

British

R A D I O A N D

TELEVISION

Incorporating "The British Radio Maker and Exporter"

Vol. X No. 7

NOVEMBER, 1955

By subscription only,
£1 a year post free

There's no range like it!

FERRANTI

BIG PICTURE T.V.



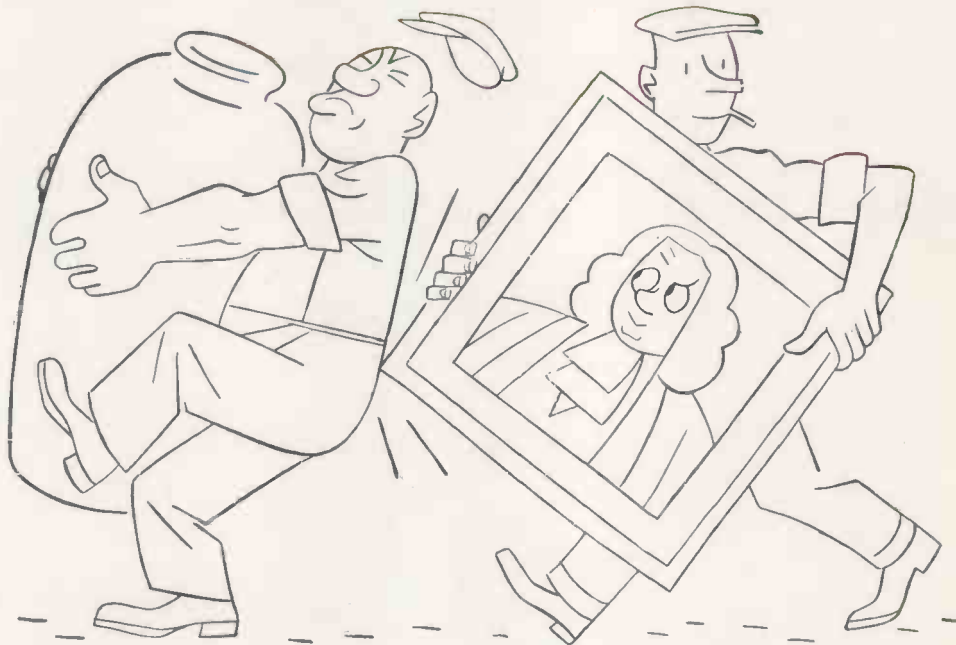
FERRANTI LTD., RADIO SALES OFFICE, MOSTON, MANCHESTER, 10

RADIO & TELEVISION RECEIVERS · GRAMOPHONE RECORDS



RADIOGRAMS & RECORD PLAYERS · TAPE RECORDERS

EXTRA SHARP PICTURE



THAT'S not what we meant! Why can't our artist draw what he's told instead of always trying to be the funny man!

All we want is a nice realistic drawing of a pretty girl showing the extra sharp picture you get on a Philips Television Set. Now is that *clear*?

Readers will already know about Philips extra sharp television pictures—which give all the detail. May we, however, remind them that Philips also make a vast range of other electrical apparatus—a selection of which is shown as a border to this advertisement.

PHILIPS

PHILIPS ELECTRICAL LTD · CENTURY HOUSE · SHAFTESBURY AVENUE · W.C.2

'PHILISHAVE' ELECTRIC DRY SHAVERS · 'PHOTOFLUX' FLASHBULBS · BATTERY CHARGERS & RECTIFIERS · CINEMA PROJECTORS

(P361A)

HIGH-FREQUENCY HEATING GENERATORS · ARC & RESISTANCE WELDING PLANT AND ELECTRODES · ELECTRONIC MEASURING INSTRUMENTS · SOUND AMPLIFYING INSTALLATIONS

MAGNETIC FILTERS · TUNGSTEN, FLUORESCENT BLENDED AND DISCHARGE LAMPS & LIGHTING EQUIPMENT · ELECTRO-MEDICAL APPARATUS · X-RAY EQUIPMENT FOR ALL PURPOSES



AVO
VALVE Characteristic
METER Mk III

The AVO Valve Characteristic Meter Mark III offers the Radio Engineer far more than is generally implied by the words "a valve tester".

This compact and most comprehensive Meter sets a new high standard for instruments of its type. It will quickly test any standard receiving or small transmitting valve on any of its normal characteristics under conditions corresponding to a wide range of D.C. electrode voltages.

A new method of measuring mutual conductance ensures that the instrument can deal adequately with modern valves of high slope and short grid-base such as are commonly used in T.V. receivers.

PROVIDES all necessary data to enable I_a/V_a , I_a/V_g , I_a/V_s , etc., curves to be drawn.

MEASURES mutual conductance up to 30mA/V.

DETERMINES inter-electrode insulation with heater both hot and cold.

GIVES direct measurement of "gas" current.

TESTS rectifying and signal diodes under reservoir load conditions.

COVERS all normal heater voltages up to 117V.

CIRCUIT improvements provide accurate setting and discrimination of grid voltage over the full range to 100V negative.

A relay protects the instrument against damage through overloading the H.T. circuits and also affords a high measure of protection to the valve under test.

The instrument is fitted with a hinged fold-over lid which protects the valve holders when not in use.



Regd. Trade Mark

A comprehensive Instruction Book and detailed Valve Data Manual are provided.

List Price

£75

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.
 AVOCET HOUSE • 92-96 VAUXHALL BRIDGE ROAD • LONDON • S.W.1.
 Telephone: VICtoria 3404 (9 lines)



What's all this about Hi-g?

"g" is the symbol for acceleration which, to the technical, is defined as the differential of velocity with respect to time. More simply this means the rate of change of speed.

When "g" is too great, damage will be done. A locomotive leaves the rails when it takes a curve too fast. At only 6 "g" a pilot blacks out when he pulls out of a dive; at 20 "g", which is very much more than any plane can possibly encounter, the plane would disintegrate.

The stylus tip of a pick-up is subjected to the same acceleration but to an infinitely greater extent. The undulations of a record groove cause the stylus to vibrate as much as 10,000 times per second or more. It moves to one side of the groove, stops, moves to the other, stops again and so on throughout the record. The accelerations acting upon the stylus tip are measured in "g" and with modern recordings may be well over 1000 "g".

Obviously a light freely suspended stylus will follow rapid changes of direction in record grooves more easily than a heavy, stiffly mounted one. On a heavily recorded record a "stiff" pick-up will tear through record grooves or even jump right out of them. Result: rapid record and stylus wear and poor reproduction.

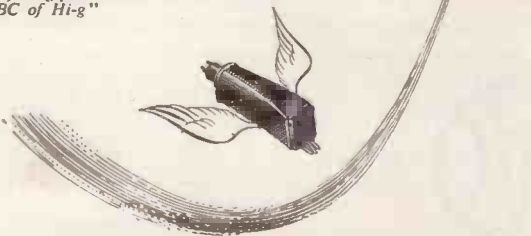
Correct tracking of modern electrical recordings with their great musical and dynamic range calls for pick-ups specially designed to cope with very high "g". They are available, after much patient research and development, under the name "Hi-g". ACOS "Hi-g" pick-ups perform perfectly at any multiple of "g" they are called upon to meet, representing a truly revolutionary advance in pick-up design. If you want your valuable records to reproduce as well as the makers intended—and to go on doing so for a long time—use an "ACOS Hi-g" pick-up.

That, in a very small nutshell, is an introduction to this question of Hi-g pick-ups. Write for a supply of the new Cosmocord booklet "The ABC of Hi-g" for distribution to your customers.



... always well ahead

ACOS devices are protected by patents, patent applications and registered designs in Great Britain and abroad.



COSMOCORD LIMITED • ENFIELD • MDDX • Tel: ENField 4022

DECCA

DE-LUXE RADIO-GRAMPHONES



DECCA MODEL RG103

This de-luxe four-waveband radiogramophone is elegantly presented in an attractively designed bow-fronted console finished in hand-polished walnut and incorporating two record storage compartments with a total capacity of over 100 discs. It has V.H.F. short, medium and long wavebands; a five valve audio push-pull amplifier feeding a special speaker system comprising two electrostatic and one 10-inch permanent magnet speakers; a Garrard triple-speed automatic record changer having a capacity of up to ten records of any one size and speed; and the famous Decca five interchangeable pick-up heads fitted with sapphire styli. The Decca model RG103 is a fine looking and fine sounding instrument, which you will be proud to sell at **102 GNS.** (*Tax Paid*)

with
VHF-FM radio
and
high-fidelity
speaker
systems



DECCA MODEL RG100

Customers who want a de-luxe console radiogramophone at a lower price than the RG103 will thank you for showing them this model. Like the larger instrument it incorporates VHF-FM as well as short, medium and long wavebands. It also has a carefully designed high fidelity amplifier; separate speakers for treble and bass; a Garrard RC111 triple-speed automatic record changer with a capacity of eight records of any one size and speed, and fitted with a turnover crystal pick-up head with sapphire styli. A pull-out hopper-style storage cupboard is a feature of the handsome bow-fronted console of the RG100, finished in selected walnut.

The RG100 is backed by Decca's unrivalled experience in sound recording and reproduction, and no one can object to its price of **79 GNS.** (*Tax Paid*)

Hire purchase terms for payment spread over 12, 18 or 24 months are available on all Decca radiogramophones

DECCA RADIO AND TELEVISION

1-3 BRIXTON ROAD, LONDON, S.W.9

Please quote *British Radio and Television* when replying to advertisers' announcements

Every set a success...

G. & C. ALL-PROGRAMME TV

Show these models to your customers—



BT1746

14 in. TABLE **65 gns.**
tax paid



BT1252

14 in. TABLE **65 gns.**
tax paid

BT1450 Fringe model 68 gns. tax paid



BT2745

17 in. TABLE **77 gns.**
tax paid

BT2449 Fringe model 80 gns. tax paid



BT5347

17 in. CONSOLE **89 gns.**
tax paid

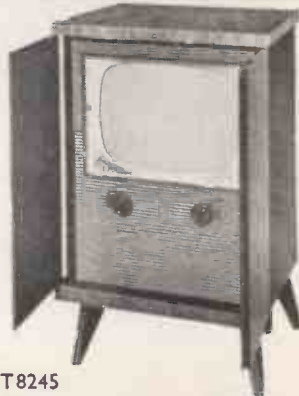
BT5545 Fringe model 93 gns. tax paid



BT5248

17 in. CONSOLE **93 gns.**
tax paid

BT5446 Fringe model 97 gns. tax paid



BT8245

17 in. CONSOLE **102 gns.**
tax paid

BT8443 Fringe model 106 gns. tax paid

You can't go wrong

every set a seller!

G.E.C. RADIO & RADIOGRAMS

they're the sets your customers want!



BC5842
VHF/FM Receiver
30 gns. tax paid

BC7443
Table Radiogram

39 gns.
tax paid



BC5445
Mains Transportable Receiver **20 gns.**
tax paid



BC9442
VHF/FM Radiogram
72 gns. tax paid



BC9640
VHF/FM Radiogram
75 gns. tax paid

BC4444
Mains/Battery Portable Receiver

18 gns.
tax paid



Complete with batteries



BC4644
Mains Portable Receiver
15 gns.
tax paid

with

G.E.C.

THE GENERAL ELECTRIC CO. LTD.
MAGNET HOUSE, KINGSWAY, W.C.2

Because



have developed

BATRYMAX^{*} dry batteries . . .

the modern Portable Radio is smaller,

lighter and

costs less

to run than

ever before



Ultra "Twin"

ULTRA specify Ever Ready Batteries
as standard equipment with all
their portable radios



for life!

* 'Batrymax' is the registered trade mark of The Ever Ready Co., (Gt. Britain) Ltd.

ALBA leads the field!



*A handsome, modern,
bureau-type radiogram at only -* **47 GNS.**

MODEL 6991 is Alba's latest contribution to consistent business. Examine the attractive appearance, note the amazingly low price—and you have the promise of quick sales and satisfied customers.

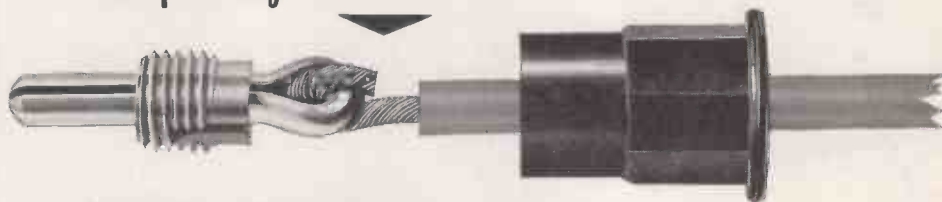
A. J. BALCOMBE LTD.
Tabernacle Street, London, E.C.2

SPECIFICATION

★ 5-valve superhet radio with 3 wavebands 16-53, 190-560 and 850-2,000 metres ★ Matched moving-coil speaker ★ External speaker sockets with cut-out ★ Tone variation control ★ 3-speed automatic changer 'gram unit ★ Operates on 190-260 volts A.C. mains ★ Modern walnut veneered bureau-type cabinet with record storage space.

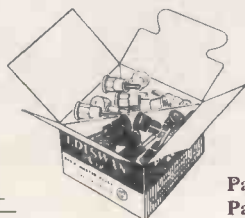
Master Plugs

Simplicity in use



Attractive presentation

In handy boxes of equal quantities Red and Black plugs, separated in colours for easy handling, Edison Clix Master Plugs retain a high reputation for reliability.



Ediswan Clix Radio Master Plugs are connected up in a jiffy. The top unscrews and the loop of the flexible pin is ready for wiring. Screw up and the connection is firm.

Pack of 12 Red & 12 Black Plugs
Pack of 18 Red & 18 Black Plugs

TYPE	LIST PRICE
MP5	18/-
MP1	10/6
MP1A	12/-
MP1B	12/-
MP2	12/-
MP2A	13/6
MP3	15/-
MP4	21/-

EDISWAN

CLIX

RADIO COMPONENTS

THE EDISON SWAN ELECTRIC COMPANY LIMITED · 155 Charing Cross Road, London, W.C.2 and branches
Telephone: Gerrard 8660. Telegrams: Ediswan Westcent, London

Member of the A.E.I. Group of Companies

Please quote *British Radio and Television* when replying to advertisers' announcements

Band III Converters

The new commercial programmes are bringing a tremendous demand for Television adaptors, for which the following **OSRAM VALVES** are recommended . . .

Type	Description	Filament or Heater		Impedance ohms	Conductance mA/V	Anode Voltage max.	Screen Voltage max.	Base
		Volts	Amperes					
B309	Double triode	6.3 12.6	0.3 0.15	10,000	5.5	300	—	B9A
B719	R.F. double triode ...	6.3	0.435	9,700	5.9	300	—	B9A
X719	Triode Heptode frequency changer ...	6.3	0.3	1,000,000	0.775	300	125	B9A
Z77	R.F. sharp cut-off pentode	6.3	0.3	300,000	7.5	250	250	B7G
Z719	R.F. sharp cut-off pentode	6.3	0.3	400,000	7.4	300	300	B9A
B319	R.F. double triode ...	7.0	0.3	4,000	6.0	250	—	B9A
LZ319	Triode pentode V.H.F. frequency changer } triode section pentode section }	9.0	0.3	4,000 —	5.0 6.0	250 250	— 200	B9A

The popular circuit and "know-how" for the registered UNIVERTER was designed by IKOPATENTS around Osram Valves.

Data sheets on all these Valves are obtainable from the Osram Valve and Electronics Dept.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, W.C.2

Mrs.
Chapman's
busy
day

MRS. CHAPMAN is a housewife. Her husband runs a prosperous and expanding firm of builders' merchants in a town not far from the Surrey-Hampshire border. They live with their two small sons in a large house on a wooded slope a few miles out.

Mrs. Chapman has plenty to do, even though she has her own small car in which to get around and a full-time man to look after the garden. The children want watching and there are the hundred and one chores that have to be done even in a modern labour-saving home. Besides, her husband is president of the local ratepayers' association, which means rather a lot of voluntary secretarial work for her in the evenings.

There was quite a stir in the village when she was chosen to represent Surrey in a national floral decoration contest, and a brand-new enthusiasm for 'Sunday-painting' has aroused great interest among her colleagues in the Women's Institute. Yes, she is indeed a busy woman.

Mrs. Chapman reads *The Listener*—chiefly for its reports of broadcasts on social problems, for the book reviews, and to keep in touch with the London art exhibitions; but she is always intrigued to discover how interested she becomes in an article about a foreign country or some industrial topic. Yet she is but one of thousands* who find that *The Listener* satisfies a need for stimulating and varied reading.



The Listener does have this unique influence among well-informed people, who in their turn enjoy considerable local prestige. Advertisers who wish to appeal directly and economically to a selective market of people of influence and discrimination will find no better medium than the advertisement columns of *The Listener*.

* Certified weekly net sales, January-June 1955, 139,752



Carries influence with influential people

Another

COSSOR

Triumph!

New **V.H.F / F.M** *Model* **524**



for only

24½

GNS.

We've done it again! This new F.M. Melody Maker is the latest in a famous line. For 27 years there has been a Melody Maker—always a good set at the right price. The model 524 has a specification unrivalled for its cost—10" elliptical speaker, 4 wavebands including VHF/FM, 6 valves, pick-up and extension loud speaker facilities, graceful moulded cabinet. This Cossor 'Melody Maker' offers your customers the finest ever interference-free listening at the lowest ever price.

Crystal Clear- **COSSOR** *Clear!*

T.44

Please quote *British Radio and Television* when replying to advertisers' announcements

3

new

winners...

IN RADIOGRAMS



THE "CHELTENHAM" FM/AM Model R/G 357

Frontal controls, 3-speed with turnover pick-up. Fully equipped to receive the new Frequency Modulated sound transmissions and existing long, medium and short wavebands. Walnut-veneered cabinet, record storage space. A.C. mains, 200/250 volts. Size 32in. wide, 30in. high, 16in. deep.

59 gns



THE "WALDORF" RADIO-GRAM Model R/G 359

This superb F.M./A.M. Bureau type radio-gram incorporates the latest refinements. The 4-wave, 7-valve (including tuning indicator) superheterodyne chassis is suitable for operation on A.C. mains, 200-250 volts, 50 cycles, while the negative feedback audio circuits, and 10in. loudspeaker ensure excellent tone response. The handsome walnut-veneered cabinet is 32in. high, 36in. wide and 15in. deep, and has two large record storage compartments. Latest Garrard type RC.110 8-speed mixer, record changer, and turnover type crystal pick-up. For reception of F.M. U.H.F. band, and long, medium and short wavebands, with magic-eye tuning. Separate tone control, extension loudspeaker terminals, built-in aerial for F.M. reception.

72 gns



THE "ASTOR" RADIO-GRAM Model R/G 360

An elegant Bureau type radiogram with 3-wave, 6-valve (including tuning indicator), superheterodyne chassis for operation on A.C. mains, 200-250 volts, 50 cycles. 10in. loudspeaker and negative feedback audio circuit, with separate tone control ensuring really good tone reproduction. Walnut-veneered cabinet 32in. high, 34in. wide and 15in. deep, with large record storage compartments. Collaro type RC.54 3-speed mixer record changer, with turnover crystal pick-up. For reception of long, medium and short wavebands, with magic-eye tuning indicator. Extension loudspeaker terminals.

59 gns



Showrooms and Sales Dept., 319/321 Euston Road, London N.W.1
 Head Office: Fitzroy Place, London, N.W.1
 Midland Depot: 103 Coleshill Street, Birmingham, 4
 Northern Depot: 41, Shudehill, Manchester. Scottish Depot:
 575/577 Pollokshaws Road, Glasgow. Welsh Depot and Factory:
 Vibrant Works, Treforest, Glamorgan.

Masteradio

WILL SELL ON SIGHT AND SOUND

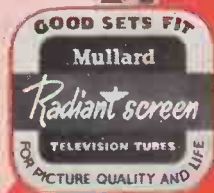
Please quote *British Radio and Television* when replying to advertisers' announcements

Radiant screen

—a new name for a **PROVED** process

There are a hundred-and-one convincing reasons for the consistent quality and long life of Mullard Picture Tubes. But to describe them all would take a book or a full length film*. One feature, however, is all important—the fluorescent screen. This has been the subject of years of research by Mullard scientists. This screen—in many respects unique—is a major distinguishing feature, and so that it may be recognised as such, Mullard have adopted a new distinguishing term—RADIANT SCREEN. In future all Mullard TV Picture Tubes will be known as Mullard Radiant Screen Long Life Picture Tubes. For details of the big Radiant Screen Advertising Campaign see the August issue of the Mullard Outlook.

** There is a film. Full details about it were given in the July issue of the Mullard Outlook. If you haven't seen it yet write at once to find out when it will be shown in your district.*



Mullard

Radiant screen

LONG LIFE PICTURE TUBES



MULLARD LTD. CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON W.C.2

MVE 122

Please quote *British Radio and Television* when replying to advertisers' announcements

10 good reasons why —

- 1 **ACCEPTANCE ANGLE**—kept as low as possible to give maximum directivity.
TECHNICALLY CORRECT
- 2 **BAND WIDTH**—adequately maintained to meet frequency requirements of Band III.
TECHNICALLY CORRECT
- 3 **FORWARD GAIN**—as great as possible to use all the available field strength (e.g. 11.5 db on 6-element array).
TECHNICALLY CORRECT
- 4 **FRONT/BACK RATIO**—made as high as possible to minimise interference and afford reflection suppression.
TECHNICALLY CORRECT
- 5 **ALUMINIUM ALLOY**—used throughout, no dissimilar metals.
TECHNICALLY CORRECT
- 6 **NO SEAMED TUBING**—only extruded section.
CONSTRUCTIONALLY CORRECT
- 7 **THE CROSS-ARM**—18 S.W.G. fully finished at both ends.
CONSTRUCTIONALLY CORRECT
- 8 **THE ELEMENTS**— $\frac{3}{8}$ " 20 S.W.G. damped and fitted with plastic plugs to prevent vibration and to give a finished appearance.
CONSTRUCTIONALLY CORRECT
- 9 **THE INSULATOR**—fully moulded with pressure cast aluminium alloy fitting to ensure that folded dipole is electrically secured to cross-arm.
CONSTRUCTIONALLY CORRECT
- 10 **THE DIPOLE CONNECTIONS**—made in moisture proof box to prevent any exposure to atmosphere.
CONSTRUCTIONALLY CORRECT

YOU SHOULD INSTALL
TELERECTION
BAND III Aerials

Completely assembled

TELERECTION LTD
ANTENNA WORKS ST. PAULS CHELTENHAM
Telephone Cheltenham 55960 & 4028

London Office :—Lennox House, Norfolk Street, Strand, W.C.2 Tel: TEMple Bar 5911

K/TL17

Peerless Performance— and Value

Beethoven 17 in. TABLE MODEL



Excellence of a high order is incorporated in the design, construction and mechanical efficiency of this NEW Beethoven addition to a famous lineage. The Model, in step with televisions ever-widening ambit, adequately meets today's requirements—and will be equal to to-morrow's demands.

The B.94 is designed for reception of Band I and Band III stations. It is fitted with a 12-Channel Turret Tuner, Automatic Anti-Fade Control on vision and sound, Flywheel synchronisation. Automatic Interference Suppression. The cabinet is beautifully finished in Highly Burnished Veneers.

B94. 17" TABLE MODEL

17" Rectangular C.R.T.

Sizes: Width 20", Depth 19" Height 20"

Beethoven



TELEVISION

VISION AND SOUND OF CLASSICAL QUALITY

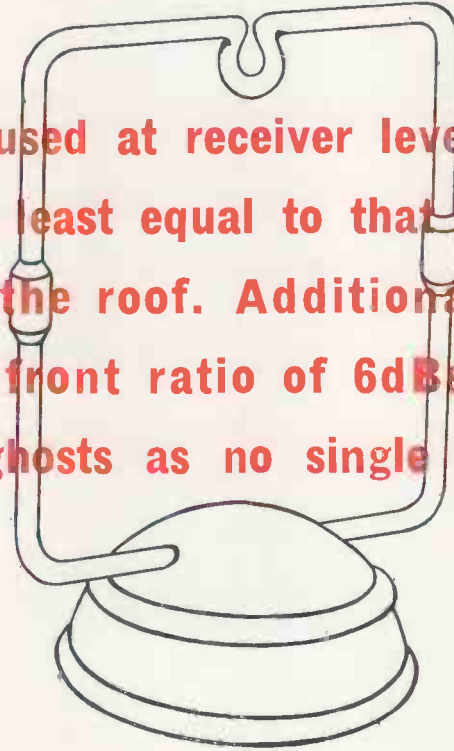
BEETHOVEN ELECTRIC EQUIPMENT LIMITED, 89 Reddish Lane, Gorton, Manchester, 18

Please quote *British Radio and Television* when replying to advertisers' announcements

Please do not be misled ...

So many experts have affirmed that an indoor aerial cannot possibly be effective on Band III that you may fail to appreciate the full facts about the Hi-Q. *Let us make the position clear, without misunderstanding:—*

The Hi-Q, used at receiver level, will give a signal at least equal to that of a single dipole on the roof. Additionally, it has a back-to-front ratio of 6dBs, and will eliminate ghosts as no single dipole can



And it looks good. And you can sell it over the counter. Here is our money-back guarantee that the Hi-Q indoor aerial *will* work wherever a single dipole will give a signal. **RETAIL PRICE 3½ GUINEAS**

The WOLSEY Hi-Q

WOLSEY TELEVISION LTD., PACEMAKERS TO THE AERIAL INDUSTRY
43-45 Knight's Hill, WEST NORWOOD, LONDON, S.E.27. TEL: GIPSY HILL 2207
(Electronics Division, Gas Purification & Chemical Co. Ltd.)

**THE FIRST
TABLE-TOP
BAND III
AERIAL**

**SAVE - TIME,
LABOUR and MONEY**

WITH THE **Radar** CATHODE RAY TUBE
TESTER REACTIVATOR



waveforms
LIMITED

£22.10s.

Nett Trade

An instrument of proved reliability which will accurately and rapidly check TV tubes for HEATER-CATHODE LEAKAGE, INTER ELECTRODE INSULATION, EMISSION, etc. Tests any component for insulation and resistance up to 50 megohms.

TIME SAVED

All these tests, comprising a comprehensive and speedy assessment of tube condition can be carried out in the customer's home or service dept., WITHOUT REMOVING THE TUBE FROM CABINET OR CARTON.

LABOUR SAVED

Many tubes which would previously have been discarded because of low emission may now with this instrument, be reconditioned for a further period of useful service.

MONEY SAVED

Highly recommended to dealers operating rental or maintenance schemes

Write to-day for information to

WAVEFORMS LTD.,

Radar Works, Truro Rd., London, N.22

Phone: BOWes Park 6641/2/3

British
**RADIO AND
TELEVISION**

Incorporating "The British Radio Maker and Exporter"

Vol. X, No. 7 NOVEMBER, 1955

Editorial and Advertising Offices :

**46-47 Chancery Lane,
London, W.C.2**

Telephone : **HOLborn 6201**

EDITOR: David McIlwain

TECHNICAL EDITOR: W. Norman Stevens

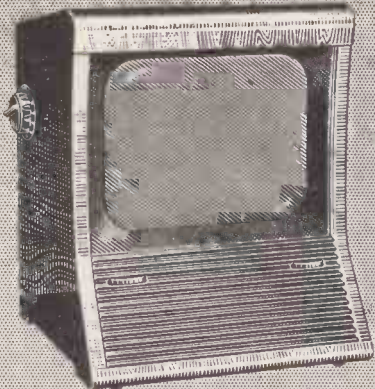
ADVERTISEMENT MANAGER: Robert C. Cornwall

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It's been PROVED...

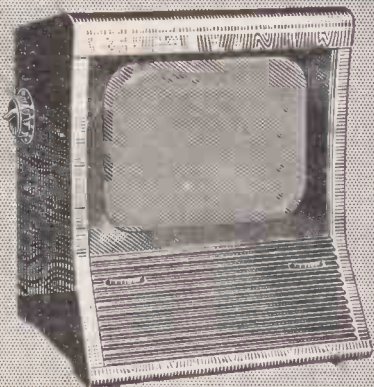


Thousands at the Radio Show saw and tested PYE 13-Channel TV for themselves—tuning in 13 specially transmitted programmes on 13 different channels.

Already viewers in London have acclaimed the excellent reception of the new programmes by PYE 13-Channel TV.

Right from the start of the original test transmissions, spontaneous testimonials have been coming in from yourselves and the public alike.

It's been ADVERTISED..



And now in one of the most dynamic and concentrated advertising campaigns ever produced, PYE have punched home to millions the logic of buying a new PYE TV—and buying it now. Remember—October and November were peak months for TV sales last year. And never has the public been so TV conscious as it is now. Follow up this campaign with all you've got.

NOW'S the time to SELL—

the **PYE**

VT4

14" Table Model with 13-Channel Tuning, Automatic Picture Control and Black Screen. Picture for picture, pound for pound, it's Britain's finest TV value.

PYE LIMITED OF CAMBRIDGE

Tele-opinion

Problems of Pioneering

ONE of the difficulties of pioneering a television service intended for public use is that of determining standards at the outset. If the standards adopted are too low or too inflexible then progress will suffer and development will be hindered. Newcomers, starting their own TV service at a later date with the advantage of already pioneered knowledge and know-how, can raise their standards and make the most of progress.

This, in many respects, is the position of British television in the world to-day. We, the pioneers of TV, chose a standard of 405 lines (at that time considered to be high definition). America, second in the field, raised her sights a little and decided on 525 lines. Since the war other nations have agreed on an international standard of 625 lines. The result is that British TV now has the lowest definition standard in the world.

Quite contrary

This doesn't necessarily mean that British pictures are the worst in the world. The contrary is true, and experts from various countries have paid tribute to the quality and definition of the televised picture in this country. The answer is, of course, that picture definition has two components, the horizontal and the vertical. Increasing the number of scanning lines (vertical definition) produces a much vaster increase in the overall bandwidth of the vision signal, and unless the receiver can cope with the wider frequency band, horizontal definition suffers considerably.

Compromise

As with most problems in radio and TV, the solution is a compromise, and such has been the progress in circuitry and techniques during the post-war years that there is no longer any difficulty in producing a receiver at an economic price to handle the bandwidth required for, say, a 625-line picture. British television is, in fact, running on a lineage and definition standard far below what is economically possible. And with television licences approaching the 5 million mark there is no likelihood that there will ever be any change.

Why worry?

Nobody seems to be particularly worried about this state of affairs, even though it doesn't actively help the export market in TV. But an important question arises as a result of experiments currently being made by the B.B.C. *Are we also going to have the lowest definition standard of colour television in the world?*

It doesn't matter whether British colour pictures look good or not. If they have 405 lines, no-one outside the U.K. is going to be impressed. And as more and more countries start their own TV services on 525 lines (or even higher definitions) so British TV prestige will suffer. We shall become the country with low definition TV—whether colour or black-and-white.

Beginner's look

Colour TV is still in the pioneering stage and it is important to keep an eye on overall transmission standards while considering the relative merits of systems. It may be that need for compatibility will make any improvement of definition out of the question, and compatibility is very important—but for whom? The existing viewer with a standard black-and-white set won't need to see colour transmissions (rendered in monochrome) half so much as the colour viewer with his £300 set will need to see black-and-white, because for a long, long time colour programmes are going to be few and far between.

In the long run it might be worth while considering the introduction of a higher definition colour service, and producing two-definition receivers to switch to either black-and-white or colour standards. Receivers capable of accepting differing standards of definition are, in fact, in use on the Continent (e.g., in Belgium). There

would be no great problem electrically in designing a set capable of receiving either a 625-line colour picture or a 405-line black-and-white picture at the turn of a switch.

More lines

The best solution, however, is to combine an improvement in overall definition (to, say, 1,000 lines) with the introduction of colour, and move up in the frequency spectrum—to Band IV. The pioneer must keep future developments in mind, and nothing is more certain that in the foreseeable future Band IV will be opened for television in this country. *It would be a major error of judgment if Band IV were ever used for the transmission of 405-line pictures.*

Those whose business it is to examine and investigate TV development should, therefore, concentrate on devising a new high-definition colour system, combining the most progressive transmission standards with the most economical receiver design specifications. Colour receivers are going to be expensive, anyway, and nobody will be able to receive colour TV without a new set. There's a lot to be said for making a clean break with the 405-line system and start thinking afresh about a high-definition colour service in Band IV to run parallel with the existing service until 405-line operation becomes obsolete.

False start?

None of these answers, however, can resolve the immediate problem as to whether a 405-line colour service is going to be worth the trouble and above all the expense of its introduction. And, perhaps more important, whether such a service would not eventually prove to be another false start with technical standards too low for this rapidly developing field of technology. In the long run it is economics that count, and the economics of any industry in this post-war era are intimately connected with exports.

Whatever decision is made regarding colour, it should be made with the full awareness of Britain's needs in the TV export markets of the world. And it should be made with an eye to the future, for what is done now will determine the shape of television as a service and an industry in this country for many decades, perhaps generations, to come.

Pioneering has its problems and responsibilities, but perhaps the best asset of the pioneer in any field is foresight.

ROUND-UP OF THE MONTH'S NEWS AND VIEWS

H.P. and the Board of Trade

DEALER H.P. STATISTICS INVITED

THE Board of Trade last month started to collect hire-purchase statistics from shops and finance houses. Mr. Peter Thorneycroft, president of the Board of Trade, has written to 6,000 retailers all over the country in trades where important sales of goods on hire-purchase terms are made (e.g., furniture, radio and television sets, domestic appliances) inviting them to provide monthly information on their hire-purchase business.

The president said in his letter to retailers: "As hire-purchase trading becomes more widespread, its influence on the economic well-being of the country becomes greater. It is therefore important that the Government should know how the volume of hire-purchase business is moving in order to take proper account of it in framing its broad economic policies."

The retailers to whom the President has written have not previously been asked to contribute monthly statistics to the Board. But in addition, department stores, multiple shops, retail co-operative societies and nationalised undertakings which are already sending monthly figures of their total retail trade to the Board of Trade are being invited to supplement their figures with information on their hire-purchase business.

Since many retailers pass hire-purchase agreements over to finance houses, the Board of Trade have also invited more than 450 finance houses to contribute statistics which only they possess, and which are essential for completing the scheme.

The information collected will be used to build up representative statistics showing the monthly changes in hire-purchase sales and debts outstanding for the main types of goods sold on hire-purchase. Against these figures the trader will be able to compare the results of his own hire-purchase business and tell how he is doing in relation to the average for his trade.

Because of the importance which the Board of Trade attaches to the secrecy of the returns a code number will be used in each return to ensure that the identity of individual firms is unknown to the staff handling the returns. Individual information will be seen only by this staff; no other officials of the Board of Trade or of any other Government Department will have access to it.

The Board of Trade invite any finance house or retailer who has not received an invitation to contribute to these statistics and who is willing to do so, to send for a form from the Director of Statistics, Board of Trade, Horse Guards Avenue, London, S.W.1.

TV TUBE SERVICE IN CHANNEL ISLANDS

AT present, dealers on the Channel Islands have to return tubes which have failed within the guarantee period to the mainland. This involves expense and loss of time.

Mullard, Ltd., have therefore arranged for their tubes to be tested on one of their standard factory-type test boards by J. J. Eastick & Sons, Ltd., of St. Helier, Jersey, who will be authorised to issue replacements subject to the usual terms of guarantee.

Similar facilities have been arranged by the Ediswan Company for Mazda cathode-ray tubes.

COMPANIONS FOR CHIEFS

For the past two months eight Uganda Chiefs have been in this country to study industry, welfare services and local government. Just prior to their return to Uganda, Harold Field, export manager of A. C. Cossor, Ltd., presented each of them with a new Cossor Companion radio receiver. It has one medium and two short wavebands.



And now it's

TV for cars . . .

THE first British television set to be specially built into a car has been developed by E. K. Cole, Ltd. It made its debut at the Motor Show, Earls Court, last month, and was shown by Freestone and Webb, Ltd., in their Rolls Royce *Silver Wraith* touring limousine.

This 9in. Ekcovision receiver has been specially styled into the rear compartment division and is so positioned as to provide comfort viewing for the passengers in the back of the limousine.



Developed from the Ekcovision mains-battery portable TV, first introduced at the Radio show, this set works off the car's 12-volt battery and uses the ordinary wing-mounted telescope car radio aerial to pick up TV transmissions—both B.B.C. and Commercial, as well as the v.h.f. radio programmes. The receiver can be used up to within 25-30 miles radius of the transmitter, unless the car is in an unfavourable location.

Tests by Ekco engineers have proved that the receiver will operate successfully while the car is moving or stationary. Working from the 12-volt car battery, the Ekcovision car receiver consumes, on TV reception, the same amount of current as that used by one headlamp.

HI - PYE

AT the recent annual general meeting of Pye, Ltd., the chairman, C. O. Stanley said: "We are convinced that hi-fi will take a prominent part in our trading during 1955-56."

WAVEFORMS ADDRESS

AN item concerning the address of a test equipment manufacturer on page 520 of our October number was incorrectly headed "Waveforms Address." We apologise for the error and point out that the correct address of Waveforms, Ltd., is Radar Works, Truro Road, Wood Green, London, N.22. There is, of course, no connection between the two manufacturers concerned.

FOR ALL IN THE TRADE AND THE INDUSTRY

PURCHASE TAX

As this issue was prepared for press before details of the Chancellor's Autumn Budget were announced, all prices quoted in the editorial and advertising pages of this number are subject to any changes made in purchase tax.

Credit Squeeze dampens Sales

RETAIL sales during August can usually be expected to exceed those for June; the increase in the hire purchase deposit introduced at the end of July is, however, reflected in the level of sales during August, showing for radio receivers a fall of 11,000 from July and 1,000 from June and for radiograms a fall of 2,000 from the levels of both July and June.

For television, August sales exceeded those for July by 3,000 and those for June by 6,000. It is believed, however, particularly with the impetus to television sales which could be expected from the approach of the additional service by the I.T.A., that sales of television receivers would have been considerably higher if the hire purchase deposit had not been raised.



TOP MARKS to Herbert and Lascelles, Ltd., Reading H.M.V. dealers, for their enterprise in staging a full-size radio and television exhibition in the Reading town hall last month. During the week's run the show attracted large numbers of local visitors. Important contributions were made by His Master's Voice and the recording equipment division of E.M.I. Sales and Service. Picture shows the eye-catching display of H.M.V. radio, radiograms, and TV sets, while E.M.I. recording was represented by professional tape recorders and a range of recording accessories, including *Emitape*. Special feature was a historical exhibit arranged by H.M.V. showing the development of the acoustic gramophone from 1887 to 1927

CHANGES OF ADDRESS

NEW address of E.A.P. (Tape Recorders), Ltd., is 9 Field Place, St. John Street, London, E.C.1, where the company have taken over larger factory premises. Telephone number is now **TERminus 9627**.

THE sales and order departments of McMichael Radio, Ltd., have now moved to Slough, Bucks. Telephone: Slough 24541; Telegrams: Radiether, Slough.

Goodmans Hi-Fi at Luton

A DEMONSTRATION of high-fidelity equipment will be given in Luton Town Hall by Goodmans Industries, Ltd., on November 15 and 16. This is part of a series of highly successful mobile demonstrations given to gramophone and kindred societies throughout the country during the past year. The event, which is being arranged in co-operation with S. Farmer & Co., of Luton, will begin at 8 p.m. on both evenings.

This will be one of the last in the Goodmans programme for the current year, which has covered more than 50 towns throughout the country. The response from hi-fi enthusiasts has been so great that the company are considering a further programme of demonstrations for 1956.

Industry's Guest of Honour

SIR WALTER MONCKTON, Q.C., M.P., Minister of Labour and National Service, is to be the guest of honour at the annual dinner of the Radio Industry Council at the Dorchester Hotel, London, on Wednesday, November 23.

Guests of honour on previous occasions have included H.R.H. the Duke of Edinburgh and the present Prime Minister, Sir Anthony Eden, when Foreign Secretary.

British Components in Denmark

WITH the increasing applications of electronics in industry, in atomic and in defence equipment, the radio and electronic component assumes a new importance, and was given a place of honour in the British Exhibition in Copenhagen (September 29 to October 16).

A space of 1,300 sq. ft. was occupied by the Radio and Electronic Component Manufacturers' Federation near the entrance to the Forum, the principal exhibition building. Thirty-one manufacturers exhibited, 22 having stands and the remainder token displays.

This is the first time the British component manufacturers have exhibited jointly in Denmark, their previous exhibitions in Scandinavia having been in Stockholm in 1948 and 1953.

The exhibits covered almost the whole range of components for the radio and electronic industries including resistors, capacitors, valves, cathode-ray tubes, switches and controls, magnetic materials, microphones, speakers and amplifiers.

There were also gramophone parts, including the latest pick-ups and record changers, which Britain exports in substantial quantities to Scandinavia, and aerials for radio and television reception.

Electronic exhibits outside the component display include 21in. television receivers, table models and consoles, radio sets combined with clocks, nucleonic instruments (E. K. Cole, Ltd.) and ultrasonic apparatus for drilling, soldering and cleaning (Mul-lard).

PRICES DOWN

PRICE reductions for two of their TV models are announced by A. C. Cossor, Ltd., Model 938 now sells at 64 gns. tax paid (£50 5s. 4d. list plus £16 18s. 8d. tax), and Model 937 is 77 gns. tax paid (£60 9s. 6d. list plus £20 7s. 6d. tax).



BY APPOINTMENT
TO HER MAJESTY THE QUEEN
SUPPLIERS OF RADIO-GRAMOPHONES,
RECORDS, RADIO, TELEVISION &
ELECTRICAL HOUSEHOLD APPARATUS.
THE GRAMOPHONE COMPANY LIMITED.

It's a commercial fact—
“HIS MASTER'S VOICE”
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The dealer who can display
“His Master's Voice” has an advantage
that carries considerable cash value.

In addition to his day-to-day trade in popular priced products in which
“His Master's Voice” are well represented, he attracts the more discriminating
public—the people who want nothing less than the best. In this way
the reputation of “His Master's Voice” for uncompromising quality brings
him both *extra* profit and *extra* prestige.



**NEWS ROUND-UP
CONTINUED**

**40,000 Retail Trade
Buyers Listed**

THE *Stores and Shops Directory for 1956* (tenth edition) lists over 40,000 retail merchandise and equipment buyers. Increased by 100 more pages, it gives the executive personnel of the Department Stores, Multiple Shop Companies (arranged in trade groups and alphabetically) and Co-operative Societies, as well as the London Buyers for overseas stores.

The 650-page volume is obtainable from book-sellers or direct from the publishers, Newman Books, Ltd., 68 Welbeck Street, London, W.1, price 50s. post paid.



Part of the comprehensive exhibition of the new seasons radio, television and electrical products held by Kerry's (Gt. Britain), Ltd., at their branch at 25-7 Highcross Street, Leicester, recently. The show was well attended by radio and electrical dealers from a wide area in the Midlands, and was staged at a time of growing interest in the proposed Lichfield I.T.A. station.

New BBC TV Station for Scotland

THE B.B.C.'s new medium power television station at Core Hill, Meldrum, Aberdeenshire, was opened on October 12 by Mr. Tom Johnston, former Secretary of State for Scotland and now Chairman of the Scottish Broadcasting Council.

The main transmitters and the aerial system were provided by Marconi's Wireless Telegraph Co., Ltd., who are also the contractors for equipment in a number of similar stations, either recently completed or in course of construction. In accordance with standard Marconi practice, the 5kW vision trans-

mitter is designed to handle colour transmissions as well as black and white.

When Meldrum is in commission the service area is expected to extend eastwards of a line running from Moray, along the foothills of the Grampians, to Montrose. This comprises most of the prosperous farming and fishing region.

For the v.h.f. service, which will emanate from the same station, Marconi's will provide six 4½kW frequency modulated transmitters to operate on Band II. A large number of these are being supplied by the company for the B.B.C.'s national v.h.f. service.

**Belling-Lee Aerial
Convention**

AN aerial convention during which technical talks on Band III aerials and problems associated with the reception of Band III transmissions will be given has been arranged by Belling & Lee, Ltd., and will be held in Birmingham on Wednesday, November 30, commencing 2.15 p.m. Invitations are being extended to retailers and wholesalers in the service area of the new Lichfield station. Details of the venue will be announced later.

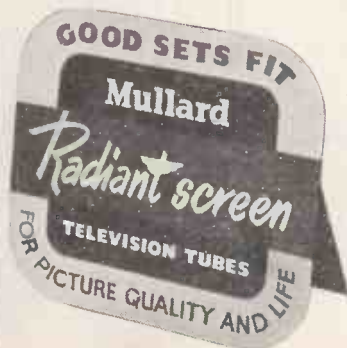
Meanwhile, Belling & Lee have sent out reception report cards to dealers, aerial erectors and wholesalers in the Lichfield area requesting details concerning the reception of the G9AED transmitter, including information about ghosting, picture quality, etc. Each report will be acknowledged by a QSL card.

Newcastle R.T.R.A. Dinner

THE seventh annual dinner and dance of the Newcastle-upon-Tyne centre of the R.T.R.A. will be held the Royal Station Hotel, Neville Street, Newcastle-upon-Tyne on November 11, commencing 7.30 p.m. Tickets, 30s. each, are obtainable from the secretary, J. Stanley Penney, 5 Charlotte Terrace, South Shields, Co. Durham.

HELICOPTERS HASTEN EXPORTS

EDWARDS HIGH VACUUM, LTD., in the drive for exports are using helicopters to ferry overseas visitors from London Airport to their factory in Crawley New Town, thirty miles away.



The Radiant Screen showcard (right) is specially designed to enable dealers to tie in with the intensive national press advertising campaign currently being conducted by Mullard, Ltd. It emphasises the essential points of the advertisements. A self-adhesive sticker, soon to be issued to dealers, carries the same design and is intended for fixing to TV sets incorporating Mullard tubes. The new booklet *Television—it's Wonderful* is also available to dealers. Humorous and colourful, it will act as a thought provoker and sales stimulator to potential customers. The Radiant Screen publicity campaign is designed to help dealers to sell TV receivers.

Colour TV in the news

LAST month the B.B.C. started a series of experimental colour television transmissions from the Alexandra Palace transmitter after normal programme hours. The system used is a modification of the American N.T.S.C. standard, the important thing being that this is a compatible system—i.e., the colour transmissions are capable of being received in monochrome on ordinary black-and-white receivers.

Many dealers and engineers were able to check the compatibility for themselves, viewing on standard TV sets. The test cards and pictures came over clearly with good definition. Here and there traces of patterning could be discerned, due, presumably, to interaction between the colour sub-carrier and the main signal carrier, but at normal viewing distance this effect was not noticeable.

These transmissions are a logical development of research into colour TV that has been going on behind the scenes at the B.B.C. for a long time. The tests are being made in agreement with the Television Advisory Committee who will prepare a report on the whole field of colour television for the Postmaster-General. The radio industry is collaborating too.

On the result of these experiments depends the decision to be taken by the Postmaster-General, advised by the Television Advisory Committee, on which system the U.K. will adopt. The system chosen will be equally binding on the B.B.C. and the I.T.A.

INDUSTRY VIEW

S. E. Allchurch, secretary of the British Radio Equipment Manufacturers' Association, commented:

"Our manufacturers are extremely interested in the B.B.C. colour television tests. They are co-operating with the B.B.C. in every possible way and looking forward to results which will enable progress to be made towards the choice of a suitable colour system for Britain."

"Our estimate, however, is that it will be at least two years before any decision can be made as to the system to be used and allowing for all the design, development and production stages it will be three or four years before colour television reception can start."

"The time lag on colour television can be judged from the United States. With all their resources, there are only four hours of colour television per week even in New York. The cheapest set costs the equivalent of £300. It was

★ LAST MONTH, WITH THE START OF THE B.B.C. EXPERIMENTAL COLOUR TRANSMISSIONS, THE ACCENT WAS ON COLOUR TV. THIS FEATURE SUMMARISES THE LATEST NEWS, VIEWS AND OPINIONS ON THIS FASCINATING IF CONTROVERSIAL SUBJECT. READERS ARE ALSO REFERRED TO "TELE-OPINION", PAGE 603 OF THIS ISSUE.

recently stated that only 25,000 had been made and only 10,000 sold.

"Out of seven million television sets expected to be made in the United States next year only 156,000 are expected to be colour sets."

EQUIPMENT

The equipment being used for the tests was supplied by Marconi's Wireless Telegraph Co., Ltd., and comprises a complete colour television camera chain, consisting of a 3-tube colour camera, a camera channel amplifier, and complete signal coding equipment for providing N.T.S.C.-type signals on

British 405-line standards. In addition, black-and-white and tri-colour monitors and a colour-bar test generator have been supplied, together with a comprehensive amount of colour test equipment.

Of particular interest is the colour camera. This incorporates three 3in. Image Orthicons, each of which handles a primary colour component fed into it by a system of dichroic mirrors and lenses, which serves to split the light from the televised scene into the three primary colours.

The new colour camera is larger than the black-and-white versions, but is actually easier to operate, being completely balanced on a rolling tripod, which gives finger-tip operation of "pan" and "tilt."

In use, it is equally suitable for indoor or outdoor scenes, the difference in colour between artificial and natural lighting being compensated by the use of a single daylight correction filter.

The complete colour camera chain is claimed to offer full three-colour reproduction with greater inherent possibilities than any other known colour reproducing system, including colour films, colour printing or colour dyeing. The equipment has been given a 1,000-hour operational test without change of camera tubes.

(Continued on page 616)

625 lines for Colour TV ?

THE adoption of a 405-line colour TV system in this country would kill the television export market, C. O. Stanley, chairman of Pye Radio, Ltd., stated at a meeting of the Midlands Radio Industries Club in Birmingham last month.

Giving his reasons for this view, he said: "Our black-and-white system is 405 lines, which is inferior to the standards of the rest of the world. Consequently, the sets we make for our home market are useless for the export market."

"We are endeavouring to compete with countries who have a big home market in sets which operate on the 625 lines system and where they can subsidise out of a valuable home business an export business with which we cannot possibly compete."

"If we do colour on 405 lines in order to satisfy the argument for compatibility, two things will happen."

"Firstly, there will be a loss of quality against the American picture of about one-third. It is unlikely that in the long run this could possibly satisfy the British public."

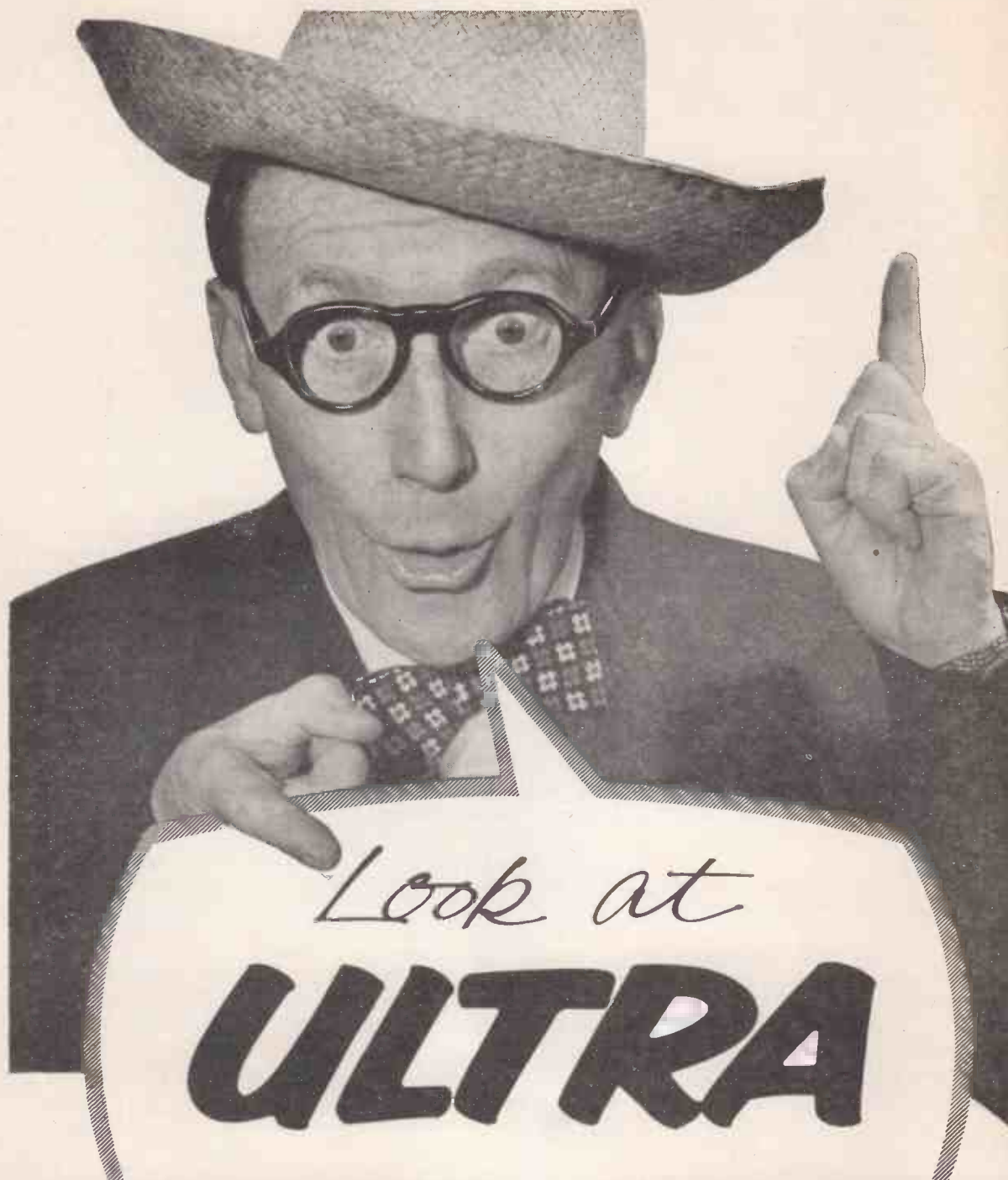
"Secondly, and this is more

important, having been pushed out of the export television market in black-and-white television sets, if we were to go in for 405 lines compatible colour, there is not a market in the world that would buy our television sets, and I don't know that Mr. Butler would agree that we should deliberately close a market in this fashion.

"Consequently, we must consider the next alternative, and that is to put our colour out in 625 lines compatible with the rest of the world."

"The old argument that it is more expensive to make something in 625 lines has now been proved to have practically disappeared, and, if colour is the real thing to have, a home market that would help to subsidise the export trade is of the very greatest importance."

"Finally, since the world decided on 625 lines, technical advances have been considerable, so we should see if perhaps we have not got beyond the stage of 625 lines and whether we should consider something of a more advanced character which might have uses on the cinema screen as well as in the home."



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extra-play magnetic recording tape 190m

Tough, thin,
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**GIVES
UP TO
6 HOURS
PLAYING
TIME**

—packs 1,800 feet on
normal 1;200-foot reel.

THE FINEST BASE-FILM EVER MADE

The astonishing new polyester base-film for 'Scotch Boy 190M,' is so much stronger than other tape bases that it can be made 33 $\frac{1}{3}$ % thinner — *and still be stronger*. This means you get 50% more length — and 50% EXTRA PLAYING TIME — on the same-sized reel.

Polyester film is a naturally limp and flexible material, and is little affected by temperature and humidity changes. 'Scotch Boy 190M' tape conforms snugly to recorder heads, is easy to handle, winds trimly, and tracks smoothly. It has an indefinite life in storage, and is an ideal tape for archive purposes.

NEW THIN COATING

The new and potent oxide coating of 'Scotch Boy 190M' tape gives clear, crisp reproduction of every frequency in the audible range. High-frequency response shows a specially notable improvement. Output variations from reel to reel and within each reel are remarkably small and, as with all Scotch Boy tapes, background noise is negligible.

THE WORLD'S FINEST TAPE

'Scotch Boy 190M' has been developed and produced in Britain by the 3M Company. Its appearance in Britain is its first appearance in the world. This is a landmark in the development of tape recording.

'SCOTCH BOY' 190m

MAGNETIC RECORDING TAPE

with polyester base

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BAND III TOPICS**Prospects
for the
Midlands**

I.T.V. WILL SOON REACH THE MIDLANDS, AND DEALERS ARE ADVISED TO MAKE AN EARLY START ON BAND III CONVERSIONS. THIS ARTICLE GIVES THE LATEST INFORMATION ON THE LICHFIELD STATION.

NOW that Commercial TV has become established in the London area and is settling down to what might be termed routine operation in competition with the B.B.C., the attention of the trade turns to the Midlands, and in particular the Lichfield transmitting station, at present under construction. What is the outlook for the radio trade in the Midlands so far as Band III reception is concerned? The radio industry provides its own answer.

The industry is confident that good viewing of the alternative programme from the I.T.A. transmitter at Lichfield will be available at no great cost to the vast majority of people in the primary service area and to others at necessarily rather higher cost in the secondary service area.

The release of the service area map and the start of the pilot test transmissions on low power are in effect the green light for dealers to go ahead in planning the conversion of single-channel receivers.

The industry believes that the vast majority of viewers within the service area will want the alternative programme. The main problem is likely to be a physical one—the dealer's capacity to undertake the necessary installations and conversions in the limited time available, particularly bearing in mind that this is the busiest season of the year. For that reason the viewer is advised to go to his dealer as soon as possible—to enable him to assess the likely load, plan his work and place the necessary orders with the manufacturers.

London experience has shown that it is essential for viewers to do this early. When the I.T.A. transmissions began from Croydon many people were disappointed because they made up their minds at the last minute when dealers were already overloaded and thousands are stated to be waiting still for their sets to be converted and aerials installed.



Associated-Rediffusion's New Wembley Television Studio Centre Studio 1. A view of Studio 1 from the lighting control position showing a Marconi television camera on the studio floor and the "bath tub" fluorescent lighting equipment with telescopic suspension from the lighting grid.

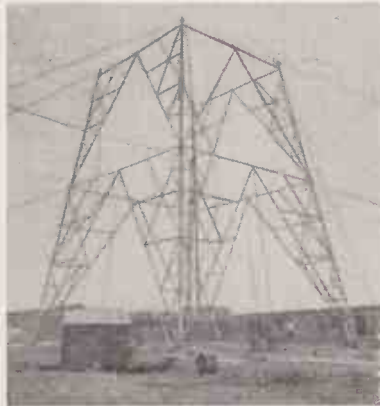
Conversion of Sets

Since the B.B.C. transmitter opened at Sutton Coldfield in December, 1949, about one million television receivers have been sold in the transmission area (estimated licence figure for end of September is 985,000 and allowance

has to be made for licences not yet taken out).

Of these the bulk are capable of conversion at no great cost, but some of the earlier purchasers may very well decide that now is the time to change their sets for multi-channel ones with bigger screens and the latest refinements in picture quality and control.

The cost of converters for single-channel sets ranges from £5 to £10, the great majority being about £6. From this it can be estimated that the total cost of converting the set only will be in the neighbourhood of £7 to £12, including allowance for labour, transport and ultimate minor adjustments in the home when transmissions begin.



Construction work on the 450ft. tower of the Independent Television Authority's transmitting station at Lichfield is now past the 90ft. level. This photograph shows the tower up to the 90ft. level. The construction of the tower is being carried out by Marconi's Wireless Telegraph Co., Ltd., who are also responsible for the design and construction of the 16-stack aerial array and the feeder system. Marconi's also made the technical survey and the field strength measurements for the Midland area.

Harmonics

Because the frequency of the Lichfield transmitter is a mathematical multiple of the B.B.C. frequency some viewers in the Midlands, in areas where interference is not severe, may receive a reasonable I.T.A. (Band III) picture on their existing B.B.C. (Band I) aerials, but an aerial specially designed to receive Band III signals will be more efficient and will be necessary for the great majority of viewers.

The Band III aerial is particularly necessary from the point of view of minimising strength of interference in relation to signal strength.

The kind of aerial necessary differs from district to district and even—in the case of Band III reception especially—from street to street and house to

house, depending on local geographical contours, screening and reflection by large buildings and other obstructions, and the incidence of interference.

The aerial manufacturers have for some time been producing special aerials necessary for the reception of Band III signals and thousands have already been sent into the Lichfield transmission area.

There are "combined" indoor aerials for receiving both B.B.C. and I.T.A. transmissions from just over £1 up to £2 and outdoor ones from about £2 to £6. Aerials for Band III only, either indoor or for attaching to existing Band I aerial masts, are also available at prices from about £1 10s. to £2. These prices do not include the cost of installation which may amount to £2 to £3 when the aerial has to be on an awkward roof.

In fringe areas more elaborate types of aerials will be necessary, but the great majority giving efficient reception in the primary and secondary service areas should come within the lower price groups.

Some Statistics

The following figures and estimates are supplied by the British Radio Equipment Manufacturers' Association, the organisation of the manufacturers of domestic radio and television receivers.

It is estimated by the industry that at the end of 1955 there will be some 830,000 multi-channel or adaptable receivers in the I.T.A. Lichfield area—675,000 in the primary and 155,000 in the secondary area.

This is based on the number of new licences taken out in the area from December 31, 1950, to June 30, 1955, which was 692,496. Of these 203,625 were taken out after March 31, 1954, and were therefore probably in respect of multi-channel sets.

	B.B.C. Sutton Coldfield	I.T.A. Lichfield Primary + Secondary
TV licences in area at 30/6/55 (industry estimate)	959,900	812,600
Population in area (B.B.C. and I.T.A. estimates)	6,909,000	6,070,000
Estimated households at 3.26 persons per household	2,119,000	1,862,000
Saturation by households	45 per cent	—

The above figures show that the Lichfield coverage is 85 per cent that of the Sutton Coldfield coverage in terms of licences at June 30, 1955 and 88 per cent in terms of population. This is a slightly higher coverage in comparison with the B.B.C. than in the London area where I.T.A. Croydon coverage is 84 per cent of the Alexandra Palace coverage in terms of both licences and population.



Associated-Rediffusion's New Wembley Television Studio Centre Master control room, which is completely equipped by Marconi's, is responsible for routine all outgoing pictures and for their quality. Exact programme timing is vital in commercial television and it is from here that programmes are kept to schedule. Master Control also inserts the filmed advertising announcements between programmes which emanate from the Telecine Room.

Equipment

The television transmitting equipment which is to be installed at the Midlands Area I.T.A. Station at Lichfield is being constructed by Pye, Ltd., of Cambridge. The vision transmitter is designed to give a peak white power output of 20kW and to operate with an associated sound transmitter of 5kW. Besides the transmitters, a complete set of ancillary control room equipment is being supplied by Pye, together with a telecine machine of the latest design.

The station itself has been designed in close co-operation with the I.T.A. within the last ten months, and the construction of the building is going

ahead rapidly. Extremely high pressure is being applied to the work in connection with this station and its equipment, in an attempt to reduce, by approximately half, the normal time of two to three years for such a project.

The final power amplifying stage of the vision transmitter comprises two water-cooled valves operated in a twin cavity circuit as a Class B linear amplifier. The amplifier is driven by the grid modulated medium power amplifier which consists of two air-cooled valves. The 5kW sound transmitter has one modulated water-cooled valve in its cavity type output stage and is also driven by two medium power air-cooled valves.

The outputs from the vision and sound transmitters are fed through 51.5 ohms co-axial feeders into the combining unit containing elements by which the vestigial sideband characteristics are obtained.

Later a further similar set of transmitters will be installed at Lichfield which are intended to be operated in parallel with the first set to provide a service with complete standby facilities.

The medium power sections of the transmitter can be operated without a high power amplifier, the vision output being nominally rated at 4kW peak white power, but capable of being increased to 5kW peak power, and when run in parallel with another similar transmitter the combined peak power would be up to 10kW. The sound transmitter is rated at 1kW output.

ITA must improve to survive—C.O.

CRITICISM of current ITV programming was expressed by C. O. Stanley, chairman of Pye, Ltd., at a recent meeting of the Midlands Radio Industries Club in Birmingham. Mr. Stanley, who has been prominent as an active protagonist of Commercial TV, said:—

"As the first person to start the battle for a competitive television service in this country, I feel it is my duty to pass a comment on the present situation. Those of us who have been identified with this fight for a second service in England since the beginning believed and still believe that the standard of the new programme ought to be considerably better than that of the existing programme."

"We felt a new approach was called for bringing more vitality and speed to the entertainment. I suppose it is remarkable that in the short time since Parliament gave its decision, that we should have an

alternative service at all in existence, but let us be quite clear at this stage that if there is one thing that will kill commercial television it is if we accept the standard and the approach of the programmes we have seen in the last couple of weeks."

"I for one am convinced that there is enough originality and enough entertainment genius in this country to give us something that is very much better."

"There is another thing that one has noticed: practically all the features worth looking at have been imported from the United States of America. This is surely a challenge to the artists of this country, and it must be economically quite wrong to spend dollars on this sort of entertainment."

"Lastly, I am convinced that the present method of injecting disjointed plugs at all sorts of times and places will give way to common-sense advertising where the advertiser is identified with the programme."

This tape means business!

EMITAPE

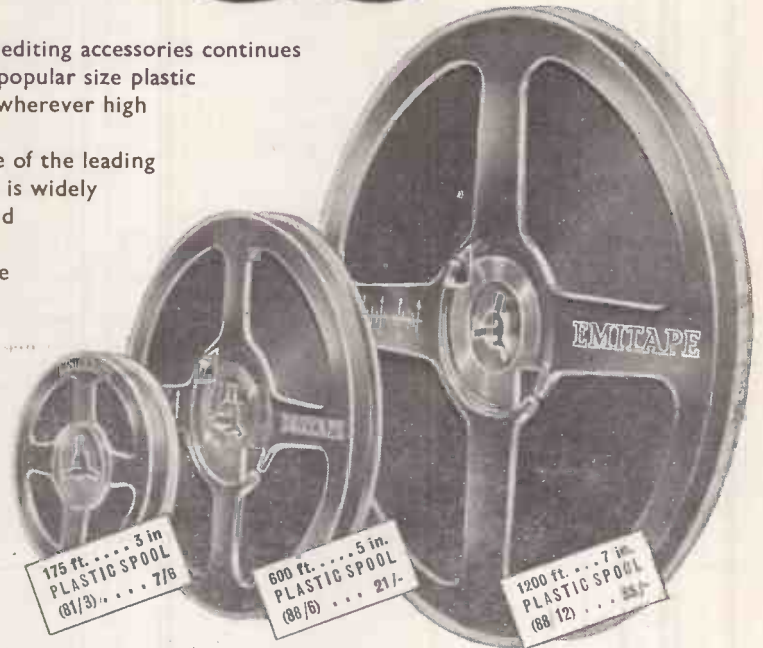
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The Emitape range has become the choice of the leading broadcasting recording organisations, and is widely used in industry, scientific laboratories and also for domestic recording of all types. Make sure that your stocks of Emitape are kept up to meet the constant and ever-increasing demand.

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Band III Topics—continued

Comprehensive monitoring facilities, under the control of the operator and actuated by means of push buttons mounted on the control desk, have been incorporated to assist in the routine operation of the station, and rapid fault clearance.

The new type of telecine machine included in the station equipment uses a Station camera tube. This will enable the station to transmit film for test or other purposes when required.

The transmitting station is provided with all test equipment necessary to ensure the maintenance of its high technical standards.

Aerials

Work on the 450ft. tower for the Lichfield station is proceeding according to schedule, and has progressed beyond the 90ft. level. This represents a good proportion of the total, as the main mass of metal is embodied in the 90ft. section; the tower, being tapered, will use progressively smaller girders at the higher levels and, given good weather conditions and adequate supplies of materials, progress should be rapid.

The construction of the tower is being carried out by Marconi's Wireless Telegraph Co., Ltd., who are also responsible for the design and construction of the aerial array and feeder system. This company, it will be re-

called, made the technical survey and the field strength measurements for the Midland area.

That the work is so far advanced is a considerable technical achievement in the face of difficulties, when it is recalled that the contract was placed only six months ago. In that short time the tower designs have had to be produced and supplies obtained. A further handicap has existed in a shortage of high-tensile steel, and work so far has had to proceed on almost a day-to-day basis, as supplies became available.

Currently the supply situation is somewhat easier, and the main problem is now the weather. Bad weather will hamper erection but, given reasonable conditions, the work should be completed to schedule.

The Marconi aerial array is a 16-stack high-gain aerial, and will be the first of its type to be produced in this country. Ultimately it is intended to be used as a split 8-stack array, each half being fed by one vision and one sound transmitter.

Coincident with the construction work at Lichfield, Marconi's are also erecting a similar tower and aerial at Rivington Moor, near Bolton. At this site, Marconi's have the contract for the entire station, including provision of the buildings, the transmitters, the tower, the aerial and the feeder system.

COLOUR TV—continued

COLOUR IN THE U.S.

Many people are saying that colour TV in the United States is already a "flop." Only some 30,000 colour receivers have been manufactured and of these only one-third have been sold. Nevertheless, the big networks are going ahead with ambitious colour programming and the chances are that after a cold start colour TV will gradually pick-up.

It is significant that prices have already fallen considerably from the 1,000-dollar mark which set the standard for the earlier receivers. R.C.A. have just brought out a colour set at 695 dollars, and Motorola have models in the 700-dollar price range.

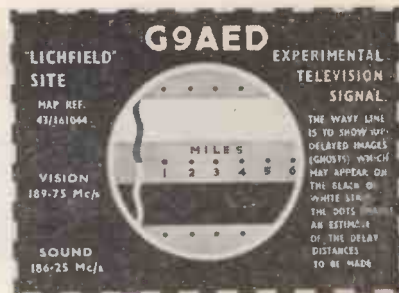
As for programmes, here is a typical N.B.C. line-up for the month of September. On September 11 Helen Hayes and Mary Martin starred in a two-hour production of Thornton Wilder's Pulitzer prize-winning play *The Skin of our Teeth* in the first of

N.B.C.'s series of Sunday night *Color Spread* programmes; starting on September 12 the weekday *Howdy Doody* show became all colour; on September 17 outside broadcast colour cameras covered a football game; on September 19 was a musical version of *Our Town* starring Frank Sinatra; on September 27 Milton Berle presented the first of a series of 13 colour productions from N.B.C.'s Color City in California.

These are some of the N.B.C. programmes. Other networks, notably Columbia, also have their regular colour schedules. There is no lack of enthusiasm or ambition from the production side.

On the other hand very few people in the U.S. are seeing these "colorcasts" in colour, but millions are viewing them in black-and-white. Their main reaction seems to be the criticism that the monochrome transcriptions of the colour transmissions are lacking in definition and subject to patterning. This feeling is not, at present, doing a great deal to help the cause of colour TV.

Although there are five times as many colour programmes on the air as there were last year, this is not



This is the test card now being transmitted from the Belling & Lee experimental TV station G9AED on the Lichfield I.T.A. site. Hours of transmission are: Monday to Friday 9.30 a.m.—12.30 p.m., 2 p.m.—5.30 p.m., and 7.30 p.m.—8.30 p.m. Saturday 10 a.m.—1 p.m. Picture below shows the trailer housing the transmitter. The 85ft. mast in the foreground carries the four-bay aerial, while in the background can be seen the lower sections of the 450ft. I.T.A. mast.



expected to result in any noticeable increase in sales of colour sets. Industry spokesmen are saying, rather cautiously, that colour TV will establish itself in 1957. Meanwhile, manufacturers and networks are consolidating their position and going ahead with colour production schedules with a confidence which will, no doubt, be justified in the long run.

All things considered it is probably going to take some five years before colour TV can be regarded in America as a functioning public service with a sizeable viewing audience. If the same pattern of development is followed in Britain we can look forward to colour TV plus an adequate number of viewers around 1960—or maybe even later in the century.

One ray of hope is provided by the industry itself, by firms such as E.M.I., Marconi, Thorn Electrical and Pye, whose research into colour techniques may well result in the evolution of an inexpensive colour receiver, or even adaptor, capable of bringing early colour into the millions of viewing homes of Great Britain in one rapid rainbow burst.



James Huxley's

No. 11

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60% brighter pictures
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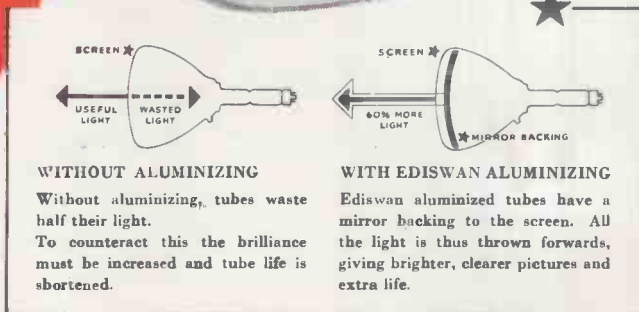
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This new Channel Converter has a Fine Tuning control in addition to a Gain control. Also a Main Switch is provided by which both Receiver and Converter can be switched on and off together. It is coloured bronze to harmonize with the Receiver and is fully guaranteed.

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This compact unit effectively reduces "wavy-line" and similar interference patterns caused by R.F. harmonics, I.F. break-through, etc.

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Let's get started on Band III

AN ENGINEERS' VIEW OF COMMERCIAL TV PROBLEMS

ON most two-band receivers, particularly the type employing a turret tuner, and on a number of single-band receivers which have been adapted to cater for both bands, a common aerial circuit is generally provided to transfer the signals on both bands to the first r.f. amplifier valve. This is achieved quite simply on turret and switched tuners by the automatic connecting in of the appropriate aerial coils.

On receivers using a separate Band III tuner section, and on receivers which are made useable on Band III by means of a superhet converter two aerial input circuits are used, one to provide an input to the Band III signals and the other to provide an input to the Band I signals.

The Ferranti range of two-band sets is typical in this respect, for here is used a fairly conventional Band I 5-channel tuner plus a continuously variable Band III tuner, and either can be put into circuit by means of a simple "Band Changeover" switch.

The arrangement is shown in Fig. 1, where switch S1 functions as "Band Changeover," transformer L1 and transformer L2 as Band I and Band III aerial couplings respectively. It may be seen that either coupling conveys its signal to the first cascode triode V1A according to the position of the switch.

It is interesting to note that the impedance across sockets A and C for the Band III input is 300 ohms and that the circuit is arranged for a balanced feeder. The impedance at the Band I input is conventionally 75-80 ohms and is arranged for coaxial feeder.

On this receiver, however, a common 75-80 ohm coaxial feeder may be employed to carry simultaneously the signals on both bands to the Band I input socket by connecting a shorting link between points B and C on the Band III input socket, as shown by the dotted line on the diagram.

This method, of course, avoids the necessity of running two different feeders, and brings the input circuits in line with those used on turret-tuner models.

Crossover units

It would seem that the general trend is to provide just a single common input socket matched to 75-80 ohm coaxial feeder. This, in certain cases, is

THIS is the concluding section of this important series of articles dealing with servicing and maintenance problems on Band III. Parts 1 and 2 appeared in September and October respectively. Readers are also referred to *Two Band TV Signal Distribution* (July), *Pattern Interference* (November, 54) and *TV in Band III* (May, 1954), all by Gordon J. King. These issues are available from our back numbers department.

most desirable, particularly in areas which are relatively close to the transmitters permitting the use of a dual-band aerial array.

Here it is necessary simply to connect the common feeder to the input socket and let the circuit function of the "Channel Selector" on the receiver extract the required signal from the feeder.

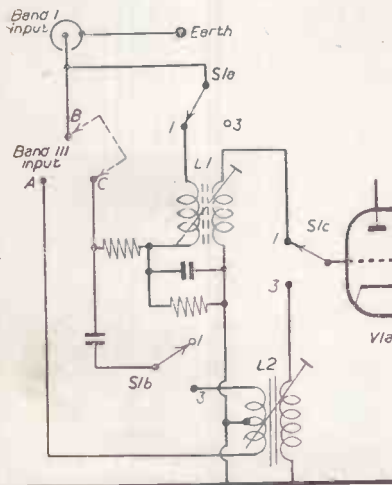


Fig. 1. The aerial input circuits of the two-band Ferranti television receivers.

PART THREE

by

Gordon J. King

A.M.I.P.R.E.



In areas remote from a transmitter the solution may not be so simple owing to the necessity for individual aerial systems on each band. Although it is feasible that pictures on both bands would be received simply by shunting the two aerials together, this method should never be used owing to the resulting impedance mismatch and the interaction between the two arrays, which will detract considerably from the performance expectations of each aerial.

In cases such as this it is highly desirable to make use of a correctly terminated high-pass/low-pass filter to connect the aerials to a common feeder. Filters of this kind (see Fig. 2) are now available from several sources, and are sometimes known as "cross-over units" or "diplexers." From the aspect of connecting two aerials to a common feeder the wiring arrangement is as in Fig. 3 (left).

At least one maker produces a unit for fixing at the aerial mast, which, of course, is contained within a waterproof box. The majority, however, are designed specifically for use indoors. The unit will need to be fixed indoors, or preferably so, if a Band I aerial system is already in existence, for then special Band III low-loss feeder can be used and extra attention given to the Band III aerial installation generally.

If a new two-band aerial system is to be installed it may be a good idea to secure the unit at the mast head to save the expense of two long feeders, but if this method is adopted it is best to use extra low-loss cable for the common feeder.

Conversely, if the receiver has an input for each band and is situated in an area which permits the use of a dual-band aerial, the cross-over unit may be installed in reverse as shown in Fig. 3 (right).

There are, of course, other methods of matching two aerials to a common feeder or two receiver inputs to a common aerial, but they tend to cause considerable signal losses. With a

correctly designed high-pass/low-pass filter unit the signals losses are something less than half a decibel, while interaction between the two circuits is in the relatively high region of 20db.

Band III aeriels

It is not here intended to delve too deeply into the design of Band III aeriels, for in any case, most follow conventional design and are more involved scale replicas of Band I arrays. Owing to the smaller size of the Band III aeriels, however, considerably more elements can usefully be employed than is the case with the larger Band I aeriels. The trend is essentially towards the Yagi array, made up of a dipole, reflector and a number of directors.

On Band I the maximum number of directors is two, constituting a four-element array, but on Band III up to eight directors are sometimes employed, producing a 10-element array.

Since adding additional elements to this type aerial reduces the impedance at the centre of the dipole, an artifice for maintaining a correct impedance match between the dipole and feeder takes the form of folding the dipole. A simple fold has the effect of increasing the impedance by four times, which, of course, effectively counters the reduction in impedance as the result of the large number of parasitic elements.

A Band III array of unique design takes the form of a horizontal skeleton slot arranged to load two five-element vertical Yagi arrays, secured broadside and at right angles to the slot. The ends of the slot may be considered as bent-over dipole elements for the two Yagis, and thus the array is termed a "double slot beam" (J-Beam Aerials, Ltd.). It is loaded to 80 ohm coaxial feeder and it covers all the potential Band III channels; a gain of 14db over a standard dipole is claimed for the combination.

Dual-band aeriels and simple adaptors for making Band I aeriels responsive to the signals on both bands are rapidly gaining favour, and are indeed most desirable in areas where a separate high-gain Band III aerial is not warranted. The adaptors generally comprise a kit of rods and sometimes an extra insulator.

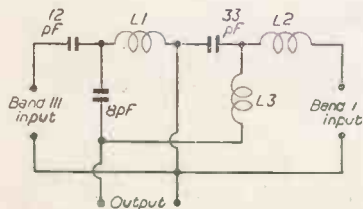
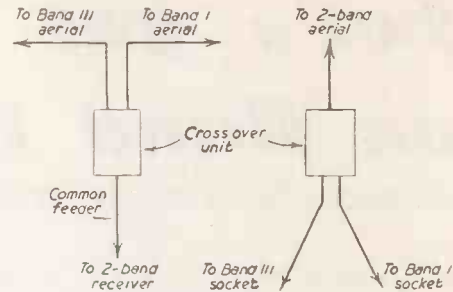


Fig. 2. Circuit of a typical high-pass, low-pass TV filter or "crossover" unit.

Fig. 3
LEFT: Diagram showing how a crossover unit is used with two separate aeriels feeding a receiver having a common input.

RIGHT: Diagram showing how a crossover unit is connected when a dual-band aerial is used with a receiver having two separate inputs.



In certain cases the aim is to get the Band I aerial to operate as a harmonic radiator on Band III, but in all cases it would appear that special attention is given so that the dual-array provides maximum gain at Band III frequencies.

The Belling & Lee adaptor rods are arranged so that they lie parallel with a section of the Band I dipole. On Band III they then behave as transmission lines end-feeding the tips of the Band I dipole elements.

In some cases the existing larger Band I elements and the metal mast are employed as untuned reflectors and thus serve to reinforce the pick-up on Band III. Although some adapted Band I aeriels and dual-band aeriels are designed to pick up the signals on both bands along a common line, a number are arranged so that the relative angle of optimum response between the two sections can be altered, thereby catering for conditions arising when the Band I and Band III stations are differently sited,

Aerial siting

Little can be said regarding the type of aerial necessary at certain distances from a transmitter, this, of course, will depend directly on local reception conditions, governed by the type of country and on how heavily the receiving site is screened.

Simple dipoles will rarely be suitable even in swamp areas, for at Band III frequencies signal reflections and resulting "ghosting" is much more troublesome than on Band I. This may mean, therefore, that even though a simple dipole would be sufficient from the signal pick-up aspect, a directional array may be demanded as an aid to reduce "ghosting."

In fringe areas particularly, where a high-gain Band III array is required, extra special attention to accurate siting of the aerial is essential, for, unlike Band I, misorientation of the order of perhaps five degrees may be sufficient seriously to impair picture quality.

It would seem that some form of communication between the aerial rigger and an operator at the receiver is going

to represent an essential factor for satisfactory installation of Band III arrays. In a large number of cases it will probably be found that siting by a compass bearing is grossly inaccurate when a matter of a few degrees may make the difference between a blank screen and a viewable picture!

A signal strength meter covering Band III frequencies is almost certain to become the chief tool of the aerial rigger's kit; according to the demand that one manufacturer has for such an instrument, this would appear to be no over-statement.

For the engineer-rigger the possibility does exist of using a small rectifier for producing a representative d.c. voltage of the video waveform at the cathode of the picture-tube. The rectifier and associated resistor and capacitor could be mounted in a small box and connected with short leads, and the d.c. output could be taken along a suitable length of twin plastic cable to give an indication on a meter which is viewable when making adjustments to the aerial.

The idea is, of course, to connect the aerial to the receiver and adjust the tuning and contrast controls so that a reasonable indication is obtained on the meter, after which the aerial can be orientated for maximum indication.

Band III converters

As has already been intimated the term converter is generally used to express the fact that the Band III sound and vision signals are altered in frequency by means of an oscillator and a mixer so that they correspond to the acceptance frequency of the Band I receiver it is required to convert.

Since it is essential that the frequency relationship between the converted Band III sound and vision signals remains the same as that between the actual transmitted signals (that is with the vision higher in frequency than the sound), it is necessary for the oscillator in the converter to work at a frequency which is lower than the Band III signals by an amount depending on the channel to which the Band I receiver is adjusted.

The function of the converter is essentially the same as the adaptor which we

have already considered, but the output of the converter is adjusted to a frequency of one of the channels in Band I, as opposed to an output at an intermediate frequency obtained from the adaptor (see Fig. 4).

Converter difficulties

It is with old style t.r.f. receivers that the converter is best suited; indeed, such represents the only method of receiving Band III on receivers of this kind, apart, of course, from completely rebuilding the r.f. sections and altering the coils so that they tune to a pre-determined intermediate frequency, thus permitting the installation of an adaptor.

Unfortunately, converters of this type considered suffer from several drawbacks. The chief of these is undoubtedly the very real possibility of breakthrough of a Band I signal when the converter is actually in circuit and the receiver is responding to a Band III signal. This occurs most severely when the receivers is situated close to a Band I transmitter, although on certain sets it has been known to occur at a distance of some 50 miles from a high-power station.

The breakthrough is in the main the result of pick-up of Band I on the lead connecting the signal output of the converter to the receiver's aerial socket, signal pick-up on the "band-change" switch-gear in the converter itself, and pick-up on the wiring and components of the first stage of the Band I receiver.

Minimising breakthrough of Band I signals

The effect can be considerably minimised by using the shortest possible length of high-grade coaxial to make the connection between the converter and the receiver, and, if necessary, by thoroughly screening the inside of the receiver cabinet; little can generally be done to reduce pick-up on the converter's "band-change" switch-gear, this, in most cases, being purely a matter of design.

Engineers operating close to a transmitter might well imagine the possibilities of breakthrough (giving rise to patterns on vision and whistles on sound) when it is considered that in some locations the Band I sound signal, and in exceptional cases the vision signal as well, can be received without an aerial—pick-up in such cases resulting due to poor receiver screening.

It would seem at present that successful operation of a converted receiver might well be governed by the relative strengths of the Band I and Band III signals in a given district, and on the design of the converter and receiver.

The possibility of heterodyne patterns and whistles must also be considered if a converter is used with a superhet receiver as the result of interaction between the oscillator in the receiver and the oscillator in the converter.

Oscillator harmonics

Such a disturbance may not be caused by a simple beat between the fundamental frequencies of the two oscillators, but may be caused by beating of oscillator harmonics, and even then the resulting signal may not gain admittance to the receiver via its normal acceptance channel, for it is feasible that it may fall within a spectrum corresponding to the receiver's second-channel, or some other spurious channel.

Moreover, a converter reproduces at a different frequency the whole character of the vision signal. Now, quite a number of vintage t.r.f. sets were designed for the reception of double side-band vision signals. They will thus be presented with a single side-band converted Band III signal if adapted for Band III operation by the use of a conventional converter.

While this mix-up may not prevent Band III pictures being received on a set of this kind, it is bound to have an adverse effect on the definition of the the picture, particularly if the converter's oscillator is adjusted for maximum sound, as is normal practice.

Improved definition may be obtained, therefore, by adjusting the oscillator tuning for a compromise between maximum sound and optimum picture quality; in certain cases it may even be found necessary to realign the t.r.f. receiver so that a more suitable overall vision response curve is obtained. The receiver will undoubtedly have to be realigned if adjusted for lower side-band operation.

Band I wavetrap

If it is found that a slight degree of Band I breakthrough cannot be cured by the methods outlined above, it may mean that it is getting to the Band I receiver aerial terminal via the Band III aerial and through the converter.

If this is the case, it can generally be cleared up by installing a wave-trap, tuned to the Band I signals, in the Band III aerial circuit. Some converters embody a circuit of this kind, which should be adjusted for minimum interference when receiving a Band III test card.

In conclusion

In concluding this series I should like to mention that since writing Part I the I.T.A. has started transmissions from Croydon on Channel 9, and I am happy to announce that reports of reception, in my fringe area at least, are more encouraging than even the optimistic results yielded by my initial experiments would have lead to believe.

Entertainable reception is possible on Channel 9 in a number of districts which are notoriously poor so far as Band I is concerned! Also, at some locations where the local field strength due to the low-power Belling and Lee was too weak to resolve even a trace of a picture, the I.T.A. programmes are receivable at entertainable value. In the majority of cases investigated, however, the local I.T.A. signals are stronger than those due to the same district Band I station!

Judging by these results at a distance of 60 miles from the transmitter, it would undoubtedly seem at present that there is going to be very little difference between relative fringe area ranges on Bands I and III. Indeed, in some cases Band III may even provide the better signal, for, apart from local signal strength considerations, the effect of impulsive interference is considerably less on Band III.

Aircraft fading would seem to be more rapid in the higher frequency spectrum, though its disturbing effect on the picture is probably shorter lived. Prolonged comparative monitoring tests reveal only slightly less fading on Band III owing to fluctuating tropospheric conditions.

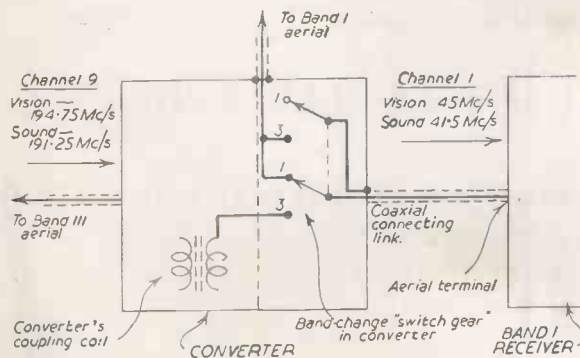


Fig. 4
Diagram showing the connections and band-change switchgear when a Band I receiver is used on Band III by means of a converter.

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Short cut to cleaning TV projection optical units

MANY SERVICING SHORT CUTS ARE UNORTHODOX BUT OFTEN SUCCESSFUL. READERS ARE INVITED TO COMMENT ON THIS CLEANING TIP WHICH HAS BEEN USED WITHOUT SNAGS BY A BUSY SERVICE DEPARTMENT. A SELECTION OF LETTERS WILL BE PUBLISHED NEXT MONTH.

by R. G. Harrison

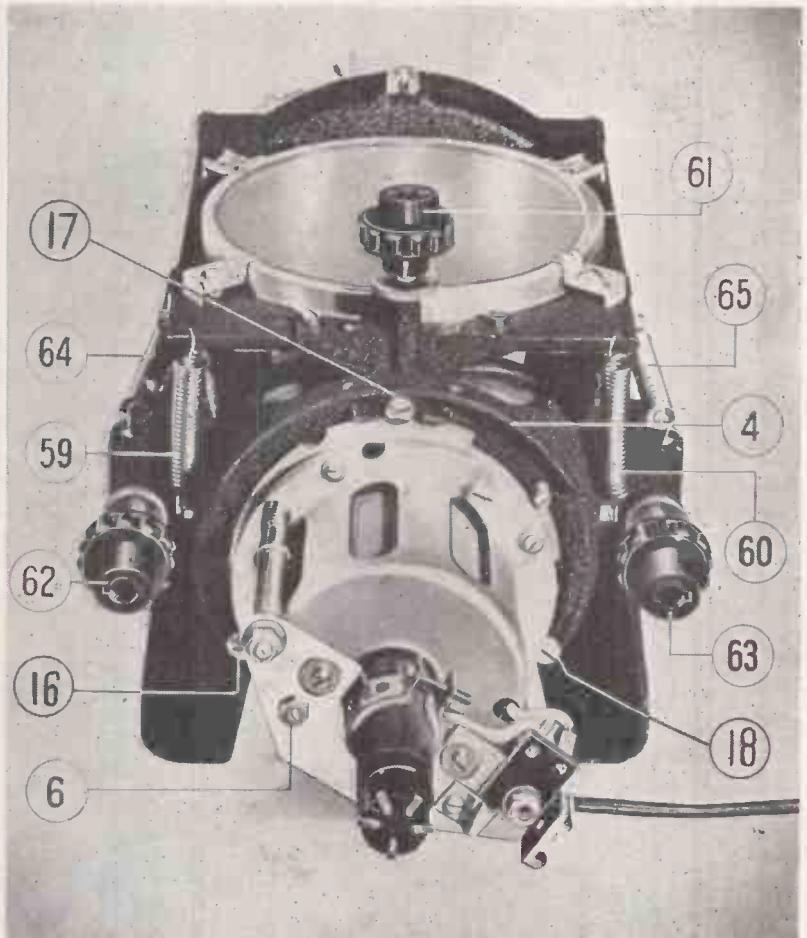
THE method used in our service department in cleaning the optical units fitted to Philips and Decca projection television receivers does not involve any displacement of the corrector lens and it avoids the risk of it losing its purpose in correcting for spherical aberration.

The unit itself is, broadly speaking, in three sections—the deflector and focus coil assembly, the yoke and the main body. The yoke and body are easily separated and access to the interior can be gained by removing the plane mirror from the underside of the unit.

The tube and coil assembly is easily dismantled by removing tube base holder, loosening the screws 16, 17 and 18, turning the assembly slightly clockwise and withdrawing from unit. It is recommended that this be done before detaching the unit from the cabinet crossbar as the top right-hand fixing bolt (of the four used) is then more easily removed.

The unit is then placed on a clean piece of felt and the focus knobs 61, 62 and 63 slackened off and the springs 59, 64, 65 and 66 removed. Then take off the slotted clamps from end of spindles 62 and 63 and the yoke can then be removed from the main body. With the unit upside down it will be seen that the plane mirror is held in position by three clamps, the bottom one of which fits into a notch in the edge of the mirror. Removal of these, and the soft dust-excluder cord, leaves the mirror free to be gently eased up and laid to one side for cleaning and giving access to the interior of the unit.

The spherical mirror and corrector lens can be cleaned by (dare I say it?) breathing on them and rubbing gently with soft cotton wool, changing this frequently. The plane mirror can be treated similarly.



Rear view of the projection optical unit showing key points for dis-assembly and reassembly.

Re-assembly should present no difficulty but the bottom clamp should be watched carefully, otherwise the mirror may be easily fractured. The units are really dust-proof but there is sometimes trouble from what, for want of a better expression, can be called "furniture bloom" which accumulates on the surfaces.

The above may at first appear to be a very complicated method of doing the job, but in actual fact the complete operation can be accomplished in about an hour with the certainty that the corrector lens has not been moved and the consolation that it has not been necessary to remove the lens and struggle to get into the corners through the limited aperture.

The large plane mirror in the cabinet is a different proposition and the "breathing" technique may not be adequate as the accumulation of dirt can be considerable. The remedy is a very gentle rubbing with a small cotton

wool pad moistened with "Stergene" diluted in accordance with the maker's instructions for cleaning glass. Even taking the greatest care, however, cleaning in this way can well cause fine scratches on the surface which will eventually cause a slight but permanent reduction of brilliance and contrast due to the scattering of light.

Re-focussing (mechanical) is no more difficult than if one were fitting a new tube, but care should be taken to ensure that the tube is pulled right up against the deflector coils before starting.

Philips Electrical, Ltd., comment: We feel that the suggested method of cleaning the corrector lens (i.e., by breathing on it, etc.) would be frowned upon by the makers. We ourselves recommend the method given in our manuals. It might also be mentioned that the optical units, whilst used in Philips and Decca receivers, are also used by other makers of projection models, such as Ferranti, etc.



Ferranti Valves for FM/AM Radio Receivers

*The types illustrated are as follows: ECC85, ECH81, EF85,
EABC80, EL84, EZ80, EM80.*



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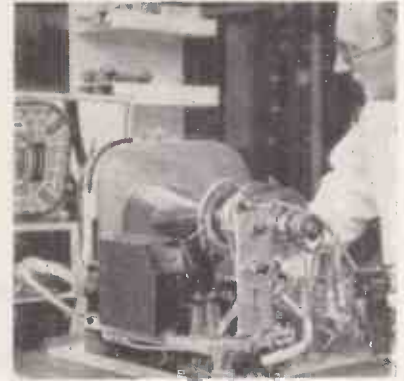
to all the technical gen in this feature, which is your feature, presenting details of faults encountered by engineers in current radio and television sets, and explaining how those faults were diagnosed and overcome. The aim of this feature is to guide

AND HELP

all in the radio and TV trade.

If you have come across any unusual fault in a set recently, write and tell James Huxley, "British Radio and Television," 46 Chancery Lane, London, W.C.2. All published contributions are paid for, and your contribution may help

OTHER ENGINEERS



H.M.V. 1360 *ERT*

Unstable I.F. Stage One of these receivers came in with severe instability. As the receiver was tuned through its tuning range, each station was accompanied by a loud whistle. Obviously the instability was in the r.f. stages. Screen, h.t., and a.v.c. decoupling condensers were checked by substitution without success. Valve and i.f. transformer screening cans were earthed to chassis via a screwdriver, also the tuning condenser. Gradually all possible causes of stray coupling, common impedance, capacitive and inductive, were checked and eliminated, but still the instability persisted.

With all the reasonable possibilities gone, it was decided to try other methods. First, the frequency changer and the i.f. valves were replaced, and with the substitution of the latter, the instability disappeared. The old valve was again fitted to make certain, and sure enough the trouble reappeared. This valve was checked on the tester, but read perfectly. Why it should introduce instability by itself, is something of a mystery.—V.D.C., Bristol, 5.

Champion 784

H.R. Chassis Point One of these receivers was brought in with the complaint of weak signals, but on test it was found that all voltage and current readings were in order. And then, while holding the chassis upside down, a sudden burst of loud signals broke through—only to vanish again when the receiver

was replaced on the bench.

Suspecting dry joints or intermittent contacts, the receiver was thoroughly investigated, but to no avail. The fault was finally cured by adding an extra lead from the tag to which the r.f. filter capacitor was soldered, to one of the chassis bolts. The tag was held in position by a steel self-tapping screw below the speaker magnet through the capacitor clip to frame, but this had evidently become oxidised and so produced a h.r. joint.—J.T.R., Leeds, 7.

Pye VT7 *ERT*

Faulty Anchor Pin This fault has occurred several times on these receivers, although it could equally well happen on other sets using the same c.r.t. The trouble is low brilliance. Sometimes a reasonable picture can be obtained,

with fair brilliance, but it lacks sparkle and cannot be turned "over the top" by advancing the brilliance control.

The c.r.t. used is the MW43-64. This has a duodecal 12-pin base (although some of the pins are not used and therefore omitted), and pin 7 is a blank. This has been used in this receiver as an anchoring point for other components, but sometimes, this blank pin develops a short to pin 10 which is the accelerator anode. Thus the accelerator voltage is greatly reduced. A simple cure is to move the anchored components to another blank pin, when the brilliance will return to normal.—V.D.C., Bristol, 5.

Invicta T126, Pam 750

Thin Insulation Both of the above models have recently been encountered with the same rather unusual fault, and as this is a new range of receivers it is felt that this early trouble is worth reporting. Both receivers came in with no picture, no e.h.t., but satisfactory sound. In checking for the cause of the absence of e.h.t., a comparative "ringing" test carried out with an oscilloscope on the line output transformer primary showed that it was o.k. against a new transformer. Further investigation showed that the line scan coils had developed a 2MΩ leak to the frame coils—replacements cured the trouble.

The insulation, being polythene, looked good but the trouble we think is due to the insulation being too thin on these coils.—R.B.V., Bournemouth.

(Continued on page 627)

Write to James Huxley

on Service Department matters, and pass on all the hints and tips and dodges that you have found useful in dealing with day-to-day service problems. Articles on all subjects of technical service interest are welcomed. All published contributions are paid for.



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TECHNICAL GEN

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Some Recent Faults

Cossor 512

This particular Melody Minor came in with the complaint of severe hum and distortion, this appearing after the set had been running for about ten minutes. Replacement of valves provided no cure and the smoothing capacitors were satisfactory.

It was finally found that in manufacture the heavy duty smoothing resistor in the h.t. line had been fitted lying alongside the feed to the volume control and on heating up it expanded sufficiently for hum to be picked up on the volume control lead. Separating the components cured the trouble.

Another fault encountered recently on Model 501 is fluctuating volume. This was due to the 0.005µF coupling capacitor to the volume control going o/c intermittently.—R.L.W., Glasgow, S.3.

Ekco T196 ERT

Common E.h.t. Fault

Several sets of this type have been brought in for service with the same fault. The symptoms are; no e.h.t. and the anode of the boost diode glows red!

The heater of this valve is fed from a special winding on the mains transformer to prevent electrical stress between the heater and the cathode which is at high potential. The heater winding, however, has a habit of developing a low resistance leak down to the transformer core. This puts the heater at ground potential, and the cathode quickly follows, with the above symptoms resulting.

A way to prevent future breakdowns due to this cause, is to have the transformer wound with mica insulation between the boost heater windings and the other windings. This has proved a permanent and complete cure to all sets so treated.—V.D.C., Bristol, 5.

Marconiphone VT59DA

Open Circuit Choke

The symptoms of this elusive fault were erratic line hold and a slightly weaker picture than usual.

Sound was normal. In checking the h.t. supply it was found to be rather low and the metal rectifier was changed. Although the h.t. was improved, the fault still persisted.

A check of the sync separator circuit revealed nothing conclusive, but the sync pulse output was weaker than usual as was the input from the video amplifier. It was in this latter stage that the

Service Briefs

English Electric 1550: Frame folded up at bottom and impossible to stop frame jumping unless height reduced considerably—even then, frame hold very critical. Voltages on V18, frame output, high on cathode and anode and positive voltage on grid due to leak in C69 coupling capacitor.—R.H.L., Newcastle.

Marconiphone VT73DA: Severe distortion and boomy sound is often due to the 3.3MΩ resistor connected between noise suppressor crystal and h.t. positive. It goes high, sometimes to 10MΩ. Similar effect may result if resistor between the crystal and earth goes high.—L.K.C., Birmingham, 19.

Alba T321: Cramping on right of picture, valve replacements to no avail. Fault due to 10kΩ resistor in parallel with linearity coil going open-circuit. Fault also encountered due to this resistor dropping in value to 600Ω. Presume that first resistor became o/c during the unsoldering necessary before it could be tested.—C.A.F., Clydebank.

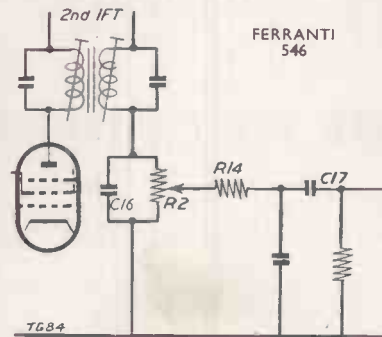
fault was found. The video correction choke in the grid circuit was completely o/c, the capacitance across the choke being sufficient to couple the signal. Since there is no high voltage across this component and it is wire-wound it was considered rather strange that it should go open-circuit. The set was a year old.—R.L.W., Glasgow, S.3.

Ferranti 546

Leak Causes Crackles

Persistent crackling on this receiver proved rather unusual and difficult to pinpoint. The symptoms

pointed to the second i.f. transformer, which was removed from the chassis for inspection. The fault proved to be a



leaky 300pF capacitor reading about 500kΩ. Marked C16 on the circuit diagram it is used for i.f. decoupling.—H.F., Belfast.

H.M.V. 1825

No Line Output

The fault was a "dead" line output stage, the line output valve (an N152) not lighting up though the remainder of the valves glowed normally. The heaters in this model are wired in a series chain.

A check was made on the wiring to the valve base for a possible short circuit, but none could be found. On closer examination of the N152 a small crack was observed in the glass near the anode; this, apparently, had destroyed the vacuum, though the heater wiring provided continuity for the heater chain.

A further example of the same fault was encountered on a Ferguson 99T (the valve being a PL81). In both cases the valve had been in use just under a year.—P.M., Birmingham, 11.

Ferguson 992T Series

No Boost Volts

On the above model the picture was just visible and no more. When the aerial was removed no raster could be obtained. On checking it was found that the h.t. boost voltage was the same as the h.t. line voltage—an accessible point for checking this voltage is on the first anode of the c.r.t. The fault was eventually traced to the boost line smoothing capacitor C30 (0.01µF); it was short circuited. This, incidentally, has become quite a frequent fault on these models.—J.G.H., Glasgow.

Ekco TC140

E.h.t. Break-down

A relatively common fault encountered on this receiver after it has been in service for a period of years is that of e.h.t. failure coupled with the sound of arcing from the line output transformer. If the transformer is removed and its screening can detached, it will be found that the e.h.t. rectifier heater winding insulation has broken down.

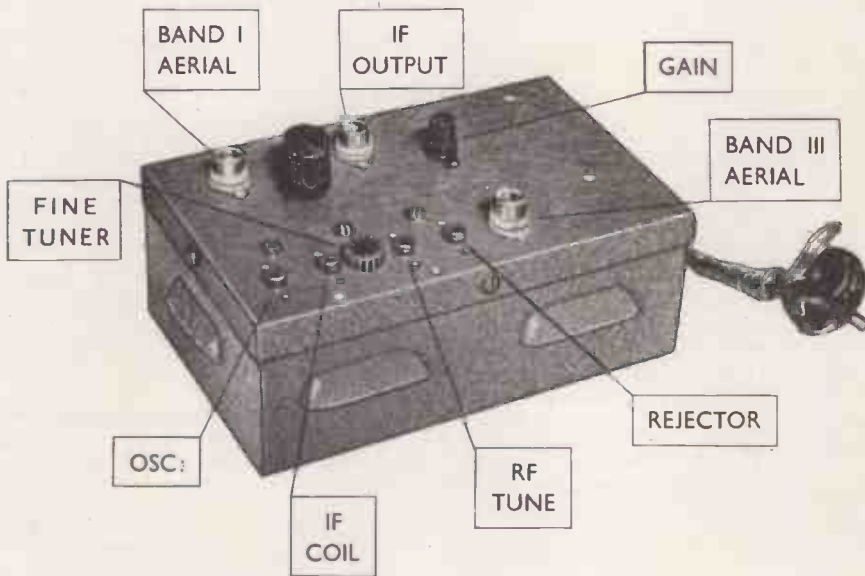
By replacing the paper insulation underlying the winding by means of polythene strip and replacing the e.h.t. winding itself, a complete cure is effected.—H.A., Lincoln.

(continued on page 629)

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R.G.D. 6017T

Delayed Action Picture

Complaint was "no picture." Upon examination it was found that there was e.h.t. and that all volts were normal on the tube base. Beam current was checked and found o.k. Some ten minutes later a dim picture appeared at the top of the tube and unfolded slowly downwards to about halfway, when it ceased to expand.

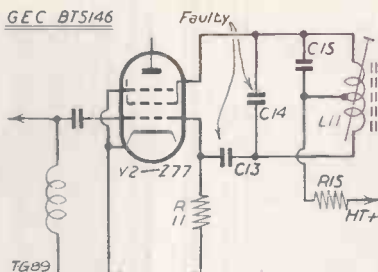
This gave a clue and the chassis was stripped from the cabinet and the tube removed. The latter was cleaned and the chassis, showing signs of damp, was dried conveniently in a large cooker oven.

On reassembly, the set worked well and it transpired that it had been standing idle for nearly four months, while its owner, a farmer, had been taking advantage of the fine weather!—R.E.J., Llanrwst.

G.E.C. BT5146

Slow Oscillator

This receiver came in for service with the complaint that it "took a long time to warm up"—or, in more accurate terms, it took a long time to start functioning after switching on. On test it was observed that both sound and vision appeared together after several minutes, although the abnormal delay only occurred when switching on from cold. Once the receiver had started operating, switching off and on again within two or three



minutes gave normal delay between sound and vision

Obviously the fault was in the first three stages, common to sound and vision, and as the oscillator seemed the most likely offender this was checked first. It was found that both the 8.2pF Ceramicons in the oscillatory circuit were intermittently open-circuit, and when these were replaced and the oscillator realigned no further trouble was experienced.—F.J.M., York.

Pye VT4

Brushing on Screen

We have recently had one of these sets in for service with severe brushing on the right-hand side of the picture. At first we anticipated the line output transformer to be at fault having had to make many replacements previously for what appeared exactly the same fault. Components were generally checked in the line output stage, including the removal of the dust cores of both the width and linearity controls (as a temporary measure) as experience in the past has taught us these cores can cause a very similar effect. (See page 178, *B.R.T.*, July, 1954.)

The operator now considered the scan coils as almost every other con-

ceivable test had been made. These were changed and the fault was cleared.

A useful test in order to save labour in changing the line output transformer is to place, say, a 100pF variable trimmer across one half of the scan coils; if the brushing can be moved from one side of the screen to the other by the variation of the trimmer one can safely assume the fault lies in the scan coil assembly, as ours did.—J.G.K., Exeter.

Cossor 917

Severe E.H.T. Arcing

A chassis came in for repair with a complaint about excessive "snow." Inspection of the chassis quickly revealed that the thick e.h.t. cable from the line transformer to the tube cap touched the line output valve, Type 302 THA. This has an aquadag coating around the top cap, and arcing was visible between the aquadag and the e.h.t. cable, which was severely charred.

The cable was changed and the set re-tested. It seemed satisfactory and was set aside to "soak." During this period there appeared intermittent bursts of "snow," which could not be encouraged by probing or tapping. The e.h.t. connections to the line transformer and the tube were carefully re-made, and the connections to the e.h.t. reservoir needed re-soldering in case a dry-joint or "points" of solder were originating corona discharge.

This capacitor was fairly inaccessible beneath the neck of the tube, so was removed from its holder for the connections to be rounded off. The capacitor was a tubular type with mica insulation, and this seemed to have "grown" out of the e.h.t. end of the

(continued on page 635)

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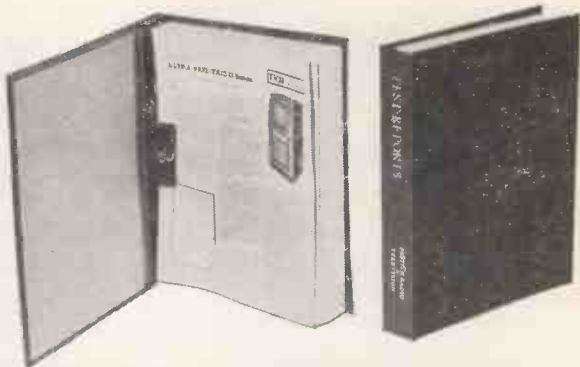
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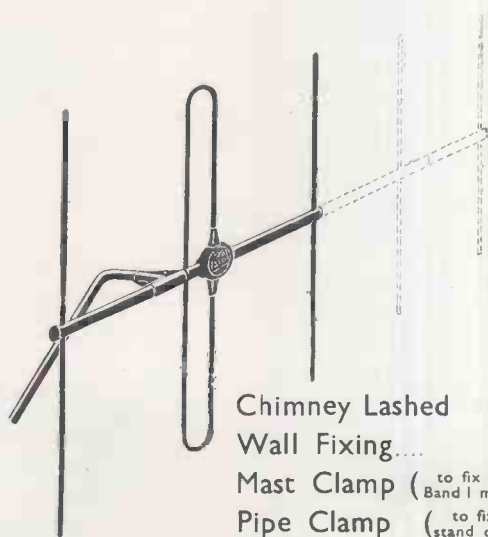


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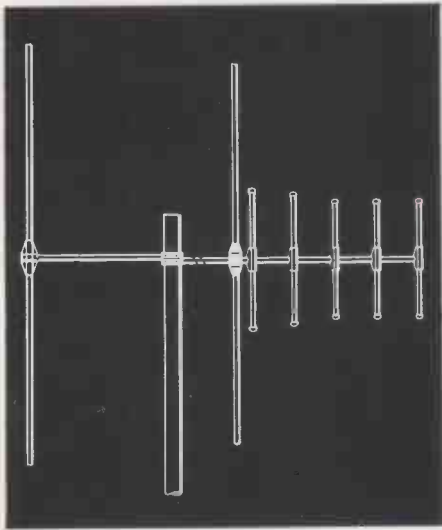
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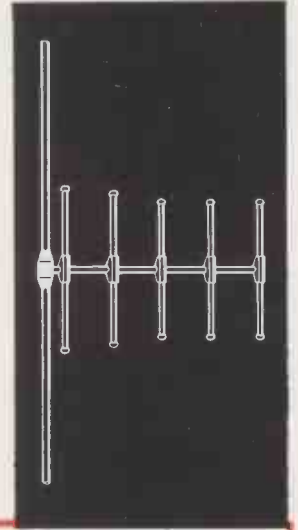


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TECHNICAL GEN

Continued

capacitor to form a slight cone effect. There were no visible signs of leakage or burning, but a new one was fitted.

The fault disappeared on re-test, so the capacitor was assumed to be faulty; moisture had probably penetrated between the insulation, causing swelling which had forced the outer layer away from the centre.

An oil-filled type was fitted and special care was taken to isolate from chassis the securing bolt, as this connects to the earthy end, which is taken to the cathode of the boost rectifier (at a positive potential).

The jaws of the securing clip for the previous capacitor were forced together to hold the new one firmly—a layer of insulation tape made a more secure fit, and no traces of "snow" were observed on prolonged test.—K.L.C., Birmingham 19.

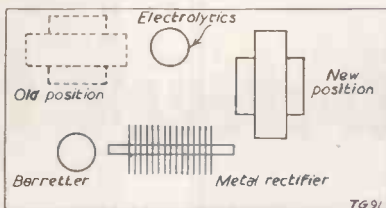
English Electric T40

Curious A fault which gave some **Vibration** trouble on one of these **Effect** sets was barretter failure.

A few weeks after a new barretter was fitted, this, too, went open-circuit. An intermittent heater-cathode short in one of the valves was suspected, drawing heavy current through the barretter, causing its failure, but extensive testing along these lines failed to bring any results.

It was then noticed that part of the resistance wire in the barretter was

violently vibrating. As it is situated alongside the smoothing choke, the cause was obviously an a.c. field from the same. After much experiment, the choke was moved from its old position to another part of the chassis. It so happens that there are fixing holes of



ENGLISH ELECTRIC T40

the right distance apart, at the other end of the chassis and the leads which go to the large condenser are long enough to reach if passed through one of the several holes near the new choke position. This set has since given no trouble from barretter failure.—V.D.C., Bristol, 5.

Ekco T221

Trouble Three of these came in **with** recently with the same **Sound** complaint—a large background hiss to the sound,

and one case was said to lose the sound after some two hours.

On test, the picture remained unchanged, ruling out oscillator drift, and attention was directed to the sound i.f. transformers. In each case L17 and L18 (Ekco manual) required adjustment. It was noticed that in this model the r.f. chassis and com-

ponents became very warm, and after a couple of hours the heat became considerable.

None of the cores had any sealing device—a piece of rubber band did the trick and no drift could be observed after a good soak test.—R.E.J., Llanrwst.

Lane Mk. IV Tape Recorder

Low This recorder was brought **Replay** in with the report that it **Volume** had been in use only a fortnight and volume was very low. All valves were tested and found to be in good order. Next a check was made on voltages at the valve pins and no snags were found. Another loudspeaker was wired in but volume was still poor. Coupling condensers were next examined as were grid and cathode resistors and condensers but these too were found to be satisfactory. A complete new set of valves was then tried but with no improvement.

After further tests which included going over volume and tone controls, checking the working of the bias oscillator and examining the erase head it was decided to examine the replay head and this proved to be the cause of low volume due to a heavy deposit of iron-oxide powder from the tape. As the recorder had only been in use for a few days we did not suspect this to be causing the trouble.

On this model when the tape is running "fast forward" or "Rewind" the pads are held off the tape if the switch which carries the pinch wheel is kept in the middle position but if the

(continued on page 637)

Photo-cells for Valve Testing

IN order to facilitate valve life testing, the M.O. Valve Co., Ltd., London, W.6, have introduced a photoelectric system which enables accurate results to be obtained without the constant full-time supervision formerly required. It is now widely used throughout the works for testing transmitting valves. G.E.C. photocell equipment is used.

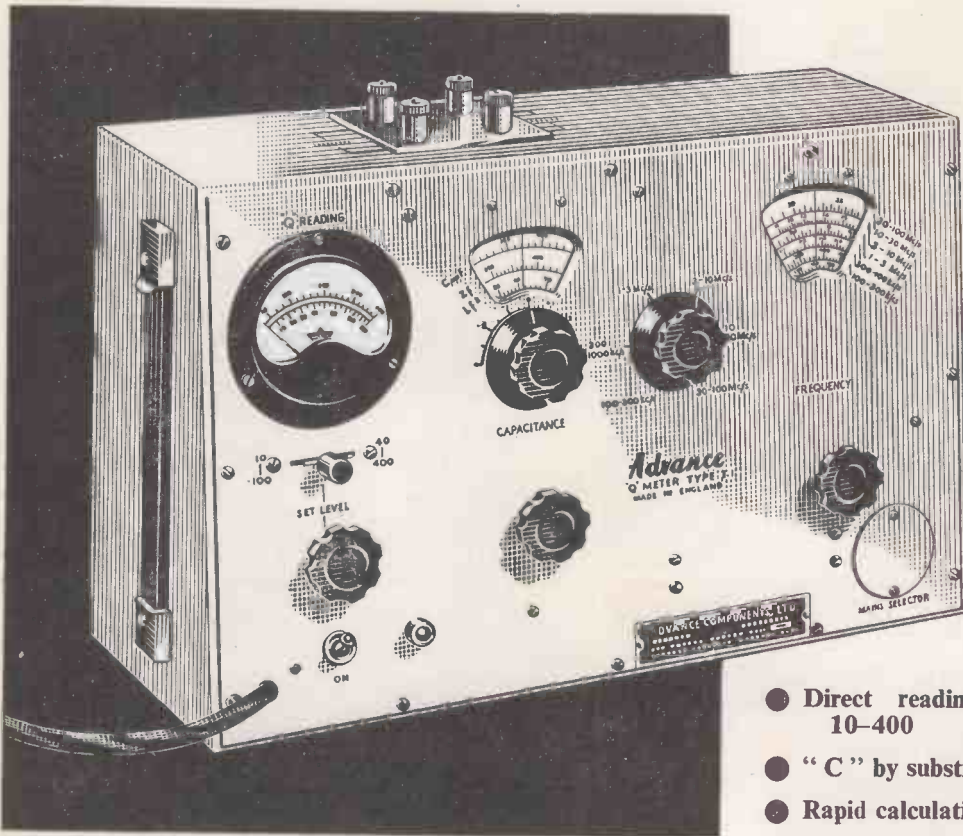
The valve is subjected to a prolonged test under overload conditions, the output being employed to illuminate a tungsten lamp, which actuates a photoelectric device. This is so adjusted that when the valve output falls below the required standard and the tungsten lamp in its turn fades, the resulting variation in the photoelectric signal, after amplification, switches a relay. The relay then operates a timing device which records the number of hours run.

The photoelectric device has the additional advantage that it automatically cuts off the supply in the event of a component failure in the valve under test: such a failure immediately puts the circuit out of tune, thereby extinguishing the lamp and dissipating the whole load in the valve anode. Consequently the valve is not severely damaged and is available for examination.



The output from the 50-watt DET18 triode valve under test, centre, illuminates the tungsten lamp, right. When the output, at the end of the test, falls off the lamp fades and causes the photoelectric device, left, to operate a timing device which records the number of hours run.

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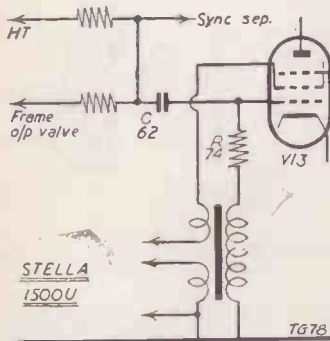
switch is held too far forward the pads press on the tape while it is running fast. This causes a deposit on the heads which we removed by using a soft brush dampened very slightly with switch cleaner. The customer was advised to see that the pads were not bearing on the tape while in the fast-running position.

The moral of this story seems to be—start at the beginning—and when servicing recorders always clean the replay head but be very sparing with the fluid used—some makers recommend carbon-tetrachloride (or Thawpit) and others methylated spirit.—J.S., Blyth, Northumberland.

Double TV Trouble **Pye B18T**
This set was sent in for servicing with the following symptoms on it: short line, short frame, and loss of focus. This was very misleading as it pointed to trouble in the h.t. supplies. The trouble was eventually traced to the line oscillator anode load resistor having gone high in value. Replacing this cured the short line and lack of focus, still leaving a short frame which was traced to the frame oscillator (EF50) having low emission. Replacement cleared the fault.

Some time was wasted looking for low rail volts before it was realised that this was a double fault.—H.G.P., London, N.W.3.

Poor Line Hold **Stella ST1500U**
This receiver was brought in with unstable horizontal hold, the control having to be readjusted every time the set was switched on and when it was locked the top of the raster



showed severe tearing. The fault was traced to the sync separator/line oscil-

lator coupling condenser C62 (10pF) which had developed a leakage. Replacement cured.—S.H., Wigton.

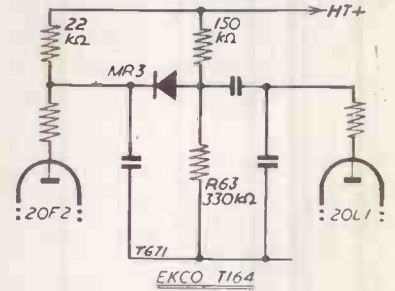
WHEN SENDING IN REPORTS TO JAMES HUXLEY FOR TECHNICAL GEN . . . please write (or type) on one side of the paper only, leaving space between the lines for editorial use and add a rough sketch where possible.

Long Waves Poor **Bush BPI0**
Routine test was carried out and as the defect was centred on the long-wave band our efforts were concentrated on same, including replacement of fixed oscillator capacitors, frame aerial, etc.

Having exhausted all normal checks, we came down to components that would effect both wavebands. At last it was found that the secondary windings of both 1st and 2nd i.f. transformers had risen in value from 17 ohms (maker's sheet) to some 42 ohms. Replacement of both transformers cleared the fault. We did, however, find that the medium wave results had improved considerably after replacement.

The writer would point out that long-wave reception before replacement was almost inaudible while medium-wave was quite reasonable.—J.K.G., Exeter.

Shaping Circuit Trouble **Ekco T164**
Symptoms were unstable frame with critical though positive frame hold. At first the small rectifier in the shaping circuit was suspected. This can often be checked by bridging it with a 0.0μF capacitor, but in this case the trouble was found to be R63 having decreased in value to below 100kΩ.



A useful tip on these receivers when no replacement of the rectifier is immediately available is to increase R63 to about 1 MΩ for a firmer frame lock.—H.W.H., Bargoed.

The Art of Installation—continued

In the older models this control could be used to balance the picture at about two-thirds contrast and then ignored, but with a.g.c. systems the correct setting-up procedure laid down by the manufacturer should be followed.

Generally, it is better to advance the sensitivity as much as possible, whilst avoiding overloading and sound-on-vision symptoms, keeping the contrast down for picture balance.

When it is necessary to retune a receiver, this should be done with the sensitivity turned down. The oscillator should first be tuned for maximum sound, then readjusted slightly for optimum picture resolution. R.f. and aerial circuits should be adjusted for best picture—and this is not always the brightest.

Focusing

Focusing should not present any difficulty as long as it is remembered that picture focus with the scanning system employed at present must of necessity be a compromise. If the focus control is set so that objects in the

centre of the picture are sharply defined, little more can be done.

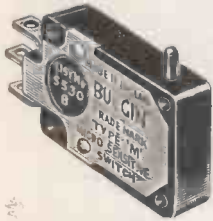
It may be necessary to reset an ion trap occasionally. The arrow on the magnet should lie over the line on the tube, pointing forward, or diametrically opposite the marked line, pointing rearward, and the magnet slid forward until a point of maximum brightness is reached. It may be rotated slightly to reach maximum, but should not be used to cut out shadowing at corners of the picture.

The Aerial

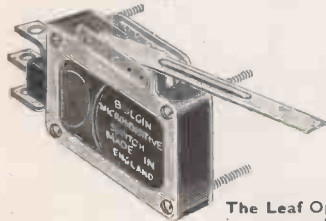
Aerial erection is an extremely important aspect of television installation but one which does not come within the scope of this article. It need only be mentioned that all efforts should be made to get as good a picture as is possible. Siting of the aerial can be a tedious and exasperating business, but well worth the effort involved.

“Well worth the extra effort.” That is the key to efficient installation. If it is at all possible to better a picture the honest service man will make that extra effort.

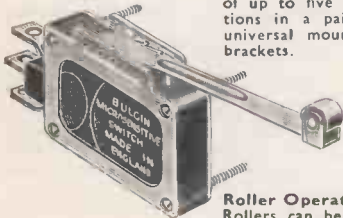
The BULGIN MINIATURE MICRO SENSITIVE SWITCHES



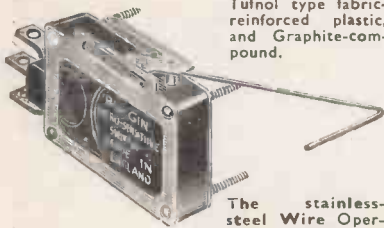
The Miniature ("M") Model. Small, yet highly rated, it can be relied on for over 500,000 operations, due to the finely tempered Beryllium-copper springs and pure silver contacts.



The Leaf Operator is a useful & adaptable drive-lever. Made of highest-grade "Nickel-Silver," it pivots to a choice of up to five positions in a pair of universal mounting brackets.



Roller Operators. Rollers can be had in: Stainless Steel, Brass nickel-plated, Tufnol type fabric-reinforced plastic, and Graphite-compound.



The stainless-steel Wire Operator finds many uses, especially in coin-vending and automatic-counting machinery to equipment.

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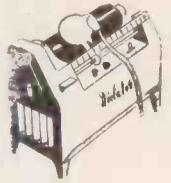
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Safety-Snap-Release to open rollers, or cut out current, swiftly and safely. "Bakelite" case makes this switch ideal for this use because of its excellent moisture resisting qualities.



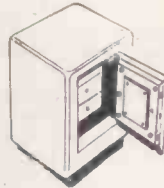
DICTIONARY EQUIPMENT

These Miniature Switches have many uses on equipment of this type, either incorporated in the machine, or in the foot or hand switching.



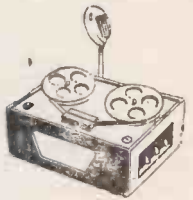
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Wired up to an alarm device, either aural or visual, this switch provides sure and unobtrusive switching. Usually concealed in the door, framework or drawers.



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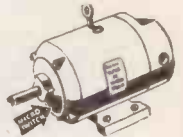
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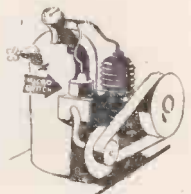
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The Decibel

its use and practice

by J. Dalton, AMIEE

ORIGINATED by the line communication engineer, the simplicity and advantage of the decibel system soon commended itself to the radio engineer with the result that its use is now widespread throughout all the various branches of radio engineering. Amplifier gain, loss in attenuators and lines, microphone outputs, image-ratios, noise levels, selectivity and frequency response, are all expressed in decibels. It is therefore desirable for the service engineer to possess a good working knowledge of the use and limitations of the decibel notation.

Being a logarithmic system, it seems to present some difficulty to many servicemen although the applications are quite straightforward and involve little more than looking up a particular number in the logarithmic tables.

Definition

The decibel is defined as ten times the logarithm to base ten of the ratio of two powers and is expressed mathematically as

$$10 \log_{10} \frac{P_2}{P_1}$$

Suppose for a particular amplifier the power ratios between input and output is twenty to one. Then the gain in decibels may be calculated quite simply as

$$10 \log_{10} \frac{20}{1}$$

$$= 10 \times 1.302 \text{ (from the tables)} \\ = 13.02 \text{ decibels.}$$

If this were an attenuator with a loss ratio of twenty to one the logarithm would still be the same, being expressed as

$$10 \log_{10} \frac{1}{20}$$

which is equal to

$$-10 \log_{10} \frac{20}{1} = -13.02 \text{ db.}$$

Alternatively, we could find the logarithm of $1/20$ that is $\log 0.05$. This gives a negative characteristic -2 plus a positive mantissa $.6990$. The addition of these two numbers equals -1.3010 and therefore

$$10 \log 1/20 = 10 \times -1.3010$$

which is -13db as before.

A change of power can also be ex-

ratio between input and output it would be necessary to multiply together the individual power ratios whereas if each ratio is expressed in decibels only simple addition is needed.

Logarithmic Basis

A further reason for the use of decibels arises from the aural properties of the human ear. Suppose an amplifier is providing a one watt output. If this is increased to two watts it will scarcely be noticeable to the listener and a ten watt output will be necessary before it appears that the impression of the magnitude of the sound has been doubled. The ear thus appears to operate upon a logarithmic basis, a one decibel change in level being the smallest change in sound intensity perceptible to the ear.

Voltages and Currents

Power in watts is equal to I^2R or V^2/R . Provided the resistances at the input and output are the same the gain or loss in decibels may be expressed as

$$\pm 10 \log_{10} \frac{I_2^2}{I_1^2} \text{ or } 10 \log_{10} \frac{V_2^2}{V_1^2}$$

and these are equal to

$$20 \log_{10} \frac{I_2}{I_1} \text{ or } 20 \log_{10} \frac{V_2}{V_1}$$

It is necessary to be quite sure that the resistances are equal otherwise misleading and sometimes, ridiculous results may be obtained such as a high-gain amplifier with a low impedance output giving a loss instead of a gain.

For example, consider an amplifier having an input of one volt across one megohm and an output of one volt across one ohm. If the resistances are ignored there is no gain, whereas the

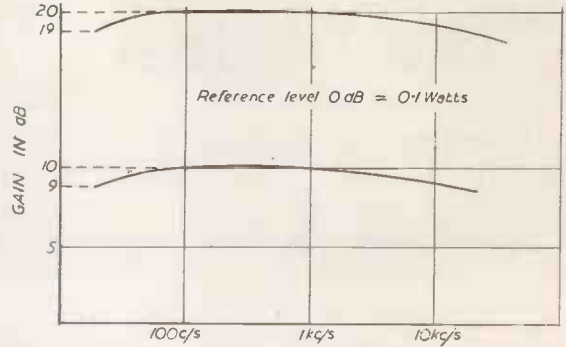
db One of the most widely used and least understood units of radio, audio and television theory is the decibel. Because it is based on the logarithmic system, it often presents difficulties to the service engineer. Yet, as explained in this article, the decibel system is quite straightforward and involves nothing more complex than the ability to use logarithmic tables. All engineers will find this article, which may appear at first glance to be rather academic in treatment, of first rate practical interest and value.

pressed in decibels. If in the previous example the amplifier supplies an output of one watt and the input is then increased until the output is equal to two watts, the increase in power will then be in the ratio of 2:1 which from the tables can be expressed as 3.01db.

In the case of a single stage amplifier it would be quite satisfactory to express the gain as a simple power ratio instead of using decibels, but this is much more difficult when a chain of amplifiers and attenuators is being considered as in Fig. 1. In order to obtain the power



Fig. 1. Block diagram of amplifier and attenuator chain. Input/output ratio = $52.4 \times 0.24 \times 36 \times 0.01 = 4.53$. In decibels, input/output ratio = $17.193 - 6.198 + 15.562 - 20 = 7.294 \text{ db} = 4.53$.



true power gain would be obtained by noting that

$$\frac{P_2}{P_1} = \frac{V_2^2}{R_2} \div \frac{V_1^2}{R_1} = \frac{V_2^2 R_1}{V_1^2 R_2}$$

$$= 20 \log_{10} \frac{1}{1} + 10 \log_{10} \frac{1,000,000}{1}$$

$$= 20 \times 0 + 10 \times 6 = 60\text{db.}$$

In practice the decibel is frequently used for calculating voltage ratios even though it is by definition the logarithm of a power ratio. This is because in many amplifiers we are really more concerned with voltage than power gain and simply $20 \log_{10} V_2/V_1$ is used without any consideration of input and output impedances.

In such cases, however, some symbol to show that a change has been made from power to voltage should be adopted. The abbreviation dbv. has been suggested but unfortunately is rarely used in practice.

Reference Levels

The decibel is fundamentally a unit of power ratio and not of absolute power but if we express the gain or loss in decibels, with reference to some particular power, then we can obtain the actual power output. A number of standard reference levels may be encountered and one that is often used in this country is one milliwatt. Thus if an amplifier has a gain of 20db with reference to one milliwatt then the power output is calculated as shown.

$$20\text{db} = 10 \log_{10} \frac{P_2}{1\text{mW}}$$

$$2 = \log_{10} \frac{P_2}{1\text{mW}}$$

Now the anti log of 2 is 100.

$$\text{Therefore } 100 = \frac{P_2}{1\text{mW,}}$$

whence $P_2 = 100\text{mW}$

Another form of reference level is often used with microphones and is an example of the misleading practice mentioned previously. In this case 0db usually refers to a level of 1V. If a microphone is therefore rated at

Fig. 3. (Left) Response curves on linear gain scale. The percentage drop at "X" compared to "Y" is the same in both cases, though not directly apparent. (Right) The same response curves on a decibel scale gives better comparison of levels.

-60db with reference to one volt the output voltage is given by

$$-60 = 20 \log_{10} \frac{V_1}{V_2}$$

$$\text{Anti log } -3 = \frac{V_1}{V_2}$$

$$= \frac{1}{1,000}$$

Therefore the output voltage = 0.001 volts.

Further Uses of Decibels

Most engineers are only too well aware that decibels come into most computations connected with radio, TV, and audio, from amplifiers to TV response curves, and from coaxial cable characteristics to aerial polar diagrams.

Decibels are frequently used in plotting response curves where both the gain and the frequency are on a logarithmic basis. This has the advantage that the same distance is occupied on the frequency range from 0 to 100 c/s as that from 1,000 c/s to 10,000 c/s, and thus provides a suitable graph of the response at very low frequencies. If the curve were plotted on a linear frequency base 0 to 100 c/s would be cramped into such a small space that any attempt at comparing gains at, say, 50 c/s and 100 c/s would be impossible (Fig. 2).

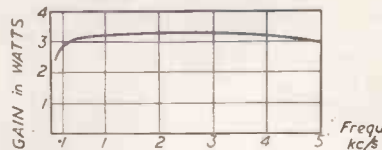


Fig. 2. Linear frequency scale causes cramped characteristic at low frequencies.

In some cases the response at 1,000 c/s is taken as the reference level of 0db, gains at other frequencies being expressed as db above or below 0db. This gives a very fair method of comparing response curves of several amplifiers.

If a voltage or power scale is used and a wide variation in amplifier gains obtained, it would be difficult to compare response curves because a lower gain amplifier would appear cramped on the scale (Fig. 3).

Selectivity

Another type of response where the decibel is used is the selectivity curve of a receiver. By this method a standard output is obtained with the receiver tuned to a particular frequency. The

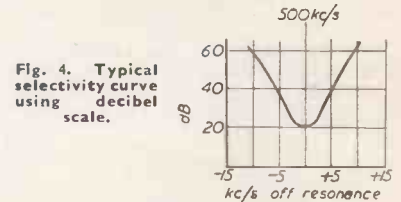


Fig. 4. Typical selectivity curve using decibel scale.

frequency is then varied in steps and the input from the signal generator increased until standard output is again obtained. In some signal generators the output is calibrated in decibels so they may be plotted directly on the graph (Fig. 4).

From the foregoing it will be apparent that the use of decibels is widespread in radio work and for all normal purposes a straightforward application of common logarithms should quickly obtain the ratio of input to output or the actual power output where a reference level is given. If such ratios are frequently required it is worth while preparing a suitable table from which the conversion, from decibels to power ratios and vice versa, may be obtained.

W. H. HELLYER DISCUSSES

The Art of Installation

PRACTICAL POINTERS TO EFFECTIVE TELEVISION INSTALLATION

ONE aspect of a television engineer's work that is too often neglected is the initial installation of the receiver. All too frequently, we find sets tucked away in murky corners, connected in a way that is seldom efficient and often dangerous, displaying a picture which must be a constant strain to nerve and eye. A little extra trouble at the outset will reap its reward in goodwill—and keep down service calls.

Installation should begin before the receiver leaves the shop! Nothing is more disconcerting than a set which exhibits faulty symptoms when first switched on at the customer's house.

Valves do fail, unfortunately, and important connections choose to come asunder in transit. Such small matters can usually be put right before the set is delivered. Initial adjustments should also be made before delivery and the scope of the various controls tested.

Delivery of the receiver is a point which could often be better attended. To the customer, his receiver is the only one that matters, not just one of a bunch. Moreover, it usually represents a goodly chunk of his salary! Treat it with care—even with fussiness. It never hurts to leave a good impression.

The positioning of the receiver depends, of course, on the customer's whims and general layout of furniture. However, if the place chosen is obviously unsuitable a little expert advice may be needed.

Siting

The set should be sited at comfortable viewing level in a position that affords a clear view to all. Try to avoid a position which causes mother to roast by the fire while father freezes in the doorway!

If it can be arranged that no direct light falls on the screen, so much the better, but it is advisable, for comfortable viewing to have a small light shining. The best position for this is slightly above and behind the set and the illumination should be indirect and subdued.

Ventilation is another problem often overlooked. The manufacturer usually stipulates a minimum clearance of several inches behind and around the receiver. The customer should be discouraged from draping the set with a shroudlike covering. The importance of adequate ventilation should be stressed.

THE IMPORTANCE OF GOOD INITIAL INSTALLATION CANNOT BE OVERSTRESSED. IT SHOULD, IN FACT, BEGIN BEFORE THE RECEIVER LEAVES THE SHOP. IN THIS ARTICLE THE AUTHOR OUTLINES THE MAIN FACTORS WHICH THE SERVICING MAN SHOULD BEAR IN MIND IN ORDER TO MAKE THE BEST POSSIBLE JOB OF INSTALLATION AND SO CUT SUBSEQUENT SERVICE CALLS TO A MINIMUM



Electrical wiring is often slipshod and sometimes downright dangerous! Ideally, the television receiver should have its own point, but this is not always possible. However, any extension to the set lead should be made with plug and socket connection—*never* with a taped joint.

When the receiver is equipped with an earth socket, a correct earth, via house wiring, rising water main or regulation earth rod should be fitted. Even if this has to be paid for separately the customer will usually have it done in the interests of safety.

Also, while on the subject of safety, precautions against accidental shock should be checked by the man who installs the receiver. With the modern trend mainly towards a "universal" type of circuit and the consequent risk of "live" chassis, etc., it is important that there should be no possibility of the customer receiving a shock.

Check the Mains

The local mains voltage should be checked, and the appropriate tappings connected on the receiver input. It is not good enough to leave it on the top tapping and "hope for the best." Under-running the valves does not improve their life any more than over-running them.

Perhaps in one case out of 20 a perfect picture will resolve when the receiver is switched on. More often it will be necessary to adjust various controls. Explain what you are doing to the customer.

Adjustments

If it is possible to adjust on Test Card "C" there should be no difficulty, but transmission times are limited and not every engineer possesses a portable pattern generator!

However, there are various ways of adjusting the receiver provided a picture of some sort is being transmitted.

Height and width and picture centring are easily done, but linearity can prove more difficult. Frame linearity can be checked by setting the hold so that the time-base runs just "off" correct speed and noting any variation in thickness of the black band as it moves up or down the picture. Adjustments should be made very carefully.

Line linearity is best checked by watching for some vertical object moving across the screen. It should be remembered that most linearity controls affect mainly the left-hand portion of the picture, overall adjustment being made by the width control.

Many modern receivers incorporate additional preset line controls, such as Drive, Balance and Anti-ringing devices, and these should be set in accordance with the maker's instructions.

Contrast Balance

Balance of contrast and brightness is largely a matter of taste, but the customer should, however, be shown the "correct" setting. If the signal is removed (by disconnecting aerial input), and brightness control rotated until the raster just disappears, the precise "black level" has been attained.

The signal can then be re-applied and contrast advanced until a satisfactory picture is resolved. Final adjustment may be made with the brightness control to suit taste.

The sensitivity control has proved a bugbear to many a sweating novice. It is important to remember that variation in sensitivity affects complete signal input.

(Continued on page 637)

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Colour TV Topics

by

W. J. CLARKE, B.Sc.

ALTHOUGH colour television is no doubt occupying a small but important place in the minds of dealers and engineers, many readers may feel that it is as yet a little too premature to embark on a series of articles explaining the technicalities of colour techniques as they are at the present time. This is, of course, perfectly true, particularly in this country, where the problems of colour transmission and reception are undergoing intensive laboratory investigation.

It may well be that we in this country will develop during the next two or three years a system of colour television differing greatly in fundamentals from that currently employed in the U.S.A. This applies particularly to the display aspect of colour reception: the triple-gun phosphor-dot picture tube, developed by America's R.C.A. and used today in U.S. colour receivers, is regarded by many experts over here as a compromise device which may be supplanted by a simpler and less costly method of colour picture reproduction.

At the same time it is generally recognised and admitted that the principles of compatible transmission embodied in the N.T.S.C. system of colour television used in the U.S. will apply in one way or another to whatever technique is finally employed in this country. Recent experiments by the B.B.C. have, in fact, used a modified form of the N.T.S.C. system. And engineers may well find that, when in the course of a few years they come to instal and service colour receivers in the U.K., the basic principles of the N.T.S.C. system will apply equally to our own television transmissions.

Colour television is extremely complex. And colour television receivers are precision instruments incorporating new circuits, new techniques, and above all, new theoretical concepts which will have to be assimilated if the servicing man is ever to tackle the problem of colour television maintenance competently and effectively.

The Editor has asked me, therefore, to write about colour television, and to do it in such a way that by the time experimental colour transmissions are

started in this country there will already be a source of reference material to which engineers can turn as a first step towards understanding of this new medium.

This column, which will appear fairly regularly, will not go step by step through the vast territory of colour television technique, but will rather deal with independent topics as they arise. The aim is not so much to provide a text book (adequate technical books on colour television are already available), but rather to comment on and explain various aspects of the subject that may, at this stage, be of general interest to dealers and servicing men.

In this connection readers who have any questions to ask about colour television are invited to write to me c/o the Technical Editor, and where possible the answers to such questions will be published in this column.

ADDING COLOURS

White light, as we know, can be split up by the use of a prism into a spectrum of component colours of varying wavelengths. The same colours, added together by optical means, will produce white light. It has been found that white light can, however, be economically produced by the addition of only three colours, namely, red, green and blue.

The word *addition* is important, for there are two ways of mixing colours—either by addition or subtraction. For television purposes the primary colours are added* and it has been found that the three primaries, red, green, and blue, when combined in varying proportions

COLOUR TELEVISION will, in the foreseeable future, add to the complexities of TV servicing and maintenance. Many of the new techniques and circuits will be unfamiliar. The purpose of this new series is to familiarise readers first with the fundamentals of colour transmission and reception, and later to discuss methods, circuitry, techniques, and servicing. Letters and questions are welcomed and will be answered in this column.

can be made to reproduce the widest range of colours of the full spectrum.

Some of the possible combinations are self-evident. Red and blue, for instance, give purple. What may not be so obvious is that red and green when added together give yellow. This can, however, be demonstrated experimentally by shining red and green light from two projectors on to a common screen so that the areas of colour overlap. Where they are superimposed is yellow.

The choice of these colour primaries corresponds to some extent to the sensitivity of the human eye, which behaves as though it has three distinct regions of colour sensitivity, with nerves responding individually to blue, green or red light. It would, in fact, be possible to produce colour television using different primaries, e.g., orange, magenta, and blue-green (cyan), but rendering of intermediate colours would suffer, and there would be no direct correlation with the behaviour of the eye.

The R.C.A. tricolour tube has a special screen consisting of more than half-a-million phosphor dots in the three primary colours, red, blue and green. The dots are grouped in triangular formation, each triangle containing one dot of each colour. The phosphor is activated by a triple electron beam which scans the red, blue and green dots simultaneously, each component part of the beam being individually modulated by its own gun to determine the brilliance level of the dot colour.

When all three dots in a group are equally activated, the result is white light. When only the red and green dots are activated, the resulting colour is yellow. Depending on the relative brilliance of the three dots in each group, any spectrum colour can be reproduced with reasonable fidelity.

These elementary principles of contemporary colour television are well known. Not many engineers, however, have had the opportunity to see the phosphor dot tricolour tube in action, or to examine the results of colour transmission using N.T.S.C. or similar standards. The results are, without doubt, extremely good. When several receivers are viewed side-by-side, some variation in colour rendering may be observed, but when a single set is viewed under conditions of subdued

*This statement probably needs some qualification, particularly to those with memories of water-colour paint mixing, by whom green is regarded as a secondary colour produced by mixing yellow and blue, and who know, furthermore, that a mixture of red, blue and green paint certainly does not produce white paint.

The answer lies, as already mentioned, in the fact that there are two basic systems of colour mixing, the additive and the subtractive. The additive is concerned with a mixture of light sources, and is the system used in television.

The subtractive system (which includes water-colour paint mixing) interposes a filter between the light source and the eye. Certain light frequencies, or colours, are thus subtracted by the filters (or paint pigments) and the eye sees what remains. Thus, if a blue filter is laid upon a yellow, the light penetrating the two filters will be green. But if a yellow light is mixed additively (by projection) with a blue light, the result is white (yellow being made up of the red and green primaries, which together with blue, give white light).

illumination, the eye quickly accommodates itself to the overall colour balance and the picture appears to be chromatically perfect.

Colour television, despite its imperfections at the present time, is so vital and striking in its impact that it makes ordinary monochrome television look insipid in comparison.

COLOUR DEFINITION

It's a curious thing, but very fortunate, that the eye is far less critical of detail in colour than in black-and-white. In a standard monochrome picture, for example, any loss of definition below 2.5 Mc/s (B.B.C. standard) is immediately noticed as a softening or smearing of outlines. But in colour television the definition need not exceed 1.5 Mc/s for adequate colour rendering of detail.

This is because the eye is less sensitive to colour in small detail. It has been proved experimentally that there is no apparent loss of colour detail if, in relatively large picture areas, the three-colour (red, green and blue) definition is restricted to a narrow band of frequencies not exceeding 0.5 Mc/s, and if, in small picture areas, the two-colour (orange and cyan) definition is kept within a bandwidth of 1.5 Mc/s.

Why only two colours in small picture areas? This is because when the area of the picture under examin-

ation is sufficiently small, adequate colour reproduction can be obtained by the use of two colours only, namely, orange and cyan (blue-green).

Cinemagoers will already be familiar with two-colour reproduction. Certain films (mainly Westerns processed in Cinecolor) do, in fact, use orange and cyan, and although the colour rendering is false to the critical observer (e.g., there are never any true yellows reproduced), most audiences are not aware that anything is lacking.

So far as television colour is concerned, dichrome reproduction (orange and cyan) would only occur in the smaller picture details while the larger areas would be reproduced in three colours (red, blue and green) giving an overall high-fidelity of colour rendering, combined with economy of bandwidth.

These considerations apply only to colour signals. The picture definition as a whole (*i.e.*, what we regard as the black-and-white definition) would be carried by the luminance (or brightness) signal, and would, of course require the full available bandwidth as in existing monochrome transmissions, namely, 3 Mc/s.

BRIGHTNESS AND COLOUR

It is important to realise that brightness (or saturation) and colour (or hue) are two independent qualities of a

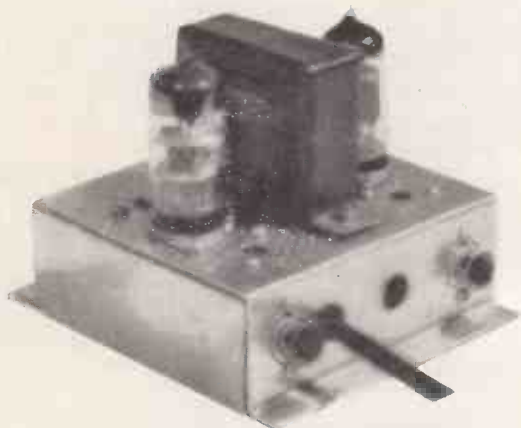
colour television signal. Any colour can be allocated to a particular point in the spectrum (frequency), but it can also vary in saturation from the deepest and most intense shade to the mildest pastel shade bordering on white, depending on how much white light is mixed with the colour to dilute it. Maximum colour saturation (or intensity) is obtained when there is no admixture of white light.

Consecutive points of a television picture will not only vary in colour, but also in saturation of colour, governed to some extent by the overall light and shade and perspective of the scene. If the colour is removed from the picture (and this can be done on current colour television sets by turning down the "chroma" control knob), what is left is an ordinary black-and-white picture which must, of course, have the full definition of up to 3 Mc/s.

The colour components, however, are restricted in definition, as previously explained, to a bandwidth of 1.5 Mc/s. It is this fact which makes compatible colour television possible, for the colour information, being of relatively small bandwidth, can be carried on a sub-carrier located within the bandwidth of the main luminance or black-and-white signal.

Exactly how this is done will be explained in a future article.

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SERVICE WITH A GRIN ——— by H. W. HELLYER

Ho—Hum!

I RECENTLY spent a reminiscent hour sorting through some old examination papers and marvelling at man's capacity to forget. Did I *really* face those inquisitors, flushed with the confidence of youth, and fill reams of paper with my brash answers? Would I give the same answers today?

I think not. One gathers reservations as one gathers moss. Black and white do not stand so sharply side by side: they fuse into off-white and grey—one's tube begins to lose emission, so to speak.

I remember one question distinctly. "Discuss," it began, temptingly, "the problem of hum in a conventional mains superhet. Give causes and cures."

I plunged into that one with glee, inventing and circumventing the most improbable faults.

What, I wonder, would my answer be, now that the years have knocked corners off my confidence. *Discuss hum . . .*

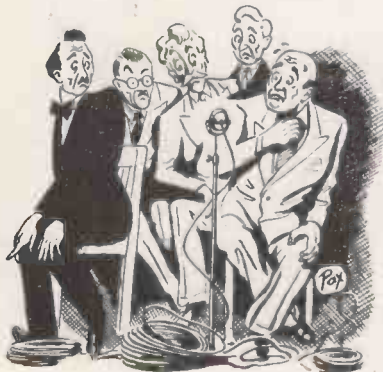
Hum is more than a problem—it is a pestilence. Only a trick of chronology saved Pharaoh from being plagued by it.

Its causes are subtle and varied; its cures legion—but not always effective. Haven't we all met the radio chassis festooned with additional electrolytics—still emitting hum? And the cause usually being nothing to do with the h.t. line at all!

I know an amateur whose repute is largely based on his wise look as he listens to a faulty receiver. If it hums like a gorgonzola he shakes his head and mutters sepulchrally:

"Smoother, I'm afraid."

Perhaps it is a sign of progress that leads we poor professionals to plump nowadays for the 'Heater-cathode short.'



. . . sitting among the coils of the cable, eyeing the microphone as if it were a cobra.

My most amusing tussle with 'hum' occurred at a church hall near Manchester. We were asked to 'hook-up' an amplifier rig for a public meeting. The amplifier that had been left for us was a rather doubtful contraption—but it worked. That is, providing the tone control was turned fully 'off' and nothing higher than 5 kc/s was expected from the flabby, patched up, cone of its archaic loudspeaker.



He shakes his head and mutters sepulchrally: "Smoother, I'm afraid. . . ."

"There's plenty of bass," we were told.

Well, if you can call a constant reverberation at 50 cycles 'bass' I suppose we would have to agree.

We tackled the weird assortment of ex-Admiralty transformers and ex-R.A.F. valves, feeling that something more than Air-Sea Rescue was needed. The heater wiring had been laid in with more regard to economy than efficiency. The earthy end of the volume control was—literally—tied to the deck. An occasional wire floated in the breeze.

We succeeded in getting it going, only to find that the microphone lead was long enough to do a broadcast from the top of Blackpool Tower—and totally unscreened. Our battle with hum began in earnest.

We spent an hour positioning that cable. It wound around chairs, under the piano, from end to end of the stage.

Eventually we managed to eliminate most of the hum and, by tying the



She pushed it away, a trifle too hard . . .

loudspeaker to a rickety gas bracket, found the one spot where feedback did not occur at more than half volume.

The secretary evidently passed on my warning that nothing should be moved for when I returned to the hall the committee was sitting rigidly among the coils of cable eyeing the microphone as if it were a cobra.

Only the chairman was unafraid. Seizing it by its silver neck he clasped it to his bosom and began his opening address. He had a fine, clear voice. Which was just as well for he'd forgotten to switch the thing on!

The second speaker found the switch and favoured the audience with several breathy asides. But he was tall and the mike was too low, so he struggled to loosen the clamp which held the telescopic rod, with no success. By the time he handed it over, with evident relief, to "Lady Somebody, our honoured guest," the audience were twitching with amusement.

Lady Somebody would have "nothing to do with the treacherous thing," as her whisper, an inch from the diaphragm, informed the delighted audience. She pushed it away, a trifle too hard, and the whole thing fell over with a crash!

Hum? Don't mention it! The microphone leads had ripped adrift, leaving a beautiful open-circuit. It took me two minutes to reach the amplifier and switch off and every second was agony.

The meeting continued without the aid of Public Address equipment and as I slunk in disgrace from the hall Lady Somebody embarked upon her speech. Her voice sounded better with the harmonics left in.

After such chastening experiences one tends to approach the discussion of 'hum' with more than a little prejudice.

Better to leave the academic discussions to the young and eager at the top of the slope, hoping they won't grow saturated with their confidence—for saturation could lead to instability—maybe even to HUM!

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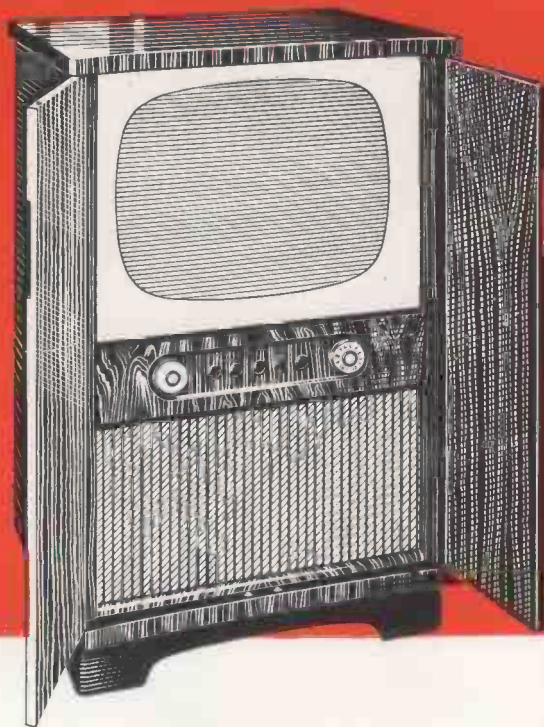
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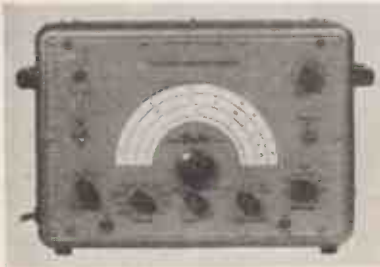


TAYLOR TELEVISION WAVEFORM GENERATOR

*Taylor Electrical Instruments, Ltd.,
419-424 Montrose Avenue, Slough,
Bucks. Telephone: Slough 21381*

THE new Taylor television waveform generator, Model 94a, is designed to provide comprehensive facilities for the accurate setting up of all types of TV receivers, and for rapid servicing and fault location. It covers a frequency range of 20-40 Mc/s (i.f. band), 40-80 Mc/s (Band I), and 175-215 Mc/s (Band III).

Nine different patterns are available from the generator. They are: (1) Grad 1—3-step gradation from black 30 per cent modulation to white 100 per cent modulation in 15 sets of 3 gradations. (2) Grad 2—5-step gradation



Taylor Model 94a TV waveform generator.

from black 30 per cent modulation to white 100 per cent modulation in 3 sets of 5 gradations. (3) A.M. Sound—750 c/s square wave sound modulation and horizontal bars. (4) Definition Grid—a grid pattern consisting of a number of internally preset vertical bars and two horizontal bars, giving a series of rectangular fields on which 1.5, 2, 2.5, 3, 3.5, 4, 4.5 Mc/s vertical lines can be displayed to check bandwidth response. (5) Grid—a grid pattern of vertical and horizontal lines for linearity, smearing and ringing tests, etc. (6) Black Raster—a fully synchronised interlaced raster comprising line sync. pulses, frame sync. pulses, and half-line interlacing signals, giving a black raster at 30 per cent modulation. (7) White Raster—similar to (6) but with blanking signals and porch waveform giving a white raster at 100 per cent modulation. (8) Vertical Bars—preset vertical bars for line linearity and hum checks (9) C.W.—Unmodulated carrier.

The instrument is factory pre-set for British, American or Continental standards. Output impedance is 75 ohms unbalanced with a frequency calibration accuracy of better than ± 1 per cent. Provision is made on the range switch to incorporate frequency modulation of Band III r.f. for television f.m. sound alignment (in Ameri-

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Two new Ronden radiogram models: left—Model DRG948 bureaugram, and right—Model 533ARG console radiogram. The bureaugram incorporates a v.h.f.-f.m. band.

can system). The circuit uses 21 internationally obtainable valves, equivalent in function to 44 single triode valves.

For use on a.c. mains, 110-250V, 50-100 c/s. Provisional price in the U.K. is £60 list.

NEW BEETHOVEN TV MODELS

*Beethoven Electric Equipment, Ltd., 89
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Telephone: East 1246.*

THREE new television models are released by the company, comprising two table sets (14in. and 17in.) and a 17in. console. They incorporate an 18-valve chassis and a 12-station turret tuner for Band I and III reception. Special circuit features include automatic anti-fade control on vision and sound, and flywheel sync for stable fringe area reception. Interference suppression circuits are included.

Model B94, the 17in. table model (illustrated) is priced at 79 gns. The console version (Model B94C) is

89 gns. The 14in. table model is 68 gns. All prices include purchase tax.

The cabinets are finished in highly burnished veneer, the console having castors for ease of movement.

NEW RONDEN RADIOGRAMS

*Ronden Manufacturing Co., Ltd., 36
Boleyn Road, London, N.6. Telephone:
CLIsold 7361.*

TWO new radiogram models are announced by the company. Model 533ARG, selling at the low price of 35 gns. tax paid, is a 5-valve 3-waveband model with Collaro RC54 3-speed autochanger housed in a cabinet of Continental finish. Output is via an 8 in. speaker.

Model DRG948 is a de-luxe bureaugram incorporating a 9-valve chassis covering four wavebands: l.w., m.w., s.w. and v.h.f. f.m. Push-pull output is via a 10in. speaker. The radio has magic-eye tuning. A Collaro RC54 3-speed autochanger is fitted. The cabinet, of bureau styling, is "glass" finished. Price of this model is 59 gns. tax paid.

EKCOVISION BAND III TV PREAMPLIFIER

*E. K. Cole, Ltd., Southend-on-Sea,
Essex. Telephone: Southend 49491*

SUPPLIES are now available of a new Ekcovision pre-amplifier for operation on Band III frequencies (174/216 Mc/s) for fitting to any turret-tuned Ekcovision receiver. It should be noted that this unit—Model TPA235—is not for use with converted Band I Ekcovision receivers.

The price of Model TPA235 is £2 (tax free).



Beethoven Model B94 17in. table TV receiver.

(Continued on page 650)



Continued

ANGELETTE RECORD PLAYER

Angela Manufacturing Co., Ltd., 348
Upper Street, London, N.1. Telephone:
CANonbury 3640.

THE Angelette electric portable record player (illustrated) incorporates a B.S.R. 3-speed record playing unit (non-auto) and a built-in amplifier, housed in an attractive attache-style case finished in two-tone leatherette. The case, which is rubber mounted, has a carrying handle. Price of the Angelette is 12 gns. tax paid.



The new Angelette portable electric record player.

The amplifier unit incorporates a mains isolating transformer. Output is via a compact semi-reflex acoustic loudspeaker system. The gram unit has a crystal pick-up with sapphire styli in a turnover head.

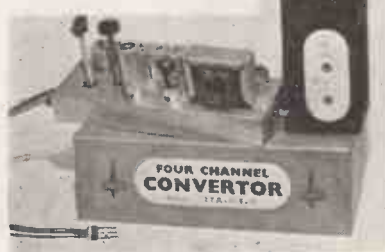
The player measures 12½ in. × 12½ in. × 7½ in., and weighs 7 lb. The manufacturers provide a 12-month guarantee (excluding valves).

APEX 4-STATION BAND III CONVERTER

Norman Rose (Electrical), Ltd., 53
Hampstead Road, London, N.W.1.
Telephone: EUSon 6886/7.

THE new Apex 4-station Band III converter is suitable for any type of television receiver, whether t.r.f. or superhet, and is housed in a metal case with brown crackle finish. There are three external controls (band switch, fine tuning, and variable gain). Installation is simple as the input sockets

The Apex 4-station Band III converter with case top removed. This converter covers one Band I and three Band III channels.



are colour coded. The four channels include one in Band I and three in Band III.

The converter employs a twin triode in a cascode circuit. The oscillator is of the Colpitts type, employing negative coefficient condensers to minimise frequency drift. A variable condenser is provided for fine oscillator setting. This control has a range of approx. 3 Mc/s. The band switch in the off position disconnects the mains from the transformer; in the B.B.C. position the Band I aerial is taken straight through to the output lead of the converter, mains is applied to the transformer and the valve heaters are on. When the switch is placed in any of the Band III positions, h.t. is then applied to the converter, the Band I aerial is shorted out, the converter output lead is connected to the mixer output transformer. The mains transformer is double wound to give full isolation from the mains. The overall gain of this unit is about 20db.

Price of the converter is £9 retail and £6 trade.

Aerial Attenuator

Another new item is the Apex TV aerial attenuator, designed for insertion in television coaxial lead-in cable.

The attenuator is fitted with a standard coaxial plug and 3½ in. coaxial cable leading from one end; at the other end is a standard fixed coaxial socket. The unit is designed for fitting to the back or side of television receiver by the four screw holes provided. There is a choice of three different attenuators: 24-18-12db, which are quickly selected by a simple plug and socket arrangement on top of the unit.

The attenuator is finished in a bronze crackle case and measures 3½ in. × 2½ in. Price, 12s. 6d. retail; 8s. 4d. trade.

PHILIPS PORTABLE TAPE RECORDER

Philips Electrical, Ltd., Century House,
Shaftesbury Avenue, London, W.C.2.
Telephone: GERard 7777.

THE company have introduced a new portable magnetic tape recorder, type EL3570, to sell at a retail price of £180. It has been specifically designed for the professional market and is particularly suitable for radio recording in the field and in small studios, for background music and effects in the theatre, in schools and in industry and for recording sound for cine films.

The recorder is housed in a tropicalised metal case, finished in light brown hammer-lacquer; the lid is detachable. Its total weight is 44lb. and it measures 17½ × 12½ × 9 in. Each model is supplied with a 9in. reel of tape; running speed is 7½ in./sec.

The tape is driven by a heavy-duty asynchronous motor; vibration has been minimised to such a degree that wow and flutter is claimed to be less than 0.3 per cent. Total recording—playback time for one reel of tape is 45 minutes.

Separate controls are provided for (i) recording, playback and re-winding and (ii) fast forward winding. Various locking devices prevent accidental erasure and damage to the tape. The recorder is fitted with three magnetic heads: recording, playback and erasing. This permits of monitoring during recording and ensures that, as the heads are permanently connected to the corresponding amplifiers, no switching interference can occur. When the controls are set in the winding positions, the tape is automatically lifted from the heads so as to avoid their being worn down by fast spooling.

A built-in electronic indicator instantaneously registers modulation levels. As it is often desirable to diminish the bass response, the microphone channel incorporates a "music/speech" switch.

The playback power amplifier has a push-pull output stage and an output power of 8W. It is suitable not only for connection to a 3-7 ohms speaker, but it also has an output socket with an internal impedance of 200 ohms and a maximum of 5V for line connection.



Philips portable tape recorder, type EL3570.

The power supply unit is suitable for 110-125 and 200-245V 50 c/s a.c. Adjustment to the correct voltage is effected by two adaptors—one for the motor and the other for the transformer—in the bottom of the cabinet.

The new tape recorder is manufactured in Holland.

NEW MCCARTHY RADIOGRAM

Felgate Radio, Ltd., Felgate House,
Studland Street, Hammersmith, London,
W.6. Tel.: RIVerside 8141.

ILLUSTRATED is the latest addition to the McCarthy range of radiogramophones, Model MC855FM, a competitively priced instrument covering the v.h.f.-f.m. band in addition to



The new McCarthy a.m.-f.m. radiogram, Model MC855FM.

long, medium and short wavebands. The chassis has eight valves, sound output being via an 8in. loudspeaker.

Special features include quick-service chassis design, in which the loudspeaker, gram motor and pick-up leads plug into the chassis, which slides into the cabinet, being secured in position by only two wood screws. The tuning dial has a visible area of more than 58 sq. in. An illuminated waveband indicator is fitted. The instrument has the latest 3-speed autochanger.

The cabinet, which measures 28½in. (high) × 30in. (wide) × 15 (deep), is finished in walnut veneer, and includes ample record storage space. For operation on a.c. mains 200-250V. Price 49 gns. tax paid (£38 19s. list plus £12 10s. tax).

VIDOR PORTABLE RADIO PRICE

Vidor, Ltd., Erith, Kent. Telephone: ER1th 3080.

PPRICE of Vidor's latest all-dry battery portable radio receiver, Model CN432, has now been fixed at 13½ gns. tax paid (£10 14s. 8d. list plus £3 8s. 10d. tax). Batteries are extra.

PYE RANGER RADIOTELEPHONE

Pye, Ltd., Telecommunications Division, Newmarket Road, Cambridge. Telephone: Teversham 311

ONE of the big problems associated with clearing Band III for the full development of television has been the finding of alternative ether space for the various services currently occupying channels in that band. Among these services are the users of mobile radiotelephone equipment, of which there

are more than 10,000 in Britain. Because of the pressure of frequency space, the ever-increasing demand for mobile radio is faced with a decreasing number of channels available for development.

To solve this problem Pye have introduced a new range of mobile radiotelephone equipment, known as the *Ranger*, which is designed to work on only a quarter of the frequency space needed by existing equipment, thus making four times the number of frequency channels available.

The specification to which the equipment works is even tighter technically than the new specifications envisaged for use in the U.S.A., even though the development of two-way radio in England is still far behind the United States in numbers, where half a million radiotelephones are in use. Consequently, the export potentialities are regarded as being particularly promising. At present mobile radio channels are spaced at 100 kc/s in Britain and 60 kc/s in the U.S. The U.S. plan to move to 30 kc/s. The *Ranger* equipment is the first in the world to offer 25 kc/s channel spacing.

The *Ranger* is intended to work in either double or single frequency simplex on a press-to-talk basis, on channel spacings as close as 25 kc/s



The Pye Ranger mobile radiotelephone equipment.

over its whole frequency range, which will enable the more efficient use of the available frequency bands, and permit the allocation of many more frequency channels.

Experience in the field of mobile radio has shown the optimum mobile transmitter output power to be in the region of 5 watts, and the *Ranger* has accordingly been designed to give an output of from 4 to 6 watts over the frequency range 25 to 174 Mc/s. Additional features include exceptional frequency stability, high sensitivity and signal to noise ratio, rapid changeover from 6 to 12 volt operation, robust construction and small size.

The standard version of the *Ranger* is for 6 to 12 volt operation, with no muting incorporated. Special versions include mute operation, up to 6-channel crystal switching, and public address facilities.

SPENCER-WEST BAND III DISTRIBUTION AMPLIFIER

Spencer-West, Ltd., Quay Works, Great Yarmouth. Telephone: Gt. Yarmouth 3009

A NEW Band III distribution amplifier (illustrated) has recently been introduced by the company. The



Spencer-West Band III distribution amplifier.

amplifier is carried on a ½in. panel and is housed in a ventilating dust-cover fitted with four wall-fixing brackets.

The circuit employs three double-triode valves with feedback in a low noise arrangement providing a gain of 30-35db with a bandwidth substantially level for 7 Mc/s. Bandpass circuits are employed throughout and together with the feedback provided preserve this bandwidth despite mains supply and other variations.

The output feed at 80 ohms is tuned-transformer coupled, permitting connection direct into an existing Band I distribution installation without additional equalising networks.

Various types are available. The example illustrated has 6 "spur" feed outlets for service shop use, and one outlet for "loop" feeding up to 20 showroom outlets. Price: £21 10s.

Other types are available without the "spur" feed outlets, for connecting direct into existing distribution systems.

PORTOGRAM BABY MODELS

Portogram Radio Electrical Industries, Ltd., Priel Works, St. Rule Street, London, W.8. Tel.: MACaulay 2246/7.

DUE to favourable sales response, Portogram announce various improvements to their *Baby Gram*. This can now be obtained in a two-tone colour finish in various shades and the silk speaker gauze has been replaced by a moulded plastic fret. It also has an escutcheon plate on which the tone, volume and on-off positions are marked.

Just announced is a new model, the *Baby Player*, which has the same finish as the *Baby Gram* and incorporates a 3-speed B.S.R. record player unit. It retails at only £7 2s. 9d. tax paid.

(Continued on page 653)

**BIGGER-THAN-EVER
SALES THIS CHRISTMAS!**

Pilot

**BM. 90
PORTABLE**

£18-10-0 (Excluding batteries)



Here's a fast seller that will have a strong appeal this Christmas—the popular BM.90 Portable. Neat, compact, robust, the BM.90 3-way radio is adaptable for batteries, AC or DC

Mains. Housed in attractive green/grey, blue/grey or maroon/beige leathercloth, the BM.90 is a sure seller. Make sure your stocks are adequate.

PILOT RADIO LTD · PARK ROYAL · LONDON · N.W.10



Continued

MARGOLIN MODEL 32 DANSETTE

J. & A. Margolin, Ltd., 112-116 Old Street, London, E.C.1. Telephone: CLERkenwell 2133.

A NEW addition to the range of Margolin Dansette record players and reproducers is the Model 32, a high-fidelity instrument incorporating separate treble and bass controls, with additional loudspeaker socket, and housed in a well-designed case finished in two-tone hide. List price £25 8s. 9d., plus £8 3s. 3d. purchase tax.

PILOT 21 in. TV CONSOLE

Pilot Radio, Ltd., Park Royal Road, London, N.W.10. Tel.: ELGar 7353-7.

THE new Pilot 21in. television (Model DDC121) is a luxury large-screen console receiver with full-length double doors. It incorporates a 19-valve



Pilot 21in. console television with doors.

chassis with vision a.g.c. for consistent reception. A 13-channel turret tuner accommodates existing and new stations in Bands I and III. The circuit incorporates flywheel sync. to eliminate picture tearing in fringe areas.

The cabinet is finished in contrasting veneers with foldback doors, and has a golden loudspeaker grille. Castors are provided for ease of movement.

NEW AVO SIGNAL GENERATORS

The Automatic Coil Winder and Electrical Equipment Co., Ltd., Avocet House, 92-96 Vauxhall Bridge Road, London, S.W.1. Tel.: VICToria 3404-9.

THE new Avo signal generator, Type TFM is introduced to meet the need for a relatively inexpensive instrument capable of giving a signal in any of the three bands now allocated to broadcasting (including v.h.f. f.m.) and television (Bands I and III).

Facilities available on this instrument are: unmodulated r.f. signal; amplitude modulation over a frequency range of 5-225 Mc/s; frequency modulation from 65-120 Mc/s (with a deviation of ± 150 kc/s); 400 c/s audio output; spot frequency calibration enabling the scale to be adjusted relative to cursor by beating the output of the signal generator against a known frequency. The instrument is suitable for operation on a.c. mains 100-120V or 200-260V.

Another new instrument is the Avo signal generator, Type III (illustrated), which covers the wide continuous frequency band of 150 kc/s-220 Mc/s. Three outputs are available: unmodulated r.f.; modulated r.f.; and a 1,000 c/s audio signal. For operation on a.c. mains 100-120V or 200-260V.

(Continued on page 655)

NEW SERVICES TO AID SERVICING

Philips introduce dealer needle clinics

PLANS to set up dealer "needle clinics" where sapphire styli may be regularly inspected and, where necessary, replaced, are announced by Philips Electrical, Ltd.

To enable dealers to offer an efficient, needle inspection service, Philips are now able to supply them with a special needle testing microscope. This has a rotatable platform with two pick-up holders which permit of an immediate

comparison between the stylus under inspection and an unused one.

Four types of Philips styli are available. The list below gives the types applicable to the models indicated.

All Philips pick-up heads are interchangeable and any of these three pick-up heads may be used as replacements on the 603A, 622A, and 624A radiograms as well as the instruments listed above.

The needle microscope (Type AG7004) is offered to dealers on a non-profit basis at a price of £6 net.

Courses for Servicing Men

A SERIES of one-day courses in radio and television receiver servicing was recently held by Philips Electrical, Ltd., Cardiff, for their dealers' service engineers.

Comments from those dealers who sent their representatives, indicate their appreciation of this additional technical service. Such was the success of this initial venture, that further courses may be held in future seasons.

Taylor to part exchange

TAYLOR ELECTRICAL INSTRUMENTS, LTD., have introduced a scheme to encourage dealers to part exchange their old test instruments for new models more suitable for the requirements of present-day fault-finding and servicing. The old models will be reconditioned by the company on a non-profit basis and resold at very low prices to students, apprentices, amateurs, etc.

The following part-exchange prices are offered for the instruments specified provided they are in good working order: *Circuit Analysers*—type 20A £4 10s., type 20B £5 10s. *Oscilloscopes*—type 30 £6 10s., type 30A £10 5s. *Valve Testers*—type 45A £6 5s., type 45B £9 10s., type 46A £6 5s., type 47A £7 10s. *Signal Generators*—type 60 £2 5s., type 65A £3, type 65B £4 5s., type 65C £4 10s., type 66A £5 10s. *Multirange Meters*—type 70A £3 15s., type 75A £4 10s., type 81A £2 10s., type 81C £2 15s., type 82 £2 10s., type 83A £2 10s., type 83C £2 15s., type 85A £5 5s., type 90 £2 10s., type 90A £4 5s. *Resistance and Capacity Bridges*—type 110A £3 15s., type 110B £4 5s. *Electronic Testmeter*—type 170A £6.

The old instruments, after reconditioning, will be offered for sale, as available, with instruction manual and two-month's written guarantee. Details of resale prices are available from the manufacturer at Montrose Avenue, Slough, Bucks.

Pick-up Head	Fitted to	Replacement stylus
AG3010 Medium Fidelity	424A 522A 532A 544A AG1000 AG1003 AG2121 AG2122 AG2124	AG5008, green for 78 r.p.m. AG5009, red for micro-groove
AG3012 High Fidelity	644A 654A 653A 712A	AG5005, green for 78 r.p.m.
AG3013 High Fidelity	644A (Earlier models) 712A (Earlier models)	AG5006, red for micro-groove

EMITRON

REG. TRADE MARK

'The'
**THERMIONIC VALVE
& CATHODE RAY TUBE**

**FOR TELEVISION, RADIO,
& INDUSTRIAL SCIENTIFIC
APPLICATION**

Manufactured by
ELECTRONIC TUBES LTD
KINGSMEAD WORKS
HIGH WYCOMBE, BUCKS

Enquiries to
HIGH WYCOMBE
2020





Continued

TRIX SOUND EQUIPMENT

Trix Electrical Co. Ltd., 1-5 Maple Place, Tottenham Court Road, London, W.1. Tel.: MUSEum 5817.

TRIX are producing a new 150-watt amplifier for high-power installations feeding a large number of loudspeakers. This unit, Model T152, is intended for rack mounting, and two of these units can be operated from one driver amplifier, Model T152/D, to give an output of 300 watts if required.

A new moving coil microphone has been introduced, Model G7871, giving substantially improved response, and of attractive appearance in satin chrome finished case. The microphone is of slightly smaller dimensions than earlier models and is normally supplied mounted on switch box with plug and socket. An alternative mounting on locking plug adaptor without switch is also available if preferred.

A useful addition to the wide range of Trix public address speakers is the Model G7073 in circular metal case suitable for both indoor and outdoor use. The construction is moisture proof with fine gauge metal gauze screen in front of the unit. A double ended Model G7072 is also available. This is a type suitable for railway platforms, but also has many other applications.

In the range of *Trixette* gramophones a number of improvements have been made both in design and reproduction. The *Playdisc* model fitted with 3-speed non-automatic player unit now has external control knobs and is available at somewhat lower cost with an alternative type of motor unit. Several points are worthy of note. The motor is spring-mounted, all sizes of records can be played with the lid closed, and the speaker is a full 6in. x 4in. elliptical type.

Model A410 is the popular model for those requiring an automatic record changer, and is fitted with the Garrard RC110 unit with turnover type crystal head.



Three recent Pye introductions: (left to right) Model P100 clock radio; the 17in. Luxury 17 console television (VT17CDL); the Jewel Case battery portable (P114BQ).

The more elaborate models are now built in cases of entirely new design and fitted with more powerful amplifier having separate bass and treble tone controls. Those models are available with Garrard automatic changer units Type RC111, RC80 and RC90, the latter types being particularly in demand in many export markets. Magnetic type pick-up heads are normally fitted to these models.

The console model gramophone, the *Recital*, is noticeably improved in appearance and finish, and is designed to provide high-quality reproduction in the home at reasonable expense. The amplifier unit incorporated is the Trix Model T41 matched to a 10in. speaker, and the unusual feature of the transparent plate-glass top for the cabinet has a number of practical advantages.

ARRELL COAXIAL PLUG

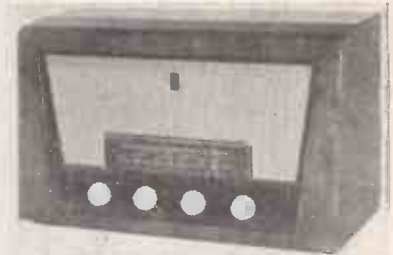
Arrell Electrical Accessories, Ltd., New Islington, Manchester, 4. Telephone: Collyhurst 2446.

THE company have introduced a new low-priced coaxial plug which, having only three component parts, can be rapidly and easily assembled. The end nut of high-grade polystyrene exerts a strong grip on any size of coaxial cable in general use, while the pull-proof grip on the other sheathing relieves the central conductor and braid from strain. Polythene insulant is used internally, the capacitance being less than 1pF. The centre connection can either be soldered or solderless as required. Price of the plug is 1s.1d. retail.

A.M.—F.M. ALLDRY BATTERY RADIO

The Ever Ready Co. (Gt. Britain), Ltd., Hercules Place, London, N.7. Telephone: ARCHway 3030.

CLAIMED to be the first battery radio incorporating the new v.h.f. f.m. band is the Ever Ready *Sky-Monarch FM/AM* receiver—a 9-valve superhet with three wavebands (l.w., m.w., and v.h.f.). The set is housed in a walnut-veneered cabinet with black speaker frame. A tuning indicator is fitted in the loudspeaker grille. Controls



Ever Ready *Sky Monarch* a.m.-f.m. battery radio.

are in cream plastic. Built-in aerials accommodate the l.w., m.w., and f.m. bands, with provision for an external f.m. dipole if required.

Power for the *Sky-Monarch FM/AM* is provided by the Ever Ready *Batrymax* B137 combined h.t. and l.t. battery. Dimensions of the set are 20in. x 9½in. x 12½in. Price: £22 plus £7 1s. 2d. purchase tax (battery B137 is £1 12s. 6d. extra).

VENUM TWIN-ELECTRODE SOLDERING TOOL

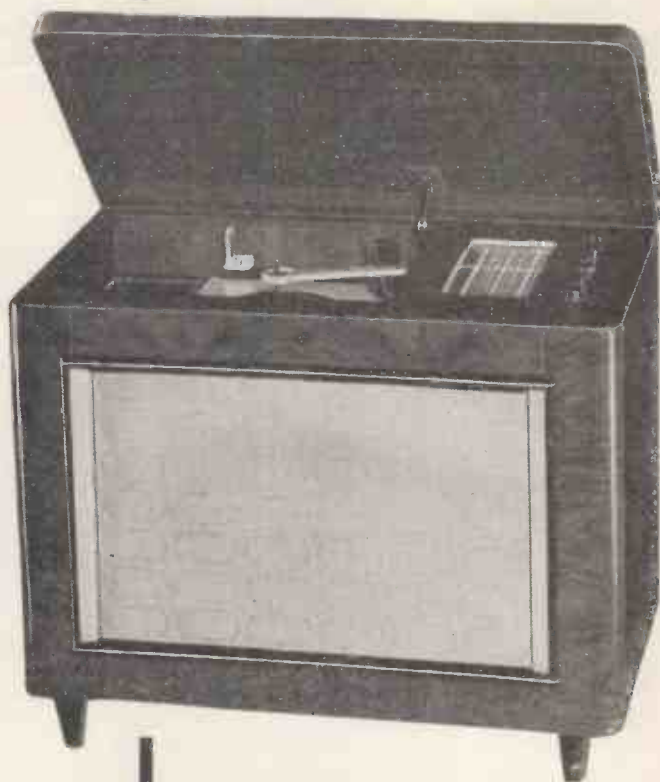
Aircraft Services and Export, Ltd., 15 Buckingham Palace Gardens, London, S.W.1. Telephone: SLOane 4862

A NEW type of soldering iron, claimed to be revolutionary in principle, is introduced by the company. Basically the iron comprises a tong arrangement which acts as a lead for the electric current which, via a

Two items from the Trix range of sound equipment. At left is the new moving coil microphone (type G7871), and at right the new 3-speed portable *Playdisc* model.



(Continued on page 657)

IMPORTANT**Stella****RELEASE IN NOVEMBER****THE NEW AM/FM RADIOGRAM (ST 308A)**

7 valves; internal ferroceptor for AM; dipole for FM; 10" dual cone loudspeaker; AC mains 200/250v.
Retail price: 79 guineas (tax paid)

A beautiful set to put on display! A magnificent model to demonstrate and sell: better reception of long and medium wavebands; and full justice is done to the new VHF/FM broadcasts.

The ST 308A has the new Philips 3-speed automatic record-changer, with press-button operation. Up to ten records of mixed sizes can be played automatically. 2 Philips sapphire stylus pick-up heads, one for microgroove, the other for standard records.

Order from your Wholesaler right away!

Stella**THE IDEAL COMPANION**

STELLA RADIO & TELEVISION CO. LTD.,
OXFORD HOUSE, 9-15 OXFORD STREET, W.1.

GERRARD 2655
(SR148a)



Continued

special type of electrodes, heats the job direct. Operation is by push-button.

The tool operates on low voltage through a 6-volt battery or a low-voltage transformer, with relatively low current consumption. The job is heated directly (not via transferred heat) and current is required only during the few seconds needed to complete the job.

Interchangeable and adjustable stems and electrode holders, as well as varying shaped electrodes, permit all types of soldering to be done with one tool in the most efficient way. The tool can



The Venum soldering tool in use.

be used for soldering solid material of 1/64in. to 1/2in. diameter, or equivalent surfaces in copper, brass, or other solderable materials.

The standard kit contains a pair of tong handles, a pair of standard stems and a complete set of electrode holders, electrodes and other accessories. Retail price, £7 10s.

NEW SOBELL A.M.—F.M. RADIOGRAM

Radio and Allied Industries, Ltd.,
Langley Park, Slough, Bucks.
Telephone: Slough 22201-6.

AN a.m.f.m. conversion of the Sobell Model 526ACG radiogram, known as the 526FMG is announced by the company. This is a 7-valve a.m.-f.m. 3-speed autoradiogram, housed in a walnut-veneered cabinet, and incorporating a 4-waveband (including v.h.f.) chassis. The set has magic-eye tuning, with internal aerial, and is for operation on a.c. mains, 200-250V. Retail price 57 gns. tax paid.

NEW E.A.R. AMPLIFIERS

Electric Audio Reproducers, Ltd., The
Square, Isleworth, Middlesex. Tel.:
HO Unslow 6256.

NEW models exhibited by the company at the Radio Show include extended range versions of the A750 amplifier



The new E.A.R. Three-Nine-Five 20-watt amplifier

incorporating an additional treble speaker and automatic "LP"-78 gram switching. Model A750T sells at 33 gns., Model P750T at 30 gns., and the Armchair Console model at 37 gns.

The E.A.R. 6-10 built-in pre-amplifier (at 19 gns.) and the 6-10P separate amplifier (23 gns.) are based on the original 5-10 amplifier with the addition of a preamplifier for low sensitivity pick-ups, radio and microphone inputs.

Another new unit is the *Three-Nine-Five*—a 20-watt high-fidelity amplifier having a distortion figure of less than 0.05 per cent. Price 45 gns.

Further details are available on request from the maker.

IMPERIAL A.M.-F.M. TABLE RADIOGRAM

Lee Products (International) Ltd., Elpico
Works, Olive Road, Hove, 3. Tel.:
Hove 46044.

THE *Imperial* a.m.-f.m. table radiogram is a 5-valve 4-waveband (including v.h.f.) instrument incorporating a 3-speed autochanger for operation on a.c. mains 200-250V. Special features include "3-D" sound from three

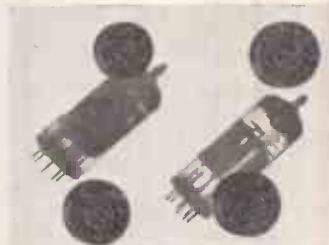
The *Imperial* a.m.-f.m. table radiogram.

loudspeaker units, piano-action push-button switching, magic-eye tuning, modern cabinet styling with walnut finish. Power output is 4 watts to two 6 1/2 in. speakers and one electrostatic tweeter unit. Retail price 49 1/2 gns. (tax paid).

MULLARD PLASTIC PIN PROTECTORS

Mullard, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.
Telephone: GERrad 7777.

NEW plastic pin protectors were introduced by Mullard at the Radio Show. These should prove to be a valuable aid to service engineers, as they also include a diagram of the pin connections. They will, in future, be fitted to all Mullard valves with B7G, B8A, and B9A base types, and even-



Mullard plastic valve-pin connectors.

tually over 100 valve types will be covered.

The pin protectors have a dual purpose. By fitting neatly and firmly over the pins, they protect them from the damage that can occur in handling, and by supplying base diagrams, clearly marked in raised lettering they give quick reference to pin connections and obviate the necessity of searching for the information in the data book.

The matching of pin protector to valve base, when in use in the service department, is facilitated by clearly defined indicators. For B7G and B9A bases, the pin gap is marked by two divergent lines on the pin protector; for B8A bases the valve's locating pip coincides with the corresponding raised circle on the pin protector.

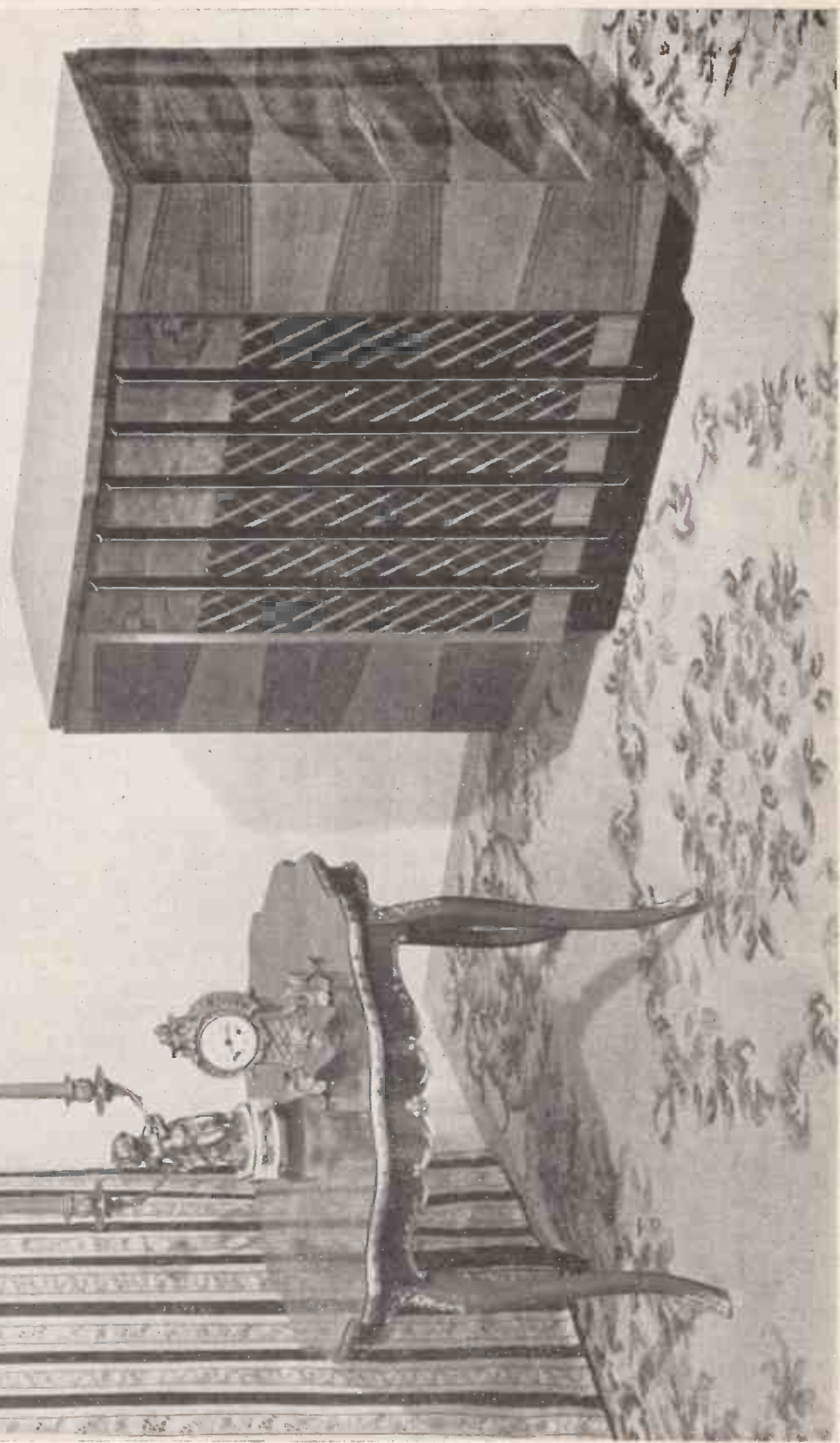
The new pin protectors are made of blue plastic. They are clean and pleasant to handle and do not deteriorate.

Power Triode

The Mullard power triode TY4-350, which is a direct replacement for the, U.S. type 833A is now available. The valve, which is widely used in r.f. heating equipment, has a maximum rated anode dissipation of 300W, and operates with h.t. voltages up to 3kV.

(Continued on page 660)

The Georgian



A New Radiogram by



HERE IS *The Georgian*, latest addition to the 1956 range of ACE radiograms. It is a luxury auto-change model housed in a solidly-built, walnut-veneered cabinet of elegance and charm, skilfully designed to blend with traditional or modern furniture. It is available for AM or AM/FM reception, and at its price is a certain seller.

AM - AC

The Georgian RG354 3-waveband, 5-valve superhet for AM reception only. For use on AC mains **52 gns. tax paid**

AM - AC / DC

The Georgian RG354U 3-waveband, 5-valve superhet for AM reception only. For AC/DC mains operation **60 gns. tax paid**

AM / FM

The Georgian RG455 4-waveband, 8-valve superhet for AM or VHF/FM reception. Includes "Magic Eye" tuning. For AC mains **65 gns. tax paid**

ACE - for contemporary home entertainment - ACE

ACE RADIO LTD TOWER WORKS TOWER ROAD LONDON NW10



Continued

H.M.V. A.M.-F.M. LOWBOY RADIOGRAM

The Gramophone Co., Ltd. (His Master's Voice), Hayes, Middlesex. Telephone: Southall 2468.

NEW addition to the H.M.V. Lowboy range of radiograms is Model 1621 (illustrated), designed for a.m.-f.m. reception. It incorporates an 8-valve circuit covering the long and medium a.m. bands, and the v.h.f. (f.m.) band of 87.5 to 100 Mc/s. For the latter there is a built-in aerial for use in high signal strength areas, with alternative sockets for an external f.m. aerial where required.

The audio amplifier, mounted on a separate chassis, has a 7-watt push-pull output feeding a 13½ in. elliptical loudspeaker with aluminium centre cone. The combined on-off switch and volume control is on the right-hand side of the cabinet, and therefore readily accessible without lifting the lid. The 3-speed auto-mechanism handles up to 8 records—either 78, 45 or 33½ r.p.m., including Extended Play types, and incorporates a featherweight high-quality crystal pick-up with rotary head for either 78 r.p.m. or microgroove records.



H.M.V. Lowboy a.m.-f.m. radiogram, Model 1621.

The cabinet is finished in highly polished walnut veneer, with sectioned record storage compartments, and mounted on easy-running castors. For operation on a.c. mains, 195-255V. Price 75 gns., tax paid.

SHERWOOD TV TROLLEY TABLE

Whiteley Electrical Radio Co., Ltd., Radio Works, Victoria Street, Mansfield, Notts. Telephone: Mansfield 1762/5.

PICTURE shows the new Whiteley Sherwood TV trolley table which has been designed to accommodate



The Whiteley Sherwood TV Trolley table.

the larger television receivers now appearing on the market. It measures 25 in. × 22 in. × 23 in. high and is finished in highly polished walnut, flat packed ready for instant assembly. The retail price is £4 14s. each.

NORA RADIO RECEIVERS

Winter Trading Co., Ltd., 6 Harrow Road, London, W.2. Telephone: PADdington 3646.

NORA radio receivers are being distributed exclusively in this country by Winter Trading. The first Nora receiver to be marketed over here is an a.m.-f.m. table model with a feature known as "Panoram Tone," called the Mazurka 56.

This receiver selling at 42 gns. tax paid is a 7-valve superhet with four wavebands—medium, long, short and v.h.f. (f.m.). It is provided with separate tuners for a.m. and v.h.f., has a built-in tunable rotating aerial for a.m. reception, and a built-in dipole for v.h.f. Other features include bass and treble controls, a bandspread control to work on any part of the short waveband, negative feedback, and three p.m. loudspeakers.

BELARK ALUMINIUM SOLDERING TOOL

The Belark Tool and Stamping Co., Ltd., 33 Sussex Place, London, W.2. Telephone: PADington 0477.

NOW in production is the Belark aluminium soldering tool, which was previewed in its prototype form in our May issue. The tool, which is designed for easy soft soldering of aluminium, was demonstrated at a Press reception in London last month.

Soft soldering of aluminium has always been considered difficult because of the presence of a tenacious oxide film which prevents the

solder from wetting the surface. Even when the film is cleaned by chemical or mechanical means, it immediately re-forms in the presence of air.

The Belark tool overcomes the problem by mechanically cleaning the surface of the aluminium by means of a vibrating steel-wire brush in the centre of the solder bit. To prevent re-oxidisation of the cleaned area a pool of molten solder round the tip of the bit excludes air, and tinning takes place at the same time.

It is the tinning which is all important, Col. D. Zinovieff, a director of the company, told B.R.T. Once the surface of the aluminium is tinned it becomes an easily solderable metal, so that joining can then be completed by the application of heat either from the solder bit of the gun or by any conventional method.

No flux is used, and since the bit is heated to a temperature of 500°C the solder must not contain lead; the solder recommended for use with the tool is Fry's LM aluminium solder, which contains 80 % tin and 20 % zinc.

The tool has many obvious applications in the radio industry where aluminium is one of the most commonly



The Belark aluminium soldering tool in use.

used metals. It is for use on a.c. mains only, 110, 200-220, 225-250V. The cylinder type heating element is encased in stainless steel and consumes 165 watts. It is therefore possible to solder sheet metal up to 12 s.w.g. without pre-heating. The steel wire brush vibrates vertically to the metal surface 100 times per second.

Price of the Belark aluminium soldering tool complete is £14 14s. retail.

GREENMAN TURNTABLE

S. Greenman, Ltd., 280-282 Old Street, London, E.C.1. Telephone: SHOREDitch 7836.

A STEEL turntable which may be used for display or other purposes is being marketed by this firm. Made of 14-gauge 7 in.-square steel plates it is ball-bearing balanced and is rivet-fixed with hardened steel washers.

The prices quoted in this new products feature are subject to any changes made in purchase tax after the issue has gone to press.

BENTLEY JONES has resigned from the board of directors of Thorn Electrical Industries, Ltd., to join Radio and Allied Industries, Ltd. In his new appointment he will be responsible for the direction and expansion of Sobell receiver sales. Mr. Jones was previously with E. K. Cole, Ltd., for five years as radio sales manager.

WILLIAM WEBSTER has been appointed sales promotion manager of the Brown Brothers, Ltd., radio and electrical group. Mr. Webster, with years of invaluable experience in these trades, is operating from the company's head office in London where he took up his appointment on September 1.



★
William Webster,
Sales Promotion
Manager
Brown Brothers,
Ltd.
★

Brown Brothers also announce the following new appointments: **F. J. TIGHE**, assistant manager, Wolverhampton branch; **D. E. VINCENT**, assistant manager (sales) Leeds branch; **R. A. SEWELL**, assistant manager Hull branch; **S. BOWDEN**, assistant manager Manchester branch.

F. SZEKELY, B.Sc. (Eng.), Grad. I.E.E., has joined the Radio Division of the Edison Swan Electric Co., Ltd., in a new section to promote the application of semi-conductors. Mr. Szekely served a graduate apprenticeship with B.T.H. Co., Ltd., after which he became a sales engineer in the B.T.H. research laboratory covering laboratory instruments and application engineering.

Latterly he was engaged on sales activities relating to semi-conductors and their applications. Mr. Szekely can be contacted at Ediswan head office at 155 Charing Cross Road, London, W.C.2.



J. S. Wilson

R. H. Pengelly

J. S. WILSON and **R. H. PENGELEY** have been appointed joint sales managers of the Ferguson Division of Thorn Electrical Industries, Ltd. Mr. Wilson was previously southern area manager, having joined the organisation in 1946 as personal assistant to the sales manager. Mr. Pengelly was previously northern area manager, prior to which he was Ferguson representative for South Wales. Both personalities are well known to the trade and in addition to their new joint responsibilities will continue to maintain their special territorial interests.

On October 2, **E. N. ROWBOTHAM**, chairman of The Ever Ready Co. (Great Britain), Ltd., accompanied by **L. W. ORCHARD**, a director of the company, left by air on a visit to the U.S. and Canada. The main purpose of the trip is to discuss new techniques in the manufacture of dry batteries for electronic devices with American manufacturers and to promote the sale of raw materials and British-designed plant for dry battery manufacture throughout the continent of America.

The Ever Ready Co. announces the appointment of **J. MURRAY YOUNG** as manager and **A. R. ANSTEY** as assistant manager of their Glasgow depot.

(Continued on page 662)

500th Pye Black Box

Mr. Murdoch (extreme right) and Mr. Greenland (extreme left) of Harrods, recently took delivery of their 500th Pye "Black Box" from R. N. Frankland, manager of the Pye Hi-Fi division, who was accompanied by C. G. Cox, London sales representative and Mr. Brying, Southern area Hi-Fi representative. Mr. Murdoch said afterwards that he attributed the steady sale of nearly one Black Box per day (amounting to over £20,000 worth of business in two years) to early enthusiasm and belief in the outstanding product. He said he considered the demand for this similar hi-fi equipment was likely to continue and expand.



People in the Picture — continued

DOUGLAS GEDDES has been appointed press officer to the E.M.I. Record Division to ensure the best possible publicity service concerning recording artistes and records published by the E.M.I. group. Mr. Geddes can be contacted at 8-11 Great Castle Street, London, W.1. (Telephone: LANgham 554). **JOHN DYER**, press relations officer of the E.M.I. group, Hayes, will deal with all information on policy and technical matters in connection with records as hitherto.

A. E. UNDERWOOD has been appointed to the main board of The Plessey Co., Ltd., Mr. Underwood, formerly at Salford Instruments, Ltd., joined Plessey in 1948. He was appointed an executive director in 1951 and a director of Plessey International, Ltd., in 1954.

British Insulated Callender's Cables, Ltd., announce the appointment of **E. WATT** as their branch manager in Chester. Mr. Watt joined the Manchester branch of British Insulated Cables, Ltd., in 1917 and has had a long and close association with heavy industry and the electrical trade. His sales territory included North Wales and he was closely identified with the initial electrification of many collieries in the North Wales coalfield.

MAJOR-GENERAL SIR LESLIE NICHOLLS relinquishes the post of chairman of Cable and Wireless, Ltd., as from January 31, 1956, in order to be free to devote his time to outside interests. During the war he served as Chief Signal Officer to Field Marshals Alexander, Montgomery, Maitland Wilson and to General Eisenhower. Later he became Chief Signal Officer, Middle East, then Chief Signal Officer to General Eisenhower at Allied Forces Headquarters and next deputy chief signal officer at S.H.A.E.F. Since 1947 Sir Leslie has travelled some 91,000 miles on business connected with Cable and Wireless, Ltd., mostly by air.

H. V. POTTER, chairman and managing director of Bakelite, Ltd., has announced his desire to be relieved of the position of managing director, though he will continue as chairman of the board. The company announced that **F. J. ROBINSON** has vacated the position of deputy managing director. The board has appointed **G. W. HODDS** as managing director.

H. E. G. HARVEY has been appointed general sales manager of Webcor (Great Britain), Ltd., in which capacity he will act as deputy to Noel Mackay, general manager of the company, which is a British subsidiary of the Webster-Chicago Corporation, manufacturers of tape recorders and



★
H. E. G. Harvey,
General Sales
Manager]
Webcor (Gt. Britain)
Ltd.
★

record players in the U.S. Three new record player models introduced over here were reviewed last month. They are the *Lark*, *Holiday* and *Musicale* "fonografs." Webcor now have their headquarters at Ingersoll House, Kingsway, London, W.C.2. (Telephone: COVEnt Garden 0283).

points of view

Letters to
the Editor

The Editor welcomes letters on subjects of general, technical or trade interest, but does not necessarily endorse the views or opinions expressed by correspondents.

BAND I CONVERSIONS

Dear Sir,—I hope dealers and engineers who are conscientiously erecting Band III aeriels in North London to receive I.T.A. transmissions are bearing in mind that the B.B.C. will also be moving from Alexandra Palace to Crystal Palace next year. Many of the indoor and loft aeriels (and even outside dipoles) now operating within a few miles of Alexandra Palace are not going to be good enough when the B.B.C. moves its transmitter, and the situation may arise that a lot of viewers north of the Thames will find they can get the I.T.A. but not the B.B.C.

I suggest that dealers who don't want a rush of "Band I conversions" next year should explain the position to their customers when adapting their sets for Band III, and where possible install a combined dual-band aerial as the best (and in the long-run the cheapest) solution.—J.B.G. London, N.14.

REAR-ADMIRAL SIR PHILIP CLARKE, K.B.E., C.B., D.S.O., has been nominated for re-election as president of the British Institute of Radio Engineers for the year 1955-56. **G. A. MARRIOTT**, B.A. (Cantab), **L. H. PADDLE**, **J. L. THOMPSON** and **PROFESSOR E. E. ZEPLER**, Ph.D., have been nominated for re-election as vice-presidents.

Nominations for ordinary members of council are: **AIR VICE-MARSHAL C. P. BROWN**, C.B., C.B.E., D.F.C., **J. W. RIDGEWAY**, O.B.E., **PROFESSOR E. WILLIAMS**, Ph.D. B.Eng. (members), **R. N. LORD**, M.A. (Oxon) (associate member) and **A. H. WHITELEY**, M.B.E. (companion).

A. C. STEWART has been appointed assistant sales manager of Chloride Batteries, Ltd., and will be working under the direction of **E. POWELL**, director and sales manager of the company.

COLOUR TV TRAINING ?

Dear Sir,—Now that the B.B.C. have got to the stage of putting out experimental colour transmissions and manufacturers are presumably busy using the transmissions to help in the design of colour TV receivers, may we hope that some effort will be made in good time to educate service engineers in the complications and difficulties of colour circuits before the thing becomes an established fact.

The people who will be installing, setting up, and servicing colour sets will be the engineers who are currently dealing with Band III problems. It's rather difficult to see how the busy engineer is going to find time to learn the new technique unless the manufacturers concerned take the trouble to organise training schemes. As TV develops so the bottleneck in competent engineers grows worse, and it may well reach the stage where an engineer, to be any good at all, will need several years of academic training to understand and cope with the new circuit techniques.—D.F.F., Watford, Herts.

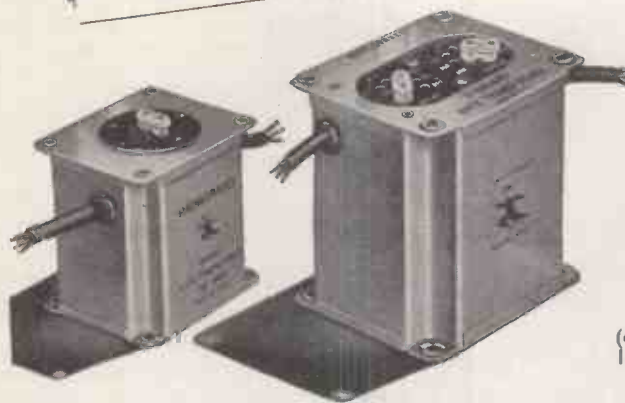
TECHNICAL KNOW-HOW

Dear Sir,—As a small dealer may I say how much I appreciate the first-rate technical articles you publish in your magazine. I take the trouble to read them because I believe that a dealer should not be dependant on his service staff for technical knowledge any more than a doctor should leave knowledge of drugs and medicines to his dispenser. I particularly welcome the articles on Band III which I find helpful and informative.—K.L., Liverpool 7.

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Every day, thousands of people move house. Some may move just around the corner, some others, across the Atlantic! All of them may (if unlucky) find that the A.C. Mains Voltage of their new home does not suit their TV, Radio, Fridge, Hair Dryer or "what-have-you". Then it becomes your job to make them work. Naturally, you will then remember our range of Auto Transformers. We produce four distinct types rated at 50, 100, 150 and 250 Watt, of which we show you two typical examples below. They all have two features in common—easy installation and absolute safety from shock. Of course you know that our Catalogue, which, if you are a recognised member of our Trade, is readily at your disposal, will give you the fullest details, not only of our Auto Transformers, but also of the multitude of our other quality components. (All prices quoted are "Net Trade" prices).



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RADIO AND TELEVISION DIGEST

★ Topicalities from Everywhere ★

Young enthusiasts collecting Lady Barnett's autograph on the R.G.D. Stand at the Midland Electricity Board's Exhibition, held in Shrewsbury recently. On the stand behind Lady Barnett is A. Gorman (advertising manager of R.G.D.).



In a mad race to sell more than 7,000,000 motor-cars a year Detroit announces a new sales "gimmick"—a record player on the dashboard. Chrysler, one of Detroit's big three car makers, is introducing the gramophone as optional equipment on 1956 models. Every buyer gets six free records.

The London "Evening News" has sent to the Electrical Industries Benevolent Association the sum of £101 1s. 3d. which represents the proceeds of the admission fees paid by the people who entered for their Television Variety Contest at the recent Radio show.

Smallest walkie-talkie f.m. radio—a transistorised instrument tiny enough to be carried in a shirt pocket, yet powerful enough for two-way communication over a quarter-mile range—has been developed experimentally by R.C.A. Engineering Products Division.

London I.T.V. programmes have been received in Birmingham by Mr. Faulkner, Coventry Road, over a distance of 110 miles, using a Pye VT4 television receiver.

A large new showroom for TV viewing has been opened at 81 Holborn Street, Aberdeen, with 32 sets on show. This salon will make a particular feature of late night opening three nights each week to allow county visitors an opportunity to see TV—more especially with the opening of a new TV station and a high frequency station pending in this area.

A new selling campaign has been launched by Pye TV. Set owners are being urged to buy a new set rather than adapt and have to "put up with doubtful performance, small screens, outdated cabinets."

Station JOAX-TV, Tokyo, Japan, is bringing millions of new viewers into its marketing and advertising area. The station has placed TV receivers in rail-road stations, transportation and other centres where the people can view its TV programmes on a community basis.

Moscow Radio reported recently that one of its TV transmissions had been picked up in Copenhagen (1,100 miles) by freak reception.

Installation of weather detection radar equipment developed by the Radio Corporation of America will be made within the next several months on the new D.C.-7C's of the British Overseas Airways Corporation. The weather detection radar system provides pilots with early warning of approaching storm centres as distant as 150 miles and enables them to detect and follow non-turbulent air paths through or around the storms.



When the new British mystery-thriller "Time-slip" started its run of cinemas at the end of last month, a Grundig TK12 tape recorder set out on a nation-wide tour that promises to bring considerable publicity to Grundig dealers everywhere. Recordings (on a Grundig TK12) of incoherent statements made by a man rescued from the river prove that he answers questions before they are asked. He is ahead of time by the seven-and-a-half seconds during which he was undergoing "clinical death." Advance publicity about the film, starring Gene Nelson and Faith Domergue, urges dealers to use stills and displays in their windows, and to demonstrate Grundig tape recorders in the foyer, after performances. Picture shows Reporter Mike Delaney (Gene Nelson), his photographer-assistant, Jill Friday (Faith Domergue), and the Grundig TK12

The Australian telecommunications industry is developing a new export market in South-East Asia in competition with British and European manufacturers. The manager of the Australian Telecommunications Co., Mr. Horan, has said that experience in designing equipment for the tropics of north Australia has been valuable in building equipment for Asian countries. A mobile telecommunication system has recently gone to Colombo, and two 7½ kilowatt short-wave transmitters are nearly ready for shipment to Malaya.

A last-minute exhibit at the British Trade Fair, held recently in Copenhagen, was a new export version of the Ekco mains-battery portable TV set, which caused such a sensation at the recent Radio Show, Earls Court.

Manhattan TV Station has a sign-off spot at 1 a.m. called *Count Sheep*, in which model Nancy Berg floats on screen in filmy lace, stretches her bare arms, yawns delicately, pops into bed and out again for a moment's play with her poodle . . . finally drifting off to slumberland to fade-out music and a cartoon of fence-jumping sheep. For this the scantily clad artiste gets \$150 nightly to be increased to \$500 when spot gets a sponsor.

Strong opposition is being expressed to the proposal by the I.T.A. to establish a transmitting station on the fringe of the Peak District National Park at Wharnciffe Chase, a beauty spot near Sheffield.

New frequency record for transistors has been set by the Bell Telephone Laboratories, U.S.A., with a junction tetrode transistor that oscillates at 1,000 Mc/s.

Test signals will be sent out from the Lancashire transmitter on Winter Hill in February. Given favourable weather conditions, the mast will be completed and equipped with aerials by Christmas.

The new Mullard publication, *High Quality Sound Reproduction*, which was first on sale at the Radio Show, introduces a new Mullard amplifier circuit which gives an output of 20 watts by using two EL34's in push-pull, and gives details of modifications and improvements to the well-established Mullard 5-valve 10-watt high quality amplifier circuit. It also contains details of an f.m. tuner.

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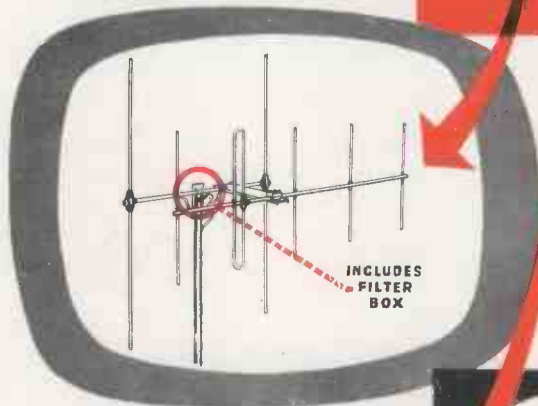
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AERIALS

The wider spacing of Aerialite Band III aerials ensures higher gain and broad bandwidth gives coverage over channels 7-10. Mechanical construction is extremely robust and fitting is extremely simple. Three, four, five and double five element aerials are available as well as twin band models.

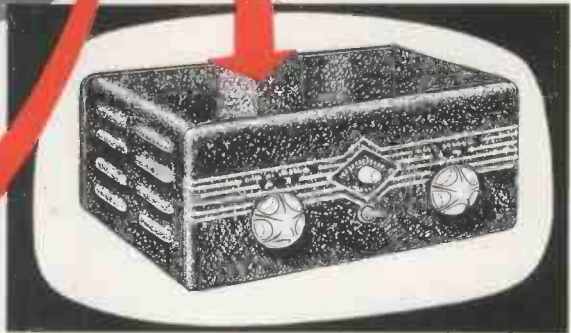


INCLUDES FILTER BOX

CONVERTORS

The range of Aerialite converters includes models for single, two and all channels in Band III. The models are attractively styled and have self-contained power packs.

Retail Prices:—
 Model TC 3 Single Channel Band III £9.10.0
 TCD Two Channels Band III £10.10.0
 MC All channels £10.17.6



DOWNLEADS

At Band III frequencies, the cable attenuation becomes important and Aerialite Aeraxial semi spaced cable really reduces losses to a minimum. Cat. 597 4.5 dB per 100 ft. at 200 mc/s and Cat. 499 2.6 dB per 100 ft. at 200 mc/s. Compare these figures with standard coaxials which have 6.2 dB attenuation per 100ft. at 200 mc/s.



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- ★ Tests any normal receiving valve.
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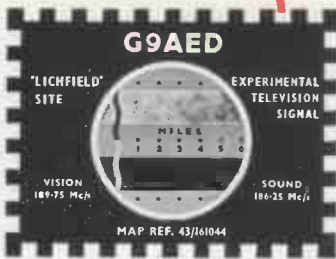


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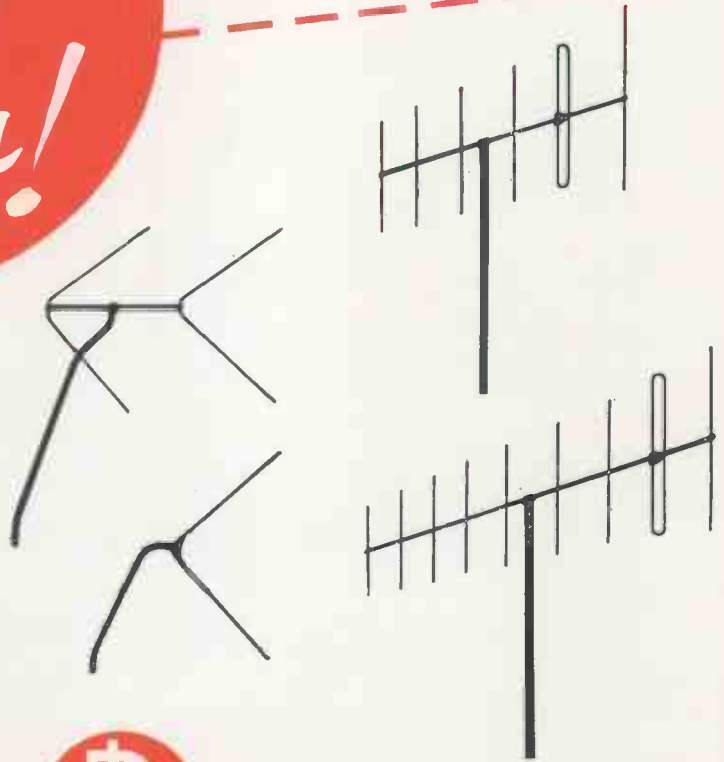
BAND III MEANS BIG BUSINESS IN THE MIDLANDS



TRANSMISSION TIMES

Regular transmissions should commence at 10.0 a.m. on Monday, October 10th, and will be as follows:—

Monday to Friday, 10 a.m.-1 p.m., 3 p.m.-6 p.m. and 7.30 p.m.-8.30 p.m. Saturday, 10 a.m.-1 p.m. There will be no transmissions on Sundays or Bank Holidays.



Our test transmissions from the I.T.A. site at Lichfield are enabling dealers in the Midlands to install aerials well in advance of the band III programmes.

Every "Belling-Lee" aerial carries a 3-year guarantee, and £25,000 insurance against third-party claims arising from personal injury or damage to property during the installation of "Belling-Lee" aerials by any dealer and for a period of three years thereafter, where such injury or damage is due to defective aerial material or faulty workmanship.

BELLING & LEE LTD
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New Books and Trade Literature

Television Receiver Servicing

Vol. 2, Receiver and Power Supply Circuits.

IN June last year we reviewed Vol. 1 of *Television Receiver Servicing* which dealt with television time-base circuits in an extremely thorough manner. Equally thorough and no less comprehensive is this second volume.

It is, perhaps, a little difficult to see why the title should differentiate between receiver and power supply circuits since the chapter on power supplies occupies only 19 pages out of a total of 308, and, in any case, the subject of e.h.t. provision was fully dealt with in Volume 1. The consideration of power supply is really an integral part of the discussion of receiver circuitry as a whole.

More important as an ancillary subject and one worthy of inclusion in the title is that of aeriels and feeders. This section, to which 54 pages are devoted, deals generally with aerial theory and practice, making no specific reference to Band III matters (which have probably materialised since the book was prepared for press). It contains much useful information on aerial matching, installation, attenuators, distribution systems, decibel notation, and propagation problems such as ghosting, aeroplane flutter, etc.

There is also a useful section dealing with television circuit alignment (which does, incidentally, touch upon Band III matters), and as in the rest of the book, the author overlooks no practical angle that may ease the engineer's daily toil, e.g., a worth-while suggestion concerning the use of a simple steel turntable on the servicing bench to facilitate alignment when adjustments are on both sides of a chassis.

The practical viewpoint is maintained throughout the discussion of receiver circuitry, with considerable emphasis on fault-finding. There is a special section on multi-channel tuners, including Band III tuners. Other subjects covered include vision a.g.c., the video stage, interference suppression, the vision detector, vision tuning circuits and sound circuits.

The book is liberally illustrated with circuit diagrams and photographs and can be recommended to all servicing men, particularly those who are studying for the Television Servicing Certificate Examination (conducted by the City and Guilds of London Institute and the Radio Trades Examination Board). The author, E. A. W. Spreadbury, has been a practical examiner for many years.—P.P.H.

Television Receiver Servicing: Vol. 2—Receiver and Power Supply Circuits, by E. W. Spreadbury, M.Brit.I.R.E. Published by Trader Publishing Co., Ltd., and distributed by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Size 8½ × 5½ in. 308 pages, 172 illustrations. Price £1 1s.

Radio Reference

HERE is a new reference book to radio theory, and an extremely compact and comprehensive one it is too. The appearance of the book may

seem a little strange to readers accustomed to normal machine typesetting and printing. This book has been privately published and the printing style is reminiscent of a compactly typewritten notebook. In a sense this is an advantage for the book acquires a "concentrated" look, rather like the concise pages of a correspondence course.

Radio Reference is intended as a radio textbook up to intermediate standard, and the author states that the required mathematical standard for intelligent use of the work is normal G.C.E. and a simple knowledge of calculus. The presentation of the subject is in the usual text-book style, commencing with notes on the structure of the atom, electrons, etc., and dealing with the units of electrical measurement, Ohm's law, through motors and generators into a consideration of alternating current and radio frequency theory. Subsequent chapters cover the theory of radio receivers, circuit analysis, amplifiers, transmitters, aeriels and transmission lines, frequency modulation, v.h.f. and u.h.f., test equipment, etc. Special appendices deal with decibel and "j" notation.

The book is well illustrated with line drawings. The chapters are subdivided into headed and numbered paragraphs which is an aid to quick reference. There are also numerous mathematical exercises, with answers.

The author, W. Clarke Riddiford, was one time senior radio instructor at Airway Training College, and the book is, in effect, a concentrated course in basic radio theory, of particular value to engineers studying for servicing examinations.—K.R.

Radio Reference, by W. Clarke Riddiford, Published by the author from 384 Tilehurst Road, Reading, Berks. Size: 8 × 6½ in., 318 pages, illustrated by line drawings. Price, £1 5s.

Color Television Fundamentals

THE "u" is omitted in the first word of the title for the very good reason that this is an American book. The author, Milton S. Kiver, must be well known by name to many English readers of U.S. technical magazines for his articles on TV circuitry, and he is, incidentally, president of the Television Communications Institute of Chicago, Illinois.

It is not surprising, therefore, that this is a very good book on a very complex subject. That Mr. Kiver succeeds in making colour television comprehensible (even in its fundamentals) is due to the extremely lucid manner in which he presents his subject, aided by a large number of clear and informative diagrams and also colour plates.

The book is topical at the present time when the B.B.C. are making experimental test transmissions using a modified form of the American N.T.S.C. system described in the text. Sooner

or later servicing men are going to have to tackle the problem of colour TV, with new techniques and a new terminology to master. The author claims that anyone who is familiar with radio and black-and-white television can follow without difficulty the step-by-step approach to the subject. Mathematics are reduced to a minimum.

The book starts with a discussion of the principles of colour and colour reproduction and then outlines the basics of the N.T.S.C. colour television system in which the colour information signal is borne by a sub-carrier located within the bandwidth of the monochrome signal. Simple colour receiver circuitry comes next, and the author goes progressively and logically through the whole of a typical three-gun colour receiver.

Two commercial U.S. colour receivers are analysed, and the last chapter deals with servicing. More detailed information including a mathematical discussion is contained in an appendix.

For readers who may feel that servicing receivers which contain such unknown and unimaginable obstacles as I and Q signals, delay lines, quadrature transformers, burst amplifiers, chroma, phase, and convergence controls, etc., is going to be the headache of all time, the author has these reassuring words to say: *Always analyse each problem first in terms of its effect on sound or picture, then in terms of black-and-white or colour. If the colour of the picture is at fault, first try to obtain a normal black-and-white image; then turn to the colour circuits. Remember that present-day colour sets consist basically of monochrome receivers with an additional number of circuits to provide the colour. If they cannot produce a normal black-and-white picture, they will not produce a normal colour picture. Considered from this angle, servicing of the colour receiver loses much of its complexity.*

It will also lose much of its complexity if the potential colour TV engineer takes time out to read and assimilate Mr. Kiver's book.—P.P.H.

Color Television Fundamentals, by Milton S. Kiver. Published by McGraw-Hill Book Co. Inc., and distributed in the U.K. by McGraw-Hill Publishing Co., Ltd., 95 Farringdon Street, London, E.C.4. Size 9 × 6 in., 312 pages, profusely illustrated. Price, £1 12s. 6d.

FM Explained

THIS booklet is a reprint of articles published in the "Wireless and Electrical Trader" explaining in simple terms the principles of the frequency modulation system of transmission as used in the B.B.C. v.h.f. radio services. Its effect on receiver design and servicing problems is explained, together with methods of circuit alignment.

FM Explained, by E. A. W. Spreadbury, M.Brit.I.R.E. Published by Trader Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1. Size: 8½ × 6 in., 38 pages, well illustrated. Price, 2s. 6d.

TRADE LITERATURE

Edwards High Vacuum, Ltd.; Manco Royal, Crawley, Surrey. Several new leaflets have been published in recent weeks to supplement the company's catalogue on vacuum equipment. They cover vacuum gauges, vacuum accessories (e.g., plumbing, seals, valves, etc.), and vacuum coating (the deposition of metallic films under vacuum). These leaflets are available to bona-fide enquirers on application to the company's Technical Publicity Department.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2. *The Present . . . The Future* is the title of a 44-page booklet published by the company. Profusely illustrated by photographs, it covers many aspects of the present state and future outlook for the electrical and electronic industries.

Financial News

It is pointed out that wind-up proceedings and liquidations are frequently rendered necessary for the purpose of reconstruction, extension of capital, transfer of business, etc., quite unconnected with any financial embarrassment, and the fact that companies appear in this list, therefore, must not be taken as necessarily indicating any want of solvency.

BANKRUPTCY PROCEEDINGS

Gilbert Dennis Fly, 62 Harlesden Gardens, Harlesden, London, N.W.10, lately carrying on business at 111 Church Road, Willesden, London, N.W.10, radio and television dealer. Receiving Order and Order of Adjudication August 30. Public examination November 10 at Bankruptcy Buildings, Carey Street, London, W.C.2.

Clarence Martin, 266 Bradford Road, Fartown, Huddersfield, lately carrying on business at 268 Bradford Road, Fartown, Huddersfield, radio dealer, etc. Receiving Order and Order of Adjudication September 9. Public examination November 2 at The County Court House, Queen Street, Huddersfield.

E. Franks (male), otherwise known as E. Franks Bushell, 15 Kirton Avenue, Newcastle-upon-Tyne, lately carrying on business at 35-37 Baltic Chambers, Quayside, Newcastle-upon-Tyne, television aerial salesman. Receiving Order September 9. Public examination November 8 at The Court House, 56 Westgate Road, Newcastle-upon-Tyne.

F. Williams (male), otherwise known as F. Bushell, 6 Wellfield Road, Newcastle-upon-Tyne, lately carrying on business at 35-37 Baltic Chambers, Quayside, Newcastle-upon-Tyne, television aerial salesman. Receiving Order September 9. Public examination November 8 at The Court House, 56 Westgate Road, Newcastle-upon-Tyne.

Kenneth Frederick Di-Citterer Ponting-Baker, carrying on business under the style of P. B. Radio Services, at the Metropole Showrooms, North Road, Minehead, Somerset, radio and television contractor. Receiving Order September 14.

CHANGES OF NAME

Electrical & Radio Engineers (Neath), Ltd., 10a Wind Street, Neath. Name changed to Neath Electrical Company, Ltd.

Telemaintenance (Pinner), Ltd., 421 Rayners Lane, Pinner, Middlesex. Name changed to Rentov v (Middlesex), Ltd.

DISSOLUTION OF PARTNERSHIP

Richard John Morton and Reuben Gold, trading as "Modern Lighting and Radio Appliances," 68 Queens Crescent, Kentish Town, London, N.W.5, retailers of radio and electrical equipment, September 15, 1955. All debts by Reuben Gold who will continue.

Derek Horton and Douglas Atkins, carrying on business under the style of "Teleservice," 84 Woodville Road, and formerly of 33 Salisbury Road, both Cardiff, radio and television retailers, August 24, 1955. All debts by Derek Horton who will continue.

Arthur James Cherry, Joseph Raymond Price and Alfred Ernest Ball, carrying on business under the style of "Rad-Electric," 18 Shelford Road, Radcliffe-on-Trent, Notts., radio and television engineers, etc., March 1, 1955 (dated July 20, 1955) so far as concerns Arthur James Cherry who retires.

INCREASES OF CAPITAL

Aerialite, Ltd., Castle Works, Stalybridge. Registered capital of £250,000 increased by £50,000.

A. F. Marriott, Ltd., 13 Gloucester Road, Bristol. Registered capital of £30,000 increased by £14,350.

Associated Broadcasting Co., Ltd., 24 Old Broad Street, E.C.2. Registered capital of £100 increased by £1,019,900.

Broadmead Wireless Co., Ltd., 146 White-ladies Road, Bristol, 8. Registered capital of £150,000 increased by £50,000.

Claridges Radio, Ltd., 81 The Strand, Cheltenham. Registered capital of £1,000 increased by £7,250.

Cleminson's Agencies, Ltd., 74 Hampden Way, Southgate, N.14. Registered capital of £100 increased by £900.

Colmore Investments, Ltd., 83 Station Street, Birmingham. Registered capital of £150,000 increased by £100,000.

Currys, Ltd., 91 Park Street, W.1. Registered capital of £1,500,000 increased by £500,000.

Davis & Timmins, Ltd., Billet Works, Billet Road, Walthamstow, E.17. Registered capital of £400,000 increased by £200,000.

Dias & Co., Ltd., 53 Lowther Street, Carlisle. Registered capital of £15,000 increased by £35,000.

Electronics (Lincolnshire), Ltd., 106 Cleethorpe Road, Grimsby. Registered capital of £100 increased by £900.

Electronic Trust, Ltd., 310 Gresham House, Old Broad Street, E.C.2. Registered capital of £100 increased by £1,999,900.

Hartley & Bramhall, Ltd., Hindpool Road, Barrow-in-Furness. Registered capital of £1,000 increased by £4,000.

Instalments Department, Ltd., merchants, factors, etc., 85 Station Street, Birmingham. Registered capital of £10,000 increased by £20,000.

Jacksons Radio, Ltd., 79 Old Kent Road, S.E.1. Registered capital of £16,000 increased by £750.

J.B. Radio, Ltd., Brent Green Works, Hendon, N.W.4. Registered capital of £1,000 increased by £2,000.

Lifes Radio, Ltd., 19-21 London Street, Southport. Registered capital of £15,000 increased by £10,000.

P.M. Distributors, Ltd., 85 Station Street, Birmingham. Registered capital of £5,000 increased by £10,000.

Priestley & Ford, Ltd., 49 John Bright Street, Birmingham. Registered capital of £10,000 increased by £10,000.

Relay Systems, Ltd., 16 Bridge Street, Hawick. Registered capital of £7,000 increased by £23,000.

Resolound, Ltd., 35a City Road, E.C.1. Registered capital of £5,000 increased by £5,000.

Richards Radio, Ltd., 746 Bath Road, Cranford, Hounslow, Middlesex. Registered capital of £3,000 increased by £2,000.

Rheostatic Co., Ltd., Farnham Road, Slough. Registered capital of £400,000 increased by £250,000.

Robert New, Ltd., 3 Northways Parade, Swiss Cottage, N.W.3. Registered capital of £10,000 increased by £2,250.

T.R.A. (Electrical), Ltd., 66 Alma Street, Luton. Registered capital of £15,000 increased by £10,000.

T.S.J., Ltd., Hammersmith Grove, W.6. Registered capital of £100 increased by £9,900.

NEW COMPANIES

Airdale Laboratories (Electronics), Ltd. Capital £1,000. Objects: To carry on the business of electronic instrument makers, both medical and industrial, etc. Directors: Dennis B. Appleby and Leslie H. King. Secretary: Sydney H. Jackson. Solicitors: Jack Chadwick, 129 Albion Street, Leeds. Registered office: 16 Hanover Avenue, Leeds, 2.

A. J. Davies (Bromley), Ltd. Capital £600. Objects: To carry on the business of electricians,

radio and electrical engineers, etc. Directors: Herbert F. Edwards and Reginald L. Priscell. Registered office: 88 Plaistow Lane, Bromley, Kent.

A.T.I. Developments, Ltd. Capital £500. Objects: To carry on the business of manufacturers and assemblers of and dealers in electric and electronic apparatus, etc. Directors: Arthur T. Izzard, Leslie D. H. Izzard, and Bernard G. Izzard. Secretary: G. B. M. Coomes. Solicitors: Devonshire & Co., Salisbury House, London Wall, E.C.2. Registered office: 70 High Road, Broxbourne, Herts.

Barr's Retail, Ltd. Capital £10,000. Objects: To carry on the business of manufacturers and repairers of and wholesale and retail dealers in electric lamps, fires, stoves and cookers, telephonic and television and wireless apparatus, etc. Subscribers: Percy L. Barr and Mrs. Edith Barr. Mrs. Edith Barr is the first director. Solicitors: Sleigh & Newton, 15 Hyde Road, Denton, Manchester. Registered office: Market Place, Denton, Manchester.

Burnie & Harriman, Ltd. Capital £75. Objects: To carry on the business of radio, electrical, motor, mechanical and general engineers, etc. Directors: J. A. Burnie, C. Harriman, and D. Johnstone. Secretary: D. Johnstone. Registered office: 38 High Street, Dalbeattie.

Clifford Radio & Television, Ltd. Capital £5,000. Objects: To acquire the business of a wireless, television, electrical and refrigeration engineer carried on by Derek Clifford Macrae at 111 Salop Street, Wolverhampton, as "Clifford Radio," etc. Directors: Derek C. Macrae and Mrs. Angela M. Macrae. Secretary: Angela M. Macrae. Registered office: 111 Salop Street, Wolverhampton.

Commercial Television Conversions, Ltd. Capital £100 in £1 shares. Objects: To carry on the business of manufacturers, distributors and assemblers of television converters and accessories, etc. Directors: Wm. J. T. Pingram and David A. Rose. The articles of Association give the directors as: Wm. J. T. Pingram and J. Rose. Registered office: 14 Robert Adam Street, W.1.

Deltra Radiovision (Boscombe), Ltd. Capital £5,000. Objects: To carry on the business of retailers, wholesalers and manufacturers of television, radio and electrical goods, etc. Directors: Kenneth W. F. White, Joyce E. White, and Joseph L. Dodd. Secretary: Joyce E. White. Registered office: Princes House, 34/6 Princes Street, Yeovil, Som.

Selecta (Midlands), Ltd. Capital £100. Objects: To carry on the business of factors of and dealers in records, discs, tapes and other contrivances for reproduction of sound, etc. Directors: Edwd. R. Lewis, Harry Bryan, Wm. W. Townsley, and Herbert C. Lambert. Secretary: Letitia J. Hemsley. Solicitors: Rowe & Maw, Stafford House, Norfolk Street W.C.2. Registered office: 1/3 Brixton Road S.W.9.

Electro Mechanical Techniques, Ltd. Capital £1,000. Objects: To carry on the business of manufacturers of and wholesalers and retailers in engineering, plastic, scientific, optical, electrical and electronic products of all kinds, etc. Subscribers: Eward D. Bintliffe and D. Brummer. Eward D. Bintliffe is the first director. Secretary: D. E. Curr. Registered office: Offices of Benjamin Kay & Brummer, 57 Blandford Street, W.1.

Electronic Services (Cardiff), Ltd. Capital £2,000. Subscribers: Cyril W. Davies and Arthur Davies. Cyril W. Davies is the first director. Registered office: Rhymney Terrace Cathays, Cardiff.

Essoldomatic, Ltd. Capital £200. Objects: To carry on the business of designers and manufacturers of and dealers in all kinds of electronic, electrical, radio, radar, television photographic and cinematograph apparatus and appliances, etc. Subscribers: Sol Sheckman and Mark Sheckman. The first directors are not named. Solicitors: Clifford-Turner & Co., 1 Old Jewry, E.C.2.

Forbes Electrical Industries, Ltd. Capital £1,000. Objects: To carry on the business of manufacturers of and dealers in chokes, suppressors, condensers, valves and electrical and electronic apparatus, etc. Directors: Wm. Roberts and Neville Hoad. Secretary: Nevill Hoad. Solicitors: Wilkinson Howlett & Moorhouse, W.C.2.

Financial News

—continued

Stevenson & Rennie, Ltd. Capital £6,000. Objects: To carry on the business of radio, television, electrical and motor engineers, etc. Directors: R. G. Stevenson and A. Rennie. Secretary: R. G. Stevenson. Registered office: 8 Cathkin Drive, Clarkston, Renfrewshire.

Teleo Electronics, Ltd. Capital £1,000. Objects: To carry on the business of manufacturers of and dealers in electrical, radio and television apparatus, etc. Subscribers: Edw D. Roff, Joseph D. Parker, and Roy E. Dubery. The first directors are not named. Secretary: Marie G. Parker, 59 Finchley Lane, N.W.4.

Television Developments (Scotland), Ltd. Capital £100. Objects: To carry on business of owners, renters, managers and operators of sound and television broadcasting stations, etc. Subscribers: A. C. McBain and R. P. Burnet. The first directors are to be appointed by the subscribers.

Trade Installations, Ltd. Capital £10,000. Objects: To carry on the business of designers, manufacturers, installers and repairers of and dealers in electrical, radio, sound recording, radio and television relay services, public and private amplifier and public address equipment, etc. Directors: Leonard W. Huggins and John G. Sterry. Secretary: John G. Sterry. Registered office: 10 Parliament Street, Gloucester.

T.V. Research (Gallup Poll), Ltd. Capital £100 in 1s. shares. Subscribers: Donald S. Shanks and Robt. G. D. Butler. The first directors are to be appointed by the subscribers. Solicitors: A. M. Longhurst & Butler, E.C.3. Registered office: 59 Brook Street, W.1.

Vision Finance, Ltd. Capital £100. Objects: To carry on the business of financiers of hire purchase agreements for the sale of radio, television, electrical and tele-communication apparatus, etc. Subscribers: Herbert E. W. Jones

and Geoffrey E. Homan. Herbert E. W. Jones is the first director. Secretary: Gladys M. Jones. Registered office: 277 East Barnet Road, East Barnet, Herts.

W. H. (Vision), Ltd. Capital £1,000. Objects: To carry on the business of manufacturers, repairers, servicers and hirers out of and wholesale and retail dealers in radio, electrical and mechanical apparatus, radio and television sets, etc. Subscribers: Wm. Hershman and Fdk. P. Thirkettle. Wm. Hershman is the first director. Secretary: Nita Hershman. Registered office: 98, Golders Green Road, Golders Green, N.W.11.

Wilson (Television Rentals), Ltd. Capital £1,000. Directors: Cyril C. Wilson and Mrs. Doris A. Wilson. Secretary: C. C. Wilson. Registered office: 18 Upper George Street, Luton, Beds.

W.W.W., Ltd. Capital £2,000. Objects: To carry on the business of financiers and capitalists, hire purchase financiers, manufacturers of and dealers in electrical goods, wireless and television sets, etc. Directors: Frank N. Williams, Dorothy W. Williams, and Maxwell P. Walls. Secretary: Dorothy W. Williams. Solicitors: Wayman-Hales, Chester. Registered office: 26 Newgate Street, Chester.

No. 28 of 1955. First of 2s. 6d. in the £ payable at the offices of A. E. Orbell & Co., 7 Old Steine, Brighton.

Hugh Brown, lately carrying on business at 109A, Park Street, Luton, Beds., radio and electrical engineer. No. 14 of 1953. First and final of 1½d. in the £, payable at the Official Receiver's Office, 6 The Parade, Northampton.

VOLUNTARY LIQUIDATION

A. J. Dyer & Sons, Ltd., 148 St. Thomas Street, Derby, electrical, radio and television engineers and contractors.

Pursuant to Section 293 of the Companies Act, 1948, a meeting of creditors of the above was held recently at Winchester House, Old Broad Street, London, E.C.2, when a statement of affairs was presented showing liabilities amounting to £30,763 6s. 3d., of which £23,807 0s. 11d. was due to trade creditors; £1,206 17s. 9d. to sundry expense creditors; £908 7s. 2d. in respect of loans; and £4,841 0s. 7d. to the Bank.

Assets were estimated to produce £14,130 14s. 9d., but after allowing £1,780 ls. for preferential claims, and £1,030 due to a debenture holder, there were net assets of £11,320 13s. 9d., or a deficiency as regards creditors of £19,442 12s. 8d.

The issued share capital of the company was shown at £1,550 and, so far as the shareholders were concerned, there was a total deficiency of £20,992 12s. 8d.

An informal meeting of creditors was held in July at Derby when it was hoped the company would be able to continue trading. Since then the matter had been investigated, but further capital could not be obtained, and it was agreed the company should proceed to liquidation.

Creditors passed a resolution confirming the voluntary liquidation of the company with Mr. N. W. Osborne, F.C.A., of Messrs. Rushton Osborne & Co., 12 Finsbury Square, London, E.C.2, as liquidator. A committee of inspection was also appointed.

NOTICE OF DIVIDEND

Philip Karl Eichenberger, 30 Market Place, Boston, Lincs., wireless dealer, No. 8 of 1936. Supplemental of 11s. in the £ (making 20s. in all) payable at the Official Receiver's Office, 27 Regent Street, Park Row, Nottingham.

Willfred James Hoskins, lately carrying on business under the style of Tele-Technics, 10A Mill Street, Pontypridd, and 4 Penuel Lane, Pontypridd, Glamorgan, television dealer. No. 2 of 1954. First and final of 8½d. in the £ payable at the Official Receiver's Office, County Court Buildings (first floor), Westgate Street, Cardiff.

Cyril Albert Markwick, 111 Church Road, Hove, Sussex, radio and television engineer.

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PORTABLE AMPLIFIER RECORD PLAYER



"The Angelette" is a quality record player at a price that will make it your best-seller. The attractive coloured case is in two-tone leatherette, complete with handle and fasteners, and is rubber mounted. "The Angelette" is guaranteed for 12 months (valves 90 days)

SPECIFICATIONS

200/250 volts, 50 c/s A.C. mains. B.S.R. player unit for records of 7" 10" and 12" Ordinary and LONG PLAYING at speeds 33, 45 and 78 r.p.m. High Fidelity crystal pick-up with turnover-head with Sapphire needles.

Amplifier consists of mains isolating transformer and output speaker transformer, output valve plus rectifier, etc., etc. Elac (or as available) loudspeaker with semi-reflex acoustic system.

Approximate size: 12½" x 12½" x 7½"

<p>RETAIL PRICE</p> <p>12 GNS. (including P.T.)</p>	<p>TRADE PRICE £6 7s. 2d.</p> <p>PURCHASE TAX £3 1s. 3.</p> <p>ORDER NOW FOR CHRISTMAS SALES!</p>
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This new pack contains 20ft. of 18 s.w.g. 60/40 alloy Ersin Multicore Solder. 2/6 each retail. Display carton containing 1 doz packs 20/- nett trade.



TAPE SOLDER

Needs no soldering iron, no extra flux, no special skill. Only a match is required to make a faultless joint. Cards 1/- each, retail. 8/- per doz. nett trade, in display cartons of 2 doz.



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This popular pack contains Ersin Multicore in any of 4 specifications. 5/- each retail, 3/4 each nett trade. Size 2 Handyman's cartons also supplied. 6d. each retail, 4/- doz. nett trade.



RADIO & T/V SERVICE ENGINEERS' 1 lb. REEL

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Bib WIRE STRIPPER & CUTTER

Strips insulation without nicking the wire, cuts wire cleanly, splits plastic extruded twin flex. 3/6 each retail. 28/- doz. nett trade, in 1 doz. display cartons.



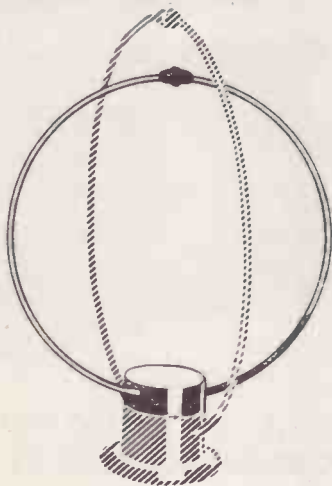
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- ★ 7" x 4" ELLIPTICAL LOUDSPEAKER.
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- ★ SPECIAL TRADE SAMPLE OFFER. SEND 8 Gns. SAMPLE SENT BY RETURN COMPLETE WITH LEAFLETS, DISPLAY PRICE CARD, ETC. CASH REFUND IF NOT SATISFACTORY.

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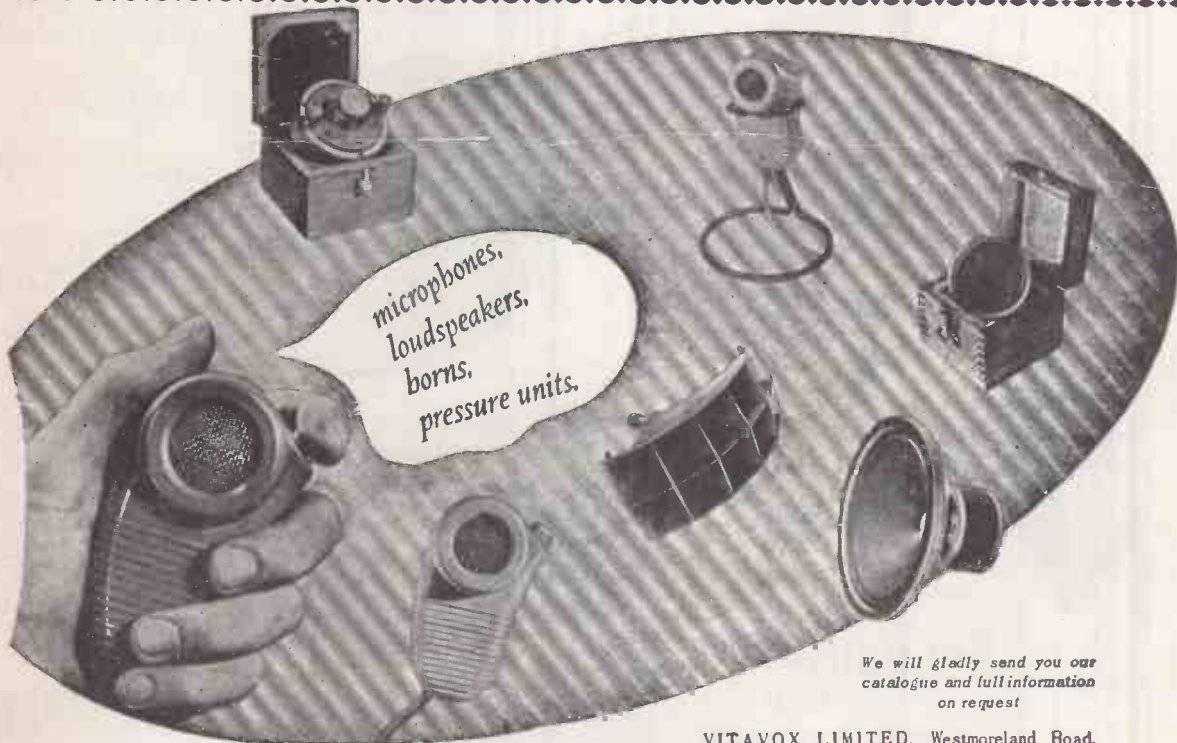
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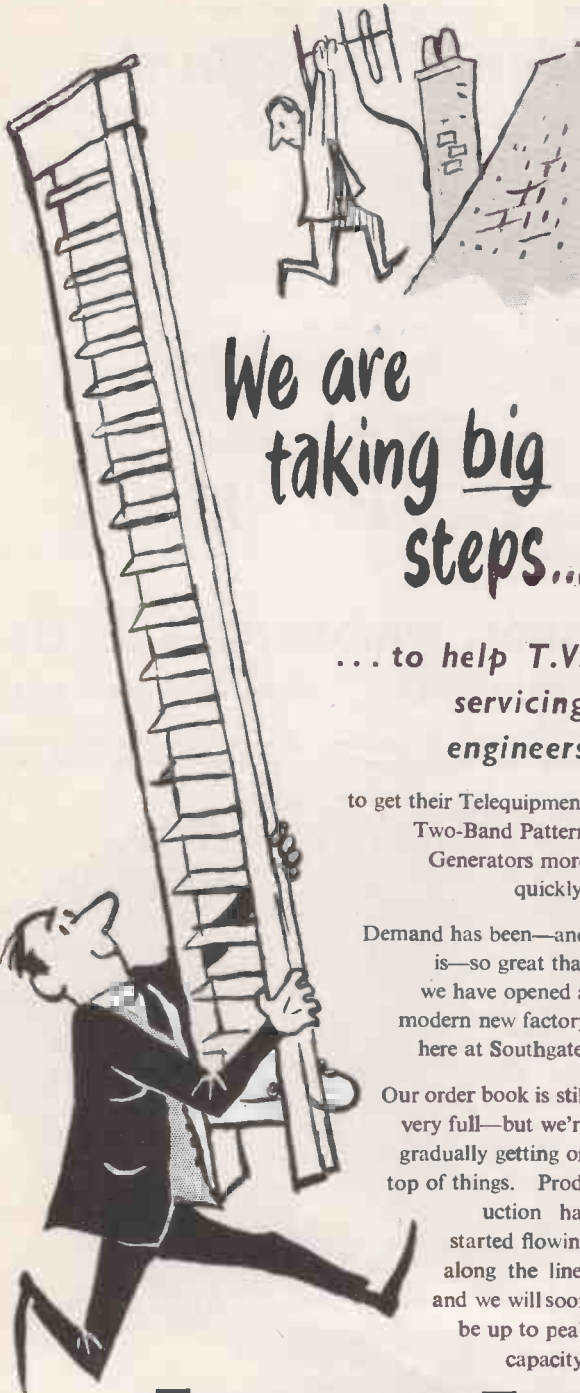
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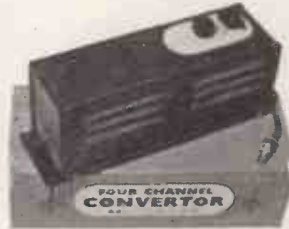
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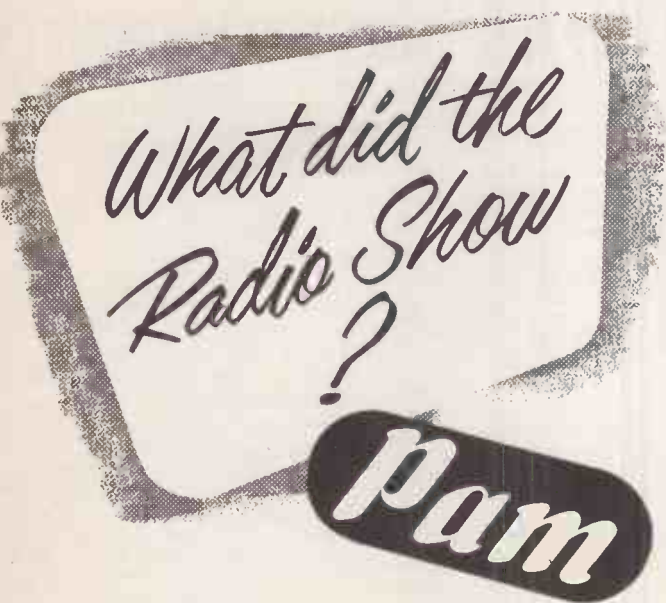
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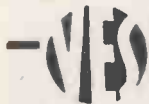
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