'TRADER' SERVICE SHEET 193

ALBA 870 (A.C.) AND 970 (A.C.) RADIO-GRAMS

COVERING a short-wave range of 17-50 metres, the Alba 870 (A.C.) receiver is a 4-valve (plus rectifier) A.C. 3-band superhet suitable for mains of 190-250 V, 40-100 C/S.

A similar chassis is fitted in the 970 (A.C.) radio-gramophone and automatic radio-gramophone but as standard they are for mains of 50-60 C/S only. Special models, however, are made for 40-100 C/S.

There are also A.C./D.C. versions of these three models, bearing the same type numbers.

This *Service Sheet* was prepared on an A.C. table model.

CIRCUIT DESCRIPTION

Aerial input on M.W. and L.W. via coupling coils **L1, L2** to inductively coupled band-pass filter. Primary **L3, L4** tuned by **C21**; secondary **L9, L10** tuned by **C24**; coupling coils **L5, L6, L7, L8.** On S.W. band aerial input is via coupling coil **L11** to single tuned circuit **L12, C24.**

First valve (**V1, Mullard metallised TH4**) is a triode-hexode operating as frequency changer with internal coupling. Triode oscillator grid coils **L13** (S.W.), **L15** (M.W.), **L17** (L.W.) are tuned by **C25**; parallel trimming by **C26** (S.W.), **C27** (M.W.), **C28** (L.W.); series tracking by **C5** (M.W.) and **C29** (L.W.); oscillator anode reaction coils **L14** (S.W.), **L16** (M.W.), **L18** (L.W.).

Single variable-mu R.F. pentode intermediate frequency amplifier (**V2, Mullard metallised VP4B**) operates with tuned-primary tuned-secondary transformer couplings **C30, L19, L20, C31** and **C32, L21, L22, C33.**

Intermediate frequency 117·5 KC/S.

Diode second detector is part of separate double diode valve (**V3, Mullard metallised 2D4A**). Audio-frequency component in rectified output is developed across **R10** and passed via I.F. stopper **R11** and manual volume control **R14** to C.G. of pentode output valve (**V4, Mullard PenA4**). Fixed tone correction in anode circuit by **C15.** Provision for connection of external high-impedance speaker across primary of **T1.**

Second diode of **V3,** fed via **C11,** provides D.C. potential which is developed across **R12, R13** and fed back as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from drop along **V4** cathode resistance **R15.**

When the receiver is switched for gramophone operation, the I.F. valve **V2** operates as an A.F. amplifier with **R8** as anode load and **C14** as coupling to the output valve.

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V5, Mullard IW4/350**). Smoothing by speaker field coil **L25** and dry electrolytic condensers **C17, C18.** Mains aerial coupling by **C19.**

COMPONENTS AND VALUES

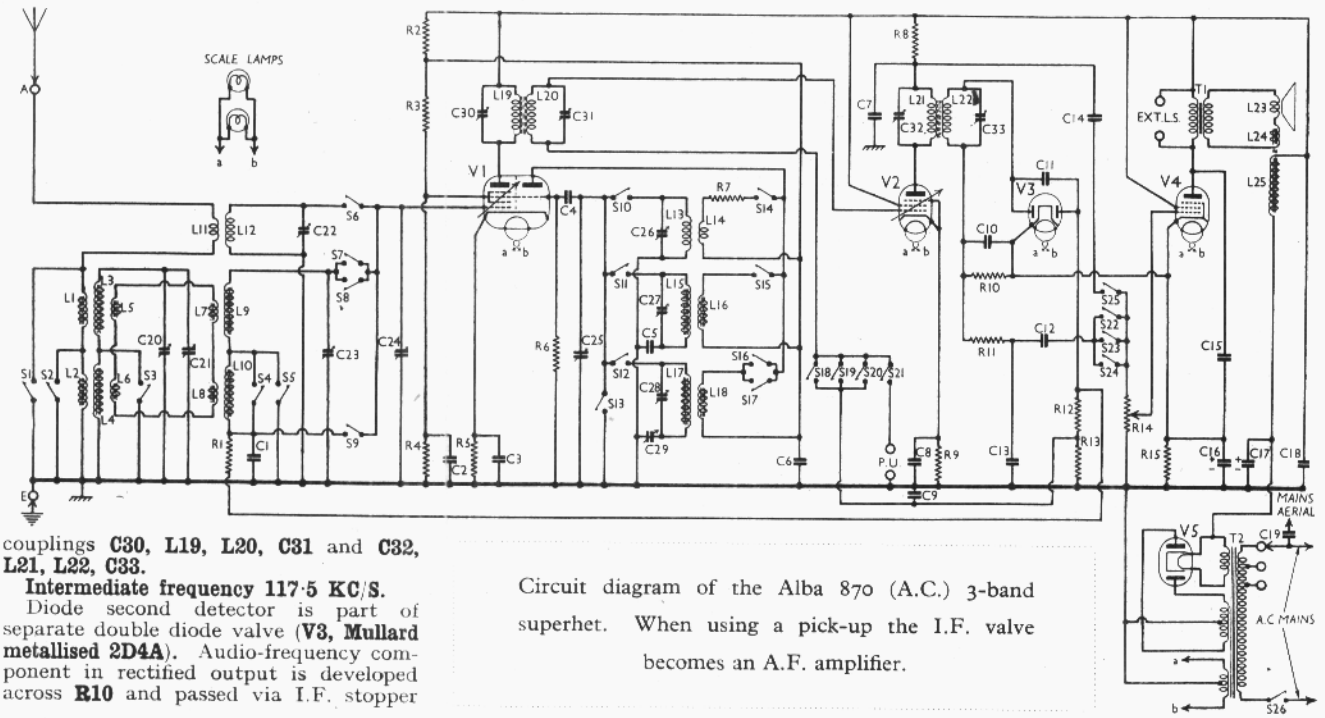
	RESISTANCES	Values (ohms)
R1	V1 hexode C.G. decoupling ..	1,000,000
R2	V1 S.G.'s and osc. anode H.T. potential divider	13,000
R3		10,000
R4		25,000
R5	V1 fixed G.B. resistance ..	200
R6	V1 osc. C.G. resistance ..	25,000
R7	V1 osc. anode S.W. stabiliser	100
R8	V2 anode decoupling	5,000
R9	V2 fixed G.B. resistance ..	150
R10	V3 signal diode load	500,000
R11	I.F. stopper	50,000
R12	V3 A.V.C. diode load ..	500,000
R13		500,000
R14	Manual volume control ..	500,000
R15	V4 G.B. resistance	150*

* May be 100 Ω.

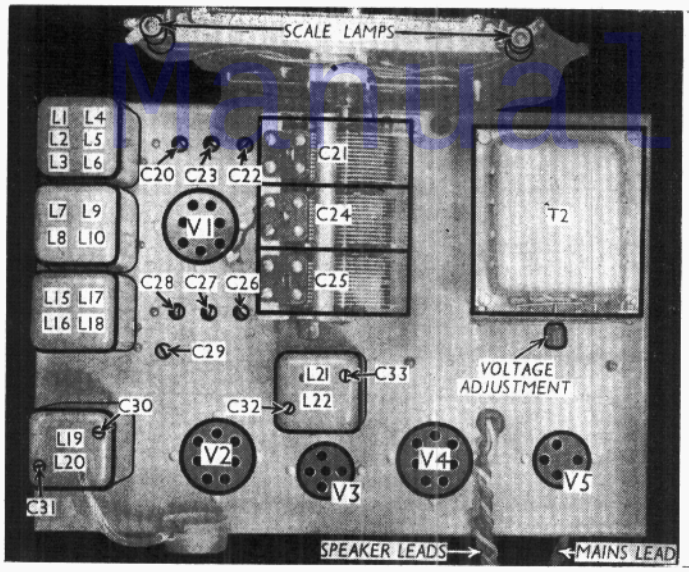
	CONDENSERS *	Values (μF)
C1	V1 hexode C.G. decoupling ..	0·1
C2	V1 hexode S.G.'s by-pass ..	0·1
C3	V1 cathode by-pass	0·1
C4	V1 osc. C.G. condenser ..	0·0001
C5	V1 osc. M.W. tracker ..	0·002
C6	V1 osc. anode decoupling ..	0·1
C7	V2 anode decoupling	0·002
C8	V2 cathode by-pass	0·1
C9	V2 C.G. decoupling	0·1
C10	I.F. by-pass	0·00025
C11	V3 A.V.C. diode feed	0·00025
C12	Radio A.F. coupling to V4 ..	0·005
C13	I.F. by-pass	0·00025
C14	Gram. A.F. coupling to V4 ..	0·005
C15	Fixed tone corrector	0·005
C16*	V4 cathode by-pass	25·0
C17*	H.T. smoothing ..	8·0
C18*		12·0
C19	Mains aerial coupling	0·00025
C20‡	Band-pass pri. trimmer ..	0·00003
C21†	Band-pass pri. tuning ..	—
C22‡	Aerial S.W. trimmer	0·00003
C23‡	Band-pass sec. trimming ..	0·00003
C24†	Band-pass sec. and S.W. tuning	—
C25†	Osc. tuning	—
C26‡	Osc. S.W. trimmer	0·00003
C27‡	Osc. M.W. trimmer	0·00003
C28‡	Osc. L.W. trimmer	0·00003
C29‡	Osc. L.W. tracker	0·0007
C30‡	1st I.F. trans. pri. tuning ..	—
C31‡	1st I.F. trans. sec. tuning ..	—
C32‡	2nd I.F. trans. pri. tuning ..	—
C33‡	2nd I.F. trans. sec. tuning ..	—

* Electrolytic. † Variable. ‡ Pre-set.

	OTHER COMPONENTS	Approx. Values (ohms)
L1	Aerial M.W. and L.W. coupling coils	70·0
L2		6·75
L3	Band-pass primary coils	1·6
L4		14·0
L5	Band-pass coupling coils	22·0
L6		
L7	Band-pass coupling coils	22·0
L8		
L9	Band-pass secondary coils	1·6
L10		15·0

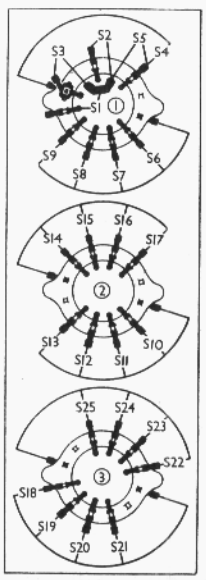


Circuit diagram of the Alba 870 (A.C.) 3-band superhet. When using a pick-up the I.F. valve becomes an A.F. amplifier.



Plan view of the chassis. Note that the signal frequency and oscillator trimmers are adjustable through holes in the chassis deck.

Switch	S.W.	M.W.	L.W.	Gram.
S1	C	O	O	O
S2	O	C	O	C
S3	O	C	O	O
S4	O	C	O	O
S5	O	O	O	C
S6	C	O	O	O
S7	O	C	O	O
S8	O	O	C	O
S9	O	O	O	C
S10	C	O	O	O
S11	O	C	O	O
S12	O	O	C	O
S13	O	O	O	C
S14	C	O	O	O
S15	O	C	O	O
S16	O	O	C	O
S17	O	O	O	C
S18	C	O	O	O
S19	O	C	O	O
S20	O	O	C	O
S21	O	O	O	C
S22	C	O	O	O
S23	O	C	O	O
S24	O	O	C	O
S25	O	O	O	C



the four control settings, starting from the fully anti-clockwise position, O indicating open, and C closed.

S26 is the Q.M.B. mains switch, ganged with the volume control **R14.**

Continued overleaf

Switch diagrams, looking at the underside of the chassis in the directions of the arrows in the illustration below.

OTHER COMPONENTS (*Continued*)			Approx. Values (ohms)
L11	Aerial S.W. coupling coil	..	0·1
L12	Aerial S.W. tuning coil	..	Very low
L13	Osc. S.W. tuning coil	..	Very low
L14	Osc. S.W. reaction coil	..	3·5
L15	Osc. M.W. tuning coil	..	1·6
L16	Osc. M.W. reaction coil	..	50·0
L17	Osc. L.W. tuning coil	..	10·0
L18	Osc. L.W. reaction coil	..	2·5
L19	1st I.F. trans. Primary	..	50·0
L20	1st I.F. trans. Secondary	..	50·0
L21	2nd I.F. trans. Primary	..	50·0
L22	2nd I.F. trans. Secondary	..	50·0
L23	Speaker speech coil	..	1·9
L24	Hum neutralising coil	..	0·1
L25	Speaker field coil	..	2,000·0
T1	Speaker input trans. Pri.	..	500·0
	Speaker input trans. Sec.	..	0·3
T2	Mains trans. Pri. total	..	50·0
	Mains trans. Heater sec.	..	0·05
	Mains trans. Rect. heat. sec.	..	0·1
	Mains trans. H.T. sec. total		600·0
S1-17	Waveband and muting switches	.. .. ..	—
S18-25	Radio-gram. change switches	..	—
S26	Mains switch, ganged R14	..	—

DISMANTLING THE SET

Removing Chassis.—First remove the four control knobs (recessed grub screws) and the four bolts (with washers) holding the chassis to the bottom of the cabinet. The chassis can now be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, unsolder the speaker leads and *when replacing*, connect them as follows:—F and 3 joined together, red; 1, black; F, blue. The white lead goes to the tag on the bottom right-hand speaker fixing screw.

Removing Speaker.—Remove the nuts from the four screws holding it to the sub-baffle. *When replacing*, see that the transformer is on the right and do not forget to fix the tag for the earthing lead on the bottom right-hand screw.

VALVE ANALYSIS

Valve voltages and currents given in the table (col. 2) are those measured in our receiver when it was operating on mains of 230 V, using the 220 V tapping on the mains transformer. The set was tuned to the lowest wavelength on the medium band and the volume control was at maximum, but there was no signal input.

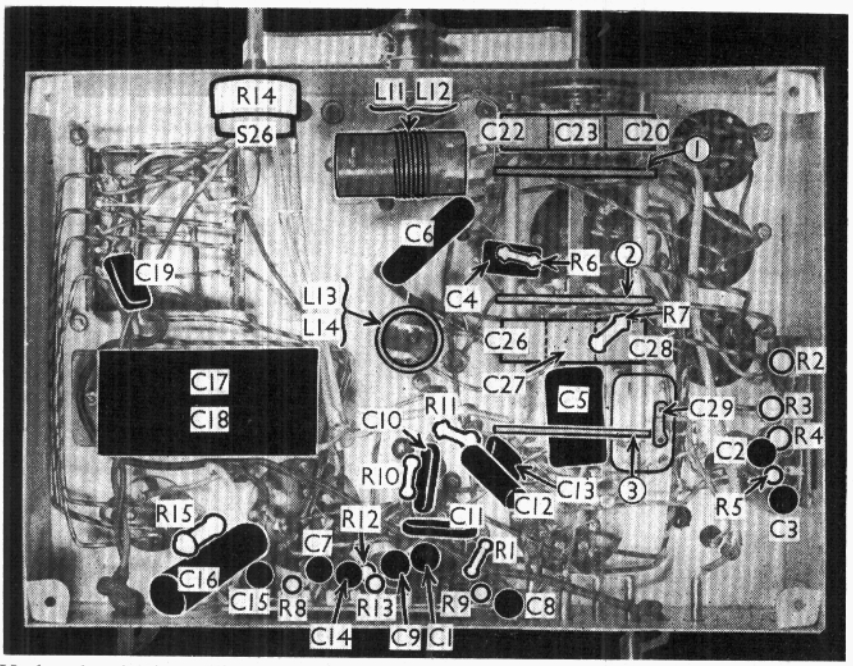
Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TH4*	260	2·1	55	3·1
V2 VP4B	175	15·0	260	5·4
V3 2D4A	—	—	—	—
V4 PenA4	240	38·0	260	4·8
V5 IW4/350	385†	—	—	—

* Oscillator anode, 110 V, 5·0 mA.
† Each anode, A.C.

GENERAL NOTES

Switches.—S1-S25 are the waveband and gramophone switches, in three ganged rotary units beneath the chassis. The three units are indicated in the under-chassis illustration, the arrows indicating the directions in which they are viewed in the diagrams on the right. The table (col. 3) gives the switch positions for



Under-chassis view. The seven trimmers are adjusted through holes in the chassis deck.

MAINTENANCE PROBLEMS

Short in Screened Lead

AN A.C. superhet was in for attention, the customer having complained of intermittent signals. The set was placed on test and performed perfectly. It was then given a soak test and, after running for some hours without trouble, suddenly failed. Signals from a generator were then applied with a view to localising the fault. During these tests the output came up suddenly, and the set performed perfectly again for some hours. This procedure was repeated and as the trouble cleared again, it was decided to try and produce the fault. Leads were moved about and valves tapped.

It was noticed that by tapping the output valve, a double diode pentode, the fault could be produced. A new valve was tried and the trouble was found to be still there. An inspection of the wiring under the valve holder revealed no fault. Eventually it was found that the fault still appeared when the pentode was held rigidly in one hand and the lead to the top cap was moved about. The set was then switched off, and an ohmmeter was connected to the metal of the top cap of the output valve and to the screening of the lead. When the lead was moved about the ohmmeter needle swung over from infinity to dead short. An inspection of the lead revealed that any movement caused a short between the screened sleeving and the bared end of the wire. This was due to the wire having been stripped back too far. The bared end was covered with a layer of waxed thread and the screening sleeving was projecting a little beyond the rubber insulation and lying on top of this layer, being itself covered with another layer or two of thread. Any movement of the lead caused the screening to pierce the layer of thread and thus cause a short to earth, and consequently, no signals.

The proper insulation of this lead cured the trouble. Since this trouble was experienced it has been found to crop up again on a number of similar sets. It is now possible to cure the trouble in a very short time, as a movement of this lead usually reveals the fault immediately.—W. G. GOUGH, WORCESTER.

Speaker Not to Blame

IF you were called upon to service a mains set for "dither" on a certain frequency, and on examining the speaker cone found it torn, you would very likely attribute the trouble to this. Which is exactly what I did. I fitted a new cone, then discovered that the trouble was due to a faulty output pentode.—W. LLOYD, SWANSEA.

Leakage in Transformer

I RECENTLY encountered a very unusual fault in a Philips 838U, an A.C./D.C. superhet. The customer complained of a very loud hum in the speaker, which only occurred when the earth was connected; upon removal of the earth the set functioned quite normally. Suspicion first fell on the electrolytics, but on test they proved to be quite O.K. After spending considerable time testing every component that could possibly cause the hum, I suddenly hit upon the trouble.

The output transformer in this set is of rather unusual design. It employs two secondaries, one of low resistance for the internal speaker, and one of high resistance for an external speaker. One side of external speaker secondary winding, the speaker chassis and transformer core are connected to true earth. The transformer also employs an electrostatic screen, which is connected to chassis.

Upon testing the transformer, I discovered that there was a partial insulation breakdown between the electrostatic screen and the external speaker secondary winding. This was allowing current to flow from the live chassis via the transformer external speaker secondary windings to earth, and was imposing hum on the internal speaker secondary winding.

Upon fitting a new transformer, all trace of hum vanished, and the set functioned perfectly. I should like to add that, had it not been for *The Trader* Service Sheet, in which full details of this transformer were given, I'm afraid that the fault would have taken a long time to trace.—K. G. PILGRIM, HOVE.

Effect of O.C. in Transformer

A FAULT that occurred in a mains superhet receiver recently might have taken a good deal longer to diagnose if it had not been my good fortune to have made a rather close study of the electrode construction of valves, both when working, and when stripped of their glass overcoats.

As it was, I was able to define the fault and give the customer a quotation for repair within three minutes of knocking on the front door.

The complaint was that when switched on, the set would work only for about a minute, and then cut out completely. Upon investigation, I found that this did indeed happen. On removing the back of the set, I was immediately struck by the fact that the inner electrodes of the output pentode were all glowing red.

It did not take long for me to realise the likely cause of this, and hurriedly switching off, I proceded to measure the resistance between the anode and the auxiliary grid pins. Finding this was infinite, I knew then, of course, that the primary of the output transformer was O.C.

The exceedingly large current drawn by the auxiliary grid when the anode is disconnected results in the inner electrodes getting red-hot.

It often saves a considerable amount of time when one is fortunate to notice these little things, especially when one is familiar with the set being serviced.—F. BRYANT, GORLESTON-ON-SEA.

ALBA 870 (A.C.)—*Continued*

Coils.—**L1-L6, L7-L10** and **L15-L18** are in three screened units on the chassis deck. **L11, L12** and **L13, L14** are in two unscreened tubular units beneath the chassis. **L12** and **L13** respectively are the thick windings of tinned copper wire. The I.F. transformers **L19, L20** and **L21, L22** are in two other screened units on the chassis deck, with their associated trimmers.

Scale Lamps.—These are two Osram 6·2 V, 0·3 A M.E.S. types.

External Speaker.—Two terminals are provided on the internal speaker transformer for the connection of a high impedance external speaker.

Condensers C17, C18.—These are two dry electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The red lead is the positive of **C17** (8μF) and the yellow the positive of **C18** (12 μF).

Alternative Valves.—Some models may have a Mullard Pen4VB in place of the PenA4, and an IW3 in place of the IW4/350.

Resistance R15.—This may be 100 O, not 150 O, in early chassis.

CIRCUIT ALIGNMENT

I.F. Stages.—Feed in a 117·5 KC/S signal between the top cap of **V1** and chassis, with set switched to M.W.

Adjust **C33, C32, C31** and **C30** for maximum output, in that order, reducing input progressively as the circuits come into alignment.

R.F. and Oscillator Stages.—See that scale pointer is horizontal at maximum position of gang condenser. If not, adjust by means of the centre fixing screw.

Feed a 250 m. signal into **A** and **E** sockets, switch set to M.W., tune to 250 m. on the scale, and adjust **C27,** then **C23** and **C20** for maximum output.

Switch set to L.W., feed in a 1,200 m. signal, tune to 1,200 m. on the scale, and adjust **C28** for maximum output, rocking the gang slightly for optimum results, since there are no separate L.W. bandpass trimmers. Feed in a 1,900 m. signal, tune it in, and adjust **C29** for maximum output, rocking the gang meanwhile.

Switch set to S.W., feed in a 20 m. signal, tune to 20 m. on the scale, and adjust **C26** and **C22** for maximum output. If **C26** gives two peaks, choose that obtained with **C26** nearest its minimum position.