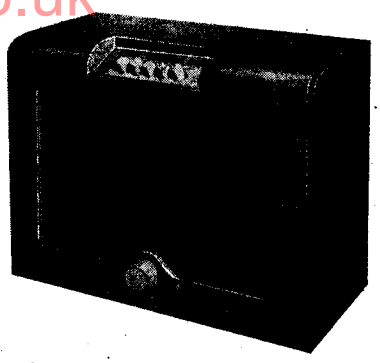
PHILCO U429 PUSH-BUTTON FOUR



A three-valve plus rectifier superhet, the U429 selects five push-button stations and does not provide manual tuning.

CIRCUIT.—This receiver employs a reflex superhet circuit. Also, there is no ordinary tuning.

The aerial connection is made through a fixed condenser, C6, and a winding which is coupled inductively to the medium- and long-wave coils. These aerial coils are tuned by pre-set trimmers, selected by a push-button switch.

The input tuned circuit is taken to the grid of V1, a conventional mixer. In the oscillator section the push-button switches select permeability-tuned coils. The oscillator circuit is of the type employing a split condenser with earthed centre point, the outers of the circuit going to the grid and anode of the oscillator valve through the usual grid leak and condenser. The press-button switching also provides for short circuiting of the coils to prevent absorption effects.

The first I.F. transformer leads to V2, which forms two stages and is also reflexed.

This valve is a triode pentode with distinct valve systems and a common cathode. The pentode portion is used as a high-frequency amplifier and contains in its anode circuit the second I.F. transformer. The latter works into the triode portion of V2, which is used as a demodulator.

The demodulator load takes the form of the volume control and the low-frequency potentials are reintroduced on the low side of the first I.F. transformer and are amplified by the pentode section.

In addition to the primary circuit of the second I.F.T. there is a 32,000-ohm resistance in the anode of V2. This acts as an audio coupling device, the amplified voltages being taken through the coupling condenser C11 to the grid circuit of V3.

V3 is a perfectly standard output pentode. There is no compensating capacity-resistance network.

In spite of the reflex arrangement, control is provided both manually and also automatically. The low-frequency output is controlled by the normal volume control.

The D.C. voltage appearing across this resistance, however, is proportional to the carrier, and this is, therefore, used for A.V.C. purposes. It will be noted that

CONDENSERS

C.	Purpose.	Mfds.
1	Mains filter	.025
2	Osc. fixed tune	.0004
3	V1 osc. anode coupling	.0008
4	Osc. grid	.0004
5	Aerial top coupling	.000005
6	Aerial series	.00025
7	Chassis isolating	.04
8	V1 cathode bias shunt	.05
9	V1 A.V.C. decoupling	.05
10	L.F. coupling	.04
11	V2 L.F. coupling	.04
12	H.F. by-pass	.0015
13	V2 grid return by-pass	.0005
14	H.F. by-pass	.00011
15	H.F. by-pass	.00011
16	V1 and V2 screen decoupling	.05
17	V2 cathode bias shunt	.05
18	H.T. smoothing	8
19	H.T. smoothing	8
20	V3 cathode bias shunt	25

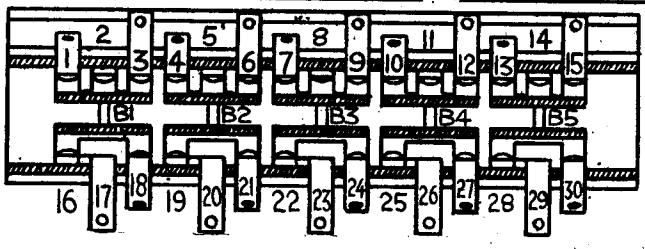
RESISTANCES

R.	Purpose.	Ohms.
1	V1 cathode bias	1,000
2	V1 osc. anode load	25,000
3	V1 osc. grid return	99,000
4	V1 and V2 screen pot. (part)	25,000
5	V1 and V2 screen pot. (part)	25,000
6	V3 grid leak	490,000
7	V2 cathode bias	750
8	A.V.C. decoupling	1 meg.
9	V3 cathode bias	400
10	V2 L.F. anode load	32,000
11	V2 grid return	2 meg.
12	V2 A.V.C. decoupling	4 meg.
13	H.F. stopper	51,000
14	Volume control	500,000
15	H.F. filter	51,000
16	Volt drop resistance	580
17	I.F.T.1. secondary shunt	250,000

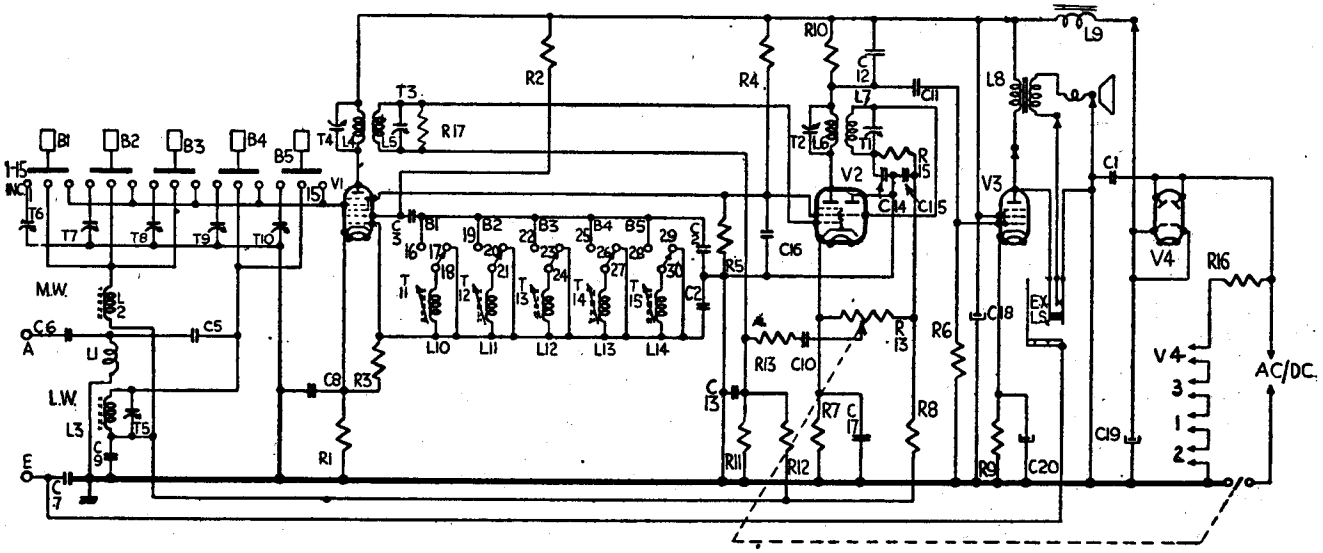
VALVE READINGS

No signal. Volume maximum.

V.	Type.	Electrode.	Volts.
	All Philco.		
1	6A7	Anode	190
		Screen	65
		Osc. anode	140
2	6F7E or 6B7E	Anode	70
		Screen	65
3	18E	Anode	185
		Screen	190
4	25RE	Cathode	255



Below, the circuit and, on left, a diagram of the push-button switch contacts identifying them with the points shown in the circuit.



the grid returns of both V1 and V2 actually go back to this point through a decoupling network. The value of the second decoupling network, however, has to be non-standard, the decoupling resistance being very high and the condenser proportionately smaller.

Chassis Removal.—The chassis is held by four quick-thread bolts fitted with rubber grommets. Removal of these releases the chassis. Before it can be withdrawn it is necessary to remove the press-button escutcheon, as well, of course, as the control knobs.

A multiple cable goes to the speaker strip which is screwed to the side of the cabinet. The easiest way of removing the speaker is not to unsolder the leads but to unscrew the strip, which is held by a single screw, and release the four wood screws holding the speaker. The colour code is as follows: cable blue to speaker green; cable green to speaker grey; cable white to speaker blue and maroon; cable white with green tracer to speaker red; cable maroon to speaker chassis.

Special Notes.—Certain components will not be easily located in this chassis. The H.F. filter, consisting of R15, C14 and C15, is located in the second I.F.T. can.

The mains drop resistance R16 is composed of an asbestos insulated resistance wire in the mains cable connection. On no account, therefore, must this cable be shortened. If it is damaged a new one must be fitted. The condenser C2, which forms part of the tuned circuit of the oscillator, consists of three condensers connected in parallel having various values to give the desired nominal value. This is no doubt adjusted in manufacture to give the correct wave coverage.

Certain condensers are mounted together in the same bakelite moulding. C8 and C16 will be found in one moulded case and, similarly C9 and C17 will be found in another.

Adjustment of Push-buttons

Press the button which it is desired to adjust. Ascertain whether the wavelength, in metres, of the required station is higher or lower than that of the station to which the button was set.

If higher, the oscillator trimmer will need to be turned counter-clockwise, and the aerial trimmer clockwise, when readjusting.

Conversely, if lower, the oscillator trimmer will need to be turned clockwise, and the aerial trimmer counter-clockwise.

Connect signal generator *via* a standard dummy aerial to the grid cap of V1 (with grid lead connected). Feed in a signal of the same wavelength as the desired station and turn the oscillator trimmer associated with the button in the required direction until maximum output is obtained.

Transfer signal generator lead *via* the standard dummy aerial to the aerial socket. With the same signal injected, turn the aerial trimmer until maximum output is obtained. Readjust oscillator and aerial trimmers in that order until no further improvement is obtainable.

To ensure that the receiver is not tuned to an image signal, rotate signal generator tuning knob through whole of M.W. and L.W. bands; only one signal should be obtained for each button adjustment. In doing this test, care must be taken that the signal generator output is kept as low as possible.

It is advisable to make a final adjustment of the trimmers when the receiver is connected to the aerial which it is proposed to use.

The coverage of the buttons is given in the " table " on page 37.

(*Continued on page* 37.)

WINDINGS (D.C. RESISTANCES)

L.	Ohms.	Range.	Where measured.
1	22	—	Tags 4 and 5.
2	3	—	Tags 2 and 3.
3	11.4	—	Tags 1 and 3.
4	8	—	V1 anode and H.T. positive.
5	12	—	V2 grid and C13+R11.
6	12	—	V2 anode and C12+R10.
7	51,000	—	V2 triode grid and R14 +R8.
8	280	—	Cable green and cable white.
9	1,500	—	Cable white and cable green/white.
10	2.5	B1	V1 osc. grid and C3+ B1—B5 common.
11	3.5	B2	V1 osc. grid and C3+ B1—B5 common.
12	4.5	B3	V1 osc. grid and C3+ B1—B5 common.
13	10	B4	V1 osc. grid and C3+ B1—B5 common.
14	10	B5	V1 osc. grid and C3+ B1—B5 common.

Philco U429 on Test

MODEL U429.—For 200-250 volts, A.C. or D.C. mains. Price, 7½ gns.

DESCRIPTION.—Three-valve, plus rectifier, push-button only, reflex universal table model superhet.

FEATURES.—Provision for five push-button selected stations, two on the long waves and three on medium. Button-operated permeability trimmed oscillator coils and condenser trimmers on the input. No manual tuning. A single knob for volume and master switching. Sockets for aerial and earth. Volt drop resistance in the mains cord designed to run warm.

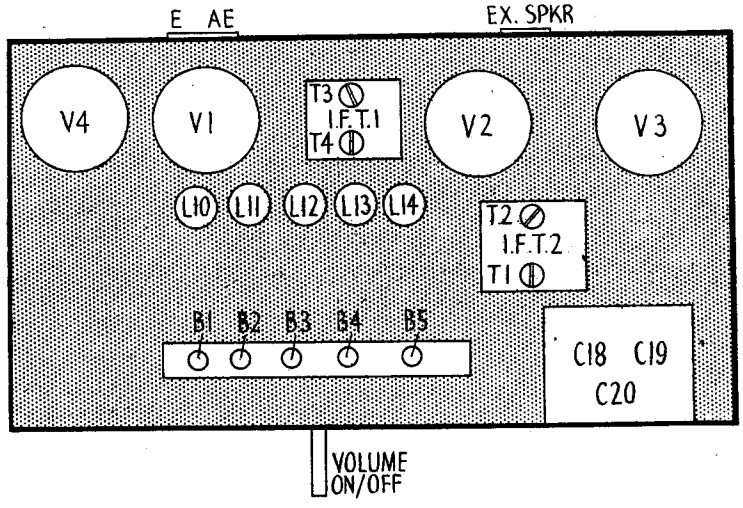
LOADING.—70 watts, average.

Sensitivity and Selectivity

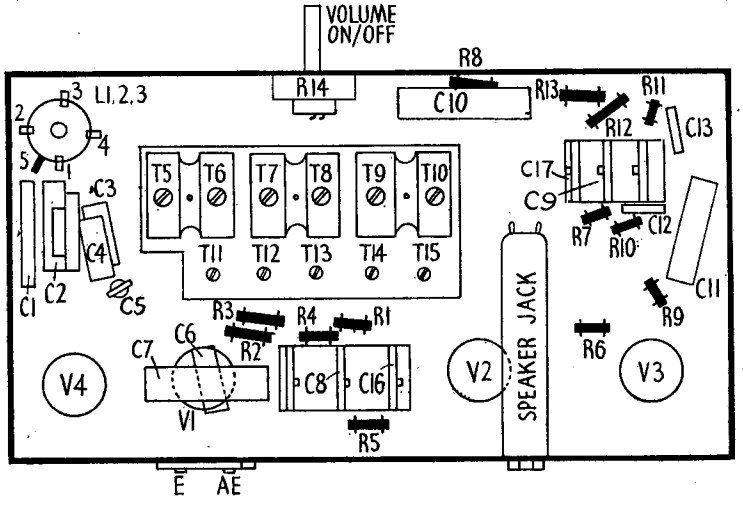
Sensitivity, with a small internal aerial, was found to be adequate, full room volume being obtained. The settings of the five buttons were accurate, and during our test there was no drift whatever.

Acoustic Output

In spite of a very small speaker the tone is well balanced and there is ample volume for an ordinary room. Both ends of the musical scale radiate well for a small speaker and the general effect is pleasing.



Right, top chassis layout diagram of the U429.



Left, the underside layout showing where the trimmers are situated.

Alignment Notes

I.F. Circuits.—Connect a signal generator, tuned to 465 kc., to the control grid of V1 with a .05 mfd. condenser in series. The lead on the top cap should be left in position on the valve.

The reaction condenser, C14, must be set at zero, and the wax securing the iron cores of the I.F. transformer can be softened by placing a heated screwdriver in the slots. The cores are then screwed in or out as required for maximum response in the output meter.

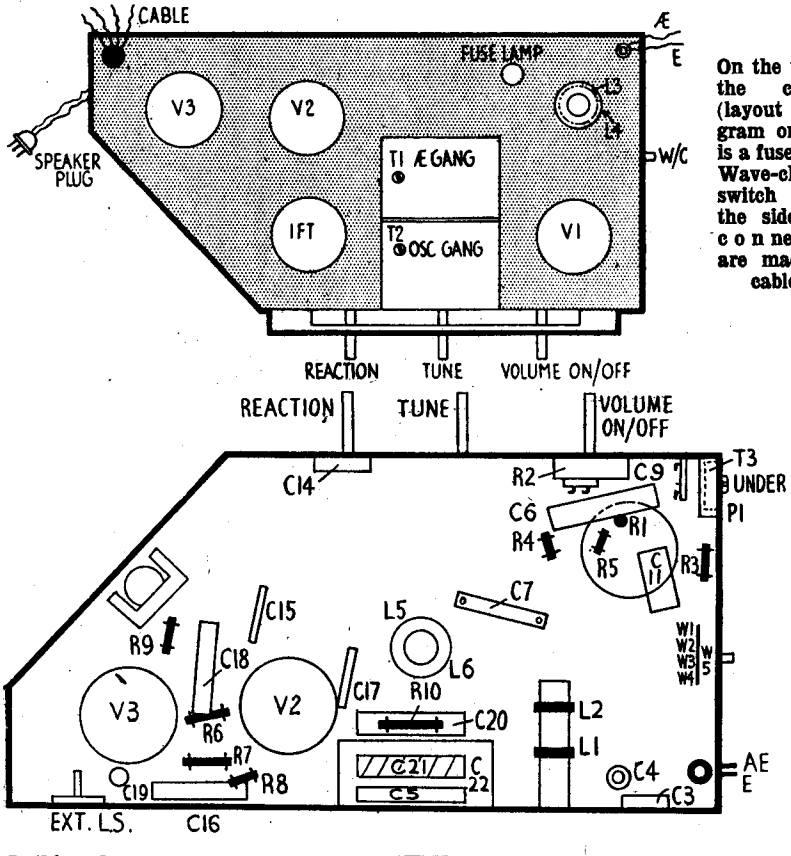
Medium Waves.—Connect the signal generator, tuned to 1,400 kc. (214 metres), to the aerial lead and set the pointer on the receiver to 214 metres.

Adjust T2 and then T1 to obtain maximum signal. No padding is available on M.W., as a fixed padding condenser is used.

Long Waves.—To adjust the L.W. trimmer, T3, tune the signal generator to 250 kc. (1,200 metres), and set the pointer on the receiver to 1,200 metres.

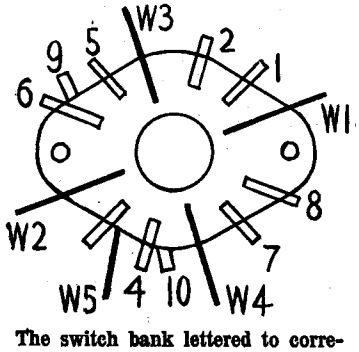
Vary the trimmer and gang condenser setting until the point of maximum gain is found.

The L.W. padder, P1, is adjusted in a similar manner at 160 kc. (1,875 metres), and the trimming operation repeated at 1,200 metres.



On the top of the chassis (layout diagram on left) is a fuse bulb. Wave-change switch is on the side and connections are made by cables.

In this under-chassis layout diagram the electrolytic condenser is shown shaded. Construction is compact and straightforward.



The switch bank lettered to correspond to the circuit. W5 and contacts 9 and 10 are on the under side. See also switch details in text on opposite page.

Cossor 394 on Test

MODEL 394.—For battery operation, requiring standard capacity H.T. battery type 1120 and 2-volt 45-a.h. accumulator, type E245. Price, 6 gns.

DESCRIPTION.—Three-valve, two-waveband table model superhet.

FEATURES.—Full-vision scale with "aeroplane" type pointer. Wave switch at side of cabinet and controls for tuning, volume and reaction (which is applied to the intermediate transformer) on the front. Scale calibrated in names and wavelengths. Switched extension speaker socket and leads for aerial and earth. Battery connection by a multiple cable. Valves held in position by rubber bands of special moulded type.

LOADING.—H.T., 7.2 ma.; L.T., .4 amp.

Sensitivity and Selectivity

MEDIUM WAVES (190-550 metres).—Very good sensitivity and excellent selectivity for a small battery set. Gain is well maintained and is very appreciably improved by the intermediate frequency reaction.

LONG WAVES (800-2,400 metres).—Excellent gain and selectivity. All main stations easily received, with very little interference on Deutschlandsender.

Acoustic Output

Sufficient volume for an ordinary room, with a very pleasing characteristic for a battery output. The tone is well balanced, with no undue prominence of top notes and the medium and lower registers are good for a small set.

Replacement Condenser

AN exact replacement for the one electrolytic condenser in the 394 is available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18. This is for C21, and is unit 4,105, price 1s. 6d.

Philco U429 Alignment Notes

Continued from page 60.)

I.F. Circuits.—Connect the output of a signal generator between the chassis and the control grid of V1 and tune oscillator to 475 kc. Connect an output meter to the extension speaker jack.

Adjust T1 and T2 and then T3 and T4 for maximum output.

The input used must be small and must be progressively reduced as the receiver comes into line. A final check of T1 and T2, T3 and T4 should then be made.

Wavetrap.—In this receiver the long-wave tuning coil is used as a series rejector circuit when working on the medium band. Connect the signal generator to the aerial and earth sockets, adjust to 475 kc., and vary T5 until *minimum* response is obtained.

Button.	Range.	Osc. trimmer.	Aerial trimmer.
MEDIUM WAVES			
1	180–280 metres (1,666.6–1,071.4 kcs.)	T.11	T.6
2	230–420 metres (1,304.3–714.2 kcs.)	T.12	T.7
3	300–550 metres (1,000/545.4 kcs.)	T.13	T.8
LONG WAVES			
4	1,000–1,800 metres (300–166.6 kcs.)	T.14	T.9
5	1,200–2,000 metres (250–150 kcs.)	T.15	T.10

Replacement Condenser

AN exact replacement is available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18, for the block containing Cs 18, 19 and 20. This is unit number 1129, price 7s. 6d.