

Models
E19SG
E19SGZ

Hotpoint

BAND-MASTER

SERVICE DATA & TECHNICAL INFORMATION

A.C. Operated
Superheterodynes

AUSTRALIAN
GENERAL ELECTRIC
PROPRIETARY LIMITED

Nine Valve
Seven Band

ELECTRICAL SPECIFICATIONS.

FREQUENCY RANGES.

1. 540-1600 Kc/s.	555-187.5M.
2. 4.0-1.5 Mc/s.	75-200M.
3. 9.7-3.6 Mc/s.	31-83.4M.
4. 12.0-9.4 Mc/s.	25-31.9M.
5. 15.0-11.7 Mc/s.	20-25.7M.
6. 19.0-15.0 Mc/s.	15.8-20M.
7. 22.3-17.7 Mc/s.	13.5-16.9M.

INTERMEDIATE FREQUENCY	455 Kc/s.
Power Supply Rating	200-260 volts A.C., 40-60 C.P.S.

(Models are produced with other voltage and frequency ratings.)

Power Consumption	100 watts
Valve Complement	

MODEL E19-SG.

1. 6U7G. R.F. Amplifier.
 2. 6J8GA. Converter.
 3. 6G8G. I.F. Amplifier, Detector, A.V.C.
 4. 6SJ7. 1st A.F. Amplifier.
 5. 6SJ7GT. 2nd A.F. Amplifier.
 6. 6J5GT. Phase Splitter.
 7. 6V6GT. Push-pull Output.
 8. 6V6GT. Push-pull Output.
 9. 5Y3GT. Rectifier.
- Y61 or Y63. Visual Tuning Indicator.

MODEL E19-SGZ.

1. 6U7G. R.F. Amplifier.
 2. 6J8GA. Converter.
 3. 6G8G. I.F. Amplifier, Detector, A.V.C.
 4. 6AU6. 1st A.F. Amplifier.
 5. 6AU6. 2nd A.F. Amplifier.
 6. 6J5GT. Phase Splitter.
 7. 6V6GT. Push-pull Output.
 8. 6V6GT. Push-pull Output.
 9. 5Y3GT. Rectifier.
- Y61 or Y63. Visual Tuning Indicator.

LOUDSPEAKER:

Model E19-SG.

12 inch permanent Magnet—Code No. AU54.
Transformer—TX4.
V.C. Impedance—12.5 ohms at 400 C.P.S.

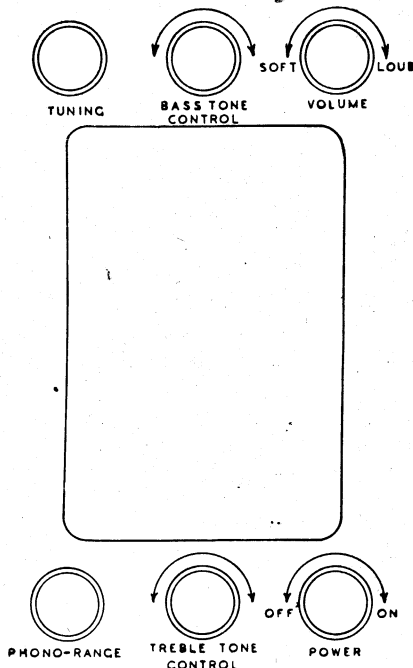
Model E19-SGZ.

12 inch permanent Magnet—Code No. AU58.
Transformer—TX4.
V.C. Impedance—12.5 ohms at 400 C.P.S.

Undistorted Power Output—8 watts.

Dial Lamps (4)—6.3 volts, 0.25 Amp. M.E.S.

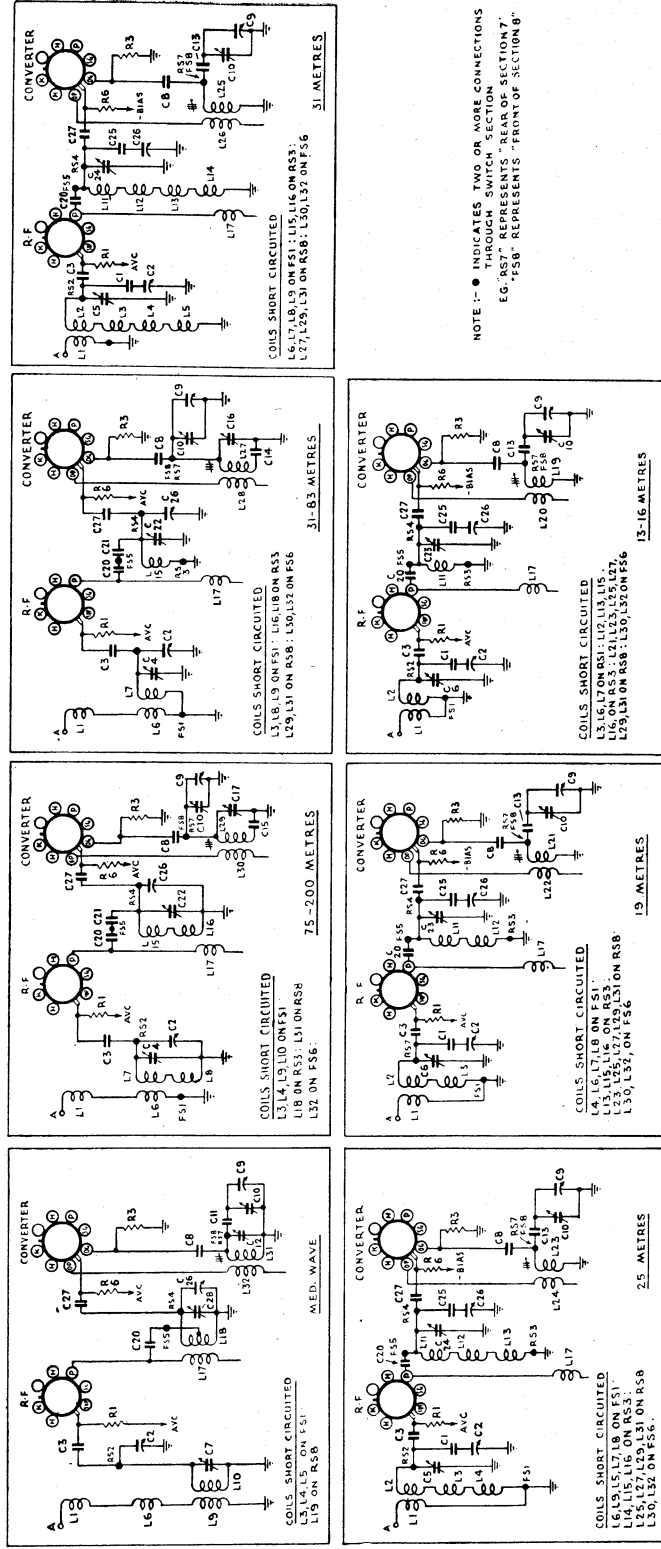
Controls E19-SG and E19-SGZ



MECHANICAL SPECIFICATIONS.

Cabinet Dimensions (inches)	Height	Width	Depth
Chassis Base Dimensions (inches)	37	40	17
Weight (nett lbs.)	3½	16	7¼
Cabinet Finish	156		
	Walnut Veneer.		

FIG. 5. TUNING CIRCUIT.



NOTE: ● INDICATES TAPS OR WIRE CONNECTIONS THROUGH SWITCH SECTION. E.G. "AS7" REPRESENTS "REAR OF SECTION 7" "FSB" REPRESENTS "FRONT OF SECTION 8"

MECHANICAL REPLACEMENT PARTS.

Item	Part No.	Item	Part No.
Cabinet	EI	Drum "A"	23543
Cable, Loudspeaker	23851	Drum "B"	23561
Cable, Pick-up	23983	Drum "C"	23539
Cable, Power	23984	Flywheel Assembly	23569
Cable, Power Switch	23859	Knob, Model E19-SG	23518
Cable, Tone, Bass	23855	-Model E19-SGZ	25913
Cable, Tone, Treble	23856	Panel, Capacitor Assembly	
Cable, Tuning Indicator	23863	E19-SG	23852
Cable, Volume	23857	E19-SGZ	24650
Chassis, Base	23554	E19-SGZ	25169
Chassis, End. Right-Hand	23527	E19-SGZ	25167
Chassis, End. Left-Hand	23528	Panel, Power Cord Assembly	4263
Clip, Grid	5793	Panel, Pin-Jack Assembly	
Dial, Frame, Assembly	23570	2 way	17386
Dial, Painter Assembly	23536	2 way	17387
Dial, Scale	23359A	3 way	10274
Drum, Drive	9090	Register, Valve Screen	4733
Drum, Wave Change (Fig. 4)		Screen, Valve	8147
		Cap	8148
		Socket, Valve, with Screen (E19-SGZ only)	24757
		Socket, Valve Cushion Assembly	24667
		Socket, Valve, 8 pin	4704
		Socket, Valve, 8 pin, Amphenol	RT8
		Strip Tag 1 way	8317
		2 way	8021
		4 way	8022
		4 way	24789
		4 way	10236
		5 way	24790
		5 way	23853
		Terminal, Spring	5458

ALIGNMENT PROCEDURE.

The receiver is tested by the manufacturer with precision instruments and all adjusting screws are sealed. Re-alignment should be necessary only when adjustments have been altered from the factory setting or when repairs have been made to the tuned circuits. Climatic conditions should not seriously affect the receiver.

It is important to apply a definite procedure, as given in this booklet, and to use adequate and reliable test equipment. Instruments ideally suited to the requirements are either the A.W.A. Junior Signal Generator, type 2R3911, or the A.W.A. Modulated Oscillators, type J6726 and C1070.

An output meter is necessary with both these instruments, the recommended type having an output impedance of 10,000 ohms and a range of 5-6000 milliwatts. The recommended meter is the A.W.A. output meter, type 2M8832.

As the calibration of the band-spread bands require great accuracy, it is recommended that an A.W.A. Crystal Calibrator, type 6795, be used after setting the oscillator calibration, to check the accuracy of the signal generator. The crystal calibrator emits a modulated signal at intervals of either 100 or 1000 Kc/s., throughout the radio frequency spectrum, thus providing a series of fixed and equally spaced calibration points of known accuracy. When using this instrument, care should be taken to select the correct signal. With the crystal set at the 1000 Kc/s. position, a spurious image signal can generally be obtained by turning the tuning control of the receiver to a point approximately 100 Kc/s. higher in frequency. This is a useful check as to whether a harmonic or spurious image is being tuned. If a crystal calibrator is not available broadcasting stations of known frequency may be used as an alternative.

When using a signal generator or modulated oscillator, with the tuning of the receiver fixed, two frequencies can be tuned from the test instrument, one 0.92 Mc/s. higher in

frequency than the other. In all cases the desired frequency is the lower of the two.

For all alignment purposes, connect the "low" side of the signal generator to the receiver chassis.

Perform alignment in the proper order as shown in the chart, starting from No. 1 and following all operations across, then No. 2, etc.

Keep the volume control set in the maximum clockwise position and regulate the output of the test instrument so that a minimum signal is introduced to the receiver to give a standard indication on the output meter. This will avoid A.V.C. action and overloading.

When the receiver has been satisfactorily aligned, seal the adjusting screws with a small quantity of cellulose cement.

If a type J6726 or C1070 instrument is used, see that an 0.25 megohm resistor is connected between the output terminals, and for short wave alignment a 400 ohm non-inductive resistor in series with the active output lead.

SIMPLE SHORT WAVE CALIBRATION ADJUSTMENT.

The short wave calibration may be adjusted slightly, without removing the chassis from the cabinet for alignment, by adjusting four cores, L19, L21, L23 and L25, after a station of known frequency is received.

The correct procedure is as follows:—

- (1) Set the dial pointer so that calibration is correct on the medium wave band.
- (2) To adjust the calibration of the 22.3-17.7 Mc/s. band, tune-in the known station, and to shift the pointer position to the high frequency end of the dial, turn L19 clockwise, or vice-versa, until the station can be tuned-in at its assigned frequency.

The adjustments for the 19.0-15.0, 15.0-11.7 and 12.0-9.4 Mc/s. bands are similar, using L21, L23 and L25 respectively.

ALIGNMENT TABLE.

Alignment Order	Connect "high" side of generator to:	Tune Generator to:	Tune Receiver Dial to:	Circuit to adjust.	Adjustment Symbol	Adjust to obtain.
1	6J8GA Cap*	455 Kc/s.	540 Kc/s.	2nd I.F. Trans.	Core L36	Max. Peak
2	6J8GA Cap*	455 Kc/s.	540 Kc/s.	2nd I.F. Trans.	Core L34	Max. Peak
3	6J8GA Cap*	455 Kc/s.	540 Kc/s.	1st I.F. Trans.	Core L35	Max. Peak
4	6J8GA Cap*	455 Kc/s.	540 Kc/s.	1st I.F. Trans.	Core L33	Max. Peak
Re-check 1, 2, 3 and 4.						
5	Aerial	600 Kc/s.	600 Kc/s.	Oscillator**	Core L31	Max. Peak
6	Aerial	1,500 Kc/s.	1,500 Kc/s.	Oscillator	C12	Calibration
7	Aerial	1,500 Kc/s.	1,500 Kc/s.	Radio Frequency	C28	Calibration
8	Aerial	1,500 Kc/s.	1,500 Kc/s.	Aerial	C7	Max. Peak
Re-check 5, 6, 7 and 8.						
9	Aerial	17.8 Mc/s.	17.8 Mc/s.	Oscillator	Core L19	Calibration
10	Aerial	17.8 Mc/s.	17.8 Mc/s.	Radio Frequency**	C23	Max. Peak
11	Aerial	17.8 Mc/s.	17.8 Mc/s.	Aerial	C6	Max. Peak
12	Aerial	21.0 Mc/s.	21.0 Mc/s.	Oscillator	C10	Calibration
13	Aerial	15.2 Mc/s.	15.2 Mc/s.	Oscillator	Core L21	Calibration
14	Aerial	11.8 Mc/s.	11.8 Mc/s.	Oscillator	Core L23	Calibration
15	Aerial	11.8 Mc/s.	11.8 Mc/s.	Radio Frequency**	C24	Max. Peak
16	Aerial	11.8 Mc/s.	11.8 Mc/s.	Aerial	C5	Max. Peak
17	Aerial	9.5 Mc/s.	9.5 Mc/s.	Oscillator	Core L25	Calibration
18	Aerial	9.0 Mc/s.	9.0 Mc/s.	Oscillator	C16	Calibration
19	Aerial	9.0 Mc/s.	9.0 Mc/s.	Radio Frequency**	C22	Max. Peak
20	Aerial	9.0 Mc/s.	9.0 Mc/s.	Aerial	C4	Max. Peak
21	Aerial	4.0 Mc/s.	4.0 Mc/s.	Oscillator	Core L27	Calibration
Re-check 18, 19, 20 and 21.						
22	Aerial	1.6 Mc/s.	1.6 Mc/s.	Oscillator	Core L29	Calibration
23	Aerial	3.7 Mc/s.	3.7 Mc/s.	Oscillator	C17	Max. Peak
Re-check 22 and 23.						

Finally, re-check broadcast band. This is necessary only if the setting of C10 has been altered.

*With grid clip connected. An 0.001 uF capacitor should be connected in series with the "high" side of the test instrument.

**Rock the tuning control back and forth through the signal.

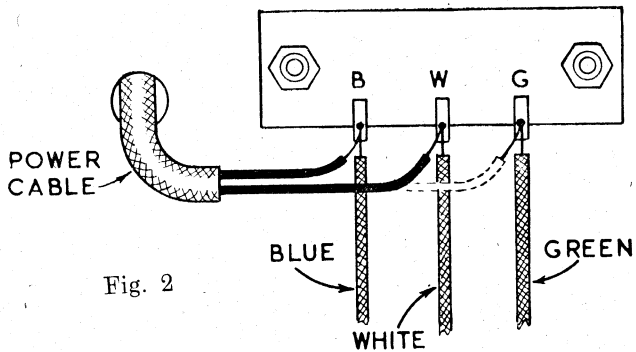


Fig. 2

CONNECTION TO POWER SUPPLY.

Each instrument is supplied ready for use on voltages between 230 and 260 volts inclusive. Should the supply be consistently below 230 volts, it will be necessary to remove the chassis from the cabinet and re-wire the power supply connection panel. The panel has three tags, to which three leads from the power transformer—blue, white and green—are connected. For 230-260 volts operation, the cables from the ON/OFF switch and the Phono-motor connection socket are connected to the blue and green leads. For voltages below 230, both should be connected to the blue and white leads. See accompanying diagram.

CHASSIS REMOVAL.

1. Remove the six control knobs by pulling them straight off their spindles.
2. Remove the backs from the receiver and Record Changer compartments.
3. Disconnect the Phono-motor, cabinet pilot lamp and pick-up cables from the chassis, the power cable from the distribution panel situated under the Record Changer compartment, and the loudspeaker cable from the loudspeaker.
4. The chassis is held in the cabinet by four screws, two at each end of the chassis. Removal of these enables the chassis to be withdrawn from the cabinet.

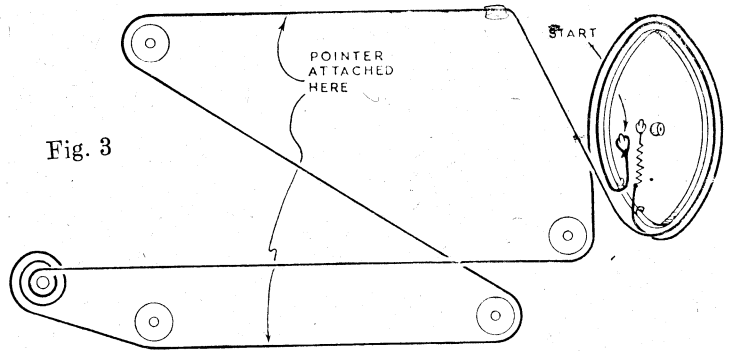


Fig. 3

TUNING DRIVE CORD REPLACEMENT.

The accompanying diagram shows the route of the cord and the method of attachment. Whilst fitting the tuning drive cord, keep it taut, and adjust the length so that the tension spring measures approximately 2 inches long when fitted. The spring should be sheathed to prevent it from rattling against the drum.

DETAILS OF "D"



DETAILS OF "E"



DETAILS OF "F"

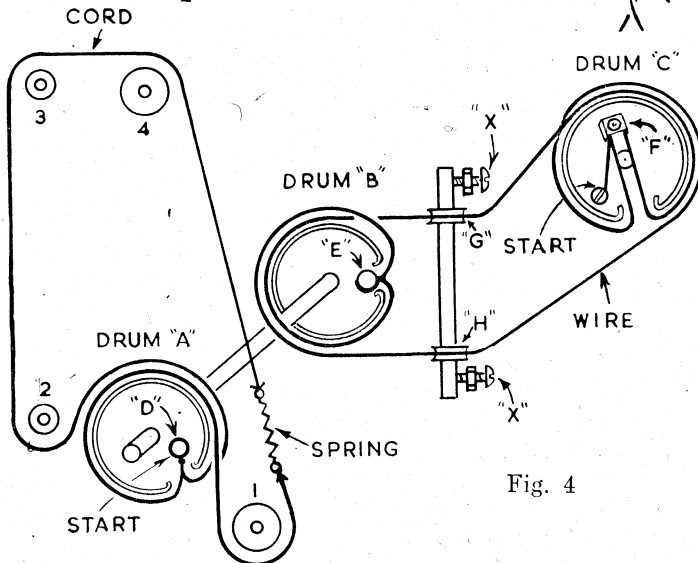
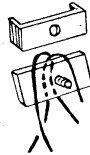


Fig. 4

WAVE CHANGE SWITCH DRIVE REPLACEMENT.

Wave Change Switch Drive Replacement.

The following notes should be read whilst referring to Fig. 4, which shows the route and method of attachment of both the drive cord and drive wire.

When replacing either the cord or the wire, the recommended procedure is as follows:—

(1) Drive Wire.

Turn the switch to the extreme anti-clockwise position.

Loosen screws "X" and anchor one end of the wire under the self-tapper as shown on drum "C".

Feed the wire under and over bush "F", around drum "C" in an anti-clockwise direction, over pulley "G", around drum "B", through "E" on drum "B" twice, then, around drum "B" in an anti-clockwise direction, over pulley "H", around drum "C", and finally, fasten under and over bush "F" by the locking bracket.

Now adjust screws "X" for correct tension and lock.

(2) Drive Cord.

Tie the cord over "D" on drum "A" so that it measures approximately 17" to the left and 9" to the right of "D".

Feed the long section of the cord anti-clockwise around drum "A", under pulley "2", and over pulleys "3" and "4".

Now feed the short section clockwise around drum "A" and under pulley "1". Tie the 9" section to the tension spring, pass the 17" section through the other end of the spring, and tie after adjusting the tension.

CIRCUIT CODE E19-SGZ.

Code No.	Description	Part No.	Code No.	Description	Part No.
INDUCTORS			C10	1.9 uF Air Trimmer	16347
L1, 2	Aerial Coil 13-16 Metres	9852	C11	490 uF Padder $\pm 2\frac{1}{2}\%$	
L1, 2, 3	Aerial Coil 16-20 Metres	9852	C12	2.21 uF Air Trimmer	19659
L1, 2, 3, 4	Aerial Coil 20-25 Metres	9852	C13	42 uF N750 Temp. Comp.	
L1, 2, 3, 4, 5	Aerial Coil 25-31 Metres	9852	C14	2550 uF Mica $\pm 2\frac{1}{2}\%$	
L6, 7	Aerial Coil 31-83 Metres	9854	C15	1350 uF Mica $\pm 2\frac{1}{2}\%$	
L6, 7, 8	Aerial Coil 75-200 Metres	9854	C16	2.21 uF Air Trimmer	19659
L9, 10	Aerial Coil 540-1600 Kc/s	9748A	C17	2.21 uF Air Trimmer	19659
L11	R.F. Coil 13-16 Metres	9853	C18	0.1 uF Paper 400 v. Working	
L11, 12	R.F. Coil 16-20 Metres	9853	C19	0.1 uF Paper 400 v. Working	
L11, 12, 13	R.F. Coil 20-25 Metres	9853	C20	200 uF Mica	
L11, 12, 13, 14	R.F. Coil 25-31 Metres	9853	C21	50 uF Mica	
L15	R.F. Coil 31-83 Metres	9855	C22	2.21 uF Air Trimmer	19659
L15, 16	R.F. Coil 75-200 Metres	9855	C23	2.21 uF Air Trimmer	19659
L17, 18	R.F. Coil 540-1600 Kc/s	9749A	C24	2.21 uF Air Trimmer	19659
L19, 20	Oscillator Coil 13-16 Metres	9747	C25	52 uF Silvered Mica ± 2 uF	
L21, 22	Oscillator Coil 16-20 Metres	9746	C26	12.430 uF Tuning	18380
L23, 24	Oscillator Coil 20-25 Metres	9745	C27	200 uF Mica	
L25, 26	Oscillator Coil 25-31 Metres	9744	C28	2.21 uF Air Trimmer	19659
L27, 28	Oscillator Coil 31-83 Metres	9743	C29	8 uF 525 P.V. Electrolytic	
L29, 30	Oscillator Coil 75-200 Metres	9742	C30	0.05 uF Paper 400 v. Working	
L31, 32	Oscillator Coil 540-1600 Kc/s	9741A	C31	0.05 uF Paper 400 v. Working	
L33, 34	1st I.F. Transformer	8286Z	C32	24 uF 600 P.V. Electrolytic	
L35, 36	2nd I.F. Transformer	8287Z	C33	70 uF Silvered Mica	
L37	Smoothing Choke 750 ohms	5879	C34	70 uF Silvered Mica	
L38	Smoothing Choke	TX14	C35	0.01 uF Paper 600 v. Working	
RESISTORS			C36	4 uF Mica	
R1	1 megohm $\frac{1}{2}$ watt		C37	50 uF Mica	
R2	20,000 ohms 1 watt		C38	70 uF Silvered Mica	
R3	32,000 ohms $\frac{1}{2}$ watt		C39	70 uF Silvered Mica	
R4	16,000 ohms 2 watts		C40	100 uF Mica	
R5	16,000 ohms 2 watts		C41	100 uF Mica	
R6	1 megohm $\frac{1}{2}$ watt		C42	0.02 uF Paper 600 v. Working	
R7	1 megohm $\frac{1}{2}$ watt		C43	600 uF Mica	
R8	20 ohms 1 watt (wire wound)		C44	8 uF 525 P.V. Electrolytic	
R9	11 ohms 1 watt (wire wound)		C45	16 uF 525 P.V. Electrolytic	
R10	0.5 megohms $\frac{1}{2}$ watt		C46	0.1 uF Paper 400 v. Working	
R11	2.5 megohms $\frac{1}{2}$ watt		C47	0.02 uF Paper 600 v. Working	
R12	0.5 megohm $\frac{1}{2}$ watt		C48	50 uF Mica	
R13	1.6 megohms $\frac{1}{2}$ watt		C49	25 uF 40 P.V. Electrolytic	
R14	0.1 megohm $\frac{1}{2}$ watt		C50	0.1 uF Paper 400 v. Working	
R15	50,000 ohms $\frac{1}{2}$ watt		C51	8 uF 525 P.V. Electrolytic	
R16	0.25 megohm $\frac{1}{2}$ watt		C52	0.1 uF Paper 400 v. Working	
R17	1 megohm Volume Control	23599	C53	3,000 uF Mica	
R18	2.5 megohms $\frac{1}{2}$ watt		C54	1,500 uF Mica	
R19	1 megohm $\frac{1}{2}$ watt		C55	2,000 uF Mica	
R20	0.5 megohm $\frac{1}{2}$ watt		C56	0.005 uF Paper 600 v. Working	
R21	3,000 ohms $\frac{1}{2}$ watt		C57	0.05 uF Paper 400 v. Working	
R22	0.1 megohm 1 watt		C58	25 uF 40 P.V. Electrolytic	
R23	0.5 megohm 1 watt		C59	0.1 uF Paper 400 v. Working	
R24	50,000 ohms 1 watt		C60	0.05 uF Paper 400 v. Working	
R25	0.25 megohm $\frac{1}{2}$ watt		C61	500 uF Mica	
R26	25,000 ohms $\frac{1}{2}$ watt		C62	0.1 uF Paper 400 v. Working	
R27	0.25 megohm Tone Control	25360	C63	8 uF 525 P.V. Electrolytic	
R28	1 megohm Tone Control	23598	C64	0.1 uF Paper 400 v. Working	
R29	0.25 megohm $\frac{1}{2}$ watt		C65	25 uF 40 P.V. Electrolytic	
R30	8,000 ohms $\frac{1}{2}$ watt		C66	0.0025 uF Paper 600 v. Working	
R31	1 megohm 1 watt		C67	0.5 uF Paper 400 v. Working	
R32	20,000 ohms 1 watt		C68	0.5 uF Paper 400 v. Working	
R33	0.25 megohm $\frac{1}{2}$ watt		C69	0.0025 uF Paper 600 v. Working	
R34	0.1 megohm 1 watt		C70	16 uF 525 P.V. Electrolytic	
R35	1 megohm $\frac{1}{2}$ watt		TRANSFORMERS		
R36	50,000 ohms 1 watt		T1	Loudspeaker Transformer	TX4
R37	10,000 ohms $\frac{1}{2}$ watt		T2	Power Transformer 40 C.P.S.	17886A
R38	0.1 megohm 1 watt $\pm 5\%$		LOUDSPEAKER		
R39	0.5 megohm 1 watt $\pm 5\%$		12 in. Permanent Magnet		
R40	5,000 ohms 1 watt		AU58		
R41	0.1 megohm 1 watt $\pm 5\%$		SWITCHES		
R42	0.5 megohm 1 watt $\pm 5\%$		S1	Phono/Range Switch, 8 Wafer, 8 Position Rotary	19008
R43	10,000 ohms $\frac{1}{2}$ watt		S2	Power Switch D.P.S.T. Rotary	20007
R44	0.5 megohm 1 watt $\pm 5\%$				
R45	200 ohms 3 watts (wire wound)				
R46	20,000 ohms 1 watt				
CAPACITORS					
C1	52 uF Silvered Mica ± 2 uF				
C2	12.430 uF Tuning	18380			
C3	200 uF Mica				
C4	14.33 uF Air Trimmer	19659			
C5	14.33 uF Air Trimmer	19659			
C6	14.33 uF Air Trimmer	19659			
C7	2.21 uF Air Trimmer	19659			
C8	70 uF Mica				
C9	12.430 uF Tuning	18380			

DESCRIPTION OF TUNING CIRCUIT ADJUSTMENTS.

Broadcast Band.

The broadcast band adjustments follows usual practice with three trimming capacitors—C7 aerial, C28 R.F., C12 oscillator, and a variable magnetite core for the L.F. adjustment of the oscillator coil L31, L32.

9.7-3.6 Mc/s. Band.

Adjustments are the same as those used on the broadcast band, that is, with three trimming capacitors—C4 aerial, C22 R.F., C16 oscillator, and a variable magnetite core for L.F. adjustment of the oscillator coil L27, L28.

4.0-1.5 Mc/s. Band.

All capacitors in the aerial and R.F. sections are common with those in the 9.7-3.6 Mc/s band, the change of band being accomplished by switching tapped coils. The oscillator section, however, is provided with a separate capacitor, C17, for tracking with the signal circuits at the H.F. end, and a variable magnetite core for L.F. adjustment of the oscillator coil L29, L30.

22.3-17.7 Mc/s Band.

At the L.F. end of this band there are three adjustments, a magnetite core in the oscillator coil L19, L20, and trimming capacitors C23 R.F. and C6 aerial. Small capacitors C1, C25 and C13 are used in series with the ganged tuning capacitors to accomplish band-spreading at the L.F. end of this band. The oscillator circuit is made to track with the signal circuit at the H.F. end by adjustment of capacitor

C10. The three series capacitors are chosen to give three point tracking, between the signal and oscillator circuits.

19.0-15.0 Mc/s. Band.

The capacity system is the same as for the 22.3-17.7 Mc/s. band, the change of band being accomplished by switching coils, the oscillator coil L21, L22 being fitted with a variable magnetite core for L.F. adjustment.

15.0-11.7 Mc/s. Band.

Adjustments are similar to those on the 22.3-17.7 Mc/s. band, excepting that no H.F. adjustment is provided for the oscillator. L.F. adjustments are trimming capacitors C24 R.F., C5 aerial, and a variable magnetite core in oscillator coil L23, L24.

12.0-9.4 Mc/s. Band.

One adjustment only is provided, a variable magnetite core in the oscillator coil L25, L26.

It will be noted that the ratio $\frac{\text{max. frequency}}{\text{min. frequency}}$ is the same on the four bands, 12.0-9.4 Mc/s., 15.0-11.7 Mc/s., 19.0-15.0 Mc/s., 22.3-17.7 Mc/s., and the tracking is practically correct, using the same series capacitor for all bands. The ratio $\frac{\text{max. frequency}}{\text{min. frequency}}$ is also the same on the 4.0-1.5 Mc/s. and 9.7-3.6 Mc/s. bands, but, due to the greatly different frequency spectrum of the oscillator, the series capacitors in the two oscillator circuits are different.

CIRCUIT ARRANGEMENT.

R.F. Amplifier—6U7G (V1).

The 6U7G is a triple grid, super control R.F. Amplifier. The output of the aerial coil, which is tuned to signal frequency by the aerial section of the tuning capacitor, is applied to the control grid for amplification. The cathode being earthed, a minimum negative bias voltage of 2.2 volts in the E19-SG and 2.0 volts in the E19-SGZ is obtained from the back-bias circuit, and applied to the control grid via the A.V.C. line.

Amplification is also controlled automatically, due to functioning of the A.V.C. Circuit.

Converter—6J8GA (V2).

The 6J8GA is a triodeheptode converter and is employed as a frequency converter. Voltages at signal frequency are applied to the control grid from the R.F. Amplifier via the R.F. coil and associate circuit. Local oscillations are provided by the triode portion of this valve operating as a tuned grid feedback circuit comprising oscillator coil, padding capacitor and oscillator section of ganged tuning capacitor. Electronic mixing gives a resultant heterodyne frequency of 455 Kc/s. The cathode of this valve being earthed, bias voltages are applied to the control grid via the A.V.C. line from the back-bias circuit. Minimum bias on medium wave is -2.2 volts and short wave -3.4 volts for model E19-SG. For model E19-SGZ, bias on medium wave is -2.0 volts and on short wave -3.1 volts. The 6J8GA is not A.V.C. controlled on short wave.

I.F. Amplifier, Detector, A.V.C.—6G8G (V3).

The output from the 6J8GA is coupled to the control grid of the 6G8G by the 1st I.F. transformer, which is permeability tuned to 455 Kc/s. Bias conditions are similar to those of the R.F. Amplifier (V1).

The 2nd I.F. transformer, permeability tuned to 455 Kc/s., couples the output of V3 to diode No. 2 for detection. Portion of the R.F. voltage from this diode is fed to the diode No. 1 by coupling capacitor (C37) and a voltage is developed across the diode load resistor (R11). This voltage is applied to the grids of V1, V2 and V3 via the A.V.C. line. This voltage, so developed, varies in proportion to the strength of the carrier being received.

AUDIO SYSTEM—MODEL E19-SGZ.

1st A.F. Amplifier (V4)—6AU6.

2nd A.F. Amplifier (V5)—6AU6.

The heater of V4 and V5 are supplied at a reduced voltage from a special centre-tapped winding to reduce hum to a minimum. The cathodes of both valves are also by-passed as an additional hum preventative.

Approximately 20 db of negative feedback is applied to the screen of V5 and the tone controls are also operated in a negative feedback arrangement. Under these conditions, a power output of 8 watts, with a negligible percentage of distortion, is obtainable.

OPERATION OF TONE CONTROLS.

Treble Tone Control (R27).

At middle frequencies, approximately 10 db of negative feedback is applied from the plate to the grid of V4.

At high frequencies, when the moving arm of the control is at the extreme anti-clockwise position, R25 is shunted by C55, which has low reactance at high frequencies. Feedback is, therefore, increased, giving "Treble Cut."

With the arm of the control in the extreme clockwise position, R26 is shunted by C56, giving less feedback, and consequently, "Treble Boost."

Bass Tone Control (R28).

Both C53 and C54 are of relatively high reactance at low frequencies.

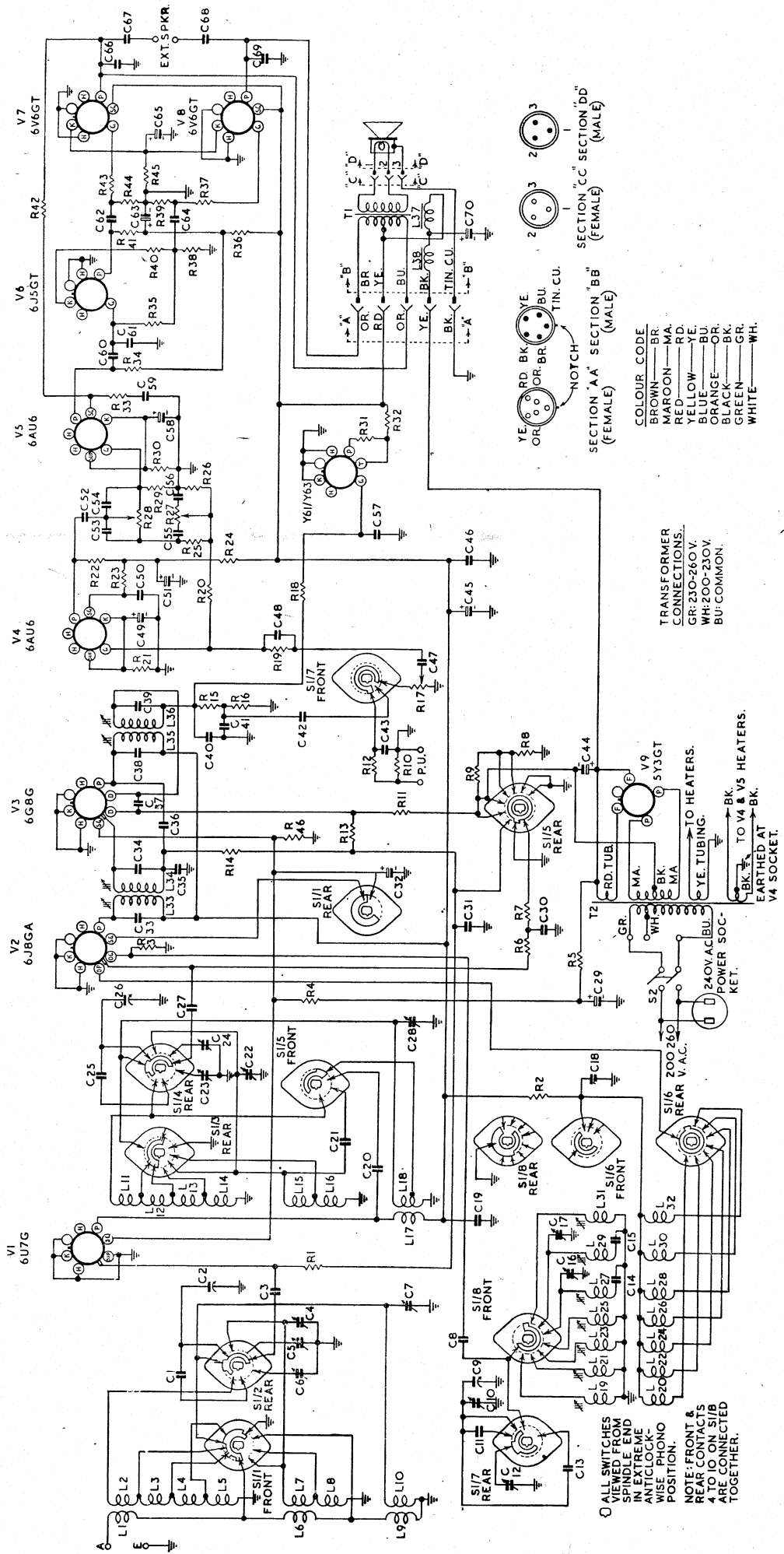
With the moving arm of the control at the extreme anti-clockwise position, C53 is short-circuited, making the negative feedback the same magnitude as at middle frequencies.

"Bass Cut" is obtained due to the voltage divider action of C54 and the grid resistor of V5 (R29).

With the moving arm of the control in the extreme clockwise position, C54 is short-circuited and the negative feedback at low frequencies is reduced owing to the high reactance of C53. This naturally results in "Bass Boost."

R19, in series with the grid of V4, is to prevent the action of the Volume Control (R17) from affecting the feedback arrangements. This resistor is shunted by C48 to increase the high frequency response on "Radio."

The remainder of the audio system follows normal practice of Phase Splitter (V6-6J5GT) and Push-pull Amplifier (V7, V8, 2-6V6GT), with 20 db of negative feedback applied between input and output via R24, R30.

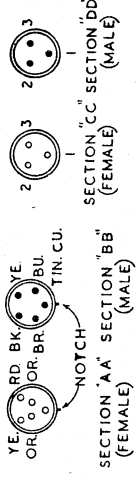


COLOUR CODE
 BROWN—BR.
 MAROON—MA.
 RED—RD.
 YELLOW—YE.
 BLUE—BU.
 BRASS—BR.
 BLACK—BK.
 GREEN—GR.
 WHITE—WH.

TRANSFORMER CONNECTIONS.
 GR-230-260V.
 WH-200-230V.
 BU-COMMON.

TO HEATERS.
 S.YE. TUBING.
 BK. TO V4 & V5 HEATERS.
 BK. EARTHED AT V4 SOCKET.

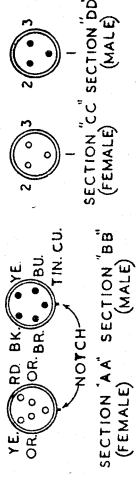
ALL SWITCHES
 REMOVED FROM
 POSITION IN
 EXTREME
 ANTICLOCK-
 WISE PHONO
 POSITION.
 NOTE: FRONT &
 REAR CONTACTS
 4 TO 10 ON S1/8
 ARE CONNECTED
 TOGETHER.



SECTION 'A' SECTION 'B'
 (FEMALE) (MALE)

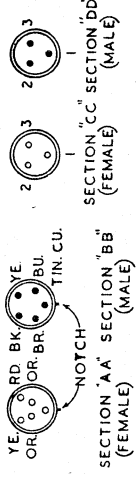
SECTION 'C' SECTION 'D'
 (FEMALE) (MALE)

YE RD BK YE
 OR BR BR BU
 TIN. CU.



SECTION 'A' SECTION 'B'
 (FEMALE) (MALE)

SECTION 'C' SECTION 'D'
 (FEMALE) (MALE)



SECTION 'A' SECTION 'B'
 (FEMALE) (MALE)

SECTION 'C' SECTION 'D'
 (FEMALE) (MALE)

AUDIO SYSTEM—MODEL E19-SG.

1st A.F. Amplifier (V4) —6SJ7.

2nd A.F. Amplifier (V5) —6SJ7GT.

A 6SJ7 valve is used as the 1st A.F. Amplifier and Tone Control source.

The action of this arrangement is as follows:—

At middle frequencies the gain of the valve is determined by the plate load R23, and the negative feedback developed across R22. All values have been arranged so that the normal gain occurs at 400 C/s.

Treble Tone Control (R18).

At high frequencies, the negative feedback is reduced, due to the shunting of the cathode circuit by C48, the amount of shunting being controlled by the setting of R18.

Maximum treble lift occurs when the moving arm of the control is turned fully clockwise. Treble cut is obtained, when the arm of the control is in the extreme anti-clockwise position, due to the shunting effect of C56 across the grid circuit of V5.

Bass Tone Control (R25).

In series with the plate load resistor R23 is R24, which is shunted by C50.

This combination has a new impedance at 400 C/s. The impedance rises as the frequency decreases and the gain rises correspondingly with the impedance. R23 can be effectively short-circuited by the adjustment of the Bass Control (R25). An increase of gain at low frequencies is obtained with the moving arm of the control in the extreme clockwise position. With the moving arm in the extreme anti-clockwise position, C52 is inserted into the coupling circuit and "bass cut" is obtained.

The 6SJ7 employed in this position should have low heater-cathode leakage, otherwise, hum may arise.

The remaining portion of the audio end follows normal

practice of Phase Splitter (6J5GT) and Push-pull Amplifier (2-6V6GT) with 20 db of negative feedback applied between input and output via R37, R27.

MODIFICATIONS TO MODEL E19-SG.

Hum Reduction.

Cause: Heater-Cathode leakage in the 6SJ7 or 6SJ7GT valves.

This can occur in either valve after a period of service.

Three things should be done to deal with this:—

(1) Wire heaters of V4 and V5 from the special centre tapped heater winding (already used for V4) and reduce the heater voltage by means of series resistance to 5.5 volts.

Two pieces of 32 SWG Eureka wire, 6 inches long, inserted through 1 mil tubing, in series with each side of the winding are very convenient for this purpose. The centre tap is earthed in the normal position. Refer to Fig. 6.

(2) By-pass the cathode of V4 with a 25/40 Electrolytic capacitor. This increases the overall gain of V4 and therefore, a voltage divider is incorporated in the grid circuit of V5. One-fifth of the available voltage is applied to this grid. See Fig. 7.

The cathode of V5 cannot be by-passed owing to the negative feedback arrangement.

(3) Improve the high tension filtering by adding to the filter unit a TX14 choke and a 16/525 electrolytic capacitor. These are inserted in the rectifier side of the filter as shown in Fig. 8.

As well as the modifications mentioned above, some other changes can be made with advantage. Two miniature valves (6AU6) can be used in place of the 6SJ7 and 6SJ7GT, and the Tone Control circuits can be altered in accordance with Fig. 9. The description of the modified audio system will then be the same as for model E19-SGZ.

SOCKET VOLTAGES AND CURRENTS. MODEL E19-SG.

VALVES		Control Grid to Chassis Volts	Cathode to Chassis Volts	Screen to Chassis Volts	Anode to Chassis Volts	Anode Current mA	Heater Volts
6U7G	R.F. Amp., M.W.	-2.2*	0	85	265	6.0	6.3
	S.W.	-2.2*	0	85	265	6.0	—
6J8GA	Converter, M.W.	-2.2*	0	85	265	0.8	6.3
	S.W.	-3.4*	0	85	265	0.6-1.3	—
6G8G	Oscillator, M.W.	0	0	—	130	8.0	—
	S.W.	0	0	—	130	6.0-8.0	—
6G8G	I.F. Amp., Det. A.V.C., M.W.	-2.2*	0	85	265	5.4	6.3
	S.W.	-2.2*	0	85	265	5.4	—
6SJ7	1st A.F. Amp.	—	1.8	18	35	0.2	6.3
6SJ7GT	2nd A.F. Amp.	—	3.5	58	88	0.8	6.3
6J5GT	Phase Splitter	—	58	—	95	0.7	6.3
6V6GT	Output	—	16	265	258	34.0	6.3
6V6GT	Push-pull	—	16	265	258	34.0	6.3
5Y3GT	Rectifier	—	—	—	680/340	—	5.0
					Volts A.C.		

100 mA Total Current Drain.

*Cannot be measured with an ordinary voltmeter.

Voltage across loudspeaker field—78 volts.

Measured with receiver connected to 240 volts A.C. Supply. No signal input. Volume Control maximum clockwise

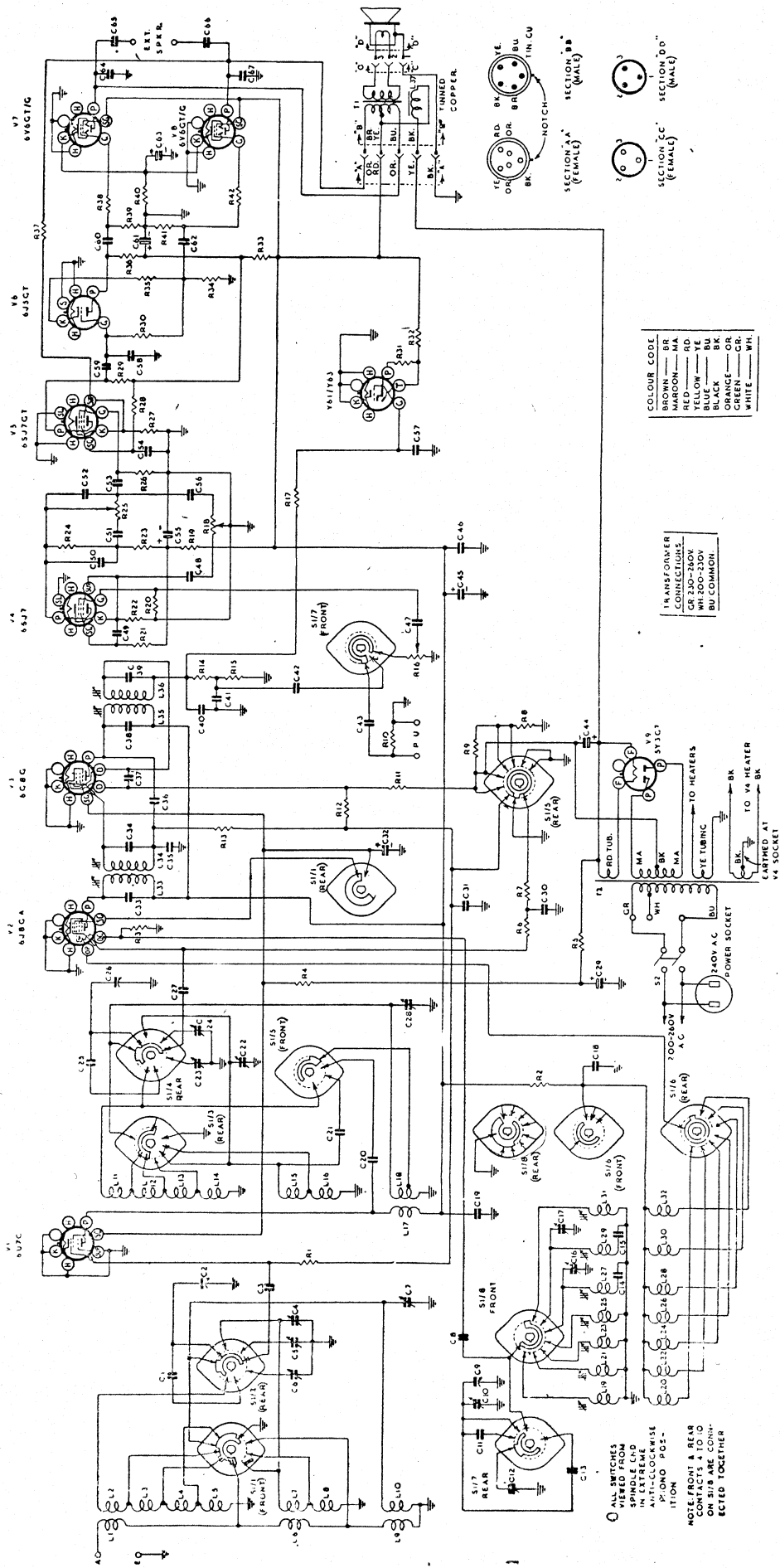
SOCKET VOLTAGES AND CURRENTS. MODEL E19-SGZ.

VALVES	Control Grid to Chassis Volts	Cathode to Chassis Volts	Screen Grid to Chassis Volts	Anode to Chassis Volts	Anode Current mA	Heater Volts
6U7G R.F. Amp., M.W.	-2.0*	0	85	250	6.0	6.3
S.W.	-2.0*	0	85	250	6.0	—
6J8GA Converter, M.W.	-2.0*	0	85	250	0.8	6.3
S.W.	-3.1*	0	85	250	0.6-1.3	—
Oscillator, M.W.		0	—	140	0.8	—
S.W.		0	—	140	6.0-8.0	—
6G8G I.F. Amp. Det., A.V.C., M.W.	-2.0*	0	85	250	5.4	6.3
S.W.	-2.0*	0	85	250	5.4	—
6AU6 1st A.F. Amp.		1.8	120*	140*	0.6	5.3
6AU6 2nd A.F. Amp.		3.0	145*	160*	0.4	5.3
6J5GT Phase Splitter		62.0	—	110	0.7	6.3
6V6GT } Push-pull		16.0	250	245	34.0	6.3
6V6GT } Output		16.0	250	245	34.0	6.3
5Y3GT Rectifier		—	—	—	680/340 Volts A.C.	5.0
					100 mA Total Current Drain	

*Cannot be measured with an ordinary voltmeter.
 Voltage across L37-80 volts.
 Voltage across L38-15 volts.
 Measured with receiver connected to 240 volts A.C. Supply. No signal input.
 Volume Control Maximum clockwise.

D.C. RESISTANCE OF WINDINGS.

Winding	D.C. Resistance in ohms
Aerial Coils	
L1	12
L2	*
L3	*
L4	*
L5	*
L6	4.5
L7	1.5
L8	1.5
L9	2
L10	4
R.F. Coils	
L11	*
L12	*
L13	*
L14	*
L15	1.5
L16	1.5
L17	55
L18	4
Oscillator Coils	
L19	*
L20	*
L21	*
L22	*
L23	*
L24	*
L25	*
L26	*
L27	*
L28	*
L29	1.25
L30	*
L31	7.5
L32	1.5
I.F. Transformer Winding	9
Smoothing Choke L37	750
Smoothing Choke L38	80
Loudspeaker Input Transformer (T1)	
TX4 Primary	380
TX4 Secondary	*
Power Transformer (T2)	
Primary	13
Secondary	280



CIRCUIT CODE E19-SG.