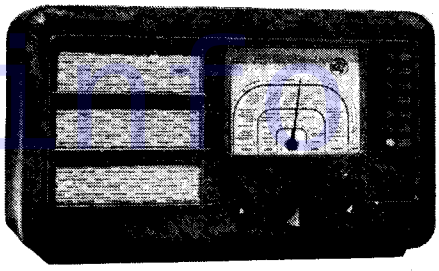
EKCO PB179 PUSH-BUTTON FOUR



Six-station press button tuning by pre-set circuits is provided by the Ekco PB179.

CIRCUIT.—The aerial coupling to the triode hexode frequency-changer, V1, is *via* a series aerial condenser or direct to a set of bandpass coils on the medium and long wavebands and an H.F. transformer on the short-wave band. The oscillator section follows standard practice, and regeneration modifying resistances are included.

On the push-button range the signal grid of V1 is taken direct to the first tuning circuit of the bandpass across the coils of which are shunted pre-set condensers situated on the right of the press-button keys. The normal oscillator coils are switched out of circuit and use is made of an oscillator master coil across which is connected one of six further coils tuned by adjusting the iron cores, the adjusting spindles being situated to the left of the press-button keys.

On both the manual tuning and the press-button ranges an I.F. wavetrap (L1 and C15) is connected between aerial and chassis.

V1 is coupled to V2, a pentode I.F. amplifying valve, by an iron-cored I.F. transformer. This is ordinarily tuned to 480 or 465 kc. (see alignment notes), but is automatically switched to a broader acceptance band on the press-button range. V1 and V2 are controlled by A.V.C.

Another iron-cored I.F. transformer (not switched) effects the coupling between V2 and the double diode output pentode V3. The demodulating diode load is connected, *via* an L.F. coupling condenser and tone compensated manual volume control, to the grid of the pentode section of V3. The potentials also feed the visual tuning indicator through a grid decoupling circuit.

The other diode of V3, fed by a small capacity condenser, provides a D.C. potential that is fed back to the grids of V1 and V2 for automatic volume control.

A pentode compensator condenser is included and control of tone is obtained by means of C47 and a variable resistance, VR2, in series between the anode of the valve and chassis.

The centre tap of a potentiometer (R21 and R22) connected across a third winding of the speaker transformer is connected to the lower end of the manual volume control, thereby applying negative feedback potentials that supplement the above-mentioned tone modifying circuits.

Mains equipment consists of a mains transformer, a full-wave rectifying valve V4, electrolytic smoothing condensers and a separate smoothing choke.

Chassis Removal.—Take off the back and the four grub-screw fixed control knobs. Remove the four chassis securing bolts from the base.

The chassis is then free to the extent of (*Continued in column 3, opposite page.*)

CIRCUIT

E. K. COLE, LTD., do not permit publication of the circuit diagram of this receiver. As, however, the chassis diagrams and component "tables" identify and give the purpose of every component, and the text above provides a general outline, few difficulties should be experienced. Apart from the push-button arrangements, the set is quite conventional.

VALVE READINGS

No signal. Volume maximum. MW min. cap 200 volt. A.C. mains.

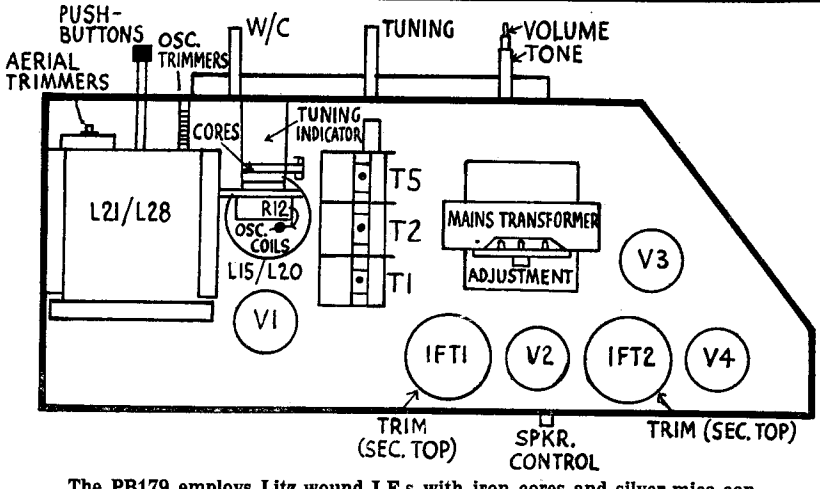
V.	Type.	Electrode.	Volts.	Ma.
1	TH 4B (Mullard).	Anode ..	245	2.1
		Screen ..	80	6
		Osc. anode	110	5
2	VP41 (Ekco)	Anode ..	240	10
		Screen ..	200	4.5
3	DO 42 (Ekco)	Anode ..	235	35
		Screen ..	240	5
4	R41 (Ekco) ..	Heater ..	290	—

RESISTANCES

R.	Purpose.	Ohms.
1	V1 A.V.C. feed	100,000/ 250,000
2	Osc. grid leak.	100,000
3	V1 cathode bias	160
4	V1 anode and osc. anode decoupling.	300
5	V1 screen stabiliser	300
6	Regeneration modifier ..	100
7	Regeneration modifier ..	1,500
8	V1 and V2 screen decoupling	5,000
9	H.F. stopper	50,000
10	T.I. grid decoupling	6 meg.
11	Demodulating diode load ..	750,000
12	T.I. anode feed	2 meg.
13	V5 grid leak	100,000
14	V1 A.V.C. decoupling ..	1 meg.
15	A.V.C. diode load (part) ..	500,000
16	A.V.C. diode load (part) ..	500,000
17	V3 cathode bias (part) ..	120
18	V3 cathode bias (part) ..	200
19	V3 screen decoupling ..	1,000
20	V2 cathode bias	75
21	Negative feed back potr. (part).	50,000
22	Negative feed back potr. (part).	10,000
VR1	Volume control	850,000
VR2	Tone control	20,000

CONDENSERS

C.	Purpose.	Mfds.	C.	Purpose.	Mfds.
15	I.F. filter	.00004	38	T.I. grid decoupling	.05
16	Aerial tune	.0002	39	V2 A.V.C. decoupling ..	.04
21	M.W. osc. fixed padder ..	.00068	40	V2 screen decoupling (part). .	2
22	L.W. osc. fixed padder ..	.000305	41	H.T. line bypass	.1
23	Bottom band pass coupling. .	.06	42	V2 screen decoupling (part). .	.1
24	Osc. anode decoupling ..	.04	43	V2 cathode bias shunt ..	.1
25	I.F.T.1 prim fixed trimmer . .	.00014	44	V1 A.V.C. decoupling ..	.01
26	I.F.T.1 sec fixed trimmer ..	.00014	45	Tone compensation	.00004
27	V1 screen decoupling ..	.04	46	Pentode compensator ..	.0025
28	V1 cathode bias shunt ..	.1	47	Tone control	.05
29	Osc. grid	.000035	48	V3 cathode bias shunt ..	25
30	Push-button coil fixed tune. .	.00028	49	V3 screen decoupling ..	1
31	Osc. fixed padder	.0075	50	H.T. smoothing	12
32	I.F.T.2 prim fixed trimmer . .	.00014	51	H.T. smoothing	8
33	I.F.T.2 sec fixed trimmer ..	.00014	52	Push-button aerial coupling	.0018
34	H.F. bypass	.00014	53	Series aerial	.0005
35	A.V.C. diode coupling ..	15 cm.	54	Negative feed back potr. shunt.	.1
36	H.F. bypass	.0001			
37	L.F. coupling	.004			



The PB179 employs Litz wound I.F.s with iron cores and silver mica condensers. They are of the driftless type and normally should not need readjustment. This top of chassis diagram shows I.F. trimmer positions.

How to Adjust the Push-buttons

Automatic push-button tuning is provided in the PB179 by a combination of the pre-set condenser and pre-set coil (permeability tuned) systems. Trimmer condensers are used in the aerial circuit and separate coils in the oscillator circuit. Four medium-wave and two long-wave stations can be selected. See diagram below for practical details.

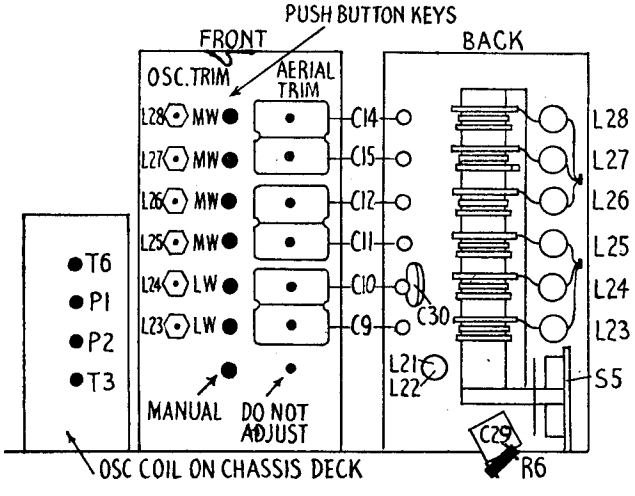
THE trimmer panel of the station keys is covered with a bakelite panel that is removable by a slight pull so as to dislodge the spring clips. In the hole beside the white button on the trimmer panel is an ivory box-spanner for re-setting the trimmers.

To realign the push-buttons using the same stations as before, all that is necessary is to adjust the corresponding oscillator and aerial trimmers on each station using only the lightest pressure on the trimming tool.

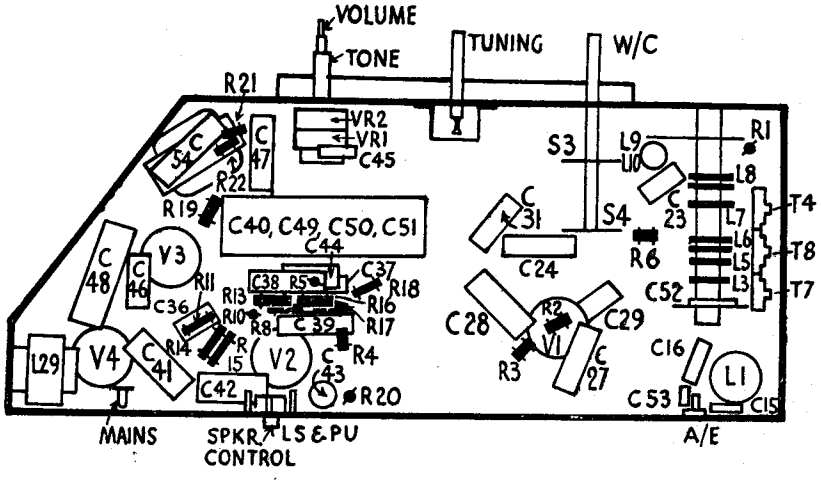
For changing a station, the makers have provided a list of station names to insert in the station-name panel. On the reverse side of the station name-card will be found the approximate number of turns rotation of the trimming tool for the oscillator trimmer from minimum capacity position and also the number of the button to be used. Each button also has a scale plan showing the wave-range it covers.

To change a station, therefore, fully unscrew the corresponding oscillator trimmer of the push-button concerned, depress the push-button and then turn the trimmer in a clockwise direction for as many turns as are indicated on the reverse of the station name-card. The station should then be approximately tuned in. Adjust the corresponding aerial trimmer for maximum and then adjust both in turn until the adjustment is complete.

Alternatively, press the white button, tune in the desired station and make a mental note of the programme. Then press the button concerned and adjust oscillator trimmer until the same programme is heard. Next adjust trimmers in turn until the tuning indicator opens widest. To check whether the correct station has been tuned-in the tuning indicator deflection on the manual setting can be compared.



Left, front and rear views of the push-button unit showing the trimmer condensers employed in the aerial circuit and the adjustable iron cores used for setting the permeability-tuned coils in the oscillator circuit.



Coils are numbered in this under-chassis diagram and in the other diagrams. The Windings table on page 41 enable them to be identified and tested.

Ekco PB179 on Test

MODEL PB179.—For A.C. mains operation, 200-250 volts, 40-100 cycles. Price 10½ gns.

DESCRIPTION.—Three-valve, plus rectifier, push-button superhet with three wavebands.

FEATURES.—Full-vision scale, calibrated in metres and station names. Six push-buttons and separate button for manual tuning. Uses pre-set circuit system. Controls for tuning, combined volume and master switch, and tone. Speaker at side of chassis. Sockets for a high output pick-up and low-impedance speaker. Speaker control switch. Visual tuning indicator.

LOADING.—56 watts.

Sensitivity and Selectivity

SHORT WAVES (16-52 metres).—Excellent gain and selectivity. Very easy handling and no drift trouble. Gain well maintained over band.

MEDIUM WAVES (200-550 metres).—Very good gain and selectivity, with local stations spreading on adjacent channels only. Good background and well maintained sensitivity.

LONG WAVES (1,050-2,000 metres).—Similar performance to medium band, with slight side splash on Deutschlandsender.

Acoustic Output

Ample volume for an ordinary room, with very pleasing characteristics. Forward tone on speech and little colouration. Good radiation at both ends of the scale.

Push-button Notes

The setting of the push-buttons remained constant during our tests and we did not detect any suggestion of drift.

(*Continued from opposite page.*)

the speaker cable to the speech coil of the internal speaker. For complete removal the leads to the speaker can be unsoldered, or, alternatively, the speaker, secured by four bolted clips, can be removed.

The push-button switches and associated tuning coils are enclosed in the screening can on the front of the chassis deck. If 10 screws are removed the screening can may be detached.

The makers recommend that no adjustment to the components in the screening box should be made, and in the unlikely event of trouble occurring, the complete button assembly should be removed and despatched to the nearest Ekco service depot. On no account should the oscillator master coils be adjusted.

Special Notes.—Sockets at the rear of the chassis provide connection for a low impedance (3-4 ohms) speaker. The internal speaker can be silenced by unscrewing a small black screw near the chassis.

Similar sockets at the rear of the chassis enable a high output pick-up to be connected.

The adjustment device on the mains transformer takes the form of three sockets inscribed with voltage values. Into one of

(*Continued on page* 41.)

Ekco Push-button PB 179

(*Continued from page* 29.)

these an insulation-headed member is screwed.

The visual tuning indicator is a Mullard type TV4. Across the holder is connected the anode feed resistance R12.

Sockets at the rear of the chassis marked L.A. and S.A. are for connecting a long aerial or a short aerial, the L.A. socket bringing a series aerial condenser into circuit.

The single dial illuminating light is of the M.E.S. type and rated at 6.2 volts .3 amp.

C30 is enclosed in the push-button assembly screening can; R7, C21 and C22 in the oscillator coils can; C25 and C26 in I.F.T.1. and R9, C32, C33, C34 and C35 in I.F.T.2. A 140 mmfd. condenser may sometimes be found connected between the anode of V1 and chassis.

WINDINGS (D.C. Resistances)

Manual-tuning button depressed.

L.	Ohms.	Range.	Where measured.
1	14.3	—	Across tags.
3	8.5	—	Across C16.
5	25.8	L.W.	Aerial gang and C23.
6	2.8	M.W.	Aerial gang and C23.
7	24.4	L.W.	Top grid V1 and C23.
8	3	M.W.	Top grid V1 and C23.
9	.1	S.W.	Top grid V1 and C23.
10	.4	—	C52 and C53.
11	4	—	Anode V1 and R4.
12	7.6	—	Top grid V2 and C39.
13	4.4	—	Anode V2 and H.T. line.
14	—	—	Inaccessible.
15	.1	S.W.	C29 and C31.
16	.6	S.W.	R6 and C24.
17	—	—	Inaccessible.
18	—	—	Inaccessible.
19	—	—	Inaccessible.
20	—	—	Inaccessible.
21	1.6	A button depressed.	Osc. anode V1 and C24.
22	8.5	—	Across C30.
23	6	—	Across wires.
24	4.9	—	Across wires.
25	4	—	Across wires.
26	3.3	—	Across wires.
27	2.3	—	Across wires.
28	2	—	Across wires.
29	980	—	Yellow and red leads condenser block.
O.T. primary	330	—	Anode V3 and H.T. line.
M.T. primary (200v.)	28	—	Mains plug pins.
Total H.T. sec.	480	—	Anode pins V4.

Circuit Alignment Notes

I.F. Circuits.—Connect an output meter across the L.S. sockets or primary of the output transformer. Switch receiver to M.W. band, turn gang and volume to maximum, and tone to high.

Connect a service oscillator between the top cap of V1 (*via* a .02 mfd. condenser) and chassis, leaving the ordinary connection still made.

The main intermediate frequency is 480 kc., but receivers within a radius of 40 miles from the Washford Cross, Droitwhich, Westerglen and Burghead stations should be aligned at 465 kc. to avoid whistles.

Tune service oscillator to appropriate frequency and with a non-metallic tool adjust I.F.T.2 secondary (upper core), I.F.T.2 primary (lower core), I.F.T.1 secondary (upper core) and then I.F.T.1 primary (lower core) for maximum response. Reduce the input from the service oscillator as the circuits come into line. Then re-seal cores with wax.

It should be borne in mind that the I.F. transformers are of the driftless type, and they should not need re-aligning under normal circumstances.

Signal Circuits.—To obtain access to the oscillator trimmers and iron cores, it is necessary to remove the scale by gently levering on the four press-studs (one at each corner), and breaking the scale away at the point where it is glued. This should be effected by slipping a knife down the back of the scale and carefully prising so as not to injure the scale.

A calibrated scale for re-aligning can be obtained from the manufacturers, and this should be cut to shape, glued to a piece of cardboard and the black circles on the scale punched out to allow the trimming tool to pass through. It is most important that the holes are accurately made to the sizes and positions given, and that the large centre hole be concentric to the drive spindle. Otherwise calibration will be incorrect when the normal scale is replaced.

Connect the service oscillator to the aerial and earth sockets via a dummy aerial. Progressively reduce the input as the circuits come into line so as to obtain reliable peaks free from A.V.C. action.

The wavelength pointer should be horizontal to the right, with the gang at maximum capacity.

I.F. Filter.—With service oscillator still tuned to the intermediate frequency, unscrew core of L1 and then screw in to obtain *minimum* response in output meter. Ignoring the small dip in the central position as in general practice the correct position will be found when the core is distinctly off centre.

Short Waves.—Tune set and oscillator to 17.6 metres (17 mcs.) and adjust T1 and then T2 for maximum response.

Check calibration at 50 metres (6 mcs.).

Medium Waves.—Tune set and oscillator to 200 metres (1,500 kcs.) and adjust T3 for maximum.

Tune set and oscillator to 250 metres (1,200 kcs.) and adjust T4 then T5 for maximum.

Tune set and oscillator to 500 metres (600 kcs.) and adjust P1 (core) for maximum, simultaneously rocking the gang.

Repeat above operations.

Long Waves.—Tune set and oscillator to 1,300 metres (230 kcs.) and adjust T6, T7 and then T8 for maximum.

Tune set and oscillator to 1,700 metres (176.5 kcs.) and adjust P2 (core) for maximum, simultaneously rocking the gang.

Repeat both operations.

Kolster-Brandes 730

(*Continued from page* 33.)

Trim T5 and T2 to give maximum output.

Reset generator and receiver to 600 kcs. (500 metres), and adjust the medium wave padding condenser, T8 (nut).

This completes the medium wave adjustments, but it is advisable to check the 1,400 kcs. trimmer settings after any adjustments made at 600 kcs.

Long Waves.—Switch the receiver to the long-wave range and set the pointer to 300 kcs. (1,000 metres). Adjust the signal generator to the same frequency and trim T6 and T3 for maximum output.

Reset the signal generator and receiver to 175 kcs. (1,714 metres), where another "dot" will be seen on the L.W. scale, and pad with T7 (screw).

Repeat the long wave adjustments until the calibration is correct over the complete range.

Short Waves.—Switch the receiver to the S.W. range and set the pointer to 17 mcs. (17.6 metres), where a "dot" will be seen. Adjust the generator to inject this frequency and trim with T4 for maximum signal.

It will be found that the signal can be tuned in at two positions as T4 is adjusted. It is important to use the higher frequency setting. This is obtained with the trimmer screw set towards its minimum capacity.

Finally, trim T1 for maximum output. While adjusting this trimmer the tuning control should be rocked a minute fraction. No padding is necessary on this range.

Brunswick 39E.H.

(*Continued from page* 35.)

grid leak had values slightly higher than those shown in the circuit.

To allow for slight drift the response of the second intermediate transformer is flattened by using a tightly coupled untuned secondary winding.

The switch button unit is of a non-standard type and the various buttons make provision for changing the input coils from medium to long. There is no switching of the oscillator coil.

Although the set has high inherent stability, it is definitely not stable with the screens removed from the valves. This point must be borne in mind in making any tests or adjustments.

Alignment Notes

I.F. Circuits.—Connect output meter to the extension speaker sockets and inject the I.F. of 120 kcs. between the grid of V2 and chassis. Adjust T4 for maximum response, but at the same time continuously reduce the input from the oscillator so that no A.V.C. action takes place.

Repeat the operation with the input applied between the grid of V1 and chassis, adjusting T3 and T2 in the normal manner.

The I.F. trap can be adjusted by injecting the intermediate frequency between chassis and, via an extremely small capacity, to the aerial. Adjust T1 until the output is at *minimum*.