

*British*

R A D I O A N D

# TELEVISION

*Incorporating "The British Radio Maker and Exporter"*

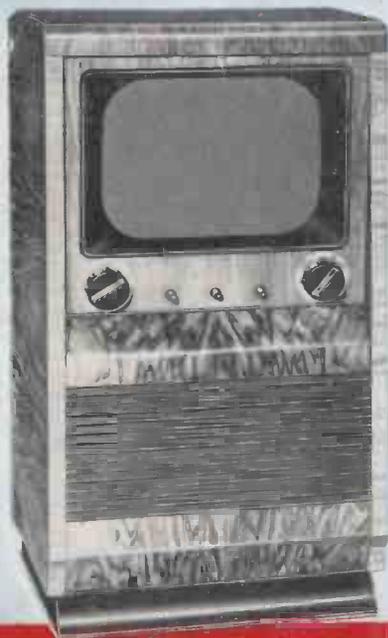
Vol. X No. 2

JUNE, 1955

By subscription only.  
£1 a year post free

# £100,000

# TV



## MODEL V14C

An elegant new 14" Console TV in contemporary styling. It incorporates the well-known Pye features of 13-Channel Switch Tuning, Automatic Picture Control, and tilted Black Screen. The controls are brought to the front of the cabinet which is finished in attractive walnut veneers. It is mounted on castors for easy movement. Here is wonderful value for money at

**71 GNS**  
TAX PAID

★ *Automatic Picture Control*

★ *Pye-Black Screen*

★ *13 Channel Tuning*

★ *Pye "Auto Sync"*

P Y E L I M I T E D O F C A M B R I D G E



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

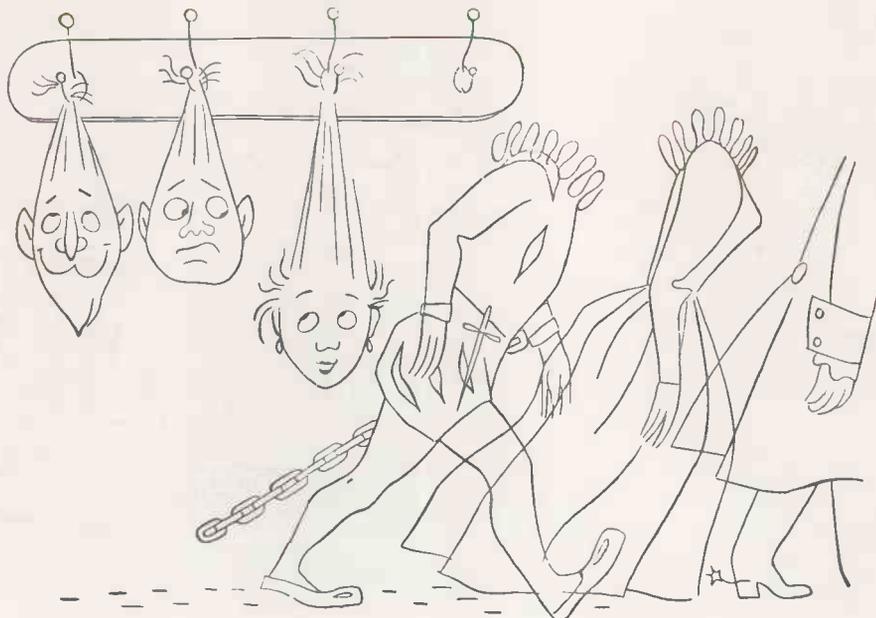
RADIO & TELEVISION RECEIVERS · GRAMOPHONE RECORDS



RADIOGRAMS & RECORD PLAYERS · TAPE RECORDERS

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

# DETACHABLE PICK-UP HEADS



**N**OT only unfunny! A rather horrific picture! When we said "detachable pick-up heads" surely the artist must have known we meant "detachable pick-up heads" not . . . anyway, we are sure *you* understand we meant the detachable high fidelity pick-up heads supplied

with our latest radiograms.

Pick-up heads are, of course, only one of the many important features of our radiograms — just as radiograms are only one of the many important branches of our business. We make electrical products of all kinds.

# PHILIPS

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

\*PHILISHAVE<sup>®</sup> ELECTRIC DRY SHAVERS · \*PHOTOFLUX<sup>®</sup> FLASHBULBS · BATTERY CHARGERS AND RECTIFIERS · CINEMA PROJECTORS

(P365A)



Produced in response to a demand for a high sensitivity version of the world-famous Universal AvoMeter, this model incorporates the traditional design features of its predecessors, so highly valued for simplicity of operation and compact portability.

It has a sensitivity of 20,000 ohms per volt on all D.C. voltage ranges and 1,000 ohms per volt on A.C. ranges from 100V. upwards. A decibel scale is provided for audio frequency tests. In addition, a press button has been incorporated which reverses the direction of current through the moving coil, and thus obviates the inconvenience of changing over test leads when the current direction reverses. It also simplifies the testing of potentials, both positive and negative, about a common reference point. A wide range of resistance measurements can be made using internal batteries, separate zero adjustment being provided for each range.

It is of importance to note that this model incorporates the "AVO" automatic cut-out for protection against inadvertent overloads.

Size 8½" × 7¼" × 4½"  
Weight 6½ lbs. (including leads)

**£23 : 10s.**

The following accessories are available to widen still further the ranges of the instrument:—A Resistance Range Extension Unit to extend the limits of measurement from 0.025 ohm to 200M... a 10kV D.C. multiplier and a number of A.C. current transformers.

| D.C. VOLTAGE | D.C. CURRENT | A.C. VOLTAGE | A.C. CURRENT | RESISTANCE               |
|--------------|--------------|--------------|--------------|--------------------------|
| 2.5V.        | 50μA.        | 2.5V.        | 100mA.       | First indication 0.5Ω.   |
| 10V.         | 250μA.       | 10V.         | 1A.          | Maximum indication 20MΩ. |
| 25V.         | 1mA.         | 25V.         | 2.5A.        | 0—2,000Ω                 |
| 100V.        | 10mA.        | 100V.        | 10A.         | 0—200,000Ω               |
| 250V.        | 100mA.       | 250V.        | —            | 0—20MΩ                   |
| 1,000V.      | 1A.          | 1,000V.      | —            | 0—200MΩ                  |
| 2,500V.      | 10A.         | 2,500V.      | —            |                          |

using internal batteries,  
using external batteries.



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

Fitted  
to the World's finest  
radiograms

**Garrard**  
record playing units

*Seven inch, ten inch and  
twelve inch records played  
at all speeds and played  
superbly.*



# THE NEW

# Osram

## KT55 output valve



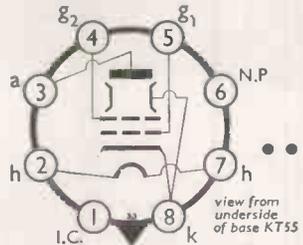
The new Osram KT55 beam tetrode will command widespread interest among designers of amplifier equipment. With a heater rating of 0.3A, 52V, it is intended for use in a series heater chain and is suited to either DC or AC/DC mains amplifiers.

Outstanding KT55 characteristic is its high power output (25 watts per pair) with minimum distortion at comparatively low H.T. voltage (200V) inevitable with DC mains amplifiers.

Robust and efficient, the Osram KT55 will form a popular companion-type to the well-known KT66.

Two valves, type KT55, will supersede the need for four valves, type KT33C, in AC/DC amplifiers required to deliver up to 25 watts at 200 volts.

KT55 List price :- 25/-  
plus P. Tax 8/2



**HEATER**

|                       |     |     |     |   |
|-----------------------|-----|-----|-----|---|
| I <sub>h</sub> ... .. | 0.3 | ... | ... | A |
| V <sub>h</sub> ... .. | 52  | ... | ... | V |

**TYPICAL OPERATION**  
Tetrode connection. Push-pull. Data per pair unless otherwise stated.

|                                   | QUIESCENT | MAX. SIGNAL |    |
|-----------------------------------|-----------|-------------|----|
| V <sub>a</sub> (b) ... ..         | 225       | 215         | V  |
| V <sub>a</sub> ... ..             | 200       | 190         | V  |
| V <sub>g2</sub> ... ..            | 200       | 190         | V  |
| V <sub>in</sub> (g-g) (pk) ... .. |           | 28.8        | V  |
| V <sub>g1</sub> (approx.) ... ..  | -20.5     | -23.5       | V  |
| I <sub>a</sub> ... ..             | 220       | 225         | mA |
| I <sub>g2</sub> ... ..            | 15        | 45          | mA |
| R <sub>k</sub> (per valve) ... .. | 175       | 175         | Ω  |
| R <sub>l</sub> (a-a) ... ..       |           | 2           | kΩ |
| P <sub>out</sub> ... ..           |           | 25          | W  |
| D ... ..                          |           | 2           | %  |
| Z <sub>out</sub> ... ..           |           | 9           | kΩ |

# A PRECISION SIGNAL GENERATOR BY ADVANCE

for the

## SERVICE ENGINEER



A high-grade generator, in the Advance tradition, at a price that puts it within reach of every service engineer.

Employing standard signal generator technique, the P.1 incorporates an up-to-the-minute oscillatory circuit with special screening and filtering so that even at 100 Mc/s leakage is less than 3 microvolts. The accurate attenuator system embodies a non-inductive slide wire followed by a five-position 75-ohm ladder network, and the correctly terminated 75-ohm cable obviates mis-match reflections and provides dummy aerial output voltages substantially those indicated by the attenuators.

*Other models available :*

PI/M for 105-125 volts, 140-160 volts, 210-250 volts  
40-100 c/s.

PI/NA for 117 volts, 25-60 c/s only.

*The instrument is covered by the usual Advance guarantee.*

*Write for fully descriptive leaflet No. B22.*

**LIGHTER**  
weighs only 10 lb.

**SMALLER**  
12 in. wide x 9 in. high x 6 in.  
deep.

**COVERS**  
100 kc/s to 100 Mc/s ON  
FUNDAMENTALS IN  
SIX RANGES

**COMPLETE**  
with T.P. Pad and Dummy  
Aerial, etc.

For 105-125, 210-250v  
40-100 c/s

# The Advance SIGNAL GENERATOR TYPE **PI**

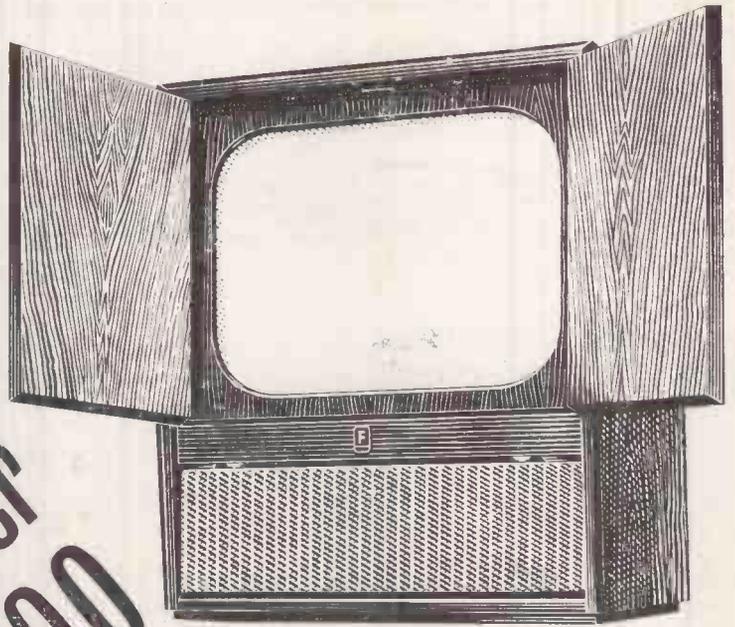
LIST PRICE IN U.K.

**£22 5s.**

ADVANCE COMPONENTS LTD., MARLOWE ROAD, WALTHAMSTOW, LONDON, E.17

Tel.: LARKSwood 4366.

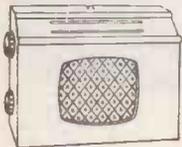
The biggest picture under £100



MODEL 20T4 89 gns.

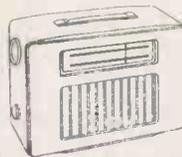
This Ferranti projection model with its 20" (diagonal) screen gives the biggest picture under £100. That's still the biggest news — sales news — in television today. We are continuing to take advantage of the fact in our national advertising—sales are

continuing to rise, as more and more customers ask for the 20T4. It's a 13-channel receiver. It has all the qualities of the most expensive set, but at a table model price. No wonder it's one of the most popular sets on the market.



MODEL 545 AC/DC  
Transportable  
17 gns.

MODEL 945 A.C.  
Mains & Battery  
Portable 19½ gns.



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THE SEASON —



'Serenade' 57 Gns.

★ All  
cabinets of an  
exceptional quality

★ F/M tuners  
available for  
all models



'Rigoletto' 39½ Gns.



'Faust' 52 Gns.

★ All  
chassis with  
latest built-in  
Ferrite Antenna

(All prices quoted  
inclusive of Tax)



'Riviera' 62 Gns.

Wholesale inquiries invited in areas not represented

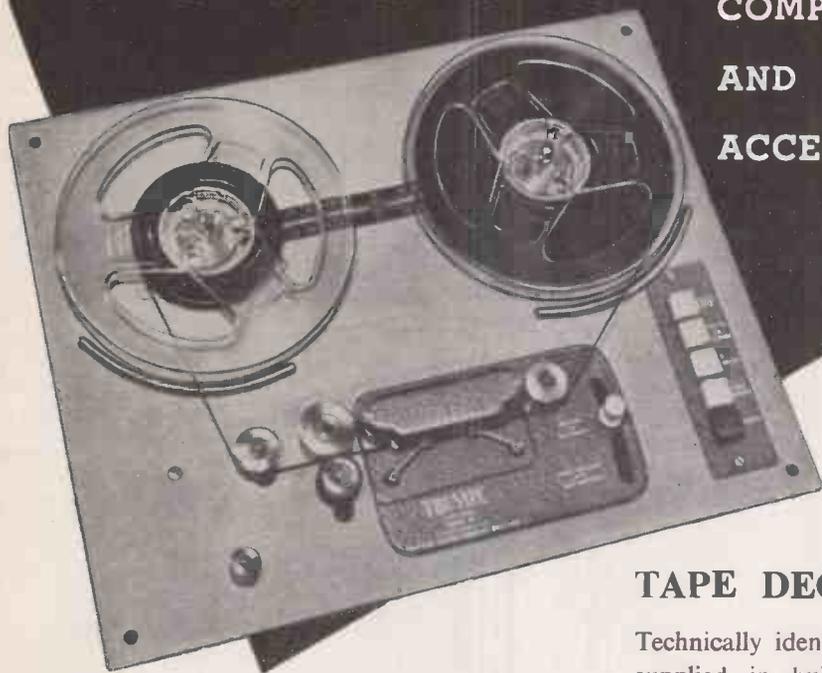
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**TAPE  
RECORDER  
COMPONENTS  
AND  
ACCESSORIES**



## TAPE DECK Mk IIIu SERIES

Technically identical with the world-famous Deck supplied in bulk to Recorder Manufacturers. With B.S.S. sense of tracking, it is fully approved for playback of pre-recorded tapes List Price remains at 22 gns.

*Details of complete recorders incorporating the TRUVOX Tape Deck are available on request.*

The full range of Truvox Tape Recorder Components and Accessories is shown alongside—send for fully descriptive leaflets.

TAPE DECKS

●  
AMPLIFIER

●  
RADIO JACKS

●  
FOOT CONTROL

●  
TELEPHONE ADAPTOR

●  
MONOSET AND STETHOSET  
HEADPHONES

●  
CORNER DIFFUSION SPEAKER



# TRUVOX LIMITED

Sales Office : 15 Lyon Road, Harrow, Middx. Tel : Harrow 9282

Tech. & Service Dept.: 328 The Broadway, Station Road, Harrow, Middx. Tel: Harrow 4455

## Gram About Town

In twenty years of specialising in radiograms (and we've produced a good many in that time) we've never introduced a model as universally welcomed as our *Elizabethan*.

Good looks, quality of reproduction or sheer down-to-earth value for money—whatever the customers are looking for the *Elizabethan* has it.



### *Elizabethan*

AC 3-speed auto-changer - - - - - 52 gns. tax paid  
AC/DC 3-speed auto-changer - - - - - 60 gns. tax paid

No wonder it's selling like hot cakes from Bolton to Bond Street.

One apology: we are sorry the *Elizabethan* is in such short supply—but the demand for it really is extraordinary. Put one on show and see!

**ACE - for contemporary home entertainment - ACE**

# SAVE TIME LABOUR! MONEY!

WITH *Radar* CATHODE RAY TUBE  
THE 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"*

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Test Reports: R74 Raymond F55; R75 Murphy A146CM; TV67 Bush TV24 series

# towards a new concept of picture quality . . .



*The Hallmark of Quality*



2-band Model 1840 14" tube  
67 GNS Tax Paid

This new receiver typifies the latest 'H.M.V. Highlight' range.

With electrostatic focussing, "His Master's Voice" has carved yet another notch in electronic history. Each of the seven superb sets in the range presents a picture of real photographic quality, with all the vitality, brilliance and tonal gradation of a fine black-and-white photograph.

*The New*

## "HIS MASTER'S VOICE"

2-BAND

'HIGHLIGHT' TELEVISION

*featuring for the first time ELECTROSTATIC EMISCOPE TUBES*

## Tele-opinion

# Aerial Summer

WITH only three months to go before the official I.T.A. test transmissions come on the air, dealers in the primary and secondary service areas of the Croydon station have little enough time in which to convert Band I TV sets and instal Band III aerials. But if a September bottleneck of Band III installation work is to be avoided, or at least minimised, it is most essential that the next few months should be an aerial summer. By taking up the slack now the retail trade may be able to avoid breaking strain later on.

Programme contractors, backed by the I.T.A. and the radio industry, are starting a widespread publicity campaign stressing the need for immediate action by John Citizen if he wants to have his TV set ready to receive the commercial programmes on time. The dealer can do much in his day-to-day contacts with the public, and by means of special window displays, to underline the urgency of the problem.

Perhaps the most important item the dealer needs is information: first, information about commercial television itself and what viewers can expect to see on their screens, for Band III TV will have to be sold as an entertainment medium before people will let themselves be persuaded to spend money on aerials and adaptors; second, information on aerials of all kinds—two-band, Band III, indoor, outdoor, fringe arrays, etc.—with illustrated leaflets from manufacturers where possible, so that customer's can have all the essential data and prices at their finger-tips before buying. They will then buy with confidence.

**Don't despise display**—Band III aerials are relatively small and can easily be featured in a window display. An aerial window is bound to attract attention, particularly if the display is linked with multi-channel receivers and adaptors, plus some general information on the I.T.A. service and some of the stars who are scheduled to appear in the early programmes.

**Be honest about installation difficulties**—and don't hesitate to point out the nearer it gets to September 22, the longer will be the waiting list for Band III conversions and installations. It is not a question of the demand exceeding the supply, but rather one of the demand swamping the available skilled labour. The truth is that there just won't be enough engineers and aerial riggers to cope with the work by the autumn.

**Read and learn as much as possible about the new service**—so that your customers can rightly look to you as an expert, not only in the technicalities of Band III operation, but also in the planning and programming of what is going to be an important addition to visual entertainment in this country.

It has always been the policy of B.R.T. to keep abreast of technical developments. We have already published a number of important articles on the technical aspects of Band III television, and will continue to do so in the future. This month, however, we are starting a new service to dealers in the form of a monthly column and fact and comment on general Band III topics under the title *Band III Trading*.

The author of this feature, who is widely versed in commercial television matters, both in this country and in the U.S.A., will tell dealers the things they ought to know in order to discuss commercial TV with their customers and keep one or two jumps ahead.

Advance information on programmes, organisations, and policies, and notes and news about personalities, events, and activities—all this will help to keep dealers fully in the picture and give them that extra bit of foreknowledge that may make all the difference in spreading the load of coming installation work. And, of course, the dealer who knows most of the answers is likely to get most of the customers, and his aerial summer too.

## v.h.f. or f.m.?

What are we to call the new v.h.f.-f.m. sound broadcasting service? Is it to be "v.h.f.," the term adopted by the B.B.C. and approved (albeit unofficially) by industry organisations such as B.R.E.M.A. and the R.I.C.; or is "f.m."—the abbreviation already in widespread use by retailers and engineers—likely to find its way into popular usage?

Manufacturers themselves seem to be divided on this point. Some use "v.h.f." in their literature and on their sets; others prefer "f.m." One or two avoid partisanship by sticking to the full abbreviation "v.h.f. f.m."

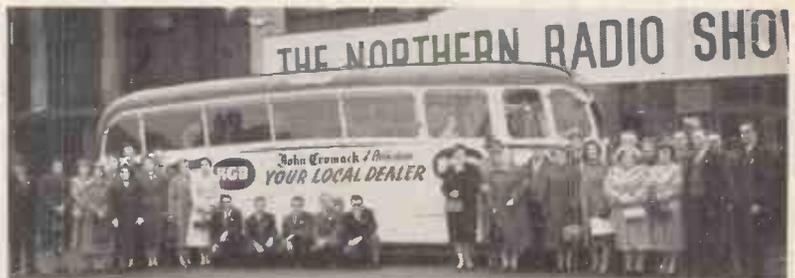
There are already signs that the public, who are invariably slow to absorb technical jargon, are showing a preference for the more economical and euphonious "f.m." It will take a deal of propaganda on the part of the Press, the B.B.C., and the trade, to reverse the trend, if such it is.

Logically, the new service takes the form of an additional waveband to radio receivers which already boast the more familiar long, medium and short wavebands, and the term "v.h.f." is therefore, appropriate in that it describes the new transmissions in terms of frequency spectrum.

On the other hand one can argue that the main feature of the new service is the method of modulation employed, from which all its advantages stem. Since you could not practically run an f.m. service on medium waves because of the bandwidth involved (there would be room for only two stations in the whole medium waveband), the term "v.h.f." becomes redundant. "F.m." implies that the transmission must be at very high frequencies.

It is one of those tricky questions to which there is no clearly defined answer, and time alone will show which expression will "pass into the language." Responsible bodies in broadcasting and the industry favour "v.h.f." What do dealers and engineers think?

## R.G.D. FANS MAKE DAY TRIP TO SEE SHOW



John Cromack, Rotherham R.G.D. dealer, organised a coach for 36 enthusiastic R.G.D. customers and ran a competition, the prize being a free trip to the Northern Radio Show at Manchester. On arrival at City Hall, the gaily decorated coach was welcomed by members of the R.G.D. sales force who then escorted their guests to their stand, showed them around the exhibition, and entertained them to a meal in the exhibition restaurant.

## ROUND-UP OF THE MONTH'S NEWS AND VIEWS

### Site fixed for Midlands Commercial TV Station

THE I.T.A. has now received planning permission to build its Band III Midland television station on a site some five miles south-east of Lichfield, Staffordshire. The site, which is 500ft. above sea level, is at Common Barn Farm, Hints.

The station buildings will cover about 11,000 sq. ft. and the high-gain transmitting aerial will be carried on a 450ft. self-supporting tower. The station will have an effective radiated power of about 100 kW initially with a possible final power of 200 kW or more.

Estimates of its coverage are being prepared and further details including a service area map will be issued shortly. Preliminary estimates indicate that the service area will extend roughly to Shrewsbury in the west; Chesterfield and Mansfield in the north; Market Harborough in the east; and Gloucester in the south.

The high-power transmitting equipment is being built by Pye Ltd. and the mast and aerial system by Marconi's Wireless Telegraph Co. Ltd. The building architects are Messrs. E. R. Collister & Associates.

Every possible effort is being made to try to get the station on the air around the turn of the year, but this achievement must inevitably depend to an extent on favourable weather conditions for building progress, in addition to very quick progress in constructing the transmitting

equipment and aerial system which are of a new design so far as this country is concerned.

### CTV day—Sept. 22

THE Independent Television Authority has confirmed that its London transmitter will start high-power test transmissions during the first half of September and regular service by the London programme companies will begin on Thursday, September 22.

The I.T.A. station is being built at Beaulieu Heights, South Norwood Hill, Croydon. It will be the first of the commercial stations to go on the air and will cover an area extending roughly to Reading, Basingstoke and Wallingford in the west; Hitchin and Saffron Walden in the north; to Southend, Burnham-on-Crouch and Chatham in the east; and to Horsham and Tunbridge Wells in the south.

The number of people living in the area to be covered by the station is estimated to exceed 10 million.

### RECORD RADIO EXPORTS

EXPORTS of British radio equipment have reached new high levels in 1955, it is announced by the Radio Industry Council. And the April figure—nearly £3 million—is the highest ever for any one month.

After record-breaking exports in 1954, valued at nearly £30,000,000, the provisional value of sales for the first four months of this year is £10½ million—an increase of more than £1 million over the same period last year.

A feature of the exports is the continued marked rise in the sales of sound reproducing equipment, including record players, tape recorders, amplifiers and public address systems. The value for the first three months of the year was £1,300,000.

This was an increase of more than £430,000 over the same period last year (when exports for the whole year were valued at the record figure of £3,700,000).

Exports of radio and television sets and radiograms were also up, to £967,000, an increase of more than £200,000.

### PYE in DUBLIN

A NEW plant to make equipment for experimental work in television and allied electronics will be opened at Finglas, Dublin, early next year. It will be operated by a new company, Pye Telecommunications, Ltd., which will shortly be formed.



Picture shows a section of the new Direct TV Replacements department at 134-136 Lewisham Way, New Cross, London, S.E.14, which is now open all day Saturday for the supply of television parts to the trade. This service will enable many dealers to cope with urgent service jobs at a time when it is normally difficult, if not impossible, to obtain replacements such as line transformers, etc. An interesting point is that the department is heated by infra-red derived from a Philips 250-watt infra-red lamp, visible at right of picture under shelf.

### New tape will record for three hours

A NEW magnetic recording tape introduced by the Minnesota Mining and Manufacturing Co., Ltd., will give a 50 per cent increase in recording time. This is due to the extremely thin but robust construction of the tape material, which is made from polyester film.

A standard 7in. spool normally carrying 1,200ft. of tape will now hold 1,800ft. of the new tape, which is known as Scotch Boy Extra Play magnetic recording tape, type 190M. At a speed of 3½in./sec. three hours recording can thus be accommodated on a standard spool.

The manufacturers claim that although the oxide coating is thinner, sensitivity has been maintained, and high frequency response much improved.



Mr. W. Harries, chairman and managing director of The Radio Gramophone Development Co. Ltd. of Romford, is greeted by T. R. Priest, president of the R.T.R.A. in the foyer of Southend Pavilion on arrival for the R.T.R.A. dance on Tuesday, April 26. Mr. Harries, who was accompanied by his wife (extreme left), headed a big party of R.G.D. dealers whom he had earlier entertained to dinner at the Westcliff Hotel.

# FOR ALL IN THE TRADE AND THE INDUSTRY

## Telerection open London office

TELERECTION, LTD., of Cheltenham, last month opened a new London office and showroom at Lennox House, Norfolk Street, Strand, W.C.2, where members of the trade were invited to a special exhibition of the company's Band III aerial range.



K. W. Harbridge has been appointed London area manager, operating from the new office. Formerly he was the company's Midland area representative.

Mr. Harbridge stated that comprehensive wholesale stocks of Telerection aerals will be held in London for immediate supply to the trade. He stressed the need for dealers to get started without delay on the conversion of existing Band I sets and the erection of Band III aerals in the service area of the Croydon I.T.A. transmitter.

## New Mullard Films

TWO new films have been added to the Mullard library of technical films. They are: *Made for Life*, a film about the production of cathode-ray tubes, and *Special Quality Valves*, a film illustrating some of the many problems associated with the production of valves for such devices as guided missiles.

The films are intended primarily for showing to the trade, in the case of *Made for Life*, and to government and industrial research and technical establishments, in the case of *Special Quality Valves*. A special version of the latter was featured in television's *Science Review* on May 24.

## General Selection

TO tie in with the General Election, A. C. Cossor, Ltd. distributed to their dealers a window poster with a topical angle, bearing a reproduction of a voting card with an "x" marked against "Cossor Radio and Television," and the following wording: *General Selection—The Majority Vote for Cossor—of course!*

## PILOT SALES AID



This new Pilot sales aid is now available to dealers. It comprises a cut-out display for the Pilot BM90 3-way portable radio, with portable in position. The display is printed in four colours, featuring a tree, the branches of which point to the operating alternatives of the set. A heart carved on the tree tells the story: *You'll love the BM90*. The small shrub lists four of the selling features of the set.

## Ediswan Clix Move

THE Edison Swan Electric Company Limited announce that the Radio Components (Clix) and Wiring Accessories Departments have moved from 21 Bruton Street, W.1. to the Head Office of the company at 155 Charing Cross Road, W.C.2. Telephone: GERard 8660.

## GRUNDIG £100 DEALER CONTEST

ALL Grundig *Stenorette* stockists are invited to enter a competition organised by Grundig (Great Britain) Ltd. What the entrant has to do is to submit an account—any length—of *How I Sell Stenorettes*. Entries should be sent to the Advertising Department, Grundig (Great Britain), Ltd., 39-41 New Oxford Street, London, W.C.1, by June 30, 1955.

Judges of this competition will be D. Mellwin, editor of *British Radio and Television*, W. E. Miller, editor of the *Wireless and Electrical Trader*, and Owen Pawsey, editor of *Electrical and Radio Trading*. Prize for the most useful and informative article will be £100.

Grundig (Great Britain), Ltd., will—with the permission of the entrants—subsequently produce a *Stenorette* selling booklet containing best selling ideas from all the entrants.

## GOODMANS EXPAND

GOODMANS Industries, Ltd., have purchased the Baird Radio and Television factory in Lancelot Road, Wembley, Middlesex. The property is of 30,000 sq. ft., and it is proposed to add an additional 15,000 sq. ft.

This is part of the expansion programme of the company to increase production of loud-speakers, transformers, vibration generators, amplifiers, oscillators, etc.

## B.R.E.M.A RETAIL MARKET SURVEY

*In accordance with the proposals the British Radio Equipment Manufacturers' Association outlined in previous statements, it has now proved possible to improve the scope and accuracy of the B.R.E.M.A. Monthly Retail Market Surveys. The panel of dealers has been increased, and the additional information obtained on the early period has enabled the Association to review the provisional figures already published for January and February. In the light of later information and as a result of this review the already favourable figures for January and February have been raised still further. Radio and radiogram sales have been lifted to 133,000 and 132,000 respectively, while television has been raised by 6,000 in January to 103,000 and by 11,000 in February to 98,000.*

*The revised figures are given in Table I, together with a breakdown showing separately, for the first time, sales for radio receivers and radiograms. Sales of all these types of equipment remained remarkably stable during the first two months of the year; radiograms and television receiver sales for March fell by 13 per cent and 23 per cent compared with February—seasonal falls which could be expected—but radio receiver sales have resisted the normal trend by scarcely declining at all. Compared with the first quarter of 1954, sales of radio receivers and radiograms have risen from 254,500 to 384,000 and television from 168,500 to 286,000.*

*The additional information obtained from the survey in March has made it possible for B.R.E.M.A. to include in the results figures indicating the proportion of the total sales for March which have been made on hire purchase or credit terms. As might be expected the lowest percentage of credit transactions fell to radio receivers—details are given in Table II below.*

### RETAIL SALES JAN.-MARCH, 1955

| Month        | Radio   | Radiograms | Television |
|--------------|---------|------------|------------|
| January ...  | 98,000  | 35,000     | 103,000    |
| February ... | 99,000  | 33,000     | 98,000     |
| March ...    | 95,000  | 24,000     | 85,000     |
| Jan/March    | 292,000 | 92,000     | 286,000    |

### CREDIT TRANSACTIONS MARCH, 1955

| Product        | H.P. or credit as % of Total Sales |
|----------------|------------------------------------|
| Receivers ...  | 41%                                |
| Radiograms ... | 62%                                |
| Television ... | 59%                                |

# NOW—the McCARTHY 7-Valve Bureau Radiogram at only 56 gns.

The radiogram you've been waiting for! McCarthy's Masterpiece! A beautiful walnut veneered cabinet with generous, easily accessible record space, houses this magnificent radiogram, with the superb tone.

## TWO TYPES AVAILABLE

1 PP 7 with short, medium and long wave-bands and push-pull output.

2 FM 7 for F.M. areas ; complete A.M. reception on short, medium and long wave-bands and F.M. reception over the whole of band II. Single ended output.

200-250 v. A.C.

At 56 guineas, this will be the Radiogram of the year! Make sure of *your* stocks to meet the demand.



- N.W. ENGLAND. Ernest Hathaway & Co. Ltd., "Sartor House," 37 Derby Street, Manchester, 8. Hardman & Co. Ltd., P.O. Box No. 23, Hardale House, Baillie Street, Rochdale. S. Hathaway & Co. (Liverpool) Ltd., 1/3 Pall Mall, Liverpool, 3.
- N.E. ENGLAND. Robert Hardman Ltd., 3 Queen Square, Leeds, 2.
- NOTTS. Robert Hardman Ltd., 3 Queen Square, Leeds, 2. Mansfield Factors (Electrical Supplies) Ltd., 50 Stockwell Gate, Mansfield.
- LINCS. Mansfield Factors (Electrical Supplies) Ltd., 50 Stockwell Gate, Mansfield.
- MIDLANDS. S. Hathaway & Co. (Midlands) Ltd., 50 High Street, Henley-in-Arden. R. A. Poole (London) Ltd., Cox Street, Coventry. R. A. Poole (London) Ltd., 40-42 St. James Street, Cheltenham. E. A. Wood. Ltd., 100 Aston Road, Birmingham, 6. E. A. Wood, Ltd., "Eltic House," 61 Belgrave Gate, Leicester.
- KENT. H. E. Kettle Ltd., Knightrider Street, Maidstone.
- SURREY AND SUSSEX. John Street Manufacturers Ltd., 88 Springbank Road, Hither Green, London, S.E.13.
- S. & W. ENGLAND. Robshaw Brothers Ltd., 105 Commercial Road, Bournemouth.
- REMAINDER OF ENGLAND. Radio & Electrical Mantel Co. Ltd., Felgate House, Studland Street, Hammersmith, London, W.6
- WALES. Electrical Wholesalers (Shropshire) Ltd., Bridge Road, Wellington, Shropshire.
- CHANNEL ISLANDS. Robshaw Brothers Ltd., 105 Commercial Road, Bournemouth.
- SCOTLAND. Bryterlite Electrical Co. (Glasgow) Ltd., 39-43 Robertson Street, Glasgow, C.2.
- N. IRELAND. Bryterlite Electrical Co. (Belfast) Ltd., 11 College Square North, Belfast.

10

*McCarthy radio*

Manufactured by FELGATE RADIO LTD., FELGATE HOUSE,  
STUDLAND STREET, HAMMERSMITH, LONDON, W.6.

NEWS ROUND-UP  
CONTINUED

Ferguson's  
500,000th TV

THE 500,000th Ferguson television receiver to come off the assembly line since the war was accepted by Wilfred Pickles for presentation to Mrs. E. Tricker, of Great Bentley, Essex, for the use of her invalid husband.

The ceremony was held on May 12 at the Enfield factory of Thorn Electrical Industries; among those present were directors and executives of the company and representatives of the national and trade press. The party was organised by S. T. Holmes, publicity manager for the Thorn Electrical group.

The presentation set was a 17in. table model with chassis parts specially chromed, bearing a gold-plated inscription: *The 500,000th Ferguson Television Receiver. May 12, 1955.* It was handed over to Mabel and Wilfred Pickles by Mr. W. White, Ferguson general works manager.

Bentley Jones, director of the radio and television division, told the guests, who numbered more than 100, that the new Sylvania-Thorn colour TV laboratory under construction at Enfield (see also page 166) would concentrate on the design and production of a colour tube at an economic price.

Guests were later taken on a tour of the production lines in the factory, which are among the most up to date in the world. They consist of five slowly moving belts running the whole length of the assembly bay. A completed television receiver leaves the assembly line every 29 seconds of the working day.

The Enfield factory is one of 15 factories, 12 in Great Britain and three overseas, owned and operated by Thorn Electrical Industries Ltd.

Although not the largest, Enfield is the most important factory, because it is from there that all the company's research, development, engineering and production activities are directed and controlled. The five separate manufacturing units at Enfield embrace not only television, but also tele-communications, radar and electronics test gear, fluorescent tubes, fluorescent phosphors and fine chemicals, and automatic machinery.

Ferguson Dealer Show

FOR the convenience of dealers unable to visit the Exhibition at Manchester, a special display of Ferguson radiograms and television receivers was held last month at the Goring Hotel, Ebury Street, London, S.W.1.

With the co-operation of Belling and Lee Ltd., Band I, Band II and Band III aerials were installed and demonstrations of F.M. and Band III transmissions were given.

More than 90,000 visited the  
Northern Radio Show

PUBLIC attendance at the Northern Radio Show, Manchester, last month, was 90,385. Trade support was greater than anticipated, many dealers travelling from places as distant as Cornwall and N. Ireland. At the close of the Show, F. W. Perks, chairman of the Exhibition Organising Committee of the Radio Industry Council, said:

*"Our return to Manchester has been fully justified, both by public attendance and business done with the retailers and wholesalers who have come from every part of the country—from the West of*



John C. Hollow, Pilot dealer from St. Ives, Cornwall, made the 700-mile round trip by car from St. Ives to Manchester to see the latest models at the Northern Radio Show and place his order with Pilot for the new TV range. "It was a long trip, but well worth it," said Mr. Hollow when interviewed. Picture shows him with Mark Lynn, director of Pilot Radio, looking over the new Pilot TV range.



Band II and Band III aerials were featured on the Telerection stand. Group includes Mr. Harbridge, London manager (left) and Mr. Collins, director (2nd from left).

*England to the North of Scotland. Dealers from all parts of the South have been flying backwards and forwards from London Airport to Manchester to see the sets which they will be selling to the public in the coming Autumn.*

*"The 48 new multi-channel television receivers shown, the adaptors for the older sets and Band III aerials, have been the focus of interest for both the public and the dealers."*

*"The north-west will not have its v.h.f. sound service until late next year, but the great variety of receivers and radiograms with provision for v.h.f. reception have also aroused great interest."*

*"By bringing Lime Grove television shows to Manchester, and by putting on the pick of the*

*North Regional sound and TV programmes, the B.B.C. has contributed enormously to the success of the exhibition, which has drawn an average daily attendance of more than 9,000—a very satisfactory figure."*

The Show was opened by H.R.H. the Princess Royal, who, during the subsequent tour of the stands, expressed great interest in high-fidelity equipment exhibited.



*"Have you heard Hi Fi, sir?." Four 'Chinese mandarins' distributed leaflets in the centre of Manchester inviting members of the public to go and hear Pye hi-fi equipment at record recitals given by two local Pye dealers, during the period of the Northern Radio Show. Nearly 100,000 invitations were distributed in this way, resulting in large and enthusiastic audiences at the recitals, which were held four times daily.*

National and local newspapers devoted considerable space to reports and pictures of the exhibition.

During the run of the Show, Dynaport Radio and Television, Ltd., held a private exhibition of their range of radio, radiogram, and television receivers in the Midland Hotel. Brown Brothers, Ltd., also held a "Little Show" in the headquarters opposite City Hall, featuring radio, television, and a demonstration of Mullard hi-fi equipment.



Busy signing autographs on the R.G.D. stand at the show was TV's Lady Barnett, who had previously been received by directors of the Radio Gramophone Development Co. Ltd.

## NEWS ROUND-UP CONTINUED

### Philips form London and Home Counties Region

**PHILIPS ELECTRICAL, LTD.**, announce the formation of a London and Home Counties Region which will be concerned with the marketing of all products of the company. It comprises the S.E. section of the country, bounded roughly in the North by the Wash, by the Oxfordshire-Worcestershire border in the N.W. and in the S.W. by Southampton. The area also includes the Isle-of-Wight and the Channel Islands.

Hector M. Thorne, formerly Radio and Television Sales Manager, has been appointed General Regional Manager of the London and Home Counties Region. S. Poole has been appointed Regional Manager of Lighting and Electrical Appliances Division. I. O. Morton has been appointed Regional Manager of Radio and Television Division.

The Philips policy of Regionalisation has been developed over the past few years and has as its aim the strengthening of the marketing effort through decentralisation.

The London and Home Counties Region has its own independent headquarters at Gt. Queen Street, London, W.C.2.

### THE BRAIN MACHINE

**AN** Ediswan electroencephalograph stars in a new British thriller film *The Brain Machine*, starring Patrick Barr and Elizabeth Allan, now on release in this country.

### Commercial TV at Radio Show?

**THE** Radio Industry Council is considering suggestions that they should offer facilities for showing commercial television films at the National Radio Show, Earls Court, London, from August 24 to September 3. These would be shown on the closed circuit which includes more than one hundred receivers in *Television Avenue* as well as several sets on each receiver manufacturer's stand, making four or five hundred in all, and seen by an average of more than 30,000 people per day.

At last year's exhibition TV receivers tunable to Band III frequencies were demonstrated only by a picture of a fish tank, as an alternative to the almost continuous B.B.C. programmes from the exhibition studio and from outside.

### New-look Mullard c.r.t. guarantee

**A** NEW three-part guarantee card is now being issued by Mullard, Ltd., with all television tubes. The new card, which has been designed as a result of much careful thought, and which embodies suggestions made by many dealers, will be of great advantage to the trade. The advantage to the dealer is that he will now have an acknowledgment—part of the card will be returned to him by the Mullard Service Department, stamped with the date of receipt.

The three parts of the new guarantee card are: (a) a registration form, to be completed by the dealer or owner and sent to Mullard; (b) a section in which brief details of (a) are repeated. This is also sent to Mullard, but is returned to the sender having been stamped with the date of receipt. *In the event of a claim, this part of the card must be returned to the Mullard Service Department;* (c) a statement of the conditions of the guarantee. This is retained by the dealer or owner.

Mullard are requesting dealers to inform their Service Department at Waddon, Surrey, in the event of an acknowledgment not being received within seven days.



Jimmy Edwards and A. Coutts, sales manager of R.M. Electric, Ltd., shake hands after the signing of the contract which puts Jimmy into the Look and Listen with Strad sales promotion campaign currently taking place.

### MORE FILM CAMERAS FOR B.B.C. TV

**THE** B.B.C. has placed an order with Acoustic Films, Ltd., for the manufacture of 12 combined sound and picture film cameras to a specification prepared by the B.B.C.

These new sound and picture cameras will produce high grade results with a minimum of equipment and will be used for filming sequences for B.B.C. television films and for inserts in studio and outside broadcast programmes.

### BAIRD MEMORIAL PRIZE PLANNED

*Nearly £2,000 has been subscribed in Scotland at the incentive of the Royal Technical College, Glasgow, to commemorate John Logie Baird who was a graduate at the College. The money subscribed will be used at the discretion of the Governors but it is expected that a permanent memorial plaque will be provided, an annual Memorial Prize arranged for competition in the Department of Electrical Engineering in the College, and a bi-annual Memorial Lecture will be arranged to enable a leading speaker to review outstanding developments in the field over the period under survey.*

### COMMERCIAL TV IN AUSTRALIA

**FOUR** commercial TV stations—two in Sydney and two in Melbourne—have been licensed by the Commonwealth Government, according to the *Financial Times*. In addition both cities are to have a national station operated by the Australian Broadcasting Commission as the first in a projected network of 14 stations to be established in seven years.

Receivers costing from £125-150 each will be produced as soon as work begins on the transmitters, but it is unlikely that any of the six stations will be on the air before the end of 1956. System of definition will be 625 lines.

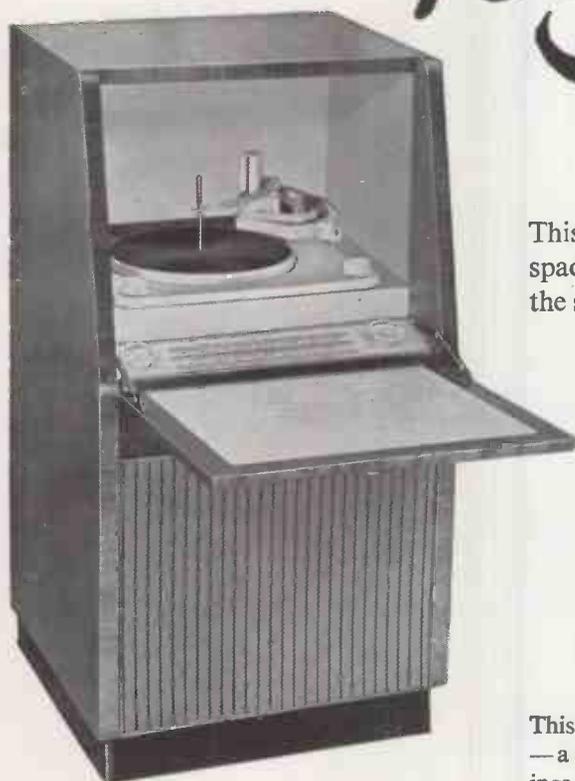
It is estimated that in two years some 25,000 receivers will be in use in Sydney and Melbourne—combined population around 3 million.

### A.B. PIANO-KEY SWITCH

**IT** is announced by A.B. Metal Products Ltd., 17 Stratton Street, London, W.1., that Friedrich Petrick, G.m.b.H. Bad Salzdettfurth, near Hanover, Germany have granted them exclusive manufacturing and distributing rights in Great Britain and the British Commonwealth for their piano-key action switch. This particular type of switch is extremely popular in Continental radio receivers and its layout makes it admirably suitable for f.m. work.

# Another fine new radiogramophone

by *Ferguson*



**INTRODUCING  
BUREAU MODEL 323 RG  
IN A CHOICE OF WALNUT  
OR MAHOGANY VENEERS**

This delightful new model occupying only  $2\frac{1}{4}$  sq. ft. of floor space, the '323 RG', is an especially charming console for the smaller home, or wherever floor space is limited.

#### BRIEF SPECIFICATION

- ★ 5-valve, 3-waveband superhet receiver feeding 8" P.M. moving coil speaker.
- ★ 3-speed autochanger with new, improved turnover crystal head for 7", 10" or 12" standard and L.P. records.
- ★ 'Tell-tale' on/off indicator is illuminated when set is on and visible when the fall is closed.
- ★ The cabinets are attractively veneered in polished walnut or mahogany with fall and cabinet interior lined with light buff leathercloth.

This is another fine autoradiogram in the true Ferguson tradition — a model with a place in the most tastefully furnished surroundings, with a performance to delight the discriminating listener.

**MODEL 323 RG for A.C. Mains**  
(Walnut or Mahogany)

**53 GNS**  
TAX PAID



**...fine sets these FERGUSON'S**

THORN ELECTRICAL INDUSTRIES LTD, 233 SHAFTESBURY AVENUE, LONDON WC2



# CHANNEL BAND 3 CONVERTORS

## ANNOUNCING

### OUR NEW IMPROVED TWO-PROGRAMME BAND 3 TV CONVERTOR TYPE C.1.

This redesigned new-look model incorporates several exclusive features, including

- ★ Attractive streamlined case
- ★ Front knob gain control
- ★ Quick-change programme knob
- ★ Hidden easy-access tuning trimmers

The C.1. provides instant choice of your B.B.C. Band 1 programme, or any one Band 3 programme.



### THE CHANNEL FOUR-PROGRAMME BAND 3 T.V. CONVERTOR TYPE C.2

This is the ONLY Band 3 convertor on the market providing

#### INSTANT CHOICE OF 4 TELEVISION PROGRAMMES

(B.B.C. plus three in Band 3)

In the C.2 the Channel design staff have covered all possible future programme requirements in any T.V. area.

PRICE **9 GNS.** RETAIL

*subject full trade discounts*

PRICE **10 GNS.** RETAIL

*subject full trade discounts*

Channel convertors are giving excellent reception on the new Band 3 Test Transmissions from London.

## INCREASE YOUR BAND 3 COVERAGE WITH THE CHANNEL BAND 3 PRE-AMPLIFIER TYPE P.7

- ★ The remarkable gain factor of 24dB has been achieved by careful design and low-loss circuit techniques.
- ★ Uses very latest twin-triode in grounded grid cascode circuit ensuring lowest possible noise factor on distant reception.
- ★ Gain control, permitting balancing of Band 1 and Band 3 signals.
- ★ Incorporates self-contained power pack, for a.c. 200-250v.
- ★ Mains switch, which also controls the T.V. receiver.
- ★ Wide-range tuning over all required channels. Bandwidth 5-6 Mc/s.



PRICE COMPLETE **£4** NET TRADE

**THIS EFFICIENT BAND 3 PRE-AMPLIFIER WILL TREBLE YOUR BAND 3 CUSTOMERS**

2,000,000 potential customers!—Demand is now heavy—Order to-day from your usual wholesaler, or if unobtainable write direct to —

# CHANNEL ELECTRONIC INDUSTRIES LTD

Office & Works : PRINCESS ST.

**BURNHAM-ON-SEA, SOMERSET**

Phone : 3167

Phone : 3167

## NEWS ROUND-UP CONTINUED

### Mobile Radio to Change Frequencies

THE Report of the Mobile Radio Committee, appointed by the P.M.G. to investigate the effects on users of v.h.f. mobile radio services of the decision to clear Band III for television, has now been published by Her Majesty's Stationery Office, price 9d.

The report contains details of security of tenure, new frequency plans, future problems, and other factors of interest to mobile v.h.f. users. To avoid interference with Band III television, the mobile band of 180.85-183.95 Mc/s will be completely cleared, and the frequencies 173.05-175.05 Mc/s also cleared although existing transmitters between 173.05-173.95 Mc/s may be permitted to remain unchanged if they do not seriously interfere with television. The two new bands will extend from 165.05-168.25 Mc/s and 168.95-173.05 Mc/s.

There are 2,150 mobile and 250 base stations occupying the "high band" and it is expected that the clearance will take about a year. It is estimated that the cost of changing frequencies will be between £10-25 for each station although a single large user may well be involved in expenditure of £10,000. No decision to award compensation has been made.

#### TV VALVE REFERENCE BOOK

THE Mullard Valve Sales Department has recently issued to Mullard dealers a 36-page booklet entitled *Television Receivers Equipped with Mullard Valves*. This contains two sets of tables. The first set contains lists of receivers grouped according to the makers' names. Against each receiver is given its valve complement. The other set of tables list Mullard valves and tubes, and against each type is given a list of the receivers in which it is used.

The booklet covers receivers marketed from 1950 to 1955, and should be a very useful work of reference, and an aid to logical stock control. Copies are available to dealers on application to Mullard Ltd., Valve Sales Department, Century House, Shaftesbury Avenue, London, W.C.2.

## NORTHERN ELECTRONICS EXHIBITION

THE tenth annual exhibition organised by the Northern Division of the Institution of Electronics will be held at the College of Technology, Sackville Street, Manchester, 1, during the period July 14-20.

The exhibition will be officially opened at 2.30 p.m. on Thursday, July 14 and the sessions will be: July 14, 2 p.m.-10 p.m.; July 15, 18, 19 and 20, 10 a.m. to 10 p.m.; Saturday, July 16, 10 a.m. to 6 p.m.

The exhibition, which is organised for its educational value, will consist of a Manufac-

turers Section, A Scientific and Industrial Research Section (including exhibits from the Hospitals, Research Associations, and Universities, etc.) and will include a programme of lectures and film shows on subjects allied to electronics. There will be exhibits of interest to members of all branches of science and industry.

Lecture and film show programmes (post free 4½d.) will be available in June. Advance catalogues (post free 2s.) will be on sale early in July.

Admission to the exhibition, lectures and film shows will be by tickets obtainable, free of charge, from the Honorary Exhibition Organising Secretary, W. Birtwistle, 78, Shaw Road, Rochdale, Lancs. A stamped addressed envelope should be enclosed.

### North of the Border

The Hawick fringe area for TV viewing will soon have improved reception. Consent had been granted to operate a TV relay service by two local firms. Each will provide connection to a communal aerial to be set up on high ground outside the town. One firm also plans to develop a TV rental service.

The B.B.C. plan to locate a major TV centre in Glasgow, adjoining the present Queen Margaret Drive studios, but this is being challenged by householders (on the question of title rights) and the Glasgow Corporation.

The shortage of qualified television engineers is causing alarm in Scotland and an appeal has been made to leading manufacturers urging the need for revived educational work in this field.

### CAKE WALKS AGAIN

A REPEAT performance of "Operation Cakewalk"—the spectacular celebration that marked the 25th birthday of the Radio Gramophone Development Co., Ltd.—was staged last month in the Midlands.

The huge imitation birthday cake made for the original event toured the pottery towns as the prelude to an ambitious radio exhibition organised by a Stoke-on-Trent dealer.

The "cake," weighing over a ton, 12ft. across, 10ft. high, and topped by 25 electric candles, dominated the stage of the Victoria Hall, Hanley, during the week-long exhibition organised there by R.G.D. dealer Leonard Godwin, managing director of Godwin (Stoke-on-Trent) Ltd.

A 15-minute film of the R.G.D. cake's eventful journey by lorry from Glasgow to London in January this year was shown daily at the exhibition.

#### CHANGE OF NAME

IN order to give a clearer indication of the range of the company's activities, the title of Hadley Sound Equipments, Ltd., of Cape Hill, Smethwick, Staffs., has been changed to Hadley Telephone and Sound Systems, Ltd.

### No TV for Eire

IRELAND'S Minister for Posts and Telegraphs, M. Keyes, ended speculation on the possibilities of installing a television transmitter in the Republic of Ireland, when he told Parliament that it was not proposed to provide such services in the near future. He was replying to a question put down by the government party deputy, Michael J. O'Higgins.

In recent weeks, following the visit of a British television expert to Dublin and Belfast, it has been suggested that something was about to be done.

Although there are quite a few TV receivers owned by householders in various parts of the Republic of Ireland, reception is freakish and uncertain. Only in the hilly areas around Dublin county and the south western districts of the coast, such as at Wexford, is reception consistently good.

Quite a number of licensed premises in Dublin city have television receivers installed in their lounge bars, with notices in their front windows to inform them as an inducement to come in and have one. Reception, however, is poor.

### Antiference Installations

TWO new branches have been opened by Antiference Installations, Ltd., to extend their service to the trade. Addresses and telephone numbers of the branches are: 59 Russell Street, Portsmouth (Phone: Portsmouth 5377), and Warwick Buildings, Warwick Place, Cheltenham (Phone: Cheltenham 56835).

#### HOLIDAY & HEMMERDINGER

IN order to concentrate and expand their activities, Holiday and Hemmerdinger, Ltd., radio and electrical wholesalers, have closed their trade service and public address hire departments, but are continuing with the supply of P.A. equipment to the trade and are able to give advice on installations, based on their long experience of this kind of work.

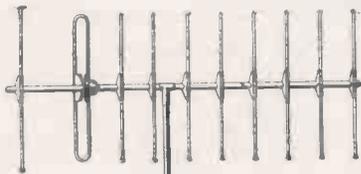
A van delivery service is now in operation in the Manchester area, and Mr. J. S. Holiday is calling on dealers.

# ANTIFERRENCE BAND 3

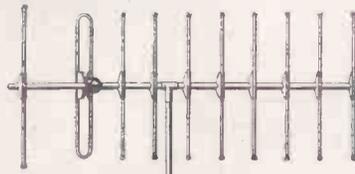
. . . **Lead the way**

Aerials as illustrated are now available for the reception of Band 3 transmissions in Channels 8 or 9 and at prices that reflect the careful planning and thought that have gone into their construction! Our wide experience gained from Antiferrence factories on the American continent has played a large part in the development of this completely new range of aerials designed for efficiency — with economy. All the fine features of the Antiferrence Band 1 range are incorporated in these models; they are easy to instal, being fully pre-assembled and aligned for peak performance on the Band 3 frequencies.

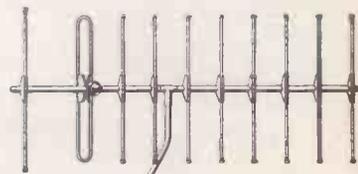
When ordering, please quote Channel for which aerials are required, e.g., Cat. No. 350/2D/ . . . (quote Channel reference here).



**Cat. No. 3101/6G**  
Ten-element array with 1½ in. mast cap, 10ft. mast and heavy duty single chimney lashing equipment Type 6.  
List Price 145/-.



**Cat. No. 3102/7H**  
Ten-element array with 2 in. mast cap 12ft. mast and heavy duty double chimney lashing equipment Type 7.  
List Price 178/6.



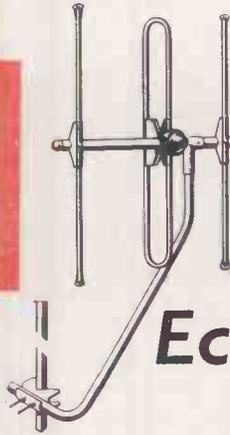
**Cat. No. 3100/5D**  
Ten-element array with cranked mast and NEW type chimney lashing equipment.  
List Price 94/6.

**ANTIFERRENCE LIMITED . BICESTER ROAD . AYLE**

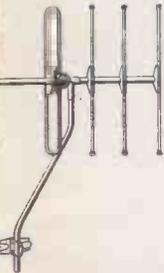
# AERIALS

## in Quality and

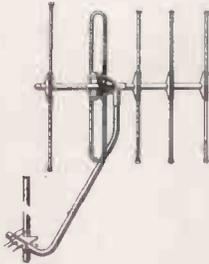
## Economy!



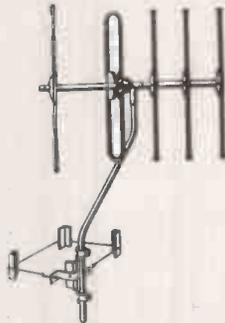
**Cat. No. 330/1C**  
Three-element array with swanneck and "U" bolt grip for fitting to existing masts from 1/2 in. up to 2 in.  
List Price 41/6.



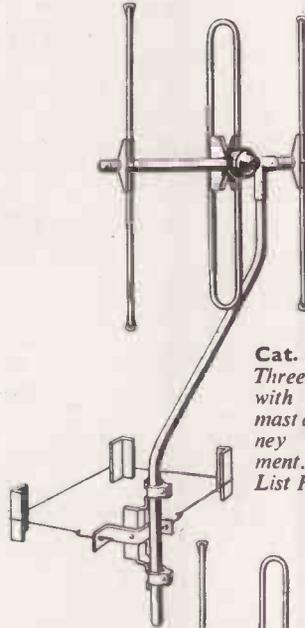
**Cat. No. 350/2D**  
Five-element array with cranked mast and universal surface mounting bracket.  
List Price 53/6.



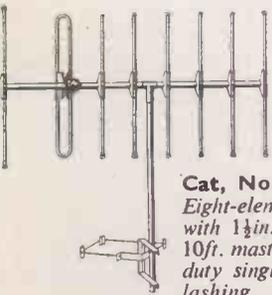
**Cat. No. 350/1C**  
Five-element array with swanneck mast and "U" bolt grip for fitting to existing masts from 1/2 in. up to 2 in.  
List Price 52/6.



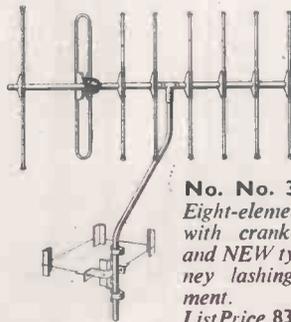
**Cat. No. 350/5D**  
Five-element array with cranked mast and NEW type chimney lashing equipment.  
List Price 67/-.



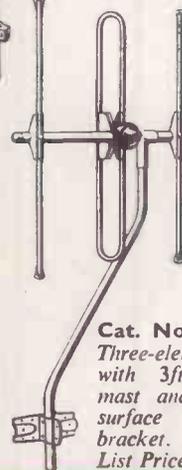
**Cat. No. 330/5D**  
Three-element array with 3ft. cranked mast and NEW chimney lashing equipment.  
List Price 56/-.



**Cat. No. 381/6G**  
Eight-element array with 1 1/2 in. mast cap 10ft. mast and heavy duty single chimney lashing equipment Type 6.  
List Price 134/-.



**No. No. 380/5D**  
Eight-element array with cranked mast and NEW type chimney lashing equipment.  
List Price 83/6.



**Cat. No. 330/2D**  
Three-element array with 3ft. cranked mast and universal surface mounting bracket.  
List Price 42/6

AYLESBURY . BUCKS

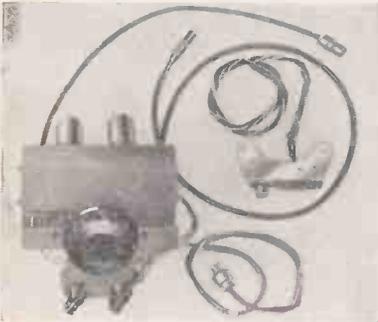
Tel: AYLESBURY 1467/8/9



### ALBA BAND III TUNING ADAPTOR

A. J. Balcombe Ltd.,  
52-58 Tabernacle Street, London, E.C.2.  
ILLUSTRATED is the Alba Band III tuning adaptor, a 2-valve permeability-tuned unit covering all the channels of Band III, enabling all Alba 5-channel sets to be converted for 12-channel operation

The circuit consists of a cascode connected r.f. stage utilising a PCC84 low noise dual triode. Pentode section of PCF80 acts as a mixer, and triode section as local oscillator. I.f. output is permanently coupled into the first i.f. amplifier of the receiver. Changeover from Band I to III is achieved by switching the valve heaters, enabling the adaptor to run off the existing receiver power supply. A separate Band III aerial should be used.



The Alba Band III tuning adaptor

The three controls (which remain outside the cabinet) consist of a tuning knob, a Band I to III changeover switch and a Band III contrast control.

Price of the adaptor is 5 gns.

### TELEVISION METERING

Sound Television (Hants), Ltd.,  
42 Elms Road, Aldershot.

THE company are marketing a television metering system which consists of a prepayment meter mounted beneath a table of modern tubular steel construction fitted with a polished oak top. The system would be particularly useful for rental television sets, advantages to the trader being the elimination of bad debts, and the reduction of maintenance costs since the consumer, who is in effect buying programme time, will tend to use his set for a minimum of time and avoid leaving it running each and every

## The latest in Radio and TV Receivers and Accessories



Three new Perth models: (left to right) the Rigoletto table radiogram; the Serenade 3-speed radiogram; the Faust console radiogram.

evening. The system also has numerous applications in clubs, public houses, waiting rooms, etc.

Trade price of the installation (comprising table and meter wired up ready for use) is £9, with a discount of £1 per unit in quantities over 100. Further details can be obtained from the company.

### NEW PERTH RADIOGRAMS

Perth Radios, Ltd.,  
90 Judd Street, London, W.C.1.

FOUR new radiogram models are released by the company, including a table model known as the Rigoletto, measuring only 18in. x 17in. x 15in. and costing 39½ gns. (tax paid). It incorporates a 5-valve 3-waveband Perth superhet chassis with built-in Ferrite aerial. Full negative feedback is used over the audio range, and the output is 3½ watts into twin 7in. x 4in. elliptical speakers. A 3-speed mixer autochanger with turnover crystal pickup is incorporated. The instrument is for operation on a.c. mains 200-250V, 50 c/s, and is housed in a walnut-veneered cabinet with flat-type solid blockboard lid.

The Faust console radiogram also has an output of 3½ watts via twin 7in. x 4in. elliptical speakers. It uses the Perth 5-valve 3-waveband chassis with built-in aerial and has a 3-speed mixer autochanger with turnover crystal pickup. The cabinet, which is finished in walnut-veneer (including underside of flat-type lid) and interiors in sycamore, contains two record compartments, each holding about 32 discs. Price of the Faust is 52 gns. (tax paid).

The other two models, both console radiograms, are the Serenade and the Riviera (a bureau type). Both employ the Perth 5-valve 3-waveband chassis, with built-in aerial, and give an output of 4 watts to a 10in. high-flux p.m. loudspeaker. A 3-speed mixer autochanger is incorporated, with turnover crystal pickup.

The Serenade is housed in a cabinet of functional design with fixed top. The autochanger unit pulls out on ball-bearing runners for easy loading, and underneath is a storage compartment with partitions capable of holding 100 records. Cabinet finish is in walnut veneer with interiors in sycamore. For operation on a.c. mains, 200-250V. Price 57 gns. (tax paid).

The Riviera has a bureau-style cabinet finished in walnut veneers with sycamore interiors. The solid blockboard drop-flap is lined in light leatherette. There are two compartments, felt-lined, capable of holding 100 records. For operation on a.c. mains 200-250V. Price 62 gns. (tax paid).

### SOBELL SEVENTEEN

Radio and Allied Industries, Ltd.,  
Langley Park, Slough, Bucks.

HIGHLIGHT of the new range of Sobell radio, radiogram, and television receivers (displayed at the Northern Radio Show last month) is the Sobell Seventeen, a 17in. table television set with two-band turret tuning which sells at 66 gns. (tax paid).

This set, Model TS17 (illustrated) which has been featured in national advertising, is housed in a walnut-veneered cabinet, and is for operation on a.c. d.c. mains, 200-250V. Circuit features include automatic picture control, and interference limiters on sound and vision. It uses a Mullard tube with M2 screen coating. Cabinet dimensions are: 19½in. x 19½in. x 18½in.

Other sets in the new Sobell range include: Model T346, a 14in. table TV with turret tuner (59 gns.); Model T176, a de-luxe 17in. table TV with cabinet



The new Sobell Seventeen 17in. table television receiver sells at the competitive price of 66 gns. tax paid.

finished in walnut veneer (79 gns.); Model T176C, a 17in. console receiver (89 gns.); Model T176LC, a luxury 17in. console TV with doors (106 gns.).

Radio and radiogram models include: Model 515P, a 5-valve all-wave table radio in walnut grained plastic cabinet (18 gns.); Model 626WF, a 6-valve table radio for a.m.-f.m. reception, with built-in aerials (29 gns.); Model 526TAG, a 5-valve, 3-speed table autoradiogram, with cabinet finished in walnut and contrasting veneers (38 gns.); Model 526RG, a 5-valve 3-speed console radiogram with record storage space (47 gns.); Model 526AGG, an all-wave 3-speed console radiogram in walnut-veneered cabinet (49 gns.); Model 626AGF, a 6-valve 3-speed autoradiogram for a.m.-f.m. reception (79 gns.).

**CHAMPION  
F.M. ADAPTOR**

*Champion Electric Corporation,  
Champion Works, Newhaven, Sussex.*

THE company have introduced an f.m. adaptor, Model 835, to enable owners of radio receivers, radiograms and high-fidelity amplifiers to receive the new v.h.f.-f.m. transmissions. The



Champion Model 835 f.m. adaptor.

adaptor has its own power supply, and operates on 220-240V a.c. mains. An indoor aerial is normally adequate within a radius of some 30 miles from the transmitter.

The company state that suitable indoor aerials are available from Aerialite, Antiference, and Belling and Lee. The aerial can be fitted to a picture rail, or behind a curtain pelmet, optimum results being obtained by rotating the aerial until maximum signal strength is obtained; the aerial is connected to the adaptor by 75-ohm coaxial lead.

Output from the adaptor is via a screened lead which plugs into the pickup sockets of the receiver or amplifier (impedance 500 kilohms), the set being used in the "Gram" position of the wavechange switch. The volume control on the adaptor is used at or near maximum, the station being tuned in the usual manner.

The adaptor uses five valves and covers the band 88-96 Mc/s. The i.f. is

10.7 Mc/s. Care has been taken in design to keep oscillator radiation to a minimum. Price 16 gns. (tax paid).

**NEW COSSOR  
MELODY MAKER**

*A. C. Cossor, Ltd., Cossor House,  
Highbury Grove, London, N.5.*

LATEST addition to the Cossor radio range is the new a.m.-f.m. *Melody Maker*, Model 524 — a table receiver in



Cossor 524 f.m. Melody Maker radio

a plastic moulded cabinet. The set has a 5-valve plus rectifier circuit with a built-in dipole for v.h.f. f.m. reception. Waveband coverage is long, medium, short, and v.h.f. (87-100 Mc/s). There is a switched gram. position.

**WINSTON DECADE  
RESISTANCE BOX**

*Winston Electronics, Ltd.,  
Hampton Hill, Middx.*

FOLLOWING the recently introduced decade capacitor box, the company are now producing a decade resistance box employing an 11-position switch allowing considerable economy of size. Three decade switches, 10's, 100's and 1,000's, enable any ohmic value between 10 kilohms and 111 kilohms to be set in 10's, the value remaining constant within 10 per cent, which is the tolerance of the resistors employed.

The case is finished in hammer-grey enamel. The lower value resistors are wirewound and the higher values are of top-grade carbon. The panel is photo facia, silver on black. Current capacity is 100mA for the first decade, 35mA for the second, and 10mA for the third. Dimensions are: 8in. x 3½in. x 3in.; weight 2lb. Price £13 5s. (retail).

**RADIOGRAM-TAPE  
CONVERTER UNIT**

*Associated Radio and Television Dis-  
tributors, Ltd., 91, Tabernacle Street,  
London, E.C.2.*

THE company are marketing a unit which enables a radiogram to be converted for use as a tape recorder and

reproducer. The unit, which is known as the Metz *Musikus* will sell at a price probably below £20, including a microphone. In addition to ordinary tape recorder facilities it is claimed that the unit will also record a gramophone disc being played on the turntable at the same time.

Principle of operation is that the tape drive is obtained from the gram turntable via a rubber friction pad beneath the drive unit, which is positioned above the turntable. At 78 r.p.m. a tape speed of 7½ in./sec. is obtained, and correspondingly slower tape speeds at 45 and 33½ r.p.m.

An amplifier and power unit are provided, and these are mounted inside the radiogram cabinet beneath the motor-board. Playback is through the radiogram loudspeaker. The equipment is for operation on a.c. mains, 110-220V.

**E.M.I. MEASURING  
OSCILLOSCOPE**

*E.M.I. Electronics, Ltd., Hayes, Middx.*

THE type WM1 oscilloscope is a compact general-purpose instrument of particular appeal to trade and industrial users, and to technical educational and training establishments. The d.c. coupled amplifiers employed make it suitable for a very wide field of application in service, research and development work in connection with radio, television and electronic equipment.

Voltage measurements are carried out by means of a unique circuit. A displayed waveform or a selected portion can be expanded (with the unwanted parts excluded) and measured on the voltmeter. In addition, voltages may be measured relative to points above or below earth potential. This is useful when serving a.c.-d.c. equipment. The time-base locks accurately to multiples of the scanning waveform and the synchronising signals may be derived either internally or from an external source. External signals may be used for the horizontal scan and are symmetrically fed to the c.r.t. "X" plates.

(Continued on page 132)



E.M.I. type WM1 measuring oscilloscope



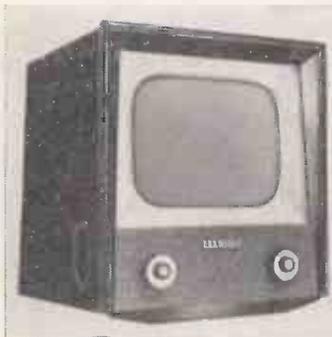
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The range of voltage measurements covered is from 0.2V to 500V a.c. and d.c.; the deflection sensitivity is 1 cm/V and the maximum bandwidth is 3 Mc/s. Time-base frequencies extend from 3 c/s to 120 kc/s and a saw-tooth of amplitude 160V to 200V is available for use with other apparatus. (The instrument operates on mains supplies of 100V to 130V or 200V to 250V a.c. 50 c/s to 60 c/s). Dimensions are: height 9½ in., width 8¼ in., and depth 11½ in. Weight 22½ lb. Price of the type WM1 oscilloscope is £49.

### NEW FERGUSON TV RECEIVERS

*Thorn Electrical Industries, Ltd., 105-109 Judd Street, London, W.C.1.*  
 THE *Nine Star* television receivers shown at Manchester last month are 21-valve models for 2-band operation. Features include a new automatic gain control circuit, long time-constant fly-wheel synchronisation, variable grey spot suppressor, and a special time-base circuit to ensure positive interlace. The range includes 14in. and 17in. table models and two 17in. consoles with the Ferguson *Halolight* feature.

For use in areas where reception conditions are normal there is also a new range of 18-valve *New Standard* models which also incorporate a number of new technical features. Both the *Nine Star* and *New Standard* models are suitable for non-synchronous supply mains and all have separate mains switches to avoid disturbing the settings of other controls. The Ferroxdure focussing assembly has been redesigned and astigmatism is reduced by a new ion trap magnet which gives a uniform field.



Two of the new Ferguson *Nine Star* range: (left) Model 203, 14in. table TV; (right) Model 245, 17in. console TV.

The complete range is as follows: *Nine Star* 14in. table Model No. 203 (67 gns.); *New Standard* 14in. table Model No. 204 (63 gns.); *Nine Star* 17in. table Model No. 205 (77 gns.); *New Standard* 14in. console Model No. 214 (73 gns.); *New Standard* 14in. console with doors and "HaloLight" Model No. 244 (88 gns.); *Nine Star* 17in. console with *HaloLight* Model No. 235 (94 gns.); *New Standard* 17in. console with *HaloLight* Model No. 236 (90 gns.); *Nine Star* 17in. console with doors and *HaloLight* Model No. 245 (105 gns.); *New Standard* 17in. console with doors and "HaloLight" Model No. 246 (100 gns.); *Standard* 12in. table Model No. 998 (49 gns.). All prices tax paid.

### MULTICORE SOLDER THERMOMETER

*Multicore Solders, Ltd., Multicore Works, Maylands Avenue, Hemel Hempstead, Herts.*

A SOLDER thermometer (illustrated) was exhibited by Multicore at the Components Show in London recently. This simple form of pyrometer will enable users of soldering irons and solder baths to determine quickly the temperature of the solder on the iron or in the bath.

The instrument is completely self-contained and comprises a motor movement which is connected to a thermo-couple mounted at the end of a tube attached to the meter. A scale is



Multicore solder thermometer in use

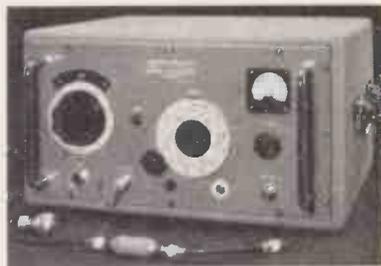
graduated in degrees Centigrade and Fahrenheit and the maximum temperature to which the instrument should be subjected is 400°C. (752°F.).

The solder thermometer will be supplied direct by Multicore to factories already using Multicore solder at a net price of £6 12s. 6d. Delivery is stated to be approximately two months.

### MARCONI U.H.F. SIGNAL GENERATOR

*Marconi Instruments, Ltd., St. Albans, Hertfordshire.*

A RECENT addition to the Marconi range of signal generators is the u.h.f. signal generator, type TF1078.



Marconi u.h.f. signal generator, type TF1078

This instrument covers the frequency range 960 Mc/s to 1,250 Mc/s in one continuous band; the tuning dial has an arbitrary numerical calibration and its reading is related to frequency by reference to a chart; both dial and chart allow a high order of discrimination and give a frequency accuracy of 0.3 per cent.

The instrument incorporates a high-quality piston attenuator and has an effective output impedance of 50 ohms. A crystal voltmeter monitors the output from the attenuator which is calibrated over a range of 110dB relative to the maximum power output of 1 mW. Normally, the output from the generator is c.w., but switching and a coaxial inlet on the front panel permit external pulse modulation at recurrence frequencies up to 100 kc/s.

The modulating system has a design which allows the reproduction of pulses with durations as short as 0.5µsec.

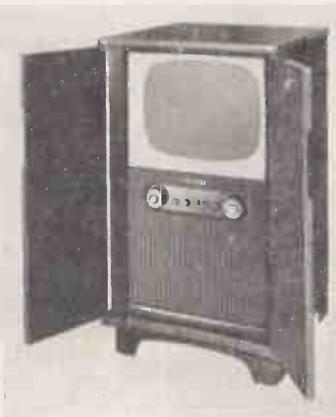
### NEW OSRAM A.F. AMPLIFIER

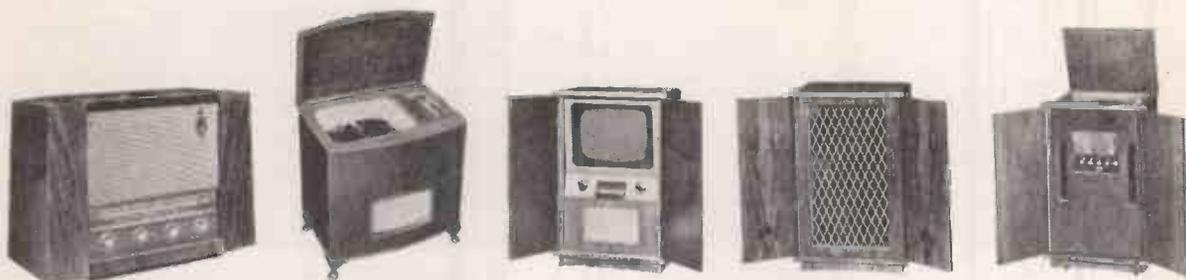
*The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.*

A NEW valve, the Osram KT55 beam tetrode, designed primarily for use as an audio frequency amplifier in d.c.-a.c. equipment using a series-connected heater chain has been introduced by G.E.C. Ltd. Two of these valves used as pentodes in push-pull are capable of an output of 25 watts from a d.c. mains supply of 220 volts, double that hitherto obtainable from valves in this class.

An octal based valve, the KT55 has a maximum overall length of 14.3 cm and a maximum diameter of 5.2 cm.; the heater rating is 0.3 amp. 52 volts, and the maximum anode dissipation is 25W. As a pentode, the valve attains the remarkable "slope" figure of 16 mA/volt, and as a triode the valve has the unusually low anode resistance of 410 ohms.

The valve should find wide application in sound equipment suitable for operation from d.c. or a.c. mains. It can also be used in voltage stabilisers





New instruments in the Pye radio, TV and hi-fi range: (left to right) Pye *FenMan I* table radio; *FenMan I* radiogramophone; *Luxury Seventeen* 17in. console TV; *Concerto* loudspeaker system, type HF12/SF; hi-fi amplifier and record playing unit, type HF12/P.

and as a source of power for running a.c. gramophone and similar equipment off d.c. mains.

List price is 25s. plus 8s. 2d. purchase tax.

**NEW PYE RADIO AND TV RANGE**

*Pye, Ltd., Radio Works, Cambridge.*  
NEW television sets, a.m.-f.m. radio receivers, and hi-fi reproducers were shown by Pye at the Northern Radio Show last month. There are four TV models (one table and three console types). The table model is the "Luxury 17" (reviewed in the April issue of *B.R.T.*), and the consoles utilise the same chassis in traditional and contemporary style cabinets. The other console, Model V14C, was reviewed in May.

All models feature 13-channel tuning and have automatic picture control. Prices are: V14C 71 gns., Luxury 17 81 gns., Luxury 17C (traditional cabinet) 105 gns., Luxury 17C (contemporary cabinet) 100 gns. All prices tax paid.

The a.m.-f.m. receivers are known as the *FenMan* range. The *FenMan I* and II are table radios, and the *FenMan IRG* and *IIRG* are console radiograms. All models cover four wavebands—l.w., m.w., s.w., and v.h.f. The *Fenman II* gives an output of 7½W push-pull via four loudspeakers, two 8in. at front of cabinet, and one 6 in. x 4in. elliptical at each side. Frequency response ranges from 30-15,000 c/s.

Both *Fenman* radiograms use a Garrard RC80M autochanger with turnover crystal pickup. Prices are: *Fenman I* 28 gns., *Fenman II* 38 gns., *Fenman IRG* 65 gns., *Fenman IIRG* 85 gns. All prices tax paid.

Two new additions to the Pye range of hi-fi equipment are the Model HF12/P amplifier

and record-playing unit and the Model HF12/SF *Concerto* loudspeaker system. Frequency range of the amplifier is substantially flat over the entire audible range up to 12 watts output. Inputs are provided on the pre-amplifier for a radio tuner unit, tape player, and microphone.

The speaker system comprises a dual concentric with 12in. bass unit and pressure-type treble unit, with frequency response (in cabinet) from 30-20,000 c/s. Prices are: Model HF12/P 130 gns., Model HF12/SF 65 gns.

**H.M.V. RADIO AND TV RECEIVERS**

*The Gramophone Co. Ltd. (His Masters Voice), Hayes, Middx.*

THE company have introduced a new range of 2-band television receivers including 14in. and 17in. table and console models. Features include tinted screen, dust-sealing mask, main controls at front, 8in. elliptical loudspeaker, electrostatic focusing, and high-efficiency e.h.t. generator unit completely sealed for long life and reliability.

Standard models are: 1840-14in. table (67 gns.); 1841-14in. console (78 gns.); 1842-17in. table (79 gns.); 1843-17in. console with doors (110 gns.); 1844-17in. console without doors (93 gns.). De Luxe models, similar to the standard models but in special cabinets with warm diffused brown mask and matching gold filled plastic panel and knobs, are: 1845-14in. table (69 gns.); 1846-17in. table (82 gns.). The current fringe area models now re-designed for two-band reception are: 1828A-14in. table (74 gns.); 1830A 17in. table (90 gns.) 1831A-17in. console with fold-back doors (114 gns.).

The new H.M.V. range of radio receivers, shown for the first time at the Northern Radio Show, includes:

Model 1251, a de-luxe 6-valve (plus tuning indicator) table receiver for a.m. and f.m. covering the long, medium

and v.h.f. bands. Features are a wide (10½in.) floodlit tuning scale; simple controls—tuning and combined volume and on/off at the front; wavechange and tone at the side; 10½in. elliptical speaker. Price 32 gns.

Model 1252 (External), a self-contained f.m. unit in polished wooden cabinet for use with a.c. receivers which have a pickup input or radiograms with pickup sockets brought out. It incorporates its own tuning arrangements and power supply. Price 15 gns.



H.M.V. Model 1252 (external) f.m. adaptor unit.

Model 1252 (internal), as above, but in chassis form for the adaptation of many existing post-war "His Master's Voice" radiograms.

All prices quoted are tax paid.

**NEW GRUNDIG PRODUCTS**

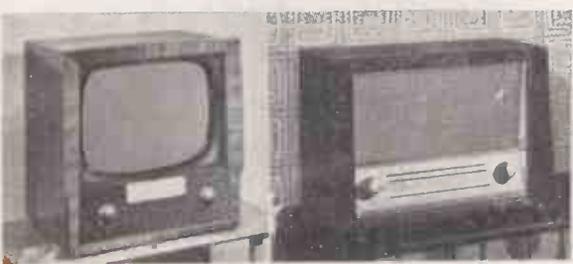
*Grundig (Great Britain), Ltd., Kidbrooke Park Road, London, S.E.3.*

ILLUSTRATED is the new Grundig *Kenilworth* a.m.-f.m. radio, type 2043W/3D, the first of the company's projected range of radio receivers. It has four wavebands (l.w., m.w., s.w., and v.h.f.) which are selected by push-buttons, and a visual tuning indicator is included. Built-in aerials comprise a v.h.f. dipole and a Ferrite rod. The receiver is housed in a highly-polished cabinet with front speaker grille in a light material.

Specifications include: Duplex flywheel tuning with one control for separate v.h.f. and l.m.s. tuning; sockets for pickup and tape

(Continued on page 134)

Two new H.M.V. models: (left) H.M.V. model 1846 17in. table TV; (right) Model 1251 a.m.-f.m. radio.





*Continued*

playback; continuously variable bass and treble tone controls with coupled visual signals; half-way position on the on-off push-button which cuts off sound while leaving the set fully tuned; "3D" sound system using three loudspeakers; for operation on a.c. mains, 105-115 and 190-250V, 50 c/s; i.f. (a.m.) 468 kc/s (f.m.) 10.7 Mc/s.

The cabinet measures: 22½ in. × 14½ in. × 9½ in. Weight of set is 22lb. Price 48 gns. (tax paid).



Grundig Kenilworth a.m.-f.m. radio.

#### New Tape Recorder

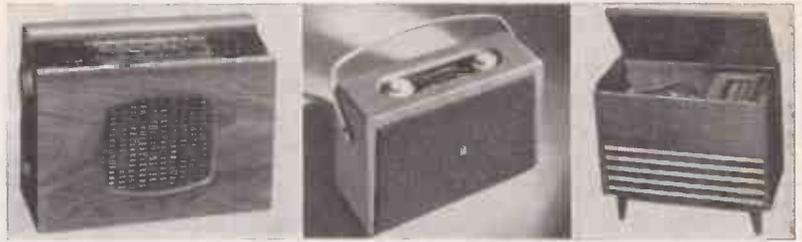
The company also announce a new tape recorder, the *Specialist*, type TK820/3D, which has three loudspeakers (one 6½ in. × 4 in. elliptical and two 2½ in. circular). Facilities include 2-speed twin-track recording, track change being effected without spool reversal by push-button. Tone control for treble and bass emphasis are provided.

Tape speeds are 3½ in. and 7½ in./sec., and an illuminated position indicator facilitates recording location. British and U.S. recording standard sense is employed, i.e., top track, left to right. Pockets are provided for two spare reels of tape, microphone, mains lead, etc. The Grundig condenser microphone, type GCM1 (6 gns.), or dynamic microphone, type GDM5Z (£6 16s. 6d.), are available for use with the instrument.

Dimensions are: 17 in. × 17½ in. × 9½ in.; weight 47lb. Price 98 gns. (retail).

#### NEW FERRANTI RECEIVERS

*Ferranti, Ltd., Moston, Manchester, 10.* FOUR new models have been added to the Ferranti range of radios and radiograms. They are three new a.m. radio receivers and an a.m.-f.m. auto-radiogram in the popular price range. The radiogram, Model 345F, is almost identical in appearance with Model 345, but incorporates the f.m. band in



Three new Ferranti models (left to right) Model 555 transportable radio; Model 855 battery portable; Model 345F a.m.-f.m. radiogram.

addition to l.w., m.w. and s.w., and has a visual tuning indicator. A Garrard RC110 3-speed autochanger is fitted. Housed in a walnut-veneered cabinet, for operation on a.c. mains 200-250V, the price of this instrument is 65 gns. (tax paid).

Of the three radio receivers, two are portables. The first, Model 855, is a 4-valve light-weight portable battery set with built-in aerials designed for indoor or outdoor use. It covers two wavebands (long and medium) and has a 5 in. p.m. speaker. The case is finished in leathercloth and plastic with a handle for easy carrying. Price 13½ gns. (tax paid). The second, Model 955, is a transportable receiver with built-in aerials, incorporating a 6-valve plus metal rectifier chassis covering the long and medium wavebands and replaces Model 945. A quiescent push-pull output stage feeds a 6 in. p.m. speaker. Price 19½ gns. (tax paid).

The other radio set, Model 555, is a successor to Model 545. It is a transportable a.c.-d.c. 2-waveband 5-valve receiver with built-in frame aerials. Output is 3 watts to a 6½ in. p.m. speaker. For operation on a.c.-d.c. mains, 200-250V. Price 17½ gns. (tax paid).

#### ANGELA CONSUL RADIOGRAM

*Angela Manufacturing Co. Ltd., 348 Upper Street, Islington, London, N.1.* ILLUSTRATED is the Angel a *Consul* radiogram, incorporating a 3-waveband receiver and a *Monarch* 3-speed



The new Angela Consul 3-speed radiogram.

autochanger with turnover crystal pick-up housed in a walnut-veneered cabinet. The lid is of the flat blockboard type. Ample record storage space is provided, and the cabinet dimensions are: 36 in. × 32 in. × 16½ in. Output is via a 10 in. high-flux p.m. loudspeaker. Price 45 gns. (tax paid).

#### TRANSISTORISED PORTABLE AMPLIFIER

*Lustraphone Ltd., St. Georges Works, Regents Park Road, London, N.W.1.*

AT the recent A.P.A.E. Exhibition, Lustraphone introduced a prototype model of a 10-watt amplifier featuring transistor circuitry. Measuring only 6 in. × 4 in. × 4 in. the complete unit is about the size of a box camera. It has normal volume and tone controls and the frequency response is sensibly flat from 50 c/s to 10,000 c/s.

The portable transistorised amplifier is capable of delivering 10 watts into a standard loudspeaker and incorporates sufficient preamplification to enable it to be fully driven by the output from a moving coil microphone or from a gramophone pickup.

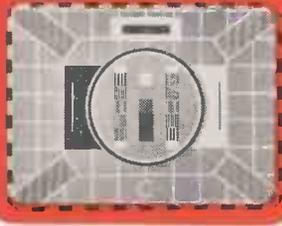
The power supply may be derived from dry batteries or from a small 12-volt accumulator. A 6-volt accumulator could be used, but this would impose a limitation on the maximum power output. Using a 12-volt dry battery the power requirements are 200 mA under no-signal conditions and 1.5A at maximum signal input.

The makers expect that full production models will be available by the end of the year, pending supply of power transistors from Mullard.

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*continued on page 175*

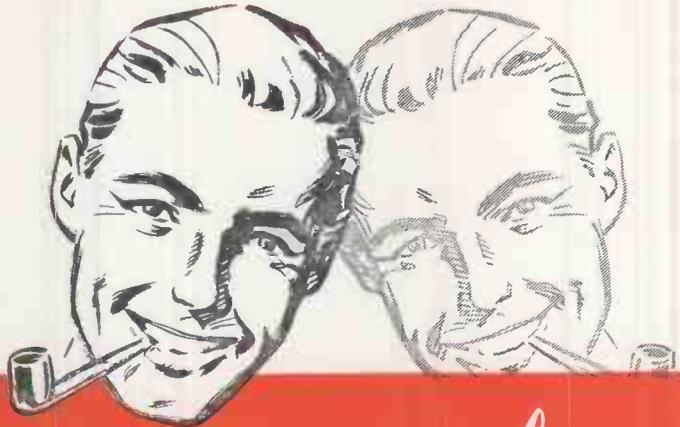


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# TECHNICAL GEN for SERVICING MEN

*Edited by James Huxley*

## HELP YOURSELF

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," 92 Fleet Street, London, E.C.4. All published contributions are paid for, and your contribution may help

## OTHER ENGINEERS



**Pye V4**  
**Intermittent Vision**  
 The picture would vanish intermittently although sound was o.k. A preliminary check revealed no e.h.t., although the presence of the 10 kc/s whistle indicated that the line oscillator stage was working. Checking the line output stage revealed that the line transformer was faulty, and a new unit was fitted. This restored the e.h.t. but there was still no raster on the screen.

Eventually it was found that the c.r.t. had an open-circuit cathode. Lack of beam current had probably caused the e.h.t. to rise and this had finally broken down the transformer. The moral is that customers should be taught to switch off in the event of a picture failure and thus save other consequential expensive replacements.—W.A.M., I. Landrindod Wells.

**Pye L75B**  
**Weak Reception**  
 The fault was very weak long wave reception. The oscillator was shown to be operating satisfactorily and meter tests showed that the frame aerial (medium wave), long wave loading coil and wavechange switch wiring had continuity. Having another receiver of the same type available in full working order, the frames were changed over—long wave reception on the defective receiver was instantly up to normal standards.

The fault was in the long wave loading coil but it was shown on test to have the same d.c. resistance as the replacement and the same as the maker's

specification. In practice, however, it had no loading effect on the aerial circuit and the results obtained were the same as obtained by using only the medium wave winding. Perhaps somebody can explain this?—E.C., Pocklington, York.

## Mains-Battery Portable

**Low L.T. Volts**  
 At this season, a steady flow of portable receivers can be expected for servicing. It would be appropriate, therefore, to recount a common fault (no doubt familiar to many servicemen already) in the hope that it will help those who have not previously experienced it.

The fault takes the form of erratic operation on mains, although the set works well on batteries. The receiver may be completely inoperative, pro-

viding intermittent reception, or perhaps be dead below a certain point on the scale. This, of course, points to a frequency changer fault but, on testing, the valve voltages are within tolerance and on changing the valve and associated components no improvement occurs. The only certain thing is the fact that the valves cease to oscillate.

Invariably, the culprit proves to be the metal h.t. rectifier. With these receivers, the l.t. is derived from the h.t. through suitable dropping resistors. If the rectifier is only slightly below par, the l.t. to the frequency changer is reduced. Although these 1.4 volt frequency changers appear to oscillate quite happily on low l.t. voltages down to 1 volt or less when working from batteries, they refuse to work below 1.2 or 1.3 volts on mains.—V.D.C., Bristol, 5.

## 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.

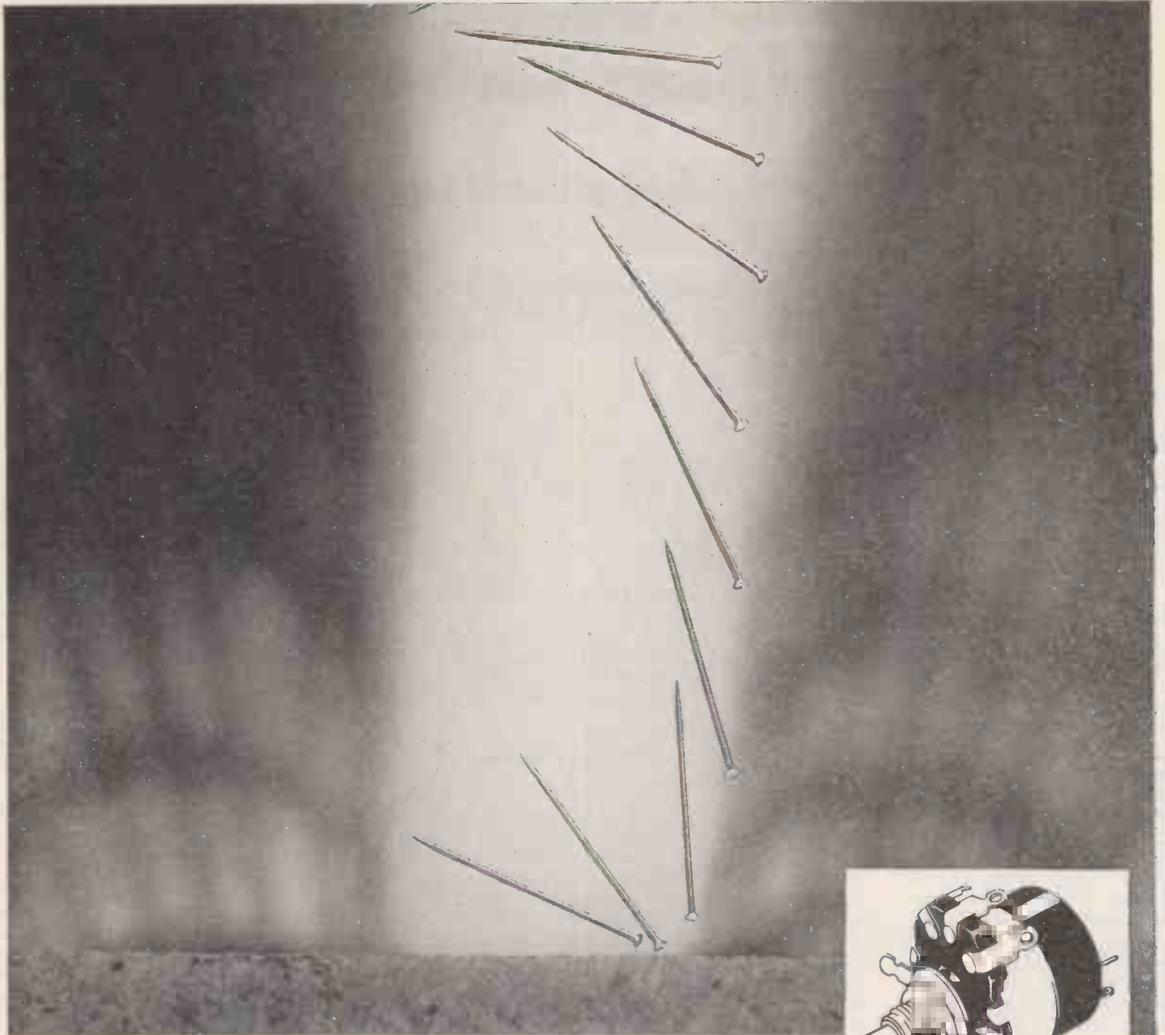
## Regentone UI41

**Tuning Gang Short**  
 The customer complained that the receiver was generally unsatisfactory and had of late begun to stop working altogether on certain occasions. The trouble was found to be mechanical in nature, as on a preliminary inspection it was noticed that when pressure was applied to the top of the tuning gang the receiver would stop working.

Investigation showed that the fixing screws holding the gang were too long and were making intermittent contact with the fixed vanes of the tuning condensers. By removing the offending screws, inserting washers (which, pre-

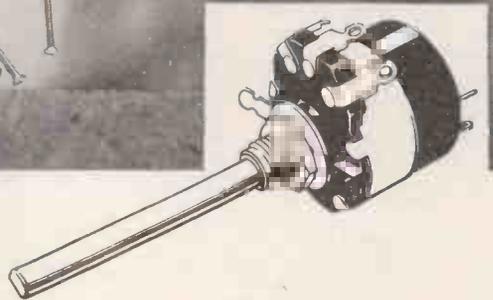
(Continued on page 139)

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**TECHNICAL GEN**

*Continued*

sumably, should have been fitted on assembly) and re-fitting, the receiver gave no further cause for complaint.—P.T.McK., Londonderry.

**Baird T164 and Baird Townsman**

**Erratic Oscillator**

Fault condition is sound and vision disappearing with vertical bars on screen. It can be restored

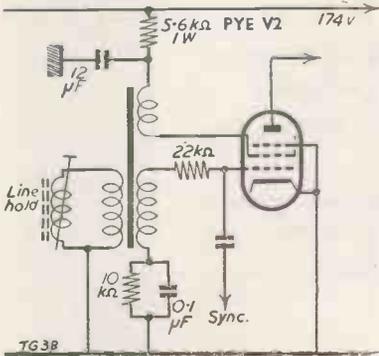
to normal by switching the receiver off and on quickly. This annoying fault, which in the past has taken quite a time to locate, has been found to be due to instability in the 10F1 frequency changer. It may be permanently cured by fitting a 2.2kΩ, ½-watt, resistor across the oscillator coil under the chassis and retuning slightly if necessary.—B.N.G., Chadwell Heath.

**Pye V2**

**Line-Hold Failure**

This receiver was brought in for service with the complaint of no line-hold.

In this model, the line-hold control is a variable inductor at the rear of the receiver, and it was found that with the core moved to one extreme end (the core being fully into the coil) the picture would almost lock.



The PL81 valve, which is the combined line oscillator and amplifier, was changed but no improvement noted. The line oscillator transformer windings were checked and found satisfactory, as was the line-hold coil. Finally, the fault was traced to an open circuit 12µF decoupling capacitor in the screen circuit of the PL81. This is contained in a canned unit situated on the other side of the chassis. A replacement 16µF proved a cure.—H.F., Belfast.

**Curious Frame Fault**

**K-B LFT50**

Complaint was that the frame time base would not lock. On test it was found that a lock could be obtained by very careful adjustment of the hold control but the maximum height was not sufficient. Voltage tests revealed incorrect conditions on the vertical sync amplifier and generator, but a thorough test of all components associated with the frame time-base and sync separator proved fruitless.

Substitution of all components in the affected circuits was commenced, and finally the replacement of the frame blocking oscillator transformer effected a complete cure. The faulty transformer was again tested but the d.c. resistance of the windings was exactly as specified in the service sheet and the insulation resistance was infinity.—F.F., York.

Hum on Focus is frequently due to one half of the GZ32 rectifier becoming defective. There is often no other evidence of hum, the sound signal and picture being otherwise normal.—P.E.C., Leigh-on-Sea.

**Peto Scott TV12I Series**

**Hum on Focus**

Hum on focus experienced on receivers in this series, showing as a horizontal band of defocused raster, is frequently due to one half of the GZ32 rectifier becoming defective.

There is often no other evidence of hum, the sound signal and picture being otherwise normal.—P.E.C., Leigh-on-Sea.

**Sobell T225**

**Some Sample Faults**

The frame would collapse every so often to a thin horizontal line, but replacing all common components to the frame time-base failed to effect a cure. After a good deal of time and trouble had been spent on this repair, the trouble was finally traced to the valveholder of V8b. There was an intermittent break in pin 6. A replacement pin, taken from another valveholder on the chassis (there are some "unused" pins), was fitted and the trouble cured.

On other sets of the above type I have also had to replace C34 (0.1µF) which have been s/c and caused complete lack of raster. Also on the same type of receiver I have several times had to replace the frame blocking oscillator transformer T2 to cure an intermittent shrinkage of frame output.—A.A., Bo'ness.

**Marconiphone VT83DA**

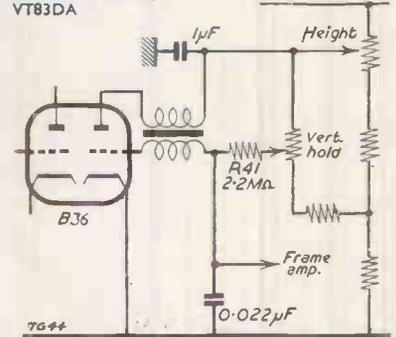
**Open Circuit Grid**

One of these receivers was working well except that picture height could only be extended to about half

normal size with picture rolling. Once the height exceeded a critical point, no setting of the frame-hold control could lock the picture.

A new B36 double-triode was tried as the most obvious possibility, but as this had no noticeable effect the chassis was withdrawn for testing. Anode voltage of the frame oscillator section of the valve was normal and C42 (in the service sheet), a 1µF electrolytic, was quite satisfactory, as were the two slider controls associated with the circuit.

**MARCONIPHONE VT83DA**



The cause of the trouble was found to be R41 (2.2MΩ) in the grid circuit of the frame oscillator. It was practically open circuit.—G.R.W., Liverpool, 9

**Drive Cord Hint**

**Pointer Set Wrong**

This can apply to any receiver which has a cord drive to the dial pointer.

The fault is such that the stations appear in unusual positions on the scale. Before attempting to start realignment or replace padders, check the position of the gang and the pointer at the minimum or maximum positions. I have had more than one experience of a set where the drive cord has been replaced which although it works perfectly has been incorrectly set so that the pointer is at 200 metres with the gang fully meshed.—E.C., Pocklington, York.

**Ferranti T1146**

**EL37 Or KT66?**

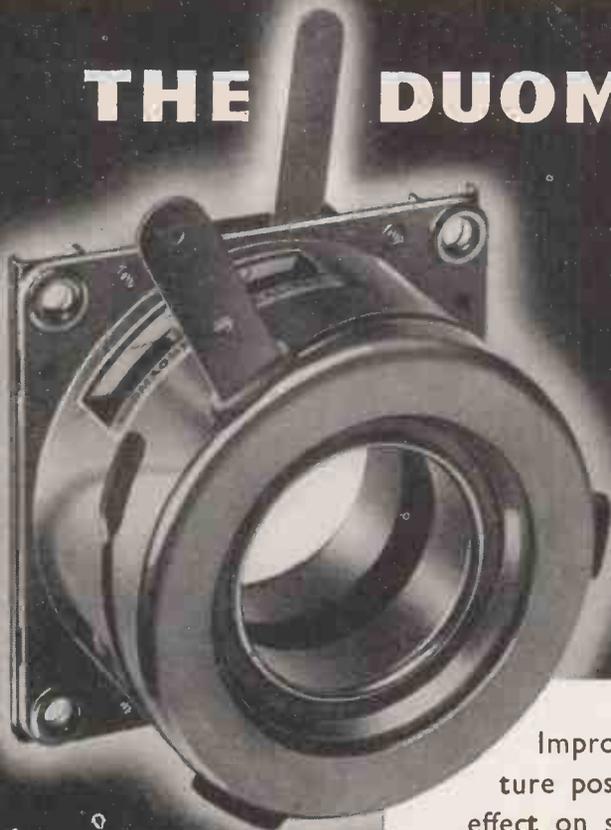
It seemed at first to be a clear case of internal arc-in; in the line transformer (th's set uses a single valve time-base). There was brushing at line frequency on the screen, accompanied by a frying noise in the vicinity of the transformer. It was also noticed that the line-hold control made little or no difference to line scan speed.

As no new KT66 was held in stock, a second-hand one from another set was tried. As the set then worked satisfactorily then, some KT66's were ordered from the wholesaler. But being out of this type he sent the equivalent EL37's.

(Continued on page 141)

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# TECHNICAL GEN

Continued

On inserting an EL37, however, the brushing returned. Another EL37 proved equally unsatisfactory. And then I decided to try the second-hand KT66 again—and the set worked o.k. for a whole day. Trying to get down to root causes, a 6L6 was plugged in and the set still worked normally.

The only conclusion I can draw from all this is that the original fault was a breaking down of insulation in the line valve and that the EL37 is not a suitable replacement for the KT66 in this particular receiver.—P.E.C., Leigh-on-Sea.

## Mullard MAS26

**Oscillator Trouble** After our apprentice had spent many hours on this elderly receiver in a vain attempt to make it play, he appealed in red-faced desperation for help. An hour later I too was red-faced

The fault was obvious failure of the oscillator, except at the h.f. end of the m.w. band. Some weak signals were obtained on s.w., but none on l.w. When the oscillator struck at 200 metres, it would sometimes operate as far as 300 metres, finally fading out. Voltages on the ECH35 were within satisfactory limits, but all the grid and anode components were changed just to make certain. The oscillator coil was removed, uncanned and checked and although it tested perfectly normal, a new temporary m.w. oscillator coil was wired in. All this activity produced no improvements at all and the apprentice was by now wearing a distinctly smug expression!

The next step was to isolate the oscillator section of the three-gang and replace it with a single 500pF variable. Result—set performance normal, by following the single variable with the set tuner.

A meter check showed no shorts or leakage on the original oscillator section of the gang, which was then wired across the main in series with a 15-watt lamp. The result was that the lamp lit up with a dull red glow, brightening to full illumination in about 30 seconds after which it very slowly faded out. Substitution by a neon lamp showed no leakage. On disconnecting the gang, and leaving for five minutes, the fault returned.

The ceramic pillars were then washed with CTC and well soaked with thin machine oil. The test lamp was connected up again but no leakage was indicated. The section was replaced

into the circuit and the set performed normally. It can only be assumed that some electrolyte from a Previous 32μF capacitor had leaked or spilled on to the lower pillars of the oscillator section. The burning out process has been effective as the receiver is still o.k. after a month's use.—G.E.B., Bradford.

## Marconiphone VT73DA

**Erratic Line Hold** The customer complained that the line-hold control needed continual re-adjustment during programmes. This was confirmed and it was also noted that the locking position was rather critical. Firstly, the 680kΩ

screen feed resistor to the sync separator (Z63) was replaced as the original had gone high to nearly 1MΩ. Next the 0.047μF coupling capacitor from the video stage to the grid of the X63 was checked and replaced as the insulation was found to be down to 10MΩ. But there was still no improvement in line-hold.

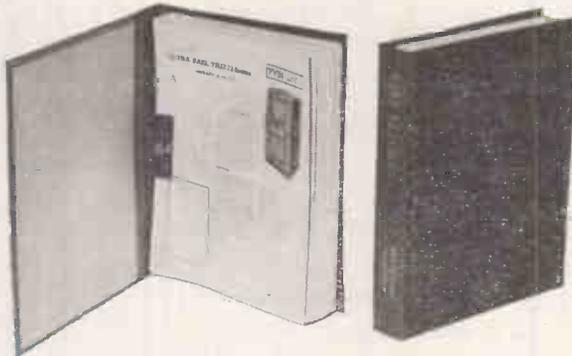
Voltages on the Z63, B36 and KT36 valves were checked and found to be within the maker's tolerances. Complete realignment was carried out, and there was still not any improvement.

A systematic check on all components disclosed the fact that the line oscillator transformer primary winding (red and

(Continued on page 143)

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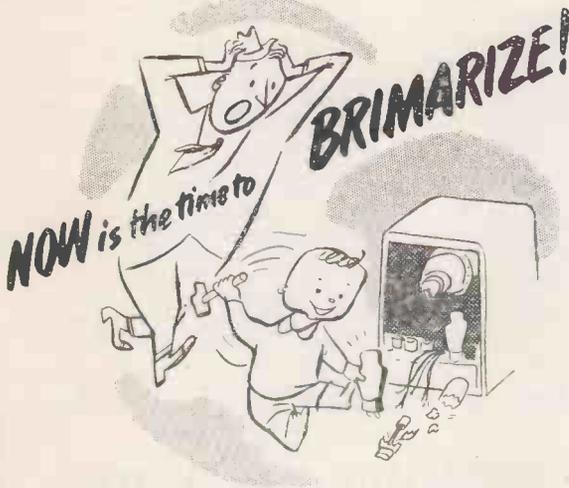


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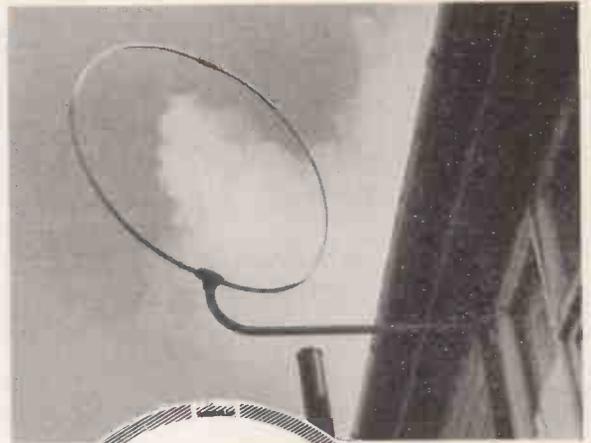
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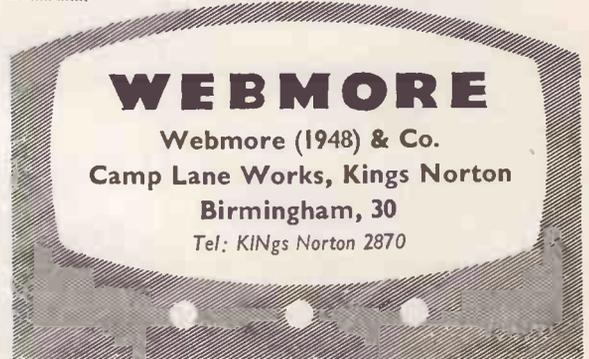
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**TECHNICAL GEN**

*Continued*

yellow leads) had a resistance of 600Ω. It should have been only 5Ω.

Replacement of the transformer resulted in solid and continued line lock. The fault caused a great deal of trouble by reason of the gradual drift from a locked condition to one of complete picture break-up.—P.A.C., Brierley Hill, Staffs.

**Pye T19D**

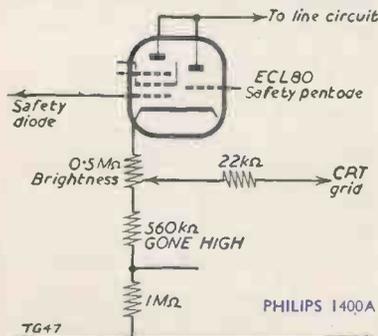
**Positive Grid** This particular receiver exhibited general weak reception and the maximum gain was obtained with the volume control somewhere along the track and not at the fully clockwise position. Tests showed that the EBC33 triode grid was positive.

This was found to be due to a leakage across the radio-gram wafer of the tone/gram switch. We have had three similar cases recently in which the wafers of this switch have come to the end of their useful life. A quick repair is to remove the h.t. leads from the switch since most owners never use the receiver with a record player and so muting of radio when on gramophone position is not required.—E.C., Pocklington, York.

**Philips 1400A**

**Safety Circuit Trouble** On this projection receiver, the customer complained that it was impossible to black out the picture. On test it was found that the voltage on the modulating electrode of the c.r.t. was in order but on manipulating the brightness control the c.r.t. grid voltage could not be brought sufficiently negative with respect to cathode (i.e., less positive). In view of this excessive p.d., the cathode circuit of the safety valve was checked.

The current through this valve is made possible when the two time-



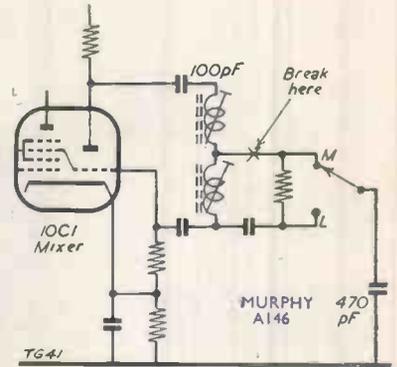
bases are operating. Eventually a resistor in the cathode leg of the ECL80 (560kΩ) was found to have risen to 2.5MΩ. Replacement cured the trouble.—K.M., Leeds, 9.

**Ekco T206**

**Curious Line Fault** A receiver of this type recently came in for service with the following symptoms.

(1) Four minutes before the raster appeared; (2) line linearity poor, with picture compressed to the right-hand side of the screen and spreading to normal after four minutes; (3) by reducing contrast and brightness, the brilliance would fade from the extreme right to the left gradually, an effect which could be likened to drawing a curtain across the screen.

The fault was eventually traced to the e.h.t. boost capacitor (0.25μF, C79 on service sheet).—J.G.S., Paisley.



effect any improvement and the coils tested o.k. for continuity. The fault was finally located by probing and turned out to be a break inside the sleeving of a 3/4-in. piece of wire connecting the common tapping of the oscillator coils to the medium wave contact on the wavechange switch.—H.W.H., Bargoed, Glam.

**Baird T163**

**Poor Earth Contact** A commonly encountered fault is low volume or no-sound and is due to instability in the sound i.f.

amplifier. The 0.01μF tubular paper decoupling capacitors in this stage are all returned to chassis via soldering tags fixed with rivets. These tags usually make poor connection to chassis and may be easily proved by careful prodding.

The cure is simple—earth all decouplers by fresh soldering tags secured to the chassis by 6BA nut, bolt, and shake-proof washer.—B.N.G., Chadwell Heath.

**Marconiphone VT63DA**

**Negative Tube Screen** No picture, brilliance or raster were the conditions on this chassis. The e.h.t. was low (at 7kV), the c.r.t. cathode and grid voltages were in order but the screen volts were 200 negative.

This was found to be caused by a leakage in C65, the 300pF (5kVwkg.) beam blanking capacitor. Replacement resulted in screen illumination but the PL81 was then found to be running red-hot. Replacing the ECL80 line oscillator and the EY51 e.h.t. rectifier was rewarded by the appearance of the full 15kV on the c.r.t. and a good picture.

Another similar set with no picture was found to have no grid voltage on the c.r.t. Our circuit differed from the chassis, but the grid is connected to pin 7 (anode) of the vision interference suppressor (V12, EB91). An internal electrode short-circuit in the EB91 was responsible for the no-picture condition.—N.R., Stoke-on-Trent.

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**Bush TV22/TV24 Series**

**Intermittent Heater** The trouble is that the valve heaters go out intermittently for a few seconds when the set has been running for a short time. This fault is difficult to trace due to the short period of the break in the heater chain and because all the valves test o.k. when the set is switched off.

This type of trouble has been experienced several times in the above-mentioned Bush models and also in a Pye FV1 and a 12in. Alba. All the receivers concerned were about two years old. I have got to know this fault and can now usually go straight to the source of trouble. It is invariably due to the line output valve (PL38) going intermittently open-circuit heater.—A.A., Leeds, 13.

**Murphy A146**

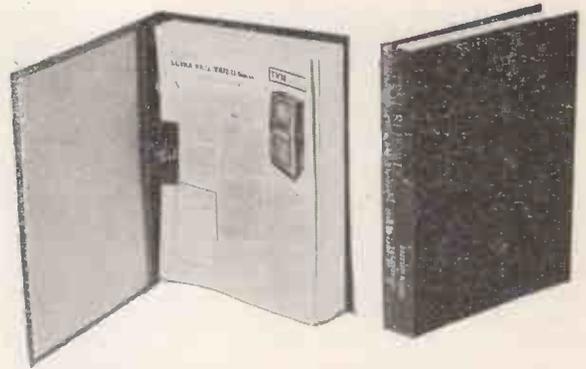
**Poor M.W. Tracking** The trouble was poor tracking and all the symptoms pointed to insufficient padding. The Light Programme was slightly off alignment and the medium wave stations were crowded at the lower end of the band. Replacement of the 470pF common padder and 100pF feedback coupler did not

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Bush KC94 AC Radiogram (R34, Nov., 52).  
Cossor 522/523 a.m.-f.m. radio receiver (R72, May, 1955).  
Cossor TV Models 919 and 920 5-Channel (TV30, Aug., 52).  
Cossor Table TV, Model 926 (TV37, Feb., 53).  
Cossor Television Receiver Model 927 (TV42, July, 53).  
Cossor 930 series TV receivers, (TV62, Feb. 55).  
Decca Double Decca Model 51 mains-battery portable (R65, Dec., 54).  
Decca Large Screen Projection TV Receivers (TV40, May, 53).  
Decalcan Radiograms, Models 91 and 92 (R23, Dec., 51).  
Decalcan Model 90, Radiogram, with notes on the Decalcan Table Radiogram (R21, Nov., 51).  
Eko TS105 and TRC124 Television Receivers (TV49, Feb., 54).  
Etronic ECS2231 Projection TV (TV46, Dec., 53).  
Etronic ECV1523/7 Console TV Receivers (TV27, June, 51).  
Etronic ETA632 Radio Receiver (R43, Aug., 53).  
Ferranti Radio Receiver Models 005 and 105; Radiogram Model 405 (R36, Jan., 53).  
Ferranti Television Models T1205, T1405, T1505 (TV18, Aug., 51).  
Ferranti 1472 and 1225 Television Receivers (TV45, Nov., 53).  
Ferguson 341BU mains-battery portable radio (R67, Jan., 55).  
Ferguson 968T series television receivers (TV60, Dec., 54).  
G.E.C. BT5147 TV Receiver (TV51, Apr., 54).  
G.E.C. BT7092 and BT7094 TV Receivers (TV44, Oct., 53).  
Griffin PA1 projection TV (TV31, Aug., 52).  
Grundig 500L & 700L/C Reporter Tape Recorder (S3, Dec., 53).  
H.M.V. 1807a television receiver (TV63, Mar., 55).

Kolster-Brandes K.B. FV30, FV40, and FV50 (TV23, Feb., 52).  
Kolster-Brandes HG30 Radiogram (R53, Apr., 54).  
Marconiphone T/C10A Radio Receiver (R41, June, 53).  
Marconiphone VC60DA console TV (TV61, Jan., 55).  
Masteradio T851 and T852 television models (TV26, May, 1952).  
Masteradio TV and Radio Console Model T853 (TV36, Jan., 53).  
Masteradio TD4T and TD7T/C TV Receivers (TV58, Nov., 54).  
McMichael Clubman model 535 table radiogram, (R62, October, 1954).  
Peto Scott TV1441 series (TV65, Apr., 55)  
Peto Scott 1412 and 1712 TV receivers (TV54, July, 54).  
Philco Model A.547B Table Radio and Radiogram. A.549A R.G. (R24, Dec., 51).  
Philips 141U Portable Radio (R56, June, 54).  
Philips 1115U TV Receiver (TV50, Mar., 54).  
Pilot TM/CM54 Television Receiver (TV41, June, 53).  
Pilot TV84877 Television Series (TV59, Nov., 54).  
Pilot VS9 Console TV Receiver (TV34, Nov., 52).  
Pye Car Radio Models P23CR and P24CR (R48, Jan., 54).  
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Pye Mains-Battery Portable Receiver Model P29UBQ (R37, Feb., 53).  
Pye V4 and V7 television receivers (TV64, Mar., 55).  
Raymond F46 radio receiver (R69, Feb., 55).  
Regentone "Big 15/5" T & C Television Receivers (TV48, Feb., 54).  
Sol-ell 516AC/U Radio (R57, July, 54).  
Stella ST151A radio (R66, Jan., 55).  
Stella Television Receiver Type ST1480U (TV25, Apr., 52).  
Stella ST8314U Television Receiver (TV55, Aug., 54).  
Strad Model 510 Table Receiver (R35, Dec., 52).  
Taylor Electronic Testmeter Type 171A (T16, Aug., 54).  
Ultra Television Models VA72, YA72/73 Series (TV38, Mar., 53).  
Ultra "Troubadour" U696 Radio Receiver (R44, Aug., 53).  
Ultra "Twin" Portable Radio (R55, June, 54).  
Ultra V84 and Y84 Television Receivers (TV47, Jan., 54).

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Ferranti 505 a.c.-d.c. mains radio (R33, Oct., 52).  
Ferranti 525 Radio Receiver (R58, Aug., 54).  
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H.M.V. Radio Receiver, Model 1122 (R54, May, 54).  
H.M.V. Radio Receiver, Model 1356 (R42, July, 53).  
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Kolster-Brandes FB10 Mains Midget Portable (R32, Sept., 52).  
Marconiphone P17B Personal Radio (R49, Jan., 54).  
McMichael 493 All-Dry Portable Radio Receiver (R47, Nov., 53).  
Portogram "Junior 8" Record Reproducer (R5, July, 54).  
Portogram "Prell 20" Portable 25W Amplifier (S4, May, 54).  
Philco A536 W/M radio receivers, (R68, Feb., 55)  
Pye P43 Radio Receiver (R63, Nov., 54).  
Pye 13-channel tuner unit, (TV66, May, 1955).  
Roberts Radio "Junior" All-dry Battery Portable (R26, Feb., 52).  
Roberts P5A portable radio, (R73, May, 1955).  
Taylor Electrical "Windsor" Circuit Analyser Model 20B (T.1.5, Sept., 52).  
Vidor Model CN414, All-dry 2-Band Attachable Portable (R28, Apr., 52).  
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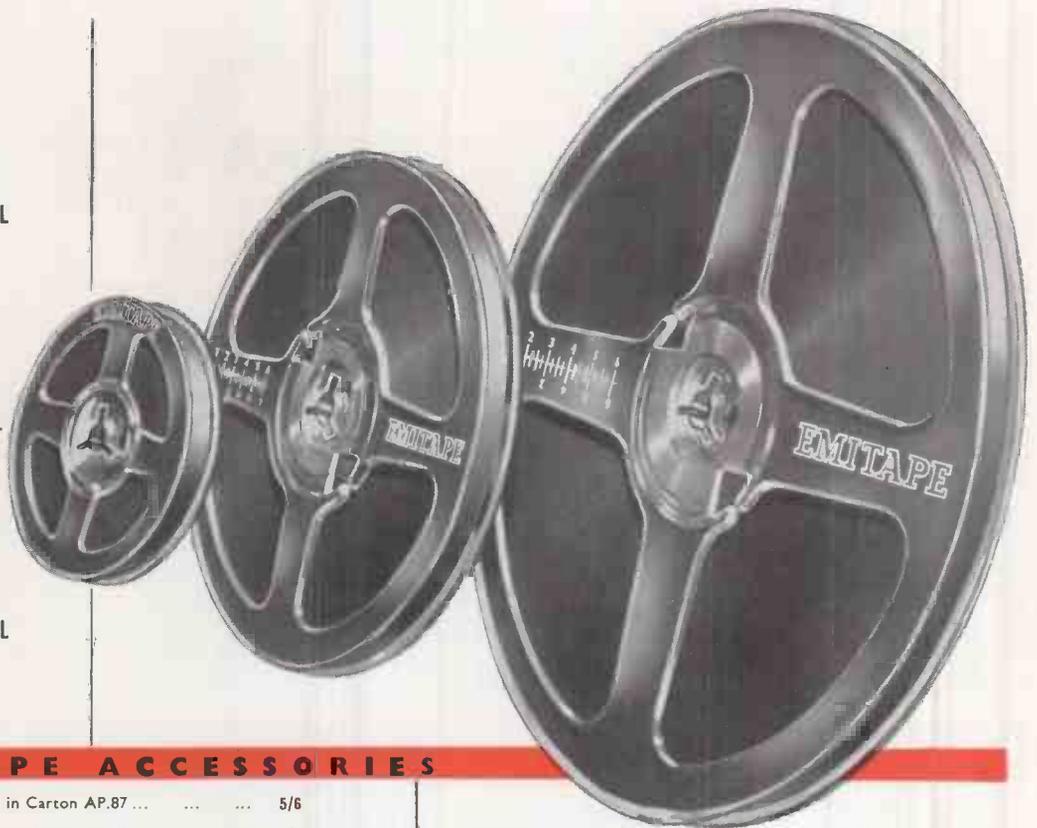
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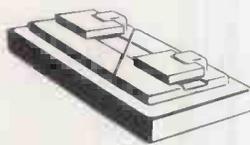


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# Servicing Audio Equipment

## PART ONE GRAMS AND AUTOCHANGERS

A GREAT number of the practical and economic problems involved in the running of an efficient organisation for servicing electronic or mechanical-electronic equipment are outside the control of the service man himself. This problem was discussed by several speakers at a recent discussion on *Practical and Economic Problems in the Maintenance of Domestic Television Receivers* held by the Radio Section of the Institute of Electrical Engineers. Although the discussion was mainly devoted to TV servicing many of the points made apply equally to all types of service work.

The principal speaker put forward the view that too often a piece of electronic equipment was put on to the market presumably with the pious hope that it would never go wrong in any way, since so little thought had been given to the accessibility or layout of components. Components which are jig-assembled in a factory can be a source of frustration to the unfortunate service engineer who has to attempt to dismantle and reassemble them without the aid of special tools, and the bad practice of burying expendable components under or behind other sub-assemblies does little to raise the service man's esteem for his designer colleagues.

The speaker went on to suggest that it should be an essential part of the experience of all apparatus designers, both mechanical and electrical, and of all production engineers, to spend a few months on the maintenance side of their particular industry. Such a view will no doubt find a ready echo in the minds of all service engineers, who after all have to "live with" the equipment for a much longer period than the designer.

### The Service Engineer

The quantity and diversity of electronic equipment coming into a service depot is continually increasing, with a corresponding increase in the demands made upon the skill and adaptability of the service engineer. Ideally the service engineer should be as highly skilled as the design engineer but under the economics of the present system it is not always possible to attract such recruits to the industry.

The shortage of service engineers of the necessary high calibre seems to be

offer better prospects of a progressive career in servicing to the skilled and ambitious engineer.

Nevertheless there is no doubt that retail businesses show an increasing awareness of the importance of rendering a prompt and efficient servicing organisation and are greatly concerned to make the jobs attractive and worthwhile.

### The Modern Service Department

One important way in which this can be done is by planning the service department to give the most congenial working conditions, and by equipping it to provide the equipment and facilities which will save time, reduce fatigue and permit the development of a standardised routine for fault diagnosis and repair.

Under the heading of department planning, attention should be paid to the location and layout of the service shop. Points which should receive consideration include siting of the service shop with relation to the retail portion of the shop, and for easy access to the delivery area.

The department should have sufficient storage space and working areas so that a logical movement of the equipment from its receipt to final return to the customer may be provided. Lighting and provision of power points are often inadequate and the provision of additional equipment of this type need not be an expensive matter and will add greatly to the convenience of the operators.

### Equipping a Service Department

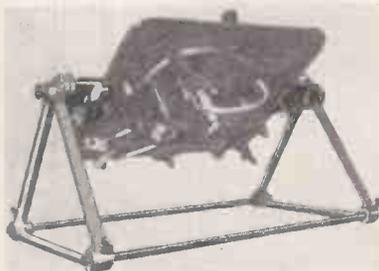
Although the amount and description of the equipment required by a servicing organisation will depend to some extent on the type of work in which it is intended to specialise, there is no doubt that it is just as important to adopt a standard routine of handling repair jobs. When this has been decided upon (and it may be necessary to do some experimenting before the correct routine which will suit the work to be handled and the personnel employed is determined) the choice of the requisite gear will follow more or less automatically.

By R. E. B. Hickman

a perennial problem and many suggestions have been put forward from time to time as to the reasons for this lack of enthusiasm for the profession.

The fact that the majority of service engineers are employed by retail organisations and their working hours consequently regulated by shop opening times has been suggested as deterrent to the recruitment of factory trained personnel. Although it might involve the retailer in additional expense and supervision it has been suggested that a change to normal factory hours for retail service departments might have beneficial results.

Similarly it might be argued that an extension in the facilities offered by trade service organisations might attract recruits. Those in favour of this suggestion argue that an extension of specialised servicing companies would



A mounting rack of this type is invaluable for the facile and efficient inspection of autochangers in the workshop.

The writer is a strong advocate of the policy of specialised fault diagnosis followed by systematic replacement or repair of faulty components or assemblies. This system has been well proven in manufacturers' service departments and in repair depots of the Armed Forces. Under such a system a skilled engineer may be fully employed in efficient location of the faulty component or circuit after which the actual repair or replacement can be handled by a junior engineer or an improver.

The fault finder will be provided with an adequate set of tools and instruments, and one of the most useful at this stage of the repair is the circuit analyser. This instrument which has been in considerable use in the U.S.A. for a great number of years, may be used to trace the course of a signal through the equipment under test.

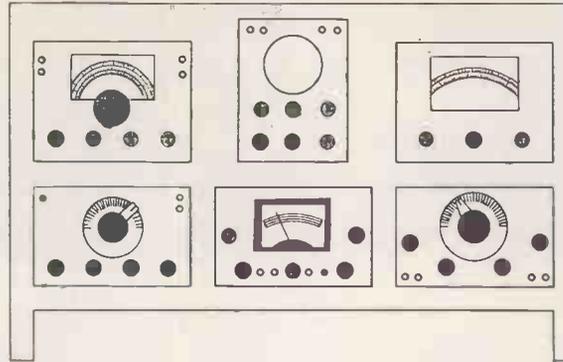
In the case of tests on an audio amplifier the signal may be applied from an i.f. oscillator which may also be used to check the audio stages of a radio or TV receiver when the r.f. circuits are known to be functioning properly. For testing the r.f. circuits of radio or TV receivers a modulated standard signal generator may be used to supply the input signal.

One of the prime requirements of servicing equipment is the ease with which it can be set up and adjusted to give the results required, and again a tip may be taken from the large manufacturers who in their service and test departments devote quite a lot of attention to the layout and proper correlation of equipment for particular purposes.

Fig. 1 shows a neat arrangement of six standard units assembled on a metal (or wooden) rack which provides facilities for numerous tests on a.m., f.m. or TV receivers as well as audio amplifiers and other equipment. A rack of equipment arranged in this manner enables all the major items of test gear to be readily available and provides extensive test facilities for all kinds of jobs. If the units are arranged on shelves they can also be easily removed if they are required for use elsewhere.

Equipment should be available to provide the following services:—

- (a) Measurement of a.c., d.c. or r.f. voltages and currents, including peak-to-peak values.
- (b) Measurement of capacity and resistance, over wide ranges.
- (c) Provision of standard test signals from l.f. through i.f. and r.f. up to the highest frequencies used in TV or f.m. broadcasting.
- (d) Provision of modulated r.f. signals and sweep signals.



A 2-tier assembly of frequently used test gear. The instruments are mounted on shelves and may be easily removed if required for use elsewhere. A typical set-up might be: bottom row (l. to r.)—a.f. oscillator, multirange electronic testmeter, TV sweep generator; r.o., TV calibrator. The space under the instruments may be used for storage of test leads, tools, etc.

(e) A circuit analyser (or signal tracer).

(f) A C.R.O. with high gain, and wide response amplifiers.

The customer rightly expects his equipment to be returned to him from the service shop working in accordance with its maker's original specification and this is only possible if the service man has (a) the necessary knowledge of manufacturers' data; (b) the correct equipment to trace the fault, remedy it and re-align the equipment; and (c) the technical skill to use (a) and (b) efficiently and quickly.

**Service and Maintenance of Record Changers**

So much then, for some of the general problems involved in running an efficient service organisation. Let us now consider some of the particular problems which will be encountered in servicing and maintaining auto record changers, and record players.

For many years, and in many service departments, the handling of record changer repairs has been the Cinderella of the shop. No special provision has been made for it and the method of tackling the problem was too often a haphazard "trial and error" process without the shop even possessing any specialised testing equipment.

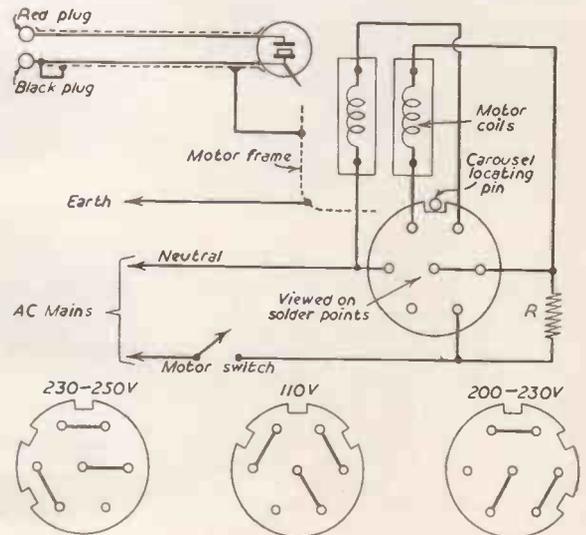
Nowadays, there is a tremendous increase in the use of gramophone records, due to a considerable extent to the introduction and wide distribution of the high quality microgroove or long-playing (l.p.) discs. Two additional speeds, 33½ r.p.m. and 45 r.p.m., have been introduced to challenge the long-established 78 r.p.m. and this has meant the introduction of 3-speed record-players as well as interchangeable pick-up heads.

**Test Equipment**

Quite a lot of the test equipment required for the proper servicing of changers is peculiar to this service and is not used in normal radio servicing or TV servicing.

A service kit for record changers should include at least the following:—

- (a) Stroboscopic discs for use with an a.c. light source for checking speeds of 78, 45 and 33½ r.p.m.
- (b) A pressure gauge for measuring the stylus pressure of pick-ups.
- (c) A selection of replacement



Always make sure that the voltage adjustment is correctly set. The motor of the Philips 3-speed players 424A and 426A can be connected with its coils in parallel, in series, or in series via a resistor for various mains supplies, as shown.

needles for use in those pick-ups having easily removable needles. The kit should include jewel styli as well as metal needles.

- (d) Test records; under this heading are included (a) special coarse pitch discs intended for checking the complete operating cycle of a changer mechanism, and (b) special discs with a recording of all frequencies from say 50 c/s up to 10 kc/s and intended for checking the overall response of the pick-up and amplifier channel

An additional tool whose value cannot be overestimated in facilitating the service of recorder changers is a mounting rack. Suitable units can be obtained ready made or alternatively it should not be beyond the capabilities of the average service depot to make up a rack which will service the same purpose.

The final "must" which we shall mention is a complete set of manufacturer's literature for all those equipments which it is intended or expected to handle. More so perhaps than any other type of equipment coming into the service department, changer mechanisms are a law unto themselves and the variety of devices used to secure the same end result employed by the different manufacturers make it a most foolhardy proceeding to attempt anything other than the simplest adjustment without access to, and a good knowledge of, the maker's recommended procedure.

*"Working to the book" on changers is not a confession of incompetence on the part of the engineer but rather a frank acknowledgment that he realises the unnecessary troubles that can be caused by an unintelligent approach to the problem.*

**Go-slow Tactics**

In one way servicing of changers offers the advantage over servicing of other equipment normally encountered in that practically all the operations of the unit may be observed directly by eye. It is not necessary to be able to interpret the pattern on a c.r.o. or the readings of various meters.

After the unit has been mounted in its rack, if it is at all possible to operate it in the normal manner it should be connected to a suitable mains supply and switched on. One or more records should be placed in position and its action should be observed. It should soon be apparent at which particular point in the cycle correct operation fails.

At this point the motor should be switched off and the operation should be repeated by rotating the turntable

by hand. If the mechanism has jammed a turn in the reverse direction will often clear the operation. Moving the turntable by hand will allow all the complicated mechanism to operate in slow motion and the functioning of each separate lever, cam or arm can be noticed and checked. An operation which under normal running conditions takes place too quickly for the eye to follow may be readily followed and any incorrect sequence or maladjustment can be spotted.

It is at this point that a careful study of the manufacturer's literature will pay dividends. All the reputable manufacturers give detailed descriptions in their service manuals of the operation of such things as the automatic trip, the turntable brake, the pick-up lift, etc., and by comparing the observed movements of the parts in question with the maker's description of how these parts should move it is generally quite a simple matter to determine what has gone wrong.

A word of caution should be added here. Never use undue force when turning the mechanism over by hand, particularly if it is seen that any part of the mechanism is twisting or bending. The operation should be stopped and the maker's service manual consulted for the correct sequence of events.

Let us now consider some of the more common faults which can occur in the changer mechanism cycle of operations.

**The Automatic Trip Mechanism**

The automatic trip is that part of the mechanism which at the end of a record initiates the cycle of operations which returns the pick-up to the beginning of the record.

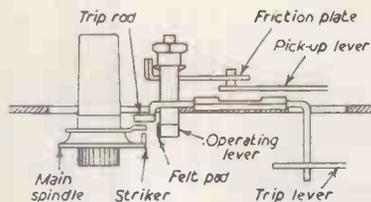
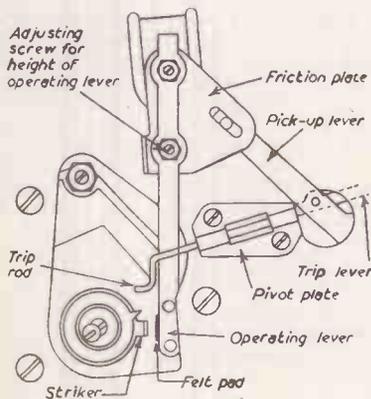
Most auto trip mechanisms on present-day units depend for their action on the increase in velocity of the pick-up arm as the stylus enters the run off or eccentric groove at the centre of the disc, although some older types of changer depended upon the return movement of the pick-up on the eccentric groove for their action.

Due to normal "wear and tear" a variety of faults may develop including failure of the auto-trip action. However, if this fault is reported (especially if the complaint stipulates "only on certain records") it is advisable to check that the records in use have a run-off groove of at least  $\frac{3}{16}$  in., as there are some old records still in use which have run-off grooves smaller than this and some even without such a groove at all. The auto trip may not operate on such records and the only way to cycle the changer in such cases is to use the reject button.

If, however, the discs in use are beyond suspicion, the position and sequence of operation of the levers and cams should be inspected and adjustments made in accordance with instructions in the service manual. All operating levers should be perfectly free on their pivots, but care should be taken to see that friction plates, which are commonly used in such mechanisms are not too slack and are not coated with oil.

Dirt, congealed oil or other foreign matter on a friction plate is a frequent source of jerky action which may cause the trip mechanism to jam. A spot of light machine oil is normally all that is required on the pivot points of operating levers.

Among other operational faults which may be caused by some defect in the auto-trip mechanism and the subsequent cycle of events are the following: the pick-up may drop out of place at the beginning of a record; the pick-up arm may refuse to lift at the end of a record or it may lift before the end; the pick-up may lift and return to the "stop" condition instead of the "replay" position; the unit may not stop after the last record. All these troubles may arise from faulty adjustment of one or more of the cams, levers or springs in the mechanism.



The automatic trip on the Garrard RC110 changer unit works on the velocity principle. Correct adjustment of the mechanism is essential, otherwise a number of faults may appear in cycling of changer (see text for details).

**Turntable Brake**

Not all record players include a brake on the turntable, but when fitted it generally takes the form of a felt pressure pad which acts on one of the inner surfaces of the turntable when the unit is switched off. If the turntable of a unit which is fitted with a brake continues to revolve for several turns after the motor is switched off, the felt brake pad should be examined.

It will generally be found that it has become badly worn or the arm holding it may have been strained so that the pad no longer makes contact in its normal operating position. It is usually a simple matter to replace the pad after it has become worn.

**Faults associated with the Pick-up Arm**

Another prolific source of trouble on any record player is the pick-up and its electrical performance, together with the mechanical performance of the pickup arm.

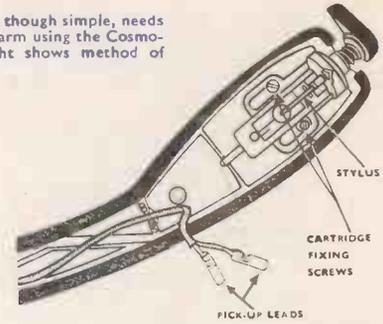
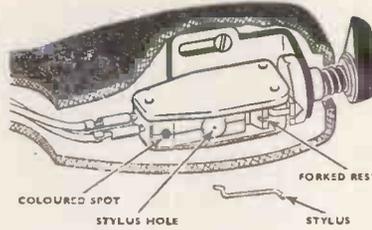
The majority of changers and a large number of single record players in use at present use crystal cartridge pick-ups. In some multi-speed equipments a turnover type head is used, whilst others use separate plug-in heads.

It is essential when using pickups with sapphire styli that the correct size stylus be used for the record to be played, i.e., 0.0025in. radius for 78 r.p.m. discs, or 0.001in. for microgroove 33½ or 45 r.p.m. discs. The normal convention is to code the 0.0025in. stylus with a green spot, and the 0.001in. stylus with a red spot and the importance of this feature should be made known to all customers.

*Considerable care should be exercised when handling pickups with jewelled styli. Dropping such a pickup head heavily on to a record will almost certainly result in damage to the point.*

If it is complained that reproduction is "rough" or distorted, especially if it is ascertained that this distortion is mainly in the high notes, it is almost a certainty that the trouble is a chipped or badly worn needle. It may be borne

Replacement of a damaged stylus in a crystal pick-up, though simple, needs care. Diagram on left shows removal of stylus on an arm using the Cosmo-cord type GP37 turnover head. Diagram on right shows method of removing complete cartridge.



in mind that with the present-day wide usage of microgroove discs the problem of worn needles is more acute than it was when 78 r.p.m. discs only were in use.

There are three main reasons for this: (1) despite the lighter weight of modern pick-ups the actual abrasive pressure on the disc is greater due to the smaller radius of the needle tip; (2) present-day needles are of the "permanent" type and hence are changed less frequently; and (3) the frequency response of modern equipment extends further into the high frequency end of the range and consequently scratch frequencies are reproduced at greater volume than on older equipments.

It may sometimes be possible to see a fracture of a stylus under a magnifying glass, but even minute chips not easily seen by such a method can cause faulty reproduction. If such a small defect is suspected it is worthwhile playing an old microgroove disc using the suspect needle and slightly increasing the pressure on the head. A chip of this kind may actually cut a fine thread off the surface of the disc which can be seen around the stylus point. In any case, if the stylus is suspected it is wisest to replace it.

If the distortion complained of is severe and accompanied by a considerable loss in volume it is a good indication that the pickup unit itself

is at fault. In the case of a turnover crystal the fault will occur on both 78 and l.p. records, but in equipments using separate heads a simple substitution will check whether the head is actually faulty.

**Pick-up Stylus Pressure**

To prevent excessive wear of l.p. records the stylus pressure should not exceed 10 grams and it should be part of the standard servicing routine to measure this pressure and if incorrect to reset it.

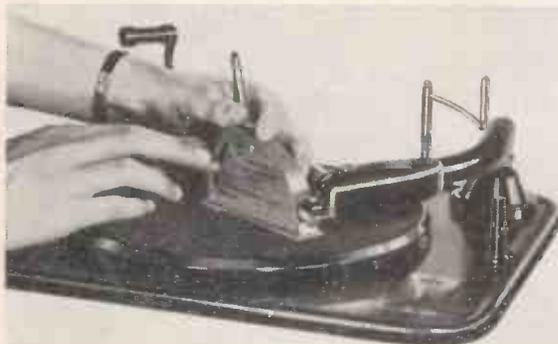
A suitable instrument for measuring stylus pressure is made by Garrard. It has a range of 0 to 15 grams and its operation is extremely simple. With the pickup arm in the normal playing position the gauge is placed on the turntable and the stylus is rested on the small balance arm provided. An indicating lever is then slowly depressed until a pointer shows the balance point in a small aperture at the top of the gauge. The stylus pressure is then read off directly on a scale by the side of the indicating lever.

Most good class changer units include some method of adjustment of the stylus pressure and if a test as above shows the pressure to be considerably more than or less than 10 grams a suitable adjustment should be made. (The adjustment on the Garrard Model RC80 changer unit is shown on page 153).

**Tracking Errors**

A common trouble, which is also associated with the pick-up and arm is incorrect tracking. Either the pick-up may jump out of the groove or it may roll up to the top of a groove. The former condition is easily observed, but the latter may be more difficult to detect. It is, however, characterised by a "bubbling" type of distortion. A number of causes may contribute to poor tracking.

First, make sure that the complete motor board unit is correctly mounted and is floating freely on its spring or rubber suspensions. Check also the level of the turntable and adjust the



The Garrard stylus pressure gauge for microgroove pickups shown in use on a typical modern autochanger.

suspension as necessary to level up the unit. (Faulty suspension should be immediately suspected if vibration, such as may be caused by a person walking across the room, tends to make the needle jump out of the groove)

Secondly, inspect the pick-up lead where it passes through the base-board to make sure that it has not been pulled tight or become entangled anywhere in the mechanism so relieving some of the tension on the arm. Check also the pick-up arm bush or bearing, and clean and adjust as necessary. If a ball bearing is used carefully clean it out and give a drop of thin machine oil.

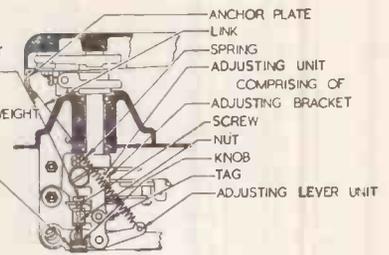
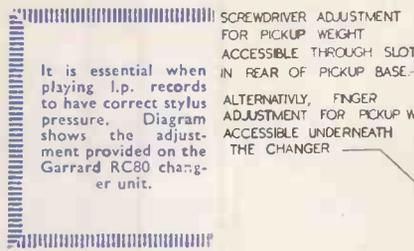
Thirdly, examine the stylus carefully under a glass, as tracking faults can be caused by chipped or badly worn points.

If the pick-up jumps out of the groove as it nears the end of the recording, or if it persistently jumps back on entering the run-off groove, it probably points to incorrect setting of the auto-trip mechanism and the maker's instructions should be followed for adjustment.

**Faults associated with the Motor**

Different manufacturers favour different types of motor for driving the turntable, but the shaded-pole induction or the synchronous types are in very common use, on machines designed for a.c. mains operation.

A common type of motor in use, although not synchronous, depends for its correct speed to a considerable extent on the frequency of the mains supply, but also upon the load applied to the motor. If this type of motor is found to be running slow the first points to be checked are that the motor shaft and all other spindles and bearings are free running. If drive belts or



intermediate rubber tyred wheels are used these must be kept free of oil which would cause excessive slip.

Rubber drive belts may also cause trouble by not running in the centre of their pulleys, so giving rise to noise and uneven drive. This fault may often be rectified by simply turning the belt over or it may be necessary to check the pulleys to see that they are not running out of true. Great care must be exercised if it becomes necessary to attempt to realign a bent pulley shaft or the result may be a worse.

On some mechanisms it is possible to apply a slight additional load to the motor by means of a spring so as to take up the slight amount of freedom which may develop in the bearings after the player has been in use for a time. Normally bearings on these machines are of the oil retaining type and the only lubrication required will be a very occasional spot of oil.

**Governor-controlled Motors**

Although governor-controlled motors are now out of favour for a.c. operation they are still used on d.c. or universal mains operated equipments. Changes of motor speed due to mains supply change or to wear can be corrected on

such motors by adjustment of the governor weights. They can be moved on the armature shaft to either increase or decrease the speed as required.

The felt friction pads of the governor should be kept saturated with a fine machine oil.

Faulty commutation on a d.c. or universal motor can give rise to serious variations in turntable speed and hence the brushes should be kept clean and smooth and they should be free to move in their holders. Over-lubrication must be avoided. If the motor has been neglected for a long time it may be desirable to remove and clean the whole armature. The manufacturer's instructions must be carefully followed when carrying out this work.

**Wow and Flutter**

The variations in speed, commonly referred to as wow (slow speed changes) or flutter (rapid speed changes) are unfortunately prevalent in all but the highest grade units and it is to obtain freedom from these very disturbing effects that the hi-fi enthusiast is willing to pay the high prices asked for the very constant speed equipment sold as "transcription type" units.

Wow may be caused by some of the faults already discussed, namely, oily or dirty driving belts or intermediate wheels or pulleys; deformed pulleys or driving wheels; binding or dry bearings or spindles; faulty commutation in d.c. motors, etc. Flutter can also be caused by an out-of-true pulley or bearing, or by the rotor shaft of the motor being out of balance due to having been accidentally dropped or even by rough handling in transit.

Incidentally it has been demonstrated that more often than not when a customer complains that his turntable is "going slow" it will be found that the real trouble is wow or flutter. Without an accurate musical knowledge it is very difficult to say if a record is being played very slightly slower or faster than correct speed.

**Rumble and Hum in Output**

A background low-frequency noise or rumble is generally due to rough or dry motor bearings or an out of balance motor but it will be accentuated

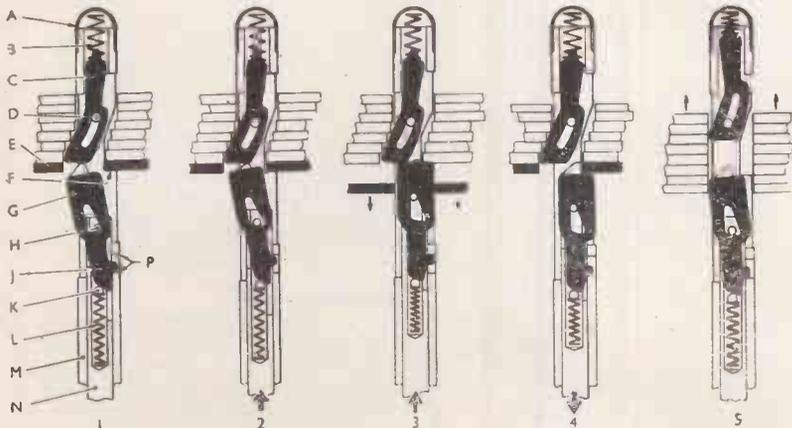


Diagram showing operation of a typical centre-spindle assembly on an automatic changer (Plessey type D). Sequence is: (1) record stack rests on shelf "F"; (2) "G" taking up record displacing position; (3) record displaced by "G" which now supports rest of stack; (4) "G" lowers records on to shelf "F" then returns to position 1; (5) records being removed from spindle, "G" and "C" going flush.

by excessive bass response in the pick-up or amplifier. When a crystal pick-up lead is in use it is often sufficient to fit a lower value of pick-up load resistor in order to eliminate rumble.

An out-of-balance motor cannot very well be repaired by the normal service shop and it is recommended that if such a fault is suspected the motor should be returned to the manufacturer of the unit for his expert attention.

It is important that the motor suspension should be free and any rubber brushes or springs used for this purpose should be inspected when rumble is present. If the motor leads or the pick-up leads are strained tight, or if some component is touching the motor, this may be sufficient to conduct hum to the pick-up and hence into the amplified output.

Hum may also be present in the loud-speaker output when the motor is switched off and this may often be due to insufficient or complete lack of screening of the pick-up lead. A simple check is to remove the pick-up leads from the amplifier input and then to short the amplifier input terminals. If the hum disappears under these circumstances it means the pick-up lead is faulty and the earthing connection should be renewed or the entire

## General Precautions

To conclude this article, there are some general observations which mostly amount to the application of so und common sense but which cannot be stressed too often in connection with repairs to record players and changes:—

*Do not use force, a file or any abrasive when making any adjustment (unless such a procedure is indicated in the service manual).*

*Do not hold the pick-up arm when the mechanism is operating.*

*Do not start the mechanism without a record in position.*

*Do not attempt to manufacture substitute cams, springs or levers—use the standard spare parts.*

*And finally some “don’ts” to be impressed upon the customer:—*

*Do not forget to use the correct stylus and speed for the record to be played.*

*Don’t mix 78, 45 and 33½ r.p.m. records on a changer spindle.*

*Don’t use old and cracked records, or discs with malformed centre holes, or discs which are not reasonably flat.*

*Don’t attempt to change speed when the mechanism is operating.*

*Don’t neglect your records and don’t let them get unduly dirty, dusty or warped.*

*Don’t hesitate to consult your service man if a fault develops which cannot be diagnosed or rectified by the methods described in the manufacturer’s instruction book.*

lead may be replaced. If the hum is still present when the amplifier inout is shorted the trouble lies in the amplifier itself.

Hum which only becomes apparent when the pick-up is actually in contact with a record is generally due to acoustic feedback. Some types of crystal pick-up are particularly susceptible to this trouble and apart from making sure that the motor suspension is free there is little that can be done to overcome it unless the customer is willing to purchase a different type of pick-up. On playing desks where a separate amplifier and loudspeaker is used this trouble may be minimised by careful orientation of the loudspeaker.

| PICK-UP DETAILS                   |                              |                                |                                       |  |
|-----------------------------------|------------------------------|--------------------------------|---------------------------------------|--|
| Type                              | Needle                       | Output (V r.m.s.)              | Optimum load                          | Recommended Max. needle pressure grams |
| Garrard magnetic 78 r.p.m.        | Replaceable standard needle  | 0.5                            | 50k                                   | 52                                     |
| Garrard miniature 78 r.p.m.       | Replaceable Miniature Needle | 0.2                            | 100k<br>0.0025μF                      | 34                                     |
| Garrard hi-fi 78 r.p.m.           | Sapphire                     | 0.35                           | 250k<br>0.0005μF                      | 17                                     |
| Garrard hi-fi l.p.                | Sapphire                     | 0.1                            |                                       | 10                                     |
| Cosmocord GPI9 78 r.p.m.          | Sapphire                     | 0.5                            | 500kΩ                                 | 17                                     |
| Cosmocord GPI9 l.p.               | Sapphire                     | 0.15                           | 500kΩ                                 | 10                                     |
| Garrard T.O. Mag.                 | Two Sapphires                | 0.2                            | 500kΩ                                 | 10                                     |
| Cosmocord T.O. GP25               | Two Sapphires                | 0.15                           | 500kΩ                                 | 10                                     |
| Decca magnetic 78 r.p.m.          | Sapphire                     | 0.3                            |                                       | 20                                     |
| Decca magnetic l.p.               | Sapphire                     | 0.03                           |                                       | 10                                     |
| Garrard miniature Low Z 78 r.p.m. | Replaceable Miniature Needle | 0.7<br>(with 70:1 transformer) | 500kΩ<br>across transformer secondary | 17                                     |
| Garrard miniature Low Z l.p.      | Replaceable miniature needle | 0.4<br>(with 70:1 transformer) | 500kΩ<br>across transformer secondary | 10                                     |

*Details of Some Important Features of Pick-ups commonly used on Record Changer Units. (By courtesy of Garrard Engineering and Manufacturing Co., Ltd.)*

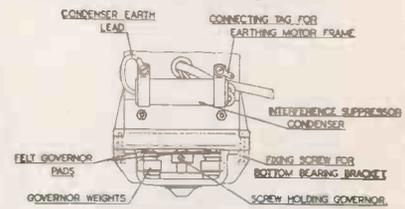


Diagram showing how speed of an a.c. or a.c.-d.c. motor may be controlled by adjusting position of governor weights (note interference suppressor condensers which are required on this type of motor).

### TV Interference

The normal a.c.-only motor fitted to a gramophone motor will not cause any TV interference but the commutator type used on d.c. or a.c.-d.c. equipments may do so. Most manufacturers of this type of unit can supply suppressor chokes to fit into the brush leads of the motor. Such motors may also give rise to interference in the normal broadcast band unless suppressors are fitted.



# SEASONAL SERVICING

POINTERS TO SYSTEMATIC SERVICING  
THROUGHOUT THE YEAR



By D. E. WINTER

**T**HE demand for radio and television servicing throughout the year varies quite considerably as all dealers and engineers know—a fact which makes it difficult to work to any kind of schedule. If it were possible to ascertain the amount of work coming in each week, and also the stock required to cope with it, it would be easy to plan and execute the jobs in a more efficient manner.

As it is, the busiest months seem to be those in the autumn, just prior to Christmas. This is understandable, as the Radio Show stimulates interest in September, and the longer evenings remind people of the winter to come. Naturally, the public want their radio and television sets to be in good working order when they are spending longer indoors.

All this means a lot of hard work for the service engineers, including working overtime in the evenings, not that this is minded too much as the extra profits are always acceptable. It would be better though, if there were more engineers to deal with jobs, and enough jobs all the year round to keep the extra engineers employed.

## Maintenance Schemes

In the case of a small dealer with two or three service engineers, the problem is to find remunerative work for all his men at all times. This is essential as wages have to be paid regardless of profits. The sales side of a dealer's business, in the past, has had to make enough profit to enable the service department to exist, and exist it must if efficient after sales service is to be given. Nowadays, it is more the aim to make the service side of the business pay its own way.

A great help in this respect is the maintenance scheme. The fact that yearly amounts are paid by the customer for possible repairs, provides a known income for the dealer on the service side of the business. This in itself is probably enough to cover wages and overheads, so reducing worries in the slack seasons, which, fortunately now, are few and far between.

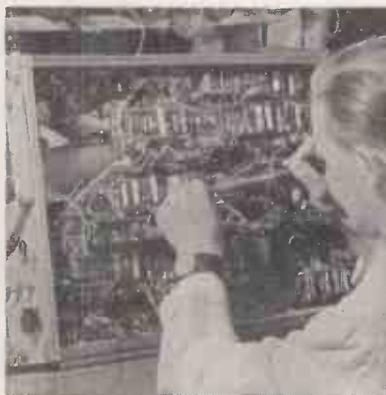
If most of the servicing is by the maintenance method on new sets sold, the problem is much simpler, as stocking

is easier, not such a large variety of replacement parts need be carried, and, therefore, in peak periods repairs can be executed with greater speed.

## Summer Slump

Before the advent of television, the summer months, when people are away on holiday, or more likely in the weeks prior to a holiday, when they were saving for one, tended to be very slack. Radio sets were still developing faults, but the public put up with them in the interest of economy, refusing to spend precious holiday money on their repair. Consequently these sets were conspicuous by their absence in the dealers' workshops; a very undesirable state of affairs.

It is a different story with television. So many sporting events are televised during the summer months as well as plays and serials, that the public still tend to have their television sets repaired at that time, despite the finances involved. Even so, the amount of work is small compared with the winter months.



This coming summer should not present any out-of-work problems for service engineers. The advent of commercial television will make more than enough work in the fitting of adaptors and converters to existing sets. This in itself will not always be a straightforward job, and will account for considerable time. Then there is the fitting of new aerials or adaptors to standard aerials to complete the jobs.

One of the factors that makes for more television work, apart from the fact that there are more valves and parts in a television set, is that the human eye cannot tolerate so many defects as the ear. Whereas radios develop many crackles and distortions and are still kept in this state by their owners, in the case of television, distortion in the picture has to be rectified in its early stages because it is uncomfortable or impossible to watch with ease.

This is fortunate for dealers in two respects, for television sets need regular service, which keeps them up to scratch and they, therefore, do not come into the workshop at a busy time for a big overhaul. The remuneration for the service is also spread more evenly over the year, a much more desirable state of affairs.

Sales of portable sets increase in the summer, and consequently repairs of these sets are more numerous, thereby keeping the service department busy. An extra sales drive at this time helps in both respects. Towards the end of the summer, it is a good idea to push the sales of mains adaptor units for the portable sets; the fitting of these provides extra work at the time when it is needed.

## Tape Recorders

Tape recorders are becoming increasingly popular, and the new service problems introduced make the study of this new technique imperative. Engineers can give more time to examining the circuits and methods involved, so that in the busy times before Christmas, for example, repairs to recorders can be carried out quickly

with the knowledge acquired during the slacker summer months.

As with portable sets, the sales of tape recorders, together with as much publicity as possible, will advertise to the public that this type of equipment is handled and serviced. There are many smaller jobs connected with recorders, such as adapting radio sets with jack plugs and sockets for direct connection to the recorder. Remote control wiring is often requested and extension loudspeaker wiring so that recordings can be relayed as for parties and similar occasions.

**Second-hand Sales**

To help spread the service work evenly throughout the year, all the secondhand sets which have to be taken in part exchange when new sets are sold, can be stored, providing the necessary space is available, and these sets completely reconditioned whenever work is wanted.

In the case of television sets, this policy pays dividends, as quite a large stock of sets can be built up ready for the peak selling season. Very often sales are lost because the customer cannot afford the price of a brand new set. He is, however, often willing to take a secondhand one, at a lower

price, from a reputable dealer.

As long as the public know that all sales are backed by good service, profitable business will be forthcoming from this source. If a new tube has been fitted this will carry a six-months' guarantee, so that the dealer can charge a price for the set, which will allow him to give a guarantee for the rest of the set. This is a good selling point.

It is sometimes possible to arrange with customers to have any large overhaul jobs done whilst they are on summer holidays. This has a double advantage, in that the set is not missed from the home, and the job is in the workshop when more time can be spent on it.

Usually, it can be arranged to keep the set for two weeks, enabling a good soak test to be given after the repair is completed. Towards the end of the winter, and during the spring, a lot of sets can be booked for this treatment. The customer is more than pleased that such consideration is shown on the part of the dealer, and the arrangement is to their mutual satisfaction.

If the service policy of the dealer is to only repair the new sets which he has sold, then less trouble is experienced at busy times, as breakdowns are usually isolated and easy to trace and rectify.

When all makes and types of sets are accepted, hold-ups can occur, and usually do, at busy periods, so delaying other more important work. On the other hand, the older sets keep the workshop fully employed at other times during the year when the work is needed, so it is sometimes difficult to decide which policy to adopt.

**Getting Organised**

Efficient planning of the workshop is a great help to keep sets moving systematically during their repair session. A little thought and re-organisation when the time can be spared, will enable work to be given, to otherwise idle engineers, in improving the workshop.

Additional storage space for sets such as proper shelves can be erected, so that when the workshop is full, the cabinets do not get scratched. Small useful items of service equipment are easily constructed, and jump leads and extension mains leads are always useful.

Another help in avoiding overloading the workshop at rush times is to have a full and comprehensive stock. This is a difficult problem, for with valves alone there are so many types in current use, that it is almost impossible to have all those required in hand.

However, it is worth while having a good and varied stock, as then the correct valves can be taken out on service jobs together with other necessary replacement parts, often enabling the work to be done on the spot, so saving congestion in the workshop.

It is often possible to work together with another dealer in the respect of stocking, especially with valves. If excessive duplication is avoided, this arrangement works well. It is comforting to know that another source is available locally to draw upon, and saves days, in some cases, on urgent jobs.

It will be seen that although service engineers are slaves to seasonal demands, a lot can be done to equalise the work throughout the year. As with all things, logic plays a big part, together with knowledge accumulated over the years. Conditions differ a great deal in each locality, but once these are known, then it is comparatively easy to forecast what may be expected in the future.

Bearing this in mind, plans can be made to cope with the demand, making working conditions better for all concerned. More important than that, the efficiency of the business is improved, as quick and well executed service work leads to a good local reputation, resulting in increased sales and goodwill.

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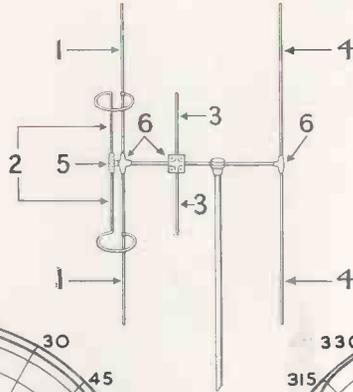
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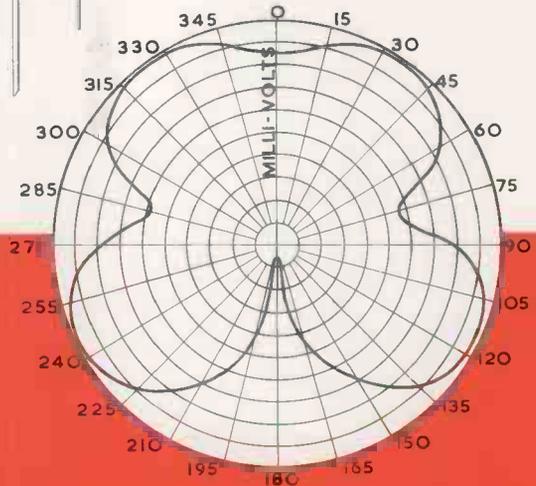
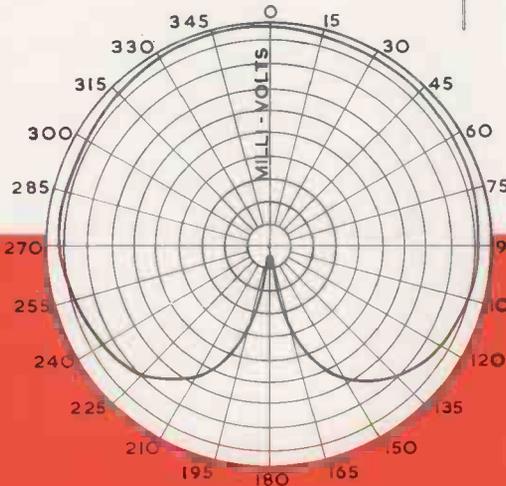
- 1. Band I Dipole
- 2. Band III Dipole
- 3. Band III Reflector

- 4. Band I Reflector
- 5. Insulator
- 6. Junction Units



Polar Diagram of Band I component part of "Dual Band" Aerial.

Polar Diagram of Band III component part of "Dual Band" Aerial.



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## REGULAR SERVICE BEGINS

## f.m. on v.h.f.

WROTHAM STATION IS FIRST IN  
NATIONAL VHF NETWORK

THE B.B.C. v.h.f. broadcasting system was inaugurated on May 2 when the station at Wrotham, 20 miles S.E. of London, went into full service, transmitting the Home Service, Light and Third Programmes in parallel with the existing m.w. and l.w. stations. Radiating an e.r.p. of 120 kW and serving a potential audience of some 13 millions in the London area and S.E. England, it covers a range of about 50 miles.

Shortage of available frequencies and severe (and increasing) overcrowding in the m.w. band — there are now 800 stations as against the 500 at the time of the Copenhagen Plan — with the resultant interference from foreign stations led the B.B.C. to the relative freedom and breathing space of Band II. Those who enjoy good reception of the m.w. transmissions may be surprised to learn that for some six million people reception can only be described as *intolerable*.

In parts of the country, B.B.C. programmes, notably the Home Service, are virtually impossible to pull through the bedlam of Continental stations. And in many more locations reception is severely marred by heterodyne whistles and other forms of interference. So far as B.B.C. reception is concerned, the advent of the evening — especially in winter — to millions of listeners implies a one-sided battle against which the only course is to switch off.

## Two Stage Scheme

Thus, the B.B.C. devised a v.h.f. scheme, divided into two parts. Stage I, to cover the main centres of population as quickly as possible, comprises five high and five medium power stations, of which Wrotham is the first to go into service. Initially, the scheme is designed to plug the gaps in the m.w. and l.w. services and to reinforce these services in areas at present inadequately served, and ultimately to provide a nationwide network of interference-free broadcasting.

By the end of this year three further stations are expected to be in full operation — Pontop Pike, Divis and Meldrum — with Wenvoe in partial operation. By the end of 1956 Wenvoe will be completed and additional stations operating from Sutton Coldfield, Holme Moss, Norwich, North Hessary Tor and Blaen Plwy. With Stage I completed, v.h.f. reception will be within reach of 84 per cent of the population of the British Isles. Stage II will provide progressive development, employing a further 16 high, medium and low power stations (not yet finally approved), which will provide a 98 per cent coverage, tentatively by 1957-8.

Some idea of the increased coverage made possible by this system can be gauged by the service provided by the Wrotham station. It is estimated that over two million more people will be able to hear the Home Service and nearly one million more the Third Programme. Taking into account interference on the Home Service, more than five million listeners can now obtain freedom from spurious transmissions.

Completion of Stage I will mean that Home Service reception will be available to an additional five million listeners, Light Programme reception to nearly three million and Third Programme to almost 12 million. All these listeners are at present out of range of the l.w. and m.w. transmissions and do not include the several million whose reception is at present ruined by interference.

The existing a.m. transmissions on the m.w. and l.w. bands will, of course, continue to operate in parallel for many years.

Each of the v.h.f. stations are to radiate a complete service — Light, Home and Third Programmes — on the frequencies shown in the list.

## Wrotham Station

The pioneer station at Wrotham, which began experimental transmissions in 1950, stands high on the North Downs 730ft. above sea level, its 470ft. mast a landmark for miles around. The equipment features some technical novelties. Two transmitters carry the Light and Third Programmes, backed by two 4.5 kW stand-by transmitters, and two new 10 kW transmitters operate together to carry the Home Service. These transmitters, together with certain ancillary equipment common to all three services, will ultimately be automatic in operation.

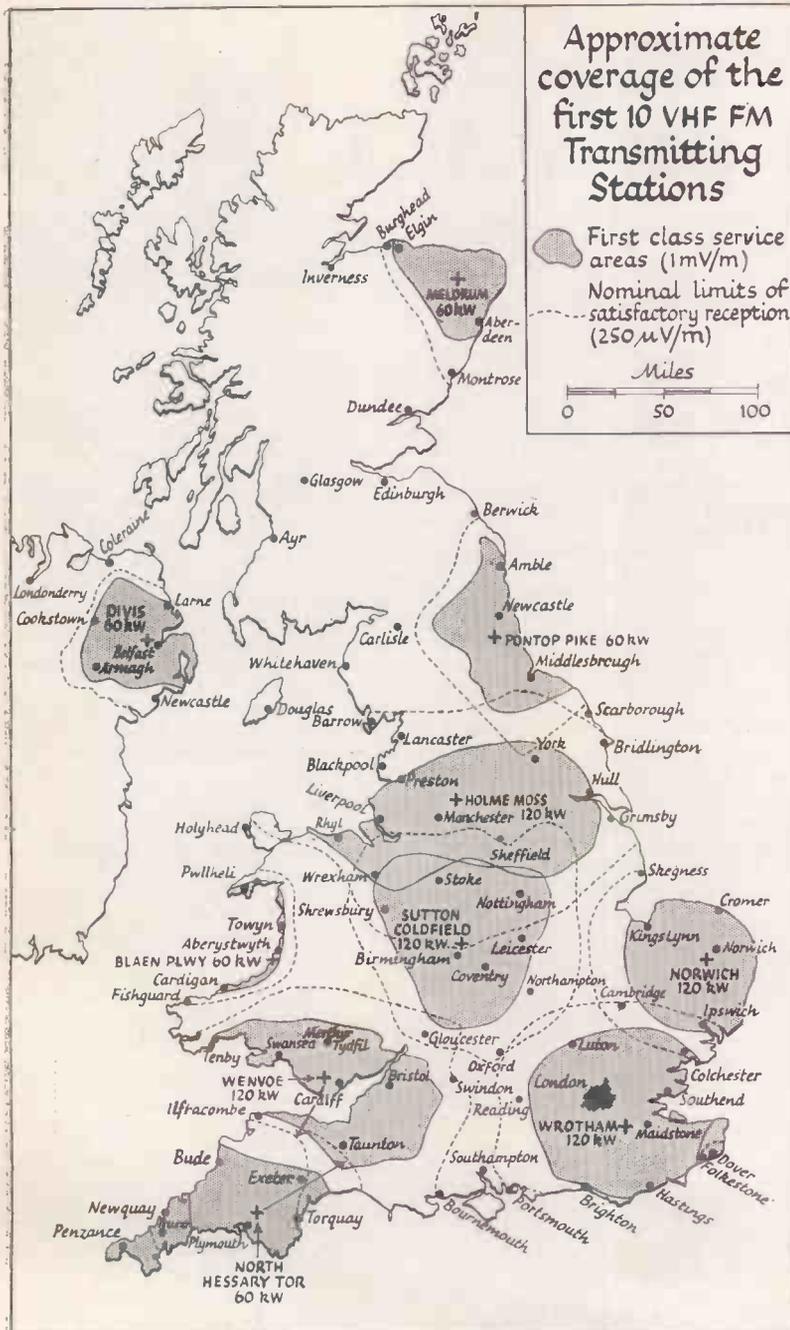
The output and combining arrangements of these six transmitters are of unusual interest. In the first two pairs, failure of the normal transmitter is covered by the reserve, manual switching being necessary. The outputs of the pairs in use are fed to a combining circuit at the output of which the Light and Third Programmes appear as a combined signal. This output is then split into two halves, each half being fed to one section of a further combining circuit. The outputs of the Home Service transmitters feed into the other section of this combining circuit.

Thus at the outputs of the second combining circuit the signal appears as two half-power combinations of Home, Light and Third signals. Under normal conditions these signals are taken over separate feeders to the two halves of the aerial system. By this means the effect of faults in the transmitters is reduced to a minimum and the failure of any one transmitter (or of one half of the aerial) would be almost undetected except by listeners on the fringe of the service area.

## Transmitter Line-up

The method of frequency modulating used is the FMQ system, featuring simple circuitry, high-





reliability and easy maintenance. A quartz crystal oscillator is connected through a quarter-wave network to a balanced modulator, the susceptance of which varies with the modulating signal and in turn varies the frequency generated by the oscillator. The oscillator output is passed through three frequency-doubling stages and one tripler stage to reach the carrier frequency.

At this point, the main Light and Third transmitters are followed by five stages of amplification, two push-pull and three single-ended, driving into a two-valve parallel output stage delivering an output of 25 kW. The new Home transmitters follow similar lines. Duplicate FMQ drives are installed for each service and are fed simultaneously with the programme; automatic changeover arrangements ensure that either drive may be selected, the other acting as spare.

The cooling system for the 25 kW transmitters serves a dual purpose in that the air is drawn from outside, filtered, passed through the transmitter cabinets and then is either exhausted to atmosphere or recirculated within the building for heating in cold weather. The re-circulation system is fully automatic and thermostat controlled.

No master control position is installed since transmissions are automatically monitored at Broadcasting House, but if a programme fault occurs an alarm will be given on the alarm and indication panel which is equipped with a series of lamps indicating the conditions of the various transmitters and equipment so that appropriate action can be taken.

**Automatic Monitors**

For normal operation three automatic monitors are installed at Broadcasting House to compare the outgoing programmes with those received by radio from Wrotham. For the unattended operation of the Home Service transmitter in the early morning changeover panels are provided at Wrotham and Broadcasting House which can be switched to transfer the monitor alarms to Broadcasting House.

Power for the station is supplied at 11 kV by duplicate feeders. Only one feeder is normally connected to the e.h.v. bus-bars, but the second feeder is automatically connected in the event of a power failure. The supply is transformed to 415 volts by duplicate 500 kVA transformers which can carry the full load of the station, and are normally operated in parallel so that failure of one would not deprive the station of power.

**Other Stations**

As new stations are brought into service, the B.B.C. would welcome reports of reception, especially in the secondary service areas. Reports should be addressed to the Engineering Information Department, B.B.C., London, W.1.

**B.B.C. v.h.f.-f.m. Band II Channels**

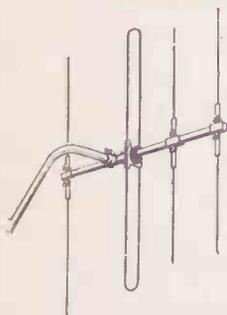
| Station          | Light Mc/s | Third Mc/s | Home Mc/s | Station              | Light Mc/s | Third Mc/s | Home Mc/s |
|------------------|------------|------------|-----------|----------------------|------------|------------|-----------|
| Wrotham ...      | 89.1       | 91.3       | 93.5      | Sutton Coldfield ... | 88.3       | 90.5       | 92.7      |
| Pontop Pike ...  | 88.5       | 90.7       | 92.9      | Norwich ...          | 89.7       | 91.9       | 94.1      |
| Divis ...        | 90.1       | 92.3       | 94.5      | Blaen Plwy ...       | 88.7       | 90.9       | 93.1      |
| Meldrum ...      | 88.7       | 90.9       | 93.1      | Holme Moss ...       | 98.3       | 91.5       | 93.7      |
| North Hessay Tor | 88.1       | 90.3       | 92.5      | Wenvoe ...           | 89.9       | 92.1       | 94.3      |

# Y4?

**BECAUSE**

- ★ THE WOLSEY Y4 SOLVES YOUR STOCKING PROBLEM
- ★ YOU CAN COVER ALL BAND III AREAS WITH FEWER TYPES
- ★ THEY CAN BE ATTACHED TO EXISTING INSTALLATIONS
- ★ THEY ARE UNSURPASSED ELECTRICALLY AND MECHANICALLY

### WOLSEY 4-ELEMENT—Y4



A 4-element aerial designed for use in either the primary service area or fringe areas of Band III.

With 3ft. cranked arm and single lashing equipment, **77/6**

With adjustable clamp for securing to existing installation, **65/-**

Y4/W. With bracket for wall mounting, **62/6**

*For use with 70-80 ohms co-axial cable only.*

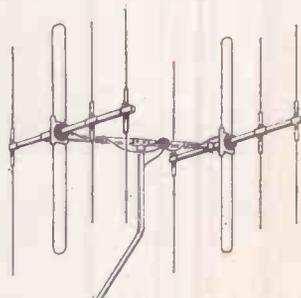
### WOLSEY BROADSIDE ARRAY—BAY4

Designed for extremely difficult or low signal strength areas. Two Y4 aerials in parallel with matching lines and splitter box.

With 4ft. 6in. cranked arm and lashing equipment, **£7 15s.**

With adjustable clamp for securing to existing installation, **£6 5s.**

With 12ft. by 1<sup>29</sup>/<sub>32</sub>in. Dural mast and lashing equipment **£11 15s.**



*For use with 70-80 ohms co-axial cable only.*

### WOLSEY F.M. AERIALS

FM/LW. Dipole with 2ft. 3in. arm and universal wall bracket, **30/-**

FM/HL. "H" type with 4ft. 6in. cranked arm and lashing equipment, **77/6**

FM/Y4. 4-element aerial with 4ft. 6in. cranked arm and lashing equipment, **97/6**

### THE WOLSEY CROSS-OVER UNIT

(WITH PRINTED CIRCUIT)

*Patent Pending*



For linking separate Band I and Band III aerials of any make (both 70-80 ohms) to receiver via one common downlead. Essential when separate aerials are used, or with a combined aerial where the receiver has two separate input sockets. Recommended by a leading Set manufacturer.

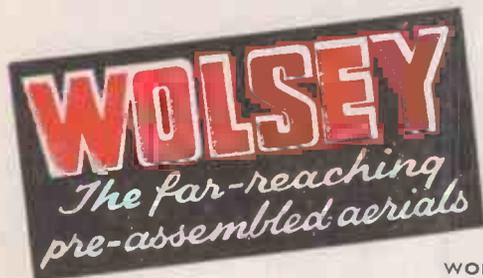
1957. For mounting on wall or wain-scot, **15/-**

1957A. For mounting on  $\frac{3}{4}$ in. to 1 $\frac{1}{2}$ in. masts, **17/6**

1957B. For mounting on 1 $\frac{1}{2}$ in. to 2in. masts, **17/6**

CONVERSION KITS AVAILABLE:—For dipoles, **7s. 6d.** For "H" aerials, **15/-**. Details on request.

Send for new catalogue giving full details of the above and all other Wolsey aerials. Then order from your usual suppliers without delay.



WOLSEY TELEVISION LTD., 43-45 KNIGHT'S HILL, WEST NORWOOD, S.E.27  
GIPsy Hill 2207 (4 lines).      Telegrams Kwikfix, Westnor, London.      Established 1934



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*All enquiries to the General Manager,*

WEBCOR (GREAT BRITAIN) LIMITED  
36 GROSVENOR STREET, LONDON, W.1

**G.E.C. INTRODUCE**

**a kilowatt  
germanium junction  
rectifier** FOR 50-CYCLE A.C.  
MEDIUM POWER CIRCUITS

**T**HE first germanium p-n junction rectifier for use in medium voltage and current circuits to become commercially available in this country has been introduced by G.E.C., Ltd. A 50 c/s a.c. full wave bridge, using four of the new type EW54 rectifiers, will provide a maximum output power of 1kW (50V at 20A) with an input voltage of 50V r.m.s.

The EW54 rectifier, which is shown full size in Fig. 1, is only 1½ in. long and has a maximum diameter of ⅝ in. Careful attention has been given to the hermetic sealing of the unit (Fig. 2) so that the sensitive p-n junction is completely shielded from the adverse effects of moisture. The container is sealed in the presence of a dry neutral gas to ensure that no moisture is enclosed in it.

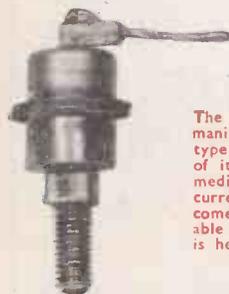


Fig. 1. The new G.E.C. germanium junction rectifier type EW54 is the first of its kind for use in medium voltage and current circuits to become commercially available in this country. It is here reproduced full size.

Higher power ratings, such as that mentioned above, are obtained when the EW54 is mounted in small cooling fins, such as those shown in Fig. 3. Even higher ratings can be obtained if oil or forced air is used for cooling.

The device has a high rectification efficiency, arising from its very low forward resistance, and this, combined with its small size, makes it especially suitable for vehicle and aircraft applications. Used with a.c. generators the new junction rectifiers provide a medium power d.c. supply which is unaffected by the brush gear trouble sometimes experienced with d.c. generators.

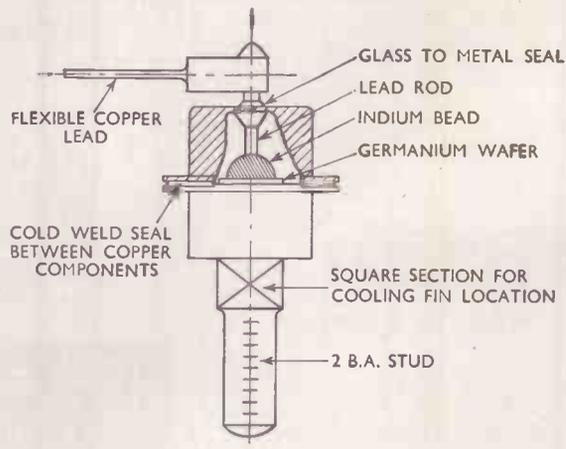
**Characteristics**

At an ambient temperature of 20°C, the typical EW54 rectifier passes a current of 8.0A at +0.5V and 6mA at -100V. Any increase in tempera-

ture results in an increase in both the reverse and forward currents at specified voltages. The rise in the reverse current means greater power dissipation, but the corresponding increase in forward current reduces the forward resistance and thus provides some slight compensation. In practice, the absolute maximum operating ambient temperature is 55°C, and the maximum storage temperature 70°C.

It follows that cooling fins, by increasing the heat dissipation of the device, step up the output power of the rectifiers. The following figures relating to a full wave bridge arrangement operating into a resistive load with a smoothing choke (Fig. 4) illustrate this point:—

| Output temperature | 20°C |      | 55°C |     |
|--------------------|------|------|------|-----|
|                    | V    | A    | V    | A   |
| Without Cooling    | 50   | 6.8  | 50   | 2.4 |
| With Cooling       | 50   | 24.4 | 50   | 4.0 |



(continued  
on  
page 165)

Fig. 2. Diagram of the EW54 germanium junction rectifier with a section of the top cap cut away to show the construction. The unit is hermetically sealed so that the p-n junction is unaffected by moisture.

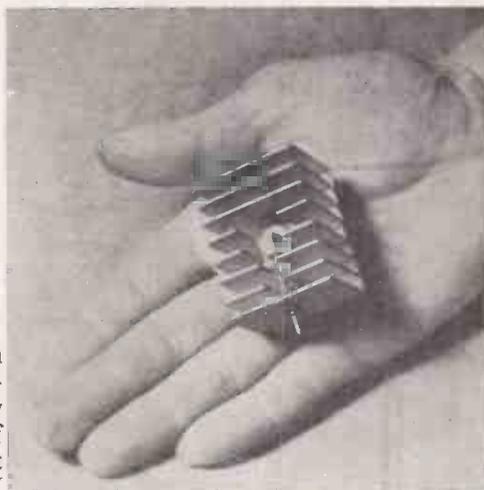


Fig. 3. The G.E.C. EW54 germanium junction rectifier fitted in a set of small cooling fins. Four such units in a full wave bridge circuit will provide an output of about 20A at 50V

If the EW54 exceeds its maximum dissipation rating the reverse current can rise further which again increases the dissipation; this cumulative effect can cause a condition known as "run-away" which will result in permanent damage to the device.

**Efficiency and Regulation**

The efficiency of a full-wave rectifier circuit working into a resistive load has been defined as the product of the mean d.c. output voltage and current divided by the product of the r.m.s. a.c. input voltage and current. The maximum theoretical efficiency for any type of rectifier is then 81 per cent. when using a sinusoidal input waveform. The EW54 rectifiers, used in a circuit of this type, have a rectification efficiency of over 95 per cent. of the limit value.

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# Spotlight on P.A.

**A**LIVELY display of the latest equipment for public address, sound distribution and associated fields, was on show at the private Annual Exhibition of the Association of Public Address Engineers held on April 27-28 at the Horseshoe Hotel, Tottenham Court Road, London, W.1.

On the Lustraphone stand, great interest was aroused by the transistorised portable 10-watt amplifier, described in greater detail elsewhere in this issue. Also shown was a large range of microphones of all types, mixer and gain control units, stands, bases and accessories. Of unusual interest was the *Velodyne* noise cancelling microphone, designed for close talking under high ambient noise conditions and featuring a new departure in conventional practice in differential microphones which results in the virtual elimination of background noise.

In addition to loudhailers, mixer units, amplifiers and microphones, Pamphonic Reproducers showed their *Victor* high fidelity loudspeaker unit featuring a room-matching switch to permit adjustment of tonal balance according to local acoustic conditions. Also exhibited was the *Westcott* super-phononic reproducer and equipment using the delayed sound reinforcement system as installed in St. Paul's Cathedral.

Microphones were shown by Reso-sound—featuring ribbon types in various stylings and mountings, and a horn-drive unit—and Film Industries, who introduced two new models: a ribbon and a moving-coil model of reduced size. The same firm also showed a re-entrant horn specially designed for space saving in packing, the complete

assembly being held together by a single nut, and a rectangular p.m. unit with a 40-in. all metal horn.

Loudspeakers were well represented. Rola Celestion exhibited their range of p.m. speakers in addition to p.a. pressure units and re-entrant types. Whiteley Electrical featured their *Stentorian* range including pressure type tweeter units, horn speakers, pillow loudspeaker for hospital patients, industrial types and various cabinet mounted models including corner consoles and bass reflex assemblies. Kelly Acoustics had a ribbon loudspeaker of advanced design.

Garrard showed a range of high quality record playing equipment, pick-up heads and arms, and accessories including a stylus pressure gauge. Quality amplifiers were seen on the stand of N.S.R. Manufacturing, including the Osram 912 and the Mullard 5-10, in addition to a 15-watt unit with wide applications. Associated Electronics, exhibiting for the first time, showed a wide range of *Astronic* p.a. amplifiers, vibrator h.t. supply units, mobile battery amplifiers, pre-amplifier units and high quality oscillators for testing high-fidelity equipment.

Tape recorders were prominently featured by Grundig, who also showed a distortion factor meter and a new a.m.-f.m. 4-band receiver (*Kenilworth*) incorporating piano keyboard band

selection, independent bass and treble controls and a three-speaker system for extended audio range—using an elliptical unit for the low frequencies and a matched pair of side speakers for high frequencies.

Truvox also exhibited tape recording equipment in addition to various pressure drive units, re-entrant speakers and horns. Also a corner diffusion speaker in a bass-reflex cabinet designed for small halls and high-quality home reproduction.

In addition to a selection of amplifiers, feeder and mixer units, velocity microphones and record players, G.E.C. showed their interesting metal cone loudspeakers, high-quality amplifiers and the recently introduced low-powered mobile amplifier. Mullard exhibited a large range of valves and transistors and the 5-10 amplifier; the display featured a new output pentode (EL34), new novel based series of valves and a miniature gas filled photocell (the 90CG).

Three new products were shown by M.S.S. Recording—a new tape mechanism, a high class tape console and a 3-speed disc recorder—together with a range of accessories such as a high quality pick-up with gimbal mounted tracking arm to ensure free movement and accurate alignment, practically eliminating tendencies to pull towards the centre of the disc.

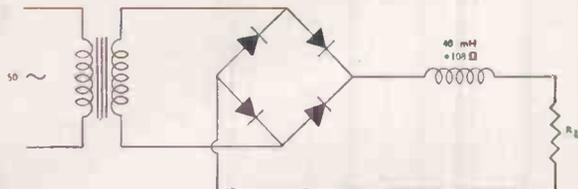
High quality test equipment, speakers and amplifiers were shown by Lowther. Also on this stand were various a.m. tuner units, an f.m. tuner and a whistle filter for m.w. high-fidelity and record scratch applications.

## Kilowatt Germanium Rectifier—continued

In addition to high rectification the EW54, because of its low forward resistance, also exhibits very good regulation. Thus, when a 50V r.m.s. input is applied to a full wave bridge arrangement, the output voltage drops from a value of 45V at zero d.c. output current to 44V at an output current of 20A. This small voltage drop corresponds to an internal forward resistance of about 0.05 ohm.

The EW54 is suitable for operation at a.c. input frequencies of up to a few kc/s but, due to the "hole storage" effect, the efficiency is reduced at the higher frequencies; this means that the output ratings must also be reduced.

Fig. 4. Four of the new EW54 germanium junction rectifiers, when incorporated in a full wave bridge circuit operating into a resistive load with a smoothing choke, as shown, will provide an output of 20A at 50V.



### Bi-phase Arrangement

When the EW54 is used in a bi-phase circuit, the output voltage has to be reduced, although a high output current is permissible. This is because the peak

inverse voltage in such an arrangement is approximately twice that in the full wave bridge circuit. As a result the maximum output voltage in a bi-phase circuit is 25V.



## SYLVANIA-THORN TO BUILD FIRST BRITISH COLOUR TV LABORATORY

**P**ICTURED above is a model of the first building in this country planned specifically for the development of colour television. It was designed for Sylvania-Thorn Laboratories, Ltd., by G. A. Jellicoe, F.R.I.B.A., M.T.B.I., P.P.I.L.A., and is exhibited at the Summer Exhibition of the Royal Academy at Burlington House, which opened on April 30. The unique character of the structure not only creates ideal conditions for the study of colour television, but catches all the atmosphere of this exciting subject of the near future.

The site, on the Great Cambridge Road, Enfield, is over an old gravel pit so that more than 160 piles for the foundations are being sunk, from 25ft. to 30ft., to support the superstructure. Probably the most impressive feature is the complete absence of structural steel, the entire building being supported by ferro-concrete columns and slabs, saving weight, achieving a light appearance, yet giving great strength.

The building is divided into three distinct blocks. On the left is the laboratory section, a three storey structure, connected by a link block of five storeys, to the offices on the right, which have four floors. The top two floors of the laboratory section will be devoted to actual development work, and as a result of the unique construction, this space is clear and unobstructed and allows changes in layout to be made whenever desired. Partitions are only provided where even more stringently controlled conditions are necessary.

Both upper floors are air-conditioned, dust extraction being controlled to two parts in one million. In view of the situation of the site on a main trunk road all windows are double glazed

and there is further provision for noise insulation with extra acoustic treatment to ceilings and walls.

All the operating machinery for heating and refrigeration, for dust extraction and air compression is accommodated on the ground floor which is isolated from the remainder of the building so that no vibration can possibly be transmitted to the floors above. In the centre of the ground floor is a staff tea room which is a complete break in design from the remainder of the building.

The centre block connecting the office and laboratory buildings will house separate goods and passenger lifts to all floors. It will also accommodate air-conditioning plants, water tanks and service equipment.

The entrance hall area in the office block passes completely through the full building height and contains the main staircase with the central column as a lighting feature inside which fluorescent lighting extends from floor to ceiling. Above the entire area a lumenated ceiling will provide pleasant, diffused lighting.

In the laboratories ventilation trunking is to be suspended below the ceiling. Part of the roof is to be paved to provide space for any experimental work which may have to be conducted out-of-doors.

A staircase set beyond the line of the building is a pleasant echo of the main office block staircase, saving valuable laboratory space and giving an external impression of activity.

Construction of the offices, while similar in principle, is varied to provide a contrast to the laboratory block. All columns are set back from the face of the slabs to accommodate the glass curtain walling which virtually forms a glass skin to the whole block.

Special opaque glass facings will introduce colour into the office building and by way of contrast coloured aggregate facings will be chosen for the laboratory block. Considerable attention is being given to the landscaping of the site with trees, shrubs and flowers in keeping with the surroundings.

The model was constructed for the architect by McCutcheon Studio.

*One of the principal problems which will be studied in the new laboratory is the design of tricolour picture tubes with a view to simplifying construction, bringing down costs and facilitating mass production techniques. Present U.S. colour tubes cost about £100 each.*

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  - 7-valve superhet radio unit !
  - 10" P.M. speaker !
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  - 3-speed mixer changer !
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  - Record storage space !
  - Magnificent contemporary cabinet !
- and the "Three-Fifteen" is only

**65 gns** TAX PAID



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The "One-Twelve" F.M. table radio at 32 gns.  
 The "Three-Twelve" console radiogram at 49 gns.  
 The "Five-o-Five" automatic record player at 22 gns.  
 and three outstanding T.V. models from 69 to 89 gns!

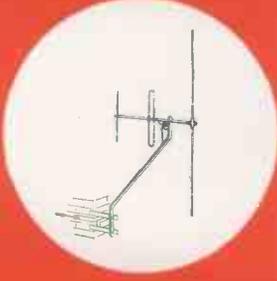
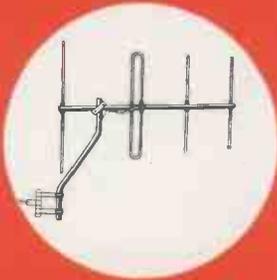
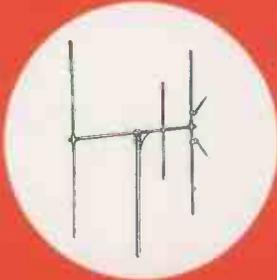
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use  
**AERIAL  
DOWNLEADS**

**Aerdaptors**— Quickly clamped on units which require no alteration to existing Band I dipoles or H-aerials.

|   |                         |
|---|-------------------------|
| Model 600 (for H aerials) ... ..          | 15s. 0d. per set retail |
| Model 601 (for single dipoles) ... ..     | 7s. 6d. per set retail  |
| Model 602 (for single dipole or H) ... .. | 30s. 0d. per set retail |

The Model 602 has auxiliary boom carrying Band III reflector which enables any directivity on Band III to be achieved.

**Band III Aerials**— These aerials have quick-fitting elements, all alloy tube construction and polythene low-loss insulators. Retail Prices:—

|                                   |  |
|-----------------------------------|--|
| <i>Arrays only 1" mast fixing</i> | <i>Drainpipe or 2" mast end mounting</i> |
| Model 700 XO 3-element ... ..     | £2. 5.0                                  |
| Model 701 XO 4-element ... ..     | £2. 12.6                                 |
| Model 702 XO 5-element ... ..     | £3. 0.0                                  |
| <i>Arrays only 2" mast fixing</i> |  |
| Model 700 XT 3-element ... ..     | £2. 7.6                                  |
| Model 701 XT 4-element ... ..     | £2. 15.0                                 |
| Model 702 XT 5-element ... ..     | £3. 2.6                                  |

|  |          |
|--|----------|
| <i>Aerials cranked arm wall mounting</i> |          |
| Model 700 CW 3-element ... ..            | £3. 7.6  |
| Model 701 CW 4-element ... ..            | £3. 15.0 |
| Model 702 CW 5-element ... ..            | £4. 2.6  |

|  |          |
|--|----------|
| <i>Aerials cranked arm chimney lashing</i> |          |
| Model 700 CL, 3-element ... ..             | £3. 17.6 |
| Model 701 CL, 4-element ... ..             | £4. 5.0  |
| Model 702 CL, 5-element ... ..             | £4. 12.6 |

*Aerials 6-foot chimney lashing*

|                               |          |
|-------------------------------|----------|
| Model 700 S, 3-element ... .. | £3. 17.6 |
| Model 701 S, 4-element ... .. | £4. 5.0  |
| Model 702 S, 5-element ... .. | £4. 12.6 |

*Aerials 10' x 2" mast, double chimney lashing*

|                               |          |
|-------------------------------|----------|
| Model 702 T, 5-element ... .. | £7. 15.0 |
|-------------------------------|----------|

*Aerials cranked arm mounting off existing chimney brackets. Models 700 CB, 701 CB, 702 CB—same price as CW types.*

*Indoor loft mounting aerials*

|                            |          |
|----------------------------|----------|
| Model 603 3-element ... .. | £1. 15.0 |
| Model 605 5-element ... .. | £2. 2.6  |

### Composite Aerials

Model 800—Single dipole Band I with folded dipole and director for Band III, i.e., giving three-element performance on Band III. Chimney lashing and cranked stand-off arm. Complete with filter box. ... ..

Model 801—as above but with folded dipole and three directors for Band III, i.e., giving five-element performance on Band III... ..

Model 802—comprises single dipole Band I and as Model 800—except is cranked arm wall mounting ... ..

Model 803—As Model 801 but with cranked arm wall mounting bracket... ..

Model 804—"H" Band I section with three element folded dipole Band III section. The Band III section has adjustable bracket giving any directivity irrespective of Band I position. Complete with filter box, cranked stand-off arm, chimney lashing ... ..

Model 805—As Model 804 but with five-element Band III section ... ..

Model 806—As Model 804 but with 10ft. x 2in. alloy mast and double chimney lashings ... ..

Model 807—As Model 806 but with five-element Band III section... ..

Model 808—Single dipole Band I with folded dipole and director for Band III giving three-element performance on Band III. Chimney lashing with straight 8ft. lin. diam. mast ... ..

Model 809—As Model 808 but with folded dipole and three directors for Band III ... ..

Filter Box Part No. 184 ... .. 17.6

Junction Box Part No. 188 ... .. 14.6

# AERIALITE LTD

CASTLE WORKS, STALYBRIDGE, CHESHIRE

DEPOTS AT : LONDON . BRISTOL . BIRMINGHAM . MANCHESTER . GLASGOW . NEWCASTLE

**BAND III TRADING**  
 FACT AND COMMENT ON BAND III TELEVISION TOPICS  
 FOR DEALERS AND SERVICING MEN ★ *by Eric Goldschmidt*

WHEN will the I.T.A. begin its service? Who will want to see these programmes? How many sets will there be with facilities for Band three reception? How will a manufacturer be able to choose the time he wants on commercial TV? These questions came up when the advertising profession held its annual conference last month. Commercial TV is probably the largest single change which this business, turning over some £280 million a year, is likely to see in the next 10 years.

A brains-trust of knowledgeable men was invited to cope with the many perplexing and genuinely difficult topics TV had thrown at people whose job it is to make a success of the commercial side of commercial television.

Sir Kenneth Clark, Chairman of the I.T.A., told them: "On September 1 our transmitters will be ready and we will be transmitting full test programmes. Both we and the contractors thought it would be wise to have a week or two of extension before throwing ourselves on the air, and so I suppose the right answer for the London station is: "sometime just after the middle of September." Since then the I.T.A. have confirmed that regular programmes will begin on Thursday, September 22.

The station near Birmingham, he said, will be operating before the end of 1955 and the spring of 1956 was given as the starting date for the I.T.A. in the North of England.

Between now and then, the two companies running the London station are launching an advertising campaign. Its theme will be the conversion of sets to Band III, and the R.I.C. is sharing some of the cost for this publicity.

Advertising men believe that their London audience will consist of something like a half-million viewers at the start. Programme companies very rightly point out that nothing except the quality of their shows will bring in the audience. Only when people had the chance of seeing what commercial TV was made of, could one begin to count the viewing strength.

There were nine people on the platform when more than 1,000 members of the advertising profession fired their questions. But all of them were so absorbed in programmes that they failed to realise one simple and necessary fact.

Unless the I.T.A. can consistently match the quality of the B.B.C.'s signal, the commercial service can be neither competitive nor profitable.

In other words, you can put on Danny Kaye, Lady Docker and King Farouk. If people in Surbiton, Sittingbourne and Southwark keep seeing streaks, snow-

flakes and stipples you might have saved your time.

In large measure the success of commercial TV is in the hands of engineers, radio retailers and equipment manufacturers.

\* \* \*

HERE are ten names which will appear on the commercial service from London: Gracie Fields, Roy Rogers, Sir John Barbirolli, Johnny Ray, Eve Boswell, Orson Welles, Sooty and Noddy, Norman Wisdom and Mr. Pastry.

From this list it becomes very clear that commercial TV has attracted the type of talent which holds out something for everybody.

\* \* \*

SOME of the questions with which TV dealers and their roving service engineers are met go something like this:

Will commercial TV bring in a lot of American programmes? Under the Television Act which guides the I.T.A. and its contractors, a "proper balance"

**By request . . .**

. . . of readers in the trade we are introducing this new feature designed to provide up-to-the-minute news and views on Commercial TV. Band III Trading will help you to answer your customers' questions and provide talking points to help clinch sales.

Our contributor, Eric Goldschmidt has worked in journalism, advertising, broadcasting, films and TV. He wrote programmes and commercials in New York and was in charge of the film, radio and TV departments of several advertising agencies. He is managing editor of TV Newsletter which has built up the only independent reference library covering all aspects of TV which exists in Britain.

must be achieved between British programmes and others. The contractors will stick to that brief. If they don't every one of the 8 trade unions in commercial TV will raise a pretty forceful protest; so will film producers, song-writers, owners of recording studios, politicians and, eventually, the viewers.

Why should commercial TV be able to put on better shows than the B.B.C.? The list above speaks for itself. Each one of those names is already familiar and if they have become familiar through appearing on the B.B.C., somehow the corporation has not managed to retain their services.

Also, it takes a fair bit of money to feed the enormous capacity which TV has for absorbing talent. Because programme companies can scout films, theatres, variety stages and commercial radio through their existing tie-ups, they can spread the risk in bringing a wider selection of programmes to viewers.

Will the B.B.C. be short of money or people when the I.T.A. gets going? Before companies could get the I.T.A.'s permission to screen commercial programmes they were told that they would face one year without profit, one year when they might break even and only by 1957 can they expect a full-blooded commercial operation. They accepted this. By now they seem to realise very clearly that they will have to invest in a new and separate TV service. By offering an alternative market to artists and producers they have naturally attracted some people who had previously worked for the B.B.C.

To assume that the B.B.C. will be starved out of existence, is to under-rate very seriously the many and varied tastes locked up among 14 million viewers. It is also a paltry thought where the B.B.C. is concerned. There seems little doubt that a second service will sell extra sets. This means that more TV licenses will be issued from which the B.B.C. has always been able to finance its programmes.

Under the new system the B.B.C. will get the same share of licence-money as it did before the I.T.A. was established. So that new viewers may prefer to see I.T.A. programmes but they continue to pay for those which the B.B.C. puts on.

\* \* \*

IT'S one year now since the B.B.C. took off its popular and skilful newsreel programme and replaced it with what we have to-day. At first many people resented the disappearance of TV Newsreel. Critics complained of slow, uneven and static presentation of what was undoubtedly a much more rapid news-service.

Now the I.T.A. will take a hand in this fight and, speaking as a newspaper man, I wish them luck. As far as I can see only a very few examples can be

(Continued on page 170)

## Band III Trading (continued)

found of real television news which is neither a re-hash of a picture magazine nor a trimmed and shampooed piece of cinema.

Commercial news will be provided by a company in whose ownership all the contractors share. Its editor-in-chief is Aidan Crawley who is flanked by Philip Dorté and Richard Gould-Adams. This news-service does not accept commercial advertisements.

PEOPLE in commercial TV have cried out against "Barnes' Bedtime Break"—the gap in the time-table between 6-7 when the Postmaster-General will not permit either the I.T.A. or the B.B.C. to put on television programmes.

One reason for this break is given as a protection to housewives. With a TV service going round the clock, they say, mothers may have difficulties in coaxing their children to bed.

A much better argument it seems to me is that the break offers a level start for both competitors. If it didn't exist, peak-time programmes on the

one service would start 15 minutes earlier. The other service would come back and start 30 minutes earlier. Then the first company starts an hour later. And all parties concerned would irritate the viewing family out of all proportion.

HERE is how Programme Contractors will operate:

|                        | London  | Birmingham | Manchester |
|------------------------|---------|------------|------------|
| (1) Asso. Broadcasting | Sat/Sun | Mon/Fri    | —          |
| (2) Asso. Rediffusion  | Mon/Fri | —          | —          |
| (3) Granada TV         | —       | —          | Mon-Fri    |
| (4) Kemsley-Winnick    | —       | Sat/Sun    | Sat/Sun    |

DO IT YOURSELF—title card illustrated above—is one of the first commercial programmes to reach crystallised form. It takes the form of a



shopping magazine with the accent on practical "do it yourself" household subjects, to be screened by Associated Broadcasting at 5.15 p.m. on Saturdays, and will be presented by well-known radio handyman W. P. Matthew. Production by TV Advertising, Ltd., of London, W.1.

ONE last point: C. W. Truefitt, director of Associated Rediffusion, Ltd., had this to say about converting sets to Band III:

"As to this difficulty of fitting extra aerials or extra points to aerials, everyone with a ladder may be called in to this business. If there is business to be done, there will be enterprise to do that business."



# FM-AM RADIO

### MODEL 37

4 WAVEBAND. Short. Medium. Long. F.M.

27 GNS (£21-9-3 plus P.T. £6-17-9)

### MODEL 59

Automatic Record Changer Radiogramophone

4 Waveband. Short. Medium. Long. F.M.

59 GNS (£46-18-0 plus P.T. £15-1-0)

# INVICTA

INVICTA RADIO LTD. 100 GT. PORTLAND ST. LONDON, W.1



The annual sales conference of Mullard Valve Sales Department was held recently at the Grand Hotel, Scarborough. Here the delegates are under the chairmanship of D. M. Hall, valve sales manager (centre back). On the right is L. A. Sawtell, commercial manager.

**SIR EDWARD APPLETON, G.B.E., K.C.B., F.R.S.**, has accepted an invitation to become President of the Radio Industry Council in succession to Lord Burghley, who has held office since 1952. Sir Edward, the distinguished scientist whose research work in the field of radio-physics was largely responsible for the development of radar, was awarded the Nobel Prize for Physics in 1947. He has been Principal and Vice-Chancellor of Edinburgh University since 1949 and for ten years before that appointment was Secretary of the Department of Scientific and Industrial Research. He was the 1953 President of the British Association.



Her Majesty Queen Elizabeth inspects machinery for the production of fine tungsten wire during the recent Royal visit to Mullard Blackburn works. On her right is C. de Wit, plant manager.

**Jack Bastable**, Mullard representative for West of England, recently celebrated his completion of 25 years' service with the firm. To mark the occasion he was presented with a silver salver on behalf of the company by **T. E. Goldup, C.B.E., M.I.E.E.**, director of Mullard Ltd.

The 32nd annual general meeting and dinner of the British Wireless Dinner Club at the United Service Club was attended by 126 members under the presidency of **MAJOR-GENERAL VULLIAMY, C.B., D.S.O.** Membership now numbers 468. New officers elected for 1955-6 were: **HAROLD BISHOP, C.B.E.** (president) and **ADMIRAL EARL MOUNTBATTEN OF BURMA, K.G.** (vice-president), while the remaining officers and the committee remained unchanged on



re-election. **LORD BRABAZON OF TARA**, guest of honour, recalled his early acquaintance with wireless in the first world war.

*It is announced by The Plessey Company Ltd. that C. D. H. Webb, executive director of the company, has been appointed director of Plessey International Limited.*

*Kenneth G. Gillespie, leading American retailer, met the trade press in the showrooms of Philips Electrical, Ltd., Century House, London, last month. Mr. Gillespie, who is vice-president and general manager of Jenkins Music Co., a chain business with headquarters in Kansas City, Missouri, has just completed a tour of European countries. He is chairman of the radio-television committee of the National Association of*



*Music Merchants of America, and is an indefatigable worker for trade organisations, holding the office of area chairman of the National Association of Radio and Television Dealers. Mr. Gillespie thought British h.p. regulations were sensible, and had much to say on the subject of "price demoralisation" caused by extensive price cutting in the American trade, where maintenance of list prices is opposed to existing anti-trust laws.*

A party of six German scientific editors recently paid a visit to the E.M.I. Factories at Hayes, Middx. They were received by **J. F. LOCKWOOD** (chairman of E.M.I.) and **L. J. BROWN** (managing director of E.M.I.). The party was accompanied by **P. C. Reynolds** of the U.K. High Commission in Germany, and **E. W. Taylor** of the Central Office of Information.



Alan Freeman of Polygon discussing with film actor Donald Sinden one of the records Donald is introducing in Pye's new Radio Luxembourg programme *Spring with the Stars*. With them is Petula Clark who was guest artiste on this programme on May 4.

**S. J. Robinson** has been appointed sales representative for **Simon Sound Service, Ltd.**, and will operate in the London area. **J. W. S. Malkin** has joined the company as sales representative for the Birmingham area.

**HAROLD J. LEAK**, chairman and managing director, and **J. F. HAWKINS**, sales director, of **H. J. Leak & Co. Ltd.**, recently returned from an intensive fortnight of market and technical investigations in the U.S.A. They introduced the new **Leak Dynamic** high-fidelity gramophone pick-up, which has achieved considerable success in Britain during the past few months. Normally, Mr. Leak visits America annually in October to attend the New York Audio Fair, and on his last visit he was elected a Fellow of the Audio Engineering Society of America—the only Britisher ever to receive this honour.

## display topics

★ PRACTICAL POINTERS TO  
ECONOMIC WINDOW DISPLAYS by Victor SuttonMore Space in  
Your Window

A STUDY of the more up-to-date windows reveals a number of important changes in display equipment design. The new styles are lighter in structure, easier to set up, and they enable a wider range of goods to be displayed without giving that overcrowded look which can so often spoil the effect.

To show two or three special lines to best advantage the best plan is to have them well presented and quite isolated. One way of doing this is to use two of the new mesh-covered wire trays which can be suspended on either side of the key point in the stacked display. Suspended items, with the correct background will always be noticed. The trays are finished in white enamel and prices range from 13s. 3d. to 24s. 3d. according to size, and are manufactured by Howe and Howe, Ltd., 47 Dorset Street, London, W.1.

In modern display one of the notable features of trade windows is the way in which they exploit the principle of using the off-balance design with simple stands made up in their workshops.

Fig. 1 shows a simple platform about 9in. high, lined with hardboard. The canopy effect is produced with four broomhandles let through at the corners and holding a light wooden framework. The best results are achieved by fitting the panel at the top with expanded aluminium mesh in 1½in. gauge measuring 6ft. x 2ft. and costing 24s. The panel. Sides can be treated in a similar manner and the back panel should be a light drape in pale blue.

The sales matter takes the form of a large hardboard panel with well-rounded corners. It should be strengthened at the back with light battens. The modern trend is to set it a little behind the main showpiece and bring it just about a quarter depth above it.

Fig. 1  
Simple window display using hardboard platform with recessed sales panel. This type of display lends itself to unusual lighting effects.



This unusual and topical display was the all-Britain prize-winning window in the 1953 Ever Ready annual window display contest. It illustrates the importance of topicality and simplicity in contest display work.

This can be used in a number of different ways to tell the public facts and figures in a convincing way. Apart from the method illustrated, it provides ample space for photographs of topical features to be seen on television, service facilities and details of new sets. It also allows scope for unusual lighting.

Window  
Contests

It should be remembered that very often the bulk of winning entries in most window display contests come from shops where the displays have made best use of originality and topicality, and have not been too crowded. Topicality is a particularly important theme to follow, and a guide to this can often be found by studying the leader articles in the National newspapers or any good paper.

The writer recently had the chance to examine some hundreds of display competition entries. It was noticed that one whole pile of photographs had been put aside due to the mistake of overcrowding. The winners all featured one main theme well supported with the authentic merchandise.

In such contests there is always a thorough entry form and this should be thoroughly studied. Photographs must be in black-and-white and not smaller than 6in. by 4in. Coloured photographs disqualify most entries but it is surprising how many are submitted.

New Display  
Shelves

There is a tendency to build up the display to make more goods go into less space. Watch this closely and try to include suspended glass shelves on the new display ladders which will hang from the ceiling and will hold five glass shelves.

Several display firms are planning new units in the range of ½in. glass shelves on stout wire legs which clip on. At first sight it may not appear that these shelves make more space, but close inspection will prove that they do. One can, with careful planning, build up a wide range of goods using up every available inch of window space.

It is the shape of the shelves which makes the difference: they are of bevelled glass with the legs finished in bronze or ivory enamel. They are made by Harris and Sheldon, Ltd., and the reference number is H1134.

There is also another range of modern glass shelves by Pollards (illustrated) which can be so adjusted to create an impressive crescent-shaped display and at the same time allow ample space for the details of the goods shown to be seen to their best advantage. The legs are in various lengths, 19 sizes in oak, mahogany or walnut being available. They are quickly assembled, robust in use and easy to dismantle and store away.

## Simplicity Counts

The modern tendency is to display on the lines of simplicity where more attention can be devoted to one special item. By careful arrangement the gaze of the onlooker can be attracted to one spot so that he takes in the full range of goods, which must eventually lead to the "buying impulse."

Do not feel disappointed about any one window; although there is no statistical evidence on this, it is often found that a great deal of business comes *after* a special window has been taken out.

Try to introduce something new in pointers to special features and lines. Crepe tubes, red tape, and other traditional methods should be dropped in the progressive trend of the day; thin white display rope is far more suitable and strikes a clean and interesting note.

## Use of Colour

Colour is a most important factor and grouping comes after this in order of priority. One good sales promoting group may be much better than an assortment of badly arranged sets. Build the "magnet" of the show at about 4ft. 6in. high and, as a rule, dead central. Bear in mind that the main theme is to make sales and not create elaborate and artistic masterpieces.

It is wise to remember that some colours when shown together appear to

Glass display shelves in contemporary style, such as this range manufactured by Pollards, do a great deal to modernise a conventional window.



change shade. The following table should be helpful:—

| <i>Neutral colour</i> | <i>Adjacent colour</i> | <i>Neutral becomes</i> |
|-----------------------|------------------------|------------------------|
| <i>White</i>          | <i>Red</i>             | <i>Greenish</i>        |
| <i>White</i>          | <i>Orange</i>          | <i>Blueish</i>         |
| <i>White</i>          | <i>Violet</i>          | <i>Yellowish</i>       |
| <i>White</i>          | <i>Yellow</i>          | <i>Blueish</i>         |

Apart from background and panel shades it will be found that modern strip lighting can sometimes play havoc with display colours when in combination.

There are now many silver, gold and bronze display papers which are attractive in use but may compete if your stands are of modern metallic style. Watch this closely in your display planning and only employ these shades when you are sure they will attract and not detract. Grey is a good colour for large-scale backgrounds, but lighting must be considered to get the best results when the illuminations are on.

## Money Well Spent

Money spent on the window is money well spent. With some of the new stands and fittings the cost may appear relatively high, but they will serve usefully for many years to come. They embody a modern dignity of style with adaptability and space-saving construction which make them ideal for this trade. Modern homes need modern furniture and up-to-date windows must have stands in keeping with this trend and based on contemporary style.

For building up the full window there is no doubt that the old style of display block has many uses and one firm has produced a comprehensive range in hexagonal, half column, round, round platform and square shapes in wood, plywood and composition board, finished in white roughcast. (Rowland

Griffiths, Ltd., 8 Newman Street, London, W.1).

Considerable use is being made of the alcove background in modern display. This is used in conjunction with special lighting, and Fig. 3 illustrates an idea recently used in which a range of radio receivers was shown in shallow recesses divided into groups by partitions.

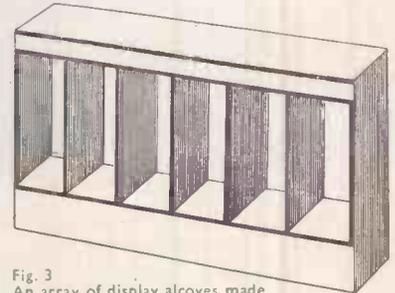


Fig. 3  
An array of display alcoves made from hardboard.

Such a unit as this, if not made too unwieldy, could be utilised at other times for stock display inside the shop. It can be made up in hardboard, the depth of top and lower panels depending on the size of the sets or products to be displayed.

## Condensation Troubles

During the very cold or damp weather windows are often completely steamed up and this must inevitably have a damaging effect on sales. Whitmarley Displays, Ltd., Knutsford Street, Birmingham 12, have brought out a new device which they claim will cure all condensation troubles in shop windows, show cases and outside display cabinets.

This is the *Demister Dry-Pane* flexible electric heater unit. It can easily be bent to shape, and is inconspicuous, unbreakable and inexpensive. Current consumption is low, and the unit works on mains voltages. It is attached to the window by means of rubber suckers and is supplied in lengths up to 8ft.

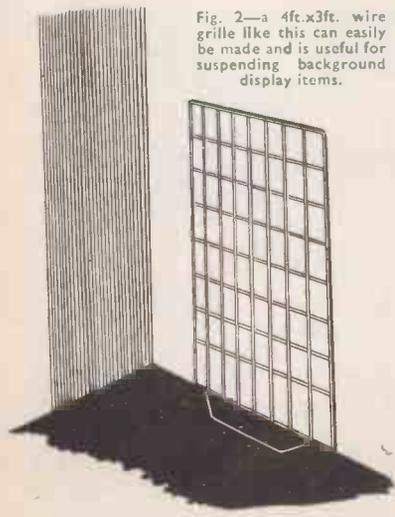


Fig. 2—a 4ft. x 3ft. wire grille like this can easily be made and is useful for suspending background display items.

They're **(Pam)**

—they're perfection!

### MODEL 701 — FM/AM

An outstanding 4-waveband 7-valve FM receiver

- Built-in aerial for FM reception in strong signal areas.
- Fly-Wheel tuning with 'Magic Eye'.
- Built-in ferrite aerial for Long and Medium wave reception.
- 3-position tone control — Fidelity — Mellow — Speech.
- 8" L/S extended range.



FM 87-102 Mc/S.M.W. 186-571 M.  
L.W. 1090-2000 M. S.W. 24-51 M. Cabinet  
dimensions: 16" x 13 $\frac{3}{4}$ " x 8 $\frac{1}{8}$ ". Mains Supply: 200/250 V.,  
A.C. 50 cycles. Price: 28 GNS. TAX PAID.

### MODEL 700 — THE "PIXIE" PORTABLE

A Sure Seller for Summer!

- Chassis—Printed Circuit Technique.
  - Cabinet finish—a new rexine in turquoise blue with a black diamond pattern.
  - 4 Low-Consumption valves.
- Batteries: Ever Ready or Vidor—90v. H.T., 1 $\frac{1}{2}$ v. L.T.  
Weight with batteries: 6 lb. (approx.). Dimensions: 10 $\frac{1}{2}$ " x 8 $\frac{1}{2}$ " x 4 $\frac{3}{4}$ ".  
Price: 11 $\frac{1}{2}$  GNS. TAX PAID (exclusive of Batteries).

PAM (RADIO & TELEVISION) LTD · 295 REGENT ST  
LONDON · W1 · Tel: LAngham 7246

## FOR SOUND VALUE AND A VISION OF QUICKER PROFITS SWITCH TO '33' TRI-SOL CORED SOLDER



### A CORED SOLDER SECOND TO NONE

**SOUND SOLDERED** joints are essential when servicing radio and television receivers—"TRI-SOL" containing the new "33" "ROSIN FLUX" . . . an "INSTANT ACTION" non-corrosive flux produced to meet the specialised requirements' of Radio and Television will always safeguard your reputation.

**FASTER SALES** mean quicker profits, so be sure you are well stocked to meet your customers' regular requirements. Each 1 lb. reel is packed in an attractive two-colour display carton.

### RADIO & TV SERVICE ENGINEERS' 1-lb. REEL

Supplied in two grades

18 s.w.g. 50/50  
approx. 174 feet

**6/6** Net Trade

18 s.w.g. 60/40  
approx. 180 feet

**7/2** Net Trade



### COUNTER PACK

4/- DOZ. NET TRADE

Containing 3 doz. reels 16  
s.w.g. 40/60 alloy Tri-Sol  
cored solder.

Wholesale enquiries Invited

**ORDER NOW**

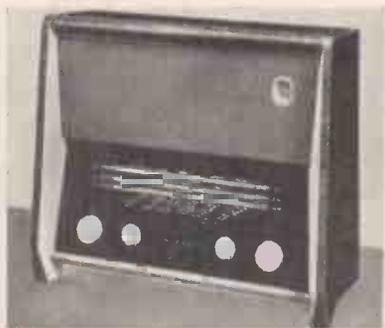
DU BOIS CO. LTD., 15 BRITANNIA ST., KING'S CROSS, LONDON, W.C.1 Terminus 6624



Continued  
from page 134

Other features include a built-in v.h.f. aerial with provision for external dipole if required, floodlit tuning scale, sockets for pickup, extension speaker and tape recorder, 8in. m.c. loudspeaker, and tone-compensated volume control. The cabinet is finished in selected walnut veneers. Dimensions 16½in. × 19in. × 10½in. Price 35 gns. (tax paid).

Model U243, for a.c.-d.c. mains operation, is a 6-valve set plus tuning indicator with inbuilt aerials for all wavebands (including f.m.), floodlit tuning scale, 8in. speaker, and preset tone control. The cabinet is walnut-



McMichael Model FM55 a.m.-f.m. radio.

the cabinet are: 30½in. × 20½in. × 13½in. Price 42 gns. Model 555 is a bureau-style radiogram with 12in. speaker and Collaro RC54 3-speed autochanger with turnover crystal pickup. Dimensions: 34½in. × 34½in. × 17½in. Price 75 gns. All prices tax paid.

**INVICTA A.M.-F.M. RADIO MODELS**

*Invicta Radio, Ltd., 100 Great Portland Street, London, W.1.*

INVICTA have introduced two new models—a table radio and a radiogram—for a.m.-f.m. reception. Both models employ a 6-valve a.c. chassis with built-in aerials and flywheel tuning covering four wavebands—long, medium, short and v.h.f.

Model 37 is a table radio housed in a highly-polished wooden cabinet of Continental style. Dimensions: 16in. × 7in. × 10½in. Price 27 gns. (tax paid). Model 59 is a console radiogram incorporating a *Monarch* 3-speed autochanger. Dimensions: 28in. × 24in. × 20in. Price 50 gns. (tax paid).



Invicta Model 59 a.m.-f.m. console radiogram.



Ekco Model A239 a.m.-f.m. table radio.

veneered and has champagne-coloured plastic speaker grille and control knobs. Price 25 gns. (tax paid).

**McMICHAEL A.M.-F.M. RADIO RECEIVERS**

*McMichael Radio, Ltd., 190 Strand, London, W.C.2.*

THREE a.m.-f.m. receivers are introduced by the company, and were exhibited at Manchester last month. They comprise a table radio (Model FM55), a console radio (Model 255), and a bureau radiogram (Model 555). All three models use a 6-valve chassis with tuning indicator, covering the long, medium, and v.h.f. wavebands.

The f.m. circuit comprises a double triode r.f. amplifier and mixer; a triode heptode and an r.f. pentode as i.f. amplifiers; triple diode ratio detector and i.f. amplifier; pentode output amplifier; electron beam tuning indicator; and a full wave rectifier. Local and moderately distant stations are readily received on the 300 ohm folded dipole aerial mounted on the interior of the receiver; for more distant stations an external dipole aerial is recommended. All three receivers are designed to receive all the new f.m. stations at present proposed by the B.B.C.

Model FM55 (illustrated) is a table set for operation on a.c. mains, 190–260V, with flywheel tuning and an elliptical speaker. Price 29 gns. Model 255, a console version of the FM55, has a 10in. speaker with independent treble and bass tone controls. Dimensions of

Both models are for use on a.c. mains, 200–250V, 50 c/s, and have a built-in dipole aerial for f.m. reception in areas of good signal strength.

**NEW MARCONIPHONE TELEVISION MODELS**

*The Marconiphone Co. Ltd., Hayes, Middx.*

FOUR new television receivers were exhibited by the company at the Manchester Radio Show. They are a 14in. and 17in. table model and a 14in. and 17in. console model, housed in highly-polished cabinets of modern design. The 17in. console has full-length doors which fold back for viewing.

These models are designed for reception of both Band I and Band III programmes and incorporate a tuner unit of the incremental inductance type with built-in coils for all 13 channels. A single coaxial aerial socket caters for a combined Band I and III feeder. Circuit features include: flat-faced aluminised Emiscope picture tube; frame flyback suppressor; stable pre-set permanent magnet focusing system, and "sync cancelled" vision a.g.c.



Marconiphone VC69DA 17in. console TV.

A black spotter interference limiter is incorporated on vision, and sound suppression circuits are included. A wide-range tunable filter can be connected in circuit to deal with diathermy and similar interference. The receivers use 17 valves, and are designed for operation on a.c. mains, 195–255V.

Prices are: Model VT68DA (14in. table) 66 gns., Model VT69DA (17in. table) 79 gns., Model VC68DA (14in. console) 79 gns., Model VC69DA (17in. console) 107 gns. All prices tax paid.

**TRUCHORD CORNER REPRODUCER**

We regret that owing to a printing error the distortion factor at 6 watts of the Truchord Corner Reproducer (page 31, May issue) was incorrectly quoted as 20 per cent. The distortion factor of this instrument is, of course, better than 2 per cent at 6 watts output.



## Financial News

*It is pointed out that winding-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.*

### NEW COMPANIES

**Elekraft, Ltd.** Capital £500. Objects: To carry on the business of electrical engineers and contractors, etc. Directors: Arthur H. Slingsby, Keith L. Hutchings, and Thomas J. Jennings. Secretary: Keith L. Hutchings. Registered office: 123 The Avenue, Hornchurch, Essex.

**Ellar Investment Co., Ltd.** Capital £100. Objects: To carry on the business of hire purchase financiers, etc. Subscribers: Edward V. Cherubini and Horace G. Whittaker. Edward V. Cherubini is the first director. Secretary: H. G. Whittaker. Registered office: 36 Oxford Street, W.1.

**Elliott & Co. (Bolton), Ltd.** Capital £3,000. Objects: To carry on the business of hire purchase financiers, etc. Directors: Wm. J. Elliott, Percy Smith, and David Jenkins. Secretary: P. Smith. Registered office: 464 Wigan Road, Bolton.

**E. P. Stacey, Ltd.** Capital £5,000. Objects: To carry on business as manufacturers and assemblers of and wholesale and retail dealers in wireless and television transmitting and receiving apparatus, etc. Directors: Ernest P. Stacey and Caroline Stacey.

**Family Television (Liverpool), Ltd.** Capital £100. Objects: To carry on the business of manufacturers of and dealers in television and wireless appliances, etc. Directors: Chas. R. P. Stonor, Stanley Bell, Thos. D. Stonor, and Leslie E. Parsons. Secretary: T. D. Stonor. Registered office: Duxcraft Werks, Franklin Road, Portslade, Sussex.

**Family Television (Portsmouth), Ltd.** Capital £100. Objects and other particulars are similar to Family Television (Liverpool), Ltd. (q.v.).

**Faulkners Electrical Supplies, Ltd.** Capital £100. Subscribers: Thomas M. Fryer, Geoffrey Thompson. The first directors are to be appointed by the subscribers. Solicitors: March, Pearson & Green, 1 Central Street, Manchester.

**Fergus Makin, Ltd.** Capital £5,000. Objects: To carry on the business of electrical, wireless, telephone, lighting, heating and general engineers, etc. Directors: Roney D. Makin and Mrs. Gladys Makin. Secretary: R. D. Makin. Registered office: 9 Eastnor Street, Manchester, 15.

**Fingate, Ltd.** Capital £5,000. Objects: To carry on the business of manufacturers of and dealers in wireless and television apparatus, etc. Directors: Wm. Hastings, James R. Hastings, Ronald Capey and Philip A. Pashley. Solicitors: Oxley & Coward, Rotherham. Registered office: 31-37 Bridgegate, Rotherham.

**Fingrav, Ltd.** Capital £100. Objects: To carry on the business of hire purchase financiers, etc. Directors: James Carley and Horace Covey. Secretary: James Carley. Registered office: 48 Windmill Street, Gravesend, Kent.

**Fischer Electronics Co., Ltd.** Capital £100. Subscribers: Wm. Fischer and George C. Pot. The first director is Wm. Fischer. Secretary: George Pot (?). Registered office: 70 Brewer Street, W.1.

**Five Counties Finance Co., Ltd.** Capital £1,000. Objects: To carry on the business of financiers of hire purchase agreements and instalment buying, etc. Subscribers: Lanna D. Fennamore and Richard W. Fennamore. Lanna D. Fennamore is the first director. Secretary: Robert W. Fennamore. Registered office: 13 Grimstone Terrace, Houndscombe Road, Plymouth.

**Forest Battery Service, Ltd.** Capital £2,000. Objects: To carry on the business of manufacturers of and dealers in wireless and television sets, accessories and apparatus, etc. Subscribers: Alan M. Jones and Arthur G. Reed. The first directors are not named. Secretary: Arthur G. Reed. Registered office: 51 Neveer Street, Lydney, Glos.

**Forum Finance, Ltd.** Capital £1,000. Objects: To carry on the business of hire purchase financiers, etc. Directors: Percy A. Bull, Percy

G. Rockell, and David Barraclough. Secretary: Donald K. Radford. Solicitors: Linklaters & Paines, E.C.2. Registered office: Palmerston House, 51 Bishopsgate, E.C.2.

**Frankfort Garage, Ltd.** Capital £10,000. Objects: To acquire the business of garage proprietors, motor engineers and radio dealers, carried on by Michael J. Doyle and Andrew M. Walsh as Frankfort Garage, Dundrum. Directors: Michael J. Doyle, Andrew M. Walsh and Thomas B. Lambert.

**Garnham Electrical Co., Ltd.** Capital £1,000. Objects: To carry on the business of manufacturers of and dealers in and repairers and hirers of electrical and mechanical apparatus, in particular wireless and radio sets and valves, gramophones, television sets, etc. Directors: Wm. E. J. Gale and Winifred H. Gale. Secretary: Winifred H. Gale. Solicitors: E. J. Garner & Co., Uxbridge. Registered office: 34/6 High Street, Southall, Middlesex.

**"Gammatron" Nucleonics, Ltd.** Capital £100. Objects: To carry on the business of manufacturers and sellers of and dealers in radio-isotope equipment, instruments and apparatus, designers and engineers of electronic and nucleonic appliances, etc. Subscribers: Sir James Marshall-Cornwall (Development), Ltd., Primar Electronic & Technical Products, Ltd. Directors: Sir James Marshall-Cornwall, K.C.B., O.B.E., D.S.O., M.C.; and Joseph Berman, M.D.

**G. F. Gray & Sons, Ltd.** Capital £5,000. Objects: To carry on the business of electricians, mechanical engineers, manufacturers of and dealers in electrical apparatus, radio and television apparatus, etc. Subscribers: George F. Gray and Geoffrey F. Gray. The first directors are to be appointed by the subscribers. Solicitors: Toller, Son & Hales, Kettering. Registered office: 94 Newton Road, Rushden, Northants.

**G. H. Northover, Ltd.** Capital £3,000. Objects: To acquire the business of radio, television, electrical and refrigeration engineer now carried on by Geo. H. Northover at 28 Watergate Street, Chester, as "G. H. Northover." Directors: Geo. H. Northover and John Benton. Secretary: Geo. H. Northover. Registered office: 28 Watergate Street, Chester.

**Gilbert Photo-Electronics, Ltd.** Capital £2,000. Objects: To carry on the business of manufacturers of photo-electric or light responsive cells, electron tubes, etc. Directors: Victor H. Gilbert and Dorothy Gilbert. Secretary: Hazel I. Gilbert. Solicitors: Rowe & Maw, W.C.2. Registered office: 332 Upper Richmond Road, S.W.14.

**Glass To Metal Sealings Co., Ltd.** Capital £1,000. Objects: To carry on the business of sealing of glass to metal and general engineering to the electronic trade, etc. Directors: Peter Sadler, Mrs. Lilian Sadler, Whitfield Aisbit and Mrs. Elizabeth Aisbit. Secretary: Elizabeth Aisbit. Registered office: Nassau Mill, Vine Street, Patricroft, Lancs.

**Goodhire, Ltd.** Capital £100. Objects: To carry on the business of hire purchase, etc. Subscribers: Jean Herbert and Claire Moore. The first directors are to be appointed by the subscribers. Secretary: T. A. Herbert.

**Good Looking, Ltd.** Capital £100. Objects: To carry on the business of electrical, wireless or radio, television, telephone, telegraph, mechanical, hydraulic, civil, maintenance and general engineers, etc. Directors: Donald H. Crisp and Oswald H. Tramontini. Secretary: Thos. A. Spittle. Registered office: Exeter Lodge, Exeter Road, Bournemouth.

**Greenside Electrical Co. Ltd.** Capital £4,000. Objects: To acquire the business of electrical, wireless and television contractors and dealers carried on by Robert Williamson at 114 Lower Wortley Road, Leeds. Subscribers: R. Williamson and Raymond Williamson. Robert Williamson shall be governing director and chairman. Secretary: Raymond Williamson.

Solicitors: J. S. Walsh, Vinces Chambers, Victoria Square, Leeds. Registered office: 94 Lower Wortley Road, Leeds.

**Griffin Electronics (Accrington), Ltd.** Capital £20,000. Objects: To carry on the business of electrical engineers and consultants and contractors, manufacturers of and dealers in television, radio and electrical apparatus, etc. Directors: Arthur R. Bradshaw, Thomas Wilson, and Harry Hoyle. Secretary: Thomas Wilson. Solicitors: Simpson & Ashworth, Accrington. Registered office: Barnes Street, Accrington.

**Guidance Finance Co., Ltd.** Capital £10,000. Objects: To advance money, negotiate loans, finance hire purchase agreements, etc. Directors: Harry Morris and Ivan Morris. Secretary: L. J. Robinson. Registered office: 55 Cross Street, Manchester, 2.

**G. W. Cook and Sons (King's Langley), Ltd.** Capital £3,000. Objects: To carry on the business of motor, electrical, radio and television engineers, etc. Directors: Alfred G. Cook, Dennis A. Cook, and Charles E. Ebbs. Secretary: Dennis A. Cook. Registered office: 11 High Street, King's Langley, Herts.

**Harmonic Music Co., Ltd.** Capital £100. Objects: To carry on the business of music publishers, printers and dealers; dealers in pianofortes, organs, gramophones, gramophone records, radiograms, television and wireless sets, etc. Directors: George M. Keates and Kurt Schick. Secretary: Kurt Schick. Registered office: Elm Park Court, Pinner, Middlesex.

**Hearnville Finance Co., Ltd.** Capital £100. Objects: To carry on the business of hire purchase, hiring, letting on hire, easy payment systems, etc. Subscribers: Jean Herbert and Claire Moore. The first directors are to be appointed by the subscribers. Secretary: Thos. A. Herbert, 128 Albany Street, N.W.1.

**Hedley Miller, Ltd.** Capital £5,000. Objects: To acquire the business of radio, television and electrical dealers and engineers carried on by Hedley B. Miller as "Hedley Miller," at Kettering. Directors: Hedley B. Miller and Mrs. Dorothy E. Miller. Secretary: Dorothy E. Miller. Solicitors: Lamb & Holmes, Kettering. Registered office: 13 Silver Street, Kettering.

**Heliodor Record Company, Ltd.** Capital £10,000. Objects: To carry on the business of manufacturers of and dealers in gramophone records, etc. Subscribers: Gilbert C. Steibelt and Alec Herbage. The first directors are to be appointed by the subscribers. Solicitors: Crawley & De Reya, 158 Fenchurch Street, E.C.3.

**H. G. Heaton, Ltd.** Capital £4,000. Objects: To carry on the business of manufacturers of and dealers in wireless and television sets, accessories and apparatus, etc. Directors: Gilbert Heaton, and Mrs. Nellie Heaton. Secretary: Eileen Howard. Registered office: 19 Westgate, Henley, Huddersfield.

**Hi-Lite Television Company, Ltd.** Capital £15,000. Directors: Jean O. Read, and Lawrence E. Crowhurst. Secretary: Fredk. J. Read. Solicitor: Alec H. Evans, 33 Paradise Street, Birmingham. Registered office: 89-91 Southbourne Grove, West Southbourne, Bournemouth.

**Hill Engineering (Catford), Ltd.** Capital £500. Objects: To carry on the business of mechanical, electrical, and general engineers, motor, motorcycle, and cycle engineers, radio engineers, metal-welders, etc. Directors: Leslie D. Hill, and Mrs. Lydia I. Hill. Secretary: H. M. Glazebrook. Registered office: 306 Langley Road, Catford, S.E.6.

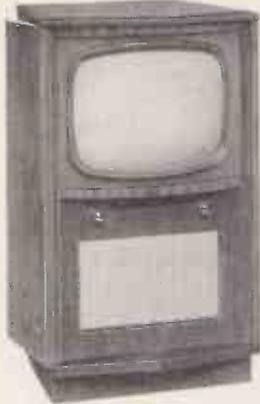
**Hirex Finance, Ltd.** Capital £100. Objects: To carry on the business of hire purchase, etc. Subscribers: Jean Herbert, and Claire Moore. The first directors are to be appointed by the subscribers. Secretary: T. A. Herbert.

**H. Kelly & Co., Ltd.** Capital £2,000. Objects: To carry on the business of electrical contractors and engineers, agents for wireless, radio and television sets, etc. Directors: Hugh Kelly, and Fredk. Jeffers. Registered office: 44 Little May Street, Belfast.

**H. L. Elton, Ltd.** Capital £8,000. Objects: To carry on the business of manufacturers of and dealers in wireless, television and telephonic receiving apparatus, etc. Directors: Henry L. Elton, and Leslie Percival. Secretary: Wilhelmina Knowles. Solicitors: Joseph Gregory, 16 Oxford

(Continued on page 179)

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## Financial News

—continued

Street, Manchester. Registered office: 42 Spring Gardens, Manchester.

Holmway Finance Co. Ltd. Capital £100. Objects: To carry on the business of hire purchase etc. Subscribers: Jean Herbert, and Claire Moore. The first directors are to be appointed by the subscribers. Secretary: T. A. Herbert.

Household Finance, Ltd. Capital £10,000. Objects: To finance hire purchase agreements in connection with the sale and purchase of wireless and television sets, gramophones, furniture, etc. Directors: Augustus Huxford, and Gladys C. Mapperson. Secretary: Harold Huxford. Registered office: 43 Haunton Avenue, Grimsby.

Hunter Cox, Ltd. Capital £100. Objects: To carry on the business of dealers in, agents for the purchase and sale of, hirers, manufacturers, producers and repairers of gramophones, radio, gramophones, gramophone records, wireless instruments, television sets, etc. Subscribers: Sacheverel O. F. Bateman. Solicitors: Bateman & Co., 30 Cork Street, W.1.

Ideal Radio Services (East Ham), Ltd. Capital £20,000. Directors: Henry A. J. Hall, and Geo. E. Hall. Secretary: R. R. Toughin. Solicitors: E. Edwards Son & Noice, E.6. Registered office: 362 High Street North, Manor Park, E.12.

I. G. Bailey and Company, Ltd. Capital £2,000. Objects: To carry on the business of radio, television and electrical engineers, electrical contractors and repairers and industrial electronic engineers, etc. Directors: Ian G. Bailey, and Phyllis M. Bailey. Secretary: Phyllis M. Bailey. Registered office: 51 Bearton Green, Hitchin, Herts.

Irish Technical and Production Co., Ltd. Capital £3,070. Objects: To carry on the business of manufacturers, maintainers and repairers of and dealers in electronic apparatus and appliances of all kinds, etc. Directors: Mrs. Marie Muldoon, Edward Muldoon, and Henri Philippe Molleran. J. G. Barnes & Co. (Hale), Ltd. Capital £100.

Objects: To carry on the business of electricians, radio and television and electrical engineers, etc. Subscribers: Mrs. Winifred M. Purvis, and Eric Dickinson. Mrs. Winifred M. Purvis is first and Permanent Director. Secretary: S. L. Purvis. Registered office: 15 Grafton Street, Altrincham.

J. J. Parkinson & Co., Ltd. Capital £500. Objects: To carry on the business of manufacturers of and dealers in electrical and mechanical apparatus and accessories, wireless, radio and television sets, etc. Directors: John J. Parkinson, and Fredk. L. Chatfield. Secretary: Doris L. Parkinson. Registered office: 5 Cray Buildings, High Street, Fooks Cray, Kent.

Joka Finance, Ltd. Capital £100. Objects: To carry on the business of hire purchase financiers, etc. Directors: John M. Black, and Mrs. Katherine M. Black. Secretary: J. M. Black. Registered office: 101 Cadogan Gardens, S.W.3.

J. Wilson & Co. (T.V.), Ltd. Capital £3,000. Objects: To acquire the business of television, radio and electronic engineers carried on by Jas. Wilson, Robt. N. Dodds, jr. and Thos. Dodds, at North Shields, as "J. Wilson & Co." Directors: Jas. Wilson, Robt. N. Dodds, jr., and Thos. Dodds. Secretary: T. Dodds. Solicitors: Dickinson Miller & Turnbull, Newcastle upon Tyne. Registered office: 191 Tynemouth Road, North Shields.

J. W. Kenington, Ltd. Capital £2,500. Objects: To carry on the business of hire purchase traders, etc. Directors: Jack W. Kenington, and Walter E. Harman. Secretary: Hilda I. Kenington. Registered office: 412 Kingston Road, Willeby, nr. Hull.

K. Blair, Ltd. Capital £2,000. Objects: To carry on the business of manufacturers and repairers of electrical, gas, oil lamps, quartz lamps, reflectors, bells, switchboards, dynamos, motors, armatures and generally electrical and gas plant, radio and television appliances, etc. Directors: Kenneth I. W. Blair, Mrs. Edna D. Blair, and Frank R. Garrad. Solicitors: Carpenters, 26 The Broadway, N.W.7.

Youngmans Finance Company, Ltd. Capital £1,000. Objects: To carry on the business of

hire purchase finance, etc. Directors: H. Young man and John A. Thomas. Registered office: 12 Cathedral Road, Cardiff.

Kenton Recorders, Ltd. Capital £2,000. Objects: To carry on the business of manufacturers and exporters of and service agents and engineers in recording and reproducing devices and machines, etc. Directors: John K. Cooper and Peter H. Wetherill. Secretary: P. H. Wetherill. Registered office: Bank Chambers, 512/4 Brixton Road, S.W.9.

Knight Investments, Ltd. Capital £2,000. Objects: To carry on the business of financiers of hire purchase agreements, and instalment buying, bill and note discounters and as an investment trust and finance company, etc. Directors: Cecil J. Knight, Kinbrae, and Carl A. Knight. Secretary: C. J. Knight. Solicitor: Malcolm Collinson, O.B.E., 5 Park Hill Road, Torbay. Registered office: 82 Fleet Street, Torquay.

Lawrence Seer, Ltd. Capital £100. Objects: To carry on the business of general wholesalers, etc. Directors: Ernest A. Smith, Mrs. Violet V. Smith, and Eric L. Seer. Secretary: E. L. Seer.

Leach Relays (Europe), Ltd. Capital £500. Objects: To carry on the business of manufacturers of and dealers in electronic relays devices, plant, apparatus and equipment, etc. Subscribers: Charles Hoile, F. J. E. Waller. Solicitors: Kenneth Brown, Baker Baker, Essex House, Essex Street, W.C.2.

Lea Valley Finance, Ltd. Capital £100. Objects: To carry on the business of hirers, hire purchase traders and dealers in radio and television sets, etc. Directors: Gordon Spriggs and Mrs. Stella M. Spriggs. Secretary: Gordon Spriggs. Solicitors: Tackley Fall & Read, 9 Duke Street, W.1. Registered office: 39 Queen Anne's Place, Bush Hill Park, Enfield, Middlesex.

Light Weight Battery Company, Ltd. Capital £100. Objects: To take over all patents, plant, equipment, stock, recorded results, goodwill and improvements relating to experiments carried out by Francis L. R. Brown and Cecil H. Gadsden in the construction and improvements of electrical storage batteries, etc. Directors: Cecil H. Gadsden and Francis L. R. Brown. Secretary: C. H. Gadsden. Solicitors: Tringhams, 23 Portman Square, W.1. Registered office: Cophthall House 13 Cophthall Avenue, E.C.2

Lindsay & Williams, Ltd. Capital £122,000. Objects: To acquire the business of insulating materials manufacturers carried on at Openshaw Bridge Works, Manchester, as "Lindsay & Williams, Ltd." (in liquidation). Subscribers: H. Williams and George E. Moss. Solicitors: Lawson Coppock & Hart, Manchester. Registered office: Openshaw Bridge Works, Manchester.

Linsted Finance Co., Ltd. Capital £100. Objects: To carry on the business of hire purchase, hiring, letting on hire and easy payment systems, etc. Subscribers: Jean Herbert and Claire Moore. Secretary: Thos. A. Herbert, 128 Albany Street, N.W.1.

Lompar Electronic Recording Company, Ltd. Capital £100. Directors: Horace W. Lomas and Edward E. Purry. Secretary: Yvonne M. Lomas. Registered office: 52a, Oxford Gardens, W.10.

Lydgate Trading Company, Ltd. Capital £1,000. Objects: To carry on the business of importers, exporters, merchants, traders, distributors, and shippers of and dealers in merchandise of all kinds, in particular radio, television and telephone apparatus, plumbers', electricians', glaziers' and builders' materials of all kinds, etc. Directors: George E. Brown and Albert W. Palser. Secretary: Geo. E. Brown. Solicitors: George Brown & Co., 16 New Meeting Street, Birmingham. Registered office: 16 New Meeting Street, Birmingham, 4.

Masterton Finance and Trading Services, Ltd. Capital £500. Objects: To carry on the business of advancing money to finance hire purchase agreements, etc. Directors: Alex H. H. Masterton, Joyce B. Masterton, and Mrs. Lilian L. Schwarz. Secretary: Joyce B. Masterton. Registered office: 466 Bath Road, West, Slough.

Milmans of Kensington, Ltd. Capital £100. Objects: To carry on the business of manufacturers of and dealers in refrigerators, heating and cold storage machinery, plant and apparatus; gramophones, and records, wireless sets, etc. Directors: Sidde Shirman and Boris Shirman.

Solicitors: Sidney Torrance & Co., 18 Bevis Marks, E.C.3. Registered office: 202B Kensington High Street, W.8.

M.R.S. (Hackney), Ltd. Capital £1,000. Objects: To carry on the business of retailers, wholesalers, manufacturers, importers and exporters of wireless receiving and transmitting sets, television receiving sets, etc. Directors: Albert R. Miller, Mrs. Phoebe Miller, John A. Miller, and Richard A. Miller. Secretary: R. A. Miller. Registered office: 106 Forest Road, Hackney, E.8.

Murville Finance Co., Ltd. Capital £100. Objects: To carry on the business of hire purchase, etc. Subscribers: Jean Herbert and Claire Moore. Secretary: T. A. Herbert, 128 Albany Street, N.W.1.

Muskham Finance, Ltd. Capital £1,000. Objects: To carry on the business of capitalists, financiers, agents and concessionaires, etc. Directors: Stanley Wood, Bernard G. Wood and Kenneth P. Wood. Secretary: Leonard H. Wood. Registered office: Muskham House, 715 High Road, Leyton, E.10.

Melbridge Finance Co., Ltd. Capital £100. Objects: To carry on the business of hire purchase, hiring, letting on hire, easy payment systems, etc. Subscribers: Jean Herbert and Claire Moore. The first directors are to be appointed by the subscribers. Secretary: T. A. Herbert, 128 Albany Street, N.W.1.

Metallurgical Radiologists, Ltd. Capital £2,000. Subscribers: Ronald B. Bexley and Eric A. Slaughter. The first directors are to be appointed by the subscribers. Secretary: Ronald B. Bexley. Registered office: 35 Clarges Street, W.1.

Millers (North Road), Ltd. Capital £2,000. Objects: To carry on the business of dealers in baby carriages, perambulators, invalid chairs, bicycles, motor cycles, motor cars, wheels, tyres and spare parts; nursery furniture, toys, sports goods, gramophones, musical instruments, wireless and television sets, etc. Directors: Wm. Myers and Nora Myers. Secretary: Nora Myers. Solicitors: Dennis Birchall, 2 Cross Street, Preston. Registered office: 160, 162 and 164 North Road, Preston, Lancs.

New Era Shade Company, Ltd. Capital £5,000. Objects: To carry on the business of manufacturers of and dealers in batteries, accumulators or other electrical apparatus, etc. Directors: Horace Swift and Sydney Cohen. Registered office: 199 Cheetham Hill Road, Manchester.

New View, Ltd. Objects: To carry on the business of manufacturers and displayers of and dealers in apparatus for projecting, receiving, transmitting, reproducing or recording sounds, pictures, etc. Subscribers: Chas. R. Davis and Emily M. Stevens. Victor Sheridan signs as director. Solicitors: Davies & Davis, E.C.4. Registered office: 9 Hanover Street, Regent Street, W.1.

Nicholls Bros., Ltd. Capital £10,000. Objects: To carry on the business of wireless, television, electrical and general engineers, etc. Directors: Percy J. Nicholls and Frank S. Nicholls. Secretary: F. S. Nicholls. Solicitors: Cannington, Son & Orfeur, Braintree. Registered office: 74 High Street, Braintree, Essex.

Non-Destructive Testers, Ltd. Capital £1,000. Objects: To carry on the business of testing steel and other materials and flaw detection by means of supersonic, radiographic, magnetic and X-ray methods, etc. Directors: Paul Fox and Max L. Johnson. Secretary: Max L. Johnson. Registered office: Cricket Inn Road, Sheffield, 2.

Ordish & Soar, Ltd. Capital £2,000. Objects: To carry on the business of importers, exporters, manufacturers of and dealers in wireless, radio and television sets, etc. Directors: Jack D. Ordish and Dennis P. Soar. Secretary: J. D. Ordish. Solicitors: Keene Marsland & Co., 52 Mark Lane, E.C.3. Registered office: 52 Mark Lane, E.C.3.

North West Mercantile Finance, Ltd. Capital £1,000. Objects: To acquire, let on hire or sell, either for cash or deferred payment systems, machinery, motor-cars, radio and television sets, furniture, etc. Directors: Leon Lubin and Mrs. Evelyn Lubin. Solicitors: Bernard Kuit, Stearn & Ashby, 83 Bridge Street, Manchester. Registered office: 47 Deansgate, Manchester.

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| IA5  | 6/-  | 6F33    | 9/6  | 25L6    | 8/6  | EF41    | 9/-  |
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| IL4  | 6/-  | 6J5     | 5/-  | 35Z4    | 8/6  | EF54    | 5/-  |
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| IR5  | 7/-  | 6K7     | 5/-  | 50L6    | 8/-  | EF91    | 6/6  |
| IT4  | 7/-  | 6K8     | 8/-  | 72      | 4/6  | EL41    | 10/6 |
| 2D2I | 8/6  | 6L7     | 7/6  | 85A2    | 10/6 | EL84    | 11/- |
| 2X2  | 4/6  | 6N7     | 7/6  | 215SG   | 4/-  | EL91    | 6/6  |
| 3D6  | 2/6  | 6Q7     | 8/6  | 807     | 7/6  | EM34    | 10/- |
| 3Q5  | 9/6  | 6SA7    | 8/-  | 866A    | 15/- | EY51    | 11/- |
| 3S4  | 7/-  | 6SH7    | 6/-  | 956     | 3/6  | EZ40    | 9/-  |
| 5U4  | 8/-  | 6SJ7    | 8/-  | 5763    | 9/-  | KT44    | 7/-  |
| 5Y3  | 7/6  | 6SK7    | 6/-  | ARP3(A) | 5/-  | KTW61   | 7/-  |
| 5Z4  | 8/6  | 6SL7    | 8/-  | D77     | 6/-  | MH4     | 5/6  |
| 6AC7 | 6/6  | 6SN7    | 8/6  | DAF91   | 7/-  | PCC84   | 11/- |
| 6AG7 | 12/6 | 6U5(UX) | 7/-  | DF91    | 7/-  | PCCF80  | 11/- |
| 6AL5 | 6/-  | 6V6     | 7/-  | DF92    | 6/-  | Pen46   | 7/-  |
| 6AM6 | 6/6  | 6X4     | 7/6  | DH77    | 8/-  | PL81    | 10/- |
| 6AQ5 | 8/6  | 6X5     | 6/6  | DK92    | 7/-  | PL82    | 9/6  |
| 6AT6 | 8/-  | 7A7     | 8/6  | DL72    | 7/-  | PY81    | 10/6 |
| 6B7  | 7/6  | 7B7     | 7/6  | DL93    | 7/6  | PY82    | 7/6  |
| 6B8  | 4/-  | 7C5     | 8/-  | DL94    | 7/-  | SP4(7)  | 8/6  |
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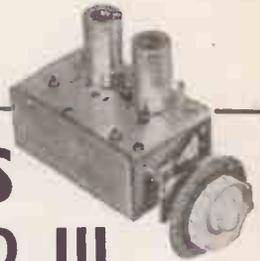
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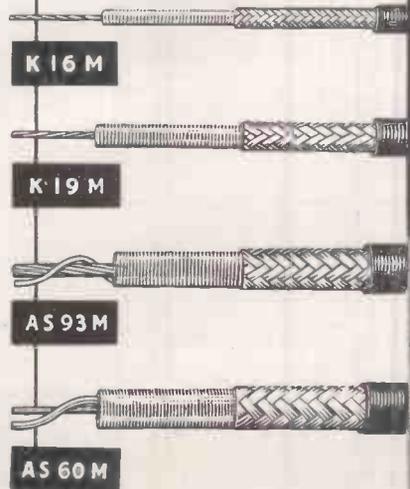
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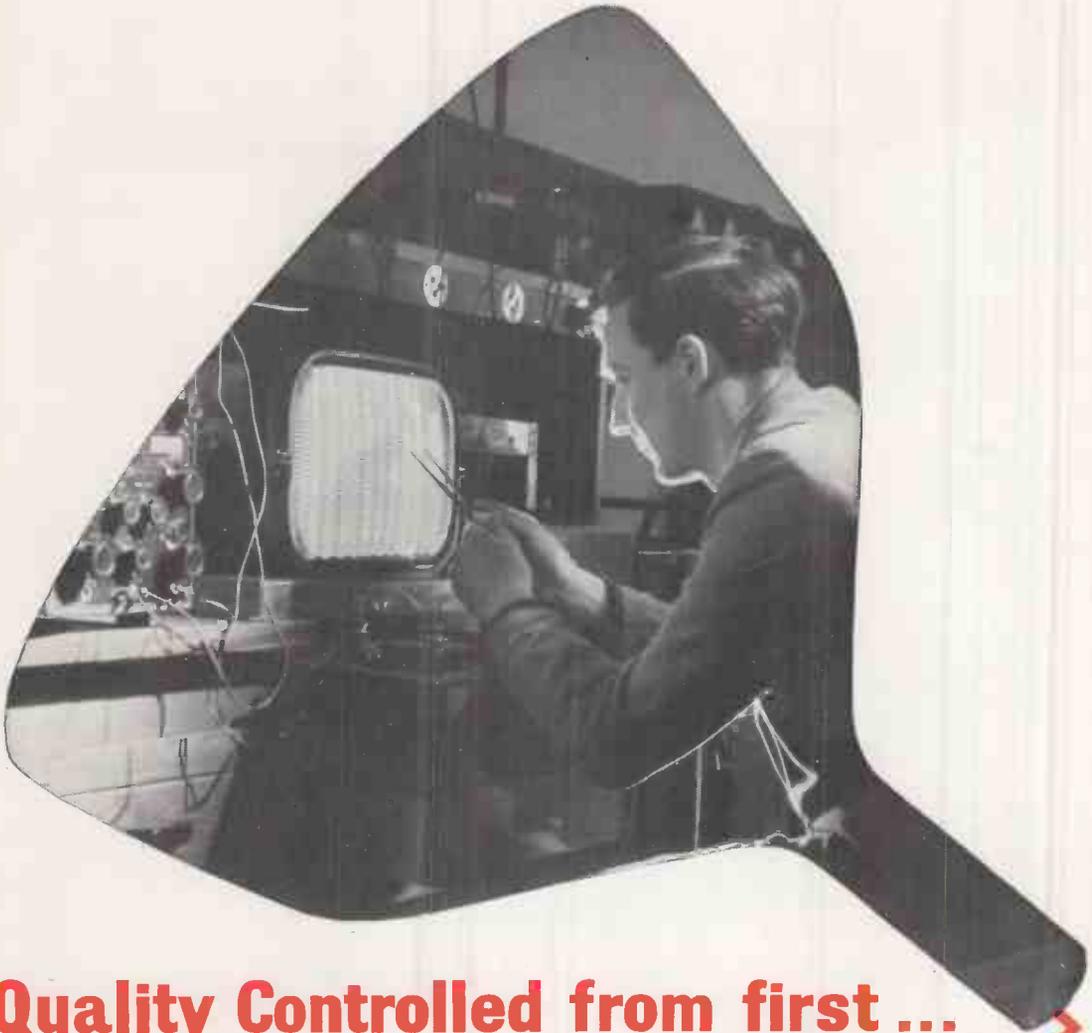
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