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Trader
Service
Sheet

Goodmans Module 80

3054

V.h.f./f.m. stereophonic tuner/amplifier

(CIRCUIT ALIGNMENT)

Introduction

Goodmans Module 80 is a high fidelity v.h.f./f.m. stereophonic tuner/amplifier with a total harmonic distortion of less than 0·1 per cent at 30W per channel into 4Ω.

It has been designed for use on 120, 220 or 245V 50Hz power supplies and the power consumption is 150W. The mains adjuster, located at the rear of the case, is coin slotted to facilitate rotation and a two pin mains outlet socket is also fitted. Because this is a switched outlet it is important that any equipment connected via this socket does not draw more than 1 Amp.

The front end consists of a two stage f.e.t. r.f. amplifier followed by separate silicon n.p.n. transistors for the mixer and oscillator. Tuning is continuous from 87·5 to 100MHz by the operation of a 100kΩ potentiometer which controls the bias to three varicap diodes.

A tuning indicator circuit is incorporated in the tuner design and has its own power supply. Switched a.f.c., a stereo decoder and stereo indicator are also fitted.

The audio amplifier has been designed to cater for a comprehensive range of facilities. It has five in- output DIN sockets and a mixture of 16 rotary and press-button controls. Fully driven each channel has a 35W r.m.s. output power capability into 4Ω.

This *Service Sheet,* which contains the circuit diagram and component locations on the main chassis assembly and stabilizer panel, must be used in conjunction with *Service Sheet* 3055.

Voltage analysis

Voltages given in the transistor table were obtained from information supplied by the manufacturers. They were measured under quiescent conditions with a 20 000Ω/V meter and are negative with respect to positive chassis line except in the many instances indicated.

Circuit alignment

Equipment required. – An f.m. signal generator ±22·5kHz deviation with outputs at 10·7MHz and the range 88MHz to 108MHz, a 0·01 μF capacitor, a zero to 25V d.c. meter, a centre zero 25μA-0-25μA meter and an a.f. output power meter 4Ω impedance and capable of handling 30W.

1. – Switch on tuner/amplifier and select f.m. Connect voltmeter between **TR8** collector and chassis then adjust **R53** for 15V on meter. Disconnect meter.

2. – Open circuit feed from junction **C23/C24** to junction **R21/R22** and **TR4** base. Replace loudspeaker of one channel with audio output meter and connect centre-zero micro-ammeter between junction **R43/R44** and chassis. Feed in a 20mV 10·7MHz f.m. signal via a 0·01 μF capacitor to base of **TR4.** Adjust **L19** for null.

3. – Adjust **L17, L15, L14, L13, L12, L11** and **L10** in that order for maximum output on output meter attenuating input test signal as receiver sensitivity increases to avoid limiting.

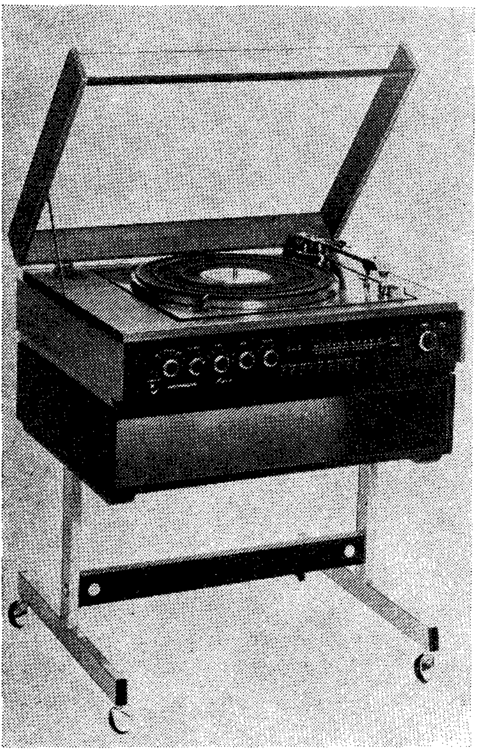
4. – Readjust **L19** for null then disconnect signal generator and capacitor, reconnect link from junction **C23/C24** to **TR4** base.

5. – If source impedance of signal generator is not 240Ω, terminate in a 240Ω matching pad with balanced output and connect pad output to aerial terminals on tuner.

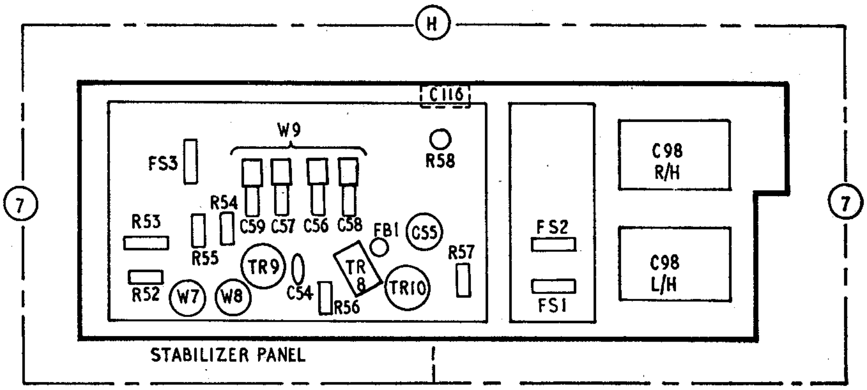
6. – Tune receiver to 108MHz and feed in a 108MHz f.m. signal. Adjust **L7** for maximum output.

7. – Tune receiver to 88MHz and feed in an 88MHz f.m. signal. Adjust **R46** for maximum output. Maintain 88MHz input signal and rock **R47** – tuning control – about 88MHz for null on centre zero meter.

8. – Adjust **L8, L9** and **L252** for maximum output.



Appearance of Goodmans Module 80 Compact. This compact unit has, for the heart of the system, a Module 80 stereo/tuner amplifier. A Goldring Lenco GL75 record player fitted with a G800E cartridge is let into the top of a Module 80 which is also furnished with a hinged lid. The stand, CS1, has a record storage space at the top.



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9. – Tune receiver to 92MHz and feed in a 92MHz f.m. signal. Adjust **L5** for maximum output.

10. – Tune receiver to 100MHz and feed in a 100MHz f.m. signal. Adjust **C251** for maximum output. Disconnect all test equipment.

Multiplex decoder

Although alignment of the decoder panel is quite straightforward, no attempt should be made at realignment unless suitable equipment is available. This should consist of an Encoder providing a crystal controlled 19kHz pilot signal, a *composite* signal that may be switched to provide a *difference* signal, a *sum* signal, and an easily identified left- and right-hand signal (or preferably separate left-hand and right-hand signals). These signals should be available as a multiplex audio output and also as modulation of a v.h.f. signal.

Procedure. – First check i.f. and r.f. alignment. Connect a test meter, switched to 2·5V d.c. range, across **R160,** to read **TR152** emitter volts.

If cores have been seriously mistuned or coils replaced, a preliminary alignment of **L150** and **L151** should be made as follows:

Depress 'Mono' press-button, feed in a 19kHz pilot signal into tag 150 (**R177** on panel) and tune **L150** and **L151** for maximum reading on meter. This reading will be approximately 0·8V when cores are peaked and 19kHz input level is 7mV.

For alignment check, when it may be assumed that **L150** and **L151** are near correct tuning point, this first operation may be omitted and procedure will be as follows:

Connect test meter as before but switched to 10V d.c. range. Connect output meters to each channel (it is assumed that audio checks have been made to ensure correct operation of audio circuits).

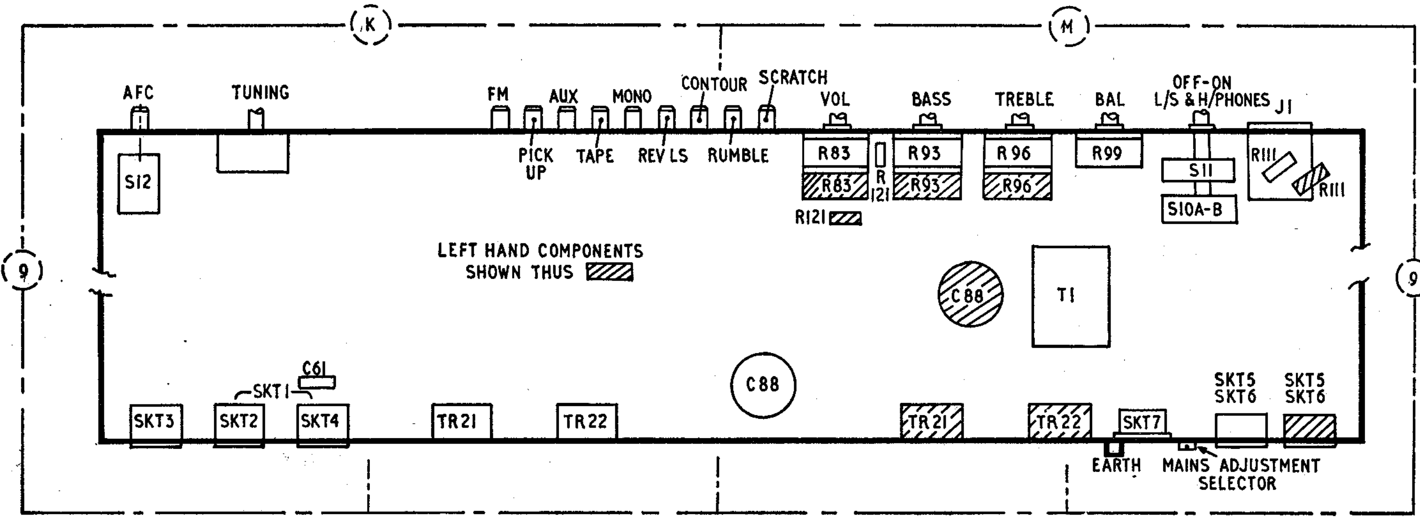
Set encoder to v.h.f. output (1mV) with *composite sum* signal modulation. This signal is to be used to ensure accurate tuning of the receiver to the test signal; it is therefore fed into aerial sockets and receiver carefully tuned with a.f.c. off. When tuning is accomplished, a.f.c. may be switched on to ensure that signal remains in i.f. pass band during decoder alignment.

Depress 'Mono' press-button and adjust **L150** and **L151** for maximum test meter reading – this will be approximately 2·5V-4·5V.

Release 'Mono' button and switch encoder modulation to *difference* signal, then adjust **L152** for maximum audio output.

Switch encoder modulation to left-hand signal only, then adjust **L153** to minimum right-hand output, i.e. minimum cross-talk.

Check right-hand signal and cross-talk also that outputs are balanced ±1dB with *difference* signal modulation.



Resistors*

R1	100Ω	C3
R2	68kΩ	C3
R3	180kΩ	C3
R4	1kΩ	C3
R6	470kΩ	C3
R7	10kΩ	C3
R8	100kΩ	C3
R9	6·8kΩ	C3
R10	22kΩ	C3
R11	2·7kΩ	C3
R12	68Ω	C3
R13	1kΩ	C3
R14	4·7kΩ	C3
R15	15kΩ	C3
R16	2·2kΩ	C3
R17	4·7kΩ	C3
R18	330Ω	C3
R19	100kΩ	C3
R20	100kΩ	C3
R21	5·6kΩ	C3
R22	15kΩ	C3
R23	1kΩ	C3
R24	330Ω	D3
R25	10Ω	D3
R26	5·6kΩ	D3
R27	15kΩ	D3
R28	1kΩ	D3
R29	330Ω	D3
R30	10Ω	D3
R31	5·6kΩ	D3
R32	15kΩ	D3
R33	1kΩ	D3
R34	330Ω	D3
R35	10Ω	D3
R36	5·6kΩ	D3
R37	15kΩ	D3
R38	680Ω	D3
R39	390Ω	D3
R40	100Ω	D3
R41	1kΩ	D3
R42	1kΩ	D3
R43	4·7kΩ	D3
R44	4·7kΩ	D3
R45	470kΩ	D3
R46	22kΩ	D3
R47	100kΩ	—
R52	3·9kΩ	H7
R53	15kΩ	H7
R54	1·2kΩ	H7
R55	1MΩ	H7
R56	3·9kΩ	H7
R57	6·8kΩ	H7
R58	680Ω	H7
R59	220Ω	A2 A2L
R60	680kΩ	A2 A2L
R61	120kΩ	A2 A2L
R62	330kΩ	A1 A2L
R63	2·2MΩ	A1 A2L
R64	22kΩ	A1 A2L
R65	820kΩ	A1 A2L
R66	1kΩ	A2 A2L
R67	680Ω	A2 A2L
R68	6·8kΩ	A2 A2L
R69	4·7kΩ	A2
R70	220kΩ	A1 A1L
R71	270kΩ	A2 A2L
R72	33kΩ	A1 A2L
R73	68kΩ	A1 A2L
R74	1kΩ	A1 A2L
R75	1MΩ	A1 A1L
R76	2·2MΩ	A1 A1L
R77	12kΩ	A2 A2L
R78	1kΩ	A1 B2L
R79	4·7kΩ	A2 B2L
R80	3·3kΩ	B1 B2L
R81	1·8MΩ	B2 B1L
R82	2·2kΩ	B1 B1L
R83[1]	100kΩ	M9 M9L
R84	3·3kΩ	B1 B2L
R85	1·8MΩ	B1 B2L
R86	6·8kΩ	B1 B2L
R87	1·5kΩ	B2
R88	22kΩ	B1 B2L
R89	4·7kΩ	B1 B2L
R90	470Ω	B1 B2L
R91	470Ω	B1 B2L
R92	8·2kΩ	B1 B2L
R93	100kΩ	M9 M9L
R94	10kΩ	B1 B2L
R95	39kΩ	B1 B2L
R96	25kΩ	M9 M9L
R97	1MΩ	B1 B2L
R98	5·6kΩ	B1 B2L
R99	50kΩ	M9
R100	6·8kΩ	B2 B2L
R101	82kΩ	G6
R102	150kΩ	G6
R103	68kΩ	G6
R104	1kΩ	G6
R105	5kΩ	G6
R106	470Ω	G6
R107	8·2kΩ	G6
R108	39Ω	G6
R109	2·2kΩ	G6
R110	2·2kΩ	G6
R111	330Ω	M9 M9L
R112	3·3kΩ	G6
R113	10Ω	G6
R114	33Ω	G6
R115	330Ω	G6
R116	100Ω	G6
R117	22Ω	G6
R118	100Ω	G6
R119	0·33Ω	G6
R120	0·68Ω	G6
R121[2]	1kΩ	M9 M9L
R150	3·9kΩ	E4
R151	33kΩ	E4
R152	8·2kΩ	E4
R153	12kΩ	E4
R154	1·2kΩ	E4
R155	39kΩ	E4
R156	150kΩ	E4
R157	1kΩ	E4
R158	39kΩ	E4
R159	1kΩ	E4
R160	1kΩ	E4
R161	6·8kΩ	E4
R162	10kΩ	E4
R163	33kΩ	E4
R164	33kΩ	E4
R165	33kΩ	E4
R166	4·7kΩ	E4
R167	100kΩ	E4
R168	33kΩ	E4
R169	100kΩ	E4
R170	100kΩ	E4
R171	100kΩ	E4
R172	2·2kΩ	E4
R173	4·7kΩ	E4
R174	1kΩ	E4
R175	5·6kΩ	E4
R176	1·2kΩ	E4
R177	2·2kΩ	E4
R180	1·2kΩ	A1
R201	150kΩ	F5
R202	12kΩ	F5
R203[3]	2kΩ	F5
R204	4·7kΩ	F5
R205	47Ω	F5
R206[4]	47Ω	F5
R207	4·7kΩ	F5
R208	47Ω	F5
R209	8·2MΩ	F5
R210	27kΩ	F5
R211[5]	22kΩ	F5
R251	100kΩ	I8
R252	100kΩ	I8
R253	100kΩ	I8
R254	1kΩ	I8
R255	270Ω	I8
R256	100kΩ	I8

Transistor table

Transistor		Emitter (V)	Base (V)	Collector (V)
TR1	BF256BC	4·5(s)*	10·5(g)	—(d)
TR2	BF274	2·6*	—	—
TR3	BF194	5·3*	8·5	—
TR4	BF194	2·1*	—	0·7#
TR5	BF194	2·25*	—	0·7#
TR6	BF194	2·3*	—	0·7#
TR7	BF274	2·05*	—	1·08#
TR8	BD135	—	—	15·0
TR9	BC213L	—	—	—
TR10	BC213L	—	—	—
TR11	BC154	0·05*	—	9·75¶
TR12	BC154	0·65*	9·75¶	6·3#
TR13	BC154	1·9*	—	0·6**
TR14	BC172B	22·0	0·6**	8·5[1]
TR15	BC154	12·5*	—	22·0
TR16	BC154	0	—	17·5[2]
TR17	BC172B	6·7*	16·0	—
TR18	BC303	0·75	—	1·8▲
TR19	BC303	—	21·5††	56·0
TR20	BC301	0·015†	1·8▲	—
TR21	MJE2955	0·03§	—	56·0
TR22	MJE2955	0	—	0·015†
TR150	BC154	2·7	—	—
TR151	BC172B	3·6*	3·6‡	—
TR152	BC172B	0	0	—
TR153	BC172B	22·5	—	—
TR154	TIS91	—	—	—
TR201	BC172B	—	—	—
TR202	BC172B	—	—	15·8(r)
TR203	AC192	—	15·8(r)	—
TR204	AC192	—	15·8(r)	—
TR205	BC172B	—	—	15·8(r)
TR251	BF256BC	6·9(s)	4·0(g)	—(d)

Main supply rail 56V negative with respect to chassis line.
(s) *Source.*
(g) *Gate.*
(d) *Drain.*
* *Measured across emitter resistor.*
† *Measured across R120.*
§ *Measured across R119.*
¶ *Measured across R62.*
** *Measured across R77.*
†† *Measured across R109.*
▲*Base to base TR19/TR20.*
‡ *Measured across R155.*
(r) *With respect to tuning indicator circuit negative line.*
Measured across collector resistor.
[1] *Measured across R79.*
[2] *Measured across R88.*
Potential differences measured across the following components are: R1 0·75V; R69 8V; R87 34V; R150 32·5V; C63 14V.
Input volts to bridge rectifier 40V a.c.

Capacitors*

C2	27pF	C3
C3	150pF	C3
C4	15pF	C3
C5	5·6pF	C3
C6	330pF	C3
C7	0·22μF	C3
C8	3·3pF	C3
C9	125pF	C3
C10	4·7pF	C3
C11	510pF	C3
C12	0·02μF	C3
C13	33pF	C3
C14	2·5pF	C3
C15	330pF	C3
C16	330pF	C3
C17	47pF	C3
C18	68pF	C3
C19	3900pF	C3
C20	4·7pF	C3
C21	6·8pF	C3
C22	100pF	C3
C23	68pF	C3
C24	680pF	C3
C25	330pF	C3
C26	0·01μF	D3
C27	330pF	C3
C28	68pF	D3
C29	0·01μF	C3
C30	2·5pF	D3
C31	1500pF	D3
C32	68pF	D3
C33	0·01μF	D3
C34	68pF	D3
C35	2000pF	D3
C36	2·5pF	D3
C37	1500pF	D3
C38	68pF	D3
C39	0·01μF	D3
C40	68pF	D3
C41	2000pF	D3
C42	2·5pF	D3
C43	2000pF	D3
C44	68pF	D3
C45	0·01μF	D3
C46	2000pF	D3
C47	68pF	D3
C48	68pF	D3
C49	150pF	D3
C50	150pF	D3
C51	8μF	D3
C52	2·2μF	D3
C53	100pF	C3
C54	1000pF	H7
C55	100μF	H7
C56	1000pF	H7
C57	1000pF	H7
C58	1000pF	H7
C59	1000pF	H7
C61	0·01μF	K9
C62	22μF	A2 A2L
C63	150μF	A2
C64	0·01μF	A1
C65	0·1μF	A1
C66	3300pF	A2 A2L
C67	0·01μF	A2 A2L
C68	0·1μF	A1 A1L
C69	100μF	A1 A2L
C70	1000pF	A1 A1L
C71	0·22μF	B2 B2L
C72[6]	2000pF	A1 A1L
C73	0·22μF	A1 B1L
C74	0·1μF	B1 B2L
C75	100pF	B1 B2L
C76	0·47μF	B1 B2L
C77	300μF	B2
C78	0·022μF	B1 B2L
C79	0·022μF	B1 B2L
C80	3300pF	B1 B2L
C81	0·033μF	B1 B2L
C82	4700pF	B1 B2L
C83	4700pF	B2L
C84	0·22μF	B1 B2L
C85	680pF	B1 B2L
C86	680pF	B1 B2L
C87	2μF	B2 B1L
C88	4000μF	M9 M9L
C89	0·22μF	G6
C90	50μF	G6
C91	1000pF	G6
C92	50μF	G6
C93	300μF	G6
C94	150pF	G6
C95	1000pF	G6
C96	0·1μF	G6
C97	0·1μF	G6
C98	3300μF	H7
C116	0·1μF	—
C150	0·22μF	E4
C151	0·01μF	E4
C152	8μF	E4
C153	0·01μF	E4
C154	0·01μF	E4
C155	1500pF	E4
C156	7000pF	E4
C157	0·01μF	E4
C158	0·1μF	E4
C159	1500pF	E4
C160	2000pF	E4
C161	2000pF	E4
C162	2000pF	E4
C163	2000pF	E4
C164	150μF	E4
C165	1000pF	E4
C166	1000pF	E4
C167	315pF	E4
C201	1000pF	F5
C202	1000pF	F5
C203	300μF	F5
C204	300μF	F5
C205	0·1μF	F5
C206	0·02μF	F5
C207	0·1μF	F5
C251	5·5pF	I8
C252	100pF	I8
C253	100pF	I8
C254	330pF	I8
C255	330pF	I8

Inductors

L2/3	—	C3
L4	—	C3
L5	—	C3
L6	—	C3
L7	—	C3
L8	—	C3
L9	—	C3
L10	—	D3
L11	—	D3
L12	—	D3
L13	—	D3
L14	—	D3
L15	—	D3
L16/17	—	D3
L18/19	—	D3
L150	—	E4
L151	—	E4
L152	—	E4
L153	—	E4
L251/2	—	I8
L253	—	I8
L254	—	I8
T1	—	M9

Miscellaneous

FS1	1A	H7
FS2	1A	H7
FS3	4A	H7
FS4	1·6A	G6
FB1	—	H7
FB2	—	—
J1	—	M9
S1-S9	—	A1
S10	—	M9
S11	—	M9
S12	—	K9
PL1	6·5V 1W	
PL2	6·5V 1W	—
PL3	6·5V 1W	—
PL150	14V 0·56W	
PL201	14V 0·56W	
PL202	14V 0·56W	
W2	BB103	C3
W3	BB103	C3
W4	AA112	D3
W5	AA112	D3
W6	AA112	D3
W7	BA147	H7
W8	1S2068A	H7
W9	1N5402(4)	H7
W10	1S2220A	B2
W11	1S970	G6
W12	Y933	G6
W13	Y933	G6
W150	OA90	E4
W151	OA90	E4
W152	OA90	E4
W153	OA90	E4
W154	OA90	E4
W155	OA90	E4
W201	1S970	F5
W202	1S970	F5
W251	BB103	I8

* *Subscript L in location column refers to left hand channel.*

[1] *Double tapped but single tapped in some chassis.*

[2] *Only fitted in chassis having double tapped volume control.*

[3] *2kΩ with 22kΩ in parallel in some chassis.*

[4] *15Ω in some early chassis.*

[5] *Not fitted when R203 is 2kΩ.*

[6] *1000pF in early chassis using single tapped volume control, changed to 1100pF in some later chassis. Some chassis have a 330pF capacitor fitted in parallel.*

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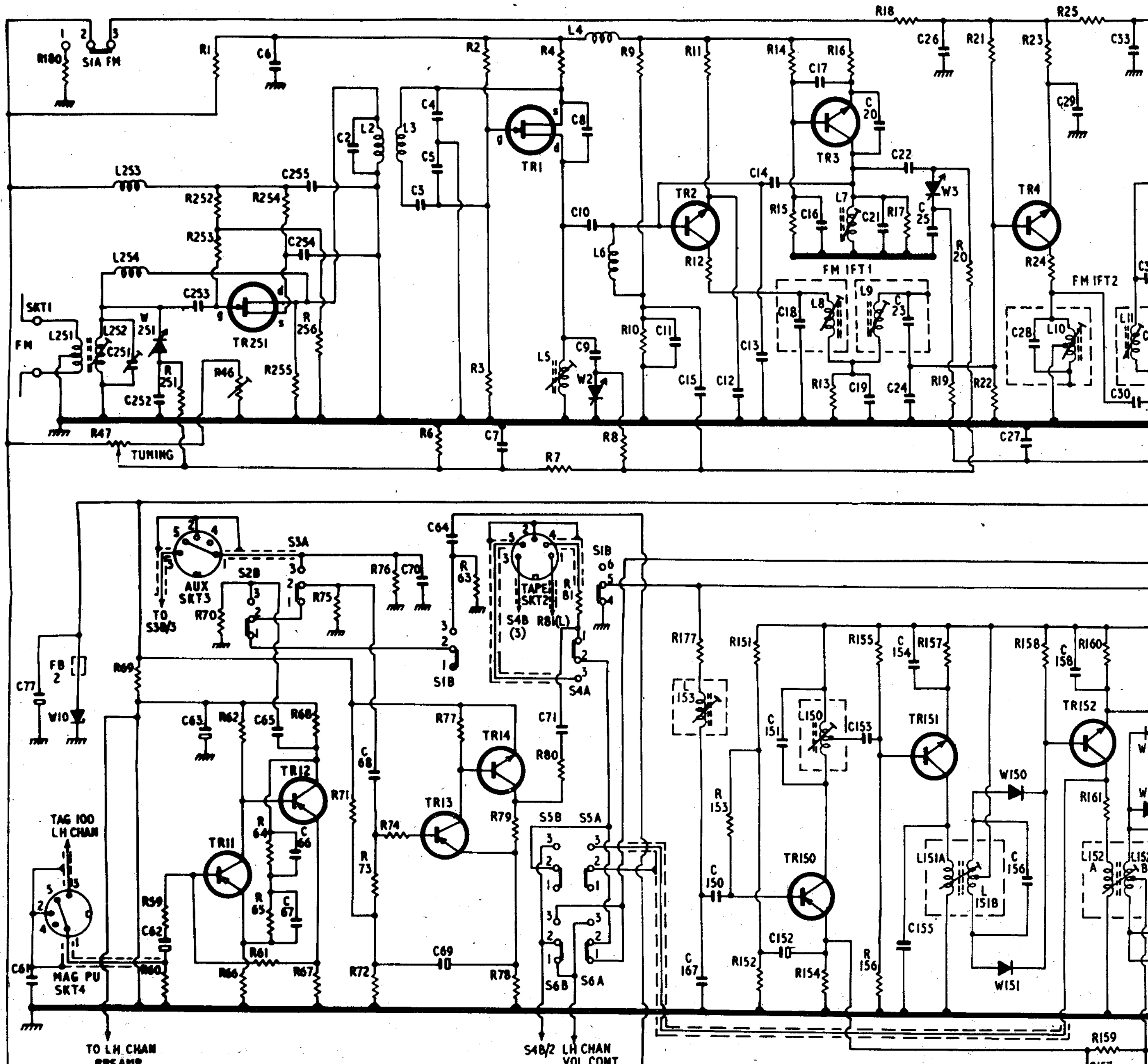
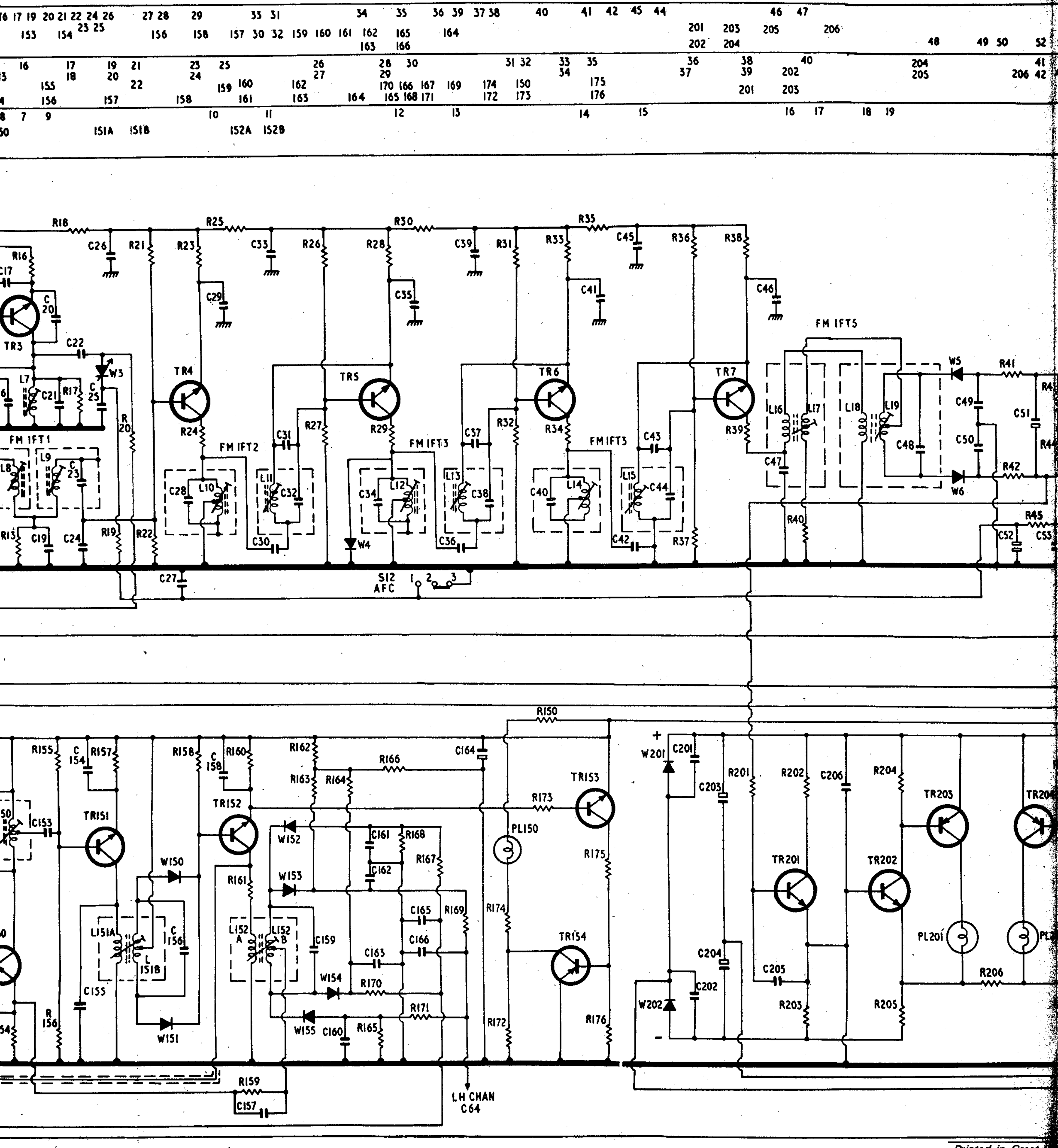
Goodmans module 80

C	251 6 2 3 4 7 8 9 10 11 15 12 13 14 18 16 17 19 20 21 22 24 26 27 28 29 33 31 255 5 23 25 77 252 253 254 167 150 151 152 153 154 156 158 157 30 32 61 62 63 65 66 67 68 70 64 69 71
R	180 251 1 68 75 71 73 76 77 2 79 7 4 8 9 11 14 16 17 19 21 23 25 46 61 67 72 74 6 63 3 78 80 81 10 12 15 13 18 20 24 47 59 252 62 64 254 177 153 151 155 22 159 160 69 60 70 253 66 65 255 256 152 154 156 157 158 161
L	251 252 253 2 3 5 4 6 8 7 9 10 11 254 153 150 151A 151B 152A 152B




R18
R25
R30
R35
R16
C17
C20
TR3
C22
W3
L7
C21
R17
C25
R20
FM IFT1
L8
L9
C23
R13
C19
C24
R19
R21
R22
C26
R23
C29
TR4
R24
FM IFT2
C28
L10
C27
C33
R26
R27
C31
L11
C32
C30
R28
C35
TR5
R29
C34
L12
W4
FM IFT3
S12
AFC
1
2
3
C39
R31
R32
C37
L13
C38
C36
R33
C41
TR6
R34
C40
L14
C45
R36
C43
L15
C44
C42
R37
R38
C46
TR7
R39
C47
R40
FM IFTS
L16
L17
L18
L19
C48
W5
W6
R41
C49
C50
C51
R42
R45
C52
C53
R150
R155
C154
R157
L150
C153
TR151
W150
L151A
L151B
C156
C155
W151
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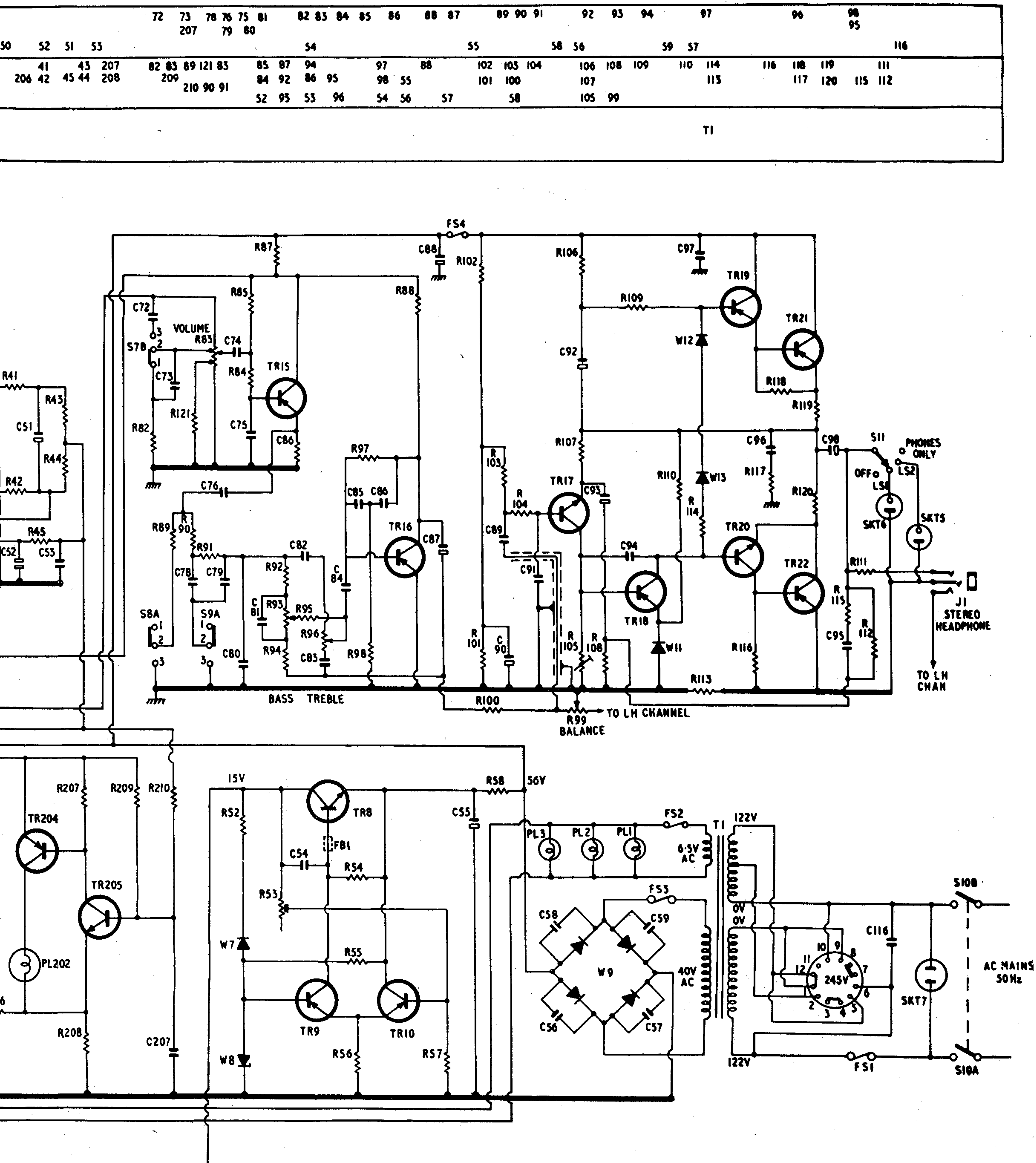

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