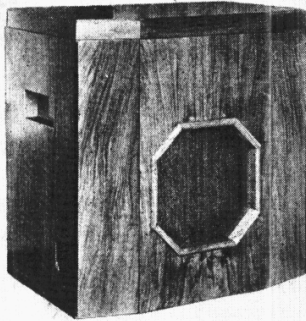


"TRADER" SERVICE SHEET

574

PYE SP/B

TRANSPORTABLE BATTERY SUPERHET



The Pye SP/B receiver.

A SPECIAL battery is provided in the Pye SP/B receiver for AVC delay, while a GB battery provides the normal grid bias. Both batteries are contained in the HT unit; but neither of them is internally connected to the HT section. The set is a 5-valve, 2-band transportable battery superhet, with an RF amplifier and a class B output stage. Release date: August, 1934.

CIRCUIT DESCRIPTION

Tuned frame aerial input **L2, L3, C22** to variable-mu RF pentode valve (**V1, Mazda metallised VP215**) which operates as signal frequency amplifier. Provision for connection of external aerial and earth via coupling coil **L1**, which is coupled to **L2, L3**.

Choke-capacity coupling by **L4, C3** between **V1** and triode-pentode valve (**V2, Mazda metallised TP22**), whose pentode control grid circuit is tuned by **L5 (MW), L6 (LW)** and **C25**, and which operates as frequency changer with cathode (filament circuit) injector coupling. Triode oscillator anode coils **L10 (MW)** and **L11 (LW)** are tuned by **C28**. Parallel trimming by **C27 (MW)** and **C26 (LW)**; tracking by specially shaped vanes of **C28**. Reaction coupling by coil **L9** in control grid circuit.

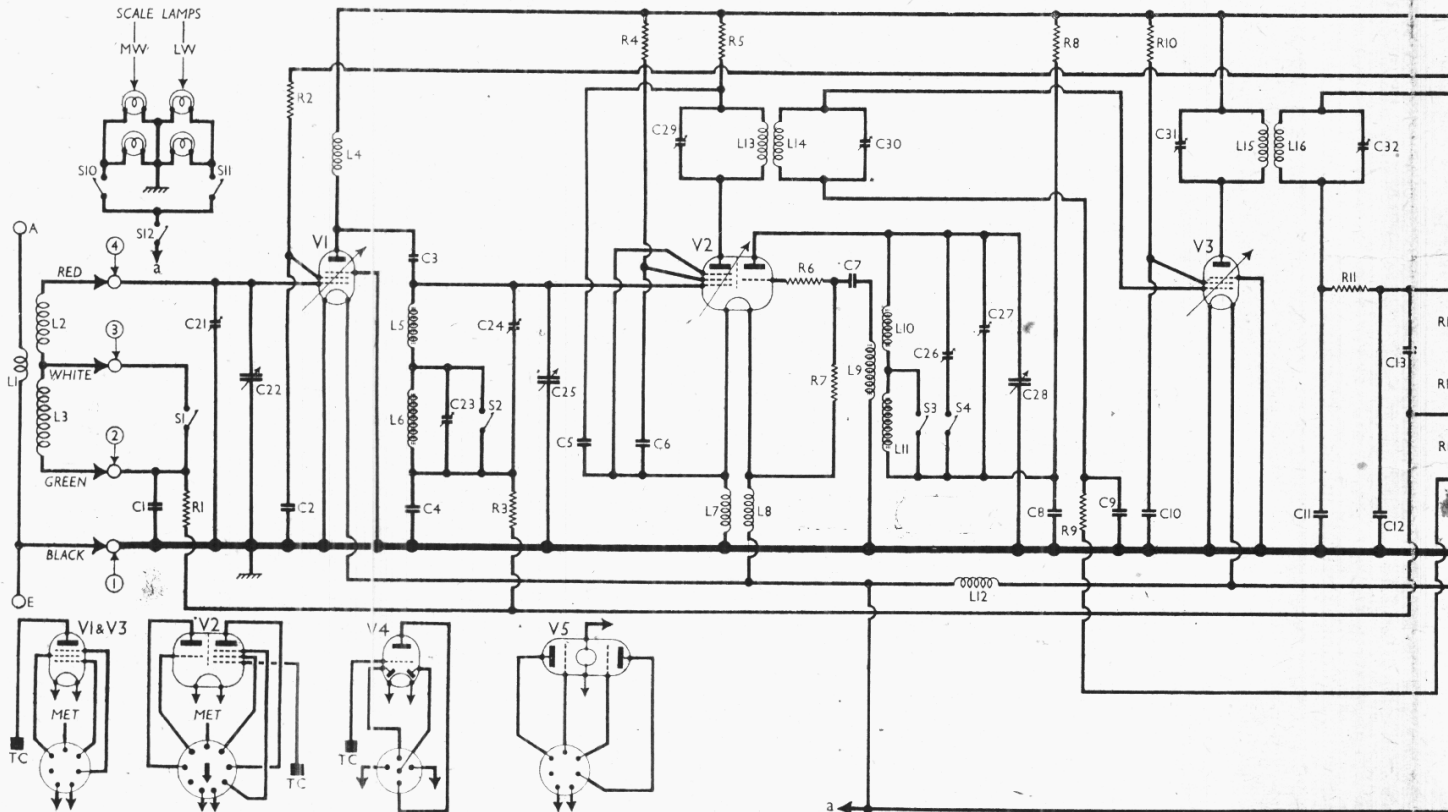
Third valve (**V3, Mazda metallised VP215**) is a second variable-mu RF pentode, operating this time as intermediate frequency amplifier with tuned-primary, tuned-secondary transformer couplings **C29, L13, L14, C30** and **C31, L15, L16, C32**.

Intermediate frequency 127 KC/S.

Diode second detector is part of double diode triode valve (**V4, Mazda metallised L21DD**), parallel-fed from **L16** via **C14**. Audio frequency component in rectified output is developed across the manual volume control **R16**, which also operates as the load resistance, and passed via AF coupling condenser **C16** and grid stopper **R19** to CG of triode section, which operates as AF amplifier. IF filtering by filter choke **L17** and **C15** in diode circuit and **C18** in triode anode circuit. Variable tone control by transformer-coupled resistance-capacity circuit **T1, R17, R18, C17** in triode control grid circuit.

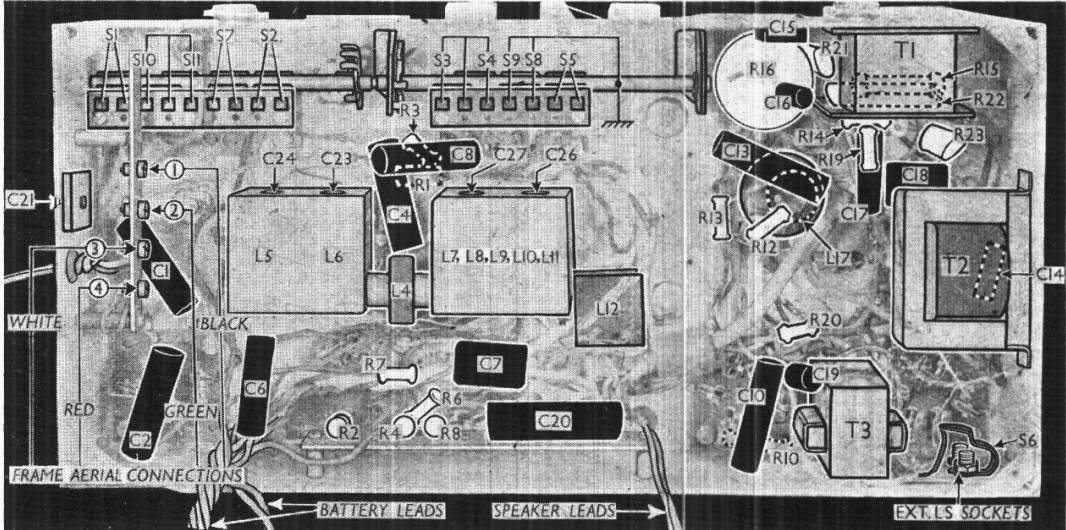
Second diode of **V4**, series-fed from **L16** directly, provides DC potentials which are developed across load resistances **R14, R15** and fed back through decoupling circuits as GB to RF, FC and IF valves, giving automatic volume control. Delay voltage is obtained from a 13.5 V delay battery connected across a shunt resistance **R12** in series with the load circuit. The leads to the delay battery isolated from chassis; they are also isolated from the rest of the circuit by decoupling components **R11, R13** and **C12, C13**.

Transformer coupling by **T2** between



Circuit diagram of the Pye SP/B transportable battery superhet. A separate Delay Battery is used to provide AVC delay, and it is connected directly to the HT section. Its connecting leads are indicated in the middle of the diagram; to have brought them out to the usual position for battery leads, on the right, a transformer-coupled resistance-capacity circuit **R17, R18, C17**, which is connected to **V4** triode control grid circuit via a double-wound transformer. The junction of

Under-chassis view. The frame aerial connections are indicated and coded to agree with those in the circuit diagram below. C21 was not fitted in our chassis, and has been drawn in. Its adjustment is reached from the right, and not from the left, as indicated by the arrow. A metal screen, which encloses the right-hand end of the chassis, has been removed for photographic purposes.



V4 triode and double triode class B output valve (V5, Mazda PD220). Fixed tone correction by C19, R20 between anodes. Provision for connection of low-impedance external speaker across secondary winding of output transformer T3. Switch S6, which is associated with these sockets, opens when the connecting plug is fully inserted, muting the internal speaker.

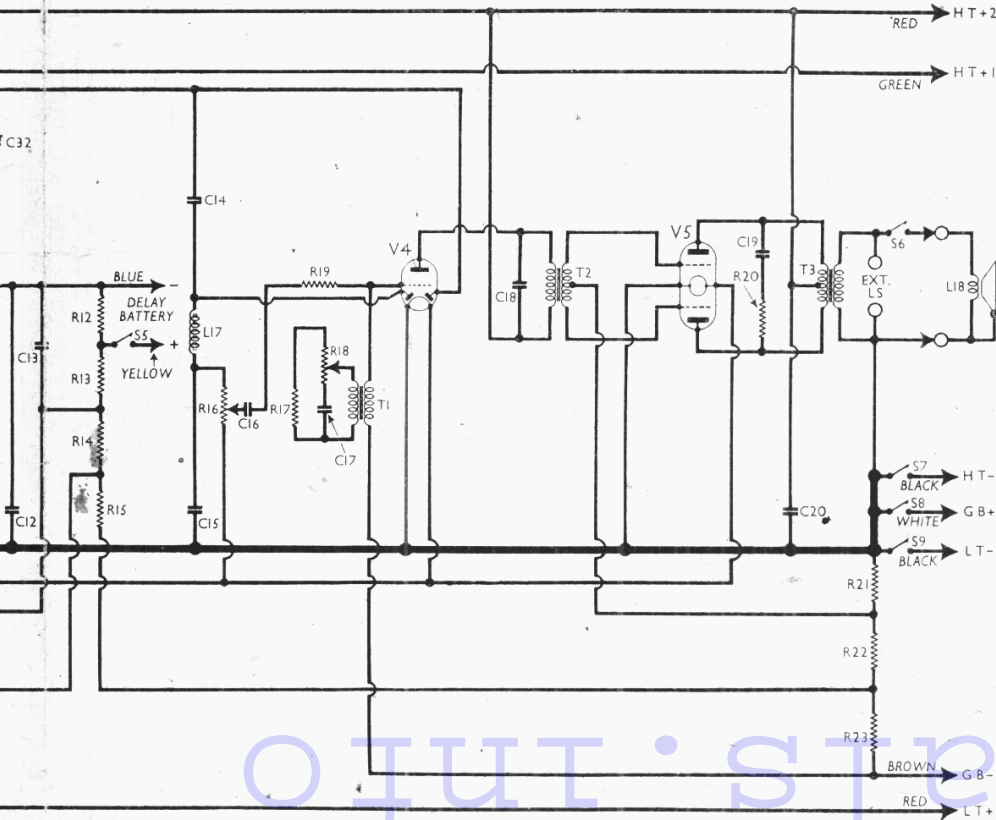
Fixed GB potentials for V1, V2 pentode and V3, GB for V4 triode and the two sections of V5, are obtained from a potential divider comprising resistances

R21, R22, R23 which are connected in series across the grid bias battery. GB potential to V1, V2 and V3 is fed via R15, R14 and the AVC line, and this voltage provides additional delay to that obtained from the delay battery connected across R12.

The scale lamps are controlled by switches S10 and S11, according to the waveband in use. They are also controlled by S12 in the common lead from the positive side of the accumulator, and are all switched off automatically as the cabinet lid is closed, when S12 opens.

COMPONENTS AND VALUES

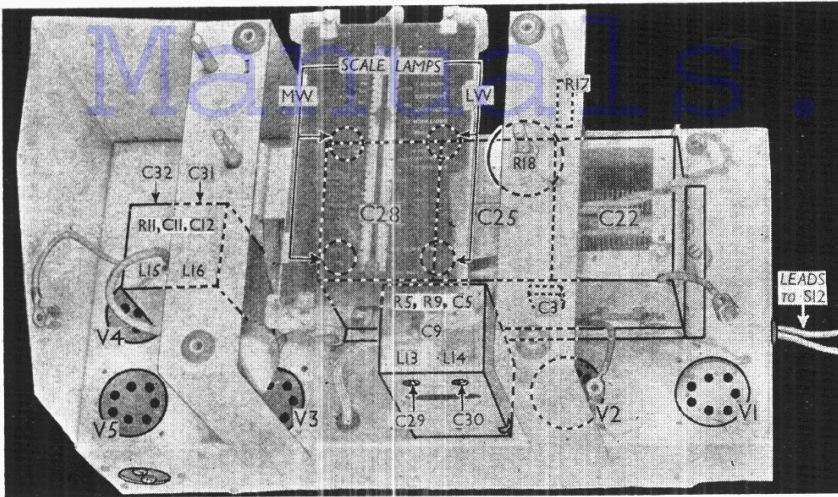
| RESISTANCES | | Values (ohms) |
|-------------|---|---------------|
| R1 | V1 CG decoupling ... | 250,000 |
| R2 | V1 SG HT feed ... | 2,000 |
| R3 | V2 pentode CG decoupling ... | 2,000,000 |
| R4 | V2 SG HT feed ... | 250,000 |
| R5 | V2 pentode anode decoupling ... | 2,000 |
| R6 | V2 osc. CG resistances ... | 2,500 |
| R7 | | 100,000 |
| R8 | V2 osc. anode HT feed ... | 50,000 |
| R9 | V3 CG decoupling ... | 250,000 |
| R10 | V3 SG HT feed ... | 250,000 |
| R11 | Delay battery decoupling ... | 1,000,000 |
| R12 | Delay battery shunt ... | 1,800 |
| R13 | Delay battery decoupling ... | 10,000 |
| R14 | V4 AVC diode load resistances ... | 2,000,000 |
| R15 | | 1,000,000 |
| R16 | Manual volume control; V4 signal diode load ... | 500,000 |
| R17 | Parts of variable tone control circuit ... | 15,000 |
| R18 | | 250,000 |
| R19 | V4 triode grid stopper ... | 25,000 |
| R20 | Part fixed tone corrector ... | 5,000 |
| R21 | V1, V2 pentode, V3 fixed GB and V4 triode, V5 GB, potential divider | 84 |
| R22 | | 110 |
| R23 | | 220 |



| CONDENSERS | | Values (μF) |
|------------|---|-------------|
| C1 | V1 CG decoupling ... | 0.1 |
| C2 | V1 SG decoupling ... | 0.1 |
| C3 | V1 to V2 RF coupling ... | 0.000025 |
| C4 | V2 pentode CG decoupling ... | 0.1 |
| C5 | V2 pentode anode decoupling ... | 0.1 |
| C6 | V2 SG decoupling ... | 0.1 |
| C7 | V2 osc. CG condenser ... | 0.0002 |
| C8 | V2 osc. anode decoupling ... | 0.05 |
| C9 | V3 CG decoupling ... | 0.1 |
| C10 | V3 SG decoupling ... | 0.1 |
| C11 | IF by-pass ... | 0.0002 |
| C12 | Delay battery decoupling condensers ... | 0.05 |
| C13 | | 0.1 |
| C14 | V4 signal diode coupling ... | 0.0001 |
| C15 | IF by-pass ... | 0.0002 |
| C16 | AF coupling to V4 triode ... | 0.01 |
| C17 | Part variable tone control ... | 0.01 |
| C18 | IF by-pass ... | 0.0005 |
| C19 | Part tone corrector ... | 0.0025 |
| C20 | HT circuit RF by-pass ... | 0.25 |
| C21† | Frame aerial MW trimmer | — |
| C22† | Frame aerial tuning ... | — |
| C23† | RF circuit LW trimmer ... | — |
| C24† | RF circuit MW trimmer ... | — |
| C25† | RF circuit tuning ... | — |
| C26† | Osc. circuit LW trimmer ... | — |
| C27† | Osc. circuit MW trimmer ... | — |
| C28† | Oscillator circuit tuning ... | — |
| C29† | 1st IF trans. pri. tuning ... | — |
| C30† | 1st IF trans. sec. tuning ... | — |
| C31† | 2nd IF trans. pri. tuning ... | — |
| C32† | 2nd IF trans. sec. tuning ... | — |

ected directly across R12 in the AVC diode load circuit, where it "floats" below chassis potential. The connection on the right, would have complicated the diagram unnecessarily. Another unusual feature is the tone correction circuit consisting of R17, C17 and the transformer winding should be shown connected to chassis.

† Variable. ‡ Pre-set.



Plan view of the chassis. The leads to the lid-operated scale lamp switch **S12** are indicated. **C3** is mounted on the rear member of the gang, and has a valve top cap lead attached to each side of it.

| OTHER COMPONENTS | | Approx. Values (ohms) |
|------------------|----------------------------------|-----------------------|
| L1 | Ext. aerial coupling ... | 0.17 |
| L2 | } Frame aerial windings ... | 1.8 |
| L3 | | 20.0 |
| L4 | | 530.0 |
| L5 | V1 anode RF choke ... | 1.54 |
| L6 | RF circuit MW tuning ... | 14.5 |
| L7 | } Oscillator injector coils ... | 0.3 |
| L8 | | 0.3 |
| L9 | Oscillator reaction coil ... | 0.5 |
| L10 | Osc. circ. MW tuning ... | 1.3 |
| L11 | Osc. circ. LW tuning ... | 4.7 |
| L12 | Filament circuit choke ... | 0.06 |
| L13 | } 1st IF trans. { Pri. ... | 45.0 |
| L14 | | Sec. ... |
| L15 | } 2nd IF trans. { Pri. ... | 110.0 |
| L16 | | Sec. ... |
| L17 | IF filter choke ... | 660.0 |
| L18 | Speaker speech coil ... | 3.23 |
| T1 | } Tone control trans. { Pri. ... | 3,000.0 |
| | | Sec. ... |
| T2 | } Intervalve trans. { Pri. ... | 1,380.0 |
| | | Sec. total ... |
| T3 | } Output trans. { Pri. ... | 570.0 |
| | | Sec. ... |
| S1-S4 | Waveband switches ... | -- |
| S5 | Delay battery switch ... | -- |
| S6 | Speaker muting switch ... | -- |
| S7 | HT circuit switch ... | -- |
| S8 | GB circuit switch ... | -- |
| S9 | LT circuit switch ... | -- |

VALVE ANALYSIS

Valve voltages and currents given in the table below are those given in the makers' manual. They represent conditions to be expected in an average receiver when operating with no signal input (frame aerial short-circuited) and with a new HT battery.

Voltages should be measured with a high resistance meter whose negative lead is connected to chassis.

| Valve | Anode Voltage (V) | Anode Current (mA) | Screen Voltage (V) | Screen Current (mA) |
|----------|--------------------|--------------------|--------------------|---------------------|
| V1 VP215 | 126 (126) | 1.6 (1.0) | 72 | 0.5 |
| V2 TP22 | { Oscillator 86 | { 0.8 0.8 | 66 | 0.2 |
| V3 VP215 | 129 | 0.8 | 66 | 0.2 |
| V4 L21DD | 128 | 2.3 | -- | -- |
| V5 PD220 | 128† | 0.5† | -- | -- |

† Each anode.

DISMANTLING THE SET

Removing Chassis.—Remove the two wood screws (with metal washers and rubber grommets) holding the lugs below the front chassis member to the wooden fillets at the front of the cabinet; withdraw the speaker plug from its socket at the bottom of the speaker unit; free from the screw terminals on the connecting strip, on the right beneath the chassis, the four leads from the frame aerial. A half-turn of each screw is sufficient;

from the batten immediately beneath the lid hinge at rear of cabinet remove three countersunk-head wood screws; from the lid-operated scale lamp switch near the lid stay, disconnect the two switch leads, and then remove the switch (two wood screws); by holding open the "V" spring, and opening the lid, release the lid stay from the spring;

remove the seven instrument-head wood screws from the edges of the wooden escutcheon board covering the receiver, but do not remove the four large-headed screws close to the escutcheon itself.

The chassis may now be withdrawn through the top of the cabinet, care being taken to avoid damage to the frame aerial windings.

If it is desired to detach the escutcheon board from the chassis, the four large-headed screws (with nuts, cupped washers and rubber grommets) may now be removed.

When replacing Chassis, first refit the escutcheon board.

Connect the frame aerial leads as follows, numbering the terminals beneath the chassis from front to rear:

- (1) black;
- (2) green;
- (3) white;
- (4) red.

Removing Speaker.—Remove the three brass fixing nuts.

When replacing, the connecting socket should be at the bottom.

Do not omit to replace the earthing lead under the bottom fixing nut.

Removing Frame Aerial.—Disconnect from the external aerial and earth sockets the three rubber covered leads, and the earthing lead from the speaker, and remove the three round-head wood screws holding the frame to the front of the cabinet. Take great care not to damage or even disturb the windings in any way.

When replacing, the connecting panel should be on the right, near the external aerial panel.

Connect the lower red lead to the upper (aerial) external socket, and the two black leads (without spade tags) to the lower (earth) socket.

GENERAL NOTES

Switches.—**S1-S4** are the waveband switches, **S5, S7, S8** and **S9** are the battery switches, and **S10, S11** the scale lamp waveband switches, in two ganged units disposed along the front of the underside of the chassis. They are operated by a brass rod which is supported on brackets. The control spindle is mounted at right angles to the rod, and the action is transmitted via wide-toothed sprockets.

The switches consist of flat metal springs against which contact bars attached to the brass rod press in the closed positions with a long wiping motion, so that the contacts remain clean indefinitely.

The whole assembly is indicated in our under-chassis view, where the switches are individually identified. The table below gives the switch positions for the two "on" positions of the control. A dash indicates open, and **C**, closed. In the "off" position of the control, all switches are open.

Switch Table

| Switch | MW | LW |
|--------|----|----|
| S1 | ○ | — |
| S2 | ○ | — |
| S3 | ○ | — |
| S4 | ○ | — |
| S5 | ○ | ○ |
| S6 | ○ | ○ |
| S7 | ○ | ○ |
| S8 | ○ | ○ |
| S9 | ○ | ○ |
| S10 | ○ | ○ |
| S11 | — | ○ |

S6 is the jack-type internal speaker muting switch, associated with the external speaker sockets on the rear member of the chassis. When the external speaker plug is fully inserted, **S6** opens, and the internal speaker speech coil circuit is broken. If the plug is only partly inserted, the switch does not open, and both speakers operate.

S12 is the scale lamp master switch. It consists of two brass terminals and a springy metal strip, and is mounted on a bakelite panel on the side of the cabinet, near the lid stay. When the lid is open, the strip connects the terminals together and the scale lamps light. When the lid is closed, the lid stay lifts the strip away from one terminal, open-circuiting the lamps.

Frame Aerial.—This is wound on moulded supports on an aluminium frame fitted to the front of the cabinet. The windings are terminated at a six-way connecting panel, mounted on the metal frame. Two leads from the panel

go to the external aerial and earth sockets. The four remaining leads from the connections to the chassis, where they are connected to four screw terminals, on a panel indicated in our under-chassis view.

Numbering the tags from top to bottom, the white, red, green and black leads with spade tags are attached to tags 1, 2, 3 and 6 respectively on the panel on the frame; their connections at the receiver end are indicated in the circuit diagram, the under-chassis view and under "Dismantling the Set." Tag 4 is blank, and the red lead and black lead (without a spade tag) from tags 5 and 6 go to the external aerial and earth sockets respectively.

Coils.—The remaining RF and oscillator coils **L5-L11** are in two screened units beneath the chassis, while the IF transformers **L13, L14** and **L15, L16** are in two screened units on the chassis deck. All units contain their associated trimmers, and the IF units contain several other components in addition.

V1 anode RF choke **L4** is situated between the **L5, L6** and **L7-L11** units, while the IF filter coil **L17** is fitted to the underside of the chassis deck, in a screened container.

Scale Lamps.—These are four Osram MES types, rated at 2.5 V, 0.2 A. They are energised in pairs, according to the waveband employed, via switches **S10, S11** and the lid switch **S12**. The four lamps are mounted on a large bracket which fits beneath the tuning scale, and the whole scale lamp assembly can be withdrawn for lamp replacement purposes after a single fly-nut is unscrewed from its threaded rod, which is fixed to the top of the gang assembly between the **C22** and **C25** sections. A bush prevents the nut from being separated from the scale lamp bracket, so that it cannot be lost.

External Speaker.—Two sockets are provided at the rear of the chassis for a low impedance (1.5-2.5 Ω) external speaker. With the sockets is associated a jack-type switch **S6**, whose action is described under "Switches."

Batteries.—LT, Pye type 13, 2 V, 40 AH celluloid unspillable accumulator cell. The HT, GB and delay batteries are all contained in a single combined unit, Pye type 501.

Battery Leads and Voltages.—Black lead, spade tag, LT negative; red lead, spade tag, LT positive 2 V. Black lead and plug, HT negative; green lead and plug, HT+1, 72 V; red lead and plug, HT+2, 129 V. White lead and plug, GB positive; brown lead and plug, GB negative, -4.5 V. Yellow lead and plug, delay battery positive; blue lead and plug, delay battery negative, -13.5 V from positive of battery. Note: the delay battery is entirely isolated from chassis.

Chassis Divergencies.—The frame aerial MW trimmer **C21** was not fitted on our chassis, but has been drawn in to show its position in chassis in which it is fitted. **C18** was in our chassis, but was not shown in the makers' diagram. Another modification that may be found is in the tone control circuit, where **R17** is discarded, and **R18** becomes 100,000 Ω. **C17** is then placed in series with **R18** slider, and the

slider is earthed instead of the transformer winding.

CIRCUIT ALIGNMENT

IF Stages.—While the secondary tuning condenser of an IF transformer is being adjusted, a damping resistance of 20,000 Ω must be connected across the primary, and it must be transferred to the secondary while the primary condenser is being adjusted. On each transformer small tags are provided on each tuning condenser, and the resistance may be conveniently attached by means of clips to these.

Connect a 0.25 μF condenser across **C28**, and turn the volume control to maximum. Connect the signal generator via a 0.002 μF condenser to the control grid (top cap) of **V2** and chassis. Feed in a 127 KC/S (2,362.2 m) signal, connect the damping resistance to the tags of **C29**, and, using an insulated tool, adjust **C30** for maximum output; transfer damping resistance to **C30**, and adjust **C29** for maximum output. Transfer damping resistance to **C31**, and adjust **C32** for maximum output; transfer damping resistance to **C32**, and adjust **C31** for maximum output. Remove the 0.25 μF condenser.

RF and Oscillator Stages.—With the gang at maximum, the pointer should coincide with the indentations in the "H" marks at the high wavelength ends of the scale. If it does not, see that scale glass fits squarely in its clamps. If a small amount of correction is then required, it can be obtained by slackening the three screws in the pointer drive drum, when the slotted holes permit a small amount of movement. If a greater amount of movement is required, it can be obtained by releasing the screw holding the drum boss to the gang spindle.

The frame aerial must be removed from the cabinet and connected to the chassis, which is, of course, also removed from the cabinet. Connect signal generator to a coupling coil, whose proximity to the frame aerial can be varied. At first, this coil should be closely coupled to the frame, but it should be moved farther away as the circuits come into line.

MW.—Switch set to MW, turn the gang to minimum, feed in a 196 m (1,550 KC/S) signal, and adjust **C27** for maximum output. If two peaks are found, select that involving the lesser trimmer capacity. Then adjust **C24** for maximum output. Feed in a 500 m (600 KC/S) signal and tune it in. If the final setting is 15-20 m low on the scale, it is fairly certain that **C27** has been set on the wrong peak. Repeat the 196 m adjustments.

LW.—Switch set to LW, with gang still set at minimum, feed in a 775 m (388 KC/S) signal, and adjust **C26**, then **C23**, for maximum output. Tune to 846 m on scale, feed in an 846 m (355 KC/S) signal, and readjust **C26** for maximum output, this time selecting the peak involving the greater trimmer capacity if two peaks are found; but do not disturb **C23**.

Finally, replace frame aerial and chassis in the cabinet and adjust **C21** (if fitted) on a broadcast signal for maximum output. The setting will not be critical, but it should be close to minimum capacity.

"Trader" Service Sheet Supplementary Index

Nos. 552-575

This interim index covers all the Service Sheets issued during the past six months, and therefore supplements the last complete index published in "The Trader," dated January 3, 1942, to which reference should be made for Sheets Nos. 1 to 551.

| Receiver | No. |
|---|-----------|
| AERODYNE | |
| *Swallow, Cardinal (AC) ... | (14) 566 |
| COLUMBIA | |
| 355, 620 (AC) ... | 573 |
| COSSOR | |
| 368 (AC) ... | 555 |
| DECCA | |
| Double Decca MB5 (AC/DC/Battery) | 556 |
| FERGUSON | |
| 907 (AC/DC/Battery) ... | 552 |
| FERRANTI | |
| *1934/5 Universal (AC/DC) ... | (37) 572 |
| 1936/7 Parva (AC/DC) ... | 559 |
| G.E.C. | |
| *BC3540, 3541, 3542, 3544, 3548, 3558 (Superhet AVC5, AC) ... | (31) 554 |
| Valve Replacement Guide ... | 564 |
| H.M.V. | |
| *149 (Battery) ... | (167) 575 |
| 436 (AC) ... | 573 |
| 501 (AC) ... | 563 |
| KOLSTER-BRANDES | |
| *666, 666A, B, C (AC) ... | (13) 568 |
| MARCONIPHONE | |
| 42 (AC) ... | 563 |
| 253, 254, 271 (AC) ... | 573 |
| *375 (Battery) ... | (167) 575 |
| McMICHAEL | |
| *Twin Supervox (AC) ... | (4) 557 |
| PHILIPS | |
| 830A (AC) ... | 567 |
| PORTADYNE | |
| *B72 (Battery) ... | (12) 561 |
| PYE | |
| Q (Battery) ... | 565 |
| *SE/AC, SE/RG/AC (AC) ... | (34) 558 |
| SP/AC (AC) ... | 570 |
| SP/B (Battery) ... | 574 |
| *T/Q (Battery) ... | (50) 571 |
| *T21 (AC) ... | (38) 562 |
| STANDARD | |
| *S60 (AC) ... | (13) 568 |
| ULTRA | |
| 22 (Battery) ... | 569 |
| *103 (Battery) ... | (171) 553 |
| 330 (AC) ... | 560 |

* Revised issue; original number in brackets.

The following service sheets are now right out of print, and cannot be supplied at present: 5, 9, 15, 16, 18, 23, 25, 28, 33, 35, 40, 41, 43, 44, 45, 46, 47, 48, 166, 168, 169, 170, 172, 175, 176, 177, 178, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 197, 198, 207, 208, 211, 212, 219, 220, 221, 222, 226, 231, 232, 237, 238, 239, 240, 241, 242, 251, 252, 253, 254, 255, 256, 261, 262, 263, 264, 267, 268, 269, 270, 277, 278, 281, 282, 285, 286, 295, 296.