construction is also simplified owing to the absence of shielding, and, in this case, the mains unit can be used for other experimental work, which is of advantage to the experimenter.

Accordingly the tube and time base are fitted in a metal case with a multicore cable connection to the mains unit. The compactness of the oscilloscope is mainly obtained by the use of miniature valves and in the original design R.C.A. all-metal valves were used in two positions. The introduction of the new range of Mazda miniature valves enables the supply circuit to be simplified as it avoids mixing 6-volt and 4-volt supplies. Alternative valve types are specified later in the article.

Circuit

The complete arrangement including the power supply is shown in the circuit. The H.T. windings on the transformer are 350 volts, one supplying the tube and the other the time base and amplifier.

The use of 4-volt valves throughout would enable a standard 350-0-350 transformer to be used, but in the circuit winding is shown for 6.3-volt heaters.

The centre tap of the H.T. is earthed as shown, and one side of the winding supplies the tube potential chain at the top of the diagram. The rectifiers are 1 volt, but any other 350-volt rectifiers may be used, corresponding allowance being made for the heater voltage.

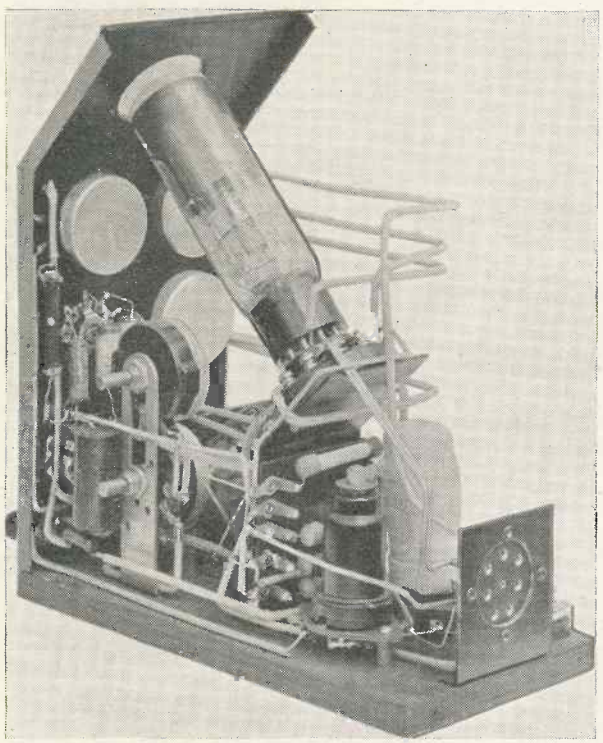
The two 1 mfd. smoothing condensers for the tube supply are fixed in the tube unit, together with the resistance (5,000 ohms).

The 9-pin standard socket for the tube is shown at the right-hand top corner of the diagram with its connections to the H.T. chain and the deflector plate circuit.

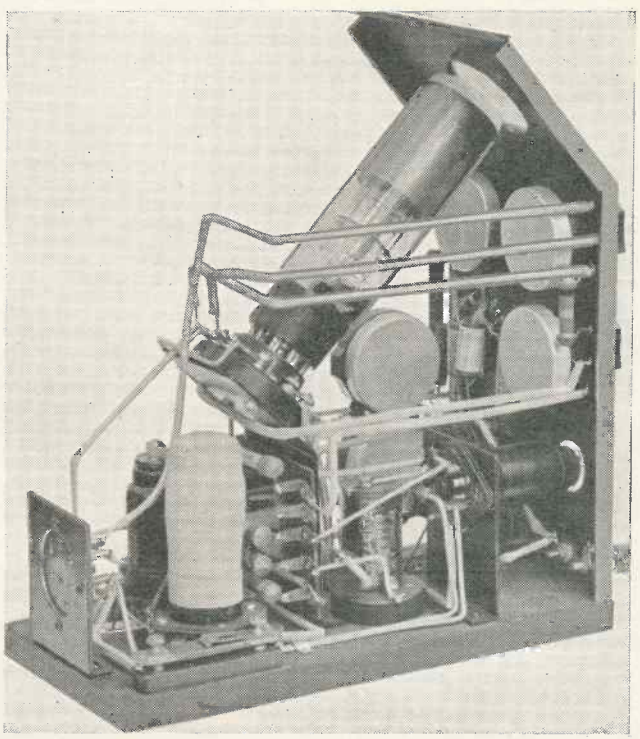
Time Base

This is of the conventional thyratron type using a pentode charging valve to ensure linearity at the low operating voltage. The thyratron is the new Mazda T.41, which is small in dimensions and of low price. It is not intended for high working voltages, however, and the grid bias should not be increased to a high value in order to obtain a wide sweep. The bias is fixed by tapping from the potential chain feeding the screen of the pentode and gives a sweep of 1-1¼ in., which is ample for the tube.

The charging condensers marked C in the diagram are selected by a 5-way stud switch (Kabi or Bulgin) the shaft of which must be insulated from the front panel. The charging pentode is a 6J7 with the grid strapped to cathode,



This photograph shows the compact layout of the components. The pre-set shift potentionmeters can be seen on the left. The 7-pin holder at the back is for the H.T. connections.



Another view of the baseboard showing the T.41 thyratron (metallised). Note the pentode amplifier mounted horizontally in the front of the baseboard.

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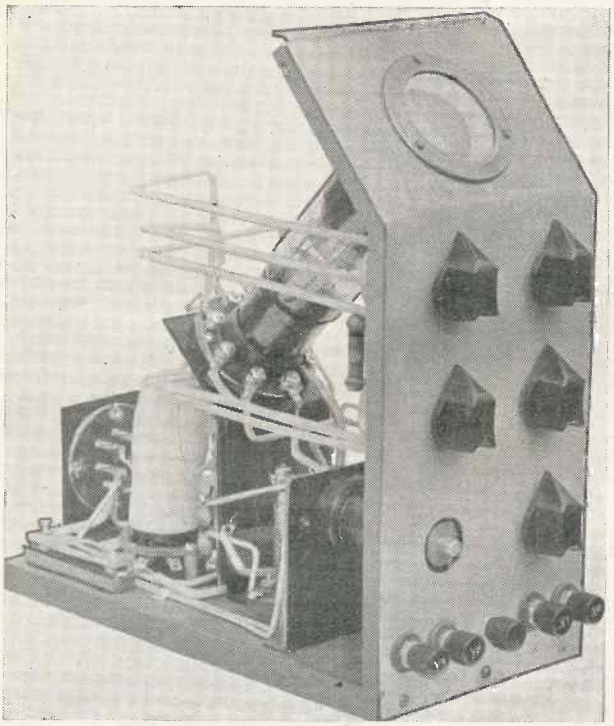
Lay-out :: Controls



In this view of the front panel the grid cap of the amplifier can be seen projecting through the metal. A neat finish can be made by a ring round the tube aperture.

the impedance being controlled by the screen potential. The control of speed is remarkably smooth and flexible, a range of 10-150 cycles being obtainable on the first condenser tapping. The time base is sufficiently stable to hold the wave steady without extra synchronising, but if required a connection to the grid of the thyratron can be made from the point S through a condenser of .001 mfd.

This has not been included in the unit, but a socket can be mounted on the front panel for the purpose.

Deflector Plates

The connections to the plates are made from four terminals at the front of the panel. A double three-way switch enables the plates to be used separately for modulation measurements or with a time base. The third position of the switch inserts the amplifier on the Y plates, and the input is then transferred directly to the grid terminal of the valve. In the diagram the switch is shown in the "amplify" position, the time base being connected to the X plates. The Y^2 and X^2 plates are returned to shift potentiometers mounted inside the unit. These are set initially to centre the spot on the screen and then need not be touched. The two 1-megohm resistances marked with an asterisk need only be used if the rating of the potentiometers is insufficient for the full 350 volts to be applied. The Reliance potentiometers will, however, stand the full working volts and the series resistances can be omitted.

The amplifier is a 6J7 mounted so that its grid projects through the front of the panel. This is particularly convenient in avoiding stray capacity loads on the circuit under test, but it must be remembered that the grid is open-circuited and cannot be connected through a condenser. A 2-meg. leak should be fitted externally when the circuit requires it.

Layout

The controls are mounted on an aluminium panel which is fitted to a ½ in. plywood base The base and the front panel form a single unit which can be withdrawn from the cover for adjustment.

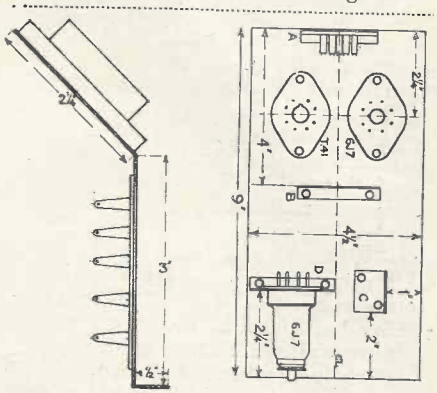
The top of the front panel is sloped back to give a convenient viewing angle for the tube when on the bench. An angle of 45° has been chosen, but this is not important to a few degrees, provided that the tube socket is in alignment with the window in the front panel.

The photograph of the front panel shows the grid of the amplifier projecting through a clearance hole in the left-hand corner. The controls are as follows:—

Tube	Time-base
Bias	Speed
Tube	Time-base
Focus	Condensers
Amplifier	Deflector
Grid	Plate switch

Terminals: Y_1, Y_2, E. X_1, X_2.

The drilling dimensions are given in the sketch on the following page. The panel is marked out with the side flaps for bending as shown.

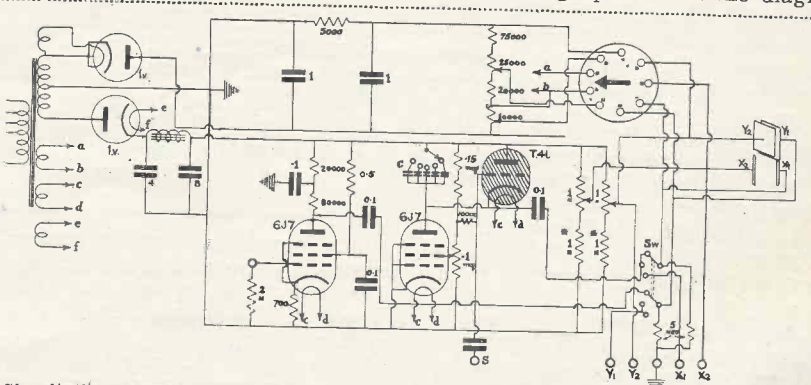


Mount for the tube (left) and layout of the baseboard (right). The lettered brackets are referred to in the text.

The holes will be ⅜th clearing for the Reliance potentiometers, and will be drilled to suit the insulating bushes in the two switch positions.

The terminals are also mounted through insulating bushes with the exception of the earth terminal which is bolted direct to the panel.

The layout of the baseboard is shown in the photograph and in the diagram



Circuit diagram showing the connections to the tube 9-pin holder. The H.T. supply unit is separate from the tube unit.

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Construction

of Fig. 4. The two time-base valves are at the rear of the baseboard and the 6J7 amplifier is shown horizontally.

The brackets marked are as follows:

A. 7-pin chassis-mounting socket for input from H.T.
B. Bracket holding tube socket.
C. Bracket for shift potentiometers.
D. Bracket for 6J7 chassis valveholder.

Assembly

Before assembling the components, the brackets referred to above must be made and mounted. The dimensions are as follows:

A. 2 in. by 3 in. aluminium sheet 1/16 thick, with a ½ in. flange bent at right angles for fixing to the board. The hole for the 7-pin chassis valveholder is drilled 1⅛ in. from the top edge and is 1⅜ in. diameter.

B. This is shown in the separate drawing. The holder for the tube is a 9-pin baseboard or chassis-mounting holder. The position of this holder is important as the correct positioning of the deflector plates depends on it.

When viewed from the front the arrow between pins 4 and 5 should point to "1 o'clock." The drilling holes should be drawn with a file to allow rotation of the holder slightly in either direction.

The bend should be made to correspond with the angle made in the front panel, or the tube will not be in alignment with its window. At the back of the upright portion a Bulgin 5-way group board is screwed as shown.

C. The bracket for the two shift potentiometers is a standard Bulgin type EH.9.

D. This is also cut from 1/16th in. sheet aluminium and is 3¼ in. by 2 in. The centre of the hole for the valveholder must be carefully checked for alignment with the hole in the front panel, and it is best to match the two after the front panel has been drilled.

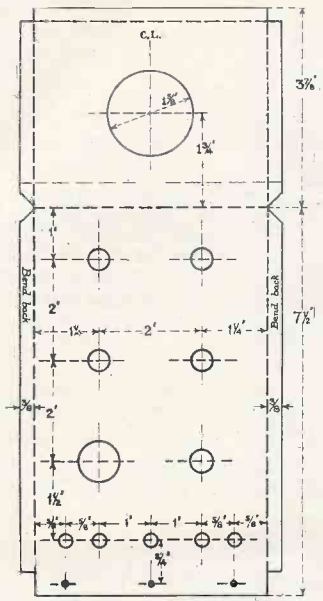
After the brackets with their holders have been made they can be screwed down on the baseboard and the preliminary wiring commenced.

The front panel should be assembled with its potentiometers and the wiring between the terminals and switches carried out as far as possible as it is difficut to get at the terminals later.

The resistances on the Bulgin group board are as follows, from top to bottom:

5,000 ohms smoothing resistance.
75,000 ohms tube resistance.
0.5 meg. screen resistance.
20,000 ohms decoupler.
80,000 ohms coupler.

The smoothing condensers for the tube supply and the decoupling condensers pack in front of the bracket.



Drilling and bending dimensions for the front panel. This can be in 1/16" aluminium or sheet iron.

The 7-pin socket carries the following connections:

2—4 volt for the heater of the tube.
2—6.3 volt for the valve heaters.
H.T. +ve. for time base and amplifiers.
H.T. −ve. for tube.
Common earth and tube H.T. +ve.

It is immaterial how the connections are made to the pins, but it is suggested that the socket be mounted with pin No. 1 at the bottom, serving as the earth connection.

Since one of the valves is 4 volts it will be necessary to connect a series resistance in the heater lead. This can be wound from 22 s.w.g. Eureka, which is approximately 1.1 ohms per yard, or can be purchased ready made. The value of the required resistance is approximately 1.4 ohms, and the final adjustment should be made when soldering the end of the resistance to the valve socket connection.

An earth lead should be run from the socket on the 7-pin H.T. connector down the centre of the board. It will be found that a number of connections can be made easily when it is in this position. Do not forget to earth the metallising of the valves to the earth lead.

The leads from the deflector plate Y1 should be shielded to avoid direct pick-up from the time base. This is shown on test by a drooping of the time base line towards one end of the screen and if the trouble is experienced it can be cured by careful spacing and shielding of the Y plate leads.

Components

In the case of components marked with an asterisk, it is possible to use alternatives, provided that they are of good quality. It is important that the condensers in the time base circuit be as specified, as inferior products will give irregular results.

In next month's article the testing of the unit will be described with the construction of the power pack.

The Mazda SP41 can be substituted for the 6J7 in both the amplifying and time base stages if desired. In the latter case it may be necessary to alter the tapping in the potential chain supplying the screen as the difference in screen current will affect the bias applied to the grid of the thyratron.

The heater winding "C.D." in the mains transformer should be specified as 4 volt instead of 6.3 volt and the series resistance in the heater of the T.41 can then be omitted.

Components for A PORTABLE OSCILLOSCOPE

CHASSIS.
1 Metal chassis and wooden baseboard, to specification (Peto-Scott).
CONDENSERS, FIXED.
2—1.0-mfd. type 341 tubular (T.C.C.).
5—0.1-mfd. type 341 tubular (T.C.C.).
1—0.05-mfd. type 341 tubular (T.C.C.).
1—0.01-mfd. type 341 tubular (T.C.C.)
1—0.005-mfd. type 341 tubular (T.C.C.)
1—0.0001-mfd. type 341 tubular (T.C.C.).
HOLDERS, VALVE.
*1—8-pin type British octal (Clix).
*2—Type 8-pin American octal (Clix).
*1—9-pin type chassis (Bulgin).
*1—7-pin type chassis (Bulgin).
RESISTANCES, FIXED.
*2—5 mg. ½ watt (Erie).
*1—10,000 ohm ½ watt (Erie).
*1—2 megohm ½ watt (Erie).
*1—700 ohm ½ watt (Erie).
*1—0.5 megohm 1 watt (Erie).
*1—150,000 ohm 1 watt (Erie).
*1—100,000 ohm 1 watt (Erie).
*1—75,000 ohm 1 watt (Erie).
*1—80,000 ohm 1 watt (Erie).
*2—20,000 ohm 1 watt (Erie).
RESISTANCES, VARIABLE.
2—1.0 megohm type potentiometer (Reliance).
1—0.1 megohm type potentiometer (Reliance).
1—25,000 ohm type potentiometer (Reliance).
1—10,000 ohm type potentiometer (Reliance).
SUNDRIES.
1—5-way group board (Bulgin).
4 Pairs insulating bushes (Bulgin).
5 Instrument knobs (Bulgin).
Wire and sleeving.
SWITCHES.
1—5-way (F. W. Lechner).
1 Ganged double three-way (F. W. Lechner).
TUBE.
1 Type 4051 (Osram).
VALVES.
*2—6J7 metal (Premier) or Mazda S.P. 41.
1—T41 (Mazda).

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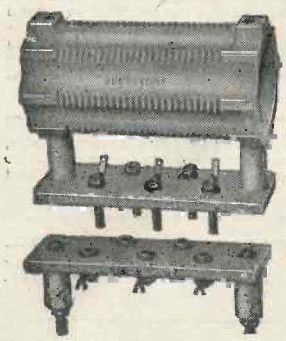

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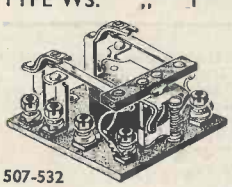
TYPE WS. " 1 " **4d.**



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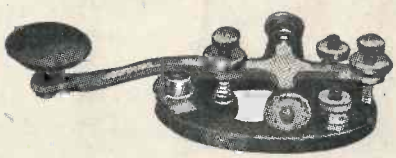

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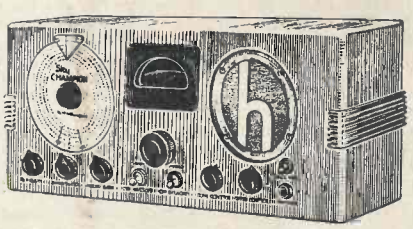

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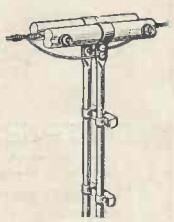

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