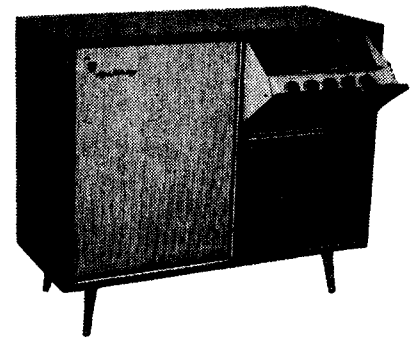
PHILIPS RADIOPLAYER
MODEL 204 A



SPECIFICATIONS
(Subject to alteration without notice)

Power Supply	200/250V, 40/50 c/s
Tuning Ranges	530-1620 Kc/s 4.7-9.2 Mc/s 9.1-18.4 Mc/s
Intermediate Frequency	455 Kc/s
Cabinet	Radiogram
Record Changer	Philips type AG1014
Pick-up Head	Philips type AG3016
Pick-up Head	Philips type AG3025

VALVE EQUIPMENT AND VOLTAGE ANALYSIS

Valve Function	Valve No.	Valve Type	Plate Volts	Screen Volts	Osc. P. Volts	Cathode Volts
Frequency Converter	V1	6AN7	235	63	88	
I.F. Amplifier, Demodulator and A.V.C.	V2	6N8	235	63		
1st Audio Amplifier	V3	6BD7	72			
Preamplifier	V4a	12AX7	65			0.45
Phase Inverter	V4b		130			1.0
Single End P.P. Power Amplifier	V5	6CW5	130	150		10
Single End P.P. Power Amplifier	V6	6CW5	255	220		130
Rectifier	V7	6V4	225/225 AC		Unfiltered B+ 257V D.C.	
Tuning Indicator	V8	6BR5	21	235	Filtered B+ 235V D.C. A.V.C. 1.85V (V.T.V.M.)	
Dial Lamps (2), Bezel Lamp	V11, 12, 13	6.3V 0.23A tubular screw			Heater Volts 6.35VAC	

NOTE: Unless otherwise stated, all voltages are 1,000 ohms per volt meter readings and may vary ± 10% from the figure quoted. They are measured from the socket points indicated to chassis. The receiver should be in a "no signal" condition.

TO REMOVE CHASSIS FROM CABINET

Withdraw the power plug from the mains outlet socket. Remove the five receiver control knobs (grub screw secured). Unscrew the cabinet back panel. Unscrew the aerial and earth terminal strip and free the leads from their securing clip.

Remove the wooden block on the receiver frame-work securing the mains, sub chassis, pick-up and loudspeaker leads and also the two clips mounting these leads to the cabinet dividing panel. Disconnect the internal aerial lead from the terminal strip, withdraw the pick-up, loudspeaker and mains plugs from the main chassis and the interconnecting leads from the sub-chassis.

MISCELLANEOUS COMPONENTS

Drawing Ref. No.	Description	Type or Code No.
5	Assembly, cursor	CR.480.668
	Assembly, dial back	CR.022.221
	Assembly, leg (maple)	CR.600.824
	Assembly, leg (rose mahogany)	CR.600.823
	Assembly, leg (walnut)	CR.600.822
3	Assembly, tuning spindle	CR.371.334
	Assembly, window (tuning indicator)	A3.758.24
	Badge	CR.531.408
	Bezel, amber	CS.430.053
	Bracket, tuning indicator	CR.270.004
	Channel, dial mtg. rubber, x2	CS.424.194
	Clamp, dial, x2	CS.233.570
4	Cord, dial drive	58" required
	Dashpot	Velvet Action 9" x ⅞" barrel
1	Drum, dial	CS.360.015
	Grommet, sub chassis mtg. x3	CS.422.458
	Holder, pick-up head	P4,380.35
	Knob, card	CS.439.218
	Knob, control, x5	CR.523.762
	Lid, stay	EFFCO.C42
	Name, "High Fidelity"	CS.436.451
	Name, "Philips"	A3.308.24
	Plug, male, (gramo. unit power)	CZ.365.115
	Plug, 2 pin polarised, x2	C/F 691.5.1
	Scale, dial	CS.412.421
	Socket, female (gramo, unit power)	CZ.365.116
	Socket, 2 pin polarised x2	C/F 733.16.1
8	Spring, cursor	CS.212.016
6	Spring, dial cord	CS.210.063.1
	Spring, I.F.T. retaining	A3.652.58
	Spring, dashpot	CS.210.062
	Strip, A. & E. terminal	C/F 679.2.5
	Surround, badge	CS.430.943
	Switch, push button (complete)	A3,790.47
	Switch, wave change	CZ.201.211
	Trim, push button	CR.520.839

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AUDIO OUTPUT STAGE CIRCUIT DESCRIPTION

Pre-amplifier and Drive.

The first triode section V4a (pins 1, 2 & 3) functions as a conventional pre-amplifier. An amplified signal is fed through coupling capacitor C43 and grid stopper R45 to the control grid of output valve V5.

The second triode section V4b (pins 6, 7 & 8) functions as a phase inverter. Input via C41 to the control grid is the vector sum of the pre-amplifier output signal, fed through R29/C42, and negative feedback, see further. Output from the phase inverter is applied through coupling capacitor C44 and grid stopper R41 to the control grid of V6.

Output.

If as shown in Fig. 1, V5 and V6 are considered as separate single ended output valves operating Class "A" with respective plate and cathode loads 2Zo then the phase relationship of signal voltages in each circuit is such that a common load equal to ½ the separate loads i.e. Zo, can be substituted without affecting the operating condition of either valve provided the respective output voltages Vo are the same in phase and amplitude.

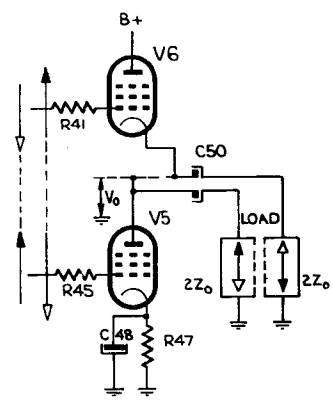


Fig. 1

The matching load impedance for 6CW5 class "A" operation as a single ended output valve is approximately 2,000 ohms so that for single ended push-pull operation this load is halved.

In this receiver the load consists of 2 series connected 800 ohms voice coil loudspeakers L18 & L19 with associated high and low pass filter network C52 & L17. Coupling is through the D.C. blocking capacitor C50.

Resistor R47 and by-pass capacitor C48 provides cathode bias for V5 while grid bias for V6 is tapped from the junction of voltage divider R43 and R44 via grid leak R42 and stopper R41.

The D.C. and signal component voltage amplitude on the plate of V4b with respect to chassis must, in order to drive V6, be maintained higher than the in-phase V6 cathode (output signal) voltage. This condition is achieved for signal by connecting the cathode of V6 to the load R40 of V4b through the screen decoupling capacitor C49 and for D.C. mean by strapping this load to V6 screen which is held approximately 90V above its cathode potential.

The necessary attentuation of the pre-amplified drive signal for V6, is achieved by negative feed back to the phase inverter grid through R30 and C41 of part of the output voltage developed across the voltage divider R31, R32. The distortion reducing properties of negative feed back are thus retained in this circuit arrangement without the disadvantage of overall gain reduction.

VOLTAGE ANALYSIS

VALVE Nº	PLATE VOLTS	SCREEN VOLTS	OSC. PL. VOLTS	CATHODE VOLTS
V1	235	63	88	
V2	235	63		
V3	72			
V4a.	65			0·45
V4b.	130			1·0
V5	130	150		10
V6	255	220		130
V7	225/225		UNFILTERED B+ 275 V D.C.	
V8	21	235	FILTERED B+ 235 V D.C.	
ALL VOLTAGES MEASURED FROM CHASSIS			A.V.C. 1·85 V (V.T.V.M.) HEATER VOLTS 6·35 V A.C.	

WHEN BUTTONS ARE DEPRESSED, SLIDING CONTACTS MOVE TO UPPER POSITION.

SWITCH SHOWN IN RADIO & ORCHESTRA POSITION.

S1 SPEECH · S2 ORCHESTRA · S3 BASS · ON S4 GRAM · S5 RADIO · OFF S6

NOTE :-
1. SWITCH A1 & A2 SHOWN IN B.C. POSITION (FULLY ANTICLOCKWISE.) POSITIONS ARE :-
   1. BROADCAST.
   2. SHORT WAVE 2.
   3. SHORT WAVE 1.
2. FRONT & REAR OF SWITCH SECTIONS DRAWN VIEWED FROM FRONT OF SWITCH.

NOTE :-
CONDENSER VALUES
WHOLE NUMBERS = pF
DECIMALS = µF
SECOND FIGURE = D.C.V.W.
TOLERANCE ± 20% UNLESS OTHERWISE SHOWN.
RESISTORS ARE ± 20% ½ W UNLESS OTHERWISE SHOWN.

A.C. MAINS INPUT · 240 V 230 V · BLUE · RED L13 · BLACK

RECORD CHANGER · L16 · MICRO SWITCH · C54 ·0047/600

YELLOW · GREEN · L14 · L15 · GREEN · BLACK · V7 6V4 · V13

P.U. · R56 330kΩ 10%

V8 6BR5 · R22 470kΩ · C39 ·033/200

R33 47kΩ 10% 1W W.W. · C46 50µF 350 · R37 · R38 2×180Ω 1W W.W. 10% · R35 2×2k7 1W 10% · C47 50µF 350 · R36 · C45 50µF 350 · R54 1MΩ · C53 ·047/200 · R34 2k7 1W W.W. 10% · R39 470kΩ

PLUG LOOKING AT PINS · RED · WHITE · BLUE · BLACK · GREEN · 40/0076

R26 56k 10% · R25 180kΩ 10% · R40 100kΩ 10% · R48 6·8kΩ 2W 10% · R49 22kΩ 10% 2W · C44 ·01 600 · V6 6CW5 · R41 1kΩ · C49 8µF 450 · R42 1MΩ 10% · R31 180k 10% · C50 8µF 450 · R43 10kΩ 10% · R44 150kΩ 10% · V5 6CW5 · R45 1kΩ · C51 8µF 450 · R46 1·5MΩ 10% · C43 ·022/600 · C48 100µF 15 · R47 180Ω 10% WW 1W · C52 ·33µF 200 · CH20 · AD3800AM · L18 · L17 · AD3800A

V4a 12AX7 · V4b 12AX7 · C42 · R29 330k 10% · C41 39 Mica · 10% · ·001/400 · R28 8·2MΩ 10% · R27 2·2kΩ 10% · C40 100µF 3 · R23 1MΩ 10% · TAPER 'A' · R24 22kΩ 10% · R20 1MΩ · R19 100kΩ 10% · C37 ·0022/400 · C38 ·022/200 · R21 10kΩ 10% · R18 100k 10% · R53 220k · C34 220 Mica · R17 1MΩ TAPER 'A' · R52 120k 10% · C35 ·0022/400 · R30 470kΩ 10% · R32 22kΩ 10% · C43 ·022/600

V3 6BD7 · C24 ·01 · R13 10MΩ · C31 ·1/200 · C32 ·0047/400 · R11 5MΩ TAPER 'C' TAP @ 40kΩ · R57 22kΩ 10% · R52 120k 10% · R50 2·7MΩ · R16 2·7MΩ · C33 1µF 350 · R15 100kΩ 10% · R58 82kΩ 10% · RED · BLACK

V1 6AN7 · V2 6N8 · R1 100Ω WW · R2 22kΩ · R3 33kΩ 1W 10% · C11 445 · C21 30 Mica · C19 195 2% Cer. · C20 110 2% Cer. · L9 · L10 · L11 · L12 · C25 2% Cer. · C26 2% · C23 100 Mica · R6 47k · R7 180kΩ 10% · R55 330kΩ 10% · R4 1MΩ · R5 56kΩ 1W 10% · C22 ·047/400

C4 Mica 180 1% · FRONT A1 · C5 30 · C6 30 · C7 Mica 115 2% · C13 Mica 100 · REAR A2 · C16 Mica 180 1% · C18 Mica 110 2½% · C17 Mica 100 · C15 30 · C14 30

INTERNAL AER · EARTH · AERIAL · C10 445 · L1 · L2 · L3 · L4 · C3 30 · C1 100 Mica · C2 ·047/200 · L5 · L6 · C8 ·0045 Mica · L7 · L8 · C12 60 · C9 475 2% Mica

AERIAL & OSCILLATOR COIL LUG PANEL VIEW OF LUGS

TRIMMER LAYOUT BOTTOM VIEW CHASSIS
B.C. OSC. · C12 · L7 L8 · 6N8 · L5 L6 · S.W. OSC PADDING · B.C. OSC. PADDING · 6AN7 · A2 · C15 S.W.2 OSC · C14 S.W.1 OSC. · L3 L4 · A1 · L1 L2 · C3 · C5 · C6 S.W.2 AER · B.C. AERIAL · S.W.1 AER · S.W. AERIAL

I.F. TRANSFORMER LAYOUT TOP VIEW CHASSIS.
C10 · C11 · S1 S2 S3 S4 S5 S6 · V1 6AN7 · V2 6N8 · L9 L10 · L11 L12

CODE No · I T · P Q
I.F. TRANSFORMER BASE VIEW OF LUGS

PRIMARY AND SECONDARY WINDINGS ARE NOT SYMMETRICAL. CORRECT CONNECTION AS SHOWN IS ESSENTIAL

V11 · V12 · X · Y

CAPACITORS

No.	Description	Type or Code No.
C1	100 pF mica	
C2	0.047μF 200V paper	
C3	30 pF air trimmer	
C4	180 pF + 1% mica	CZ.065.722
C5,6	30 pF air trimmer	
C7	115 pF ± 2½% mica	CZ.066.138
C8	0.0045μF ± 10% mica	CZ.068.102
C9	475 pF ± 2% mica	CZ.066.119
C10,11	2 gang tuning	CZ.107.759
C12	60 pF air trimmer	49.005.58
C13	100 pF mica	
C14,15	30 pF air trimmer	
C16	180 pF ± 1% mica	CZ.065.722
C17	100 pF mica	
C18	110 pF ± 2½% mica	CZ.066.140
C19,20	Part of 1st I.F. transformer	
C21	30 pF mica	CZ.065.315
C22	0.047μF 400V paper	
C23,24	100 pF mica	
C25,26	Part of 2nd I.F. transformer	
C27	0.01μF 400V paper	
C28	150 pF mica	CZ.066.915
C29	0.015μF 200V paper	
C30	0.001μF 400 V paper	
C31	0.1μF 200V paper	
C32	0.0047μF 400V paper	
C33	1μF 350 VW electrolytic	Ducon ET1X
C34	220 pF mica	
C35	0.0022μF 400V paper	
C36	0.0047μF 400V paper	
C37	0.0022μF 400V paper	
C38	0.022μF 200V paper	
C39	0.033μF 200V paper	
C40	100μF 3VW electrolytic	Ducon ET1X
C41	0.001μF 400V paper	
C42	39 pF ± 10% mica	
C43	0.022μF 600V paper	
C44	0.01μF 600V paper	
C45,46,47	50μF 350VW electrolytic	Ducon EBS507
C48	100μF 15VW electrolytic	Ducon ET2B
C49,50	8μF 450VW electrolytic	Ducon EO5C
C51	8μF 450VW electrolytic	Ducon EE5C
C52	0.33μF 200V paper	
C53	0.047μF 200V paper	
C54	0.0047μF 600V paper (pt. rec. chgr.)	
C55	0.0047μF 400V paper	

All tolerances are ± 20% unless otherwise specified.

RESISTORS

No.	Description	Type or Code No.
R1	100 ohms ± 20% W/W	
R2	22,000 ohms ± 20%	
R3	33,000 ohms 1W	
R4	1 megohm ± 20%	
R5	56,000 ohms 1W	
R6	47,000 ohms ± 20%	
R7	180,000 ohms	
R8	27,000 ohms	
R9	470,000 ohms	
R10	390,000 ohms	
R11	0.5MΩ pot. taper C tpd. at 40,000Ω	CZ.029.152
R12	4,700 ohms	
R13	10 megohms ± 20%	
R14	68,000 ohms	
R15	100,000 ohms	
R16	2.7 megohms	
R17	1.0MΩ pot. taper "A"	CZ.029.326
R18, 19	0.1 megohms	
R20	1.0MΩ pot. taper "A"	CZ.029.326
R21	10,000 ohms	
R22	470,000 ohms ± 20%	
R23	1 megohm	
R24	2,200 ohms	
R25	180,000 ohms	
R26	56,000 ohms	
R27	2,200 ohms	
R28	8.2 megohms	
R29	330,000 ohms	
R30	470,000 ohms	
R31	180,000 ohms	
R32	22,000 ohms	
R33	47 ohms 1W W/W	
R34	27 ohms 1W W/W	
R35, 36	2,700 ohms 1 W	
R37, 38	180 ohms 1W W/W	
R39	470,000 ohms ± 20%	
R40	100,000 ohms	
R41	1,000 ohms ± 20%	
R42	1 megohm	
R43	10,000 ohms	
R44	180,000 ohms	
R45	1,000 ohms ± 20%	
R46	1.5 megohms	
R47	180 ohms 1W W/W	
R48	6,800 ohms 2W	
R49	22,000 ohms 2W	
R50	2.7 megohms	
R51	180,000 ohms	
R52	120,000 ohms	
R53	220,000 ohms	
R54	1 megohm ± 20%	
R55	330,000 ohms	
R56	390,000 ohms	
R57	22,000 ohms	
R58	82,000 ohms	

Tolerance is ± 10% and rating is ½W unless otherwise specified.

INDUCTORS

No.	Ohms	Description	Code No.
L1 L2	1.2-1.7 0.5	S/W Aerial Coil	CZ.323.027
L3 L4	19.6-26.4 1.5-2.0	B/C Aerial Coil	CZ.323.026
L5 L6	<0.5 <0.5	S/W Oscillator Coil	CZ.323.614
L7 L8	0.8-1.2 2.7-3.7	B/C Oscillator Coil	CZ.330.613
L9 L10	4.7-5.2 8.0-9.0	1st I.F. Transformer	A3.126.84
L11 L12	4.7-5.2 8.3-9.2	2nd I.F. Transformer	CZ.320.444
L13 L14 L15	20 135/140 <0.5	Power Transformer	CZ.344.108
L17	<0.5	Dividing network choke	Rola CH20
L18	—	Loudspeaker	AD3800AM CZ.161.226
L19	—	Loudspeaker	AD3800A CZ.161.224

IMPORTANT! When ordering spare parts, quote CODE NUMBER of part and MODEL NUMBER of Receiver. In claiming free replacement under GUARANTEE, return defective part PROMPTLY and quote MODEL and SERIAL NUMBER of Receiver and DATE OF PURCHASE.

Chassis Withdrawal (Continued)

To withdraw chassis, extract the two wood screws on either side extreme top edge of dial back plate and the two $\frac{5}{32}$" Whit. machine thread screws securing the chassis side flange to the mounting plate. The main chassis complete with dial scale, etc., may now be removed from the cabinet.

Procedure for chassis replacement is a reversal of the foregoing, but care should be taken to ensure that the leading edge of the chassis side flanges locate in the securing lip of each mounting plate.

LOUDSPEAKERS.

The loudspeaker L18 may be rendered accessible by removing the two wood screws through the top and bottom flanges of the totally enclosing baffle box. Prior removal of dividing network components is unnecessary.

When replacing box ensure that the screws are turned fully home. The bezel lamp strip is separately screwed so that bezel lamp replacement is an independent operation.

The phase relationship between L18 and L19 must, for satisfactory reproduction, be according to the circuit diagram notation. The red paint mark on each loudspeaker back plate adjacent to the speech coil terminating tag, corresponds with the + notation on the circuit diagram.

MAINS VOLTAGE ADJUSTMENT.

The power transformer primary winding is provided with two mains voltage tappings—200/230 volts and 240/250 volts—for adjustment to the suppy voltage at the point of installation. The receiver is factory adjusted to the 240/250 volts tapping.

DIAL CALIBRATION.

In the event of an equal calibration error existing over the entire dial scale band, correction can be effected by simply sliding the cursor assembly on the dial cord as required. A pointer position centrally over the scale stop mark (low frequency end of short wave band calibration rectangle) should correspond with a tuning gang fully closed setting.

ALIGNMENT.

Check that the position of pointer is over the stop mark on the dial scale when tuning gang is fully closed. Adjust if necessary as described in the foregoing.

For I.F.T. and R.F. trimmer locations refer to the circuit diagram inset drawing.

The "Radio" and "Speech" push buttons must remain in the depressed position and the volume control be set to maximum (fully clockwise) throughout alignment procedure.

I.F. Alignment.

Screw out iron core of 2nd I.F.T. primary.

Apply modulated 455 Kc/s signal via a 100 pF capacitor to control grid (pin 2) of V1 and peak I.F.T. cores in the following sequence:—

Secondary 2nd I.F.T. (L11)
Secondary 1st I.F.T. (L10)
Primary 1st I.F.T. (L9)
Primary 2nd I.F.T. (L12)

Do not repeat any adjustments.

B/C Alignment.

Use a standard R.M.A. dummy aerial and apply a modulated R.F. signal to the aerial terminal.

Alignment frequencies are: 1,420 Kc/s, 3XY (peak oscillator (C12) and aerial (C3) trimmers), and 600 Kc/s, 7ZL (peak oscillator slug (L7, 8) whilst rocking gang).

S/W Alignment.

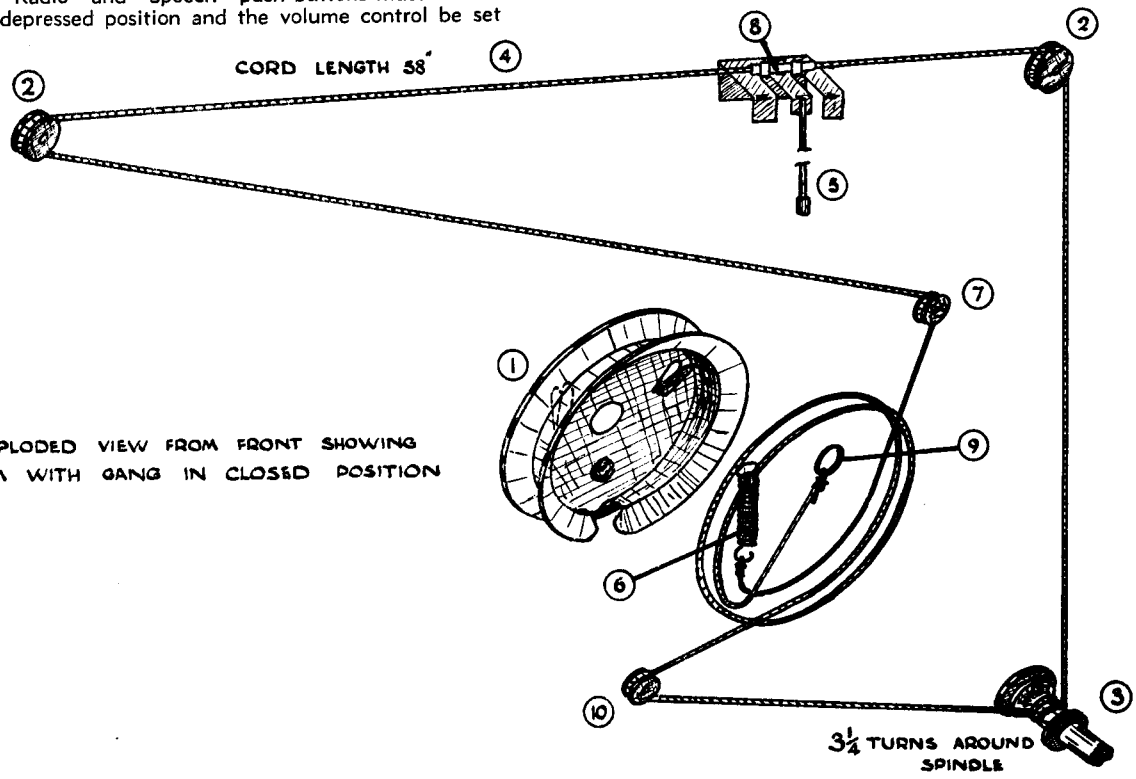
Alignment of the S/W 2 band (wave change switch in central position) should be completed before commencement of S/W 1 alignment.

Since the receiver oscillator frequency is above that of the signal, selection of the higher of the two frequencies tunable on the receiver is the correct alignment procedure.

S/W 2 (4.7 to 9.2 Mc/s) band; Alignment frequencies are 4,825 Mc/s (white triangle—peak oscillator (L5, 6 slug) and, 8.9 Mc/s (white triangle—peak oscillator trimmer C15 and aerial trimmer C6 whilst rocking gang). If the oscillator slug can be peaked in two positions a core setting nearest to coil connection lugs is the correct setting. The minimum capacitance (furthest out) position of oscillator trimmer C15 is similarly the true peak setting of two possible peaks obtainable.

S/W 1 (9.1 to 18.4 Mc/s—W/C switch fully clockwise) band: Alignment frequencies are 17.8 Mc/s (green triangle—peak oscillator trimmer C14 and aerial trimmer C5 whilst rocking gang), and 9.65 Mc/s (green triangle — check calibration). The minimum capacitance setting of oscillator trimmer C14 is the correct peak of two peaks obtainable, i.e., an image response is tunable at 16.9 Mc/s.

Do not attempt adjustment of the slugs in aerial coils L1, 2, and L3, 4.



EXPLODED VIEW FROM FRONT SHOWING DRUM WITH GANG IN CLOSED POSITION