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# Practical Television

1'3

AND TELEVISION TIMES

DECEMBER: 1957

EDITOR: F.J. CAMM

CONTENTS

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| 3V4 | 9/- | 6F12 | 9/- | 7B7 | 8/- | 19H1 | 10/- | 5763 | 12/6 | DM70 | 8/6 | EF80 | 8/6 | KTW63 | 8/- | SP4(7) | 15/- | | 9/- |
| 5U4 | 8/6 | 6F13 | 13/- | 7C5 | 8/- | 20D1 | 16/- | 7193 | 5/- | EA50 | 2/- | EF85 | 7/6 | KTZ41 | 6/- | SP41 | 3/6 | VT61A | 5/- |
| 5V4 | 12/6 | 6F16 | 9/6 | 7C6 | 8/- | 20L1 | 13/6 | 7475 | 7/6 | EA76 | 9/6 | EF86 | 14/6 | KTZ63 | 10/6 | SP42 | 12/6 | VT501 | 5/- |
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| 6A8 | 10/- | 6J5GTG | 5/6 | 9D2 | 3/6 | 28D7 | 7/- | AC/P4 | 8/- | EBC33 | 7/6 | EL81 | 15/- | MU14 | 8/6 | U50 | 8/- | XFW10 | 6/6 |
| 6AB7 | 8/- | 6J5GTM | 6/- | 10C1 | 15/- | 30 | 7/6 | AP4 | 7/6 | EBC41 | 10/- | EL84 | 10/6 | OA10 | 12/6 | U52 | 8/6 | XFY12 | 6/6 |
| 6AB8 | 9/- | 6J6 | 5/6 | 10F1 | 15/- | 30C1 | 12/6 | ATP4 | 4/- | EBF80 | 9/6 | EL91 | 5/- | OA70 | 5/- | U76 | 8/- | XH(1.5) | 4/- |
| 6AC7 | 6/6 | 6J7G | 6/- | 10F9 | 11/6 | 30F5 | 12/6 | AZ31 | 12/6 | EBF89 | 9/6 | EM34 | 10/- | OA71 | 5/- | U78 | 7/- | XSG(1.5) | 4/- |
| 6AG5 | 6/6 | 6J7GT | 10/6 | 10F18 | 12/6 | 30FL1 | 12/6 | B329 | 7/6 | EC52 | 5/6 | EM80 | 10/6 | OC72 | 30/- | U251 | 15/- | Y63 | 7/6 |
| 6AG7 | 12/6 | 6K7G | 5/- | 10LD3 | 8/6 | 30L1 | 12/6 | BL63 | 7/6 | EC54 | 6/- | EY51 | | P61 | 3/6 | U404 | 10/6 | Z63 | 10/6 |
| 6AJ8 | 8/- | 6K7GT | 6/- | 10P13 | 17/6 | 30P4 | 15/- | CK505 | 6/6 | EC70 | 12/6 | (Small) | 12/6 | PABC80 | | UABC80 | | Z66 | 20/- |
| 6AK5 | 5/- | 6K8G | 8/- | 11E3 | 15/- | 30P12 | 13/6 | CK506 | 6/6 | | | | | | 15/- | | 10/6 | Z77 | 9/- |
| 6AL5 | 6/6 | 6K8GT,G | | 12A6 | 6/6 | 30P16 | 10/6 | CK523 | 6/6 | ECC31 | 15/- | EY51 | | PCC84 | 8/- | UAF42 | 10/6 | Z719 | 12/6 |
| 6AM6 | 9/- | | 11/- | 12AH7 | 8/- | 31 | 7/6 | CV63 | 10/6 | ECC32 | 10/6 | (Large) | 12/6 | PCC85 | 12/6 | UB41 | 12/7 | Z729 | 14/6 |

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# Practical Television

## & TELEVISION TIMES

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# TELEVIEWS

### *AUDIENCE RESEARCH*

THE BBC has admitted that its viewing audience is much less than I.T.V. It says that of the possible viewing public, 28 per cent. look in to the BBC programmes and 72 per cent. to I.T.V. The systems adopted by TAM and the BBC in order to arrive at these figures are very dissimilar, yet they seem to give somewhat comparable results. Under one such system, a gadget attached to the set affords them a means of measuring the time spent looking at I.T.V. or BBC and must give a reasonably accurate result. The BBC, however, depend upon interviewing what is considered to be a cross-section of the public. The director of BBC television, Mr. Gerald Beadle, in a later statement, said that on the question of programme ratings and preferences, the BBC's average audience in TV areas is greater than that of I.T.V. He was possibly taking account here of the number of unconverted sets.

### *COLOUR TV TRANSMISSIONS*

THE BBC started a further series of experimental colour transmissions on October 7th, as a continuation of the experiments for studying the problems of producing, transmitting and receiving TV pictures in colour.

The first experimental transmission was in October 1955. They are being made in co-operation with the radio industry, and in agreement with the Television Advisory Committee, which is to report to the Postmaster General on the whole field of colour television. The experiments do not mean that the BBC is committed to the adoption of the system used in the experiments or of any other system of colour television. The decision rests with the Postmaster General. The experiments take place outside normal programme times and will continue for about six months, and are transmitted from the Crystal Palace station on Channel 1 (vision 45 mc/s, sound 41.5 mc/s).

### *BBC TV COMES OF AGE*

AT 3.30 p.m. on the afternoon on Monday, November 2nd, 1936, the first regular TV programme of the BBC went on the air. Thus, this year, it celebrates its 21st birthday.

We join with the Radio Industry in wishing it many happy returns of the day.

### "PRACTICAL HOME MONEY MAKER"

THE third issue of our new companion "practical"—"PRACTICAL HOME MONEY MAKER"—is now on sale, and it bristles with money-making ideas for the home worker. Our new companion monthly is performing work of national importance, and I hope you will join its ranks.—F.J.C.

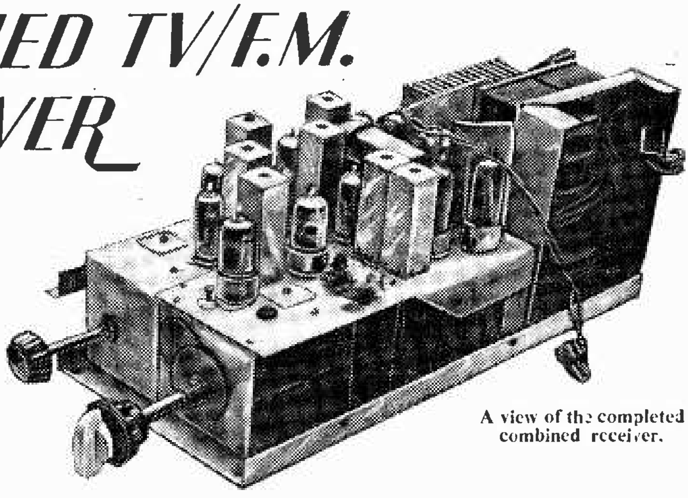
***Our next issue dated January will be published on December 20th.***

# A SWITCHED TV/F.M. RECEIVER

## A COMBINED TV AND BAND II SOUND RECEIVER

By R. Shatwell

*(Continued from page* 173 *November issue)*



A view of the completed combined receiver.

THE tuner is the heart of the set and provides the F.M./A.M. switching of the detector as well as the station selection. Fig. 1 in last month's issue gives the theoretical circuit of the tuner and to cut down variations to a minimum a point to point drawing of the top plate with the precise location of every item is given in Fig. 4b. The work involved should be done in the following order:—

Make up the top plate (Fig. 4a), front panel (Fig. 5a) and two partitions (Fig. 5b).

2. Modify switch plates to take coil platforms (Fig. 6a).

3. Make up coil platforms (Fig. 7).

4. Assemble switch wafers, platforms, front panel and partitions (Fig. 7).

5. Make and fit fine tuner.

6. Wire top plate, check no shorts when in position on switch assembly.

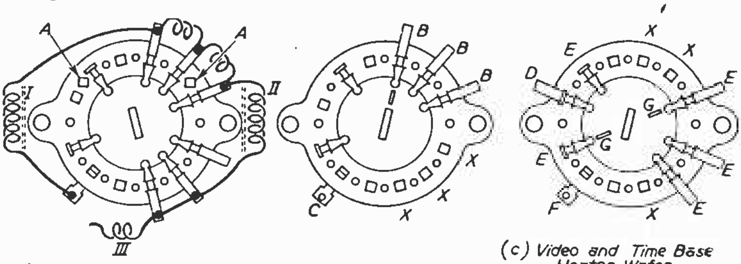
7. Insert Band I and II coils, wire to switch plates, bolt to top plate and complete wiring between the two.

The first stage is amply covered by the diagrams. The top plate is 18 s.w.g. aluminium. The partitions can be 18 or 20 s.w.g. Note that only one partition needs the cut-out to avoid components, and this will also need coil platform supporting holes drilling at a later stage. The other partition has a hole for the bias lead to the signal balancing switch plate.

Fig. 6A shows the modifications to the switch plates necessary to accommodate the coil platforms, the existing small hole at "A" being enlarged to 1/16in. square in an upward direction on plate 1. downward on plate 3. symetrically on plate 4; and also on plate 2. but in this case to 1/16in. × ⅛in. to accommodate two platforms. This latter operation calls for careful work and a fretsaw was used by the author.

The coil platforms can be made up from the details on Fig. 7. The supporting lugs are 1/16in. wide and ¼in. long. Again a fretsaw is a useful aid. The centres of the coil-former holes must be not less than ⅞in. from the centre. to avoid the switch actuating bar touching the coils. One 8 BA bolt on the outer hole secures the coil formers, as these are inserted through a ⅜in. hole in the platforms. It is therefore a simple matter to remove any coil for modification even in the completed set.

Assembly of the switch is the main work involved. Fig 6a gives the wafer layout. and it will be seen that there are two fixed contacts without soldering tabs and these do not normally take any part in the switching. These are made use of in the modified switch wafer 9. Although nine wafers are used ten are necessary. as an extra contact must be inserted in this modified wafer. The tuner incorporates seven of the nine, and although switch specialists will no doubt make up the assembly to order. it can be made up for a few shillings from two surplus switches as sold by Messrs. W. A. Benson. 136, Rathbone Road. Liverpool. This firm sell a 1P 6W 5B switch at a very low price. and if two are obtained then the ten wafers are obtained, also the copper foil links, and by careful use of the




(a) Tuner Wafer Modified for platforms and coil connections.
A....Holes enlarged to take coil platforms

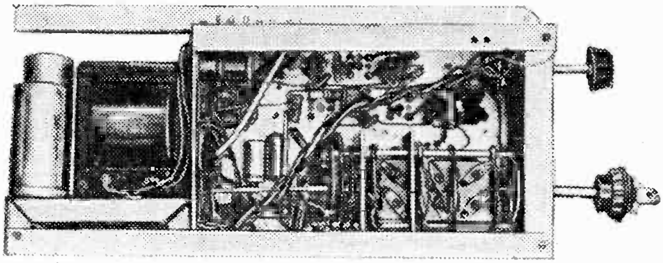
(b) Tube Heater Wafer
X....Contacts removed
B....Contacts linked and to Tube heater tag strip.
C....Tube heater supply

(c) Video and Time Base Heater Wafer
X....Contacts removed
D Contact inserted
D and E contacts all linked and to tag strip.
G....Moving contacts. Existing one repositioned and extra one inserted
F...6•3 v. supply

Fig. 6(a), (b) and (c). Details of the switch wafer modifications.

spacers very little modification to these is necessary. The only difficulty is the short spindle, as the fine tuner prevents the use of an ordinary extension coupler. The author used this switch and pinned and soldered a 3in. extension to the spindle (Fig. 8). A precise horizontal joint can be obtained by lying the pinned joint in a piece of angle aluminium when soldering with a gas or small blow lamp jet. A steel shaft is used on the switch and either spirit flux or the special cored solder will be necessary. After the joint is cleaned up it should be protected with a sleeve of ¼in. ID tube until the fine tuner is fitted.

Fig. 7 gives the spacer lengths, the critical dimensions being the position of the partitions, and it is essential that these be checked. The wafers face to the rear and the moving contact lug is at the top for wafers 1 to 6, and bottom for wafer 7, where the L.F. signal is taken off. The front panel is secured only by the switch fixing nut and the top plate. At least ¼in. of the actuating rod must protrude beyond wafer 7, for ganging purposes. The copper foil links bridge the wafers and ensure the effective electrical return of the



**This view shows the switch assembly**

distance pieces to the chassis. The assembly should then be positioned on the top plate and the 8 B.A. holes drilled through from the top plate into the front panel and partition flanges.

The fine tuner fixed plate should now be fitted. This is made up on a 1¼in. paxolin disc with a countersunk hole at the centre. This hole should be made by using a ⅛in. drill to make a countersink, but completing the breakthrough with a pin, and it coincides with the ½in. dia. centre of the elongated hole in the front panel. Another 1/16in. dia. hole is made to coincide with the 5/16in. dia. centre. A piece of tinned 36 s.w.g. wire is threaded through one and back

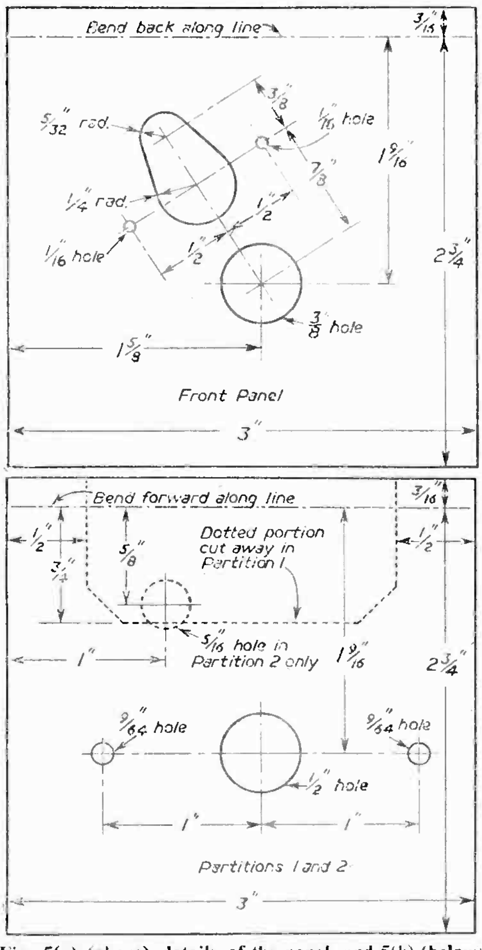



**Fig. 5(a) (above), details of the panel, and 5(b) (below), the partitions, two of which are needed.**

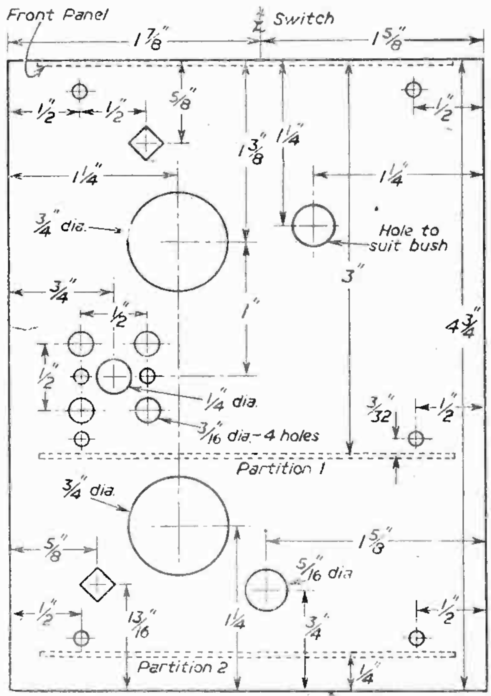
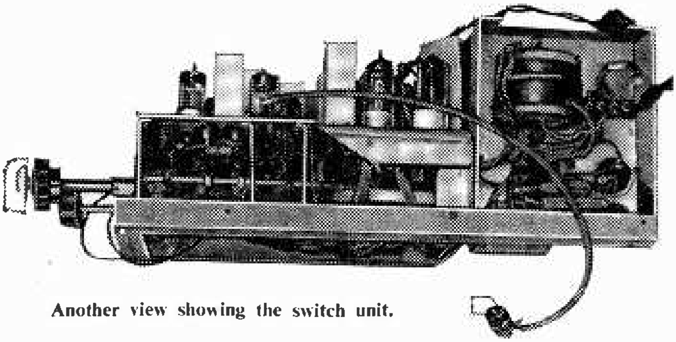



**Fig. 4(a).—The top plate drilling data.**

through the other and twisted and soldered behind, being left 2in. long. The countersink on the front is filled with solder until a raised



Another view showing the switch unit.

¼in dia. blob adheres to the wire (Fig. 9b). This is filed to a flat raised disc, and the paxolin then secured to the front panel by two 8 B.A. bolts, a strip of springy brass 3/16in. wide being held by one of these bolts to press against the moving plate.

The moving plate is shown in Fig. 9a. Its capacity change is obtained by the cam shape augmented slightly by its closing air gap. Maximum capacity should be obtained in about 270° rotation when the threads of the bush and nut butt tightly. The tab on the outer edge is bent down to form a stop in the minimum capacity position. The plate is of 22 s.w.g. copper, soldered to a nut to suit the switch thread, and this to an inch of ⅜in. I.D. copper tube into the end of which is soldered a length of ¼in. I.D. tube to form the fine tuner shaft, the inner shaft to protrude ⅜in. beyond this. This soldering operation is best done by tinning all surfaces and then completing the whole jointing in one operation with a small jet. Check that the moving and fixed plates cannot short at any position but arrange them to be as close as possible.

### *Components*

The top plate can now be wired and a small type iron is essential for this. Use of the heavier type ¼in. bit will almost certainly damage some components. Ceramic tubular condensers are used throughout and in no case is there more than ¼in. of wire from the condenser to its fixing point and a pair of pointed-nosed pliers should be used as a "heat shunt." All resistances are ¼ watt unless otherwise specified, and to avoid failures at a later date ½ w. are specified wherever anything higher than bias volts are involved. Leave about ¼in. of wire protruding at all points requiring connection to Band III coils or switch points. The test point is for lining up the I.F.s. Leave the aerial input transformer connections long on the top side of the plate. *Wire to the theoretical diagram* only, using Fig. 4b as a guide to location of components.

This completed and checked try the switch assembly in position and ensure there are no shorts between components and this assembly. If not, the Band I and II coils can be inserted and wired to the switch. On wafers 1, 2, 3 and 4 the soldering lugs are cut off the fixed contact points, and connections are made to the contacts at the level of the paxoline. Links are made at the back of the wafers, and damping resistors,

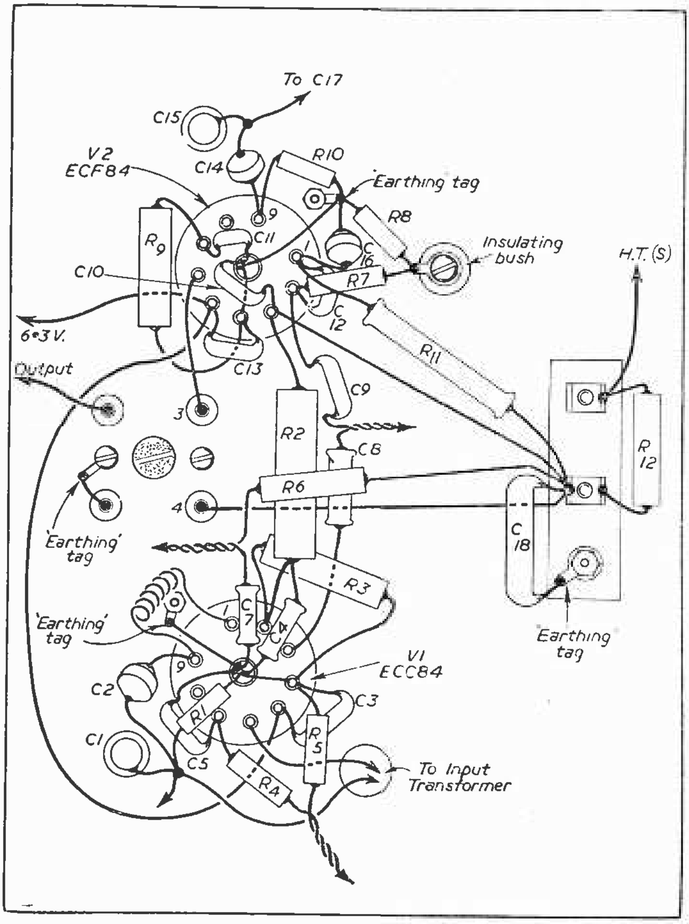



Fig. 4(b).—Wiring diagram of the tuner.

if used, can likewise be accommodated here. The Band III coil L13 does not go to any anchor point on the top plate and can be inserted at this stage the free end passing through the small hole alongside the contact, and tinned ready for C8

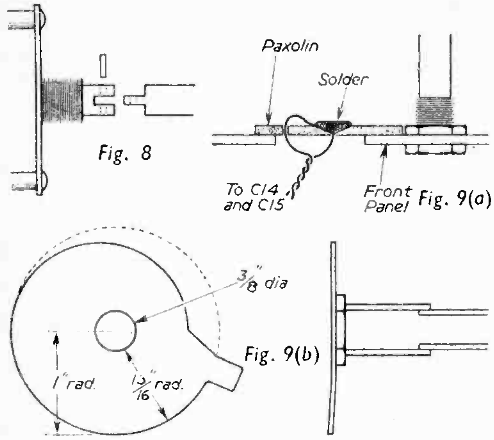



**Fig. 8 (above).—Modification to the fine tuner spindle. Fig. 9(a) and (b).—Further fine tuner details.**

and 9 to be connected. Note that no connection is made to the Band I position, as this coincides with all coils being in circuit. Fig. 6a shows the coil connections to the wafers. The top plate and switch assembly can now be bolted together and the necessary links made and Band III coils inserted. Those links consist of fine tuner to wafer 1 and C14, 15; L19 from wafer 1 to V2, pin 2; wafer 2 to V2 chassis return; C8, C9 to L13 as prepared; R6, C7 to wafer 3; L7 from wafer 3 to V1, pin 3; R4, R5 to wafer 5; C1, R1, C2 to wafer 4; L1 from wafer 4 to V1, pin 6 Fit the aerial transformer on the top plate near the grommet hole, with a two-way tag strip nearby and connect to prepared leads and wire C19, C20 to tag strip and T1. Connect a convenient length of 70-80 ohm coaxial suitably terminated for aerial plug used. Wafer 5 can have all fixed contacts taken to chassis at this stage. Wafers 6 and 7 have the three TV positions linked and the three F.M. positions also linked. This completes work on the tuner.

**TUNER COILS BAND III**

| | Position 1 | Position 2 | |
|---|---|---|---|
| L1 | 4T | Link | All coils clean 18 s.w.g. wound on .2in. former, removed and opened slightly. |
| L7 | 5½T | ,, | |
| L13 | 4T | ,, | |
| L19 | 3T | ,, | |

**BAND II**

| | Position 4 | | |
|---|---|---|---|
| L3 | 7T | 20 s.w.g. enam. | Aladdin former. |
| L9 | 5T | 39 DSC bifilar wound-spaced to fill .5 inch | |
| L15 | 5T | | |
| L21 | 3T | 20 s.w.g. enam. | |

**Position 5 and 6—2T throughout, wound as Band III coils. See text for oscillator links.**

**BAND I**
**Channel**

| | Position 1 & 2 | Position 3, 4, & 5 | |
|---|---|---|---|
| L6 | 7T | 6T | 32 s.w.g. Closewound. |
| L12 | 8T | 7T | Bifilar wound, spaced to fill 6 in.—39 D.S.C. |
| L18 | 8T | 7T | |
| L24 | 4T | 3T | 32 D.S.C.—to all ¼in. |

**Aerial input transformer—20T 32 D.S.C. PRI. 1¼T sec. interwound earthy end.**

| | | |
|---|---|---|
| L25 | 8 turns | 22 s.w.g. enam. ¼in. diam. |

*Coil Data*

Coil data is given in sets for each coil position as being more convenient to use. At this stage the oscillator F.M. positions, 3, 4, 5 and 6 (wafer 1) can be linked at the back with a short piece of 28 s.w.g. The intervalue coupling transformers are best made up by anchoring two lengths of 39 s.w.g. to the fixing holes in the Aladdin formers and then laying the wires up opposite sides of the former and taking two or three turns of thread tightly around the former at the start of the winding and tying securely. After winding bifilar fashion finish each wire on the same side as it began and another two or three turns of thread will anchor these. If necessary move the

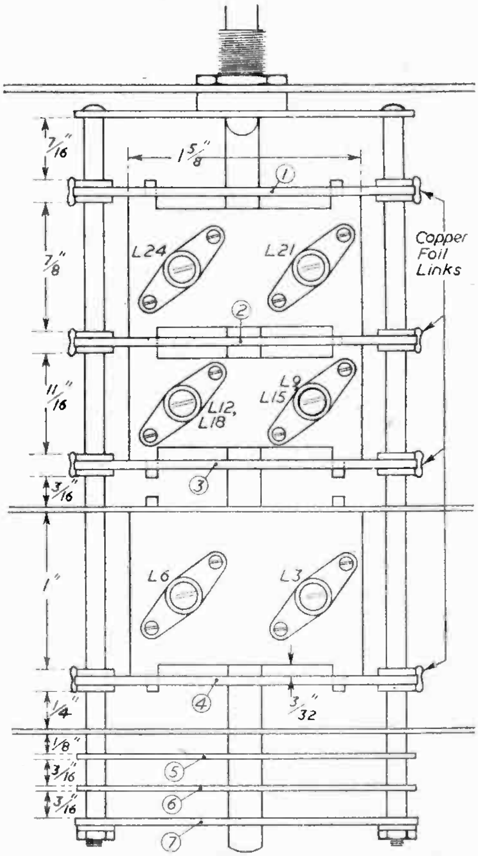


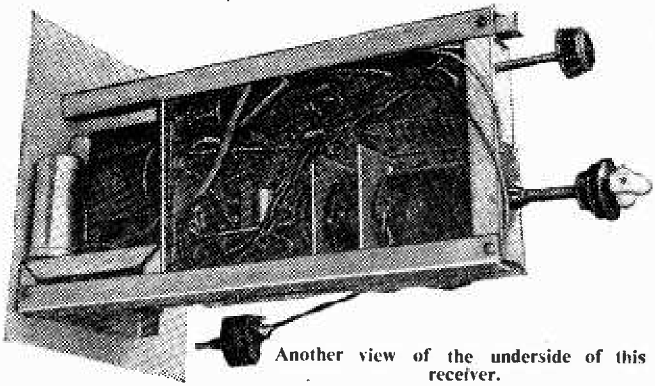

Fig. 7.—Details of the main switching assembly.

wires to even out the spacing and take a strip of Sellotape completely around the former to protect the winding. Free the wire from the fixing holes and the coil is complete.

### *Main Chassis*

The main chassis can now be made up. This is 9in. × 6in. × 2¾in. deep. This may be made up from a sheet of 18 s.w.g. aluminium. Next month we will show details of the wiring and chassis data.

(*To be continued*)

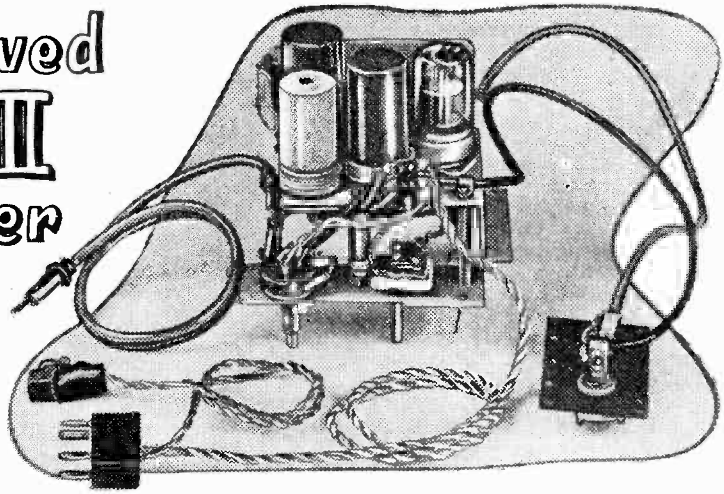


Another view of the underside of this receiver.

**I.F. COIL DATA**

| | | Pin No. | Turns | S.w.g. | End of winding T=Top B=Bottom | Wire spacing | Other data |
|---|---|---|---|---|---|---|---|
| T2 | A | 3 | 9 | 28 DSC | T | Close wound | Sec. on PRI. Tissue interleave. |
| | HT | 4 | | | B | | |
| | E | 6 | 9 | „ | B | | |
| | G | 1 | | | T | | |
| T3 | A | 4 | 11 | „ | T | | |
| | HT | 3 | | | B | | |
| | E | 6 | 11 | „ | B | | |
| | G | 1 | | | T | | |
| T7 | A | 4 | 16 | „ | T | „ | 1¼in. between coils. |
| | HT | 3 | | | B | | |
| | E | 2 Junction of C47-48 | | | | | |
| | G | 1 | 15 | 28 DSC | B | „ | |
| | Rejector | 6 | | | T | „ | |
| L26 | | | 13½ Centre tapped | 28 DSC | | | Aladdin former. |
| T8 | A | 4 | 15 | 38 EW | T | To cover .45in. | Bifilar wound |
| | HT | 3 | | | B | | „ |
| | Diode | 6 | 15 | „ | B | „ | „ |
| | E | 1 | | | T | „ | „ |
| T4 | A | 4 | 13½ | 28DSC | T | Close Wound | ⅜in. between windings. |
| | HT | 3 | | | B | | „ |
| | E | 6 | 13½ | „ | T | „ | „ |
| | G | 1 | | | B | „ | „ |
| T5 | A | 4 | 13½ | 28 DSC | T | „ | „ |
| | HT | 6 | | | B | „ | „ |
| | E | 1 | 13½ | „ | T | „ | „ |
| | Diode | 3 | | | B | „ | „ |
| T6 | A | 4 | 9 | 39 DSC | B | To cover .375in. | 3/16in. between windings. |
| | HT | 6 | | | T | | |
| | HT | 1 | 7+7 | „ | B | .5in. | Interwound 1 turn with top of primary. |
| | HT | 3 | | | T | „ | |
| | Tert | 2 | 3 | „ | T | Close | |
| | | | All coils wound in same sense. | | | | |
| L27 | | | 108 | 38 enam. | | Close | Formers 1½in. long, ½in. dia. paper tube. Start winding ¼in. from top of former. Winding length ¾in. |
| L28 | | | 108 | „ | | „ | |
| L29 | | | 200 | 40 enam. | | „ | Former 1⅝in. x ¾in. dia. paper tube. Start winding 3/16in. from top. Winding length 13/16in. |

# An Improved BAND III Converter



This Article is Written to Help Readers Who are Having Difficulty in Obtaining Satisfactory Reception on Band III with EF50 and EF80 Valves

By "Diadem"

*(Continued from page 154, November issue)*

THE converted output is taken from the I.F. transformer secondary in the anode of V2, and after switching is fed into the receiver. The 330pF decoupling condensers were found to be adequate. Larger ones up to 1,000pF were tried and can be used without affecting performance. All other condenser and resistor values must remain as stated. Nothing is to be gained by altering these, many combinations of resistors and condensers were tried and those given were found to be the best. "Red" Sylvania EF50s were found to be much better than the "silver" type and more stable, and gave better contact, especially the spigot which is of different metal and does not oxidise so rapidly.

### *Valveholder Troubles*

Ceramic valveholders were used for low loss. The sockets are silvered and turn black. Some of this can be removed with carbon tetrachloride, and a flat nail file very lightly passed up and down the sockets a few times removes the rest. Do not forget the centre spigot hole, and pinch the spigot contacts together. Clean all valve pins the same way and make sure the aluminium ring on the valve base which holds the spigot is making good contact with the valve can, as both these parts film over with age.

Use spring type ring retainers. The worst type of retainer is the two coiled spring type with the disc on top, although the spigot is "earthed" the top of the valve can is earthed through the disc and the two expanding springs. The disc and the top of the valve can are usually filmed over, the springs make bad contact at both ends and at V.H. frequencies it plays havoc with stability, especially in the first stage where it upsets alignment of L2, and the gain drops considerably. I hope this explanation will save much hair tearing by the constructor.

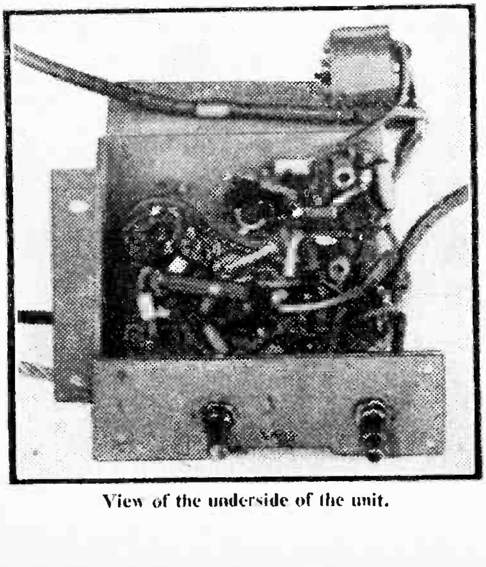
At the start all the stages were screened from one another and screens were also placed across the valveholders. All this screening was removed piece by piece and now only coils L1 and L4 are "canned," with no ill effect on performance.

The valveholder bolts are longer than usual and through this bolt on top of the chassis passes the valve retainer ring, the valveholder collar. Then comes the chassis, and underneath the solder tag, nut, Aladdin coil former, washer and nut. This enables the coils to be as near as possible to the valves. On coils L2, L3, L5, only one bolt was sufficient when the thick wire was soldered in place. No holes were drilled through the chassis for the cores as these were not found to be necessary. Coils L1, L4 were held by two bolts each and screened to prevent BBC pick-up.

The formers are ¼in. Aladdin with purple cores. When the converter is working satisfactorily the cores can be removed and a thin piece of elastic inserted down the inside of the former and the cores put back. This is necessary, especially if cores L2, L5 rock about.

Wind the coils on ¼in. control spindle and press on formers; as the formers are slightly over ¼in. the coil makes a tight fit.

The heater chokes are wound on a fat knitting



View of the underside of the unit.

needle (plastic); this needle is also used for trimming purposes when filed to a screwdriver tip.

In weak signal areas increase R9 across L4 to 6 KΩ or cut out altogether. It should be left in wherever possible.

### *Patterning*

BBC and I.T.A. co-ax cables running side by side from the aerials have not been found to be the cause of patterning on the I.T.A. unless the cables have been cut or joined or extended. If the BBC cable is cut or extended use a proper cable joiner, not tape, as the cable inner must be screened. The Band I co-ax must always be shorted out when receiving the I.T.A., or pronounced patterning will result. Switching the inner co-ax out of circuit or removing the plug is not effective.

Keep the output leads from the converter away from A.C. wiring in the power pack and mains wiring.

The filter coil L1 will overcome patterning from the BBC being fed into the unit. If patterning is experienced on the BBC fit switch in H.T. lead from the converter power supply or in the mains lead. This is usually switched out automatically when the band switch is operated.

Although an ordinary 3-pole 3-way band switch was used without screening no trouble was experienced through patterning if co-ax is used liberally. Connect co-ax screening to nearest possible points on chassis or solder them to the metal pillars on the switch framework. In the writer's case the converter was fixed inside the front of a console cabinet and the Band I co-ax from the change-over switch was in one continuous length to the back of the cabinet, where it terminated in a Pye socket fixed to a square of paxolin, alongside the

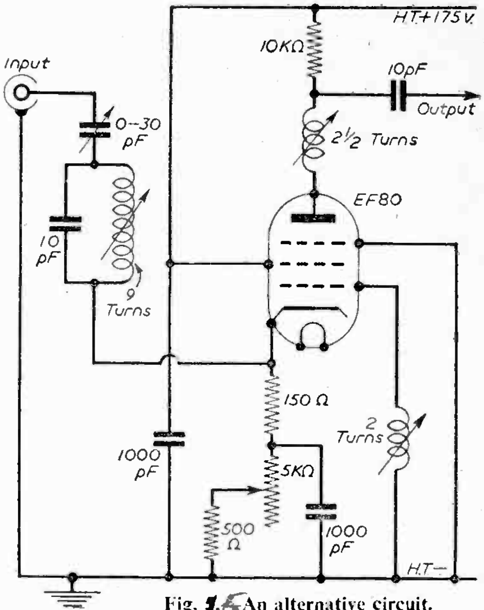



Fig. 5.—An alternative circuit.

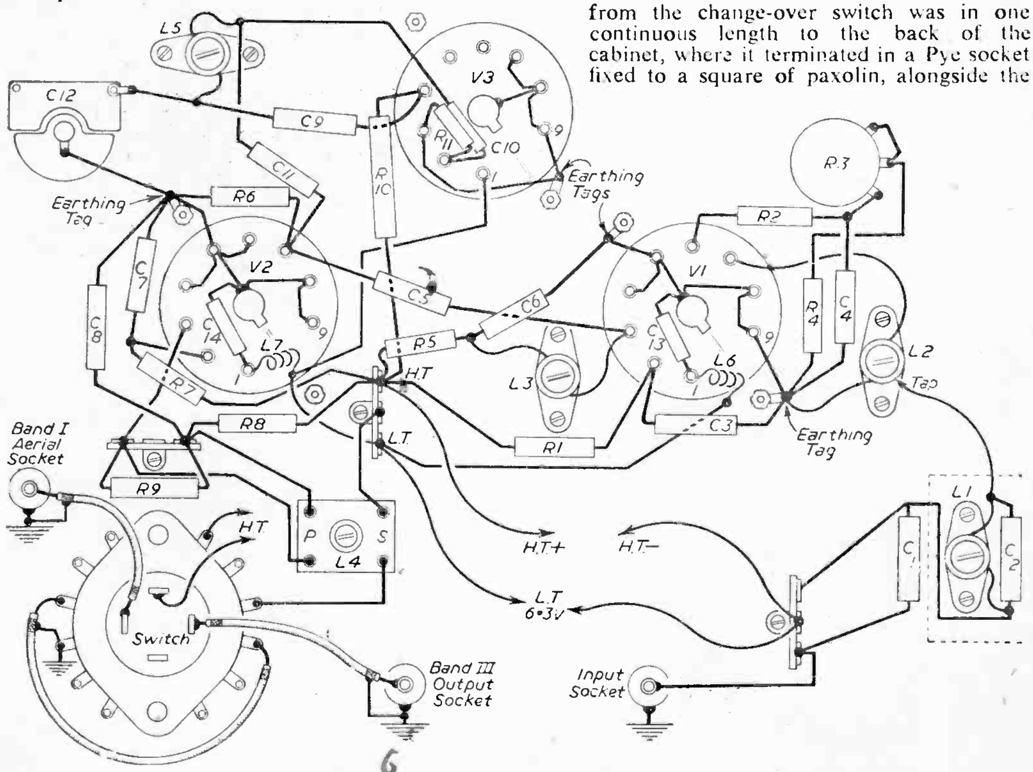



Fig. 6.—Wiring diagram of the converter.

I.T.A. socket from which it was screened. This is mentioned because if you are contemplating fixng the Band I socket on the converter chassis, unless the co-ax is taken right up to the socket and the socket screened, patterning will be experienced on the I.T.A.

**COIL DATA**

| Channel | L1 | L2 | L3 | L4 Pri. | L4 Sec. | L5 | L6 | L7 |
|---|---|---|---|---|---|---|---|---|
| 1 | 11 | 2 | 2½ | 11 | 3 | 5 | 10 | 10 |
| 2 | 10 | 2 | 2½ | 10 | 3 | 5 | 10 | 10 |
| 3 | 9 | 2 | 2½ | 9 | 2 | 5 | 10 | 10 |
| 4 | 8 | 2 | 2½ | 8 | 2 | 5 | 10 | 10 |
| 5 | 7 | 2 | 2½ | 7 | 2 | 5 | 10 | 10 |
| | Close wound 28 s.w.g. s.c. | Space diam. wire tapped ½ turn earthy end 22 s.w.g. enamel | Space diam. wire 22 s.w.g. enamel | Close wound 28 s.w.g. s.c. | Close wound 28 s.w.g. s.c. spaced ⅛ from primary | | Close wound 26 s.w.g. enamel self-supporting | Same as L6 |

¼in. Aladdin formers with purple cores.

*Wiring*

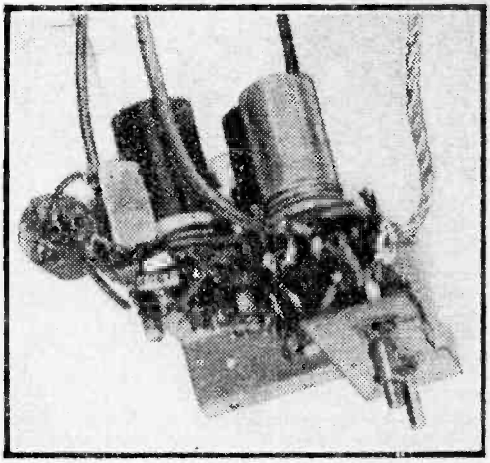
Keep it short, wire components right up to the valveholder where possible, especially V1. When "earthing" V1 spigot, solder wire at the bottom of the spigot tag nearest the valveholder, keep R2 off the chassis at least ¼in.

*Alignment*

Turn down gain control at least quarter of the way and leave alone. Switch on converter, place Band I aerial on grid of V2 mixer and tune L4 for maximum vision. Remove aerial, plug in Band III aerial and set C12 and cores of L1, L2, L3 all midway and L5 on a level with the former top. Tune L5 slowly and rock C12. Vision may be received at two places on L5, but only one where sound and vision is received together, this is the correct one. Tune for maximum sound, tune L2, this may be a little sharper than usual for this position, and if the gain is set too near maximum the removal of this core or the aerial may cause V1 to oscillate with a bright plain raster, and no signal will be received. Keep tuning L2 and L5, and when a signal is received tune L3 for maximum vision. This tunes rather broadly. Now tune L4 for maximum vision, and turn core slightly towards the sound if necessary and increase gain with R3. Now tune L1 if patterning is experienced: this may not seem to have much effect, as it tunes broadly, but it removes BBC patterns. Finally set C12 oscillator trimmer for maximum sound.

The gain control was a 300Ω W/W midget, as it was to hand, but it can be 500Ω or up to 1KΩ, but then R4 is omitted, the slider being taken direct to chassis. If a wire-wound control is used Vaseline the track. For those who like to experiment, the circuit in Fig. 5 with EF50 valves, has slightly less gain. L2 tunes rather flatter. Do not omit the condenser in the aerial lead. With the EF80 it works exceptionally well on low voltages (Fig. 5). About 10pF seemed about right for matching in the aerial lead; a postage stamp trimmer was used. This matching was found to be very important for this valve, as the impedance of the valve is altered and mismatching takes place when the aerial is taken to the cathode. The EF50 requires 1,000pF aerial condenser, or vary to suit individual requirements.

The band change switch contacts were smeared with Vaseline, not oil. This prevents it getting "noisy" after a few months' wear, and an additional refinement which I have found to be worth while to keep the dust out and prevent losses and delay any oxidisation is to make a hole ¼in. in the bottom of a small polythene bag, drop the band switch in spindle first, pull spindle through the hole and fix to chassis in the usual way; bunch the top of the bag together and hold together with Sellotape.



A view of the complete converter.

*Chassis*

Any type of chassis will do provided it is rigid. The chassis used was the two-valve platform from the 3170A unit. The tuner and band switch are under the chassis, built on a smaller platform so as to be near the wiring.

# BBC U.H.F. Transmissions

## DETAILS OF THE LATEST EXPERIMENTS FOR TV

THIS month, November, the BBC will begin a series of test transmissions on 654.25 Mc/s to collect propagation data relating to the U.H.F. bands (Bands IV and V) which were allocated to television at the International Radio Conference at Atlantic City, 1947, but are not so far used for this purpose.

Following earlier laboratory work, the BBC embarked on its first series of U.H.F. propagation measurements in 1955. These were directed towards the investigation of propagation on frequencies between 470 and 960 Mc/s over distances representing a normal service area, and over longer distances to obtain data necessary for the evaluation of co-channel interference. The initial tests were for the latter purpose and employed transmitters, modulated by square waves, manufactured for the BBC by Mullard Electronic Products Ltd. The transmitters were installed at various television transmitting stations, the aerials being erected high up on the television masts. Regular field-strength measurements were made over long periods at various locations, some as far away as the Shetland Islands. These transmissions are still in progress.

The long-distance tests were followed in 1956 by a series to determine propagation conditions within a typical service area using a transmitter at the Crystal Palace, working into a Yagi aerial and radiating a peak power of 1kW over a fairly narrow beam when modulated with square waves; pulse modulation was also used for some of the tests. The bearing of the aerial, which was at a height of 440ft., was changed from time to time so that field-strengths could be measured over the whole circle from Crystal Palace. These measurements have been completed and the resulting information concerning field-strength contours and an assessment of shadow and echo effects are now being studied.

The information collected in this way was, however, insufficient to determine fully the suitability or otherwise of Bands IV and V for television broadcasting, and at the request of the Television Advisory Committee the BBC decided earlier this year to embark on a more ambitious series of experiments using a high-power transmitter and radiating full television signals, initially on 405 lines and later on 625 lines (C.C.I.R. standards). These tests have been planned by the BBC in co-operation with the committee and the radio industry.

### *New Equipment*

The BBC has installed at the Crystal Palace a 10kW peak-white U.H.F. vision transmitter and a 2½kW carrier power sound transmitter manufactured by E.M.I. Electronics Ltd., the vision frequency being 654.25 Mc/s. The equipment is low-power modulated on both sound and vision channels and employs Eimac 3K50000LF klystrons in both audio and video final stages. These klystrons use three external cavity resonators and operate as linear amplifiers with a power gain of approximately 100. They are driven by a modulated amplifier stage operating with a cathode modulated circuit. The output of the transmitters is combined in a circuit of the filter bridge type constructed in rectangular section waveguide. The combined output is then conveyed to the aerial by an elliptical waveguide having dimensions of 12in × 6in. The elliptical waveguide is made of 99.5 per cent. aluminium in 12ft. lengths. At the top of the television mast the waveguide is transformed into a 5in. concentric feeder to take power to the four driving points of the helical aerial, the pole supporting the aerial being arranged to form the outer of the concentric feeder.

The helical aerial made of ½in. diameter copper rod comprises four bays, mounted one above the other on the same vertical axis, each having a linear height of five wavelengths. Each bay is fed at the centre, the helix being wound from the centre point of the bay in opposing directions to cancel the vertical component of radiation. In the four bays there is a total of 48 turns, each turn being approximately two wavelengths long. The aerial is mounted at the summit of the Crystal Palace tower, the top of the 6½in. diameter pole supporting the aerial being 707ft. above the ground, while the centre line of the aerial is 691ft. above the ground. The aerial has a power gain of 20 and after allowing for losses in the feeder and waveguide system, the effective radiated power of the vision signal is of the order of 125kW peak-white in the horizontal plane. Provision is made for de-icing the aerial by electrical heating.

When put into use, the transmitter will be in use for several hours a day radiating pictures on the 405-line standard. The pictures will be the same as those radiated by the Band I transmitter installed in the same building. Later on, the pictures on 625 lines will be produced at Lime Grove from flying spot telecine equipment supplied by Cinema-Television Ltd., and sent over a specially equipped coaxial cable to the Crystal Palace.

### *Change in March, 1958*

The tests on 405 lines will continue until about March, 1958, when there will be an interval for the transmitter to be adjusted to radiate on 625 lines. A second series of tests will then begin and will continue for a period not yet decided. For these latter tests, the programme will usually be different from that being radiated by the Band I transmitter, but at certain times duplicate copies of films scanned on the two systems will be radiated by the two transmitters simultaneously.

The BBC, the radio industry, the Post Office, the D.S.I.R., and the I.T.A. are organising comprehensive studies of the received pictures. The receivers themselves will be of various types.

# Simplified Sound TV Receivers

PICK UP SOUND ONLY ON THESE SIMPLE CIRCUITS

By F. G. Rayer

A RECEIVER for the reception of the sound signal only can be very easily made, and can prove more useful than might at first be supposed. A fair number of TV programmes, such as orchestral items, are satisfactory without the visual component, and the improved reception is worth while in areas where the usual medium-wave transmitters suffer from interference and where no F.M. receiver is available. Other programmes remain intelligible and interesting with sound only, though naturally a fair number depend so much on the visual element that they are not satisfactory for listening only.

If an amplifier is available, a single valve will suffice in the sound receiver. Such an arrangement (detector followed by two-stage amplifier) has been found to give ample volume at some 40 miles from a transmitter, without any need for a conventional TV type aerial. However, range naturally depends upon local conditions.

The popular 954 V.H.F. acorn pentode operates well on these frequencies, and pin connections for it are shown in Fig 1. The elongated end carries the anode pin. This valve has a 6.3V. .15A. heater, and can be operated from the 6.3V. supply of an amplifier. Maximum anode and S.G. voltages are 250V. and 100V. respectively.

A ring holder, with clips, may be used for the valve, though these are not easy to obtain. Soldered connections can be made successfully, but the iron must on no account be kept in contact with the pins longer than necessary, or the glass seal may crack. Leads should also be attached to the extreme ends of the pins, the iron being removed immediately the joint is made.

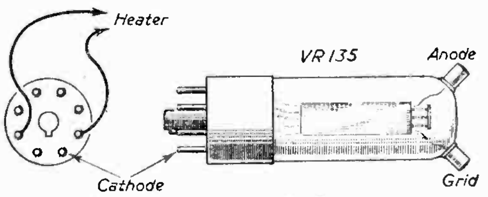



Fig. 2.—Twin cap V.H.F. triode.

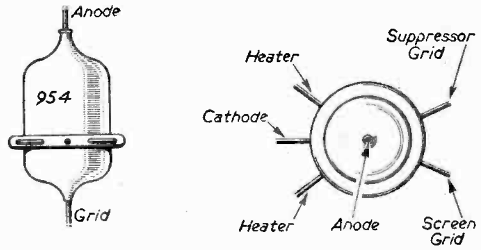



Fig. 1.—Connections for 954 V.H.F. pentode.

The twin cap or "horned" V.H.F. triode shown in Fig. 2 also appears from time to time in ex-Service valve lists, at very low cost. It can be used instead of the 954 in detector circuits.

## *One-valve Receiver*

This will operate phones, with a 90V. to 120V. battery H.T. supply, and 6V. heater supply. Or it can be employed to feed an amplifier, as mentioned. The circuit is shown in Fig. 3. Super-regenerative circuits are not recommended, because they may so easily cause interference. Nor should an ordinary regenerative detector be operated at oscillation point for this reason. If this is remembered, no interference can be caused.

A compact layout, with short wiring, is necessary, and the circuit will readily tune from 40 to 70 Mc/s. or about 7.5 to 4.25 metres. Other transmitters (such as Amateurs) within the band tuned will, of course, be heard also. To reach the higher frequencies stray capacity must be kept very low, or a coil with fewer turns will be required.

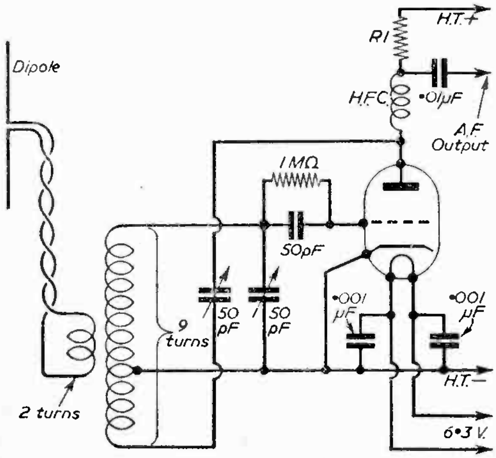



Fig. 3.—The detector circuit.

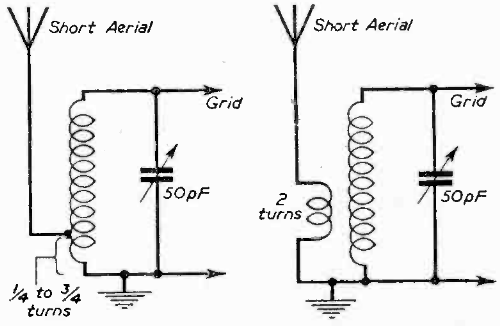



Fig. 4.—Alternative aerial couplings.

R1 may be 50K. for a H.T. line of 175V. to 200V. For 350V. supplies a larger value is required, or a dropping resistor in the amplifier. The 954 may be used as a triode by strapping anode and screen grid, suppressor being returned to cathode. Excessive anode voltages must be avoided, or reaction will be difficult to control.

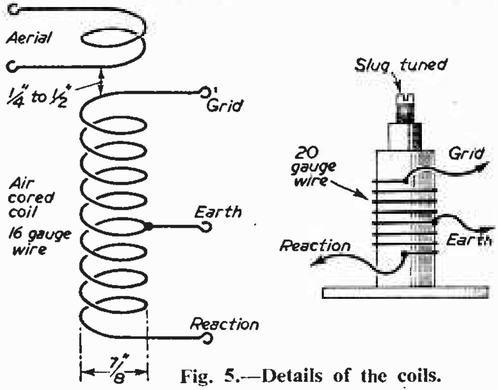


Fig. 5.—Details of the coils.

A simple wire dipole, using a few feet of conductor for each element, is satisfactory. If circumstances result in poor volume, signal strength can be increased by cutting the dipole to suit the station, or by using an improved form of aerial. The distance between aerial coupling winding and tuned winding will considerably influence results. With very weak signals, reaction is also quite critical.

In many areas a single vertical wire a few feet long will be sufficient. This may be coupled to the receiver by either of the methods shown in Fig. 4. Tight aerial couplings should not be used, or adequate reaction will be impossible. The aerial wire may be indoors (except in metal buildings) and may be cut one ½-wave long.

### *Tuning Coils*

For continuous tuning with a 35pF to 75pF variable condenser, a self-supporting coil such as that shown in Fig. 5 will be satisfactory. A length of wire is pulled out straight and wound tightly on a suitable object. The coil is then removed, and the turns pulled out slightly to separate them. Higher frequencies can be reached by taking off a turn or two at each end of the coil.

If the receiver is to be left tuned to the sound programme, and not employed for the reception of other V.H.F. A.M. transmissions, then a slug-tuned coil can be used. The number of turns required will depend upon the station frequency and receiver layout. As the coil is not required to gang with other tuned circuits, modification of the number of turns is a simple matter, until the station is found. Between four and eight turns on the tuned section will normally suffice with a ⅜in. or similar former. Slightly fewer turns are used on the reaction section. The band covered may also be modified by changing the parallel capacity, and a pre-set can be used here.

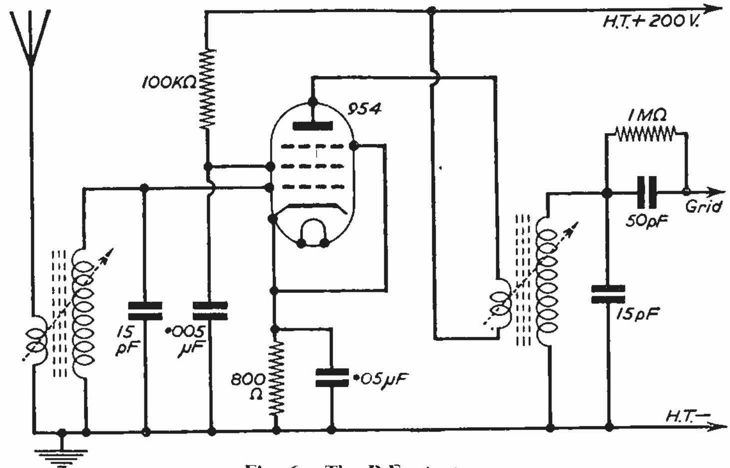


Fig. 6.—The R.F. stage.

### *Adding an R.F. Stage*

An R.F. stage will improve volume, and a circuit for this is shown in Fig. 6. Slug tuning will be simplest, to avoid two tuning condensers or possible instability associated with continuous tuning with a ganged condenser. If any difficulty arises in aligning, the R.F. coil may be temporarily disconnected, a H.F. choke or .25 megohm grid load being provided. The detector coil can then be tuned, as for the one-valve circuit. The aerial coil can then be replaced in circuit, and tuned.

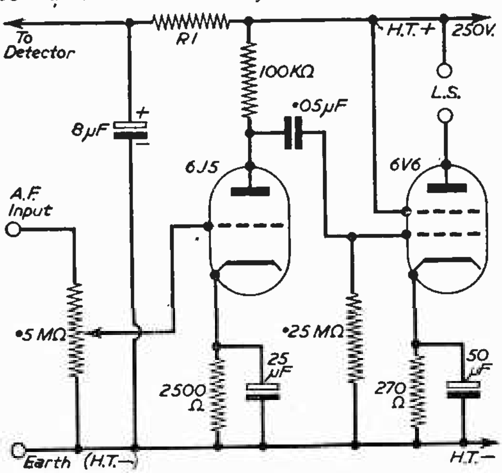


Fig. 7.—A simple amplifier.

# Scanning & Synchronisation

## 4.—FRAME SCANNING CIRCUITS (2)

By G. K. Fairfield

### *High-impedance Coils*

IN an attempt to dispense with an output transformer and its attendant disadvantages, high-impedance coils have been used for the frame scanning circuit. A simplified arrangement used for the output stage is shown in Fig. 25. An isolating capacitor C is necessary to prevent direct current from flowing through coils Ry, included in the anode circuit. A resistor R1 is

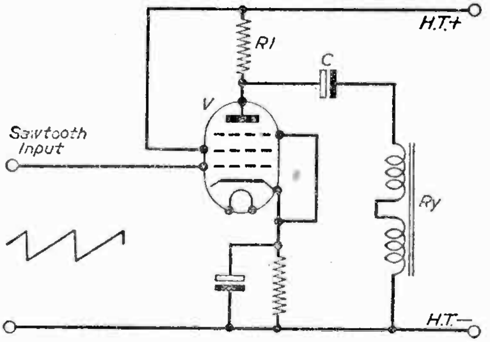



**Fig. 25.—Frame scanning output stage for high impedance coils.**

connected between anode and H.T. rail and will inevitably absorb some of the output current and result in a fairly low efficiency for the circuit. The limiting factors for scan distortion will now be the reactance of the coupling capacitor C and value of the load resistance and it can be shown that the percentage scan distortion produced by the circuit is given by:

$$\% \text{ distortion} = \frac{1.9}{C.(R+Ry)}$$

where R is the resistance of the parallel combination of R1 and the valve anode impedance Ra.

The value of Ry is governed by the practical difficulties of winding a suitable deflection coil and the most one can hope for is a figure of around 2,000Ω. The resistance R1 cannot be too large or the anode will "bottom" at the peak of the sawtooth current swing. Let R1 be 6,800Ω using a valve of Ra=5,000Ω, then for a maximum of 5 per cent. distortion a capacity value of about 80μF is required. This is not an unreasonable figure, although the cost of such a capacitor—at a working potential of 200 to 250 volts—together with the practical difficulties of coil construction (a subject to which it is hoped to return later in this series) will have to be balanced against the cost of a transformer circuit. A further point to consider is the power dissipated in R1. In the example given about 20 per cent. of that supplied by V will not reach the scanning coils, and whilst this low efficiency may be tolerated for the older 53 deg. scanning-angle tubes, it would be difficult to justify for the wide-angled tubes in use to-day.

### *Sawtooth Current Generators*

The third class of scanning circuits mentioned in the introductory article (part 1) were those which generated a sawtooth current directly without the need for first producing a controlling sawtooth potential. The inductive transitron circuit to be described below is of this type and is suitable for scanning a 12in. tube with an applied EHT of 10kV. This circuit has several points of difference with the Miller transitron used for electrostatic timebases and before describing these it is as well briefly to run over the working of this latter circuit.

Referring to Fig. 26, the transitron can be regarded as a means of periodically short-circuiting the capacitor C between intervals of slow charging via a large resistor R from the H.T. supply. Thus it resembles the sawtooth generators described in an earlier article (part 2) although, in this case, the positive feedback necessary for repetitive action is obtained between screen and suppressor grid via coupling capacitor C1.

Consider the sawtooth cycle to commence with C fully charged and with g3 at zero potential. Screen-grid current Ig2 is at minimum and allows the screen-grid voltage Vg2 to take up its maximum potential. As C discharges linearly through R the grid g1 becomes less negative, allowing Ig2 to increase slightly; Vg2 falls gradually until the "knee" of the pentode characteristic is reached, when anode current ia begins to decrease. This causes a sharper reduction in Vg2 which is communicated to g3, causing this electrode to be biased negatively and ia is now rapidly decreased until the anode current is cut off. g3 is now left with a large negative bias and g2 is drawing

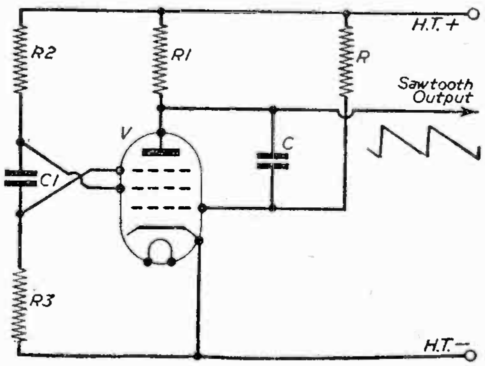



**Fig. 26.—Miller transitron sawtooth voltage generator.**

all the cathode current. With no drop across R1 and the capacitor now almost completely discharged. g1 assumes a positive potential and C is rapidly charged by grid current via R1. This tends to increase g2 current and reduces vg2 still further causing g3 to become yet more negative. When C is nearly fully charged, vg1 becomes nearly zero potential and Ig2 is reduced. Vg3 rises and allows anode current to flow once more. The cycle then repeats with C discharging gradually through R once more. This rather complicated sequence of events will be made clearer by reference to Fig. 27. which shows the waveforms experienced at the different electrodes during the sawtooth cycle.

The modified transitron circuit for EM scanning is shown in Fig. 28. An output transformer takes the place of R1 and low-impedance coils are connected across the secondary circuit. Correction for the distortion introduced by the transformer is obtained by feedback from the primary circuit to g1 via C2R4, and R4 is made variable to provide a linearity adjustment. Some compression at the top of the picture may be experienced and is due to the small inductive component of the deflection coils. This may be removed by suitable choice of R5 inserted in series with the charging capacitor C. Sawtooth amplitude is best adjusted by variation of total H.T. supply, in order to have as little effect on the operating frequency as possible. R6 achieves this and is bypassed by a decoupling capacitor C3.

The transformer used can follow the general lines of that described in the previous article with the turns ratio adjusted to:

primary: 3,900 turns .0092 en. copper wire
secondary: 420 turns .018 en. copper wire.

This will then be suitable for matching 26Ω coils and later in this series will be described the construction of a suitable set of coils.

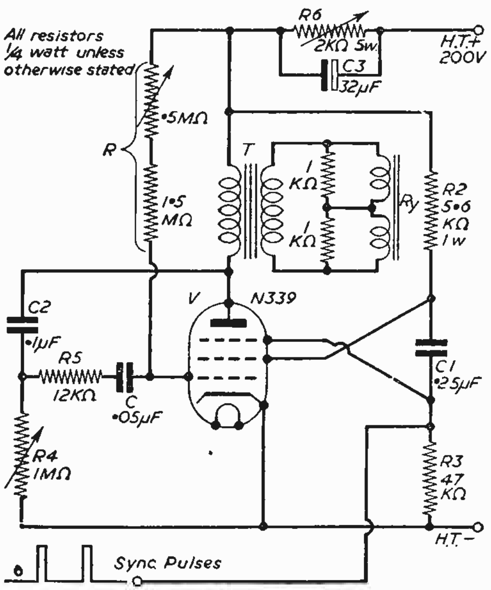



Fig. 28.—Inductive Miller transitron frame scanning circuit.

## 90 Deg. Scanning

To complete this section on frame circuits let us now consider the latest of frame scanning problems: that of beam-deflection in the new

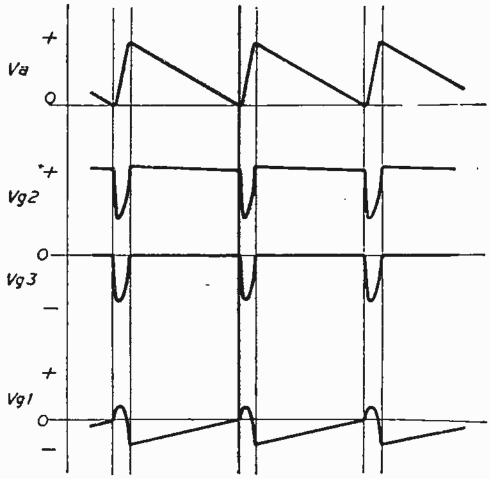



Fig. 27.—Waveforms at the various valve electrodes of the transitron circuit.

90 deg. scanning-angle tubes now appearing on the British market.

As the cathode-ray tube neck diameter in these new tubes is unchanged (35mm.) a decrease in the deflector coil sensitivity can be expected due to the necessity to avoid beam cut-off or "shadowing" of the picture. Even with an unchanged sensitivity, a 20 per cent. increase in scanning current will be required. so that the design must be capable of delivering. say, 30 per cent. more scanning current than a 70 deg. circuit. Fortunately the increase in mean anode current

(Continued on page 238)

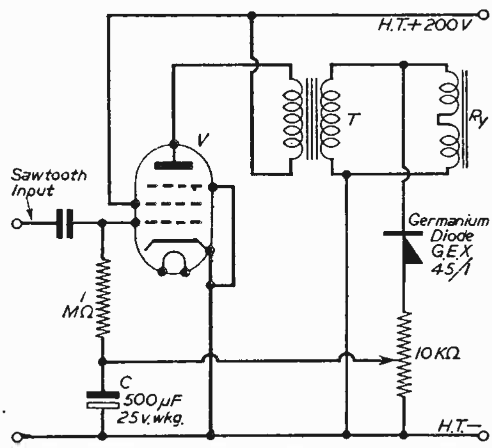



Fig. 29.—Method of obtaining bias supply in a frame scanning output stage.

# FLYWHEEL SYNC. & A.G.C.

## AN EXPLANATION OF THESE CIRCUITS, AND METHODS OF INCLUDING OR ELIMINATING THEM IN EXISTING RECEIVER CIRCUITS

By H. Peters

TWO blessings have been bestowed upon the manufacturer by his designer to make his set "elastic," and these are "Flywheel Sync." and "A.G.C.", and although these are usually accorded separate paragraphs in the manual they are almost Siamese twins in the set, as engineers sometimes discover when things go wrong. The purpose of these notes is to attempt to break up the circuits physically and diagrammatically so that fault finding can be done in logical progression. In addition suggestions will be made to help those who wish to remove either or both, and details are given to enable both types of control to be fitted to receivers without them.

In order to establish how the two systems are linked Fig. 1 (a) is a block diagram and (b) waveforms. They do not relate to any particular set, but form the basis of most systems used.

Beginning at the left-hand side there is the sync. separator, which is similar to the type employed in non-flywheel receivers. At its grid there is a composite video waveform which is inverted to feed the C.R.T. cathode, and at its anode there is available an amplified upright (negative going) line sync. pulse.

This is passed on to the discriminating device, but may be inverted or amplified—or both—on the way. Here the sync pulses are compared with a reference waveform, usually derived from the line amplifier, and a resultant D.C. voltage, whose amplitude and polarity is according to the difference, is used to vary the speed of the line timebase by means of a control device.

The "flywheeling" of the line sync. system is due to a smoothing device at the discriminator output, shown as a box labelled "Time Constant." This ensures that the control only varies according to the average of the difference between the sync. and the reference pulse, and not to individual pulses.

Whilst all this is going on the inverted video waveform at the sync. separator grid is quietly passed to the box marked "gate," where the short period of black level which follows the line sync. pulse is measured and the output voltage so derived is used as A.G.C. to control the gain of the R.F. and I.F. valves. If everything from the camera to the video detector is working right this "back porch" of black level corresponds to the strength of the received signal and will produce an accurate control of gain regardless of picture content. The last box in the bottom row is labelled "protection" and covers the devices incorporated in the set to prevent overloading of the video stage before the A.G.C. system warms up, and at other odd times.

The bonds which link these two systems, and which make servicing awkward at times, are the reference pulses which are derived from the line timebase stage, and which for manufacturing convenience can even be one and the same pulse.

The state of affairs can be better visualised by a study of Fig. 1 (b), where the composite video waveform (i) is shown in register with the idealised waveforms required to work the flywheel sync. (ii) and the A.G.C. (iii).

As far as the flywheel sync. is concerned the middle of the line flyback (m) should come halfway between the end of the picture on one line (e) and the beginning of the picture on the next (b). This centres the picture electrically in the raster and prevents foldover, and as can be seen in the drawing, the line (m) is to the right of the centre of the sync. pulse itself. In actual practice slight variations from the ideal do occur, but they do not materially affect the action of the control.

The A.G.C. gating pulse (iii) has to be positioned in the centre of the back porch, and it can be seen that it also coincides with the end

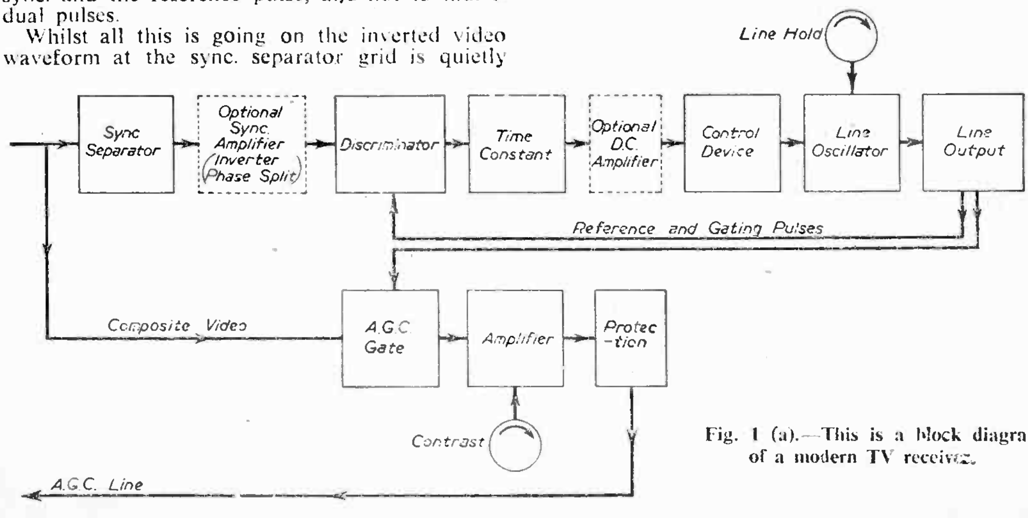



Fig. 1 (a).—This is a block diagram of a modern TV receiver.

of the flyback line, which provides the clue as to why the two systems are sometimes fed with the same pulse and how faults in one can affect the other. Consider, for example, a fault in the line timebase which causes the picture to move slightly to the right; the gating pulse (iii) for the A.G.C. will then occur at the end of the sync. pulse and

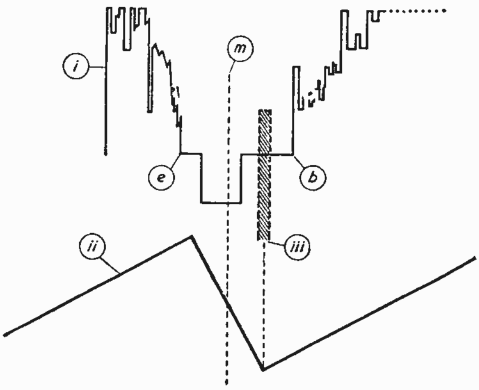



**Fig. 1 (b).—The ideal waveforms to be expected in a receiver.**

no voltage will be developed at the output of the gate. The set will then run at maximum gain and probably produce a negative picture. If the phase of the line oscillator was such that the picture shifted the other way, to the left, that is, the gating pulse would sample the picture instead of the back porch, and the voltage at the output of the gate would increase and thus black out the picture.

These two examples serve to illustrate the dependence of the A.G.C. on the line timebase, and the two effects may be sometimes seen together when hum gets into the line oscillator, causing bent verticals. Where the picture is bent to the right it will brighten up, and where it bends to the left it will darken, giving the appearance of a hum bar. A variety of interesting faults can arise from this association, and in order to set about them logically it is usually desirable to disconnect the one whilst working on the other. This can be done at various points and these will come to light as the circuits are analysed.

### *Discriminator Flywheel Sync. System*

The circuit in Fig. 2 (a) represents the commonest type of flywheel timebase. It is by no means the original in this country, where the honours go to English Electric's Synchrophase, but is representative of the systems used by Bush, Ekco, Murphy, Pye, Philips, Philco and others. V1, the sync. separator, is a conventional pentode, cumulatively biased back to cut off the negative-going picture input and to amplify only the positive going sync. pulses. Its anode load is the transformer T1, which may be augmented by a resistor to develop a larger frame pulse. The secondary of this transformer is centre tapped and feeds equal and opposite pulses of about 20 volts amplitude to the rectifiers D1 and D2. The sense of these pulses is shown in the diagram, and it will be seen that the two diodes conduct at the same time, developing equal and opposite voltages across R1 and R2, and leaving their junction, from which the output is taken to V2, at zero.

The other ends of the two diodes are joined, and at this point is fed a sawtooth waveform (3) from the line output stage. This is an A.C. waveform and therefore balances about its middle

(*Continued on page* 219)

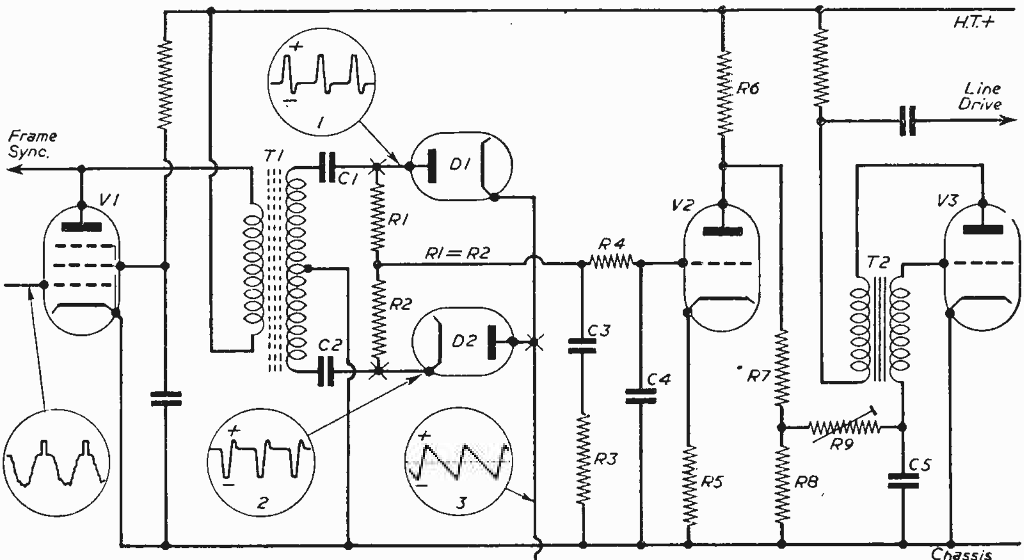
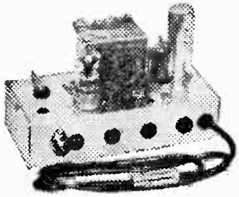



**Fig. 2(a).—The diode discriminator. V1 is the sync. separator, V2 a D.C. amplifier, and V3 the blocking oscillator.**



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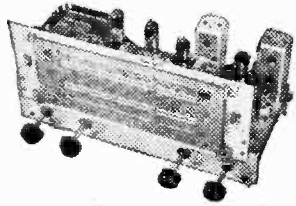

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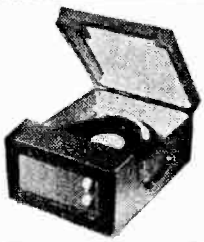

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as seen in oscillogram (3). D2 conducts for the portion of the waveform above the line and D1 for the portion below the line; and although R1 and R2 are charged up on alternate half cycles the voltage at their junction over a period of time averages zero.

Now provided that the sync. pulses are fed in at the same time as the sawtooth waveform passes across the zero line the voltage at the junction of R1 and R2 will still be zero. Such a moment occurs halfway through the flyback period and as we saw in Fig. 1 (b) this is just when we want it to be. If the sync. pulses arrive at that instant the line oscillator is running at the right speed and all is well.

What if the line oscillator tries to go fast? The flyback period will have passed by the time the two balanced sync. pulses get to the diodes and

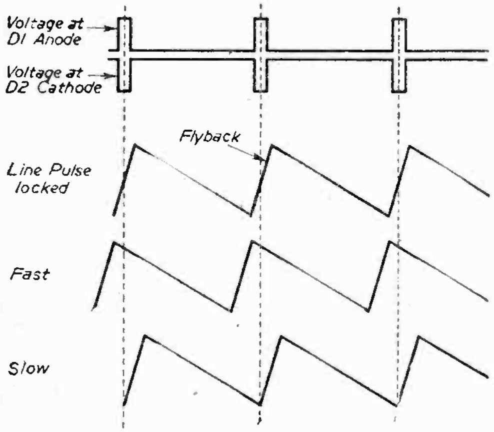



**Fig. 2 (b).—Waveforms out of sync. and locked.**

the sawtooth waveform will be causing D2 to conduct heavily and at the same time lift the cathode of D1 positive, cutting it well off. Thus the negative going sync. pulse to D2 adds itself to the current passing through the diode and makes the charge at the bottom end of R2 *more positive*. (If you find this confusing, remember that a negative voltage applied to the cathode of a diode causes conduction just as much as a positive one applied at the anode.)

At D1 conditions are rather different ; the diode is biased beyond cut-off by the positive pulse at its cathode, and because the amplitude of the positive sync. pulse is less in value it cannot overcome this bias and D1 remains cut off. So the voltage at the top end of R1 becomes *less negative* than before.

It follows from this that the voltage at their junction—which hitherto was zero—will now be positive by an amount equal to half the voltage at the bottom end of R2, and will ultimately be used to control the line speed.

The reverse happens if the timebase runs slow. In this instance the sync. pulse arrives before the flyback period, and D1 will be approaching the peak of its conduction. Thus the positive pulse applied to D1 anode will cause the diode to conduct all the more and build up a greater negative charge at the top of R1. D2 will this time be cut off and the negative sync. pulse, being of less amplitude than the cut-off voltage, is ineffective. So the bottom of R2 remains at zero and the junction voltage is now negative by an amount equal to half the voltage at the top of R1.

We now have available a control voltage which is positive when the timebase runs fast, and negative when the timebase runs slow. It is still responsive to random noise and interference, but can easily be smoothed out to present a reasonably clean D.C. This is done by C3, R4 and C4, with R3 thrown in to provide a fixed delay time, and this section corresponds to the box in Fig. 1 marked "Time Constant."

### *Horizontal Hold Control*

We jump ahead a bit to the blocking oscillator V3, which generates the line scan, and which is conventional except for the horizontal hold control. It is common practice to use a potentiometer across the H.T. supply to perform this function, the higher the voltage on the slider the faster the timebase and vice versa. This enables R9 to be a high stability type, for it is the value of this resistor and C5 which determines the repetition frequency of the scanning voltage. In our case R9 is made variable, and the potential divider across the H.T. supply comprises 3 fixed resistors, R6, R7, R8. If the voltage at the junction of R7, R8 was to rise, the timebase would run faster, and this could be done by applying the D.C. which is available at the end of R4, but unfortunately it is of the wrong polarity. V2, the D.C. amplifier, is therefore interposed between the two, and this not only inverts the sense of the control voltage, but amplifies it as well, thus increasing the "pull-in" range. R6 not only happens to be the top resistor in the blocking oscillator potential divider, but is also the anode load for V2.

Variations on the above circuit are manifold. Pye and Bush use a multivibrator line oscillator and dispense with the D.C. amplifier, and although this would be expected to reduce the pull-in range, it does not in practice appear to do so. This is partly because of the greater stability of the multivibrator as a sawtooth oscillator and partly due to greater control voltages being made available from the discriminator.

In some instances the sense of the control voltage is reversed by inverting the applied sawtooth, and it is instructive to permute the possible combinations available by inverting the sync. pulses, reversing the sense of the diodes, applying the sawtooth at the other side of them.

### *Fault-finding*

Faults in the flywheel system are usually difficult to locate because they seldom stop the set from working altogether. Drift in the oscillator will not show itself until it exceeds the pull-out range of the discriminator or until the transmission breaks momentarily, when sync. is lost and the horizontal hold has to be reset. Unfortunately similar symptoms can arise if the pull-in range is low due to a fault in the control device or discriminator. To settle which half of the circuit is at fault, the line oscillator can be made free running by disconnecting the "flywheel."

A suitable way in Fig. 2 (a) is to ground the grid of V2. or disconnect its anode from the junction of R6, R7.

In the case of multivibrators, or where no D.C. amplifier is used, it is better to disconnect right back at the discriminator at the points marked X. In strong signal areas where conventional sync. is quite adequate this can then be fitted and, if desired, left permanently in the circuit. In Fig. 2 (a) this would be done by connecting a 5pF condenser between the anode of V1 and the anode of V3. A similar link can be fitted from the same point to other types of timebase. In the case of multivibrators it is best to try it on both anodes and grids in turn, as although the sync. pulse will lock the oscillator almost anywhere, it can, if applied at the wrong electrode, give

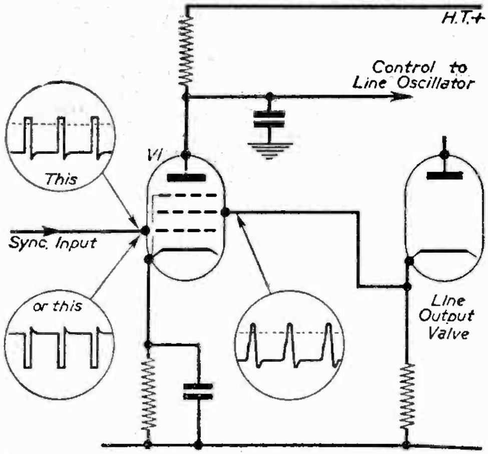



**Fig. 3.—A pentode coincidence detector. The screen is tied down to the line output valve cathode.**

rise to false lock when the set warms up (i.e., blanking pulse appears down the centre of tube).

The time constant section can give rise to short pull-in or erratic behaviour. C3 is usually in the order of 1.0$\mu$F (paper) and is likely to leak, and although this will not have much effect in the circuit as shown, if its bottom end is returned to a positive potential, as in the Pye, it can cause intermittent oscillator drift.

If C3 loses its capacity, ragged edges may result, or even "hunting," which is a continual over-correction of the system and which produces oscillating verticals and a corrugated picture.

Bent verticals normally indicate mains hum in the timebase, and in Fig. 2 (a) will usually be picked up in the grid of V2, perhaps on R4. A hint here is to reverse the polarity of the mains supply. If the verticals bend the other way the cause is due to mains; if they do not, the frame timebase should be suspected.

Trouble in the discriminator can be caused if the diodes have unequal emission. If this is the case, and the unbalance due to it is within the pull-in range of the system, it will be corrected automatically, but will result in the free-running speed of the oscillator being offset from normal by an amount due to the voltage required to correct the discriminator's unbalance. The symptoms to the user are that the horizontal hold control is over to one end and the picture often warms up out of sync. This sort of trouble is more likely to crop up where semi-conductors are used, and fortunately these can be checked by an ohms test both ways round.

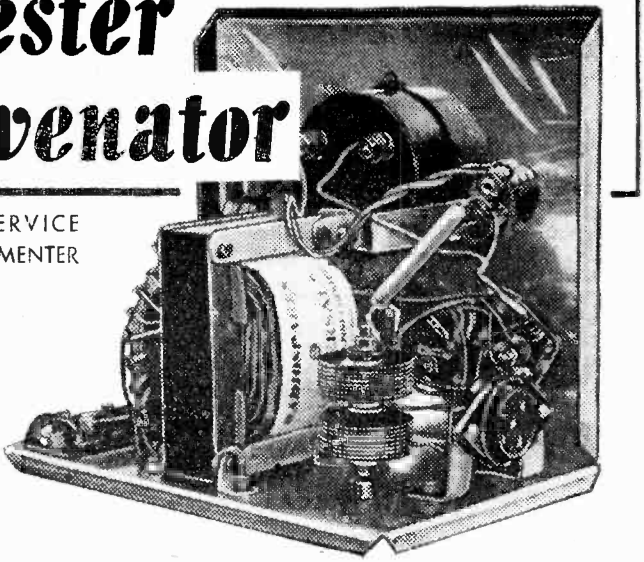
### *The Coincidence Detector (Fig. 3)*

This circuit, which is about the simplest type of flywheel sync., is centred around a valve, usually a pentode, which is biased beyond cut-off on two electrodes, in our case on the control and screen grids. Positive going sync. pulses are fed to the grid at an amplitude sufficient to lift it above cut-off on the peaks and positive line flyback pulses are fed to the screen, which in turn raise it to sufficient a potential to enable the valve to conduct.

It can be seen that the valve will only pass current when the grid pulses and screen pulses arrive at the same time, and that the amount of current passed will be greatest when they overlap exactly. At this point the anode voltage will be at its lowest and it is this "dip" which is used to control the line timebase speed. A disadvantage of this system is that if the timebase runs either fast or slow it will cause the anode voltage to rise, and so the pull-in only works one way. For this reason the free-running speed of the timebase is offset from the correct one, usually on the high side, so that the circuit is held on lock when the pulses only partly coincide. By this means the device can pull-in both ways. Another disadvantage is that the pull-in range is small compared with the previous system, and this can lead to the hold control requiring resetting every time the receiver is switched on. This can be overcome by designing the line oscillator to warm up slowly and pass through 10,125 c.p.s. on its way to its slightly offset free running speed. Provided it does so slower than the time constant circuits can smooth out its effect the coincidence detector will "latch on" to the timebase and hold its speed steady.

*(To be continued.)*

# A C.R.T. Tester and Rejuvenator



## A HANDY UNIT FOR THE SERVICE WORKSHOP AND THE KEEN EXPERIMENTER

By J. Hillman

IN TV servicing one of the great problems is whether the tube is at fault or whether the fault lies in the video circuit. In most cases it is difficult to decide which is the trouble, and extensive testing is necessary before a definite conclusion can be reached. This, of course, takes time and adds to the cost of any repairs, so this tester was designed to overcome these difficulties. With this tester the tube can be tested at its correct heater voltages and its emission checked, any leakage between cathode and heater, cathode and anode, grid and anode being located. All these tests can be carried out without removing the tube or having the set on, and, of course, this can be done at a customer's home. Another advantage is that new tubes can be tested without taking them out of their cartons and thus time is saved, for it has been known for new tubes to be faulty and the fault only becomes apparent when it has been fitted to a set. The operation of the tester is quite simple and consists of applying a low H.T. voltage between cathode and grid and checking the reading on a meter. The right heater voltage is selected by means of a switch and the test is selected by means of another switch. Adaptors are used to suit the particular tube to be tested and thus any make of tube can be tested. The reason for using a low H.T. voltage is to avoid breaking down the insulation between electrodes and thus creating faults. The tester can also be used to rejuvenate old tubes by applying the H.T. between the cathode and grid and gradually increasing the heater voltage by means of the variable resistor and heater switch until the emission current rises as far as possible.

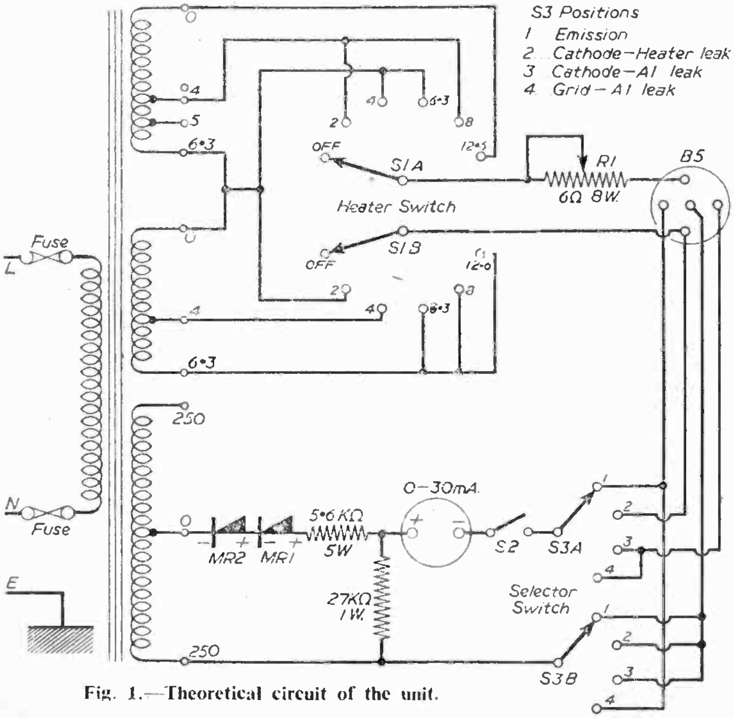



Fig. 1.—Theoretical circuit of the unit.

### Construction

First mark off on a sheet of aluminium as in Fig. 6 and cut off the shaded portions, then bend up the ½in. sides. Note that the one edge has no ½in. side and this is the bottom of the front panel. Next mark off as in Fig. 2 and drill and file holes as shown, the hole marked A is first drilled $\frac{3}{8}$in. and then filed larger to suit the size of toggle switch used. The hole marked B may be $\frac{3}{8}$in. or $\frac{1}{4}$in. according to the type of variable resistor used. Now mark off and cut out the chassis, as Fig. 3 ,and bend up the $\frac{1}{4}$in sides and mark out and drill as Fig. 4. The front panel and chassis may now be placed together, and by marking through the centre $\frac{1}{8}$in. hole and drilling through the chassis the panel can be secured temporarily with a 6BA screw whilst the other two holes are then drilled and secured with 6BA screws. Now fit the mains transformer, using 4BA screws, then the rectifier, twin fuse-holder, 3 switches, resistor and meter. In fitting the meter place it in the hole and get it level and then mark through the holes on to the panel and drill $\frac{1}{8}$in. holes securing with 6BA screws. Make up the bracket as in Fig. 5 and bend the two ends at right angles so that it appears as in Fig. 7. It will be seen that one end of the

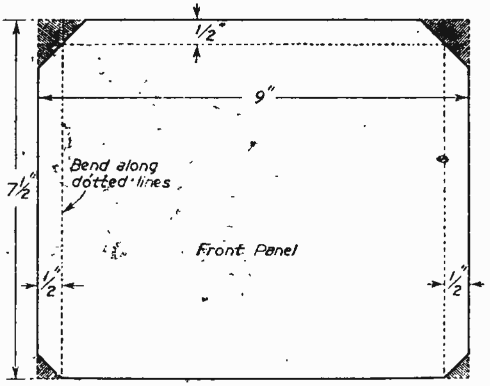



**Fig. 8.—The front panel details.**

bracket is secured to a bracket on the mains transformer whilst the other end is fastened to the front panel with 4BA screws. The object of this bracket is first to strengthen the support of the panel and second to provide a position for a dial bulb bracket. The cover can now be made as Fig. 6, bending the two 7in. sides first, then the $\frac{1}{2}$in. sides and finally the remaining 7in. side. Now drill holes marked A in Fig. 6 and secure with 6 BA screws. Next mount the valveholder by means of two suitable brackets, as Fig. 10 in position as Fig. 7. Place cover in position and mark and drill a 3/32in. hole in the centre of the

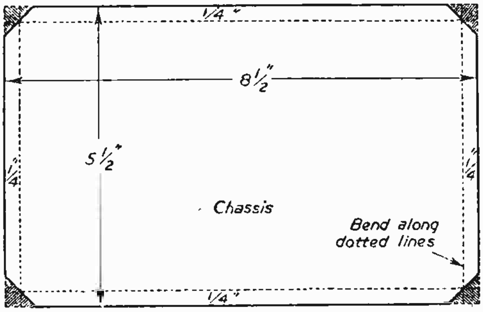



**Fig. 3.—Details of the top of chassis.**

top and secure with a self tapping screw, 6BA. Then get cover to fit properly and drill one hole at a time, securing with a self tap screw each time.

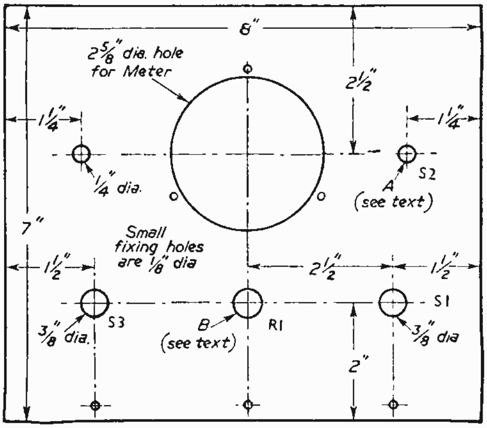



**Fig. 2.—Drilling details for the panel.**

The holes in the bottom of the cover where they go through the chassis are secured with 6BA screws. Finally remove cover and mark off position of a suitable hole to allow access to the valveholder and cut out the hole.

### Wiring

Wire up the heaters, first using 20 s.w.g. T.C. wire and cover with sleeving. It may happen that the mains transformer heater windings are phased differently from that shown in Fig. 1; if so. then the circuit will be as Fig. 11. A check should be

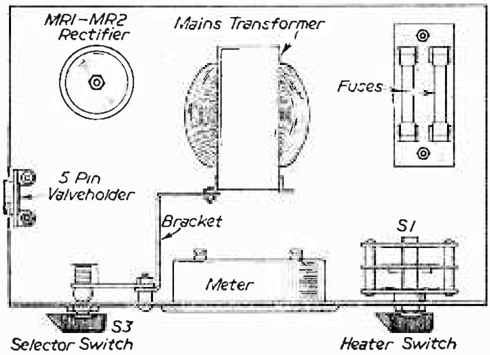



**Fig. 7.—The layout.**

made with an A.C. voltmeter across the two windings in series and if the voltage is about 13 volts then the two windings are phased correctly. If, on the other hand, the voltage is very low, then they are out of phase and the connections will need to be altered. Now complete the rest of the wiring, taking note of the correct polarity on the rectifiers and on the meter. The adaptors are made up, using an old valve 5-pin type with the glass envelope removed and the wires unsoldered from the pins and 7/33 coloured flex used to make a lead 3ft. long. Three adaptors are sufficient to cover most C.R.T.s. one with a

B12 valveholder. the other two a Mazda and an International octal valveholder. These are wired up as in Fig. 9.

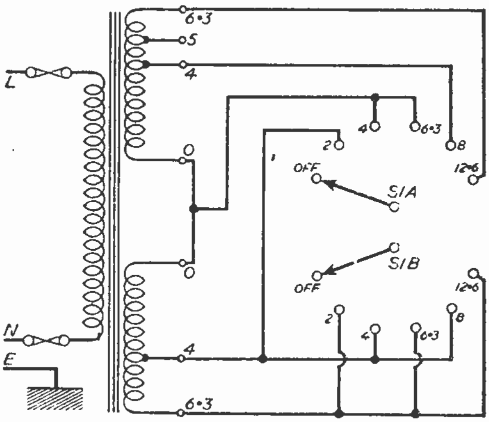



**Fig. 11.—Alternative switch circuit.**

### *Testing*

Before testing C.R.T.s check all the voltages at the adaptors with different settings of the switches and R1. The voltages should be as follows: H.T. volts off load between cathode and grid 90 volts. and on load 15 volts: H.T. current off load is 3.5mA: the heater voltage on 12.6 position of S1 off load will be about 14 volts: on load voltage on 6.3v. range with resistor R1 at max. volts is 6.5v. and with resistor at min. volts is 4.75v.: on the 8 volt range resistor at max volts is 8.4v. and at min. volts at 6.5v. Having made sure that all the voltages and adaptors are correct a C.R.T. may now be tested. First put S2 to off, next

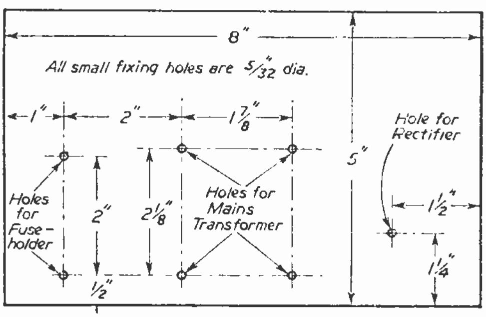
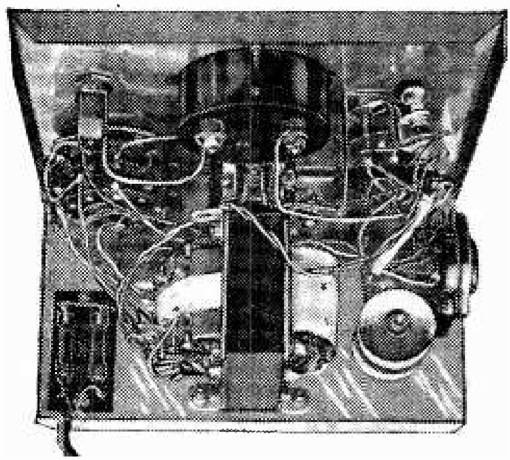



**Fig. 4.—Drilling details for the chassis.**

select the correct heater voltage to suit the tube to be tested, plug on the adaptor to suit the tube after first removing its holder. Now plug in to the mains and allow the heater to warm up. and then with S3 in position 1 switch on S2 and read off the value on the meter. This should be around 15mA for a new tube and will be below 5mA for a tube that has lost its emission, whilst for a complete loss of emission the meter will read zero. Having read the emission the switch S3 is put to position 2 and the cathode/heater leakage will be shown if the meter reads at all. A good tube will have a zero reading. Similarly, on position 3 the cathode/A1 leakage is checked. and on this it is quite in order for the meter to read slightly, providing it does not read more than the first division of the meter. Finally, on position 4 the grid/A1 leakage is read. and this should be zero for a good tube.

### *Rejuvenation*

This is carried out by first running the tube at its correct heater voltage and then putting R1 to min. volts position (i.e., with all resistance in circuit) and switching S1 to the next highest heater range and gradually increasing the heater voltage by means of R1 until the meter reading will not increase any more or until it reads 15mA. To take an example. say a 6.3v. C.R.T. First switch S1 to 6.3v. and advance R1 to max. volts and allow C.R.T. to heat up. then put R1 to min. volts and switch S1 to 8v., allow C.R.T. to heat



**A view of the layout and wiring.**

up and watch meter until current will not rise any more. Then advance R1 until current rises again. leave until current stops rising. and then increase R1 again and continue like this until

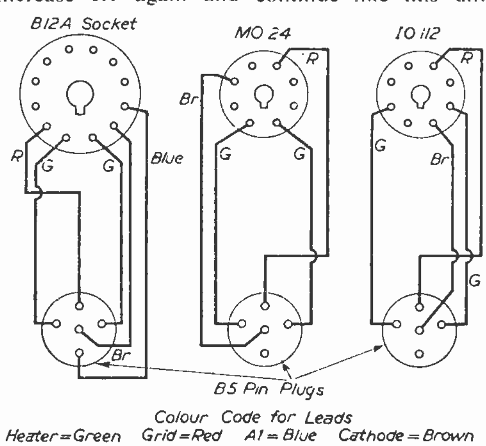



**Fig. 9.—Tube base connections.**

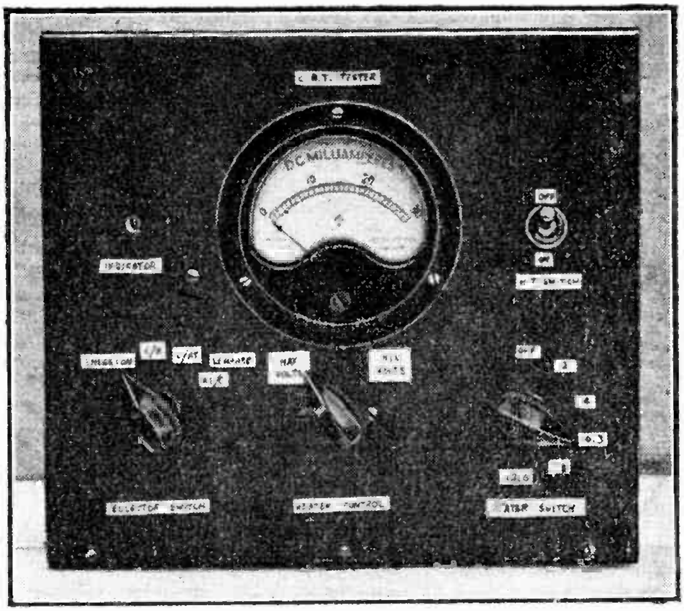
current ceases or meter reaches 15mA. Not all tubes will respond to this treatment, but a good proportion will have their useful life extended.

### *Tube Data*

It is a good idea to type out a list of the tubes covered by the adaptors and to give their heater voltages, and then to glue this to the top cover of the tester. This will avoid the danger of putting the wrong voltage on a C.R.T. when checking at customer's house, and no data is available normally.

An examination of the various tube makers' catalogues will show that various tubes come under the different categories of bases. For instance, the majority of 6.3 volt tubes, with the exception of certain G.E.C. models, have the duodecal base and will therefore call for the B12A adaptor. The G.E.C. tubes 6501, 6502, 6504, 6504A, 6506A, 6703A, 6705A, 6802A, 6801A, 7101A and 6102A, although having 6.3 volt heaters, utilise the International Octal base. The Ferranti 8v. tubes, types T12/71U, T12/81U and T12/82U also require the Octal base.

The Mazda tubes C9A, C12A, CRM91, CRM92, CRM92A, CRM121, CRM121A, CRM121B, CRM123 and CRM151 all call for the Mazda Octal base.



A front view of the panel.

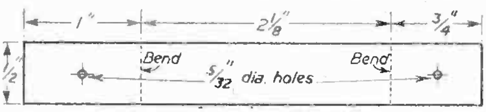



Fig. 5.—Bracket for bulb.

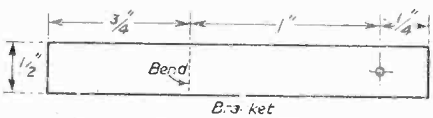



Fig. 10.—Valveholder brackets (two needed)

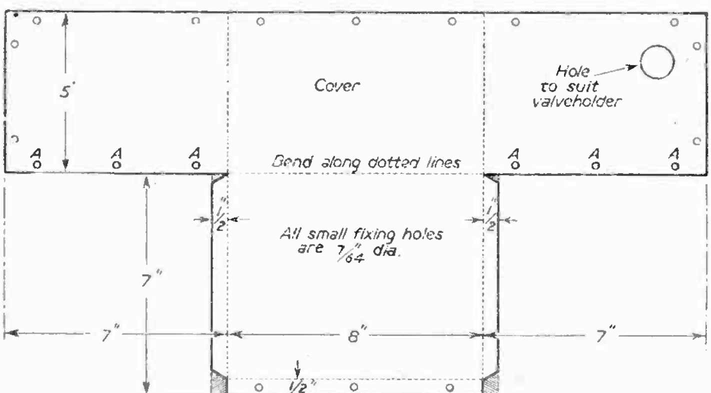



Fig. 6.—Details of the chassis cover.

## Radio-telegraph Reception

In telecommunications circles it is well known that errors can occur in messages transmitted by radio-telegraphy. Consequently, some messages, or parts of them, have to be re-transmitted so that the errors can be eliminated before the message is delivered.

In a new technique, developed by the G.P.O., frequency-shift keying is still used, but whereas in conventional equipment used for the reception of such signals a limiter and discriminator are employed, the new method makes use of the fact that all the signalling intelligence is impressed both on the marking and spacing frequencies. In other words, the information in the mark-channel duplicates that in the space-channel. Consequently, if all the available intelligence is derived independently from each frequency and then combined, a double-diversity arrangement is obtained. Frequency selective fading conditions often cause trouble on R.-T. circuits, but using the new arrangement they can be turned to advantage—if the signal on the marking frequency has faded, there is a second chance of obtaining the required information from the spacing frequency.

# SIMPLIFIED TV SERVICING

## 3.—SETS USING R.F. OSCILLATORS FOR EHT

(*Continued from page 160 November issue*)

ALTHOUGH the general practice nowadays is to provide EHT by the line flyback method, there are still many sets, of about the time T.V. broadcasting restarted, which use the R.F. oscillator method for obtaining EHT for the picture tube. In present-day sets it will only be found in projection models where about 25Kv is required on the tube. Fig. 9 gives a circuit showing a typical R.F. oscillator. Fig. 10 shows a line output stage used with it. It will be noticed that with this type of set the failure of the line output stage does not stop the EHT so that it is necessary in a set where the line fails to keep the brilliance control well down; otherwise damage will be caused to the C.R.T. In the larger projection sets this is covered by electronic circuits which disconnect the EHT from the C.R.T. should either the line or frame circuits fail. This is very necessary in these sets owing to the very high EHT provided. The oscillation frequency varies according to make and will be between 85 Kc/s and 300 Kc/s. The oscillator valve is generally a beam tetrode. Troubles that can arise here are mostly either faulty valves or shorting or arcing across the coil. Replacements are about the only solution.

### *Sets With EHT Supplied from Mains Transformer*

This type of set, which is the earliest type of television set of which there are still some in use, used a mains transformer for supplying EHT. The C.R.T.s were nearly all electrostatic and a circuit is given in Fig. 11. The main trouble on this section of these sets was generally the EHT secondary of the transformer going O.C. or shorting to the core. Valve trouble was not so common. As replacement transformers are very difficult to obtain it is best, if the job is required to be done, to have them rewound. The .1μF EHT smoothing condensers should always be checked. Be careful to short them out before checking. They can retain a very hefty charge for quite a time.

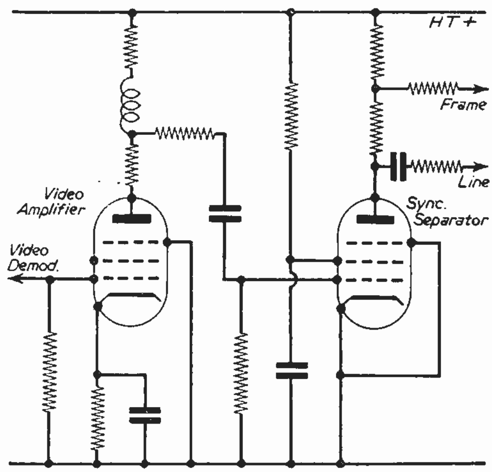



Fig. 12.—Simple sync separator.

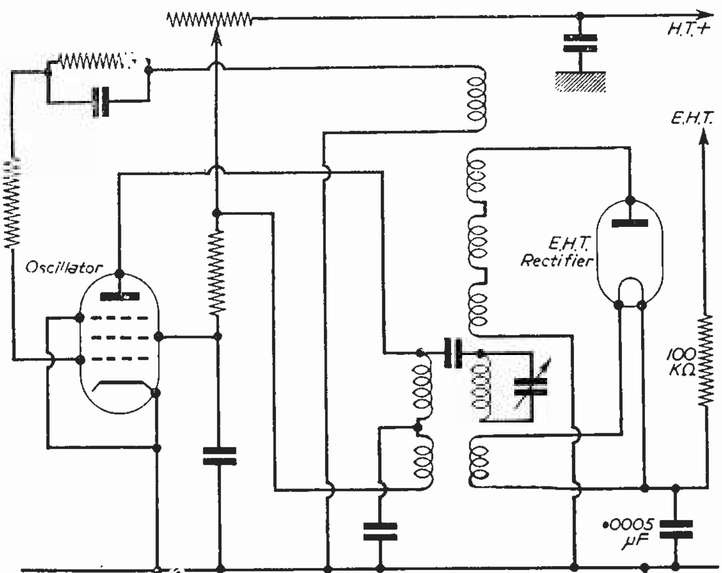



Fig. 9.—A typical R.F. oscillator EHT supply.

### *Set With Synchronising Faults*

The sync separator stage is between the video system and the horizontal and vertical timebases. Any fault in this section will nearly always cause both the frame and line timebases to fall out of

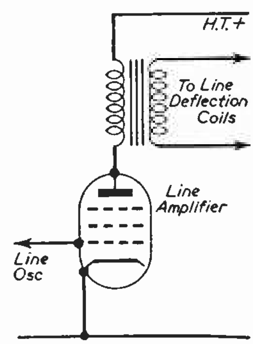



Fig. 10.—A line output stage for use with Fig. 9.

sync. The fault will be shown as a continually rolling picture (frame) or a torn-up picture (line). Sometimes it will be found that one can lock the picture but it will soon fall out of sync again. With only a meter to assist you here, it is difficult to trace a fault, but after valve checking the following should be carried out. Fig. 12 shows a simple sync separator. Fig. 13 shows another

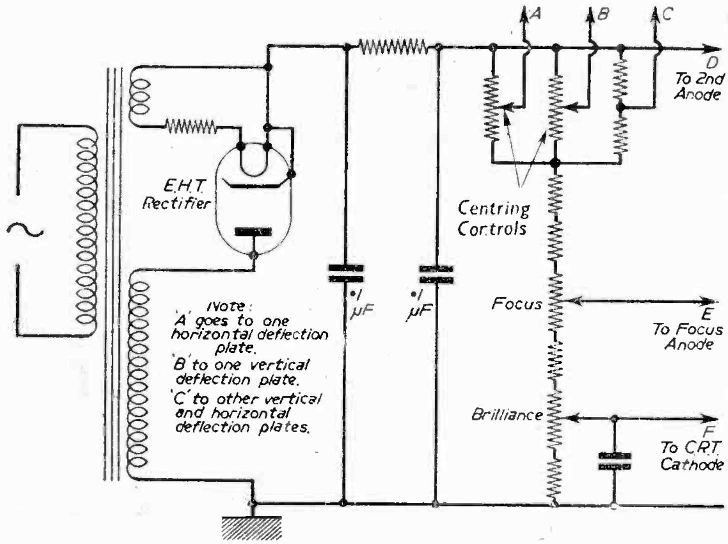



**Fig. 11.—An A.C. mains-fed EHT supply.**

type. Condensers and resistors from the sync. separator to the line and frame circuits should be carefully checked. In the case of condensers, replacement is the best method, but be careful to use the correct value, as given in the service sheet. Do not forget to take voltages on the sync separator valve electrodes. It should be realised that faulty synchronisation of frame and line timebases does not necessarily mean that the trouble lies in the sync stage. Check the timebase circuits first. If, having checked the timebase circuits and the sync stage, trouble is still apparent, then it can possibly be due to compression or limiting of the sync. pulses. This can be caused by a fault in the set anywhere in front of the sync. stage. A faulty valve, a defective A.G.C. system, too strong a signal or any change in component values can be responsible.

### *Sets With Faulty or Poor Picture*

Faults of this description can be in many cases due to the video amplifier circuit. Fig. 14 gives a typical video amplifier stage.

If the video amplifier circuit becomes completely inoperative, there will, of course, be no picture on the screen, but if there are any faults in this stage they will be indicated by the picture shown. The following faults may occur. A faulty low frequency network, a faulty high frequency network or incorrect voltages on the valve electrodes. Should the first occur, a "smeary" picture will be noticed. In this case check coupling and bypass condensers, grid resistors. It could also be due to overloading the video amplifier. Check the grid leak. The second fault will appear as ghost lines after any sharply defined line and especially noticeable on test card. Check the peaking coils in anode circuit of video amplifier and especially any resistors paralleled across them.

### *Sets With Two-stage Video Amplifiers*

Many of present-day sets are now using two-stage video amplifiers. Some of these utilise the cathode follower technique. There are no more troubles to be expected here than from an ordinary video amplifier stage. If necessary the cathode follower could be isolated if trouble is met.

A circuit of a typical cathode follower stage and some further details will be given in our next issue.

(*To be continued*)

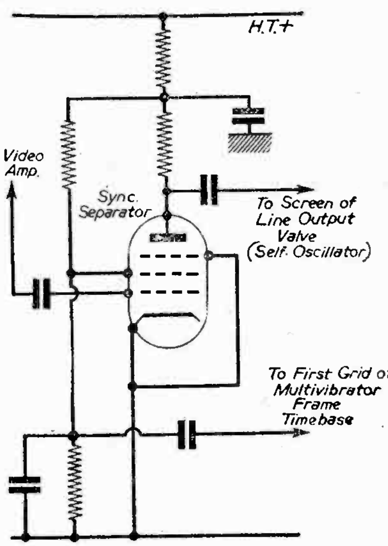



**Fig. 13.—Another type of sync separator.**

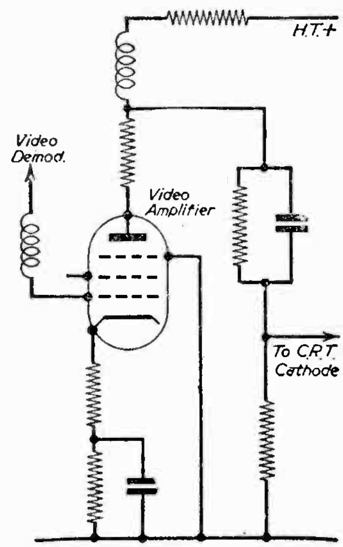



**Fig. 14.—A typical video output stage.**

## DON'T STUMBLE IN THE DARK

Install 2-way switches. Our outfit comprises : 30 yards Multi-core cable, two 2-way switches, two wood blocks. Full instructions. **19/6** each (post and insurance 2/6).

## MAINS-MINI

Uses high-efficiency coils, covers long and medium wavebands and fits into the neat white or brown bakelite cabinet—limited quantity only. All the parts, including cabinet, valves, in fact everything, **£4.10.0.** plus 4/6 post & ins. Constructional data free with the parts, or available separately 1/6.

## DON'T BE CAUGHT LIKE THIS

## CAR STARTER CHARGER KIT

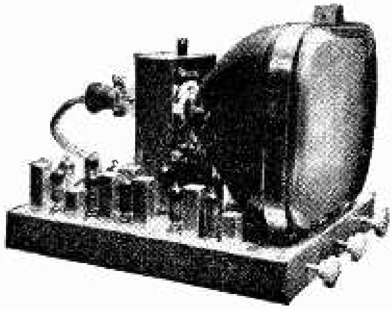
All parts to build 6- and 12-volt charger which can be connected to a "flat" battery and will enable the car to be started instantly. Kit comprising the following :

| | |
|---|---|
| Mains transformer | 22/6 |
| 5-amp. rectifier | 17/6 |
| Regulator Stud Switch | 3/6 |
| Resistance Wire | 2/- |
| Resistance Former | 2/6 |
| Mains on/off Switch | 2/6 |
| 0-5 amp. Moving Coil Meter | 12/6 |
| Construction Data | 1/6 |

or if bought all together price is 52/6, plus 3/6 post and packing.

**Waterproof P.V.C. covered Heating Element, 16 ohms per foot. 1/- per yard.**

## BUILD THIS IN AN EVENING



Undoubtedly the most up-to-date televisor for the home constructor. You can build it in an evening and the set when finished will be equal to a factory-made equivalent. What other constructor T.V. has all these features ?

- ★ No technical knowledge required.
- ★ All miniature valves.
- ★ Metal rectifier.
- ★ Turret Tuner.
- ★ 12-channel circuitry.
- ★ Multi-vibrator time bases.
- ★ Ferruxcube, E.H.T. and scan coils.
- ★ 34/38 Mc/s I.F.
- ★ Suitable for any modern 12, 14 or 17" tube.

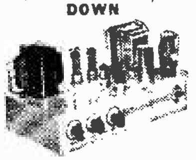
The building cost (less tube) is only **£29.10.0.** plus 10/- carriage and insurance, or £16 deposit & 12 monthly payments of 27/-. All parts guaranteed 12 months. **Full information and data, price 3/6.**

## THIS MONTH'S SNIP

**TAPE DECK.**—Made by the famous Truvox Company. This contains exactly the same essentials as the current model. Only the styling is different. It also takes the stereophonic head. **Specification :** 3 B.T.H. shaded pole motors with silent friction drive eliminating wow and flutter. Push-button controls, electrically and mechanically interlocked. Patented electric type push-button controlled brake. Tape loading on the drop-in principle, accommodation for reels of 7" diameter. Tracking sense to British and American standards. Playing times : up to 3 hours with L.P. Tape or 2 hours with Standard Tapes. Two tracks side by side with safety gap. Positive Azimuth adjustment of Record/Player head. High Impedance Heads. Overall size 14½" x 12½" x 5" approx. 120 only of these fine decks offered at non-repeatable price of **£17.10.0** or **£3.10.0** down and eight monthly payments of **£2**. Non-callers add 10/- carriage and insurance.

## MULLARD AMPLIFIER "510"

**YOURS FOR 30/- DOWN**

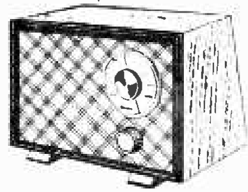


A Quality Amplifier designed by Mullard. Power output exceeds 10 watts. Frequency response almost flat from 10 to 20,000 C.P.S. For use with the Acos "Hi G" and other good pick-ups. Made up and ready to work. **£12.10.0** or **£1.10.0** down and 8 payments of **£1.10.0**, plus 10/- carriage and insurance.

## MULLARD PRE-AMPLIFIER

For extra gain and fidelity this unit gives ideal results. It is arranged to plug into the amplifier and has two switches to provide compensation of radio, microphone, L.P., and 78 records. Complete with valve, made up ready to work, £4. Post and insurance 3/6, or **10/-** deposit and eight monthly payments of **10/-**.

## OUR 19/6 COLUMN



### THE SKYSEARCHER

This is a 2-valve plus-metal receiver set useful as an educational set for beginners, also makes a fine second set for the bedroom, workshop, etc. All parts, less cabinet, chassis and speaker, **19/6**. Post and ins. 2/6. Data free with parts or available separately **1/6**. **3-valve battery version also available at the same price.**

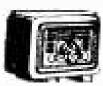
### ALL-MAINS AMPLIFIER

Powerful three-valve Mains amplifier ideal for dances, parties, etc. Complete less chassis, cabinet and speaker (available if required)—data 1/6 (free with parts). Price **19/6**, plus **2/6** post and insurance.

### "CHIMELITE" 19/6

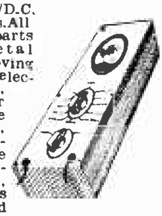
It is a hall light as well as a double chime and you can make it in a couple of evenings for the total cost of only **19/6** including instructions, post 2/-—data available separately price **2/-**.

### Simplex Transistor Kit



Makes ideal bedroom radio, uses one transistor and one crystal diode. Complete less case **19/6**, case **5/-** extra, post and ins., 1/6.

### A.C./D.C. Multimeter Kit



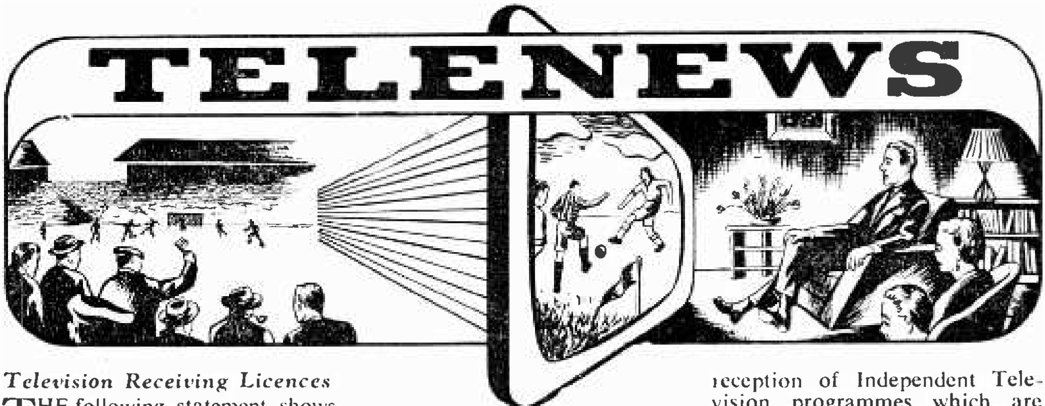
Measures A.C./D.C. volts and ohms. All the essential parts including metal case, 2in. moving coil meter, selected resistors, wire for shunts, range selector, switches, calibrated scale and full instructions, price **19/6** plus 1/9 post and insurance.

# ELECTRONIC PRECISION EQUIPMENT, LTD.

**Post orders should be addressed to E.P.E., Ltd., Dept. 5, 66, Grove Road, Eastbourne.**

Personal shoppers to one of these addresses, please.

| | | | |
|---|---|---|---|
| **266, London Road, Croydon.** | **42-46, Windmill Hill, Ruislip, Middx.** | **152-3, Fleet Street, E.C.4.** | **29, Stroud Green Road, Finsbury Park, N.4.** |
| Phone : CRO 6558 | Phone : RUISLIP 5780 | Phone : FLEet 2833 | Phone : ARChway 1049 |
| Half day, Wednesday | Half day, Wednesday. | Half day, Saturday. | Half day, Thursday. |




### *Television Receiving Licences*

THE following statement shows the approximate number of Television Receiving Licences in force at the end of September, 1957, in respect of receiving stations situated within the various Postal Regions of England, Wales, Scotland and Northern Ireland.

| *Region* | *Total* |
|---|---|
| London Postal ... ... ... | 1,516,535 |
| Home Counties ... ... | 889,325 |
| Midland ... ... ... | 1,212,406 |
| North Eastern ... ... ... | 1,170,335 |
| North Western ... ... ... | 1,048,311 |
| South Western ... ... ... | 548,611 |
| Wales and Border Counties ... | 415,574 |
| Total England and Wales ... | 6,801,097 |
| Scotland ... ... ... | 526,015 |
| Northern Ireland ... ... | 71,073 |
| Grand Total ... ... ... | 7,398,185 |

### *Television Really Comes of Age*

WHILE definite figures will not be available until after we go to Press, it is now pretty certain that the number of combined sound and TV-Wireless licences now exceeds that for sound radio only.

In 1935 when the figure for sound receiving licences reached 7¼ million—approximately the same as the number of licences for combined sound and television now issued—there was no licence for television. Introduced on June 1st, 1946, for the post-war opening of the service from Alexandra Palace, there were then only 1,343 TV licences.

In little over 11 years, however, users of both sound and television have caught up with sound-only enthusiasts, who took 13 years—1922 to 1935—to reach the 7¼ million figure.

### *Chillerton Down, Isle of Wight*

CHILLERTON DOWN, on the Isle of Wight, I.T.A. station will operate on Channel 11, and the precise frequencies will be: vision 204.75 Mc/s, sound 201.25 Mc/s. Signals will be vertically polarised.

This station will serve an area roughly semi-circular in shape stretching along its base from Weymouth through Ventnor to Brighton and reaching to Newbury in the north. Lying in the service area will be Hampshire and the Isle of Wight, almost the whole of Dorset, West Sussex, the south-eastern part of Wiltshire and the south-western part of Surrey. The Independent Television Authority hopes to bring the station into service next summer.

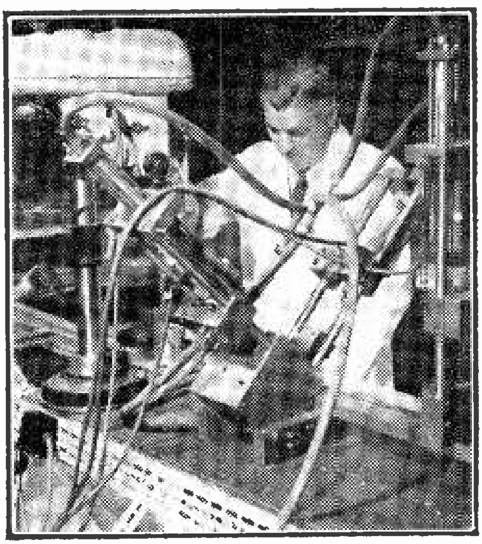
An approach road to the site is now under construction and the Authority plans to begin work on the building in October.

### *I.T.A. in the West*

FROM September 2nd onwards low power test signals have been radiated from the site of the Independent Television Authority's new transmitting station at St. Hilary in Glamorganshire. The purpose of these test signals is to enable viewers to have their sets adjusted and Channel 10 aerials fitted in time for the reception of Independent Television programmes which are planned to start before Christmas. Lying in the area which will be served by St. Hilary when it is operating on full power will be the South of Pembrokeshire, the South of Carmarthenshire, Glamorganshire, Monmouthshire, the South of Gloucestershire, Somerset and the North of Devonshire.

Construction work on the permanent station is proceeding extremely rapidly. The mast has been completed and transmission equipment is now being installed.

The St. Hilary transmitting station will be the sixth to be opened by the Independent Television Authority and test transmission have commenced.



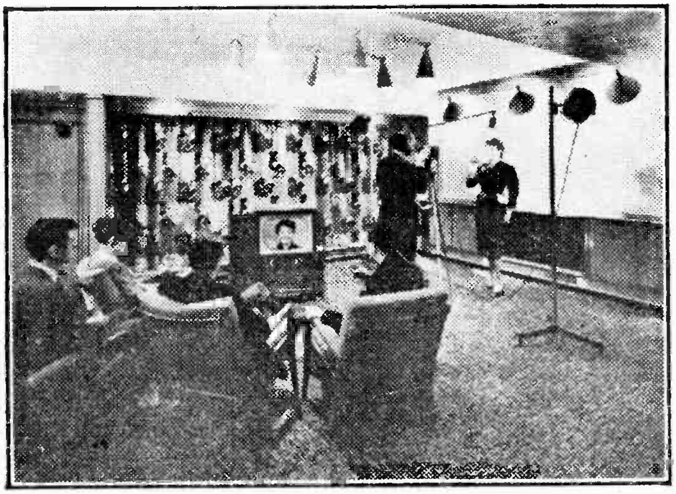
**This picture of a J. Beam Aerials operative making aerials was exhibited at the exhibition of professional photographers recently.**

### *Transmissions from Black Hill*

SINCE the start of high power test transmissions from the I.T.A.'s Black Hill station, it has been found that in some localities outside the primary service area a strong horizontally polarised signal has been received. In consequence, some dealers have been able to secure better pictures by mounting aerials horizontally instead of vertically.

The cause of this unforeseen development is now being investigated and it is hoped that the trouble can soon be corrected in order that a uniform vertically polarised signal will be available throughout the service area.

In these circumstances dealers are strongly advised to proceed with their installation work in the normal way, mounting all aerials vertically, and deferring installation where the vertical signal is not at present sufficient for reasonable reception.



The producer and his staff watching a rehearsal for an advertising TV system which has been recently introduced.

### *I.T.A. Opening Delay*

THE Independent Television Authority regrets to announce that the opening of its transmissions in South Wales and the West must be postponed to a date now expected to be between the middle of January and the middle of February, 1958, involving a delay of four to eight weeks in the opening date originally announced as December 17th.

This delay is due to unforeseen technical defects in the aerial system which would lead to inferior reception in some areas so that the general technical quality of the service would not be good enough.

### *Hungary Makes O.B. TV Unit*

HUNGARY'S first outside broadcast television unit has been completed in the Postal Research Institute. Plans were drawn up by 15 young engineers who experimented until every piece of the unit was made in Hungary.

An institute spokesman told the newspaper *Népakarat*: "After trial tests the unit is operating to perfection and surpasses the one bought from Britain last year from many points of view. The Hungarian-made cameras proved to be faultless."

The television car is equipped with a telephone to link it with studios in various parts of Budapest. It can also be used for long-distance calls to the studios from outside of the capital.

### *Peterborough and Orkney Stations*

NEW BBC television stations are to be built, with the approval of the Postmaster-General, near Peterborough and in Orkney. The Orkney station will in addition carry sound broadcasts on V.H.F.

The Peterborough station will serve about 11,000 people and the Orkney station 30,000. No dates can yet be given for the completion of the stations.

### *Delay at Black Hill*

HIGH power test transmissions from the Black Hill (Central Scotland) transmitting station of the Independent Television Authority were delayed.

Due to weather conditions, difficulties occurred in making the final adjustments to the transmitting aerial.

### *Radio Show, 1958*

THE RADIO INDUSTRY COUNCIL announces that the 25th National Radio and Television Exhibition will be held at Earls Court, London, from Wednesday, August 27th, to Saturday, September 6th, with a preview on Tuesday, August 26th.

**C.R.T. ISOLATION TRANSFORMER**

**Type A.** Low leakage windings. Ratio 1 : 1.25 giving a 25% boost on secondary. 2 v., **10/6** ; 4 v., **10/6** ; 6.3 v., **10/6** ; 10.8 v., **10/6** ; 13.3 v., **10/6**.
Dito with mains primaries, **12/6** each.
**Type B.** Mains input 220/240 volts. Multi Output 2, 4, 6.3, 7.3, 10 and 13 volts. Input has two taps which increase output volts by 25% and 50% respectively. Low capacity suitable for most Cathode Ray Tubes, **21/-**. Ditto for 6 v. C.R. Tubes only, **17/6**.
**Type C.** Low capacity wound transformer for use with 2 volt Tubes with falling emission. Input 220/240 volts. Output 2-2¼-2½-2¾-3 volts at 2 amps. With Tag Panel, **17/6** each.
**NOTE.**—It is essential to use mains primary types with T.V. receivers having series-connected heaters.

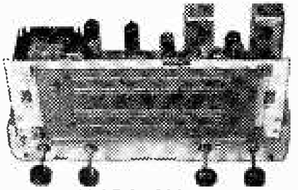
**TRIMMERS, Ceramic.** 30, 50, 70 pf., **9d.** ; 100 pf. 150 pf., **1/3** ; 250 pf., **1/6** ; 500 pf., 750 pf., **1/9**.
**RESISTORS. Preferred values.** 10 ohms to 10 meg., ¼ w., **4d.** ; ½ w., **4d.** ; 1 w., **6d.** ; 1½ w., **8d.** ; 2 w., **1/-**.
**HIGH STABILITY.** ½ w., 1%, **2/-**. Preferred values 100 ohms to 10 meg. Ditto, 10%, **6d.**
5 watt, 10 watt, 15 watt **WIRE-WOUND RESISTORS** 25 ohms—10,000 ohms ............ **1/3**, **1/6**, **2/-**
15,000 ohms—50,000 ohms, 5 w., **1/9** ; 10 w., **2/3**.

**12/6 PURETONE RECORDING TAPE**
**1,200 ft. on standard 7" Metal reels. Spools 5" metal, 1/6, 7" metal, 2/3.**
**FERROVOICE 1,200ft. Plastic Tape 25/- on Plastic Spools.**

**O/P TRANSFORMERS.** Heavy Duty 50 mA., **4/6**. Multiratio, push-pull, **7/6**. Miniature, 3S4, etc., **4/6**.
**L.F. CHOKES** 15-10 H. 60/65 mA., **5/-** ; 10 H. 80 mA., **8/6** ; 10 H. 150 mA., **12/6**.
**MAINS TRANS.** 350-0-350, 80 mA., 6.3 v. tapped 4 v. 4 a., 5 v. tapped 4 v. 2 a., ditto 250-0-250, **22/6**. Bargain 300-0-300 65 mA., 6 v. 4 a., 4 v. 2 a., **15/-**.
**HEATER TRANS.** Tapped prim., 200/250 v. 6.3 v. 1½ amp., **7/6** ; tapped sec. 2, 4, 6.3 v., 1½ amp., **8/6** ; prim. 230 v. Sec. 6.3 v. 3 amp., **10/6**.
**ALADDIN FORMERS** and core, ¼in., **8d.** ; ⅜in., **10d.** 0.3in. **FORMERS 5937/8** and **Cans TV1/2.** ½in. sq. x 2in. and ¾in. sq. x 1½in., **2/-** ea., with cores.
**TYANA.**—Midget Soldering Iron. 200/220 v. or 230/250 v., **16/9. Solon Instrument** Iron, **24/-**.
**MAINS DROPPERS.** 3in. x 1¼in. Adj. Sliders, 3 amp. 750 ohms, **4/3.** 2 amp., 1,000 ohms, **4/3.**
**LINE CORD.** .3 amp., 60 ohms per foot, .2 amp., 100 ohms per foot, 2-way, **6d.** per foot, 3-way, **7d.** per foot.
**LOUDSPEAKER, P.M. 3 OHM.** 2½in. square. **17/6.** 5in. Goodmans, **17/6.** 7in. x 4in. Goodmans, **21/-**. 3½in. square, Elac., **21/-**. 8in. Plessey, **19/6.** 6½in. Goodmans, **18/6.** 10in. R. & A., **30/-**. TSL Tweeter, LSH75, **8/6.** 12in. Plessey, **30/-**. 8in. M.E. 2.5k field, tapped O.P. transf., **24/6.** 15 ohm Plessey 10 wt. 12in. with Tweeter, **97/6.**
**CRYSTAL DIODE** G.E.C., **2/-**. **GEX34, 4/-**.
**HIGH RESISTANCE PHONES.** 4,000 ohms, **16/6** pr.
**MIKE TRANSF.** 50 : 1, **3/9** ea. ; 100 : 1, Potted, **10/6.**
**SWITCH CLEANER** Fluid, squirt spout, **4/3** tin.
**TWIN GANG TUNING CONDENSERS.** 365 pf. miniature 1in. x 1¼in. x 1⅝in., **10/-**. .0005 Standard with trimmers, **9/-** ; less trimmers, **8/-** ; midget, **7/6**; single, 50 pF., **2/6** ; 100 pF., **7/-** ; 150 pF., **8/6.** Solid dielectric 100, 300, 500 pF., **3/6.**
**SPEAKER FRET.** Expanded Metal Silver, 15¾in. x 9½in., **2/-** each.
**GOLD CLOTH.** 17in. x 25in., **5/-** ; 25in. x 35in., **10/-**. **Tygan** 4ft. 6in. wide, **10/-** ft. ; 2ft. 3in. wide, **5/-** ft.

**All Boxed VALVES New & Guaranteed**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1R5 | 8/6 | 6K8 | 8/6 | EB91 | 6/6 | E1148 | 1/6 |
| 1S5 | 8/6 | 6L6 | 10/6 | EBC33 | 8/6 | HABC80 | |
| 1T4 | 8/6 | 6Q7 | 10/6 | EBC41 | 10/6 | | 12/6 |
| 2X2 | 3/6 | 6SA7 | 7/6 | EBF80 | 8/6 | HVR2A | 7/6 |
| 3S4 | 8/6 | 6SG7 | 8/6 | ECC84 | 12/6 | MU14 | 10/6 |
| 3V4 | 8/6 | 6V6G | 7/6 | ECF80 | 10/6 | P61 | 6/6 |
| 5U4 | 8/6 | 6V6GT | 8/6 | ECF82 | 10/6 | PCC84 | 12/6 |
| 5Y3 | 8/6 | 6X4 | 7/6 | ECH42 | 10/6 | PCF80 | 10/6 |
| 5Z4 | 10/6 | 6X5 | 7/6 | ECL80 | 8/6 | PCF82 | 10/6 |
| 6AM6 | 8/6 | 12A6 | 7/6 | ECL82 | 12/6 | PCL82 | 10/6 |
| 6B8 | 5/6 | 12AH8 | 10/6 | EF39 | 7/6 | PEN25 | 6/6 |
| 6BE6 | 7/6 | 12AT7 | 10/6 | EF41 | 10/6 | PL82 | 10/6 |
| 6BH6 | 10/6 | 12AU7 | 10/6 | EF50 | 5/6 | PY80 | 10/6 |
| 6BW6 | 8/6 | 12AX7 | 10/6 | Equip. | | PY81 | 10/6 |
| 6BW7 | 8/6 | 12BE6 | 10/6 | EF50 | 5/6 | PY82 | 10/6 |
| 6CH6 | 10/6 | 12BH7 | 10/6 | Sylv. | 8/6 | SP61 | 5/6 |
| 6D6 | 7/6 | 12K7 | 8/6 | EF80 | 10/6 | UBC41 | 8/6 |
| 6F6 | 7/6 | 12Q7 | 8/6 | EF92 | 5/6 | UCH42 | 8/6 |
| 6H6 | 3/6 | 35Z4 | 10/6 | EL32 | 5/6 | UF41 | 8/6 |
| 6J5 | 6/6 | 80 | 8/6 | EL84 | 10/6 | UL41 | 8/6 |
| 6J6 | 7/6 | 954 | 1/6 | EY51 | 11/6 | UY41 | 8/6 |
| 6J7 | 8/6 | | | | | | |
| 6K6 | 6/6 | EA50 | 1/6 | EZ40 | 10/6 | U22 | 10/6 |
| 6K7 | 5/6 | EABC80 | 8/6 | EZ81 | 11/6 | X79 | 10/6 |



**1957 RADIOGRAM CHASSIS**

**THREE WAVEBANDS. FIVE VALVES**
S.W. 16 m.—50 m. LATEST MULLARD M.W. 200 m.—550 m. ECH42, EF41, EBC41, L.W. 800 m.—2,000 m. EL41, EZ40.
12 month guarantee.
A.C. 200/250 v. 4-way Switch : Short-Medium-Long-Gram. A.V.C. and Negative feedback 4.2 watts. Chassis 13½ x 5½ x 2¼in. Glass Dial 10 x 4½in., horizontal or vertical available. 2 Pilot Lamps, Four Knobs, Walnut or Ivory. Aligned and calibrated. Chassis isolated from mains.

**10 gns.** Carr. & Ins. 4/6.

**TERMS :** Deposit **£5.5.0** and six monthly payments of **£1.**
**MATCHED SPEAKERS FOR ABOVE CHASSIS.** 8in., **17/6** ; 10in., **25/-** ; 12in., **30/-**.

**RECOMMENDED FOR ABOVE CHASSIS**
**★ COLLARO ★**
**HIGH-FIDELITY AUTOCHANGER**
**1957 Model RC456**
**7in., 10in., 12in. Records**
**16, 33, 45, 78 r.p.m.**
**4 SPEEDS—10 RECORDS**
**With Studio "O" pick-up**
**BRAND NEW IN MAKER'S BOXES**

**OUR PRICE £9.15.0** post free

**TERMS : Deposit £5.5.0 and six monthly payments of £1.**
**Space required 14in. x 12½in. 5in. above and 3in. below. Cut Out Board, 6/-.**

**GARRARD 4-SPEED RECORD CHANGERS RC120/4H 1957 MODELS**
**Brand new and fully guaranteed 12 months.**

**AUDIO PERFECTION**

**Designed to play 16, 33, 45, 78 r.p.m. Records. 7in., 10in., 12in. Lightweight Xtal pick-up, turnover head, two separate sapphire styli, for Standard and L.P., each plays 2,000 records Voltage 200 250 A.C.**

**OUR PRICE £10.15.0 each. Post Free.**

**Terms : Deposit £6 and 6 monthly payments of £1. Space required 14in. x 12½in. 5in. above and 3in. below.** Cut Out board, 6/-.

**AMPLIFIER—RECORD PLAYER CABINETS.** Cabinet size 18¼ x 13½ x Ht. 8½in., with motor board 14 x 12½in., **£3.3.0**, post 3/-.

**ALUMINIUM CHASSIS.** 18 s.w.g. undrilled. With 4 sides, riveted corners and lattice fixing holes, 2½in. sides, 7 x 4in., **4/6** ; 9 x 6in., **5/9** ; 11 x 7in., **6/9** ; 13 x 9in., **8/6** ; 14 x 11in., **10/6** ; 15 x 14in., **12/6** ; 18 x 16 x 3in., **16/6.**

**TRANSISTORS.** Audio, **10/-**. R.F. 2.6 Mc/s, **21/-**. Mullard OC71, **20/-**.

**SUPERHET COIL PACK. 27/6.** Miniature size 2¾in. x 2¼in. x 1¾in. HIGH "Q" Dust cored Coils. Short, Medium, Long, Gram Switching. Single hole fixing with connection diagram and circuit. 465 Kc/s I.F.

**COLLARO.** 4-speed Motor and Turntable with selecting switch for 16, 33, 45, 78 r.p.m. records. 200-250 v. A.C. 50 cps. Also **HIGH FIDELITY** Lightweight Pick-up Acos Xtal turnover head, separate Sapphire styli for L.P. and Standard records. **SPECIAL OFFER, THE TWO ! £4.12.6,** post 2/6. Cut Out Board, 14 x 12½in., **6/-**.

**SUITABLE AMPLIFIER-PLAYER CABINET.** Ready cut out for above. **45/-**.

**CRYSTAL MIKE INSERT** by Acos, precision engineered. Size only 1⅜ x 3/16in. Bargain Price **6/6.** No transformer required.

**CHAMPION VHF (FM) TUNER, 88-96 mc/s.**

5 Mullard valves and superhet tuning heart. Maroon and cream receiver styled cabinet 12 x 6 x 6in. **Features : This is a self-powered** 200/250 v. A.C. VHF (FM) Adaptor with operating and servicing data and a screened lead for connection to pick-up sockets of any radio, radio-gram, or amplifier.
Brand new with 12 months' guarantee. List price, 16 gns. **Our price, 10 gns.,** carr. 4/6.

**Volume Controls** Long spindles. Guaranteed 1 year. Midget 10,000 ohms to 2 Meg. No Sw. S.P.Sw. D.P.Sw. **3/-** **4/-** **4/9** Linear or Log Tracks.

**80 ohm CABLE COAX** Semi-air spaced Polythene insulated. ¼in. dia. Stranded core. Losses cut 50%. **9d.** yd. **Fringe Quality Air Space, 1/6** yd.

**COAX PLUGS** ... **1/-** **DOUBLE SOCKET** **1/3**
**SOCKETS** ... **1/-** **OUTLET BOXES** ... **4/6**
**BALANCED TWIN FEEDER yd. 6d.** 80 or 300 ohms.
**DITTO SCREENED per yd. 1/-.** 80 ohms only.
**WIRE-WOUND POTS. 3 WATT.** Pre-Set Min. T.V. Type. All values 25 ohms to 30 K., **3/-** ea. 50 K., **4/-**. (Carbon 50 K. to 2 m., **3/-**.)
**WIRE-WOUND 4 WATT.** Pots 2¼in. Spindle. Values, 100 ohms to 50 K., **5/6** ; 100 K., **6/6.**
**CONDENSERS.** New stock. .001 mfd. 7 kV. T.C.C., **5/6** ; Ditto, 20 kV., **9/6** ; 100 pf. to 500 pf. **Micas 6d.** ; Tubular 500 v. .001 to .01 mfd., **9d.** ; .05, .1, **1/-** ; .25, **1/6** ; .5 350 v., **1/9** ; .1 350 v., **9d.** ; .1 600 v., **1/3** ; .1 mfd., 2,000 volts, **3/6.**
**CERAMIC CONDS.** 500 v., .3 pf. to .01 mfd., **10d.**
**SILVER MICA CONDENSERS.** 10% 5 pf. to 500 pf., **1/-** ; 600 pf. to 3,000 pf., **1/3.** Close tolerance (± 1 pF.) 1.5 pF. to 47 pF., **1/6.** Ditto, 1% 50 pF. to 815 pF., **1/9** ; 1,000 pF. to 5,000 pF., **2/-**.

**I.F. TRANSFORMERS 7/6 pair**
**465 Kc/s Slug tuning Miniature Can. 2¼in. x 1in. x 1in. High Q and good bandwidth By Pye Radio. Data sheet supplied.**
**Wearite M800 IF 465 Kc/s 12/6 per pair.**

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| TUBULAR | | TUBULAR | | CAN TYPES | |
|---|---|---|---|---|---|
| 1/350 v. | 2/- | 100/25 v. | 2/- | 8+16/500 v. | 5/6 |
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| 4/450 v. | 2/- | 16+16/500 v. | 5/6 | 25+25/450 v. | |
| 8/450 v. | 2/3 | | 6/- | 32+32/350 v. | 4/6 |
| 8/500 v. | 2/9 | **CAN TYPES** | | 32+32/450 v. | 6/6 |
| 16/450 v. | 3/6 | Clips | 3d. | 50+50/350 v. | 7/- |
| 16/500 v. | 4/- | 16/450 v. | 3/6 | 60+100/350 v. | 11/6 |
| 32/450 v. | 5/6 | 32/350 v. | 4/- | 100+200/275 v. | 12/6 |
| 25/25 v. | 1/9 | 64/350 v. | 5/6 | | |
| 50/25 v. | 1/9 | 500/12 v. | 3/- | 1,000+1,000/6 v. | |
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**SENTERCEL RECTIFIERS. E.H.T. TYPE FLY-BACK VOLTAGES.** K3/25 2 kV., **5/-** ; K3/40 3.2 kV., **7/-** ; K3/45, 3.6 kV., **7/6** ; K3/50 4 kV., **8/-** ; K3/100 8 kV., **14/6.** 50 c.p.s. voltage, 30% of above. **MAINS TYPE CONTACT COOLED** 250 v. 50 mA., **8/6** ; 250 v. 85 mA., **9/6.** **COILS** Wearite, "P" type, **3/-** each Osmor Midget "Q" type adj. dust core, from **4/-**. All ranges. **TELETRON.** L. & Med. T.R.F., with reaction, **3/6.** **FERRITE ROD AERIALS** M.W., **8/9** ; M. & L., **12/6.** **T.R.F. COILS** A HF, **7/-** pair. **H.F. CHOKES 2/6. FERRITE ROD** 8 in. x 3/8in. dia., **2/6**

**JASON F.M. TUNER COIL SET. 26/-.** H.F. coil, aerial coil, Oscillator coil, two I.F. transformers 10.7 Mc/s. Detector transformer and heater choke. Circuit book using four 6AM6, **2/-**. J.B. Chassis and Dial, **19/6.**
Complete Jason F.M. Kit, **£5.18.6.**
With Jason superior calibrated dial, **£6.15.0**

**FULL WAVE BRIDGE SELENIUM RECTIFIERS.** 2, 6 or 12 v. 1½ amp., **8/9** ; 2 a., **11/3** ; 4 a., **17/6.**
**CHARGER TRANSFORMERS.** Tapped input 200/250 v. for charging at 2, 6 or 12 v., 1½ amp., **15/6** ; 2 amp., **17/6** ; 4 amp., **22/6.**
**VALVE** and **T.V. TUBE** equivalent books, **5/-**.
**TOGGLE SWITCHES.** S.P. 2/-. D.P. 3/6. **D.P.D.T. 4/-**
**WAVECHANGE SWITCHES.**
5 p. 4-way 2 wafer long spindle ... ... 6/6
2 p. 2-way 3 p. 2-way short spindle ... ... 2/6
2 p. 6-way 4 p. 2-way 4 p. 3-way long spindle 3/6
3 p. 4-way, 1 p. 12-way, long spindle ... ... 3/6
**VALVEHOLDERS.** Pax. Int. Oct., 4d. EF50, EA50, 6d. B12A, CRT, 1/3. Eng. and Amer. 4, 5, 6, 7, and 9 pin, 1/-. MOULDED Mazda and Int. Oct., 6d. B7G, B8A, B8G, B9A, 9d., B7G with can, 1/6. VCR97, 2/6, B98 with can, 2/6. CERAMIC EF50, B7G, B9A, Int. Oct., 1/-. B7G with can, 1/9.
**BLACK CRACKLE PAINT,** air drying, **3/-** tin.

**A MERRY CHRISTMAS TO ALL READERS OF PRACTICAL TELEVISION**

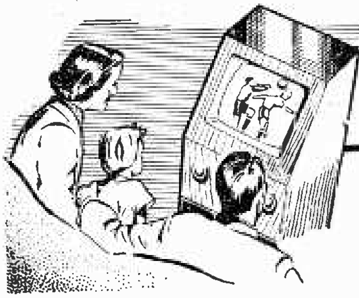
Please post Christmas orders by Wednesday 17th December.

# RADIO COMPONENT SPECIALISTS

**337 WHITEHORSE RD., WEST CROYDON**

Shop closed 25th, 26th, 27th December.
**OPEN ALL DAY—(Wed. 1 p.m.)** *Catalogue 6d.*

**Tel. THO 1665. Buses 133 or 68 pass door. 48-hour postal service.** *P.&P. 1/-, over £2 post free. (Export Extra.) C.O.D. Service 1/6*



# UNDERNEATH THE DIPOLE

TELEVISION PICK-UPS AND REFLECTIONS

**By Iconos**

### RIVERSIDE LIGHTING

THE fine new lighting equipment at the BBC's Riverside studios has been admired by all the I.T.A. engineers, especially the new lightweight 1,000 watt lighting units by G.E.C., which weigh only 56lb. each as compared with the more normal weight of about 84lb. The ease with which these lights can be manipulated mechanically has surprised everyone. The amount of capital invested by the BBC in TV premises and equipment must be enormous. The I.T.A. companies now have plenty of money coming in, and both their producers and engineers look with envy at the plushy BBC facilities. Let us hope that this envy doesn't lead to rashness. Pounds can be profitably invested in Personalities as well as Premises.

### THE DISTORTION DRUG

THESE Hi-Fi demonstrations of sound radio and records do bring you down to earth and make you realise the shortcomings of your sound radio. Time marches on and valves get tired, but so slowly that one does not notice the slow deterioration in quality. In fact, one becomes drugged to accept quite serious distortion. The same applies to TV reproduction, unless one makes regular use of the transmitted test cards. The BBC clock is a constant reminder of horizontal or vertical egg-shaped distortions, but even these tend to become accepted. When I visit friends' houses and see their TV in operation, I am often shocked by the obvious distortions which are quite happily tolerated. Constant fiddling with the controls —"meggling," they call it in Lancashire—is apt to annoy one's family. But they should be trained to accept at least part of one evening a month for devoting to a routine check up.

### "THE PIER"

A.B.C.'s Armchair Theatre has not had a very even run of plays up to now, but surely the most creaky armchair it has ever turned out was *The Pier*. The producer and writer of this play tried to put over a story about Teddy boys (and girls) with a background of a seaside resort and its pier, presented with a new style of production technique. Breaking almost every rule of theatrical, film and television conventions, the continuity of *The Pier* jerked inconsequentially from scene to scene, scattering close-ups without meaning amidst a farrago of partially inaudible dialogue. If pretentious nonsense of this kind qualifies for recognition as "new art," then I will be proud to call myself a Philistine! Still, A.B.C.-television deserves a pat on the back for daring to experiment. Even the best of experimental rockets sometimes turns out to be a damp squib.

### THOSE ANGRY YOUNG MEN

I HAVE an idea that A.B.C.-television intended *The Pier* to be another offering in the idiom of the angry young men, who are the current symptoms of indigestion in modern art. I suppose that 1957 will go down in history as

**Behind the scenes at a TV broadcast. Note the microphone arrangements, and the orchestra being directed by Eric Robinson who follows the singer through headphones.**

the year when the Russian satellite and the angry young men of the British theatre both started bleeping. John Osborne set the ball rolling with his provocative play, *Look Back in Anger*, which achieved a great deal of success through the shock effect of its wild attacks upon conventions, traditions and constitutions. Anger being contagious amongst authors, especially when it pays off well, there has been something of a spate of angry young men frantically looking for targets to aim at in their plays for theatre, television and films. Come to think of it, Gilbert Harding must really have started the "anger" cult, with Malcolm Muggeridge following him up with his own special style of attack. Both achieved immediate public attention when their anger was assisted by the combined sound-and-sight impact of television. Fortunately, television has a way of dealing with such repetitions of exhibitionism. The wiser ones, like Gilbert Harding, modify or vary their techniques before the television viewing public gets too angry. I may be wrong, but I have formed the opinion that the mass audience television now commands has no real liking for irresponsible intellectuals. The advertisers on I.T.A. certainly don't love them!

## COMMERCIALS IN THE WEST

IT was a good idea to invite potential advertisers on the T.W.W. channel to a preview of various types of filmed commercial, local and national, which will be transmitted from the I.T.A. station at St. Hilary Down. With a probable viewing public of three million, the T.W.W. organisation claims that the relative prices to be charged for advertising space are lower than any other I.T.A. programme contractor. But a friend who was present at the preview, which was held at a local cinema, tell me that the ideas and execution of many of the local advertising commercials was poor and amateurish, not in the same street as some of the nationally advertised products. Still, the local men will soon settle down to work, first to acquire experience in the difficult art of animation draughtsmanship and then to find the ideas which catch public attention. Have you noticed the growing importance of "character" voices in television advertising? I think it was the husky cockney voice of the "one for the—er—pot" tea advertisement which started this craze.

## TECHNAMATION

THE latest gadget for putting over animated diagrams clearly, simply and cheaply (it is claimed) is the Technamation system, recently imported from America. This is a mechanical device in which several layers of clear plastic material can be moved separately. Each plastic sheet carries a part of the diagram to be animated. The mechanical movements can be pre-set. Apparently Technamation scored a big success on the Columbia Broadcasting system when it was used with great effect to demonstrate the working of an automobile suspension system. It sounds to me to be a wonderful toy, with immense possibilities in the specialised fields of machinery demonstrations or any kind of repetitive movement. Makers of commercials might find this useful.

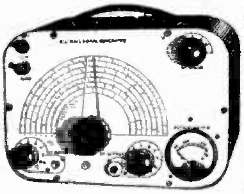
## MAGNETIC PICTURE RECORDING

PROGRESS continues to be made in U.S.A. with the recording of television pictures on magnetic tape, which is now known as "Video Tape Recording" or V.T.R. V.T.R. machines have been in regular operation on the Columbia Broadcasting system since November, 1956. Valuable experience has been gained in their operation, which, to date, has shown little or no economy as compared with telerecording or, as they call it in U.S.A., Kinescoping. The Ampex video tape recorders scan the tape with four heads, and sixteen television lines are recorded for each sweep of a head across the tape. Since the scanning lines are interlaced, a total of 32 lines per picture field are affected when one head or its associated amplifiers goes out of adjustment. It has been found almost essential to reserve the particular set of heads used for a recording until that recording is reproduced. Otherwise, the wear on the heads (if used for other recordings in the meantime) will change the characteristic of the pick-up and give bad distortion when the tape is played off. If the V.T.R. recording is sent elsewhere, the magnetic heads have to go with it. The tape has to be very carefully coated to standards infinitely higher than those which are quite satisfactory for sound recording. Nevertheless, steady improvements are being made and already some excellent results have been obtained by Columbia in their regular programme schedules. The V.T.R. system is used for the time delay of a programme for different time zones from coast to coast, and there is no doubt that it will eventually supersede the telefilm recording methods, when used within the same organisation. For picture recordings to be exchanged between networks, or exported abroad, telefilm recording is likely to be used for many years to come.

## SOUND QUALITY

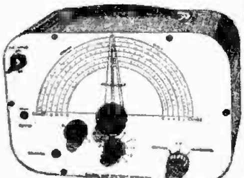
ON many occasions I have mentioned the question of poor sound quality on televison plays, the I.T.A. companies being the principal offenders. Plays or spectaculars from the television theatres, such as the Wood Green Empire (A-T.V.) or the Palace, Chelsea (Granada), often suffer on the sound side when the local loudspeakers for the audience in the auditorium are turned up slightly too high, on the verge of oscillation through feed back. This is a case where an acoustic sound delay system such as that developed by B.T.H. would help matters, both for the transmitted sound quality and for the intelligibility on the auditorium loudspeakers. An acoustic or electronic delay system is adjusted critically so that the sound on the local loudspeaker synchronises with the arrival of the same sound through the air from the stage. In a very large theatre this delay might be half a second for some distant loudspeakers, or even more for a Cathedral. The resultant improvement in intelligibility is quite remarkable.

## SIGNAL GENERATOR



Coverage 120 Kc/s-320 Kc/s. 300 Kc/s-900 Kc/s. 900 Kc/s-2.75 Mc/s. 2.75 Mc/s-8.5 Mc/s. 8 Mc/s-28 Mc/s. 16 Mc/s-56 Mc/s. 24 Mc/s-84 Mc/s. Metal case 10in. x 6½in. x 4½in. Size of scale, 6½in. x 3½in. 2 valves and rectifier. A.C. mains 230-250 v. Internal modulation of 400 c.p.s. to a depth of 30 per cent., modulated or unmodulated R.F. output continuously variable 100 milli-volts. C.W. and mod. switch, variable A.F. output and moving coil output meter. Grey hammer finished case and white panel. Accuracy plus or minus 2%. £4.13.6 or 34/- deposit and 3 monthly payments 25/-. P. & P. 4/6 extra.

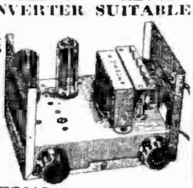
## SIGNAL & PATTERN GENERATOR



Coverage 7 Mc/s-210 Mc/s in five bands, all on fundamentals, slow-motion tuning, audio output, 8 vertical and horizontal bars, logging scale. In grey hammer finished case with carrying handle. Accuracy ± 1%. A.C. mains 200-250 v.

£6.19.6. Or £2 deposit and 4 mthly. pymts of 27/6. P. & P. 5/6.

**COMMERCIAL TELEVISION CONVERTER SUITABLE ANY T.V. (Except Philips) WITHIN 35 MILES OF I.T.A. TRANSMITTER. ALL CHANNELS NO ALTERATIONS TO SET.**



Complete with built-in power supply. 230-250 v. A.C. mains. Crackle finish case 5½in. long, 3½in. wide, 4½in. high. Incorporating gain control and band switch. Illus. with cover removed.

**£3.19.6** Plus P. & P. 2/6.

3 element folded dipole I.T.A. loft AERIAL, 15/-. P. & P. 2/-. Co-ax cable, 8d. yard.

**H.P. TERMS AVAILABLE**

## AC/DC MULTI-METER KIT

Comprising 2in. moving coil meter, scale calibrated in AC/DC volts, ohms and milli-amps. Voltage range AC/DC 0-10, 0-100 and 0-500. Milli-amps 0-10, 0-100. Ohms 0-1,000 and 0-10,000. Front panel, range switch, wire-wound pot (for ohms zero setting) two toggle switches, resistors and metal rectifier. In grey hammer-finish case. **19/6** Plus P. & P. 1/6.

Point to point wiring diagram 1/-, free with kit.

## 4 VALVE ALL-DRY SUPERHET PORTABLE KIT

**incorporating Ferrite rod aerial**

Medium and long waves. In grey leatherette. Size 9in. x 7in. x 6in. Valve line-up: 1T4, 1R5, 1S5, 3V4. Complete kit of parts (less batteries).

**£5.19.6** Plus Post & Packing 3/6

**COMPLETELY BUILT PORTABLE AMPLIFIER**

approx. size 6½in. x 2½in. incorporating 2 valves, contact-cooled metal rectifier, bass and treble lift controls and double wound mains transformer 230-250 v. **39/6** Plus P. & P. 3/6.

**5in. P.M. SPEAKER & O.P. TRANSFORMER,** if purchased with the above. 18/6. Plus P. & P. 1/6.

## COLLARO 4-SPEED AUTOMATIC CHANGER

Model 456 (suitable for use with above amplifier). A.C. mains. 200-250 v., turnover crystal head. Brand new, fully guaranteed. **£8. 19. 6** Plus P. & P. 5/-.

Or £3 deposit plus P. & P. 5/- and 6 mthly. payments of £1.4.0.

## RADIO & T.V. COMPONENTS (Acton) LTD.

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GOODS NOT DESPATCHED OUTSIDE U.K.

# TRANSISTORS

## JUNCTION TYPE P-N-P

(British Manufacture)

| | |
|---|---|
| **RED-SPOT** 800 kc/s Audio Frequency | 10/- |
| **BLUE-SPOT** 1.6 Mc/s Mixer and Frequency Changer | 15/- |
| **WHITE-SPOT** 2.5 Mc/s R.F. and I.F. Amp. | 20/- |

All Transistors are Tested and Guaranteed.

**N.B. The Red Spot is similar to Mullard OC71.**

## The New "TRANSISTOR—8"

Push-Pull Portable Superhet Can be built for **£11/10/-.**

This Portable 8 Transistor Superhet is tunable for both Medium and Long Waves and is comparable in performance to any equivalent Commercial Transistor Set. Simplified construction enables this set to be built easily and quickly into an attractive lightweight cabinet supplied.

**TEN STAR FEATURES**

★ 8 Specially Selected Transistors
★ 250 Milliwatts Output Push-Pull
★ Medium and Long Waves
★ Internal Ferrite Rod Aerial
★ 7 x 4 Elliptical High Resistance Speaker
★ Drilled Plastic Chassis 8½ x 2½in.
★ Point to Point wiring and practical layout.
★ Economical. Powered by 7½ v. battery
★ Highly sensitive
★ Attractive lightweight contemporary case

**N.B. Pair of Matched OC72's or equiv. Supplied at additional cost of 40/-.**

We can supply all these items including Cabinet for **£11 10/-** All parts sold separately.

Send for circuit diagrams, assembly data, illustrations and instructions, and full shopping list. **1/6.**

Call and hear demonstration model.

## "EAVESDROPPER"

**THREE TRANSISTOR POCKET RADIO**

(No Aerial or Earth required)

Variable Tuning. Total cost, as specified including Transistors, Transformers, Coils, Condensers and Battery etc. with circuit and plastic case. **77/6** POST FREE

All items sold separately. With single phone, 82/6. With Acos Mike, 90/-. With Min. Hearing Aid 92/6.

## MINI-TWO

**TWO-TRANSISTOR MINIATURE POCKET RADIO**

The smallest Transistor set offered on the market. Variable Tuning, Drilled Chassis, Plastic Case size 3in. x 2in. x ¾in., Miniature Hearing Aid, 2 Transistors and all components including 1½ volt Battery. Circuits and full practical layout diagrams.

Total Cost **49/6** Complete

**TRANSISTOR SIGNAL TRACER**

**Complete Kit with 2 Transistors, Components, Phones, with Circuit and plastic case. 42/6.**

**TRANSISTOR SQUARE WAVE GENERATOR**

**Complete Kit with 2 Transistors, Components Circuit and plastic case. 25/-.**

**QUARTZ CRYSTALS**

5/- each. Send for Lists.

**"HOMELIGHT" 2-TRANSISTOR PERSONAL PORTABLE**

**Variable Tuning**

We can supply all components including 2 Transistors Diode, Resistors, Condensers and Miniature Hearing Aid and Plastic Case size 4½ x 2½ x 1½in. and 1½ v. Battery. FOR 52/6

All items sold separately

**6 v. VIBRATOR PACKS** Output 120 v. 40 mA., 12/6. Brand new.

R.F.24. 10/-. R.F.25. 12/6. R.F.26 25/-. Brand new with valves. carr. 2/6.

**SEND 6d. STAMPS FOR NEW 1958 28-PAGE CATALOGUE**

OPEN MONDAY to SAT. 9-6. THURS. 1 o'clock.

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# CORRESPONDENCE

The Editor does not necessarily agree with the opinions expressed by his correspondents. All letters must be accompanied by the name and address of the sender (not necessarily for publication).

## SIMPLIFIED SERVICING

SIR,—Articles on testing without elaborate test gear are always interesting, and there is one part of a modern receiver which I think gives rise to more troubles than any other. I refer to the sync. separator so far as it is tied up with the frame timebase. We often hear of bad interlacing, or failure to interlace, but how many amateurs can tell whether the set is interlacing or not? My picture looks as good as most others, yet a friend who comes to see me from time to time always tells me the set is not interlacing. When I ask him how he can tell, all he can say is "You get to know. I can just see that it isn't." and he can't tell me how I can tell. What is the secret, and if it is possible to tell others, how can one really check it and make improvements without a 'scope or something equally unintelligible to the amateur? Perhaps one of your more experienced readers will lend a helping hand to those of us, and I am sure there are literally hundreds, who are lost in this particular wilderness.—J. Y. TIMMINS (Kensington).

**SPECIAL NOTE**

**Will readers please note that we are unable to supply Service Sheets or Circuits of ex-government apparatus, or of proprietary makes of commercial receivers. We regret that we are also unable to publish letters from readers seeking a source of supply of such apparatus.**

## SOME USEFUL AERIAL DEVICES

SIR,—May I, with all due respect, submit a correction to the article by J. Brown—"Some Useful Aerial Devices"—in your August issue.

The Star Delta Theorem used to find the value of resistor for equally dividing the output of a TV aerial between any number of receivers is as follows:

$$R = Za\frac{n-1}{n+1}$$

where Za is the impedance of feeder,
n is the number of outlets.

For 75Ω and 3 outlets:

$$R = 75 \times \frac{2}{4} = 37\Omega \text{ approximately.}$$

For 75Ω and 2 outlets:

$$R = \frac{75}{3} = 25\Omega$$

The circuit would be then as shown.

It is seen quite simply that the impedance presented to us at A, B or C is 75Ω,

$$\text{i.e.,}\quad 25\Omega + \frac{(25\Omega + 75\Omega)}{2}$$

These notes should also apply to the splitter/combiner unit in Fig. 3 of the same article.—D. C. EMMERSON (Northampton).

## DABBLERS

SIR,—The recent remarks on "dabblers" were most interesting, especially as I am what might be classed as one. I am a lecturer on radio at a well-known institute, was a signals officer in the R.A.F. at a fairly high rank during the war, and consider I am fairly well up in most techniques in modern radio and television. Yet, when I wrote to a well-known firm recently for a service manual for *my own* set, not one I was servicing for someone else and for which I might have been accused of doing a service man out of a job, I was told that I couldn't have it—in spite of having listed my qualifications. I agree with the amateur who suggested that manufacturers treat those who ask for a service manual as though they were asking for a working drawing of a guided missile. What is so secret about a set, anyway? The circuit can be traced out by anyone with the slightest knowledge and one's own circuit prepared, but why have to go to all this trouble when you have spent £60 to £80 on the set? I would venture to suggest that in many cases manufacturers are ashamed of some of the arrangements, not jealous that someone will steal their ideas. I remember, before the war, one judged the quality of a radio set by the size of the service department it had. The bigger the service section, the worse the sets. I think I am correct in saying that one of the big firms had *no* service section at all—the number of faults was so small that local men could put them right and they did not have to go back to the makers. Let us hope that the correspondence and remarks which have been made under this heading will give the manufacturers food for thought and maybe these manuals will be more freely available, even if a slight charge is made for printing, etc.—G. P. RAILTON (Manchester).

SIR,—I am 100 per cent. in agreement with the letter from R. Purdey, of Brighton, in your November issue.

When, as an electrical engineer in a position of responsibility, I have installed complex equipment, a wiring diagram, etc., has been asked for and readily obtained.

Indeed, why not for TV sets, as this writer remarks? £100 spent surely merits full information, if only for the use of the serviceman called in.

I submit that if you must buy, before you buy demand a service sheet. If not given, don't buy and try elsewhere.

I recall a "superior" serviceman attending to my own vacuum cleaner, and impressively grinding out on a megger to prove the said vacuum cleaner was finished. He gleefully anticipated commission on the sale of a new one.

He didn't notice, as I did, a little blue spark busily buzzing brightly to frame. He left sadly as

I refused to buy a new one. The old vacuum cleaner is still singing soothingly.—E. B. DOUGHTY (Bearsden).

SIR,—I, too, would like to add a note or two on "dabblers."

Being a dabbler myself, I have done quite a few jobs on TV sets which have been returned from incompetent radio dealers with small shops and radio service departments. Many of these so-called dealers seem quite unable to diagnose tube faults as such, and when a customer calls him in he blithely tells the customer his tube is done, while all the time all that is required is a new H.T. valve. I do think that the radio dealer should try to be fair in his dealings with a very gullible public, and, to further my argument, I enclose a copy of a letter from an old man of 82 years of age who had similar dealings with a "service engineer" on "the make." This same old man is a cripple with only a pension. I did the job free of charge.

### *MULTUM IN PARVO*

The other day, with much regret, they took my television set.
Not for lack of payment—no!
But just the darned thing wouldn't go.
Some weeks ago it lost its sound, "a new valve needed" the expert found.
As he twiddled knobs and scanned the view he said, "Is this the best the set will do?
"Your screen should be just twice as bright, a new tube's wanted here, all right.
"I'll fix the lot for 20 quid and make it just like new, no kid."
With gleaming eyes he grabbed the set; a voice within me said not yet.
This man thinks you are a boob, I'm sure it doesn't need a tube.
I said "I think I'll let it stay and send for you another day."
And so, fearing that the set would burst, another expert called, to do his worst.
Then to my extreme delight, he found another valve won't light.
And upon replacement was found, to wit, it worked like new, yes, every bit.
The valve cost six and twenty bob, I guess that expert knew his job.
The moral of this I hope you'll take,
Be sure your man's not on the make.

R. E. WOODALL (Hove).

### *USING A CONVERTER*

SIR,—I would like to pass on a little hint which I think may not be familiar to many viewers. It concerns the addition of a converter which gives rise to patterning on the set, not on those of neighbours. In trying to overcome this trouble I was told of an arrangement which in my case and those of several of my friends really worked. Round an ordinary lead pencil wind 10 turns of the coaxial normally used. A piece of Sellotape will keep the turns together and then the ends are cut to reach from the normal aerial terminal to the set. The position of the converter should be such that there are 1½in. or 2in. left between the coil and the converter and set. In other words, the connection between the converter and the set consists of a short length of coaxial, 10 turns, and then another short piece. This acts as a sort of wavetrap and, as already mentioned, works very effectively.—G. H. RANSOME (Woolwich).

### *PECULIAR FAULTS*

SIR,—With reference to recent notes on peculiar faults, I thought you would be interested to see the attached newspaper cutting relating to the new transmissions in Scotland. I think it is extremely cute. No doubt some of your "expert" readers would be able to explain it!—G. FORSYTH (Edinburgh).

[*The cutting related that during the experimental tests on the new Band III station dealers erected aerials for viewers in a vertical position instead of horizontal, with the result that the pictures which were received were lying on their side. When the complaints started coming in, the aerials were turned to suit horizontal polarisation, and the pictures were then the right way up!*—ED.]

### *PROJECTION SCREEN*

SIR,—I have a small cinema screen which has a beaded surface apparently painted on. This works very well and I would like to paint a similar screen for my projection receiver. I have been unable to find any firm who can supply a suitable paint and wondered if any reader could help me in this direction.—G. M. WORTHINGTON (Burslem).

## SCANNING AND SYNCHRONISATION

(*Continued from page 214*)

required for the output valve will be within the maximum ratings for the type of valve found in 70 deg. practice, e.g., N329, PL82, etc., and the additional scanning current can be obtained with the type of circuit described in part 3 of this series, merely by increasing the H.T. potential to the output stage.

With the low-voltage line obtained with direct half-wave rectification of the supply mains this cannot easily be done and a useful way of providing an overall increase in anode-cathode potential for the output valve is shown in Fig. 5. The cathode bias required for this valve is normally of about 12 to 16 volts. If this could be applied separately as negative grid bias then an effective increase in H.T. potential would be realised. This is obtained in Fig. 5 by rectifying the sawtooth potential across the transformer secondary and applying this as negative bias to the grid. As extremely little grid current flows a point-contact germanium diode can be used. A large capacitor C is necessary to smooth the bias supply, which if insufficiently smoothed will cause a pronounced modulation of the sawtooth waveform.

(*To be continued*)

# Your Problems Solved

*Whilst we are always pleased to assist readers with their technical difficulties, we regret that we are unable to supply diagrams or provide instructions for modifying surplus equipment. We cannot supply alternative details for constructional articles which appear in these pages. WE CANNOT UNDERTAKE TO ANSWER QUERIES OVER THE TELEPHONE. The coupon from p. 245 must be attached to all Queries, and if a postal reply is required a stamped and addressed envelope must be enclosed.*

## FERRANTI 17K3

**For about 12 months, the operation of width control, on narrowing of the picture, produces a "wickerwork" pattern at the top of the tube face. Further operation of this control produces multiple images; by returning the width control to almost fully clockwise a good picture can be obtained, except that the picture seems to "blow" slightly and clips detail at the sides. Height and frame hold work correctly.**

**Operating the line hold away from fully anti-clockwise results in a complete break up of the picture, and one position of the line hold produces loss of line scan, i.e., a ragged vertical line only. Could this be a faulty potentiometer.—D. T. White (Ely).**

We would advise you to change the 1MΩ horizontal hold control, and also to check the parallel 100K and 150K which are wired in series with it.

## R.G.D. 1755T

**This set has been in use for about 12 months. The set had not been in use for a week due to holidays. On returning back home I tried the set and it appeared to be O.K. The following day the set appeared to have developed a fault, i.e., the raster was O.K. and slight hum from the speaker, but no sound or picture. I suspected the F.C. stage as the most likely suspect. A friend fitted a new PCC84; the set then seemed to function. The line linearity and width controls were also adjusted. The trouble appears from here on. The aerial is a dipole. The picture now appears slightly blurred. The focus control used to make the picture sharp but it is not as good now. The white content of the picture at times appears as a glare, turning down the brilliance makes the black content lifeless and devoid of detail.**

**I find that by advancing the brilliance slightly the picture is flat, just as though the interference limiter had been adjusted. The interference limiter is turned out as far as possible so as not to limit the maximum whites.—K. Holding (Liverpool).**

We are rather inclined to suspect the PL81 line output valve of failing, but the symptoms described could be misleading. The V12 ECL80 sig. cathode follower/A.P.C. output valve could be at fault or the 39K1 (MR2) A.P.C. rectifier could be defective. If the contrast cannot be controlled properly this would appear to be extremely likely.

## PHILIPS MODEL 1115U

**Line hold is very unstable, the slightest drop in volts on the mains causes the picture to slip from the right. This takes place every day, and has been so ever since I bought the set. The engineer put all the blame on the mains, but I could not help thinking that it was a case of 50-50. Last week the supply company fitted an extra transformer on to the supply; this has made a big difference to the supply; we now only get about 5V. drop on peak load, but the line hold still slips.**

**The ECL80 line oscillator has been changed with other ECL80s in the set, but makes no difference. This change over took place in the first week when the valves were new. The set is now three years old and has given no other trouble. The frame only slips when there is a big drop on the mains, by that time the picture is not worth looking at. I have service sheet for this model.—J. Blake (Bridgwater).**

We would advise you to change the 220KΩ (red, red, yellow.) load resistor of the 2nd line sync clipper. Reduce the value to 150KΩ if necessary.

## FERGUSON 306T

**The set is six months old. In that time I have had to replace E.H.T. rectifier (EY86) four times. Can you please tell me where to look for the trouble? I have a "Avominor" test instrument and service sheet.—J. Ford (Willenhall).**

The EY86 heater connections should be examined to ensure that the 4.7Ω resistor, which should be wired in series wth the heater, is actually included in the circuit. If no resistor is found your dealer should be consulted. If the resistor is in the circuit it may be necessary to increase its value to prevent overrunning the EY86 heater.

## P.T. BAND III CONVERTER

**I wonder if you will be good enough to kindly advise me on the following:**

**1. Can it be connected to my set, Philips 1100U, by simply plugging the output into the aerial input?**

**2. My channels are: Band I Channel 5 and Band III, Channel 10. Will the coils as shown be O.K.?**

**3. Is there sufficient H.T. and L.T. available to energise it from my set? Can the converter heaters be linked into the set chain? Where will I take my 200V. H.T. from?**

**4. This set, as you know, is fed with a balanced twin feeder. Can twin feeder and its sockets be used in place of the coax and its**

**fittings on the converter?—G. G. D. Evans (Swansea).**

1. Although your receiver uses a balanced aerial input circuit, provided the signal due to the local Band I station is not unduly high in your area, a short length of coaxial feeder can be used successfully to connect the converter to the receiver in the usual manner. If the Band I signal is high, however, trouble will be experienced with Band I breakthrough.

2. L7 should be wound with eight turns of wire of the kind indicated. L6 may also require alteration by increasing the turns spacing or winding with four turns of wire, instead of 4½ turns.

3. A separate power pack should be used in your case.

4. Yes. See 1 above.

### *PYE LV51*

**The picture keeps tumbling around and only halts for short periods, even with the control (frame hold) at its maximum. I also note that the position is worsened when an electric fire is switched on.—W. M. Thompson (Radlett).**

We would advise you to replace the 470KΩ resistor (yellow, violet, yellow) which is wired in series with the centre tag of the frame hold control.

### *FERRANTI MODEL T1325*

**My problem is that, on switching on in the evening, the picture is perfect but the brilliance control is almost fully retarded. After about two hours' viewing the brilliance has increased to such a degree that I cannot reduce it on the control any further and, although the picture itself is perfect, flyback lines are clearly visible and, of course, it is most uncomfortable to watch. If the set is switched off for about three or four hours it then becomes normal for a time but gradually the brilliance increases again.**

**Can you advise me what to look for? I suspect a resistor is working above load and gradually altering in value. I have no service sheet for this set.—H. I. Toms (Banbury).**

Since the picture quality remains good, the increasing brilliance must be due to a rise in potential applied to the grid of the C.R.T. This could well be due to leakage through the .1μF capacitor connected from pin 5 of the C.R.T. to the H.T. line. This capacitor should be changed and the associated 470kΩ resistor (yellow, violet, yellow) checked.

### *BUSH DAC90A*

**My Bush has developed a hum which is getting unbearable when trying to listen to a programme. Directly I switch on, the set hums and keeps on all the time it is switched on. I have looked to see if any connections to earth have come unsoldered but there does not seem to be anything wrong. I am only a novice so perhaps with your valuable knowledge you could enlighten me where else to look for the trouble. The set is four years old.—A. Pring (Kew).**

If the hum is present when the volume control is turned right down then the trouble is probably caused by a defective electrolytic smoothing capacitor. A dual 32+16μF unit is used in your model, and both sections should be tested or substituted with a part known to be in good order. Also check the condition of the CL33 output valve.

### *ULTRA V7116*

**I would like to know if this model is suitable for conversion to Band III, if so what would be the best to fit, a converter or a channel tuner?—Norman Dewey (Bourne).**

Since the oscillator in this model is working below the signal frequency, giving a sound I.F. of 16 Mc/s and a vision I.F. of 19.5 Mc/s, it is not possible to employ a turret converter as these are made only for sets using an oscillator working above the signal frequency.

A simple add-on type Band III converter will need to be used in your case, therefore, such as the Spencer West Type 80 unit.

### *REPLACING A TUBE*

**I have replaced a burned out tube, G.E.C. 6706A, with a Mazda CRM122, which the dealer said would fit in. The picture is quite bright, but there is very little contrast, and the raster cannot be cut off with the brightness control at minimum.**

**Is this a sign of a faulty tube, or is it something in the set which does not agree with the tube ratings?—R. Bailey (Beeston).**

Is the tube base connected correctly? The base connections of the G.E.C. tube do not conform with the connections of the Mazda tube. The connections on the Mazda tube are as follows: pins 1 and 8, heater; pin 3, cathode; pin 5, grid; while the connections on the G.E.C. tube are: pins 2 and 7, heater; pin 5, grid; pin 8, cathode. If the base connections are correct, uncontrollable brightness may be caused by a defect in the tube.

### *RAYMOND 14in.*

**The vision went completely off, the sound being O.K. At the same time smoke came from the rear of the set. On inspection I found that the smoke was coming from the 1K resistor situated in the E.H.T. section. The resistor is R72 on the service sheet which I have.**

**The 10 Kc/s whistle is present and the E.H.T. rectifier I had tested and found O.K.**

**I would be very grateful if you could help me locate the trouble. I do not have any test equipment.—R. M. Ball (Wallasey).**

This trouble is almost certainly caused either by a fault in the line deflector coils or in the line output transformer.

### *PYE MODEL T18*

**I am trying to modify my Pye to a 14in. I have got a CRM142 tube which has the same size neck as the 9in. tube had (the latter had become quite worn out, hence the idea of trying to adapt a 14in. instead of buying another 9in. tube). I have altered the base connections and fitted a 12 volt filament transformer, raised the tube support and focusing coils and fitted the tube.**

(*Continued on page* 245)

## SETS & COMPONENTS

**TEST SETS:** 74A with 10 valves. VCR, 139a and 50-cycle power pack; fair condition, 50/- (carr. 8/6). Transformers: Pri. 50v. 50c. to 10/15/20 25/30/50v, 2A, 7/6 (post 2/6). "C" core: 230v. in: outputs: 315-0-315v. 60 mA, 5v. 2a, 6.3v. 1.5a, 25/- (p.p. 3/6). Input 200/250v. Outputs: 12v., 3a, and 5v., 3A, 12/6; 300-0-300v. 200mA, and 4v. twice, 17/6. Indicator Units, new, with VCR97, 3/VR91, 2/CV18, 2/VR54, 24/- (carr. 7/-). Responser ZC8931, 160/190 mcs., with valves, 15/- (carr. 7/6). Brand new RF.26, 27, 25/- (post 3/-); RF25, 10/6. Metal Rectifiers: 240v. 100mA, 4/-; 240v. 30 mA, 3/6; 1,000v., 30 mA, 7/6. Chokes, L.F., 10H. 120 mA, screened, 7/6; 10H. 50 mA, 5/6; 5H, 200 mA, 4/6. List and enquiries s.a.e., please! Terms c.w.o. Postage extra. Immediate despatch. W. A. BENSON (P.T.), 136, Rathbone Road, Liverpool, 15.

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## SITUATIONS VACANT

**PART TIME** Television Service Engineer; Essex area; own transport required. CHA. 8493.

**When I tried it out the sound is still O.K. and all the valves appear to light up O.K.—that is the glass ones—but all I get on the tube is a bright horizontal band about ¾in. wide which is unaltered by any of the controls. Only movement of the ion trap either widens or narrows it within limits. The people who supplied the tube did warn me that I might need more E.H.T. Do you think this is what is wrong? The E.H.T. that is fitted is a cylindrical affair with a Paxolin tube that slides up and down which gives a very slight adjustment to the picture—or rather did do—and two leads—a long one to the C.R.T. and a short one to the top cap of a PL38 valve.—S. L. F. Seares (Letchworth).**

Modern wide-angle picture tubes require greater scanning power, E.H.T. voltage and video drive than your 9in. chassis is capable of supplying. Some form of picture should be obtained, however, and from your description of the symptom we feel that a fault has developed in the frame timebase circuits. Make sure that you have not damaged or disconnected any wires or windings associated with the scanning coils.

### *EKCO TC185N*

**My set was converted for Band III, using a Clydon Turret Tuner. My trouble on the set is a varying white line or edging on the bottom of the picture. Adjustment on the frame linearity and height controls, plus the C.R.T. adjustments, removes it to some extent, but still leaves me a gap at the bottom. On some occasions the line seems to disappear on its own accord.**

**A month ago I had trouble with the picture width but a new 20L1 valve rectified it. Checking over recently I found that on switching on occasionally the U801 H.T. rectifier would flash a little or show a blue tint.**

**Could this valve or the frame oscillator have any effect with the white line? Also on one occasion I heard a gentle plop in the set and wondered if you could explain this to me.—S. Flox (Leeds).**

The flashes around the U801 (and the "plops" probably) are due to small emissive particles flaking off the cathode. One day one of these will lodge between cathode and anode and the valve will need replacing. Your foldover could be due to a low emission frame output valve, which is a 6L18 in some sets and a 10P13 in others. Failing this check the 4,700pF feedback condenser from the anode of the output valve to the linearity control.

### *MURPHY V114 9in. TV*

**The lower half of the picture is marred by black or white lines (horizontal) and these usually start at the very bottom and run up to half way and then disappear. Picture quality is excellent. Close investigation of the picture was made and it appears that the spot misses some six or more horizontal traces and then carries on normally until it repeats itself. This causes this part of the picture to "jump up and down" because of the displacement. Sometimes the trace piles up on itself, causing a white line. Frame hold and other frame controls will not correct this.**

**Frame output valve (Pen45) checked O.K. Thyratron oscillator (T41) interchanged with line timebase valve. No change. Sync sep. (DD41) interchanged with sound section valve. No change. Frame output transformer windings checked with ohmeter. O.K. Video output valve replaced with new valve (6F12). No change. C52 (32$\mu$F) electrolytic shows signs of "bulging" on its end but "kicks" the meter O.K. H.T. voltage O.K. Various resistors associated with frame timebase valves and controls checked and appear to be O.K.—D. Goodey (Farnborough).**

The trouble you are having could either be oscillation of the frame output valve or a breakdown in the frame output transformer. As neither of these troubles would show on a tester the only sure way to check is to replace.

A fairly large cored audio transformer will do as a makeshift frame output transformer. It almost certainly will not match, or produce a full linear scan, but it should suffice to enable you to check the original.

### *MASTERADIO TG7T*

**The trouble is that, after the set has been switched on, the picture always comes on in broken horizontal lines, with a vertical line down the centre, and dull, and turning up the brightness control does not make much difference. By turning the line hold control I can get two or more dull pictures side by side, and after manipulating the controls for some time the screen will brighten suddenly, and by turning the line hold control I can get a picture which will immediately go dull and break up again. After about half an hour I may finally get a steady picture which may last half to one hour when it will break into two pictures with a wide vertical black band in the middle. Sometimes the picture can be restored by turning the line hold or it may right itself, and may last for an hour or two. The frame hold and contrast controls seem to work all right. I have fitted a new line output valve, 50CD6G, but it did not cure the trouble.—P. F. Wilson (Walthamstow).**

Make sure that the aerial is supplying a good signal to the receiver. If all is well here, suspect trouble in the line sync circuits. Change the capacitor between pins 1 and 6 on V11 for one valued 22pF. This will improve the line lock. Line drift may be caused by trouble in V11 itself, and this is best checked by substitution.

**QUERIES COUPON**

This coupon is available until DECEMBER 21st, 1957, and must accompany all Queries sent in accord with the notice on page 241.

PRACTICAL TELEVISION, DECEMBER, 1957

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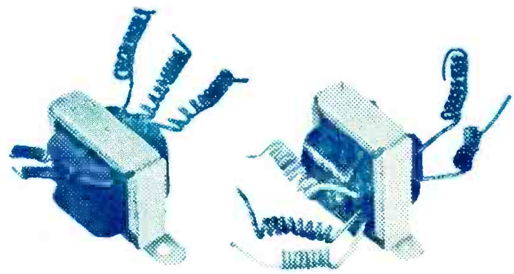

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