JUNE 1961

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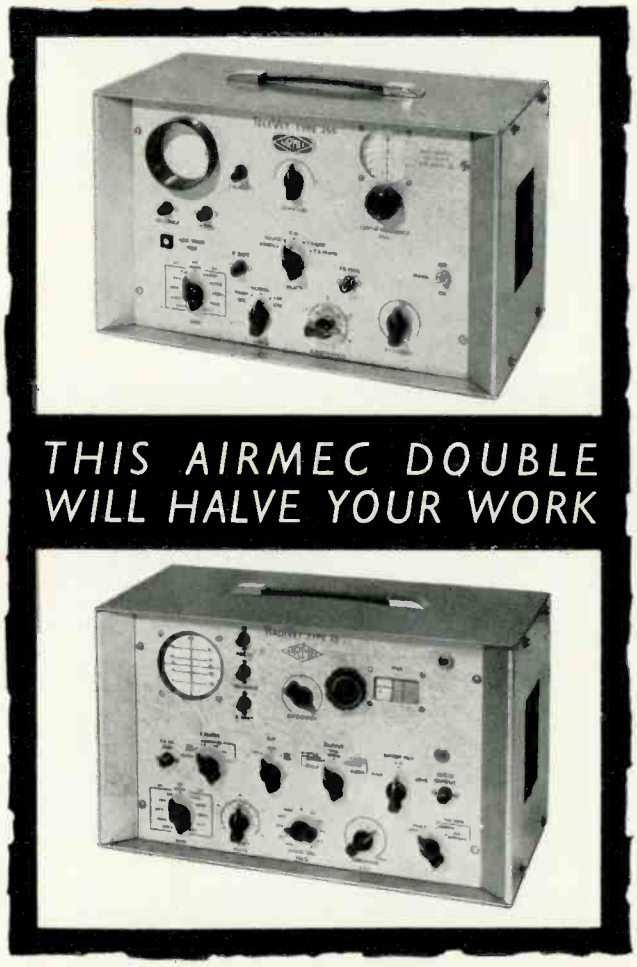

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SERVICE ENGINEER

Vol 4. No. 2 JUNE, 1961

Edited by W. Norman Stevens

Issued as a special supplement with "Radio Retailing"

In this issue:

CRC 2·26

Anti-corrosion treatment

A new anti-corrosion and anti-moisture treatment for electrical and electronic equipment has been introduced by Corrosion Reaction Consultants of Philadelphia and distributed in the U.K. by Hellermann Ltd. Known as CRC 2·26 it penetrates pores, cracks or holes and displaces absorbed moisture.

After driving out the moisture CRC 2·26 forms a film to prevent further contamination. The film does not become brittle or crack and is a corrosion inhibitor for metallic surfaces. It also has a beneficial lubricating effect on moving parts, and can be used to restore to operation equipment that has been damaged by excessive exposure to moisture or by total immersion.

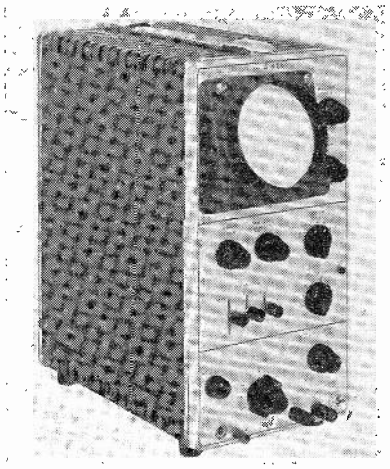
CRC 2·26 is supplied for spraying in a handy 16 oz. aerosol dispenser and is also-available for brushing and immersion in cans and drums. The dispenser is obtainable at 28s. from the distributors: Hellermann Ltd., Gatwick Road, Crawley, Sussex.

New Serviscope

MODEL S42A

Being shown for the first time at the Component Show, is the new *Serviscope* Model S42A. This carries the development of the *Serviscope* a stage further with an increase in the Y amplifier bandwidth to 9 Mc/s at the normal gain of 100mV/cm. All features of the Model S42 are preserved, including the 10X gain facility at limited bandwith. The price of the new instrument is £97.

Also new from Telequipment is the new PA2 twin channel pre-amplifier, designed for use with any oscilloscope in the *Serviscope* range. It gives an increase in sensitivity of up to 100X.



PLASTIC CONTAINERS FOR MARCONI VALVES

From May, most noval and B7G types of Marconi valves will be available in a new plastic container as well as the unit carton formerly used. The new plastic containers, developed by Electronic Tubes Ltd., in conjunction with Pioneer Plastic Containers Ltd., are cylinders of clear polystyrene, closed at one end and moulded in strips of three.

The polythene bases into which the valves seat, form pin protection and a positive push fit to the cylinders. A buffer of plastic sponge at the closed end of the cylinder cushions the valve top and ensures they are held firmly in position.

These advantages are claimed over the conventional cartons: 25 per cent saving of shelf space. Valves are visible. Easier to remove and return valves, Pack does not deteriorate. More robust.

COMPONENT SHOW

The 17th Component Show, organised by the Radio & Electronic Component Manufacturers' Federation, is being held at Olympia, London, from May 30 to June 2. Further details on pages 99-107.

Literature received

RADIOSPARES May/June catalogue is 68 pages thick and contains details of various new and improved components. Introduced with this catalogue is a "choke" output transformer (price 7s. 6d.) designed particularly for EL84 valves, matching 3- 7- and 15-ohm speakers, and featuring two taps on the primary for use in hum cancellation. Also new is a type V87 dual replacement control (150kΩ and 1MΩ) as used in the Pye V110 and Invicta 638 series (price 9s. 0d.), and an entirely new range of multiple plugs and sockets to replace the earlier *Varicon* type.

WILKINSON'S TOOLS have sent us their Special Purpose Tools catalogue which contains details of box joint, long nose, special pivot, relay adjusting, taper nose centre, extractor and nut pliers, nippers and a special cutting and clinching plier, designed for use with printed circuits. Copies may be obtained from the company at Kerfoot Street, Warrington, Lancs.

LEARNING MORSE is a 20-page booklet giving methods of learning the code, key manipulation and methods of practice, in addition to details of a transistorised practice set. This is the 13th edition and is published at 1s. 10d. post paid, by Iliffe Books Ltd., Dorset House, Stamford Street, London, S.E.1.

STANDARD TELEPHONES AND CABLES LTD. have sent two new booklets. MS/116 is a valve equivalent booklet giving equivalents to, and the degree of interchangeability of, the STC valve range with British, American and Continental valve types. MK/162 describes a 6-transistor superhet receiver and gives full details including performance curves. Both booklets are obtainable from STC Ltd., Footscray, Kent.

Service Viewpoint

AFTER a year or so of comparative steadiness so far as TV circuitry is concerned, things appear to be shaping up for some interesting developments. For instance, the introduction of the new Ekco model TC382 is more than just another TV set which will appear from time to time on the workshop bench. It suggests the possibility of a break in routine.

This receiver is designed for the later possible conversion to 625-line operation on u.h.f. The station selector switch has a position which provides for switching in an additional unit which would include a u.h.f. tuner and, if required, for converting the line timebase to 625 lines.

Sets to come

Ekco have gone the whole way in their crystal gazing, even planning an alternative r.f.-i.f. printed circuit panel which could be switched in should the vision/sound channel spacings be different from those now used.

It seems highly probably that other companies are thinking, and acting, on similar lines. For the public, of course, these facilities mean that they can buy a receiver confident that it would not become obsolete should line standards be changed during the working life of the set.

For the engineer, it implies more complexities to tackle in the future. But the stimulus of breaking new ground should compensate for the initial headaches involved in learning about the new techniques. And, whichever way you look at it, if a change to 625-lines is made with a substantial number of convertible sets in use, business should be brisk. Shades of the mid-50's and Band III!

It is also fairly safe to say that the stage is being set for launching transistorised TV receivers, although when is open to conjecture. Possibly the present state of uncertainty over transmission standards may be holding back finalised designs.

Nevertheless, manufacturers are working on the problems, many of which have been solved. Transistors for most applications are now available, others soon will be. And in this concept we are considering not only receivers capable of operating on 625 lines at u.h.f. but giving a performance up to, or even better than, standard valve sets and having large screen tubes.

At the present price levels and market conditions, the demand for small carry-around sets is not likely to be very great and when transistor TV sets begin to appear most will probably be of conventional portable type.

By then transistor prices may be low enough (due to increased volume of production) and their performances good enough that the old cliche "valves are on the way out" may well prove to be true after all.

New Books

★ *SERVICE ENGINEER REVIEWS OF THE LATEST TECHNICAL LITERATURE*

Fundamentals of Radio Receiver Servicing, **by E. M. Squire. Published by Sir Isaac Pitman & Sons, Pitman House, Parker Street, Kingsway, London W.C.2. 7¾ × 5 in. 172 pages, 152 line drawings. Price 15s. net.**

THIS review is undertaken with some misgivings. Here is an unpretentious book, that does what its author sets out to do – places before the novice such information as will help him in his initial training period. It is the third edition of a 1940 publication, and has been revised to cover some of the more important modern radio receiver techniques, such as F.M. reception and the use of printed circuits and transistors.

In its original form it undoubtedly helped many a learner along the way. Nowadays – I wonder . . .

This does not pretend to be a textbook, does not delve more deeply into theory than is necessary to understand how a radio set works. On the other hand, it is not a guide for a practical man.

Many of the "thumbnail" circuits given are purely academic, serving only to illustrate the text. A novice would be hard put to identify them in the commercial domestic receiver.

For this reason alone the present volume would not be the cause of my misgivings. But there is another, less concrete, stricture, that would make me hesitate to pass it on to the apprentice as a book to keep at his elbow.

That stricture is the style of presentation. The form and manner of *Fundamentals of Radio Servicing* are sadly outdated. With so many technical books on the market whose authors contrive to be both accurately informative and entertaining, Mr. Squires is faced with some fearsome competition.

The Chinese had a word for it – two words, in fact, *wen-hua* and *wen-ming*, the former denoting the influence of culture, the latter the brightness or overlaying style. This book lacks *wen-ming*, if I may annoy the pedants by so saying. That it need not do so without losing sight of its aims is the reason for my stricture, the cause of my misgiving. A glance at the works of such stalwarts as Scroggie and Briggs will underline my point.

In short, though this may be an excellent book to pass on to the apprentice, I greatly fear he would not bother to read it.—*M.A.Q.*

Television Receiver Servicing. Volume 1: Time Base Circuits. **Second Edition, by E. A. W. Spreadbury, M.Brit. I.R.E., Published by Iliffe Books Ltd., Dorset House, Stamford Street, London, S.E.1. Size 8¾×5½ in. 362 pages. 214 illustrations. Price 25s. net. (26s. 5d. per post.)**

IN his preface to the first edition the author stated . . . "*probably more than half of the servicing problems encountered with television receivers, and certainly 75 per cent of the unfamiliar techniques involved, are located in these (timebase) sections*". This is a statement with which few practising service engineers will argue, and it is as true now as it was in 1954.

The present edition has had a substantial facelift, it has been brought up-to-date (Autumn 1960) and there are a number of new features. The most important changes, wider-angle deflection and the circuit and component changes it necessitates, modern deflection coil assemblies, line output transformers, third harmonic tuning of these, and the latest frame circuits have all been given a full descriptive treatment.

Other commendable changes, in addition to some extensive re-writing, are the adoption of the 'decimal' system of numbering illustrations (the integer denoting the relevant chapter), and the inclusion of component values on many illustrations. A wide variety of circuits are discussed in detail and many "incidental" servicing tips are given. This is more than a mere academic review of current circuits, and should commend itself to the newcomer particularly.

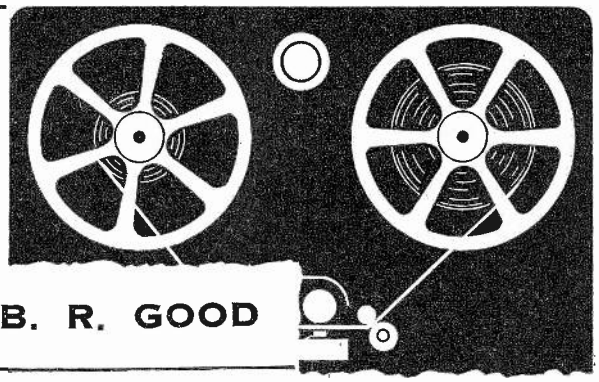
This is not, however, intended as a "beginner's book". The author stresses that a good grounding in radio techniques is essential; there is no writing-down, no waste of space on that exposition of fundamentals that pads out too many technical books.

A final chapter on the use of instruments is lavishly illustrated. The author does not hesitate to recommend certain servicing practices and makes it clear that some instruments are more of a luxury than a necessity to the average workshop.

Readers who have not yet seen the two-volume work in its original form will assuredly find this edition a useful addition to the technical bookshelf. Those who already possess the first edition need have no qualms about wasting their money – this is a completely revised and re-written work. Thoroughly recommended.—*D.C.*

Servicing the

MODERN TAPE RECORDER



PART THREE OF A NEW SERIES BY **B. R. GOOD**

IN the last part of this series the "popular" decks were discussed. We are now ready to move on to some of the more complicated mechanisms, and those machines that are complete designs. On the latter, it will be usual to find additional mechanical arrangements, augmenting the electronics.

MOTEK K10

But modern technique has swung dramatically toward simplicity, even with the more ambitious tape recorders. As an example, let us consider the Motek K10 tape deck, manufactured by Modern Techniques, of London.

This is a three-speed deck of attractive design, accommodating up to seven-inch spools, using three motors, separate push-button functional switching with eight two-way change-over switches on the inbuilt wafers for playback and record, and having the minimum of mechanical operation for motor switching.

An indication of the mechanics of this widely used deck is shown in Fig. 1. This drawing is not to scale, and the view of the underside only shows sufficient of the mechanism to illustrate our discussion.

The three motors, Take-up, Rewind and Capstan, are lettered A, B and C, respectively. Selection of motors is made by switch contacts on the push-button unit.

The reduced torque needed for Record and Playback is obtained by switching the field coils of the take-up and capstan motors in series. For Rewind, these field coils are in parallel (fast forward), and field coils of capstan and rewind motors in parallel for fast reverse.

On later runs of the K10 there will be found a high-wattage resistor on the base of the take-up motor, with an arrangement of tapped field coils to provide the lower torque as necessary. The system is basically as outlined above, however, and should give the serviceman no headaches.

The shaded-pole motors have self-oiling bearings; only a light mineral oil sparingly applied to the felt pads around the bearings should be sufficient after protracted use.

The Mechanics

When either Record or Playback button is depressed, the mechanical function is identical. Except for the simple interlocking safety switch to prevent accidental erasure, the only difference on "Record" is in the switching.

Operation of record and playback buttons depresses the flat (D) which is fixed to a swivel arm (E). A linkage lever on the same arm moves against the tension of spring (F) and actuates lever (G). The precise operation of these levers is better seen in Fig. 2. Here it is shown that the movement at the lower (deck direction) extremity of the swivel arm is transmitted to (G) by a rod (H), against a coiled spring tension. The length of this rod is controlled by its locknut, as is the length of the other transmission rod, (J), shown in Fig. 1. The inner end of lever G actuates this latter rod, moving the plate (K) forward.

On this plate is mounted the pressure pad assembly, which engages the tape with the heads. Exact adjustment of these nuts (if they have been disturbed) is most important, and should be done as follows:

First adjust locknut (j) until approximately ¼ in. of rod protrudes, then, with Record button depressed, adjust the other nut (h) until the rod (H) has about

(Continued overleaf)

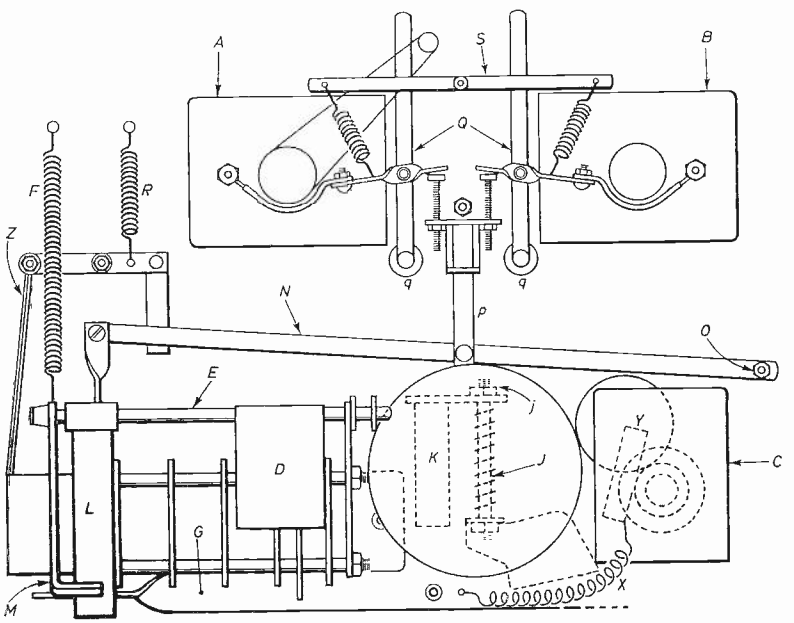


Fig. 1: Underside view of the Motek K10 tape deck showing the main components of the mechanism. (*This drawing is not to scale*)

MODERN TAPE RECORDER
—continued

$\frac{1}{32}$ in. of free play. Next, press the Stop button and re-adjust nut (j) until the Record button push-rod is just touching flap (D). Finally, depress Record and Stop buttons alternately, ensuring that the felt pad assembly on slide (K) springs back sufficiently.

It may be necessary to make these slight adjustments several times to achieve the right balance of tension. Do not be tempted to alter the pressure pad movement by bending flap (D) on the arm (E) – a common maladjustment!

Operation of any of the other three push-buttons, Rewind and Stop, allows the spring (F) to return this mechanism to neutral. The Rewind buttons make only electrical switch changes. The Stop button operates the brake mechanism as follows:—

Flap (L) is depressed, carrying with it the interlock lever (M). The lower (deck) portion of (L) moves forward. This is linked to lever (N), pivoted at (O), carrying lever (P) in a slide assembly, with two lock-nutted screws for individual brake adjustment. Against the heads of these screws rest the two levers attached to the brake bands.

These are pivoted on the brake assembly levers (Q), assisted by spring tension. Return to the neutral position is effected by spring (R) when any button other than the Stop is pressed.

Tape Spillage

To lessen the risk of tape spillage, correct brake adjustment should be made. With the Stop button depressed, see that the locknuts on the two screws are well clear of the brackets. Slacken the assembly fixing nuts (q) and remove the transverse arm (S), which is held by its central screw.

Adjust each brake separately by rotating the spool and its brake drum while moving the appropriate lever (Q) left or right for the desired degree of tension. Then tighten the nuts at (q-q) and replace transverse arm (S).

Note when adjusting that the servo action of this type of brake enables freedom in one direction and tension in the other, so any alteration must take note of the normal direction of rotation of the spool hub.

Finally, check that the locknuts on the screws are approximately $\frac{1}{16}$ in. clear of the bracket when the Stop button is pressed.

As a further safety feature, an Interlock device is incorporated, making it impossible to switch from function to function without first depressing the Stop button.

Referring again to Fig. 2, we see that a bush (T) is free to slide along the interlock arm (U) when Record or Playback button is pressed. But if the Rewind or Fast Forward buttons are pressed, the flaps (L) and (D) have returned to their neutral positions and spring (V) carries the inner end of arm (U) to a position where it prevents the bush from moving

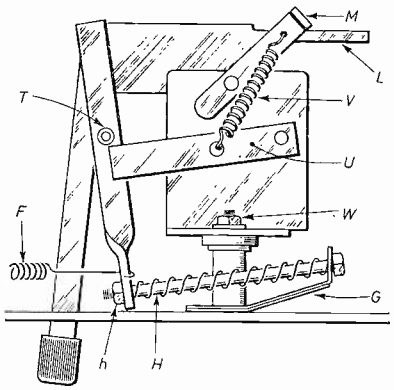


Fig. 2: Side view of the switch mechanism used in the Motek K10 tape deck.

forward, thereby forestalling accidental switching to Record or Playback until the interlock is released by lever (M) being raised by flap (L) (Stop button depressed).

Any adjustment of this assembly can be made by first slackening the holding nut (W) and positioning the assembly for correct operation, then tightening the nut.

The capstan and flywheel assembly are straightforward, the intermediate drive wheel (Y) being assisted in contact with flywheel and stepped pulley by spring (X). To remove the idler assembly it is only necessary to release this spring. Alteration of the height of the pulley is carried out by first slackening the grub screw at the side of the three-step pulley.

Small Points

Small points to watch are the correct height of spool hubs and the tension of Pause cord. The latter is shown at (Z) in Fig. 1. It will be noted that it passes through a fibre washer at the linkage end. Pivotal action enables the outer end of lever (G) to be pulled by this cord when the Pause lever is operated, disengaging the pressure pad assembly. Incorrect tension can cause some peculiar symptoms. Check also the correct tension of return spring (R).

The hub height is easily adjusted by a grub screw accessible from above the deck. Ensure that the decorative top-plate is tightly screwed down on the steel deck-plate, or a rubbing spool can cause spillage.

Loose spooling and tape spill are prevalent faults with this type of mechanism, but can usually be traced to maladjustment.

Little space need be wasted on heads, except to mention that on earlier runs a high impedance erase head may be found, whereas some later models incorporate a double gap low impedance erase head, suitable for 25 to 30 Volt feed. The Record/Playback head is high impedance, with two-screw azimuth adjustment.

PHILIPS TAPE DECKS

A number of quite novel features are to be found in the Philips range of tape decks, and the Philips, Stella and Cossor machines that incorporate them.

Of the popular range, there are two main trends, which can best be illustrated by consideration of the main points of two specific machines – the EL3541 and EL3542. If space allows we may later consider the more elaborate stereo models, such as the EL3536.

The EL3541 is a four-track, single-speed ($3\frac{3}{4}$ i.p.s.) instrument, which is basically similar to the well-known 3515, but includes superimposition and a stereo playback arrangement, with the addition of a suitable amplifier.

A later version, the EL3541/15B has a similar mechanical layout, but the main amplifier switches are printed contact sliders and the amplifier components are mounted on two printed panels, using a different circuit.

No great advantage is gained by a general layout diagram, and illustration of the main adjustments can be seen in Fig. 3.

Brake System

The brake system shown is that of the earlier models. Adjustment of the rod (A) by locknut (B) against the pressure of the spring (C) allows the main setting of the bracket on which the brake shoes are mounted.

Correct adjustment is for the brake pads to be moved 1 mm. from the turntables in fast forward, rewind or record/play position. The end of rod (A) should be engaged by the tongue of lever (D) under these conditions, holding the brake pads clear. Adjustment of tension can be made by alteration of the anchoring position of spring (E).

When the central Stop key is pressed, lever (D) moves away from rod (A), allowing spring (E) to apply the brakes. In this condition, the clearance between the end of the rod and the lever should be no more than 1 mm.

Some allowance for wear can be made by bending the brake felt assemblies to obtain greater friction between the rubber pads and the turntables.

Care should be taken to ensure that the given clearances are correct before any attempt at bending the bracket.

In the later model, there are two nuts securing the bracket to rod (A), and a pair of springs in place of (E). When adjusting these nuts, do not forget to tighten both against the bracket, or end play of the rod will result, and consequent faulty braking.

Drive Belt

Another possible fault that can give rise to erratic recording is caused by a slack drive belt. There should be an angular rotation of the tension wheel mounting (F), allowing the tension wheel (G) to move some 10 mm. against the tension of the drive belt before the bracket comes against its stop. *A movement smaller than this indicates that the drive belt has stretched.* (See Fig. 4).

Tension of the belt can be measured in its working position by applying a pressure gauge to the spindle of the tension wheel, with the belt removed, when a force of between 500 and 600 grams should be necessary to push the tension wheel to its normal position. The height of the tension wheel, and indeed all the points with which the drive belt is in contact, must be adjusted for a drive without twist.

Flywheel Adjustment

Height of the flywheel is adjusted by a screw at the bottom, locked by a nut. The coupling wheels of the turntables are also easily adjusted, if necessary, by slackening of a grub screw.

But here some care must be taken not to mistake poor clutch action for an incorrect level. First check that the drive belt runs level in all its grooves and ensure that grub screws are tight. Then work up towards the turntables.

The eventual height of the turntables to allow horizontal tape travel may be

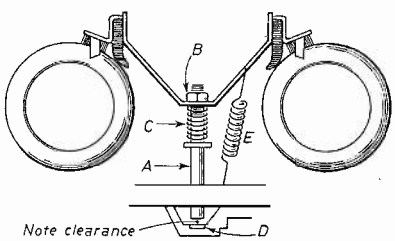


Fig. 3: Sketch of the brake mechanism used used in Philips tape decks.

altered in two ways. First, the ends of the brackets below the clutch spindles should be checked to see that the "set" is correct at 1½ to 2 mm.

Then the height of the turntable can be varied by the addition of the small washers beneath the friction discs. The slightly larger washers under the clutch are to ensure that the turntable "sits" about 1 mm. clear of the "vulcalan" plugs of the coupling wheel.

The left-hand coupling wheel and turntable are allowed to run anti-clockwise against friction pressure, and the right-hand to run both anti-clockwise for take-up and also clockwise under friction to eliminate tape spill during fast re-wind.

Variations in these pressures often gave trouble on earlier models that had been in use for some time, and many engineers made the mistake of embarking on laborious clutch adjustment. *Before doing this, check the "life" in the felt pads and try the effect of a little degreasing with carbon tetrachloride.*

Tape Pressure

The pressure of the tape against the heads can be adjusted by bending the brass plate on which the felt is glued. Check that the felt is not loose and that the solder behind the turned ears of the brass plate is still secure. Some earlier models were prone to looseness at this point after prolonged use.

Pressure roller tension should be between 800 and 1000 grams against the capstan, allowing a tension of more than 500 grams to draw the tape through the mechanism.

To bring this pressure up to standard, first check that the pressure roller is degreased (be sure after degreasing that no C.T.C. is left to contact the tape – allow time to evaporate, or, to be safe, use methylated spirit) and finally adjust tension of the spring at the right-hand end of the bearing bracket for optimum pressure.

When these points have been checked, it is permissible to go on to record/playback head alignment, certainly not before. It cannot be emphasised strongly enough that a hasty adjustment to overcome a suspected fault may give the engineer a great deal of unnecessary work.

To set the head at the correct level, first adjust the screws (A), (B) and (C), as shown in Fig. 5, so that the tape runs through the head guide with no twist. Then make the final adjustment to screw (B) for perpendicularity of the gap.

For this operation a test tape is advisable. This can be made on a known good machine by recording a frequency of about 5 kc/s at a constant level. On playback, screw (B) is then adjusted for maximum output, measuring with a valve voltmeter at the pickup socket, for convenience.

It may be necessary to re-adjust the head level after this operation, when the whole procedure will have to be carried out again. Finally, it is a good idea to seal these screws with a touch of paint, just to discourage the sort of customer (or serviceman) to whom they are too easily accessible!

Erase Head

The adjustment of the erase head on a four-track machine needs some care if correct readings are expected, with no overlap or attenuation. On these machines the makers recommend a procedure that can serve as a general guide. First the erase head is levelled by its set screws so that the top edge of the tape is levelled with the top edge of the core. Then a 1,000 c/s signal is recorded

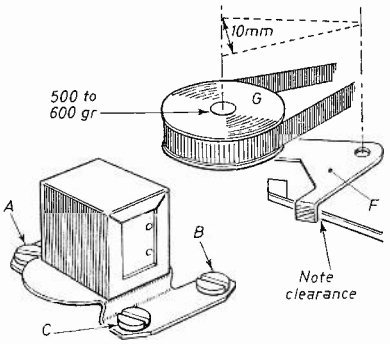


Fig. 4: (*Top right*) **Tension wheel mounting in Philips tape decks.**

Fig. 5: (*Bottom left*) **Record/Playback head of Philips tape deck showing positions of the three adjustment screws.**

on Track 1 at an input voltage of 100 mV, measured at the Radio/P.U. socket with the volume control at maximum.

This recording is repeated on Track 3, by using the track selector switch. Then the recordings are played back with the volume control adjusted for a constant level output of 1-volt, measured at the extension L.S. socket.

After this, the tape is turned over and Track 2 is erased. This gives a "sandwich" of silence between the two recorded tracks – if the head is properly aligned. If not, some of the Track 2 erasure will have affected either the track above or below and introduced attenuation.

All that is now necessary is to play the recorded tracks back and note which is attenuated below a figure the makers quote as 850 mV. If Track 1 is attenuated, the head is too low, if Track 3, the head is too high.

As a final note on the mechanical arrangements, see that the printed blocks of the switch slider lie under the stator when the switch is at rest position. Coarse adjustment is by bending the bracket in which the cable is secured, fine adjustment by movement of the nuts on the end of the operating rod.

Part Four
of this new series
will appear
in the next issue

NEW!

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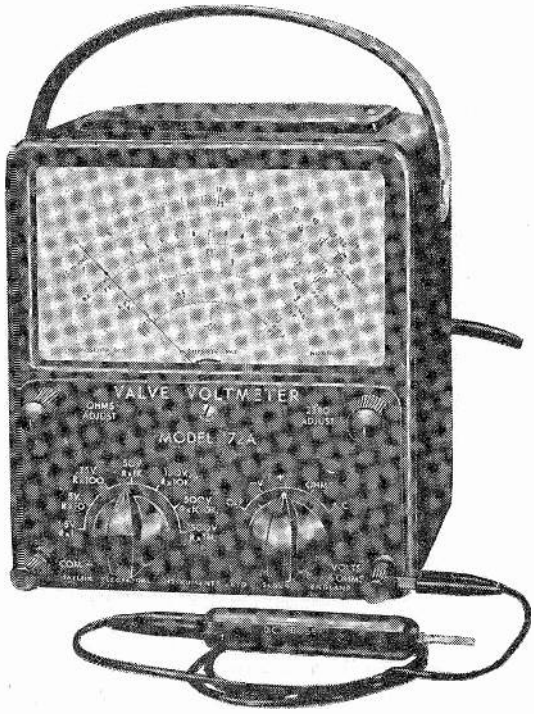

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Input Resistance, 11 megohms.
A.C. Volt Ranges, 0-1·5-5-15-50-150-500-1,500 volts R.M.S. also calibrated for peak to peak readings.
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Input Impedance, 1·5-150V ranges 830k, 500V range 1·3 meg. 1,500V range, 1·5 meg.
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METAL INDUSTRIES GROUP

Which? *tape recorder report — two viewpoints*

I READ with interest your comments on our comparative test of tape recorders (*p. 179, Service Engineer, April*). Nothing we said in the report we published in *Which?* in January of this year implied that we were trying to make a comprehensive review of the tape recorder market. Your contributor, Mr. B. R. Good, therefore, is I think, a little unfair to us when he calls our report "woefully inadequate". This is certainly not the view of many of our members. The 180 recorders you mention as the total market, of course, include a number of quite distinct groups ranging from machines designed for specialists to what could perhaps be described as "teenagers' toys".

The sixteen models we tested were the market leaders of the middle price range when we bought the test samples in the shops. They were thus the ones most likely to be offered to members of this Association who wanted a tape recorder for non-specialist purposes. And, it was these people our report was designed to help.—**Casper Brook,** *Director, Consumers' Association (publishers of* Which?)

B. R. Good replies:

Whereas in theory the Consumers' Association is a very good idea, in practice there are some snags. As Mr. Brook says, the *Which?* report did not claim a fully comprehensive survey of the tape recorder market. But he is surely not unaware of public reaction to these reports? The lay Press invests them with an air of authority and a comprehensive survey is thus *implied.*

The machines selected were a very small proportion of the available range. They were judged on their individual merits and these assessments used for comparison. Any small deviation from the production norm would be sufficient for the report to carry condemnatory weight with readers. All that could reasonably be said was that *the machines tested* did or did not come up to their manufacturers' claims.

In this respect I consider the CA report to be "woefully inadequate". The general public is bound to gain the impression that the machines tested are the best on the market. In some cases they may be, but on the basis of the CA selection, they are merely those which enjoy the largest sales.

As an illustration, I can think of one firm with very impressive sales figures, whose products were continually giving trouble, and who have now ceased production. Another firm that has made tape decks for years, and latterly complete tape recorders, has sales that are not fantastic but their products seldom bother the serviceman at all.

By all means let the CA direct its objective authority at pots of jam and income tax, but such highly specialised technical products as tape recorders are best left to those capable of offering an overall review rather than a restricted comparative report.

TRADE TOPICS *Letters to the Editor*

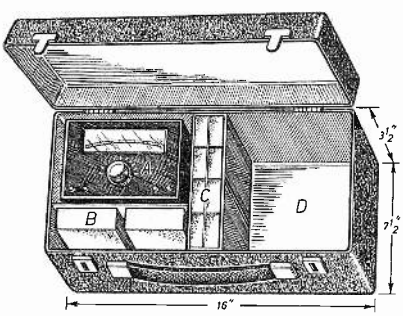
The Editor welcomes letters on subjects of technical or trade interest, but does not necessarily endorse the views or opinions expressed by correspondents.

★

Another Personal Toolbox

THERE must be as many "personal" toolboxes as there are engineers to carry them, but I feel my own arrangement may be of some interest to other readers.

I have a small case which was once the sample case of a crockery traveller.



It is in four sections, as shown in the drawing. The leather partitions are about an inch shallower than the base, allowing one to overlay the compartments with a soldering iron, valve manual and duster. The iron shank and bit are housed in a tubular spanner $\frac{1}{4}$ in.$\times \frac{5}{16}$, standard size for potentiometer locknuts.

In the compartments are (A) an Avominor, universal; (B) two lozenge tins, one containing assorted nuts, washers and screws, the other containing knob spring clamps, springs and a few iron dust cores; (C) eight "popular" valves as follows: PCC84, PCF80, PL81, PY81, EY86, PCL82, PCL83 and ECL80. Section (D) contains basic tools, such as a number of screwdrivers, large and small pliers, side-cutters, a nest of flat spanners, 2BA and 4BA box spanners, a file and a junior hacksaw.

There is also a small bottle of switch cleaner and a twist of solder (a full reel takes up too much space). The whole case is compact and unobtrusive. I have found it a great timesaver and most impressive to customers.

As a matter of interest I keep all my other "stock" in a Geo-Pat toolbox in the van. It is surprising how much one can pack in these boxes, all readily available at the snap of a catch.—**I. McGregor,** *Cardiff.*

★

Basic Needs

ALL this nonsense about tools and boxes! I've been in this game since 1935 and still manage quite well with all I can carry in my pockets. This is, my Neon tester, a small torch, a couple of screwdrivers, a pair of blunt pliers, pair of long-nosed and a small sidecutter.

With these basic items it should be possible for the average chap to weigh up the fault. Then, if he has to go to the van he can bring back as much as he likes. Carrying the big stuff to every job is just a waste of energy.—**A. Sedbury,** *Birmingham.*

M. A. Quales replies:

Reader Sedbury missed the point. The aim if my article *Tools and the Man* was to discuss the wide range of tools and tool-carriers available to the serviceman. It certainly was not to advocate wasting energy by carrying them all at once.

But the key word in the letter is "manage". We can all "manage" with a wet finger and grub-screwdriver, and on occasions we have to, and are glad not to have lost the knack. But how much better to have the "basic" needs contained in a neat holdall, rather than pushing the lining from his pockets. What does Mrs. Sedbury have to say about that?

The other point is that a tidy toolbox never fails to impress a customer. Psychologists would tell us it is evidence of the sort of tidy mind a serviceman should have – if he wants to do his job properly, and not just "manage".

"Basic Electronics"

The Technical Press Ltd., 122 Westbourne Grove, London, W.2, have just released a new revised edition of the six-book volume of *Basic Electronics.* Extensive revisions and improvements have been carried out on each part and a complete new chapter on the cathode ray tube has been incorporated in Part 5.

The original edition was reviewed in the July, 1960, *Service Engineer* (page 46). The price remains the same for the new edition; *i.e.*, 12s. 6d. per part or 66s. for the complete volume of six books.

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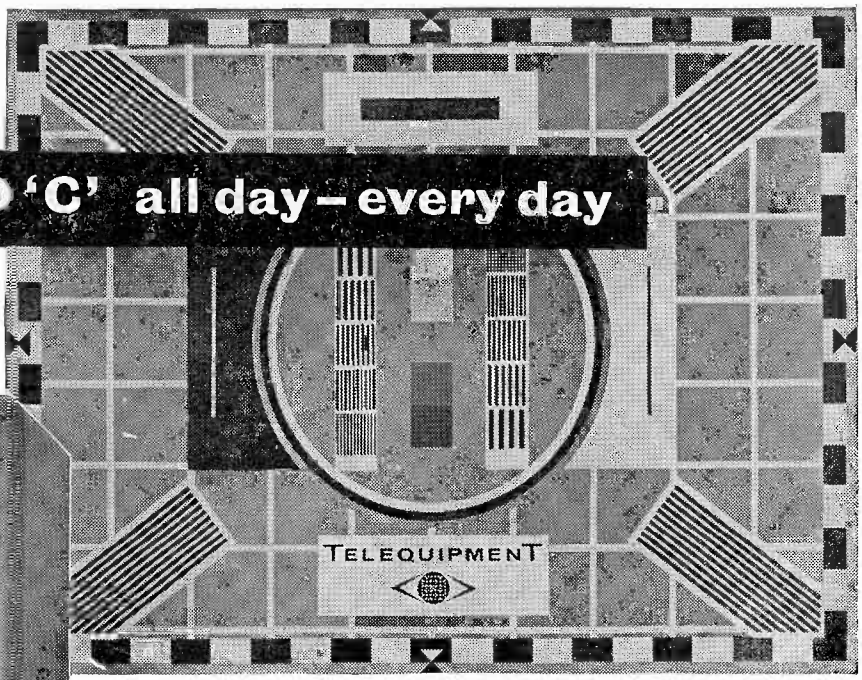

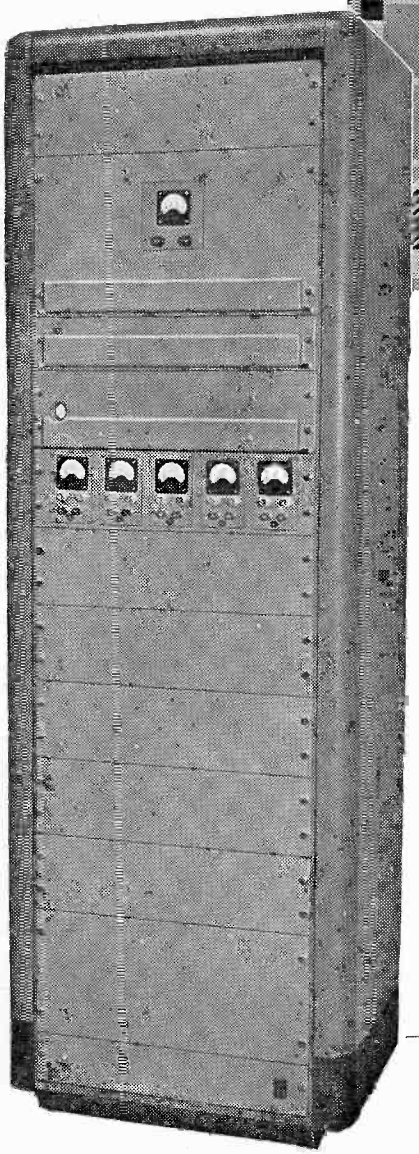

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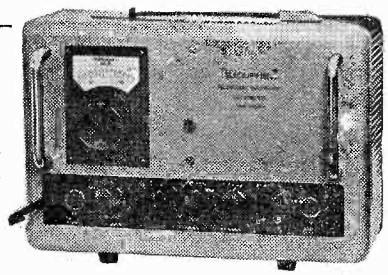

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Cossor 948

Trouble with Vision Symptoms were uncontrollable brilliance, coupled with no picture information. This was obviously a video fault. On these models the cause is usually a leaky detector crystal diode (a CG12E) which is located in the last i.f. can. But this time replacing it made no difference. The PCF80 video output valve was also changed, with no improvement.

Checking voltages on the video output revealed that the anode voltage of the pentode section which should be between 100 and 120 volts was actually down to 50 volts. Transferring the meter probe to the h.t. end of the corrector coil gave a reading of 150 volts.

Testing the coil for continuity when cold gave no clue, for there was, as expected, nearly a dead short. But tentative probing revealed that the fine wire of the coil, where it is soldered to the lead-out wires of its carrying resistor at the anode end, was held only by the insulating varnish, giving a lovely dry joint.

A gentle scrape with a penknife blade and a touch with the soldering iron cured the fault. Next time I'll check voltages before jumping to conclusions.—B.R.G., Gilfach (966).

Sobell T279

Line Stage Fault This set was returned to the workshop again after two previous visits within a short time. At previous visits, the line output transformer and output valve had been replaced. Each time the set had been run on test for 3–4 hours and found to be satisfactory.

This time everything was checked. Voltages were down in the line output stage. No cause could be found. On going through the voltages again the oscillator triode anode voltage was again noted as 50V. The printed circuit at this point reads "60V" printed in copper and this was cross checked with the manual, which showed 120V.

Resistances were measured and found normal but replacement of C108 cured the fault. This capacitor, which goes to chassis from the triode anode via a 4·7kΩ resistor, at first measured o/c but after putting voltage across it, it measured 200kΩ varying to infinity. C108 is mounted in a pac of components below the ECC82 valve.—E.J.D., Bristol (993).

Ferguson 606

Loss of Sound The trouble with this set was intermittent loss of sound and picture. As usual the set worked perfectly normally on the bench for some time before the fault developed. Eventually, after several hours, sound and vision went. At first it was thought that the aerial had become disconnected as the symptoms were those of very low sound gain with just a faint trace of picture.

The fault then cleared and it was found that movement of the tuner unit would bring on fault again. The tuner was tackled bravely but luckily the fault was found almost at once. The 16pF capacitor coupling the aerial to the r.f. amplifier was completely disconnected at one end. The application of a hot soldering iron completed the job. —F.E.R., St. Ives (983).

Items for publication

in this feature are welcome, particulary in regard to the more unusual type of faults. All contributions used will be paid for at our usual rates.

When sending in items for Technical Gen, please write (or type) on one side of paper only, adding rough sketches (where considered necessary) on a separate sheet of paper. Correspondence should be addressed to — RR Service Engineer, 46 Chancery Lane, London, W.C.2.

Marconiphone VT158

Loss of Interlace The complaint on this set (also applicable to HMV 1871 and Fergusoh 405T, 407T) was intermittent loss of interlace, two frames overlapping 1½ in. above each other. The fault would come on after about three-quarters of an hour, run for a quarter of an hour or so, repeating itself, or correct itself if a meter or oscilloscope test probe were used on any part of the frame circuit.

The PCF80 V13 (part frame oscillator) and the PCL82 (part frame oscillator and output) valves were replaced with no change, as was the OA81 frame sync limiter diode. In an attempt to find the cause capacitors in the frame timebase were artificially leaked with resistors of various values but this did not reproduce the fault condition. Capacitors were then disconnected in turn and in so doing the trouble was traced to the 0·1μF capacitor C104 which was found to be going intermittently open circuit.

Readers may be interested that intermittent flashing on picture on these receivers has been found to be due to the nut (bent metal type) on the channel selector disc working loose. The most effective cure has been to replace this nut by a 4BA solid metal type and to fix a spring washer behind it.—S.W., Buckingham (990).

Ultra V1770

Picture goes Negative The trouble with this set was that it would work normally for an hour or so and then the picture would go negative. The sound remained normal but the contrast control had reverse or little effect on the picture. Any application of instruments during operation was impossible as this returned the picture to normal.

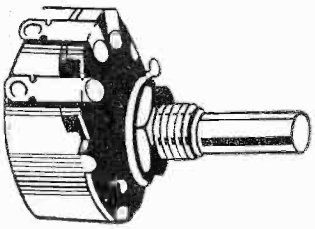
A valve voltmeter was connected while the set was cold and left in circuit while checks were made on the a.g.c., etc. All this proved fruitless. Attention was then turned to the video amplifier stage and it was here that the fault was finally found.

(Continued on page 27)

The Editor does not necessarily endorse the views expressed by contributors to this feature

Volume Controls for Radio & TV

by return



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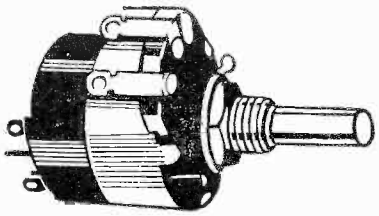

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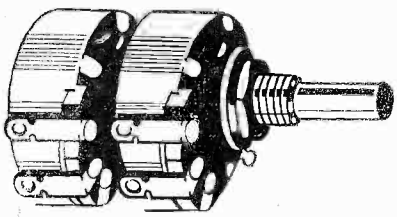

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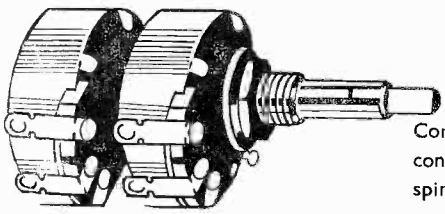

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TECHNICAL GEN *continued*

The 1μF electrolytic, in parallel with a 68kΩ resistor, coupling the detector output to the video amplifier grid, was found to be intermittent with temperature, the capacitance going down to about 0·01μF.—G.M., Smethwick (984).

Pam 752DL and 753C

Low Anode Volts One of these sets came in for servicing with the complaint of no raster. Receiver was switched on and a voltage check revealed normal h.t. and e.h.t. and normal voltages on the c.r.t. base except for the first anode (pins 10 and 7), which was between 40–60V instead of the normal 430V.

Receiver was switched off and an ohmmeter check revealed 30kΩ leakage between the c.r.t. first anode and chassis. At first the common fault of a leaky 1μF smoothing capacitor C108 was suspected but in this case this proved to be O.K.

The fault was traced to the 1MΩ vertical amplitude control R98 which had developed 30kΩ leakage between the top end of the track and the earthed casing.—E.L., Long Eaton (981).

RECEIVER SPOT CHECKS

No. 70: ULTRA VI780 AND VP1782

Low Gain: Check Cf1 for leakage. Check R6 for h.r. and Cf3 for leakage.

No Sound or Vision: Check R83 for o/c and C78, C13, Cf6, Cf4 or C14 for s/c. Check R7 for o/c and Cf5 for s/c, R11 for o/c and Cf7 for s/c, R12 for o/c and C12 for s/c, R29 for o/c and C33 for s/c, R35 for o/c and C36 for s/c.

No Vision: Check R39 for o/c and C39 for s/c. Check for faulty D1. Check L28, L29, L31 or L32 for o/c. Check C49 for s/c and C41 or C89 for s/c causing o/c in the limiter circuit.

No Sound: Check R89 for o/c and C110 for s/c. Check R92 for o/c.

Line Oscillator Inoperative: Check T1 primary for o/c, R69 for o/c and C64 for s/c. Check C60 for o/c or s/c.

Line Amplifier Inoperative: Check R74 for o/c and C67 for s/c. Check C65 for s/c or leakage. Check L35 and L36 for o/c. Check C69 for o/c or s/c.

Frame Oscillator Inoperative: Check for faulty C107 or C109.

Frame Amplifier Inoperative: Check for faulty C99. Check T4, the VA1033 thermistor or L49 for o/c.—E.L., Long Eaton (870B).

Ferguson 406

Vision Fades Out The fault reported was fading out of picture after half-an-hour. On test this proved to be accurate and the fault was traced to a dry joint on the video coupling coil to the grid of the video amplifier valve.

We have since had a number of these faults on this model and find that to save time, a gentle prodding with a knitting needle usually shows up this trouble. It is also worth while checking the smaller choke in the video stage.

Overloading on Band I in this receiver can also be cured by replacing the EF80 1st vision i.f. valve with a Type EF85 as this valve has less gain.—E.D., Sale (952).

Sobell T193

Trouble in Tuner This new receiver had no sound or vision on the local channels 5 and 10 but showed faint sound and vision on channel 3. There was no ignition or mixer noise but there were flashes on changing channels.

The tuner valves were checked and found OK. Checking voltages to the tuner was difficult due to the position of the turret, but the oscillator voltages were found to be very low. On removing the 10kΩ oscillator feed resistor and measuring its resistance this was found to be increased to 500kΩ. Replacement cured the trouble.

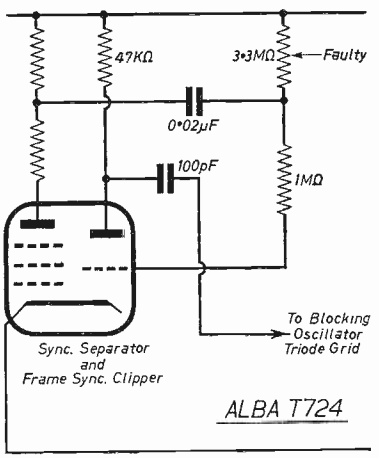
Later the same day, a T192 showed similar symptoms and in this receiver the feed resistor was open circuit. This fault may occur in any of this range of receivers—T192, T193, T279.—E.J.D., Bristol (992).

Alba T724

Faulty Frame Lock The set came in with faulty frame lock and the trouble was quite obviously a 2MΩ vertical hold control with a loose slider. After replacing the control, there was persistent frame jitter.

The obvious possibilities were tried —ECL80 blocking oscillator, the 0·05μF feedback and 0·1μF bypass capacitors in the anode/grid circuit of the pentode section, the 0·1μF anode decoupler of the triode section and the 0·05μF coupler from the anode of the pentode. All to no avail.

It was clear that the fault originated "farther back" and a test of the frame sync clipper stage showed 150 volts on the anode of the triode section of this ECL80 where there should only be 50 volts.



The 47kΩ anode resistor was correct, as was the 0·02μF coupler from the anode of the sync separator (pentode section). All that was left was the fixed potentiometer in the grid circuit, which consists of a 3·3MΩ and a 1MΩ in series from the h.t. line, with the 0·02μF coupler taken to their junction.

Although both these resistors were perfectly normal when measured, replacing the 3·3MΩ resistor cured the jitter and gave a good solid lock.—H.W.H., Bargoed (965).

Philips 17TG106U

Trouble with Sound Several of these receivers have been experienced with sound trouble. Symptoms are low volume when first switched on after being unpacked, or the development of low volume after a few days from installation.

(Continued on page 29)

Brainless Bertie

Bertie made an awful boob
With a low-emission tube,
Couldn't have popped it any neater—
6-volt boost, but 2-volt heater.

Feste

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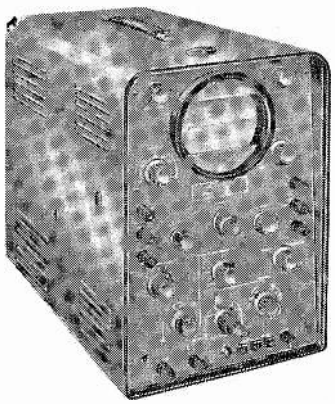

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TECHNICAL GEN continued

When the volume control is turned to maximum, the picture shrinks as the PCL83 sound output valve draws excessive current.

The trouble has been found to be due to the body of the 0·015μF ceramic capacitor C115 (coupling between the triode anode and pentode grid of the PCL83) touching the ferrite bead on the lead from the pentode anode, which in turn is pressed on to the valve base tag.

H.t. leaks through the paint coating on the capacitor to the outer conductor, which is in turn connected to the pentode grid via the volume control, and causes the trouble.

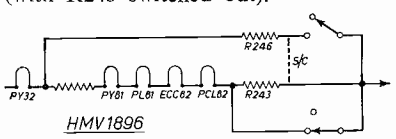
Moving C115 obviously effects a cure and neither it nor the PCL83 appear to suffer any damage as the volume then returns to normal.—J.P., Enfield (985).

H.M.V. 1896

Lack of Width

The complaint with this receiver was lack of width and poor frame linearity. After extensive checking of valve d.c. voltages and components in both time base circuits had proved fruitless, a check was made on the heater voltages of the timebase valves.

These were found to be low. The 780-ohm wire-wound resistor R246 (see diagram) was found to be in circuit on both radio and TV positions of the switch, whereas it should be out of circuit on TV and in circuit on radio (with R243 switched out).



HMV1896

Examination showed that there was a blob of solder which was short circuiting R246 to the bottom end of R243 on the tag panel. These two resistors are mounted side-by-side. Removal of the short restored everything to normal.—W.H.S., London (953).

Bush TUG34 Series

Lack of Contrast

This set was received with no picture. This was restored by fitting a new c.r.t. but on test it was obvious that the picture was not as contrasty as is usual with this model.

The vision interference limiter was checked and found to be normal but routine voltage checks showed a low voltage on the video amplifier anode. This was found to be due to a completely open circuit load resistor.

A check on the circuit soon showed that the vision interference limiter was functioning as an anode load resistor. And presumably the set had worked in this condition for some time prior to the loss of picture fault.—G.M., Smethwick (991).

Philips EL3541

No Bias Volts

Playback on this tape recorder appeared normal, from a known good recording, but a recording made and played back on the machine itself was distorted. A quick testmeter check showed there was no bias voltage on either record or playback head.

Further voltage checks revealed that the pentode section of the ECL82 (bias oscillator on record, output valve on playback) had no anode volts. This was found to be due to the 0·01μF capacitor C19 which was leaking to 10kΩ.

On record this is the oscillator anode coupling to the oscillator coil (the other end of the coil being taken to chassis) but on playback is used as the output valve top-cut control connected from anode to a potentiometer which is earthed.

Replacement brought back the bias voltages (approx. 50–80V a.c.) to the heads and restored normal operation.—G.H., Harrogate (986).

● odd spot

OUR outside engineer was in the customer's house attending to a complaint of "rattling on sound". After five minutes the noise occurred and the engineer, being a frugal type, immediately exclaimed: "I know that sound. It's money rattling!"

Indeed it was. The little girl in the house had pushed two pennies through the holes in the front of the cabinet and they were inside the speaker.—J.H.J., Bristol (872).

SERVICE BRIEFS

Raymond F90: Engineers familiar with this model will know that the transitron frame timebase is particularly prone to frame jitter. A modification that cures this trouble is to change R54 to 220kΩ, remove CV3 and replace with a fixed 0·002μF capacitor, fit a 2MΩ potentiometer in the hole left by CV3 and wire this to the junction of R54 and R55.—J.H.J., Bristol (902).

Invicta 638 (Pye RV80B chassis): A new set was unpacked and switched on but there was no picture. There was an arcing noise in the region of the line output transformer and as it was getting dark we switched off the lights in the workshop in the hope of seeing signs of the arcing. A close inspection revealed a faint glow in the 0·1μF anode decoupler to the efficiency diode (C91) and a replacement restored the picture.—S.W., Buckingham (908).

Ultra 1770/1771: The following modification to this series of receivers will improve the frame hold. Change C98 from 300pF to 680pF, change R88 from 180kΩ to 270kΩ.—C.J., Guildford (925)

Pam 600: Intermittent non-linear frame with excessive height, both linearity controls having little or no effect. This fault was traced to C69, 0·01μF capacitor which had developed a leakage of approximately 1·5kΩ. If tapped this leak would disappear or change in resistance.—G.C., Boroughbridge (928).

Ferguson 992T Series: We have had several of these old but fairly reliable receivers into the workshop recently for the following faults that are now cured on the site. Sound distortion—R42 (3·3MΩ) open circuit. Low gain—crystal detector inside i.f. can faulty. No Line—line hold control R31 open circuit—J.P-J., Bristol (933).

Ekco T368: The symptoms were bent verticals but all the obvious cures failed to correct the fault until it was noticed that the brass band holding the two halves of the scan coil assembly was fractured. When the band was repaired and the two halves of the yoke pulled together the fault cleared.—P.E., Bedford (924).

Ultra VT917: The trouble was poor line sync. The contrast control had to be turned up past the point of overload before the line hold would lock steadily. We found that C40, the coupling capacitor between the video amplifier and sync separator, had decreased in capacitance from the specified 0·1μF to a few picofarads. The frame hold was not affected.—G.C., Boroughbridge (926).

Pye V410: Trouble with this nearly new receiver was reduced width after about half an hour, width also varying. Replacement of line valves brought no improvement. From a stock set was borrowed line output transformer, injection choke and scan coils; still no improvement. Voltage checks during the fault condition showed that the voltages on the oscillator anode and output screen varied in sympathy with variations in width, so the capacitors in this part of the circuit were checked by substitution. The culprit was C56, leaking when hot.—D.E., Pocklington (892).

Service Engineer special laboratory test

COSSOR

Model 1091

Split-Beam Oscilloscope

By Gordon J. King, Assoc. Brit. I.R.E.

A SPLIT-BEAM oscilloscope, featuring a very wide range of calibrated time-base speeds, fly-back black-out and an X amplifier for internal and external voltages, in addition to such things as triggered or repetitive time-base and X expansion, are highly desirable to the television service technician and laboratory worker.

Such features are to be found in the Cossor 1091 oscilloscope, which also incorporates five printed-wiring boards and ten miniature valves. The instrument sells at £69 10s. 0d.

Model 1091 is based on the design of Model 1071K but has calibrated time-base speeds, extending to very low sweep velocities, and a more robust case. The instrument has been designed not only to meet the progressively more exacting requirements of the modern radio, television and audio service engineer, but also in view of its many facilities is highly suitable for production line-testing, day-to-day laboratory measurements, student use and in all similar applications where a reasonably-priced, but efficient, split-beam, general purpose oscilloscope is the order of the day.

Green Trace

It employs a Cossor, type 93D, flat-faced cathode-ray tube with green fluorescence and medium persistence. A type 93L tube, of long persistence, or 93J with blue fluorescence can be fitted to special order if required. Fitted at the viewing end is a perspex implosion guard, calibrated metrically in the form of a graticule.

The accelerating potential of 1·6 kV ensures adequate brightness of the trace under normal working conditions without shielding, and the focus is maintained to a high degree at high settings of brightness. A mu-metal screen is fitted completely round the neck of the tube to avoid the trace being influenced by spurious signal fields and mains hum.

Y Amplifiers

The two Y amplifiers are of identical design, and both are preceded by a frequency-compensated attenuator. Each employs a single valve which is direct-coupled to the signal source and has pre-set gain control by the adjustment of the negative feedback.

Grid-current protection due to moderate overloads, and high frequency compensation to offset the stray capacitances in the anode circuits are also provided. The signal input may be conveyed to the attenuator through a blocking capacitor, via the 'a.c. Input' terminal when d.c. isolation is required.

The response is from d.c. to 3 Mc/s (30% down), while the output deflection is 4 cm. minimum at 3 Mc/s and 2 cm. minimum at 7 Mc/s. The compensated attenuators provide five sensitivity ranges from 50V/cm. to 0·5V/cm., the accuracy of voltage measurement being within ±10%. The gain adjustment for correction is accessible from the outside of the case.

The amplifiers have a rise-time better than 0·12 μS with negligible overshoot, and the input impedance ranges from 1 megohm/60 pF to 3 megohms/30 pF, depending on attenuator setting.

Y1 Pre-Amplifiers

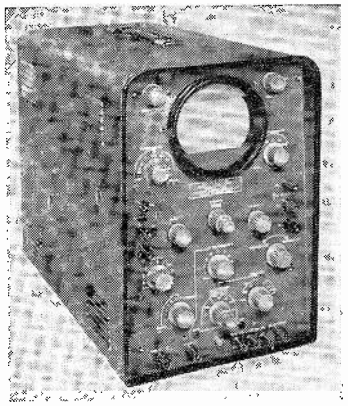
On the Y1 channel a pre-amplifier is automatically switched into operation and gives a further four sensitivity positions from 150 mV/cm. to 5 mV/cm. The frequency response through the pre-amplifier is 5 c/s to 350 kc/s on the 5 mV/cm. range and 5 c/s to 500 kc/s on the other ranges. The input impedance is 1 megohm/20 pF.

As the graticule is calibrated in centimetres (sub-divided into 2 mm. steps), the peak-to-peak value of any waveform in volts can be obtained by measuring the height of the waveform against the graticule marks and multiplying by the setting of the appropriate sensitivity switch.

The pre-amplifier uses a single triode-pentode valve of fixed gain, and is enclosed by an adjustable negative feedback loop to set the gain.

Timebase

The sawtooth voltage for the X scan is produced by a conventional screen/suppressor d.c. coupled phantastron arrangement, using a 6AS6 pentode valve. The velocity of scan is controlled by switched capacitors, switched resistors and by a variable resistor.



The circuit provides 21 basic calibrated sweep speeds from 1 μS/cm. to 5 S/cm. unexpanded. All these ranges can be expanded by five times, thereby giving a maximum calibrated sweep speed of 0·2 μS/cm. Continuously variable sweep speeds are also available with repetition rates from 0·25 c/s to 200 kc/s.

The accuracy of time measurement over the centre 6 cm. is ±10% except on the 1 μS/cm. expanded range. A fly-back suppression circuit is incorporated, and also are timebase output terminals, the impedance of which is 100kΩ via an 0·1 μF capacitor.

The timebase output signal is extracted from the cathode of a triode valve, whose purpose is also to provide a low impedance for charging the timebase capacitors, and in this way the speed of the flyback is effectively increased.

X Amplifier

A portion of the timebase signal present at the cathode of the triode valve referred to above is fed to one grid of a cathode-coupled amplifier through a compensated attenuator. The anodes of the pentode amplifier valves are directly coupled to the X plates of the cathode-ray tube to provide a linear sweep.

An external signal can be applied to the X amplifier, if required, to provide a horizontal sweep, or for other tests, via the "X Input" terminal. This is coupled to the amplifier via the grid which is not normally receiving the timebase signal. A switch cuts out the internal timebase and switches in the external signal in the manner described.

In the calibrated positions of the Multiplier switch, the gain of the X-amp is pre-set at X1 (on X1, X2 and X5) and at X5 (on X1, X0·4 and X0·2). The pre-set adjustments are available at the front panel as "Set X1" and "Set X5". When the Multiplier is in the" Variable" position, the gain of the X-amp, and hence the trace expansion, is continuously adjustable up to X5 by the X-gain control.

The gain of the X amplifier to external signals and to the timebase when on "Variable" is adjustable by means of the "X amp sensitivity" control, which is

connected between the cathodes of the amplifier valves. In the relevant setting of the "Sync/X Amp" switch, the "X Amp Sensitivity" control provides horizontal expansion up to five times. The expanded trace allows detailed examination of waveforms because the trace is extended almost five screen diameters.

Synchronisation

The sync signal is selected either from the Y1 amplifier or from an external source. This is fed to a phase splitter, and in conjunction with a "Sync Amplitude" control provides for either positive or negative sync signals – zero sync signal is present with the "Sync Amplitude" control in the mid-position, and progressively increasing sync is applied, positive in one direction and negative in the other, either side of the mid-position. The sync signal is applied to a cathode-follower, and thence, at low impedance, to the timebase valve.

Two modes of operation are available – triggered and repetitive. Repetitive operation is easily instigated by turning the "Triggered/Repetitive" control in the appropriate direction. Normal operation of the timebase then occurs, and the trace is locked by adjustment to the "Sync Amplitude" control.

The triggered mode necessitates turning the "Triggered/Repetitive" control in the opposite direction until the timebase stops. The "Sync Amplitude" control is then rotated, from the mid-position, positive or negative as required, until the timebase recommences operation and locks to the signal.

In the "triggered" position, the timebase will only operate when a triggering pulse, derived from the signal being displayed, is received. Thus, irrespective of changes in signal frequency, the displayed pattern will remain stationary.

If the timebase is to be triggered from an external signal, a sinc-wave amplitude (50 c/s. to 2 Mc/s.) of not less than 1-volt r.m.s. or a 1-volt peak-to-peak amplitude is required, in the case of pulses. The sync input impedance is 5 megohms/10 pF.

Other Features

The instrument features all the usual controls associated with oscilloscopes in addition to those described in the foregoing text. There are also three calibration voltages of 10mV, 1V and 10V. A timebase output terminal allows the instrument's timebase to sweep a wobbulator for visual alignment operations and for tuned circuit checking.

Alternatively, of course, a wobbulator's sweep signal may be used to sweep the oscilloscope by applying the signal to the X input terminal.

The X shift comprises a dual control arrangement, the outer control gives a coarse shift adjustment and the inner control gives a fine adjustment. This can prove extremely useful for certain X measurements.

All the controls are adequately calibrated, the various markings being clearly visible direct on the front panel. A red warning light indicating that the instrument is switched on is fitted at the bottom of the front panel.

On Test

The instrument was subjected to various tests and applications to which it would be put in the service department and laboratory. It operated with remarkable ease, and this would appear to be a very desirable attribute of the instrument, for, although it contains complex circuits, there is nothing at all difficult in its operation.

Once the basic controls are understood it can immediately be put into action on almost any test, and these are considerably assisted by the comprehensive handbook which is supplied with the instrument.

The instrument was used in the service department for normal day-to-day and advanced servicing, including voltage measurement, waveform analysis, distortion testing on audio equipment and the alignment of v.h.f. amplifiers and r.f. amplifiers. It was also used with the Cossor FM Receiver Alignment Generator, Model 1324, and in all cases presented no problems of any kind.

The triggered timebase mode operates really solidly and is very simple to set going. It was also noticed that there is very small interaction between the two beams, and this is only discernible when a high frequency signal of large amplitude is displayed on the screen.

There is, indeed, every reason to believe that this versatile instrument will find a place in all fields of electronics.

The instrument has the following dimensions: Height 15 in., width 9⅞ in., depth 19 in., and the weight is 29 lb. It is mains powered 200-255V, 50-100 c/s, 80 watts.

BREMA Annual Report

TECHNICAL SECTION

The following are brief details of some features of interest from the technical section of the BREMA Annual Report.

(1) Should we adopt 625 line standards in Bands IV and V, the channel width would be 8 Mc/s (agreed in Europe). Suitable i.f.'s to provide relative freedom from interference are suggested as 39·5 or 72 Mc/s.

(2) A world standard line repetition frequency is proposed. The American 525 line/60 field system produces a frequency of 15,750 c/s. As the 625 line/50 field system produces 15,625 c/s it would be possible to make receivers work from either system providing that sufficient smoothing could be introduced economically to remove the 10 c/s frequency difference effects when a 60 field system is used on 50 c/s mains.

(3) Asynchronous working. Continental TV systems are engineered to operate with field frequency independent of mains frequency, though in practice they operate mainly under mains-locked conditions. Tests showed that current designs are not always adequate to cope with frequency differences which may occur in practice. The displayed picture is always better when field and mains frequencies are locked.

(4) A revised Test Card C has been agreed with the BBC and ITA. The background grid pattern consists of 11×8 squares and a space has been left in the bottom row to allow for local station identification or engineering announcements. Part of the castellations extend outside the official area of the test card; the inside edges of the side castellations are the horizontal reference points for a 5:4 aspect ratio.

The black and white "pole pieces" each side of the circle are transposed and changed to rectangles. The frequency gratings are now all 6μS wide and it is hoped that they will be of sinewave instead of square wave formation. The frequencies are 1, 1·5, 2, 2·5, 2·75 and 3 Mc/s.

In the top row of castellations, background white vertical grid lines have been extended through the middle of two of the black blocks to assist line identification by single-line monitors. An off-white dot appears in the white square and an off-black dot in the black square of the central tone block to assist in the setting up of correct contrast and brightness.

(5) Windscreen wiper effect (vertical white bar up to two inches wide the full height of the screen and usually moving slowly to and fro across it) is increasing. It can be caused by an e.h.t. discharge due to a faulty condition, or by a transient occurring during the line flyback time. Although mainly a design problem it is possible for faults to occur due to ageing components or inexpert servicing. Fitting chokes in the recovery diode and line output valve circuits is often a simple and effective method of suppression.

There has been a steady rise in incidence of complaints, from 30 in 1955 to 1,612 in 1960. Interference has increased in step with the availability of alternative programmes.

On the other hand, complaints of timebase interference to m.w. and l.w. sound radio programmes has shown a steady drop, from 5,742 in 1955 to 1,137 in 1960.

(6) Of the three major instances of interference on TV programmes discussed last year, two (Peterborough and Dover) rapidly diminished in magnitude once the new transmitters had started regular transmissions and receivers had been retuned to the new local channel.

In the Peterborough area, however, interference is troublesome on channel 11 Mendlesham ITA programmes caused by second harmonic radiation from sets tuned to BBC channel 5. Mendlesham field strength is very low (below 250μV/m) in Peterborough and this led to the area not being officially designated as falling within its service area. An unexplained phenomena is that a gradual increase in field strengths has taken place.

In many cases chassis radiation has been found to be the main mode of propagation, sometimes aggravated by screening covers being left off after servicing.

by H. W. HELLYER

Another Little Niggle

THIS column has been taken to task by a Birmingham reader for growing too tame in it's old age. "You are always more interesting", he says, "when you are having a bash at someone".

He may be right. As certain well-known literary and dramatic critics have discovered, it pays to provoke. But provocation is not my purpose; I only wish to spotlight some of those lighter moments in the serviceman's, life even if occasionally my grin becomes a grimace.

* * *

This month, for example. I was already compiling a list of minor niggles when the letter from our Brum friend arrived. This list could well have been an expanded daily report, the result of our workshop having recently taken on an "overflow" of repairs from another firm.

Yes, Joe, you can chuckle. As you have surmised, 'Operation Overflow' consisted of sets of all types and ages in varying states of decrepitude. Some looked as if they had been hit by a hurricane – or a handyman. Others appeared guileless, until we learned they were long-term intermittents, which should have borne explanatory labels. I could suggest an appropriate motto: "*If at first you don't succeed – not to worry, neither did the other chap!*"

Still others were suffering from what can only be called mal-service. This is a form of "Fiddler's Itch", when the sufferer is seized with a desire to tighten every screw in sight, cross threads, crack components and lay about lavishly with a soldering iron. This disease usually proves painful – especially to the consumer.

And indeed, most of these overflow jobs proved painful to us, for if they had a common factor, it was that their owners had long exhausted their patience.

One particularly irate gent had waited a fortnight before storming into the shop, then discovered that his precious receiver was stacked in the middle of a job lot of second-hand sales. He was more insulted by the price on the ticket than the fact that when it was whipped from the window and returned to him it had still not been properly repaired.

He was in a high old dudgeon when we got there. But, peculiarly enough, he spoke highly of the original engineer. Which brings me to another strange corollary – the Jekyll and Hyde personality of the last mechanic.

A desire to lay about lavishly with a soldering iron.

It seems unbelievable that the same "nice young chap" could have been the one who (a) tapped down the mains carousel to get more height, (b) fitted a c.r.t. booster in a hidden corner of the chassis, (c) twisted a couple of high-voltage leads in solderless joints held by ordinary adhesive tape, and (d) peaked up the sound i.f.s for more gain, thus rendering the tuning so unstable that all the neighbours petitioned the G.P.O.

* * *

Such a nice young chap . . . I could run through the alphabet, listing his crimes. The earthing pigtail left loose, the vanished valve screens and line-output cage, the cracked necks on knobs that disintegrate when next removed, the chewed iron-dust cores, the dry joints, the reversed polarity mains, the finger-mark on the inside of the implosion guard, the scratches on the cabinet . . .

Compiling a list of minor niggles.

The fellow who alters the drawings.

Such a nice young chap . . . I am reminded of Mr. Robertson-Glasgow's character, the "local Leonardo", who spent six years at University. The first three to decide what subject to take and three more failing the resultant examinations. ("*As a photographer, no one has produced more total and absolute blanks*".)

Well our N.Y.C. produces less negative results (if you will pardon the pun.) He leaves a legacy of botchery that makes his successor want to call in the Fraud Squad. In fact, the only decent bit of repair work he seemed to do was to solder in a resistor so beautifully that the joints looked like the original wiring. It must have been just unfortunate that the ohmic value was so wrong that the valve ran into grid current when the signal exceeded a whisper.

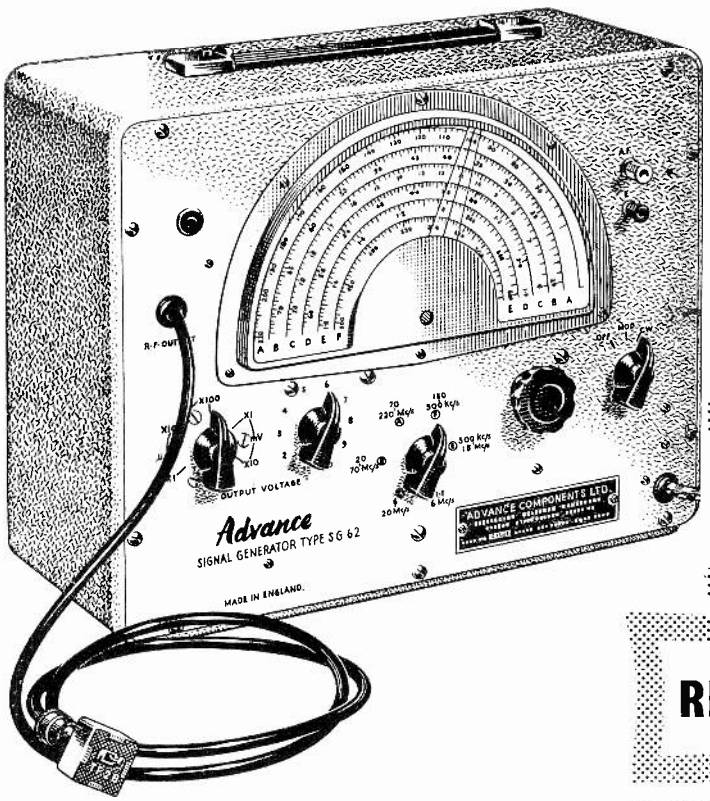
* * *

He's a very elusive gentleman. Visiting engineers seldom run across him. He blazes the trail, we merely burn up the road. Little is known about him – apart from that most unreliable source, the customer's report.

Which reminds me of a *Queer Customer* contribution some time ago. A.D.B. paid a visit and was regaled with a virulent complaint about the last chap, description and all. It wasn't until he came to check the description that he remembered he had made the last call himself. But the significant thing about that story is that the customer was *complaining*. If she had been full of praise, our N.Y.C. would have remained, as usual, modestly in the background.

He has a close relation, who works in the design office of every manufacturer. He is the fellow who leans over the chief designer's shoulder and alters the drawing. As a result, on every new receiver, for which, Joe, you will as yet have had no service information, there is an unexpected fault-producing trap – but that's another story.

FROM THE RANGE OF *Advance* SERVICE INSTRUMENTS



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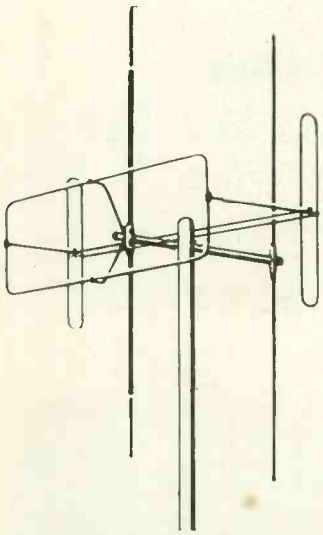

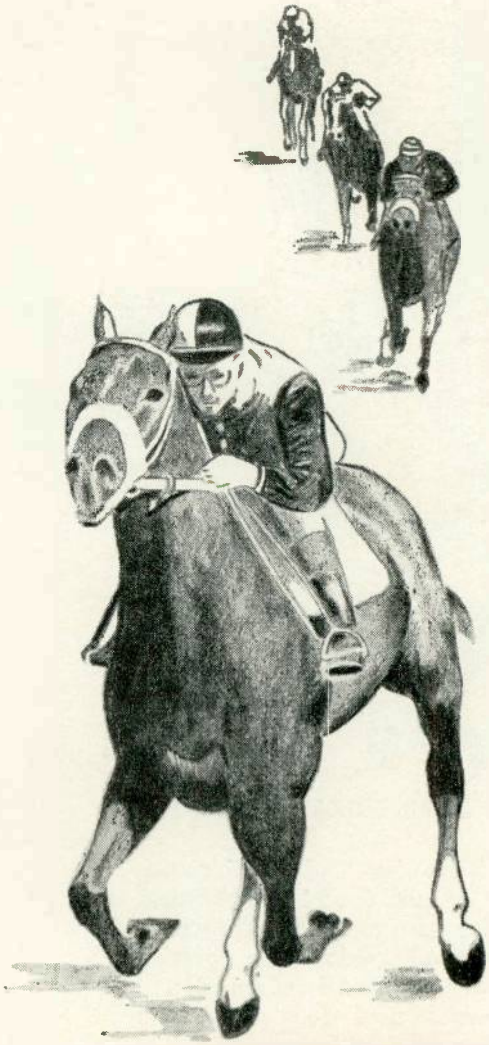

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