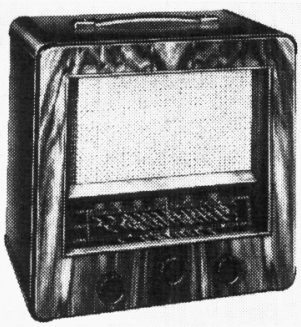
Supplement to The Wireless & Electrical Trader, March 9, 1940.

"TRADER" SERVICE SHEET

455

CAMEO ABX

3-BAND AC/DC TRANSPORTABLE



THE Cameo ABX receiver is a 3-band AC/DC transportable superhet instrument, incorporating four valves, plus a valve rectifier. It is suitable for use on 100-250V mains, 40-100 C/S in the case of AC.

The receiver is fitted with frame aerials, but has provision for the use of an external aerial and earth if desired. The SW range is 15-55 m.

Release date: August, 1939.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L2, L3, C30** on MW and LW to triode heptode valve **(V1, Mazda metallised TH233).** Provision is made for connection of an external aerial via coupling winding **L1** wound at the side of the MW frame winding **L2,** and for an earth connection via isolating condenser **C2.**

For SW operation, **L2** and **L3** are connected to the SW coupling coil **L4,** and provide it with the signal, which they have collected when the receiver is used as a portable, or which has been passed to them from **L1** when an external aerial is used. The signal is then fed via **L4** to single tuned circuit **L5, C30.**

V1 triode oscillator anode coils **L9** (SW), **L10** (MW) and **L11** (LW) are tuned by **C36;** parallel trimming by **C31** (SW), **C32** (MW) and **C33** (LW); series tracking by **C8** (SW), **C9, C34** (MW) and **C35** (LW). Reaction by grid coils **L6** (SW), **L7** (MW) and **L8** (LW).

Second valve **(V2, Mullard EF9)** is a variable-mu RF pentode operating as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C37, L12, L13, C38** and **C39, L14, L15, C40.**

Intermediate frequency 430KC/S.

Diode second detector is part of double diode triode valve **(V3, Mullard EBC3).** Audio frequency component in rectified output is developed across manual volume control **R14,** which also operates as load resistance, and passed via AF coupling condenser **C18** and CG resistance **R15** to CG of triode section, which operates as AF amplifier. IF filtering by **C14, R13,** and **C15.**

Second diode of **V3,** fed from **V2** anode via **C17,** provides DC potentials which are developed across load resistances **R19** and **R20** and fed back through decoupling circuits as GB to FC (except on SW), and IF valves, giving automatic volume control. Delay voltage, together with GB for triode section, is obtained from drop along resistance **R16** in **V3** cathode lead to chassis.

Resistance-capacity coupling by **R18, C20** and **R21** between **V3** triode and tetrode output valve **(V4, Mazda Pen 383).** Fixed tone correction by **C22** in anode circuit. Variable tone control by **R23, C21,** also in anode circuit.

When the receiver is operated from AC mains, HT current is supplied by IHC half-wave rectifying valve **(V5, Mullard CY1),** which, with DC mains, behaves as a low resistance. Smoothing is effected by iron-cored choke **L17** in conjunction with dry electrolytic condensers **C24, C25.** Mains RF filtering by **C26.**

Valve heaters, together with ballast resistance **R27,** are connected between one side of the mains input and chassis, while the scale lamps, together with their by-pass resistance **R26,** are connected between chassis and the other side of the mains.

DISMANTLING THE SET

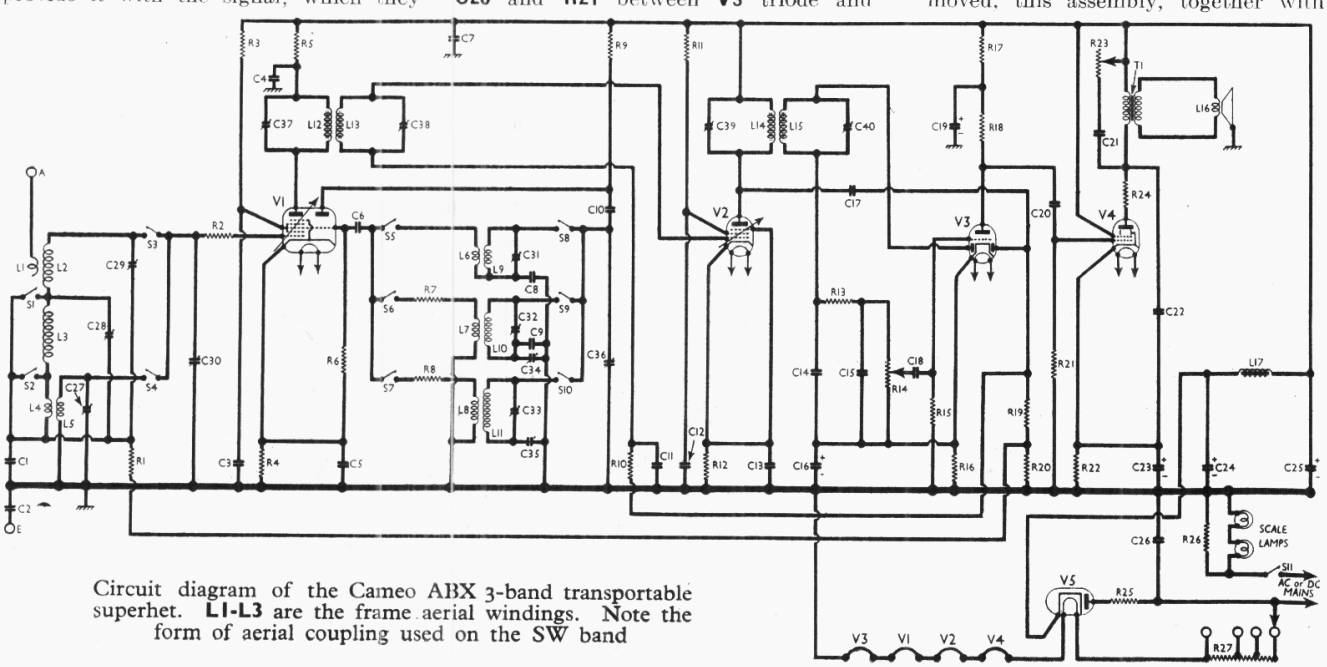
Removing Chassis.—Remove the three control knobs from the front of the cabinet;

remove the two round-head wood screws holding the rear of the chassis to the base and left-hand side of the cabinet;

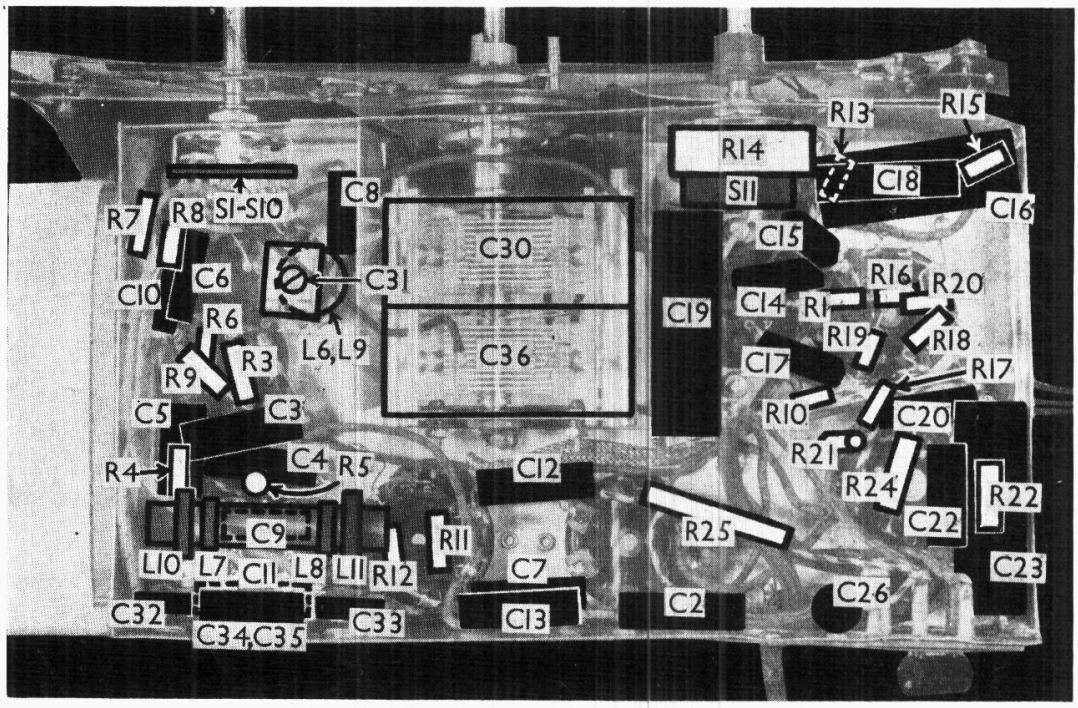
remove the round-head wood screw holding the MW frame winding former fixing bracket to the wooden base of the auxiliary assembly, which is fixed in the top of the cabinet.

The chassis can now be withdrawn to the extent of the leads connecting it to the auxiliary assembly.

If the two counter-sunk head wood screws holding the auxiliary assembly to the top of the cabinet are now removed, this assembly, together with



Circuit diagram of the Cameo ABX 3-band transportable superhet. **L1-L3** are the frame aerial windings. Note the form of aerial coupling used on the SW band



Under-chassis view. A diagram of the **S1-S10** unit is overleaf. **C32-C35** are adjustable through holes in the rear chassis member. **C31** is the only other trimmer beneath the chassis

the chassis, can be withdrawn to the extent of the speaker leads.

When replacing, if the leads to the terminal strip on the auxiliary panel have been disconnected, they should be reconnected as follows, numbering the tags from front to rear (of cabinet), as shown in our illustration of the assembly:

1, red from chassis; green from electrolytic condenser (mounted on the auxiliary assembly); and brown from smoothing choke (also mounted on the assembly);
2, blank;
3, green/black from chassis; green from output transformer (mounted on sub-baffle); green/black from electrolytic condenser (on assembly); green/black from slider of tone control (on assembly); and green lead from smoothing choke (on assembly).
4, blank;
5, yellow from chassis; yellow sleeved lead from **C21** (on assembly); and brown from output transformer (on sub-baffle);
6, blank;
7, black from chassis; and black from smoothing choke and electrolytic condenser casings (on assembly).

Removing Speaker and Output Transformer.—These two components are separately mounted on the sub-baffle.

The output transformer is mounted to the left of the speaker, with its connecting leads emerging from the side facing the speaker; it is fixed by two round-head wood screws.

The speaker is mounted so that its speech coil tags face the output transformer; it is held in position by four terminal nuts (with lock-washers).

A green/black braided earthing lead joins the case of the smoothing choke (on the auxiliary assembly) to a tag under one of the output transformer fixing screws, and a bare wire joins this tag to another which is clamped under one of the speaker fixing nuts.

The speaker and transformer may be removed separately or, if the sub-baffle is removed (four counter-sunk head wood screws) together.

COMPONENTS AND VALUES

	CONDENSERS	Values (μF)
C1	V1 heptode CG decoupling	0·05
C2	Earth isolating condenser...	0·05
C3	V1 SG decoupling	0·05
C4	V1 heptode anode decoupling	0·05
C5	V1 cathode by-pass	0·05
C6	V1 osc. CG condenser ...	0·0001
C7	HT circuit RF by-pass ...	0·05
C8	Osc. circuit SW tracker ...	0·01
C9	Osc. circuit MW fixed tracker	0·0005
C10	V1 osc. anode coupling ...	0·0001
C11	V2 CG decoupling	0·05
C12	V2 SG decoupling	0·05
C13	V2 cathode by-pass... ...	0·05
C14	IF by-pass condensers ...	0·0001
C15		0·0001
C16*	V3 cathode by-pass... ...	50·0
C17	Coupling to V3 AVC diode	0·0001
C18	AF coupling to V3 triode ...	0·006
C19*	V3 triode anode decoupling	4·0
C20	V3 triode to V4 AF coupling	0·05
C21	Part of variable tone control	0·05
C22	Fixed tone corrector ...	0·01
C23*	V4 cathode by-pass... ...	25·0
C24*	HT smoothing condensers	16·0
C25*		24·0
C26	Mains RF by-pass	0·05
C27‡	Aerial circuit SW trimmer	—
C28‡	Frame aerial LW trimmer	—
C29‡	Frame aerial MW trimmer	—
C30†	Frame and SW aerial tuning	—
C31‡	Osc. circuit SW trimmer ...	0·00005
C32‡	Osc. circuit MW trimmer...	0·00005
C33‡	Osc. circuit LW trimmer ...	0·00007
C34‡	Osc. circuit MW tracker ...	0·00075
C35‡	Osc. circuit LW tracker ...	0·00035
C36†	Oscillator circuit tuning ...	—
C37‡	1st IF trans. pri. tuning ...	—
C38‡	1st IF trans. sec. tuning ...	—
C39‡	2nd IF trans. pri. tuning ...	—
C40‡	2nd IF trans. sec. tuning ...	—

* Electrolytic. † Variable, ‡ Pre-set.

	RESISTANCES	Values (ohms)
R1	V1 heptode CG decoupling	500,000
R2	V1 heptode CG stabiliser	50
R3	V1 SG HT feed	20,000
R4	V1 fixed GB resistance ...	200
R5	V1 heptode anode HT feed	5,000
R6	V1 osc. CG resistance ...	25,000
R7	Osc.MW reaction stabiliser	1,000
R8	Osc. LW reaction stabiliser	4,000
R9	V1 osc. anode HT feed ...	40,000
R10	V2 CG decoupling	500,000
R11	V2 SG HT feed	75,000
R12	V2 fixed GB resistance ...	300
R13	IF stopper	50,000
R14	Manual volume control; V3 signal diode load ...	500,000
R15	V3 triode CG resistance ...	1,000,000
R16	V3 triode GB; AVC delay	2,000
R17	V3 triode anode decoupling	10,000
R18	V3 triode anode load ...	100,000
R19	V3 AVC diode load resistances	500,000
R20		500,000
R21	V4 CG resistance	250,000
R22	V4 GB resistance	300
R23	Variable tone control ...	50,000
R24	V4 anode stabiliser ...	50
R25	V5 anode surge limiter ...	50
R26	Scale lamps shunt	50
R27	Heater circuit ballast ...	750*

* Tapped at 0+500Ω+125Ω+125Ω from V5 heater

	OTHER COMPONENTS	Approx. Values (ohms)
L1	External aerial coupling ...	0·1
L2	Frame aerial windings ...	0·7
L3		5·6
L4	Aerial SW coupling coil ...	0·6
L5	Aerial SW tuning coil ...	Very low
L6	Oscillator SW reaction ...	24·0
L7	Oscillator MW reaction ...	2·5
L8	Oscillator LW reaction ...	3·6
L9	Osc. circuit SW tuning coil	Very low
L10	Osc. circuit MW tuning coil	2·0
L11	Osc. circuit LW tuning coil	4·5
L12	1st IF trans. Pri. ...	6·0
L13	Sec. ...	6·0
L14	2nd IF trans. Pri. ...	6·0
L15	Sec. ...	6·0
L16	Speaker speech coil	3·0
L17	HT smoothing choke ...	370·0
T1	Output trans. Pri. ...	260·0
	Sec. ...	0·5
S1-S10	Waveband switches ...	—
S11	Mains switch, ganged R14...	—

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VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on AC mains of 230V, using the 220-230V tapping on the voltage adjustment panel. The receiver was tuned to the lowest wavelength on the MW band, and the volume control was at maximum.

To prevent a possible signal from influencing the reading, a 0·1μF condenser was connected between **V1** heptode control grid and chassis.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being negative.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 TH233	192 / Oscillator / 657	4·2 / — / 3·7	91	6·7
V2 EF9	210	5·0	75	1·5
V3 EBC3	76	1·2	—	—
V4 Pen383	197	39·0	210	9·0
V5 CY1†	—	—	—	—

† Cathode to chassis, 230V, DC.

GENERAL NOTES

Switches.—S1-S10 are the waveband switches, in a single rotary unit beneath the chassis. This is indicated in our under-chassis view, and shown in detail in the diagram (col. 2), where it is drawn as seen looking from the rear of the underside of the chassis. The table below gives the switch positions for the three control settings, starting from fully anti-clockwise. A dash indicates open and **C** closed.

SWITCH	SW	MW	LW
S1	—	C	—
S2	—	—	C
S3	—	C	C
S4	C	—	—
S5	C	—	—
S6	—	C	—
S7	—	—	C
S8	C	—	—
S9	—	C	—
S10	—	—	C

S11 is the QMB mains switch, ganged with the volume control **R14.**

Coils.—L1 is the single-turn external aerial coupling coil, **L2** the MW frame and **L3** the LW frame. **L1** and **L2** are wound on a wooden former fixed to one side of the chassis, and **L3** is on a separate former inside **L1, L2. L4, L5** are in an unscreened unit on the chassis deck, **L5** being the thick wire winding. **L6, L9** are in a similar unit beneath the chassis, **L9** being the thick wire winding. **L7, L8, L10, L11** form another unscreened unit beneath the chassis, while **L12, L13** and **L14, L15** are in two screened units on the chassis deck.

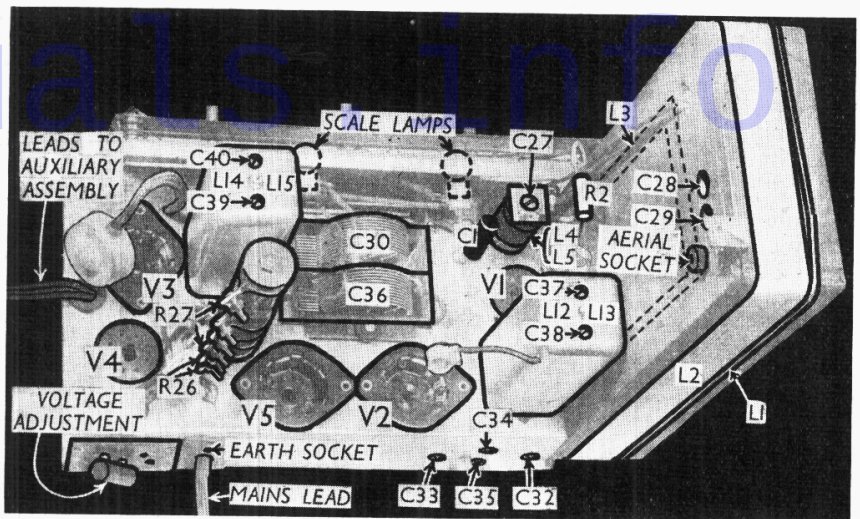
Scale Lamps.—These are two MES types, rated at 6.2V, 0.3A.

Pre-Set Condensers.—Each IF transformer contains its own two trimmers; **C27** is mounted on the **L4, L5** unit; **C28, C29** are on the frame aerial assembly; **C31** is mounted on the **L6, L9** unit; and **C32-C35** are reached through holes in rear member of the chassis.

Condensers C24, C25.—These are two dry electrolytics in a single tubular can mounted horizontally on the auxiliary assembly panel. The can forms the common negative connection; the red spotted tag is the positive of **C24** (16μF) and the plain tag is the positive of **C25** (24μF).

Resistances R26, R27.—These are in a single vitreous enamelled unit on the chassis deck. The bottom two tags belong to **R26,** and the remaining four to **R27.**

Chassis Divergencies.—**R2** and **C7** are not shown in the makers' diagram; **R23** is given as 100,000Ω by the makers; some of the pre-set condensers are shown fixed in the makers' diagram; **C4** and **C12** are given as 0·02μF by the makers; all the remaining 0·05μF condensers in our chassis are 0·1μF in the makers' diagram; **C12** is shown returned to **V2** cathode in the makers' diagram.



Plan view of the chassis, showing the frame aerial windings and most of the trimmers

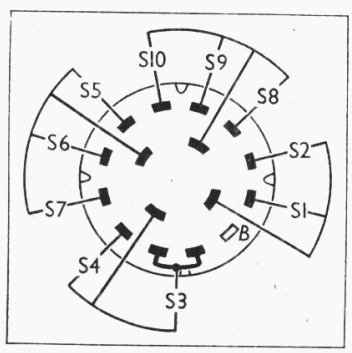
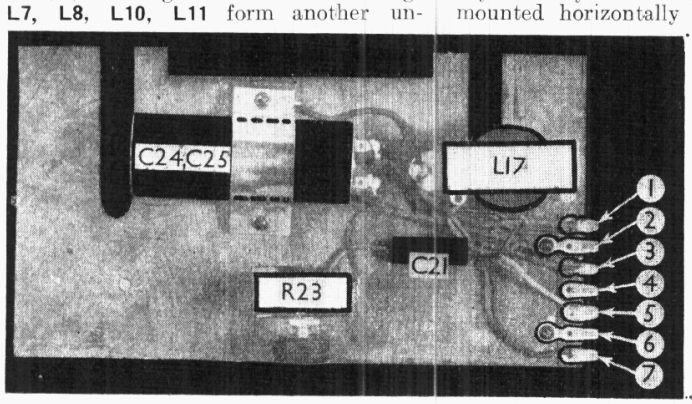


Diagram of the switch unit, as seen from the rear of the underside of the chassis



The auxiliary assembly removed from inside the top of the cabinet. The connecting tags are numbered to agree with the dismantling instructions

CIRCUIT ALIGNMENT

IF Stages.—Switch set to MW and tune to bottom of scale. Turn volume control to maximum. Connect signal generator, via a 0·1μF condenser, to control grid (top cap) of **V1** and to earth terminal. Feed in a 430KC/S signal, and adjust **C40, C39, C38,** and **C37** in turn for maximum output.

RF and Oscillator Stages.—With gang at maximum, pointer should cover the vertical lines at the right hand ends of the scales. Connect signal generator to external **A** and **E** sockets.

SW.—Switch set to SW, tune to 19m on scale, feed in a 19m (15·8 MC/S) signal, and adjust **C31,** then **C27,** for maximum output.

MW.—Switch set to MW, tune to 200m on scale, feed in a 200m (1,500 KC/S) signal, and adjust **C32,** then **C29,** for maximum output. Feed in a 500m (600 KC/S) signal, tune it in, and adjust **C34** for maximum output, while rocking the gang for optimum results.

LW.—Switch set to LW, tune to 1,300m on scale, feed in a 1,300m (230 KC/S) signal, and adjust **C33,** then **C28,** for maximum output. Feed in a 1,800m (166·7 KC/S) signal, tune it in, and adjust **C35** for maximum output, while rocking the gang for optimum results.