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NUMBER 146 **'TRADER' SERVICE SHEETS**

PHILCO 269 (AND 444)

(ALSO 269 RADIOGRAM)

THE 3-valve (plus rectifier) A.C. superhet chassis fitted in the Philco 269 table receiver is also fitted, with slight modifications, in the model 444 "People's Set" and in the 269 radiogramophone. Our Service Sheet was produced in conjunction with a chassis taken from a 269 table model (runs 3 and 4). Full details of the changes which have been effected since run 1 are given in the General Notes section.

Features of special interest in the 269 chassis are the unscreened signal frequency and oscillator coils and the unscreened second I.F. transformer which has only its primary tuned.

CIRCUIT DESCRIPTION

Aerial input via coupling condenser **C1** to coupling coils **L2** (M.W.) and **L3** (L.W.) Tuned filter **L1, C17** by-passes interference at the intermediate frequency.

Single tuned circuits comprising **L3 C19** (M.W.) and **L4, C19** (L.W.) precede first valve (**V1, Philco 6A7**), a heptode operating as frequency changer with electron coupling. Oscillator grid coils **L6** (M.W.) and **L7** (L.W.) are tuned by **C21**; trimming by **C22** (M.W.) and **C23** (L.W.); tracking by **C24** (M.W.) and **C25** (L.W.); reaction is applied from anode by fixed condenser **C4.**

Second valve, a variable-mu H.F. pentode (**V2, Philco 78E**), operates as intermediate frequency amplifier with tuned-primary tuned-secondary input transformer **C26, L8, L9, C27** and tuned-primary output transformer **C28, L10, L11.**

Intermediate frequency 451 KC/S.

Diode second detector is part of double diode output pentode (**V3, Mazda Pen DD.61**). Audio-frequency component in rectified output developed across manual volume control **R10** is passed via coupling condenser **C11** and I.F. stopper **R13** to C.G. of pentode section. Tone correction by fixed condenser **C13** in anode circuit.

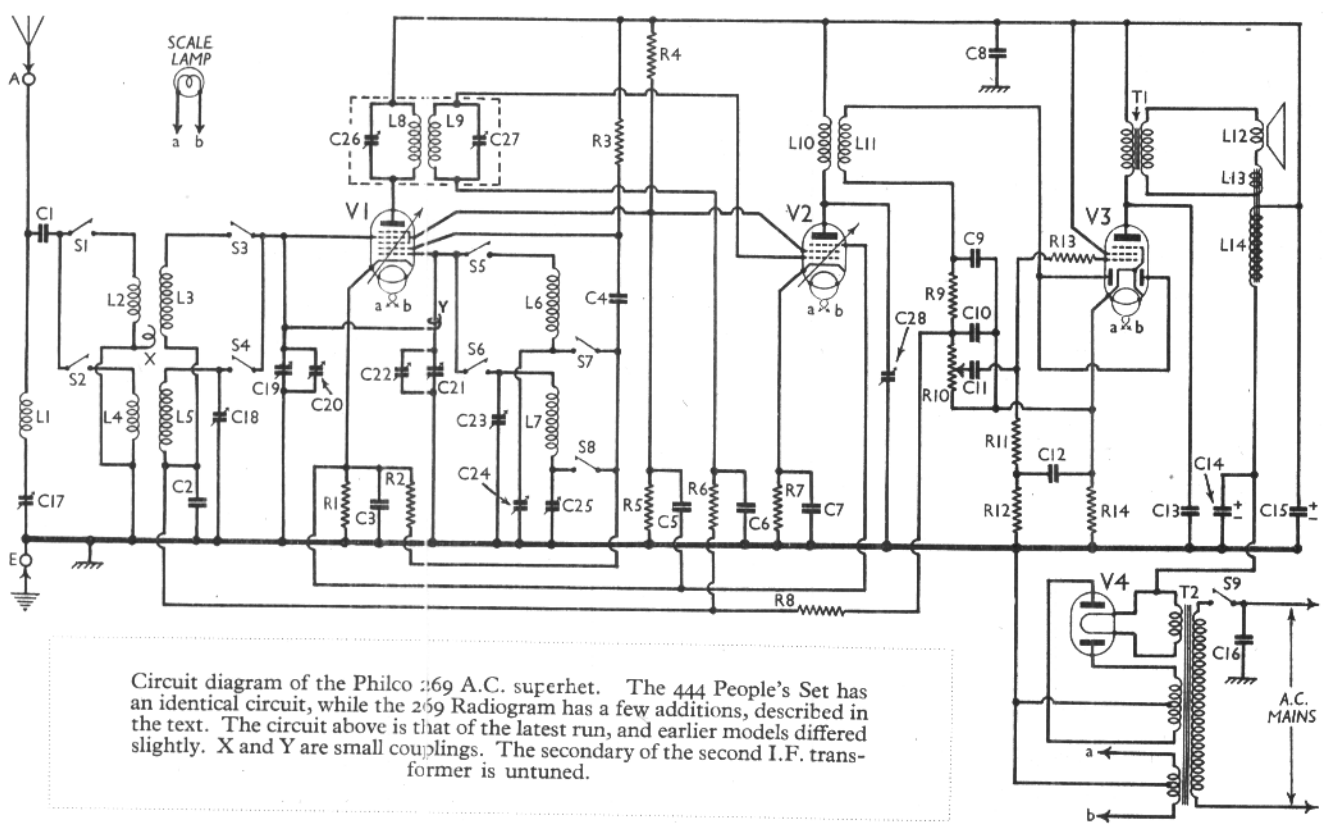
D.C. potential developed across **R10** is fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control.

H.T. current is supplied by full-wave rectifying valve (**V4, Philco 80**). Smoothing by speaker field coil **L14** and dry electrolytic condensers **C14, C15** Mains H.F. by-passing by condenser **C16.**

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	Aerial coupling condenser ..	0·00025
C2	V1 tetrode C.G. decoupling ..	0·05
C3	V1 cathode by-pass	0·09
C4	V1 osc. anode coupling ..	0·0008
C5	V1, V2 S.G.'s by-pass.. ..	0·05
C6	V2 C.G. decoupling	0·05
C7	V2 cathode by-pass	0·09
C8	H.T. supply H.F. by-pass ..	0·1
C9	I.F. by-passes	0·00011
C10		0·00011
C11	L.F. coupling to V3 pentode..	0·01
C12	V3 pentode C.G. decoupling ..	0·1
C13	Tone corrector..	0·003
C14*	H.T. smoothing ..	8·0
C15*		8·0
C16	Mains H.F. by-pass	0·015
C17‡	Aerial I.F. filter tuning ..	0·000125
C18‡	Aerial circuit L.W. trimmer ..	0·00008
C19†	Aerial circuit tuning	—
C20‡	Aerial circuit trimmer ..	—
C21†	Oscillator circuit tuning ..	—
C22‡	Oscillator circuit trimmer ..	—
C23‡	Oscillator circuit L.W. trimmer	0·00005
C24‡	Oscillator M.W. tracker ..	0·0005
C25‡	Oscillator L.W. tracker ..	0·00024
C26‡	1st I.F. trans. pri. tuning ..	—
C27‡	1st I.F. trans. sec. tuning ..	—
C28‡	2nd I.F. trans. pri. tuning ..	0·00008

* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Philco 269 A.C. superhet. The 444 People's Set has an identical circuit, while the 269 Radiogram has a few additions, described in the text. The circuit above is that of the latest run, and earlier models differed slightly. X and Y are small couplings. The secondary of the second I.F. transformer is untuned.

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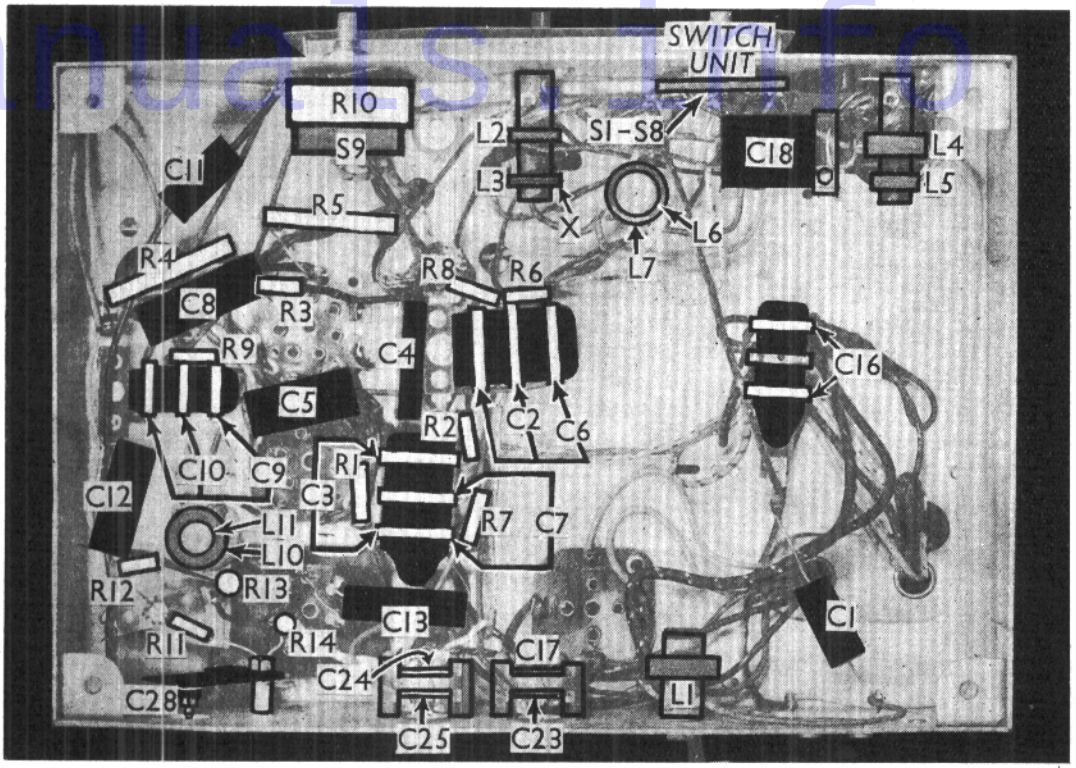
Under - chassis view. L10 is below L11, and L7 is below L6. Note the connections of the condensers in the four moulded units, indicated by arrows. The coupling X consists of a turn of wire wound round the outside of L3. A diagram of the switch unit is on this page.



RESISTANCES		Values (ohms)
R1	V1 fixed G.B. resistance	700
R2	V1 osc. C.G. resistance	51,000
R3	V1 osc. anode resistance	10,000
R4	V1, V2, S.G.'s H.T., potential divider	25,000
R5		51,000
R6	V2 C.G. decoupling	2,000,000
R7	V2 fixed G.B. resistance	800
R8	V1, V2, A.V.C. line decoupling	2,000,000
R9	I.F. stopper	51,000
R10	V3 diode load ; vol. control	330,000
R11	V3 pentode C.G. resistance	490,000
R12	V3 pentode C.G. decoupling	490,000
R13	V3 pentode C.G. I.F. stopper	100,000
R14	V3 G.B. resistance	140

OTHER COMPONENTS		Approx. Values (ohms)
L1	Aerial I.F. filter coil	20·0
L2	Aerial M.W. coupling coil	25·0
L3	Aerial M.W. tuning coil	2·5
L4	Aerial L.W. coupling coil	95·0
L5	Aerial L.W. tuning coil	37·5
L6	Oscillator M.W. tuning coil	2·5
L7	Oscillator L.W. tuning coil	14·5
L8	1st I.F. trans. Pri.	8·0
L9	1st I.F. trans. Sec.	12·0
L10	2nd I.F. trans. Pri.	30·0
L11	2nd I.F. trans. Sec.	80·0
L12	Speaker speech coil	2·2
L13	Hum neutralising coil	0·1
L14	Speaker field coil	2000·0
T1	Speaker input trans. Pri.	230·0
	Speaker input trans. Sec.	0·25
T2	Mains trans. Pri. total	35·0
	Mains trans. Heater sec.	0·2
	Mains trans. Rect. fil. sec.	0·15
	Mains trans. H.T. sec. total	480·0
X	Small couplings	—
Y		—
S1-S8	Waveband switches	—
S9	Mains switch, ganged R10	—

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs from their spindles (pull off). Remove the four hexagonal-headed self-tapping screws from the underside of the cabinet, and the chassis can be withdrawn to the extent of the speaker leads for all normal repairs. *When replacing* do not omit to place the rubber bushes under the chassis before inserting the screws, and make sure that the buffers at the front of the chassis are also in position.

Removing Speaker.—Four bolts with ornamental heads support the speaker chassis inside the 269 cabinet, while in the 444 four bolts hold the speaker on a wooden sub-baffle. Removal of the nuts in each case enables the speaker to be taken from the cabinet. *When replacing*, the input transformer of the 269 speaker should project towards the bottom right-hand corner of the cabinet (viewed from the rear) and the 444 speaker should be at the top. The colour coding of the leads is as follows :—centre tag, green ; nearest outer tag, green-white ; remaining outer tag, white.

VALVE ANALYSIS

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
6A7*	230	2·9	90	2·5
78E	230	6·2	90	1·5
PenDD61	225	30·0	235	6·0
80	330†	—	—	—

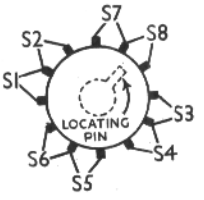
* Osc. anode (G2) 180 V 3·7 mA.
† Each anode, A.C.

Valve voltages and currents listed in the table above were obtained from a representative chassis operating with a 230 V. 50 c.p.s. mains supply. There was no signal input (aerial and earth sockets s/c), and the receiver controls were set as follows :—wavechange switch at M.W., tuning condenser at minimum capacity, volume control at maximum. All voltage readings were taken on the 1,200 V scale of an Avometer, chassis being negative.

GENERAL NOTES

Switches.—**S1-S8** are in a single rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and is shown on this page in diagrammatic form, as seen from the rear of the underside of the chassis. Note that the switches are in pairs, each pair having one common contact. **S1, S3, S5** and **S7** are closed on the M.W. band and open on the L.W. band, while **S2, S4, S6** and **S8** are open on the M.W. band and closed on the L.W. band.

Diagram of the switch unit, as seen looking at the underside of the chassis from the rear.



S9 is the Q.M.B. mains switch, ganged with the volume control **R10.**

Coils.—Most of the coils are beneath the chassis, and are unscreened. They are weave-wound on cylindrical formers. **L1** is attached to the rear of the chassis. **L2, L3** and **L4, L5** are mounted behind the front of the chassis. **L6** and **L7** are mounted vertically under the chassis ; **L7** being nearest to the chassis.

(*Continued overleaf*)

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PHILCO 269 (and 444)—*Continued*

L8 and **L9,** the first I.F. transformer, is in a screened unit on the chassis deck, while **L10, L11,** forming the second I.F. transformer, is mounted vertically beneath the chassis, **L10** being nearest to the chassis. The trimmers of **L8, L9** are operated through holes in the top of the screen, but the second I.F. unit has an untuned secondary, the primary, **L10,** being tuned by **C28** (reached through a hole in the rear of the chassis).

Scale Lamp.—This is a Philco M.E.S. tubular type, marked "6—8," Philco part number 6608.

External Speaker.—No provision is made for this, but a high resistance type could be connected across the primary of the internal speaker transformer **T1** (to the tags to which the white and green leads are already attached).

Coupling X.—This consists of a single turn of wire with one end free, taken round the outside of **L3** (beneath the chassis).

Coupling Y.—This consists of a short length of insulated connecting wire soldered to the tag of **C20** and taken to the tag of **C22,** through which it is looped (but not soldered, of course.)

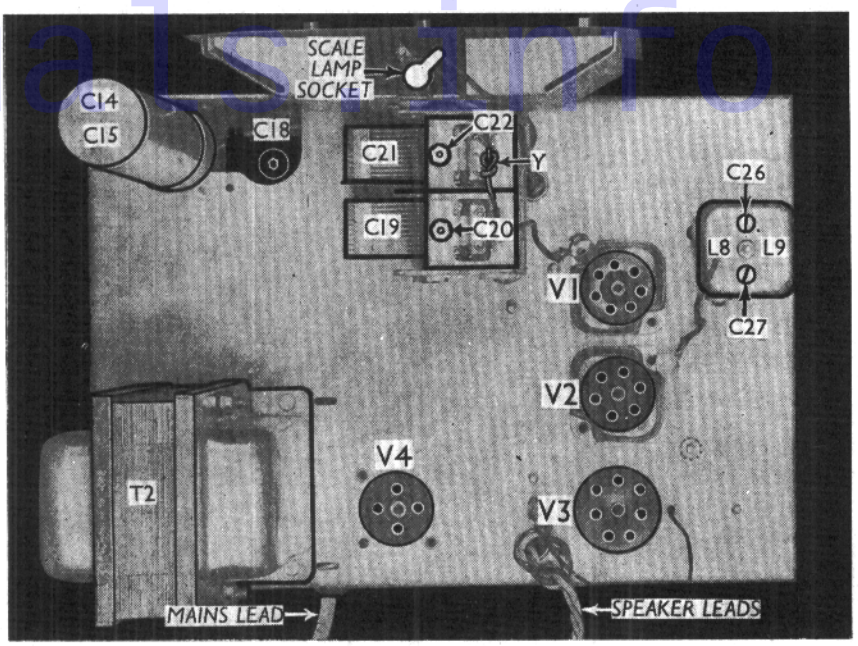
Condensers C14, C15.—These are two 8μF electrolytics in a single tubular metal can mounted in a clip on the chassis deck. The can is negative. The plain tag is the positive of **C14,** while the other tag, marked with a spot of red enamel, is the positive of **C15.**

Black Moulded Condensers.—There are four paper condenser units with black moulded containers. Three of these each contain two condensers, having one common contact. In the **C2, C6** and **C3, C7** units, the common tags are earthed by the mounting bolt. In the **C9, C10** unit, the common tag is not earthed. The fourth unit only contains a single condenser, **C16,** connected across the outer two tags. The central tag on the unit merely acts as a bearer. The individual condensers are identified in our under-chassis view.

Trimmers C17, C23, C24, C25.—**C17, C23, C24, C25** form two dual units, adjustable through holes in the rear of the chassis. The screws adjust **C17** and **C24** respectively, and the nuts **C23** and **C25.**

Radiogram Model.—The chassis of this is similar to that of the 269 table model except for a few additions and modifications. An extra rotary switch, with "radio" and "gram" positions, is fitted. Only two single pole units of this are used. One contact of one of these goes to chassis. The connection of **R1** to chassis is broken, and taken to the other contact of this switch. On radio the switch closes, connecting **R1** to chassis, while on gram, the switch opens.

One side of the pick-up goes to the lower end of the volume control **R10,** while the other side goes to one contact of the other switch. The other contact of this switch goes to the top end of **R10.** On radio the switch is open, while on gram it is closed, connecting the pick-up across **R10.**



Plan view of the chassis. Note the small coupling Y. C18, a pre-set condenser, does not occur in the early runs.

A fixed condenser (0.01μF) and a fixed resister (51,000 O) are connected in series across the two outer tags of the volume control in run 3 and run 4 radiograms.

Chassis Divergencies.—In runs 1 and 2, **C18** was not incorporated, but a 50$\mu\mu$F fixed mica condenser was used instead. The H.F. by-pass **C8** was also omitted. **C28** had a maximum of 50$\mu\mu$F instead of 80$\mu\mu$F as in the run 3 and run 4 models.

In the earlier radiograms, the 0.01μF condenser and 51,000 O resistance across **R10** were omitted.

CIRCUIT ALIGNMENT

Connect an output meter across the primary of **T1** (green and white leads). With gang condenser at maximum, check that the pointer is in line with the index arrow. Set wavechange switch to M.W. (clockwise), turn gang to minimum, and volume control to maximum.

I.F. Stages.—Feed a 451 KC/S signal from the signal generator to the grid (top cap) of **V1,** previously disconnecting the grid lead to the cap. Earth the generator to receiver chassis. Adjust generator to give a half scale deflection on output meter. Adjust **C28, C27, C26** in turn for maximum output. Repeat until no further improvement can be obtained. Take particular care with **C28.**

I.F. Filter.—Transfer signal generator lead, via a dummy aerial, to the A socket and replace top cap connection of **V1.** Feed in a 451 KC/S signal and adjust **C17** (screw) for *minimum* output.

H.F. and Oscillator Stages.—Set gang condenser to 1400 KC/S on scale. Feed in a 1,400 KC/S signal and adjust **C22,** then **C20,** for maximum output. Feed in and tune a 600 KC/S signal. Rock the gang condenser slightly and adjust **C24** (screw) for maximum output. Re-adjust **C22** and **C20** at 1,400 KC/S and **C24** at 600 KC/S until no further improvement can be obtained.

Switch set to L.W. (anti-clockwise). Feed in a 290 KC/S signal, and set pointer to 290 KC/S. Adjust **C23** (nut) and **C18** (from above chassis) for maximum output. Feed in and tune a 160 KC/S signal. While rocking the gang slightly adjust **C25** (nut) for maximum output. Re-adjust **C23** and **C18** at 290 KC/S and **C25** at 160 KC/S until no improvement results.

Note.—In runs 1 and 2, **C18** was not fitted, a small fixed mica condenser (50$\mu\mu$F) being used instead. In this case the adjustment at 290 KC/S consists in feeding in a 290 KC/S signal, tuning it in and adjusting **C23** while rocking the gang slightly. Otherwise the alignment is the same.

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