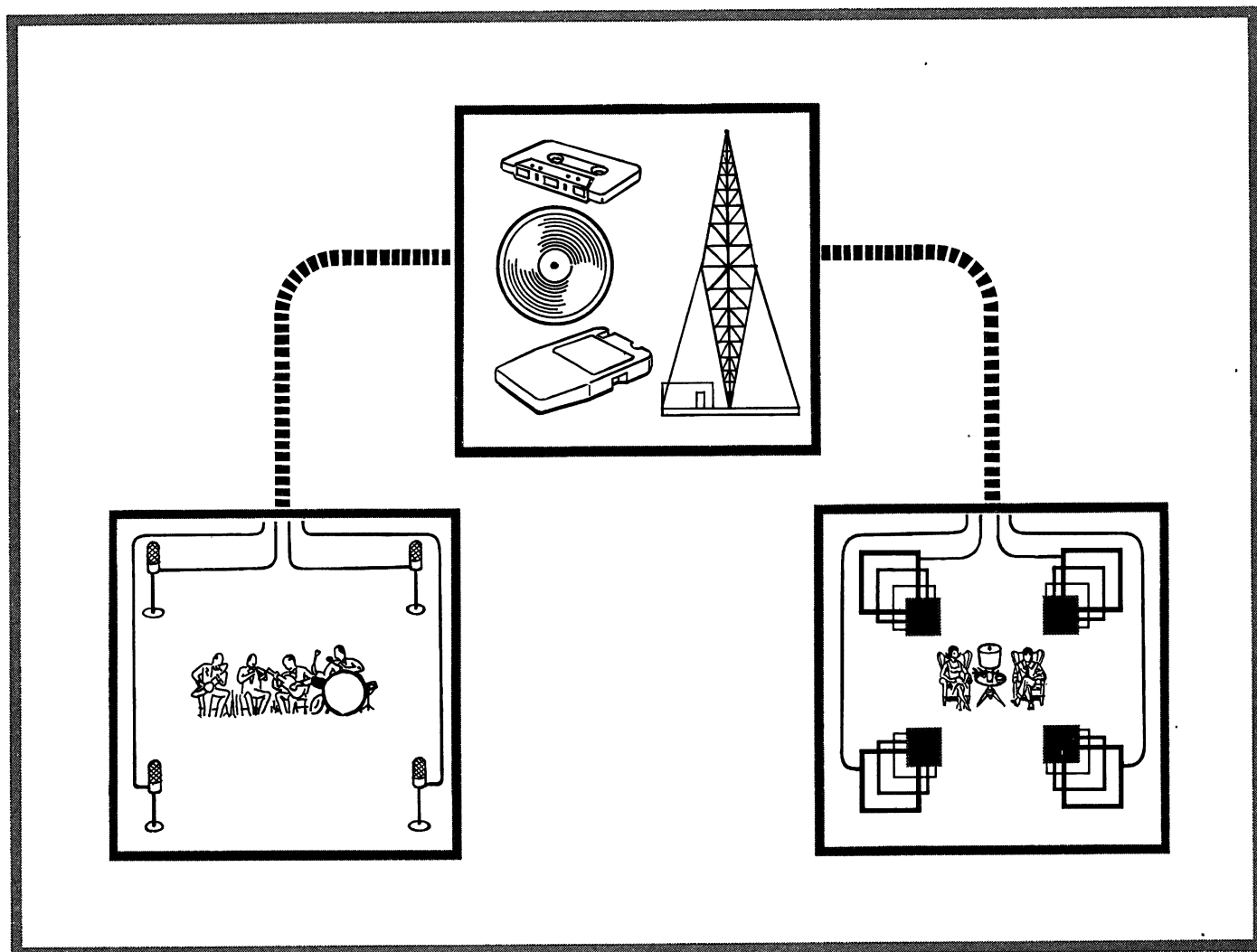


HF-31S1

HF-31S1

ZENITH

SERVICE MANUAL



MODULAR AND CONSOLE AUDIO PRODUCTS

ZENITH RADIO CORPORATION

1900 N. AUSTIN AVENUE

CHICAGO, ILLINOIS 60639

To the Service Technician

PRODUCT SAFETY SERVICING GUIDELINES FOR ALL AUDIO AMPLIFIERS AND RADIO RECEIVERS

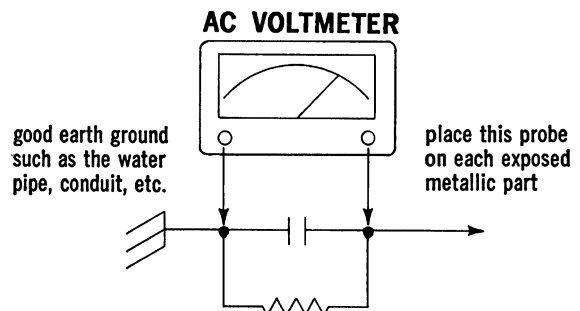
CAUTION: No modification of any circuit should be attempted. Service work should be performed only after you are thoroughly familiar with all of the following safety checks and servicing guidelines. To do otherwise increases the risk of potential hazards and injury to the user.

SAFETY CHECKS

SUBJECT: Fire & Shock Hazard

1. Be sure that all components are positioned in such a way to avoid possibility of adjacent components shorts. This is especially important on those chassis which are transported to and from the repair shop.
2. Always replace all protective devices such as insulators and barriers after working on a receiver.
3. Check for frayed insulation on wires including the AC cord. Also check across-the-line components for damage and replace if necessary.
4. All fuses and certain resistors and capacitors which are of the flameproof type (shaded on the schematic diagrams and parts lists) must be replaced with exact Zenith types to prevent potential fire hazard.
5. After re-assembly of the set always perform an AC leakage test on the exposed metallic parts of the cabinet such as the knobs, antenna terminals, etc. to be sure the set is safe to operate without danger of electrical shock.

Do not use a line isolation transformer during this test. Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm 10 watt resistor, (63-10401-76) paralleled by a .15 mfd, AC type capacitor (22-4384) between a known good earth ground (water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination 1500 ohm resistor and .15 mfd. capacitor. Reverse the AC plug on the set and repeat AC voltage measurements for each exposed metallic part. Voltage measured must not exceed .3 volts RMS. This corresponds to 0.2 milliamp AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.



TECHNICAL DATA INDEX

Various "HF" series service manuals contain information relating to solid state device theory, operation and circuit applications as introduced into our products. In addition, service procedures are also explained, if required, in the appropriate service manuals. Such information has been included in the following service manuals:

- HF 18: Theory — Diodes (Including Zener and SCR), Transistors, (PNP, NPN, Darlington, and JFET). Applications — Chassis 29AT24 (JFET FM-RF, Multiplex, Electronic Touch Switching), Complementary Symmetry, Chassis 11ZT27 (Electronic Filter).
- HF 22: Theory — JFET, IGFET, MOSFET. Applications — Dual Gate MOSFET FM-RF, JFET Biphase Detector, Quasi-Complementary Symmetry.
- HF 23: Applications — Model C9029/Chassis 15WCA10 Four Channel Decoder.
- HF 26: Applications — Chassis 15WDR51 (JFET Meter Circuit, Multiplex IC, Four Channel Decoding).
- HF 27: Applications — Model SD2568 Speaker Switching Circuitry.
- HF 28: Applications — Model D9013W Allegro Speaker System.
- HF 29: Theory — Light Emitting Diodes (LED). Applications — Three Light Tuning (Target Tuning), Multiplex IC.
- HF 29S1: Applications — Snap-off Escutcheon and Out Front Chassis Removal, "E" Line Models.
- HF 30: Applications — Snap-off Escutcheon and Out Front Chassis Removal, "F" Line Models.
- HF 31: Theory and Applications — Chassis 12WGR59 (Ceramic Filters, IF IC, Quadrature Detector, Interstation Muting, PLL Multiplex IC). General Product Information — Audio Circuitry (including Two on Two Speaker Matrix, Allegro Speaker Systems), Disassembly Procedures.

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1WEA11 (Z1)	—	HF 28S1, 29, 30	29CT20	—	HF 22, 24
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5WFR51	—	HF 30, 30S1	D556W (1)	—	HF 26, 28
5WER52	—	HF 29S2, 30, 30S1	D583W (1)	—	HF 26
5WER52Z1	—	HF 30, 30S1	D742W (1)	—	HF 26, 28
5WER52Z2	—	HF 30, 30S1	E743W (1)	—	HF 29S1
5WER52Z3	—	HF 30, 30S1	G1000W	23	HF 31
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6WGR57	20	HF 31	E9012W (1)	—	HF 29S1, 30
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12WGR59	21, 22, 27 thru 32	HF 31	E9018W (1)	—	HF 29S1, 30
15WCA10	—	HF 23, 24, 27	G9019W	23	HF 31
15WEA10	—	HF 29S1, 30	E9026W	—	HF 30S1
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15WDR51	—	HF 26, 27, 29, 30	S-82931	—	HF 18S1, 19, 23
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15WFR55	—	HF 30, 30S1			
15WER56	—	HF 29, 29S1, 29S2, 30	SPEAKER	23	—
15WFR57	—	HF 30, 30S1	WIRING	—	—
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21BT34Z1	—	HF 22, 23			
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25BT22	—	HF 19, 23			
25WDA10	—	HF 27, 28, 30			

HF 18 is Part No. 923-558
 HF 19 is Part No. 923-606
 HF 22 is Part No. 923-642
 HF 25 is Part No. 923-669
 HF 28 is Part No. 923-718
 HF 29S1 is Part No. 923-762
 HF 30S1 is Part No. 923-841

HF 18S1 is Part No. 923-576
 HF 20 is Part No. 923-610
 HF 23 is Part No. 923-646
 HF 26 is Part No. 923-702
 HF 28S1 is Part No. 923-734
 HF 29S2 is Part No. 923-784
 HF 31 is Part No. 923-848

HF 18S2 is Part No. 923-592
 HF 21 is Part No. 923-626
 HF 24 is Part No. 923-653
 HF 27 is Part No. 923-707
 HF 29 is Part No. 923-740
 HF 30 is Part No. 923-809
 HF 31S1 is Part No. 923-857

PRODUCT FEATURES
SEE NOTES ON PAGE 4

CABINET			CHASSIS		SPEAKERS			RECORD CHANGER	OTHER FEATURES		
MODEL	COLOR	NOTE A	MODEL	TYPE	PART NUMBER	IMPED. (In Ohms)	QTY. AND SIZE (In Inches)	PART NUMBER	TAPE PROVISION NOTE B	SPEAKER PROVISION NOTE C	MISC. NOTE D
G584W1	Walnut	M,LL	3WGR52	FM/AM/Phono	Note C	—	—	169-511 or 169-511A	TM	2 on 2, A1,A2,A3	DGL, H, PL
G587W2	Walnut	M,LL	3WGR52	FM/AM/Phono/ Tape	Note C	—	—	169-511	8TK-P 169-492	2 on 2, A1,A2,A3	DGL, H, PL
GR587W1	Walnut	M,LL	3WGR52	FM/AM/Phono/ Tape	Note C	—	—	169-511 or 169-511A	8TK-R/P 169-472	2 on 2 A1,A2,A3	DGL, H, PL
G590W	Walnut	M,LL	6WGR57	FM/AM/Phono/ Tape	Note C	—	—	169-512	8TK-P 169-510 or 169-510A or 169-510B	2 on 2, A1,A2,A3	AUX,DGL, F, H, PL, T
GR590W	Walnut	M,LL	6WGR57	FM/AM/Phono/ Tape	Note C	—	—	169-512 or 169-512A	8TK-R/P 169-507 or 169-507A	2 on 2, A1, A2, A3	AUX,DGL, F,H,PL,T
GR591W	Walnut	M,LL	6WGR57	FM/AM/Phono/ Tape	Note C	—	—	169-512 or 169-512A	Cass.-R/P 169-519	2 on 2, A1,A2,A3	AUX,DGL, F,H,PL,T
G596W	Walnut	M,LL	12WGR59	FM/AM/Phono/ Tape	Note C	—	—	169-513 or 169-513A	8TK-P 169-505 or 169-505A	2 on 2, A1,A2,A3	AUX,DL, F,H,PL,T
GR596W	Walnut	M,LL	12WGR59	FM/AM/Phono/ Tape	Note C	—	—	169-513 or 169-513A	8TK-R/P 169-506	2 on 2, A1,A2,A3	AUX,DL, F,H,PL,T
G680W2	Walnut	M	3WGR54	FM/AM/Tape	Note C	—	—	—	8TK-P 169-492	2 on 2, A1,A2,A3	AUX,DGL, H, PL
GR684W	Walnut	M	6WGR56	FM/AM/Tape	Note C	—	—	—	8TK-R/P 169-507 or 169-507A	2 on 2 A1,A2,A3	AUX,DGL, F,H,PL
G901P1	Pecan	C,LL	1WGR50	FM/AM/Phono/ Tape	49-1153-01 49-1094	16 45	2-6x9 2-3½	169-535	8TK-P 169-536	—	DL,H,RS
GR901P1	Pecan	C,LL	1WGR50	FM/AM/Phono/ Tape	49-1153-01 49-1094	16 45	2-6x9 2-3½	169-535	8TK-R/P 169-537	—	DL,H,RS
G904P	Pecan	C,LL	5WFR50	FM/AM/Phono/ Tape	49-1224-01 49-1094	8 45	2-6x9 2-3½	169-502	8TK-P 169-490 or 169-490A	2 on 2 A1,A2,A3	DL,H,RS
G914P G914P11	Pecan	C,LL	3WGR50	FM/AM/Phono/ Tape	49-1261-01 49-1237	8 8	2-8 2-3	169-515	8TK-P 169-521 or 169-521A	2 on 2 A1,A2,A3	A,DL,H RS

PRODUCT FEATURES
SEE NOTES ON PAGE 4

CABINET			CHASSIS		SPEAKERS			RECORD CHANGER	OTHER FEATURES		
MODEL	COLOR	NOTE A	MODEL	TYPE	PART NUMBER	IMPED. (In Ohms)	QTY. AND SIZE (In Inches)	PART NUMBER	TAPE PROVISION NOTE B	SPEAKER PROVISION NOTE C	MISC. NOTE D
G915AE G915AE11	Antique Oak	C,LL	3WGR50	FM/AM/Phono/ Tape	49-1251-01 49-1237	8 8	2-8 2-3	169-515	8TK-P 169-521 or 169-521A	2 on 2 A1,A2,A3	A,DL,H, RS
G916M G916M11	Maple	C,LL	3WGR50	FM/AM/Phono/ Tape	49-1261-01 49-1237	8 8	2-8 2-3	169-515	8TK-P 169-521 or 169-521A	2 on 2 A1,A2,A3	A,DL,H, RS
G920AE	Antique Oak	C,LL	6WGR55	FM/AM/Phono/ Tape	49-1217 49-1166	8 8	2-10 2-3½	169-516	8TK-P 169-521 or 169-521A	2 on 2 A1,A2,A3	A,AUX,DL, H,RS,T
G921P	Pecan	C,LL	6WGR55	FM/AM/Phono/ Tape	49-1217 49-1166	8 8	2-10 2-3½	169-516	8TK-P 169-521 or 169-521A	2 on 2 A1,A2,A3	A,AUX,DL, H,RS,T
G922M	Maple	C,LL	6WGR55	FM/AM/Phono/ Tape	49-1217 49-1166	8 8	2-10 2-3½	169-516	8TK-P 169-521 or 169-521A	2 on 2 A1,A2,A3	A,AUX,DL, H,RS,T
GR936AE	Antique Oak	C,LL	12WGR58	FM/AM/Phono/ Tape	49-1217 49-1166	8 8	2-10 2-3½	169-513	8TK-R/P 169-523 or 169-487	2 on 2 A1,A2,A3	A,DL,F,H, PL,RS,T
GR937P	Pecan	C,LL	12WGR58	FM/AM/Phono/ Tape	49-1217 49-1166	8 8	2-10 2-3½	169-513	8TK-R/P 169-523 or 169-487	2 on 2 A1,A2,A3	A,DL,F,H, PL,RS,T
G1000W	Walnut	M,SP	—	—	49-1249 49-1168	8 8	1-6½ 1-3½	—	—	—	A1
G2000W	Walnut	M,SP	—	—	49-1254-01 49-1168	8 8	1-8 1-3½	—	—	—	A2
G2000W11	Walnut	M,SP	—	—	49-1261-02 49-1166	8 8	1-8 1-3½	—	—	—	A2
G3000W	Walnut	M,SP	—	—	49-1265 49-1168	8 8	1-10 1-3½	—	—	—	A3
G3000W11	Walnut	M,SP	—	—	49-1270 49-1166	8 8	1-10 1-3½	—	—	—	A3
G9012W1	Walnut	M,SP	—	—	49-1249 49-1168	8 8	1-6½ 1-3½	—	—	—	A1
G9014W	Walnut	M,SP	—	—	49-1254-01 49-1168	8 8	1-8 1-3½	—	—	—	A2
G9019W	Walnut	M,SP	—	—	49-1241 49-1168	8 8	1-10 1-3½	—	—	—	A
G9026W	Walnut	M	—	—	—	—	—	169-512	—	—	—

PRODUCT FEATURES

NOTES

NOTE A – CABINET STYLE:

C = Console, M = Modular, LL = Lift Lid, SP = Speaker System.

NOTE B – TAPE INPUT AND OUTPUT PROVISION:

Factory Installed: 8 TK = Eight Track Cartridge,

Cass = Cassette, P = Play, R = Record,

TM = Top of Set Model for installation with the designated console or modular models:

Model F635 - Cartridge Tape Player.

Model E637 - Cassette Tape Player/Recorder.

Model F638 - Cartridge Tape Player/Recorder.

NOTE C – SPEAKER PROVISIONS:

2 on 2 = Speaker Matrix or Conventional Stereo Extension Speaker System Provisions.

A1 = Model G1000W Allegro 1000 Speaker System may be used.

A2 = Model G2000W Allegro 2000 Speaker System may be used.

A3 = Model G3000W Allegro 3000 Speaker System may be used.

NOTE: Models G1000W, G2000W, W11, G3000W, W11, G9012W1, G9014W and G9019W (and the prior E9012 series) are 8 ohm Allegro Speaker Systems. Allegro Models in the E9014 and E9018 series were 16 ohm systems.

NOTE D – MISCELLANEOUS FEATURES:

A = Speaker System is Allegro.

A1 = Speaker System is Allegro 1000.

A2 = Speaker System is Allegro 2000.

A3 = Speaker System is Allegro 3000.

AUX = Auxiliary input accepts Record Changer Model G9026W or Tape Units listed under Note B.

DGL = Digilite Dial Scale Light.

DL = Dial Scale Light.

F = Flywheel Tuning.

H = Headphone Jack (Stereo).

HH = Headphone Jack (Four Channel).

PL = Power Indicator Light (other than Dial Scale Light).

RS = Record Storage.

T = Tuning Meter.

RECORD CHANGER FEATURES

SEE NOTES BELOW

Part No.	Mfg. Code	Stylus Pressure - Grams -	Cartridge & Stylus	45 RPM Adapter	Turntable		Record Size/ Selector	Record Stack Capacity	Base-Plate Color	Turntable Pad Color	Pressure Arm Color	Misc. Features
					Speeds RPM	Diameter Inches						
169-502	VM 1272	2-2.9	142-167 D-S S-82621	S-82964	16, 33, 45 78	11"	7, 10, 12, M Manual	See Note 2	Black	Black	Black	Cue Lever
169-511	BSR	2.5-4.0	142-182 D 56-632	S-72910	33, 45, 78	10-1/8"	7, 10, 12 Manual	See Note 2	Black	Black	Black	Cue Lever
169-511A	BSR	2.5-4.0	142-185 D 56-638	S-72910	33, 45, 78	10-1/8"	7, 10, 12 Manual	See Note 2	Black	Black	Black	Cue Lever
169-512	BSR	2.5-4.0	142-182 D 56-632	S-72910	33, 45, 78	11"	7, 10, 12 Manual	See Note 2	Black	Black	Black	Cue Lever
169-512A	BSR	2.5-4.0	142-185 D 56-638	S-72910	33, 45, 78	11"	7, 10, 12 Manual	See Note 2	Black	Black	Black	Cue Lever
169-513	BSR	2.0-3.5	142-182 D 56-632	S-72910	33, 45, 78	11"	7, 10, 12 Manual	See Note 2	Black	Black	Black	Cue Lever
169-513A	BSR	2.0-3.5	142-185 D 56-638	S-72910	33, 45, 78	11"	7, 10, 12 Manual	See Note 2	Black	Black	Black	Cue Lever
169-515	VM	2-2.9	142-182 D 56-632	S-82964	16, 33, 45 78	11"	7, 10, 12 Manual	See Note 2	Black	Black	Black and Chrome	Cue Lever
169-516	VM	2-2.9	142-182 D 56-632	S-82964	16, 33, 45 78	11"	7, 10, 12 Manual	See Note 2	Black	Black	Black and Chrome	Cue Lever
169-535	BSR	3.5-4.5	142-186 D 56-639	S-72910	33, 45, 78	11"	7, 10, 12 Manual	See Note 2	Black	Black	Black	Cue Lever
169-535A	BSR	3.5-4.5	142-186 D 56-639	S-72910	33, 45, 78	10-1/8"	7, 10, 12 Manual	See Note 2	Black	Black	Black	Cue Lever

NOTE: 1. All record changers have 120VAC motores. See "Misc Features" for those with overwinds.

2. All record changers will play as many as five (flat and unwarped) records in 12-inch, 10-inch or 7-inch size. Sizes cannot be intermixed.

3. D = Diamond, S = Manufactured Sapphire.

TAPE UNIT FEATURES

SEE NOTES ON PAGE 7

Part No.	Mfg. Code	8-Track/ Cassette	Channels		ALC/Full Feature Note A	Motor Note B	Auto Stop Note C	Use Note D	Misc. Features Note E
			Play	Record					
169-458	AMI/MC	8-Track	2	—	—	AC	—	M	A1, C1
169-463	Maruco	Cassette	2	2	ALC	DC/E	Tape	M	A1,B,C1,E,FF, I,P2
169-464	AMI/MC	8-Track	2	—	—	AC	—	C	A1,C1
169-469	AMI/MC	8-Track	2	2	Full	DC/M	Full	M	A1,C1,FF,I, M,P1,R
169-471	AMI/MC	8-Track	2/4	—	—	AC	—	M	A1,C1,Q
169-472	AMI/MC	8-Track	2	2	Full	DC/M	Full	M	A1,C1,FF,I, M,P1,R
169-473	AMI/MC	8-Track	2	—	—	AC	—	M	A1,C1
169-485	AMI/MF	8-Track	2/4	—	—	AC	—	C	A1,C1,Q
169-486	AMI/MF	8-Track	2	—	—	AC	—	C	A1,C1
169-487	AMI/MC	8-Track	2	2	Full	DC/M	Full	C	A1,C1,FF,I, M,P1,R
169-489	AMI/MF	8-Track	2	—	—	AC	—	M	A1,C1
169-490	AMI/MF	8-Track	2	—	—	AC	—	C	A1,C1
169-490A	AMI/Z/MF	8-Track	2	—	—	AC	—	C	A1,C1
169-490B	AMI/Z/MF	8-Track	2	—	—	AC	—	C	A1,C1
169-491	AMI/MF	8-Track	2/4	—	—	AC	—	M	A1,C1,Q
169-492	AMI/MF	8-Track	2	—	—	AC	—	M	A1,C1
169-494	JVC	Cassette	2	2	ALC	DC/M	Tape	M	A1,B,C1,E,FF, I,P2
169-494-01	JVC	Cassette	2	2	ALC	DC/M	Tape	M	A1,B,C1,E,FF, I,P2
169-505	AMI/MF	8-Track	2	—	—	AC	—	W	A2,C1
169-505A	AMI/Z/MF	8-Track	2	—	—	AC	—	W	A2,C1
169-506	AMI/MC	8-Track	2	2	Full	DC/M	Full	W	A2,C1,FF,I M,P1,R
169-506D	AMI/Z/MC	8-Track	2	2	Full	DC/M	Full	W	A2,C1,FF,I M,P1,R
169-507	AMI/MC	8-Track	2	2	Full	DC/M	Full	M	A2,C1,FF,I M,P1,R
169-507A	AMI/Z/MC	8-Track	2	2	Full	DC/M	Full	M	A1,C1,FF,I M,P1,R
169-510	AMI/MF	8-Track	2	—	—	AC	—	M	A2,C1

TAPE UNIT FEATURES

SEE NOTES BELOW

Part No.	Mfg. Code	8-Track Cassette	Channels		ALC/Full Feature Note A	Motor Note B	Auto Stop Note C	Use Note D	Misc. Features Note E
			Play	Record					
169-510A	AMI/Z/MC	8-Track	2	—	—	AC	—	M	A2,C1
169-510B	AMI/Z/MF	8-Track	2	—	—	AC	—	M	A2,C1
169-518	AMI/MF	8-Track	2/4	—	—	AC	—	M	A2,C1,Q
169-519	JVC	Cassette	2	2	ALC	DC/M	Tape	M	A2,B,C1,E,FF,I,P2
169-520	AMI/MF	8-Track	2	—	—	AC	—	M	A2,C1
169-521	AMI/MF	8-Track	2	—	—	AC	—	C	A2,C1
169-521A	AMI/Z/MF	8-Track	2	—	—	AC	—	C	A2,C1
169-522	AMI/MF	8-Track	2/4	—	—	AC	—	C	A2,C1,Q
169-523	AMI/MC	8-Track	2	2	Full	DC/M	Full	C	A2,C1,FF,I,M,P1,R
169-536	AMI/ML	8-Track	2	—	—	DC/M	—	C	A2,C2
169-537	AMI/ML	8-Track	2	2	ALC	DC/M	Four	C	A2,C2,I

NOTES

NOTE A — RECORD

ALC = Automatic Level Control

Full = Full Feature with Record Level Controls and Meters.

NOTE B — MOTOR

E = Electronic Governor

M = Mechanical Governor

AC Motors require conversion kit if used on 50Hz.

NOTE C — AUTO STOP

Full = Stops after each program, fourth program or runs continuously (in both Play and Record modes).

Four = Stops after fourth program in Record only.

Tape = Tape tension sensor at end of stop.

NOTE D — USED IN

C = Console

M = Modular

W = Wedge Modular

NOTE E — MISC. FEATURES

A1 = Parallel Blade AC Connector.

A2 = Molex Type AC Connector.

B = Bias Frequency Switch.

C1 = RCA Type Audio Connector.

C2 = Spade Lug Audio Connector.

E = Eject

FF = Fast Forward Button.

I = Interlocked Record Button.

M = Record Level Meter.

P1 = Pause Button (Push In, Slide Left to Lock).

P2 = Pause Button (Push-Push).

Q = Automatic 2/4 Channel Switching.

R = Ready Light.

SECTION TWO

GENERAL INFORMATION

THEORY

From time to time Zenith includes the use of new components and circuit applications in product design. Theory and explanation of such components and circuits is included in various manuals. Refer to the index on page 1 for further information.

CIRCUIT BOARD COMPONENT IDENTIFICATION

In order to assist the Service Technician, most circuit boards are marked to identify the location of components, test points, etc., using the schematic reference symbols and numbers. We have also prepared a drawing of the foil side of the circuit board showing the relationship between the components and the foil. This will aid the Technician in quickly tracing circuits, as not only are the components shown, but also the voltages at various check points. Components are identified by a letter/number combination. A letter prefix to indicate the type of component: C=Capacitor, L=Coil, R=Resistor, CR=Diode, etc. The numbers are assigned, in blocks, to identify the circuit in which it is used:

Block	Stage	Example
1 - 99	FM Tuner	R1, C1, L1.
101 - 199	AM Tuner	R101, C101, L101.
201 - 299	IF	R201, C201, L201.
301 - 399	Multiplex	R301, C301, L301.
401 - 449	Audio, Right Channel	R401, C401, L401.
451 - 499	Audio, Left Channel	R451, C451, L451.
501 - 599	Power Supply	R501, C501, L501.
601 - 699	Switching Circuits	R601, C601, L601.
701 - 799	Special Applications	R701, C701, L701.
801 - 849	Audio, Right Back Channel	R801, C801, L801.
851 - 899	Audio, Left Back Channel	R851, C851, L851.

POWER AMPLIFIERS

When servicing these products, the Service Technician must consider the following:

1. Each channel of the following amplifiers use a pair of matched power transistors in the final output stage. Therefore, should one transistor fail, both transistors must be replaced simultaneously, since they will not perform properly unless matched. (In chassis using complementary symmetry circuits a matched pair consists of one NPN and one PNP transistor.): 1WGR50, 3WGR50, 3WGR52, 3WGR54, 5WFR50, 6WGR55, 6WGR56, 6WGR57, 12WGR58, 12WGR59.
2. When a power transistor is replaced the insulator (when used) between the transistor and the heat sink should also be replaced. On the following be certain to apply Dow Corning No. 340 heat conductive grease between the

transistor and the insulator. Also between the insulator and the chassis. The Dow Corning grease can be obtained in 1 c.c. quantities by ordering Part No. 205-51: 3WGR50, 3WGR52, 3WGR54, 5WFR50, 6WGR55, 6WGR56, 6WGR57, 12WGR58, 12WGR59.

3. Do not operate these amplifiers without their proper speaker load.
4. Do not short out the audio output of either channel when the amplifier is operating.
5. Should a power transistor fail (short) be certain to replace the emitter resistors for the specific channel. Also be certain to check the condition of the silicon diode rectifiers, and driver transistors.
6. Remove plug-in transistors from their sockets before doing any soldering to the socket lugs.

SIGNAL STRENGTH CHART

There are certain minimum voltages necessary for proper stereo FM reception. To help determine if there is sufficient signal available, the following developed AGC voltage versus micro-volt input voltage charts have been compiled. Since the desired FM Station may not always be operating in the stereo mode when an installation is made, these AGC voltage measurements have been taken with a monaural FM signal. The point "*" of minimum AGC voltage necessary for good stereo FM reception has been indicated on these charts.

AGC voltages are to be measured with a V.T.V.M. connected to the following Test Points.

Chassis 1WGR50, 3WGR50, 3WGR52, 3WGR54, 5WFR50 — Test Point "C" at base of Q1; located between Transistors Q101 (A.M. Converter) and Q201 (1st I.F.)

Chassis 6WGR55, 6WGR56, 6WGR57 — Test Point at junction of R2 and R229; either end of orange wire at pulley end of gang.

Chassis 12WGR58 — Test Point at junction of R2 and R229; either end of violet wire at pulley end of gang.

Chassis 12WGR59 — AGC voltages do not provide significant information.

**Chassis 1WGR50, 3WGR50,
3WGR52, 3WGR54, 5WFR50**

**Chassis 6WGR55,
6WGR56, 6WGR57**

Chassis 12WGR58

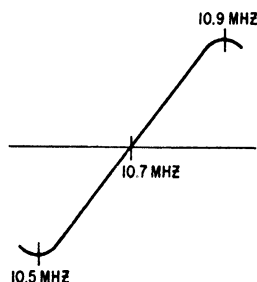
Micro Volts Input	Voltage AGC Voltage at Test Point "C"	Micro Volts Input	Reverse AGC Voltageeq At Gate 2 of FM RF	Micro Volts Input	Reverse AGC Voltage At Gate 2 of FM RF
0	1.23	0	5.4	0	5.7
25	1.10	25	4.5	25	4.5
100	0.88	100	3.3	100	2.8
200	0.79	200	2.85	200	2.2
500	0.71	500	2.5	500	1.5
1K	*0.67	1K	*2.1	1K	*-0.96
5K	0.60	5K	1.22	5K	-0.22
50K	0.12	50K	0.15	50K	-1.10
100K	0.06	100K	-0.08	100K	-1.20

**MINIMUM RATED POWER OUTPUT PER CHANNEL INTO 8 OHMS
(SINE WAVE CONTINUOUS AVERAGE POWER - OFTEN CALLED RMS POWER)**

Chassis	Number of Channels	Watts Per Channel	Power Bandwidth	Total Harmonic Distortion (THD) No More Than
3WGR50	2	2.5	100Hz - 10kHz	1.0%
3WGR52	2	2.5	100Hz - 10kHz	1.0%
3WGR54	2	2.5	100Hz - 10kHz	1.0%
6WGR55	2	6.0	80Hz - 12kHz	1.0%
6WGR56	2	6.0	80Hz - 12kHz	1.0%
6WGR57	2	6.0	80Hz - 12kHz	1.0%
12WGR58	2	12.0	40Hz - 15kHz	1.0%
12WGR59	2	12.0	40Hz - 15kHz	0.5%

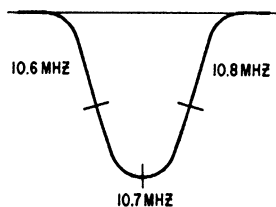
SECTION THREE

FM/AM/MULTIPLEX ALIGNMENT



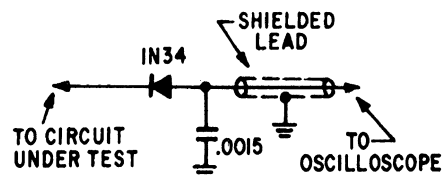
Scope Pattern A — Ratio Detector

Adjust for maximum amplitude while maintaining linearity and symmetry. 10.7 MHz marker must be on the curve at base line.



Scope Pattern-B — IF

10.6 and 10.8 MHz markers must be symmetrically positioned with 10.7 MHz at center of curve. This point must be adjusted for maximum.



Detector Probe - C

If your oscilloscope is not equipped with a detector probe, one can easily be constructed. For best results the probe should be shielded.

GENERAL

These receivers have been properly aligned at the factory and normally will not require further adjustment. As a result, it is not recommended that any attempt be made to alter the stages. If any components are replaced or if anyone tampers with the adjustments, realignment may be necessary.

FM ALIGNMENT

Because of the wide band pass required in a FM Multiplex tuner, it is desirable to use an FM signal generator having a deviation of 400 kHz as well as an oscilloscope, when aligning both the FM IF and RF portions of this receiver. It is not only necessary to obtain maximum amplitude in the IF amplifier stages, but also necessary to maintain symmetry. It is desirable to use 10.6, 10.7 and 10.8 Megahertz markers in obtaining IF curve symmetry.

Capacitors mentioned in the alignment procedure should be as small in size as possible and the ground lead of the generator must be connected to ground as close as possible to the point of injection.

AM ALIGNMENT

A V.T.V.M. on low AC scale connected across the speaker voice coil output terminals (either left or right channels), will be satisfactory for AM, IF and RF adjustments.

MULTIPLEX ALIGNMENT

Before any attempt is made to align, or service, FM Multiplex circuitry, the technician must be certain that the RF, IF, and Detector alignment is correct, and that the receiver functions normally on monaural signals.

Most Multiplex generators are excellent troubleshooting devices because they provide a composite Multiplex signal as well as an RF signal (which is FM modulated by the composite multiplex signal). The composite signal is very useful since it can be used in signal tracing the Multiplex portion of the receiver. We do not recommend that Multiplex alignment be

made using the composite signal injected at the output terminal of the Detector since there is always some phase shift occurring in the RF, IF or Detector circuits. As a result, Multiplex alignment made by a signal injected at the Ratio Detector input would not be correct. For proper Multiplex alignment the composite signal must FM modulate the RF carrier and then be fed into the FM antenna terminals. With the signal injected in this manner, the Multiplex alignment would then be the best that could possibly be obtained.

RF signals should be injected at a point in the FM band where no signal is present. If at all possible this should be at a frequency near the middle of the FM band. Tune the FM receiver to this point and adjust the RF frequency adjustment on the generator to this same frequency. The AGC voltage developed in the receiver should be maximum. AGC voltage substantially less than this may indicate the RF frequency adjustment is tuned to an image.

GENERAL TROUBLE-SHOOTING PROCEDURE

Should a problem arise in aligning the FM Multiplex portion of the receiver, the technician must determine whether the difficulty lies in the RF, IF, and Detector portions of the receiver, or whether the difficulty lies in the Multiplex portion. The composite output of the multiplex generator can be injected at the output of the Detector to help determine the area of difficulty. To reduce possible extraneous signals coming through a Ratio Detector, short the Ratio Detector primary with a jumper lead. The wave forms and their magnitude may vary slightly from chassis to chassis, however, they are quite indicative of what will be seen when signal tracing the Multiplex circuitry.

If all the waveforms are similar in form and magnitude to those indicated, it can be assumed that the Multiplex portion of the receiver is functioning properly and the problem lies ahead of this in the FM receiver. If any of the waveforms are missing at a latter point but are apparent at a previous point, circuitry between the two test points should be checked.

RF AND IF ALIGNMENT PROCEDURE

CHASSIS 1WGR50, 3WGR50, 3WGR52, 3WGR54, 5WFR50, 6WGR55, 6WGR56, 6WGR57

STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT VTVM/ SCOPE TO	INPUT SIGNAL FREQUENCY	SET DIAL TO	ADJUST	PURPOSE
NOTE: For AM Alignment Use A Signal With 400 Hertz Modulation, Bandswitch In AM.							
1	One turn loosely coupled to wavemagnet.	None	VTVM Speaker Voice Coil	455 KHz	600 KHz	L203, L204 (T202) L207 (T204) L210 (T206)	Align IF channel for maximum output.
2				1600 KHz	1600 KHz	C1G	Set Oscillator to dial scale.
3				600 KHz	600 KHz	T101	
4				Repeat Steps No. 2 & 3 for minimum change.			
5				1400 KHz	1400 KHz	C1D	Align Antenna stage.
NOTE: For FM Alignment Use A Signal With 400 KHz Deviation, Bandswitch In FM. AFC "Off".							
6	Term. No. 5 of T205 3rd IF Trans. Test Point "G"	47 ohm in shunt with gen. output. Then from hot lead a 27 ohm in series with a .001 MF capacitor.	Scope Ratio Detector Test Point "H"	10.7 MHz	Gang Closed	L212 (T207)	Adjust Primary and Secondary of Ratio Detector for maximum amplitude and symmetry as shown in Scope Pattern "A".
7						L214 (T207)	
8	Term. No. 3 of T203 2nd IF Trans. Test Point "F"		Scope Last FM IF Test Point "G"			L208 & L209 (T205)	Align I.F. transformer for maximum output and symmetry. This pattern is not necessarily identical to the overall Scope Pattern "B".
9	Term. No. 3 of T201 1st IF Trans. Test Point "E"					L205 & L206 (T203)	
10	Test Point "D"					L201 & L202 (T201)	
11						Readjust L201, L202, L205, L206, L208, L209	Align I.F. transformer for maximum output and symmetry as indicated in Scope Pattern "B".
NOTE: In Steps 10 and 11 Generator Ground MUST be Connected On Braid As Close To Gang As Possible.							
12	FM Antenna Post (Disconnect Antenna) Test Point "A"	300 ohm	Scope Last FM IF Test Point "G"	106 MHz	106 MHz	C13	Set Oscillator to dial scale.
13				90 MHz	90 MHz	L4	
14				Repeat Steps 12 and 13 for minimum change.			
15				106 MHz	106 MHz	C1A	Align FM Detector stage for maximum.
16				90 MHz	90 MHz	L2 if necessary	
17				106 MHz	106 MHz	C1H	Align FM Antenna stage for maximum.
18				90 MHz	90 MHz	L1 if necessary	
19				Repeat Steps 15 thru 18 for minimum change.			
NOTE: The Following Applies Only To Chassis 6WGR55, 6WGR56, 6WGR57, No Signal Input.							
20	None	None	None	None	None	R233	Zero center tuning meter.

MULTIPLEX ALIGNMENT PROCEDURE

CHASSIS 1WGR50, 3WGR50, 3WGR52, 3WGR54, 5WFR50, 6WGR55, 6WGR56, 6WGR57
Before Aligning or Servicing Multiplex Circuits Be Certain That RF, IF And Ratio Detector Are Correctly Aligned And That Operation Is Normal On Monaural FM Signals.

Normal On Monaural FM Signals.							
STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT SCOPE AND/OR ACVTVM	INPUT SIGNAL FREQUENCY	SET DIAL TO	ADJUST	PURPOSE
NOTE: Place Bandswitch In FM STEREO Position.							
1	FM Antenna Post (Disconnect Antenna) Test Point "A"	300 ohm	Test Point "M"	98 MHz 10% Pilot	98 MHz	T301	Adjust 19 kHz Amp for maximum.
2				98 MHz 5% Pilot		R302	Adjust mute control to point where stereo lamp lights up.
3			"L" Tape Output	98 MHz 10% Pilot L+R, L-R, (Mod. L. Only)		T302	Adjust for maximum L Channel Reading
4			"R" Tape Output			T302 if necessary	Adjust for minimum R Channel Reading
5				Repeat Steps 4 and 5 for minimum change.			

RF, IF AND MPX ALIGNMENT PROCEDURE FOR CHASSIS 12WGR59

STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT VTVM/ SCOPE TO	INPUT SIGNAL FREQ.	SET DIAL TO	ADJUST	PURPOSE		
NOTE: For AM Alignment Use A Signal With 400 Hertz Modulation, Bandswitch In AM.									
1	One Turn Loosely coupled to AM Wavemagnet Antenna	None	VTVM Speaker Voice Coil	455 KHz	Gang Closed	L203, L204 (T202)	Align IF for maximum output.		
2						L207, L208 (T203)			
3						L209 (T204)			
4						1600 KHz	1600 KHz	C109	Set Oscillator to dial scale.
5						600 KHz	600 KHz	L105 (T102)	
6				Repeat Steps No. 4 & 5 for minimum change.					
7						1400 KHz	1400 KHz	C1H	Align RF stage.
8						600 KHz	600 KHz	L103 (T101)	
9				Repeat Steps No. 7 & 8 for minimum change.					
10						1400 KHz	1400 KHz	C1F	Align Antenna stage.
11						600 KHz	600 KHz	L101 if necessary	
12				Repeat Steps 10 & 11 for minimum change.					
NOTE: For FM IF Alignment Use A Signal Of 250 KHz Deviation, 50 Hertz Modulation For Full Bandpass Display. FM In MONO, AFC OFF, Preset R213, R308 and R317 To Mid Rotation Before Connecting Generator. Connect Generator Cable Ground To Gang Frame.									
13	Test Point "D" FM IF Input	47 Ohm in shunt with gen. output. Then from hot lead a 27 Ohm in series with a .01 MF capacitor. See Fig. 1.	Scope Test Point "G" Thru Diode Detector Probe, See Fig. 2.	10.7 MHz	Gang Closed	L201, L202 (T201)	Align I.F. transformer for maximum output and symmetry as indicated in Scope Pattern "B".		
NOTE: For FM Detector Alignment Use A Signal Of 75 KHz Deviation, 1 KHz Modulation. Also Connect Generator Modulation Frequency To Scope Horizontal. Adjust Generator IF Frequency To Center Total Bandpass Waveform. Do Not Change Generator IF Frequency For Remainder Of IF Alignment. (If Your Generator Does Not Provide Output For Audio Modulation Frequency Use Horizontal Output From Generator, Or Scope Horizontal Sweep, And Follow Step 14C.) Minimum Distortion Can Only Be Achieved By Use Of Step 14A Below.									
14	Test Point "D" FM IF Input	47 Ohm in shunt with gen. output. Then from hot lead a 27 Ohm in series with a .01 MF capacitor.	A. Distortion Analyzer (thru a 100 usec de-emphasis network) and/or Scope. See Fig. 3.	Center Frequency of Ceramic Filters Y201 and Y202. See Fig. 4.	Gang Closed	L205	A. Preferred Method: Distortion Analyzer at Test Point "H" should read minimum distortion, approx. 50 to 55 dB below 0 dB set level.		
			B. Scope				B. Alternate Method: Adjust L205 for linear scope trace - no curve at ends of trace. Disregard meter reading.		
			C. Scope Test Point "H"				C. Alternate Method: Adjust L205 for maximum length and symmetry, Similar to Scope Pattern "A".		
15						R213	Adjust for center reading on Tuning Meter.		
16	Test Point "A" FM Antenna Post (Disconnect Antenna)	300 Ohm		106 MHz	106 MHz	C15	Set Oscillator to dial scale.		
17				90 MHz	90 MHz	L4			
18				Repeat Steps 16 & 17 for minimum change.					
19				106 MHz	106 MHz	C1C	Align FM Detector stage for maximum.		
20				90 MHz	90 MHz	L2 if necessary			
21				106 MHz	106 MHz	C1A		Align FM Antenna stage for maximum.	
22				90 MHz	90 MHz	L1 if necessary			
23				Repeat Steps 19 thru 22 for minimum change.					

RF, IF, AND MPX ALIGNMENT PROCEDURE FOR CHASSIS 12WGR59 – CONT'D.

STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT VTVM/ SCOPE TO	INPUT SIGNAL FREQ.	SET DIAL TO	ADJUST	PURPOSE
NOTE: Apply Sufficient Signal Level — Approx. 100 Microvolts — To Obtain Full Limiting At Point Near 98 MHz.							
24	Test Point "A" FM Antenna Post (Disconnect Antenna)	300 Ohm	Scope Test Point "H"	98 MHz	98 MHz	—	Turn Modulation "ON". Adjust generator RF frequency to obtain center indication on Tuning Meter. Adjust VTVM for "O" dB reading.
25						Turn modulation "OFF". Reduce RF level to get -45 dB quieting (approx. 3 to 4 microvolts).	
26			R308			Turn Mute "ON". Rotate R308 (Mute) full clockwise. Audio will mute. Slowly adjust R308 counter-clockwise until audio just turns "ON". Do not over adjust. This will be approximately 45 dB S/N. To check, tune generator off frequency and then back on frequency from both sides.	
27			Frequency Counter and/or Scope Test Point "M"	No Signal Input. Mute "ON".		R317	A. Frequency Counter should read 19 KHz, ± 100 Hz. B. Alternate Method: Connect Test Point "M" Signal to scope vertical and an accurate 19 KHz signal to scope horizontal input. Adjust R317 for one square synchronized waveform.
28			Scope and/or AC VTVM Left Tape Output	98 MHz 10% Pilot (L+R) (L-R) (L Only)		—	Check for separation. Maximum left output.
29	Right Tape Output.	Check for separation. Minimum right output.					
NOTE: Do Not Readjust Control R317 After Step 27.							

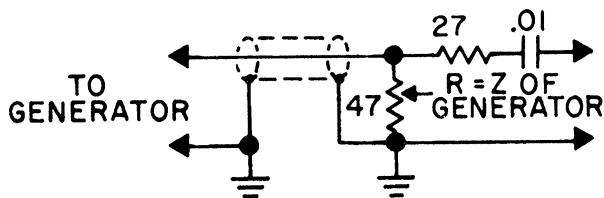


FIGURE 1 – RF INPUT PROBE

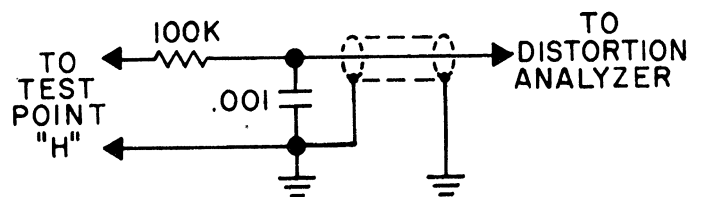


FIGURE 3 – DE-EMPHASIS PROBE

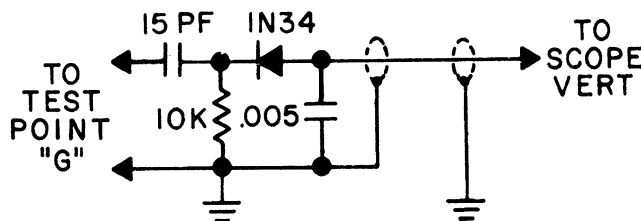
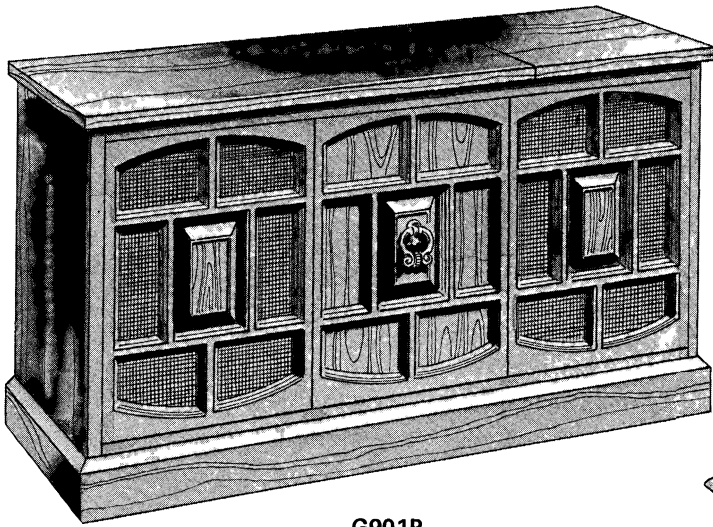


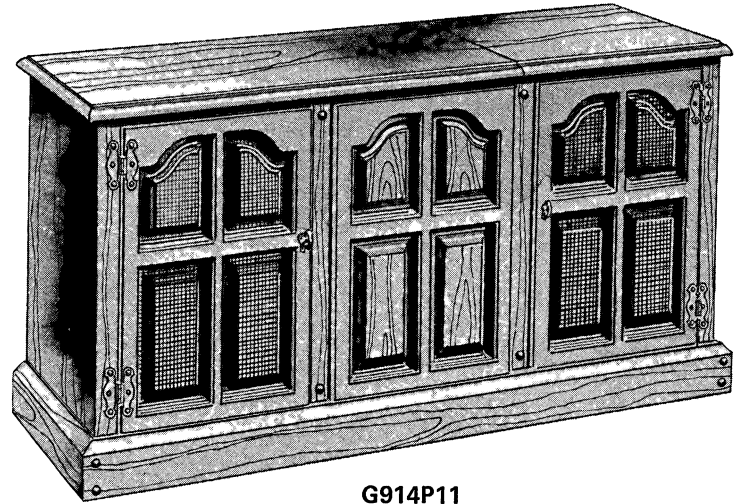
FIGURE 2 – DIODE DETECTOR PROBE

CERAMIC FILTERS – CHASSIS 12WGR59			
PART NO.	COLOR CODE	NOMINAL CENTER FREQUENCY	FREQUENCY RANGE
224-1	Black	10.64 MHz	10.61 to 10.67 MHz
224-1-01	Blue	10.67 MHz	10.64 to 10.70 MHz
224-1-02	Red	10.70 MHz	10.67 to 10.73 MHz
224-1-03	Orange	10.73 MHz	10.70 to 10.76 MHz
224-1-04	White	10.76 MHz	10.73 to 10.79 MHz

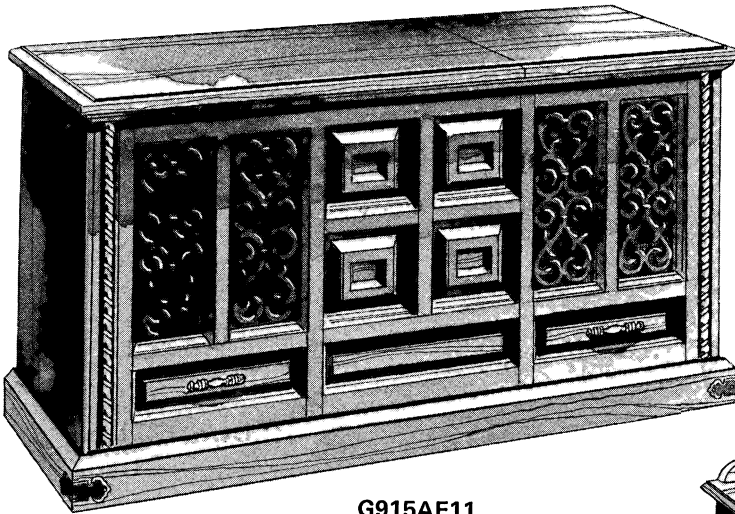
FIGURE 4 – CERAMIC FILTER TABLE



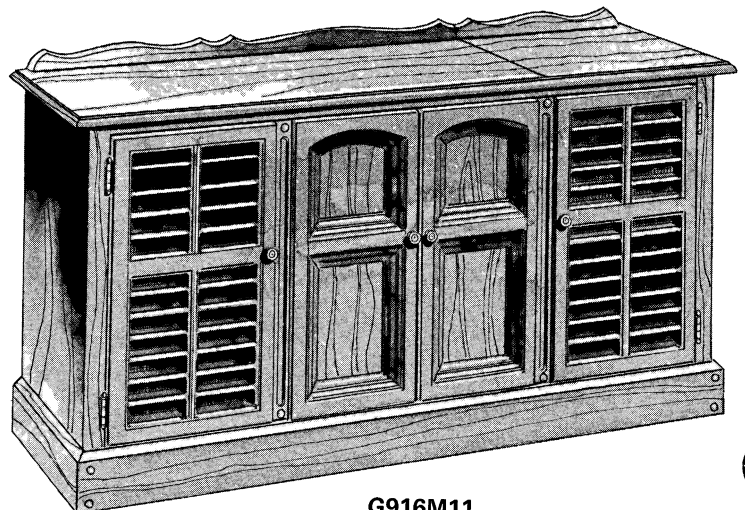
G901P,
GR901P1



G914P11



G915AE11



G916M11

REPRESENTATIVE MODEL ILLUSTRATIONS

REVISIONS

Change information will follow the format illustrated below. Each chart heading will list Chassis and/or Model identification and reference to the appropriate Service Manual, such as "Refer to HF31". Change information will normally consist of: schematic reference number (i.e. C304), action taken (omit, add, or alternate usage), part number and description of components, and a partial schematic of the circuit or other appropriate drawing.

CHASSIS 3WGR50 MODELS G914P, P11, G915AE, AE11, G916M, M11				3WGR50 CHASSIS MODELS
COMPONENT CHANGES		REFER TO HF31		DRAWING CHANGES
(4931G1, G2)				
C222	OMIT	22-3362	560PF 10% Disc 500V	
	ADD	22-5989	.02MF 20% Disc 25V	
C225	OMIT	22-3033	.02MF +100 -30% Disc 25V	
	ADD	22-7512	.01MF 20% Disc 25V	
R220	OMIT	63-9921-94	8.2K 5% 1/4W	
		63-7824	Alt. 10% 1/2W	
	ADD	63-9921-84	3.3K 5% 1/4W	
		63-7806	Alt. 10% 1/2W	
R221	OMIT	63-9921-96	10K 5% 1/4W	
		63-7827	Alt. 10% 1/2W	
	ADD	63-9921-86	3.9K 5% 1/4W	
		63-7810	Alt. 10% 1/2W	
SW2	***	85-1437-01	SPDT Slide AFC (Pref)	
	OR	85-1372-01	SPDT Slide AFC (Alt)	
(4931H1, H2, 4932C)				
C305	OMIT	22-3608	68PF 10% Disc 500V	
	ADD	22-3728	15PF 10% Disc 500V	
C306	OMIT	22-13	.0033MF 10% Disc 500V	
			(used with 221-79-01)	
	OR	22-7191	.0027MF 10% Disc 500V	
			(used with 221-65)	
	ADD	22-13	.0033MF 10% Disc 500V	
			(used with 221-79-01)	
	OR	22-5581	.0039MF 20% Disc 1000V	
			(used with 221-79)	
C308	OMIT	22-3034	.05MF +100 -50% Disc 25V	
	ADD	22-3527	.22MF +80 -20% Disc 12V	
R302	OMIT	63-8328	300 Ohm Mute Control	
	ADD	63-9697-26	500 Ohm Mute Control	
		63-9261	Alt. Mute Control	
R303	OMIT	63-9924-48	1.5 Meg 10% 1/4W	
		63-7918	Alt. 10% 1/2W	
	ADD	63-9922-34	390K 5% 1/4W	
		63-7894	Alt. 10% 1/2W	
IC301	OMIT	221-79-01	Multiplex Demodulator	
	OR	221-65	Multiplex Demodulator	
	ADD	221-79-01	Multiplex Demodulator	
	OR	221-79	Multiplex Demodulator	
T301	OMIT	95-3021	Input Coil 19kHz	
	ADD	95-3248	Input Coil 19kHz	
C411/ C461	OMIT	22-3513	.01MF 10% Disc 500V	
	ADD	22-7512	.01MF 20% Disc 25V	
	OMIT	204-501	Circuit Board	
	ADD	204-564	Circuit Board	

REVISIONS

CHASSIS 3WGR52
MODELS G584W1, G587W2, GR587W1

3WGR52 CHASSIS
MODELS

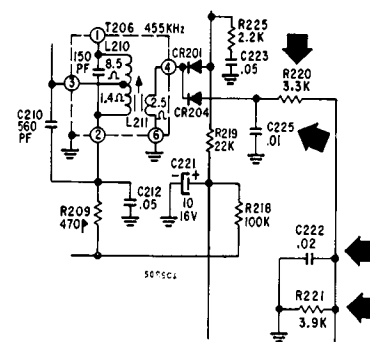
COMPONENT CHANGES

REFER TO HF31

DRAWING CHANGES

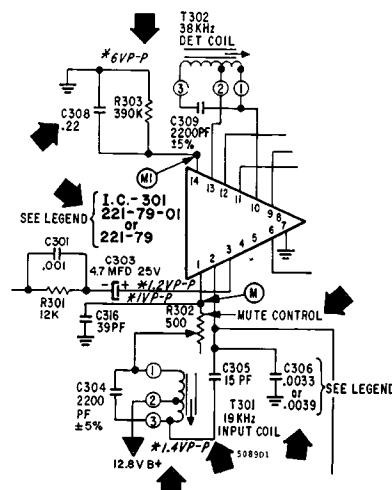
(5089C1, C2)

C222	OMIT	22-3362	560PF 10% Disc 500V
	ADD	22-5989	.02MF 20% Disc 25V
C225	OMIT	22-3033	.02MF +100 -30% Disc 25V
	ADD	22-7512	.01MF 20% Disc 25V
R220	OMIT	63-9921-94	8.2K 5% 1/4W
		63-7824	Alt. 10% 1/2W
	ADD	63-9921-84	3.3K 5% 1/4W
		63-7806	Alt. 10% 1/2W
R221	OMIT	63-9921-96	10K 5% 1/4W
		63-7827	Alt. 10% 1/2W
	ADD	63-9921-86	3.9K 5% 1/4W
		63-7810	Alt. 10% 1/2W
SW2	***	85-1437-01	SPDT Slide AFC (Pref)
	OR	85-1372-01	SPDT Slide AFC (Alt)
SW3	OMIT	85-1410	SPDT Slide Speaker
	ADD	85-1466	SPDT Slide Speaker



(5089D1, D2, 5087B)

C305	OMIT	22-3608	68PF 10% Disc 500V
	ADD	22-3728	15PF 10% Disc 500V
C306	OMIT	22-13	.0033MF 10% Disc 500V (used with 221-79-01)
	OR	22-7191	.0027MF 10% Disc 500V (used with 221-65)
	ADD	22-13	.0033MF 10% Disc 500V (used with 221-79-01)
	OR	22-5581	.0039MF 20% Disc 1000V (used with 221-79)
C308	OMIT	22-3034	.05MF +100 -50% Disc 25V
	ADD	22-3527	.22MF +80 -20% Disc 12V
R302	OMIT	63-8328	300 Ohm Mute Control
	ADD	63-9697-26	500 Ohm Mute Control
R303	OMIT	63-9924-48	1.5 Meg 10% 1/4W
		63-7918	Alt. 10% 1/2W
	ADD	63-9922-34	390K 5% 1/4W
		63-7894	Alt. 10% 1/2W
IC301	OMIT	221-79-01	Multiplex Demodulator
	OR	221-65	Multiplex Demodulator
	ADD	221-79-01	Multiplex Demodulator
	OR	221-79	Multiplex Demodulator
T301	OMIT	95-3031	Input Coil 19kHz
	ADD	95-3248	Input Coil 19kHz
C411/ C461	OMIT	22-3513	.01MF 10% Disc 500V
	ADD	22-7512	.01MF 20% Disc 25V
	OMIT	204-501	Circuit Board
	ADD	204-564	Circuit Board



REVISIONS

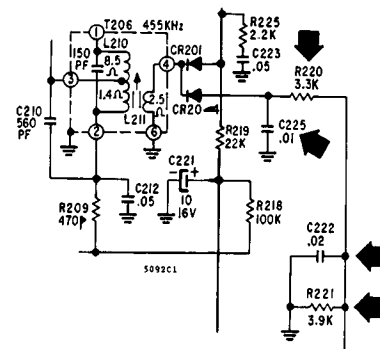
CHASSIS 3WGR54
MODEL G680W2

3WGR54 CHASSIS MODELS

COMPONENT CHANGES REFER TO HF31 DRAWING CHANGES

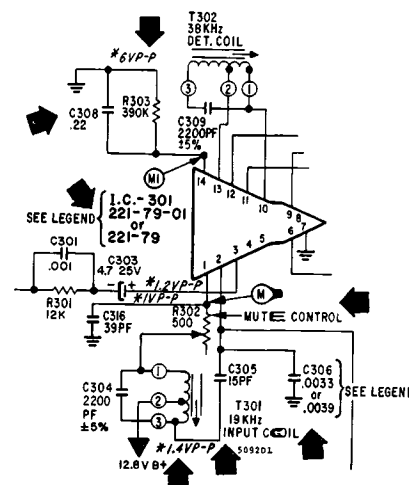
(5092C1, C2)

C222	OMIT ADD	22-3362 22-5989	560PF 10% Disc 500V .02MF 20% Disc 25V
C225	OMIT ADD	22-3033 22-7512	.02MF +100 -30% Disc 25V .01MF 20% Disc 25V
R220	OMIT ADD	63-9921-94 63-7824 63-9921-84 63-7806	8.2K 5% 1/4W Alt. 10% 1/2W 3.3K 5% 1/4W Alt. 10% 1/2W
R221	OMIT ADD	63-9921-96 63-7827 63-9921-86 63-7810	10K 5% 1/4W Alt. 10% 1/2W 3.9K 5% 1/4W Alt. 10% 1/2W
SW2	* * * OR	85-1437-01 85-1372-01	SPDT Slide AFC (Pref) SPDT Slide AFC (Alt)



(5092D1, D2, 5090B)

C305	OMIT ADD	22-3608 22-3728	68PF 10% Disc 500V 15PF 10% Disc 500V
C306	OMIT OR ADD OR	22-13 22-7191 22-13 22-5581	.0033MF 10% Disc 500V (used with 221-79-01) .0027MF 10% Disc 500V (used with 221-65) .0033MF 10% Disc 500V (used with 221-79-01) .0039MF 20% Disc 1000V (used with 221-79)
C308	OMIT ADD	22-3034 22-3527	.05MF +100 —50% Disc 25V .22MF +80 —20% Disc 12V
R302	OMIT ADD	63-8328 63-9697-26 63-9621	300 Ohm Mute Control 500 Ohm Mute Control Alt. Mute Control
R303	OMIT ADD	63-9924-48 63-7918 63-9922-34 63-7894	1.5 Meg 10% 1/4W Alt. 10% 1/2W 390K 5% 1/4W Alt. 10% 1/2W
IC301	OMIT OR ADD OR	221-79-01 221-65 221-79-01 221-79	Multiplex Demodulator Multiplex Demodulator Multiplex Demodulator Multiplex Demodulator
T301	OMIT ADD	95-3021 95-3248	Input Coil 19kHz Input Coil 19kHz
C411/ C461	OMIT ADD	22-3513 22-7512	.01MF 10% Disc 500V .01MF 20% Disc 25V



REVISIONS

CHASSIS 6WGR55
MODELS G920AE, G921P, G922M

6WGR55 CHASSIS
MODELS

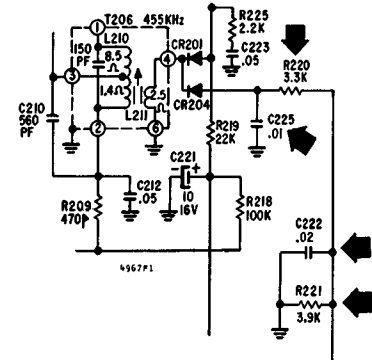
COMPONENT CHANGES

REFER TO HF31

DRAWING CHANGES

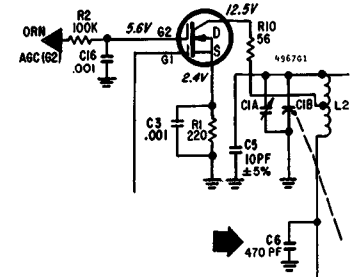
(4967F1, F2)

C222	OMIT	22-3362	560PF 10% Disc 500V
	ADD	22-5989	.02MF 20% Disc 25V
C225	OMIT	22-3033	.02MF +100 -30% Disc 25V
	ADD	22-7512	.01MF 20% Disc 25V
R220	OMIT	63-9921-94	8.2K 5% 1/4W
		63-7824	Alt. 10% 1/2W
	ADD	63-9921-84	3.3K 5% 1/4W
		63-7806	Alt. 10% 1/2W
R221	OMIT	63-1827	10K 10% 1/2W
		63-1810	3.9K 10% 1/2W
SW2	***	85-1437-01	SPDT Slide AFC (Pref)
	OR	85-1372-01	SPDT Slide AFC (Alt)



(4967G1, G2, 4968D)

C6	OMIT	22-3393	.01MF +80 -30% Disc 25V
	ADD	22-5761	470PF 10% Disc 1000V
C305	OMIT	22-3608	68PF 10% Disc 500V
	ADD	22-3728	15PF 10% Disc 500V
C306	OMIT	22-13	.0033MF 10% Disc 500V (used with 221-79-01)
	OR	22-7191	.0027MF 10% Disc 500V (used with 221-65)
	ADD	22-13	.0033MF 10% Disc 500V (used with 221-79-01)
	OR	22-5581	.0039MF 20% Disc 1000V (used with 221-79)
C308	OMIT	22-3034	.05MF +100 -50% Disc 25V
	ADD	22-3527	.22MF +80 -20% Disc 12V
R302	OMIT	63-8328	300 Ohm Mute Control
	ADD	63-9697-26	500 Ohm Mute Control
		63-9261	Alt. Mute Control
R303	OMIT	63-9924-48	1.5 Meg 10% 1/4W
		63-7918	Alt. 10% 1/2W
	ADD	63-9922-34	390K 5% 1/4W
		63-7894	Alt. 10% 1/2W
IC301	OMIT	221-79-01	Multiplex Demodulator
	OR	221-65	Multiplex Demodulator
	ADD	221-79-01	Multiplex Demodulator
	OR	221-79	Multiplex Demodulator
T301	OMIT	95-3021	Input Coil 19kHz
	ADD	95-3248	Input Coil 19kHz
R402	OMIT	63-1841	22K 10% 1/2W
	ADD	63-1855	47K 10% 1/2W
	OMIT	204-533	Circuit Board
	ADD	204-563	Circuit Board



REVISIONS

CHASSIS 6WGR56
MODEL GR684W

6WGR56 CHASSIS
MODELS

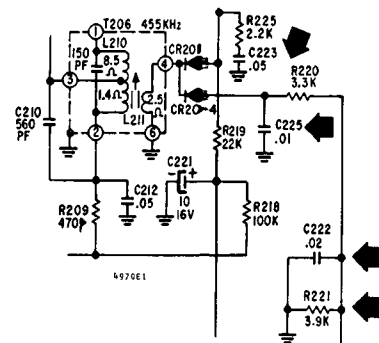
COMPONENT CHANGES

REFER TO HF31

DRAWING CHANGES

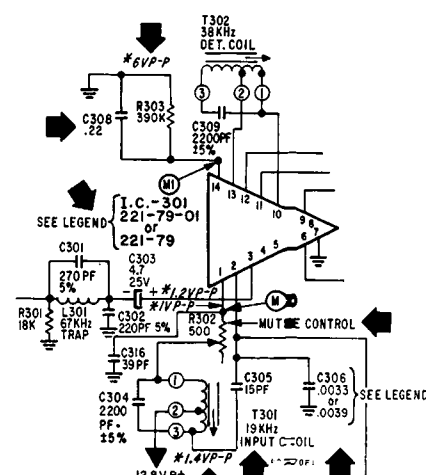
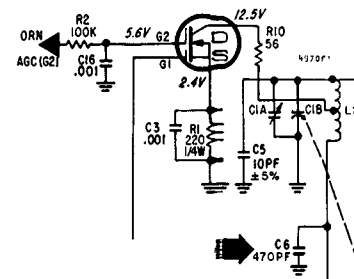
(4970E1, E2)

C222	OMIT	22-3362	560PF 10% Disc 500V
	ADD	22-5989	.02MF 20% Disc 25V
C225	OMIT	22-3033	.02MF +100 -30% Disc 25V
	ADD	22-7512	.01MF 20% Disc 25V
R220	OMIT	63-9921-94	8.2K 5% 1/4W
		63-7824	Alt. 10% 1/2W
	ADD	63-9921-84	3.3K 5% 1/4W
		63-7806	Alt. 10% 1/2W
R221	OMIT	63-1827	10K 10% 1/2W
	ADD	63-1810	3.9K 10% 1/2W
SW2	***	85-1437-01	SPDT Slide AFC (Pref)
	OR	85-1372-01	SPDT Slide AFC (Alt)
SW3	***	85-1437-01	SPDT Slide Matrix (Pref)
	OR	85-1372-01	SPDT Slide Matrix (Alt)



(4970F1, F2, 4971E)

C6	OMIT	22-3393	.01MF +80 -30% Disc 25V
	ADD	22-5761	470PF 10% Disc 1000V
C305	OMIT	22-3608	68PF 10% Disc 500V
	ADD	22-3728	15PF 10% Disc 500V
C306	OMIT	22-13	.0033MF 10% Disc 500V (used with 221-79-01)
	OR	22-7191	.0027MF 10% Disc 500V (used with 221-65)
	ADD	22-13	.0033MF 10% Disc 500V (used with 221-79-01)
		22-5581	.0039MF 20% Disc 1000V (used with 221-79)
C308	OMIT	22-3034	.05MF +100 -50% Disc 25V
	ADD	22-3527	.22MF +80 -20% Disc 12V
R302	OMIT	63-8328	300 Ohm Mute Control
	ADD	63-9697-26	500 Ohm Mute Control
		63-9261	Alt. Mute Control
R303	OMIT	63-9924-48	1.5 Meg 10% 1/4W
		63-7918	Alt. 10% 1/2W
	ADD	63-9922-34	390K 5% 1/4W
		63-7894	Alt. 10% 1/2W
IC301	OMIT	221-79-01	Multiplex Demodulator
	OR	221-65	Multiplex Demodulator
	ADD	221-79-01	Multiplex Demodulator
	OR	221-79	Multiplex Demodulator
T301	OMIT	95-3021	Input Coil 19kHz
	ADD	95-3248	Input Coil 19kHz
R402	OMIT	63-1841	22K 10% 1/2W
	ADD	63-1855	47K 10% 1/2W
	OMIT	204-533	Circuit Board
	ADD	204-563	Circuit Board
NOTE			Reference in "NOTES" to 121-926 and 121-927 should read 121-926-01 and 121-927-01.



REVISIONS

CHASSIS 6WGR57
MODEL S G590W, GR590W, GR591W

6WGR57 CHASSIS
MODELS

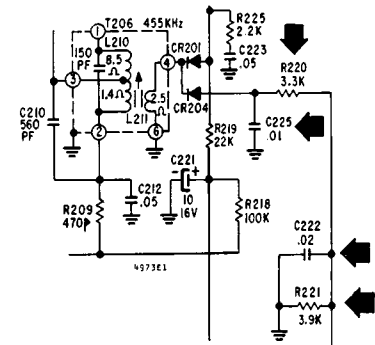
COMPONENT CHANGES

REFER TO HF31

DRAWING CHANGES

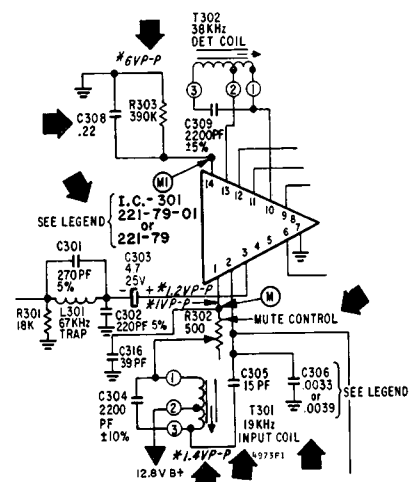
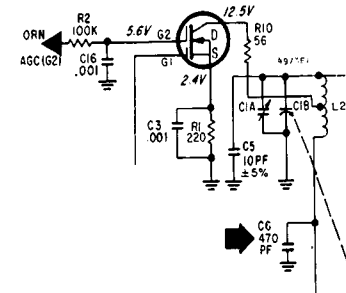
(4973E1, E2)

C222	OMIT	22-3362	560PF 10% Disc 500V
	ADD	22-5989	.02MF 20% Disc 25V
C225	OMIT	22-3033	.02MF +100 -30% Disc 25V
	ADD	22-7512	.01MF 20% Disc 25V
R220	OMIT	63-9921-94	8.2K 5% 1/4W
		63-7824	Alt. 10% 1/2W
	ADD	63-9921-84	3.3K 5% 1/4W
		63-7806	Alt. 10% 1/2W
R221	OMIT	63-1827	10K 10% 1/2W
	ADD	63-1810	3.9K 10% 1/2W
SW2	***	85-1437-01	SPDT Slide AFC (Pref)
	OR	85-1372-01	SPDT Slide AFC (Alt)
SW3	***	85-1437-01	SPDT Slide Matrix (Pref)
	OR	85-1372-01	SPDT Slide Matrix (Alt)
NOTE:		-	At RX305 B+ should read +36V, not +47V.



(4973F1, F2, 4974E)

C6	OMIT	22-3393	.01MF +80 -30% Disc 25V
	ADD	22-5761	470PF 10% Disc 1000V
C305	OMIT	22-3608	68PF 10% Disc 500V
	ADD	22-3728	15PF 10% Disc 500V
C306	OMIT	22-13	.0033MF 10% Disc 500V (used with 221-79-01)
	OR	22-7191	.0027MF 10% Disc 500V (used with 221-65)
	ADD	22-13	.0033MF 10% Disc 500V (used with 221-79-01)
	OR	22-5581	.0039MF 20% Disc 1000V (used with 221-79)
C308	OMIT	22-3034	.05MF +100 -50% Disc 25V
	ADD	22-3527	.22MF +80 -20% Disc 12V
R302	OMIT	63-8328	300 Ohm Mute Control
	ADD	63-9697-26	500 Ohm Mute Control
		63-9261	Alt. Mute Control
R303	OMIT	63-9924-48	1.5 Meg 10% 1/4W
		63-7918	Alt. 10% 1/2W
	ADD	63-9922-34	390K 5% 1/4W
		63-7894	Alt. 10% 1/2W
IC301	OMIT	221-79-01	Multiplex Demodulator
	OR	221-65	Multiplex Demodulator
	ADD	221-79-01	Multiplex Demodulator
	OR	221-79	Multiplex Demodulator
T301	OMIT	95-3021	Input Coil 19kHz
	ADD	95-3248	Input Coil 19kHz
R402	OMIT	63-1841	22K 10% 1/2W
	ADD	63-1855	47K 10% 1/2W
	OMIT	204-533	Circuit Board
	ADD	204-563	Circuit Board
NOTE		-	Reference in "NOTES" to 121-926 and 121-927 should read 121-926-01 and 121-927-01.



REVISIONS

CHASSIS 12WGR59
MODELS G596W, GR596W

12WGR59 CHASSIS
MODELS

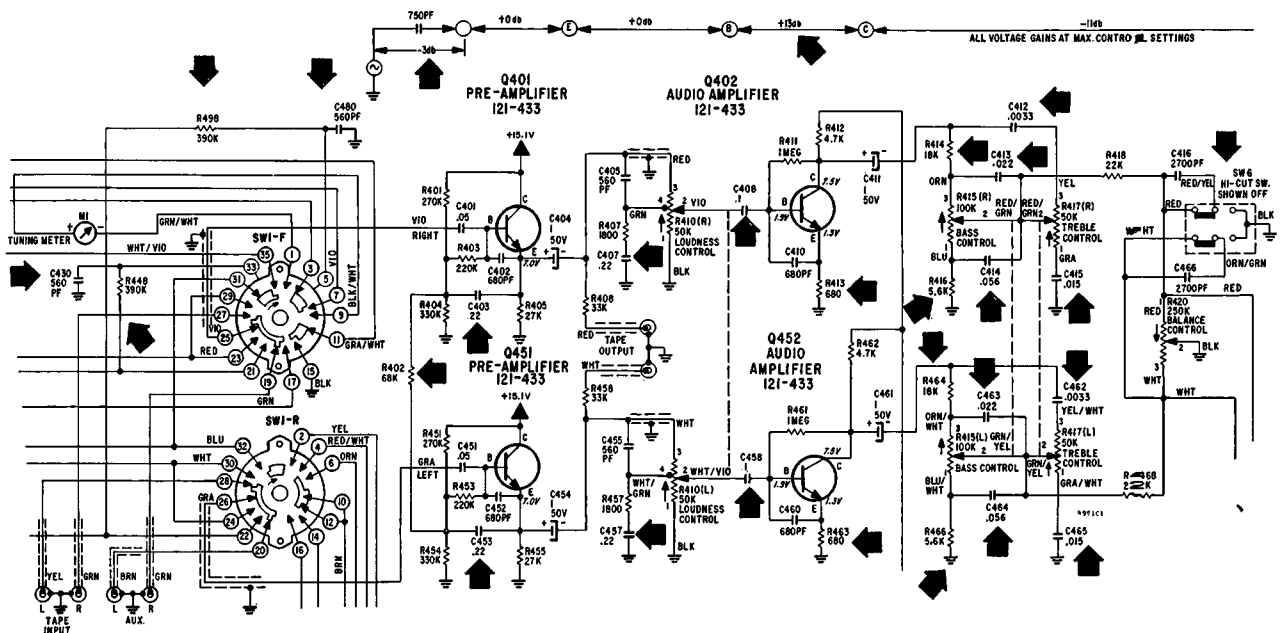
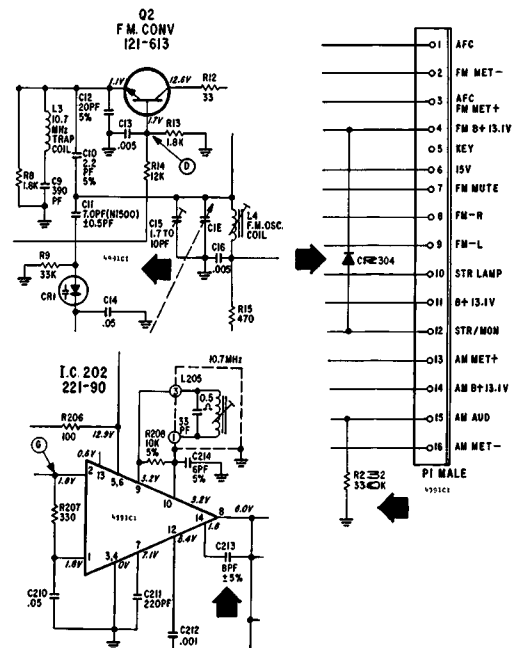
COMPONENT CHANGES

REFER TO HF31, 31S1

DRAWING CHANGES

(4991C1, C2)

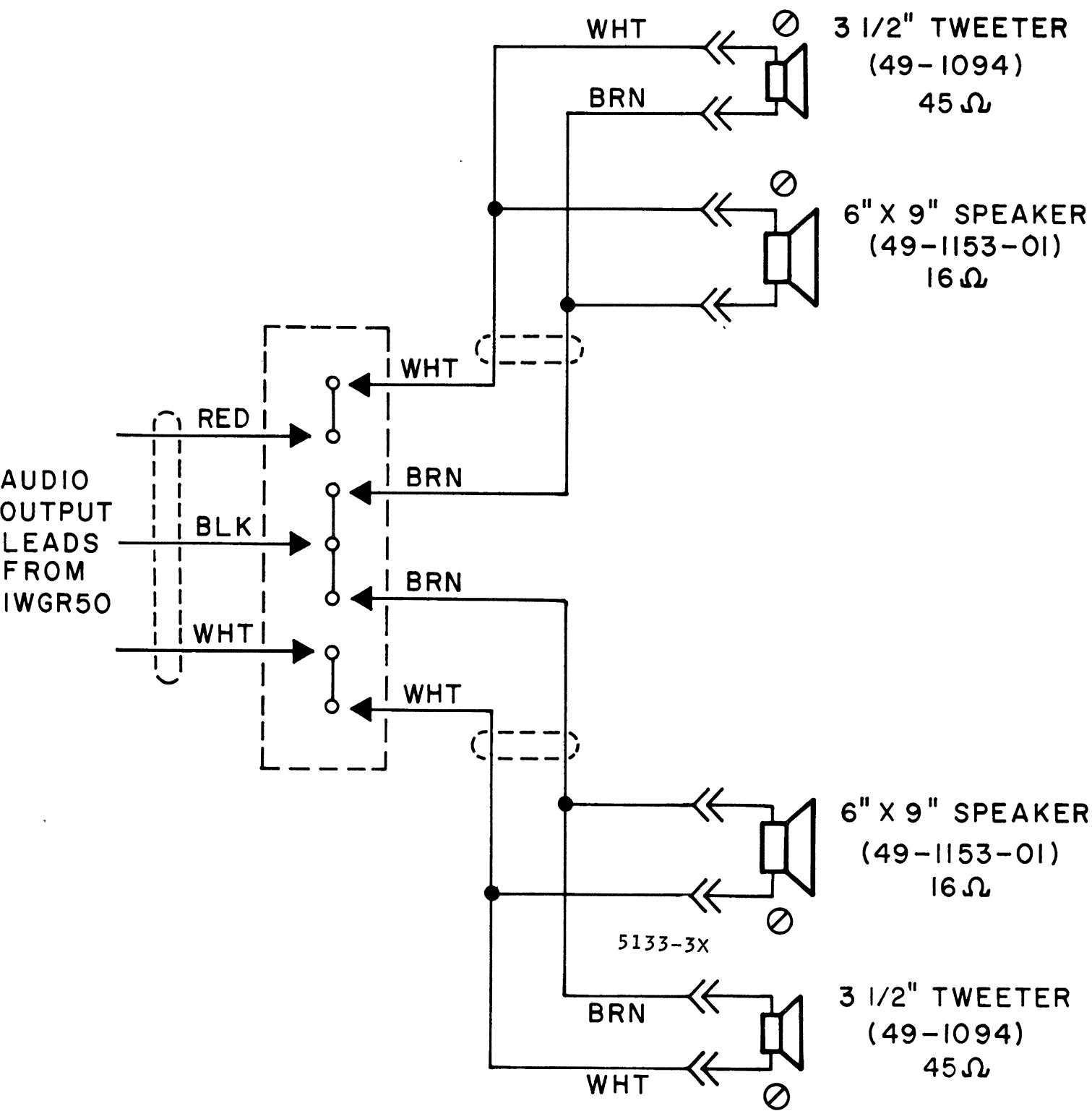
R10	OMIT	63-9922-16	68K 5% 1/4W
	OR	63-10484-16	Alt. 10% 1/4W
C213	OMIT	22-3770	5.5PF $\pm$.25PF Disc 500V
	ADD	22-5805	8.0PF 5% Disc 500V
R232	ADD	63-4290	330K 10% 1/4W
CR304	ADD	103-142	Silicon Diode
C403/	OMIT	22-5487	.47MF +100 -0% Disc 3V
C453	ADD	22-3527	.22MF +80 -20% Disc 12V
C407/	OMIT	22-7496	.47MF 10% Mylar 100V
C457	ADD	22-6048	.22MF 10% Mylar 50V
C408/	OMIT	22-3034	.05MF +100 -50% Disc 25V
C458	ADD	22-6905	.1MF 10% Mylar 50V
C412/	OMIT	22-14	.0047MF 10% Disc 500V
C462	ADD	22-13	.0033MF 10% Disc 500V
C413/	OMIT	22-5883	.033MF 10% Mylar 500V
C463	ADD	22-5632	.022MF 10% Mylar 200V
		22-7179	Alt. 10% Mylar 50V
C414/	OMIT	22-5884	.082MF 10% Mylar 100V
C464	ADD	22-5815	.056MF 10% Mylar 100V



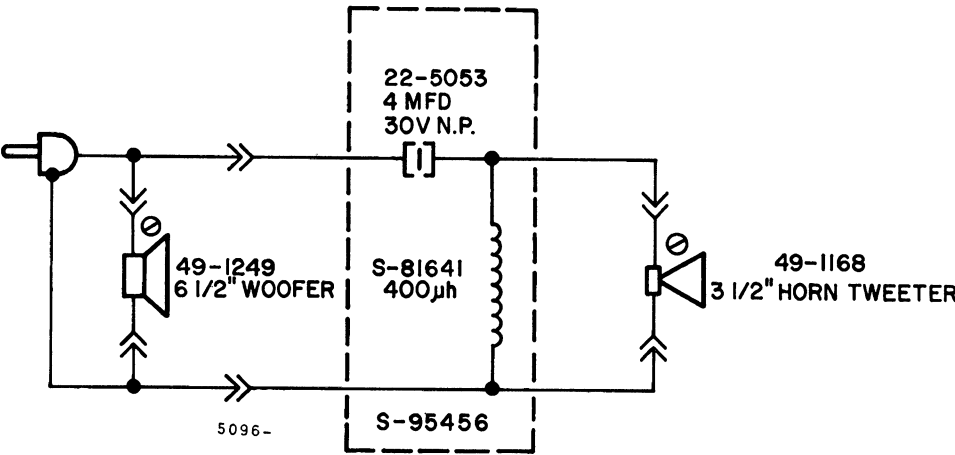
REVISIONS

CHASSIS 12WGR59 MODELS G596W, GR596W			CONTINUED	12WGR59 CHASSIS MODELS
COMPONENT CHANGES			REFER TO HF31, 31S1	DRAWING CHANGES
(4991C1 , C2 Cont.)				
C415/ C465	OMIT ADD	22-5814 22-6130	.022MF 20% Mylar 100V .015MF 10% Mylar 50V	
C430/ C480	ADD	22-3362	560PF 10% Disc 500V	
R402	OMIT ADD	63-9922-04 63-7841 63-9922-16 63-7862	22K 5% 1/4W Alt. 10% 1/2W 68K 5% 1/4W Alt. 10% 1/2W	
R413/ R463/	OMIT ADD	63-9921-70 63-7782 63-9921-68 63-7778	820 5% 1/4W Alt. 10% 1/2W 680 5% 1/4W Alt. 10% 1/2W	
R414/ R464	OMIT ADD	63-9921-96 63-7827 63-9922-02 63-7838	10K 5% 1/4W Alt. 10% 1/2W 18K 5% 1/4W Alt. 10% 1/2W	
R416/ R466	OMIT ADD	63-9921-92 63-7820 63-9921-90 63-7817	6.8K 5% 1/4W Alt. 10% 1/2W 5.6K 5% 1/4W Alt. 10% 1/2W	
R448/ R498	ADD	63-4294	390K 10% 1/4W	
Q401/ Q451	NOTE	—	Gain changed from —1db to —3db	
Q402/ Q452	NOTE	—	Gain changed from +11db to +13db.	
SW6	ADD	—	Two connections added at C416/C466	

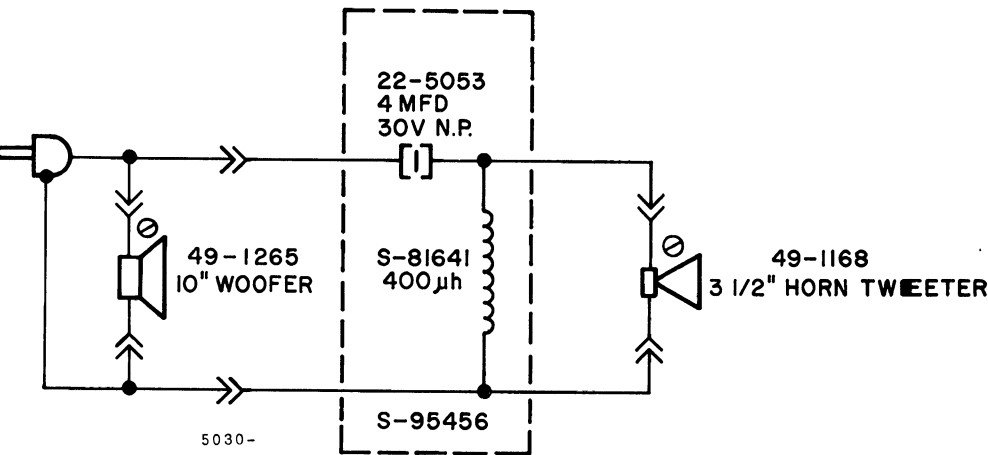
MODELS: G901PI, GR901PI



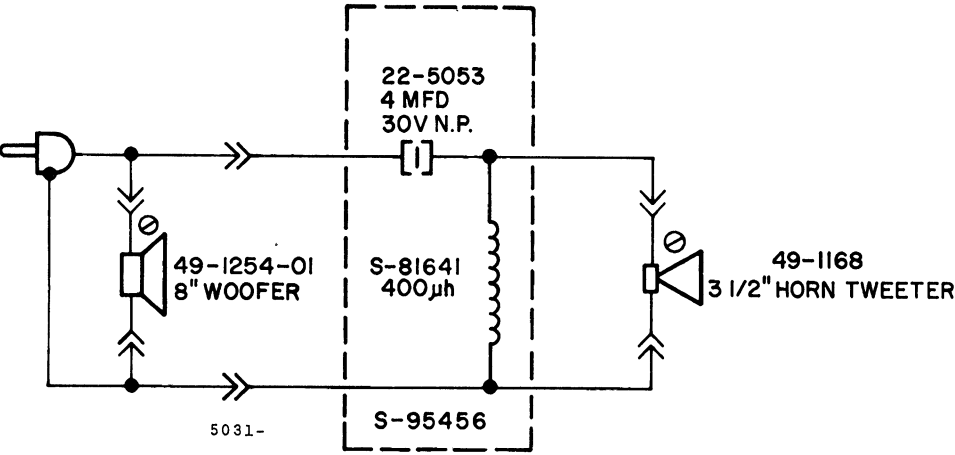
MODELS G1000W, G9012W1



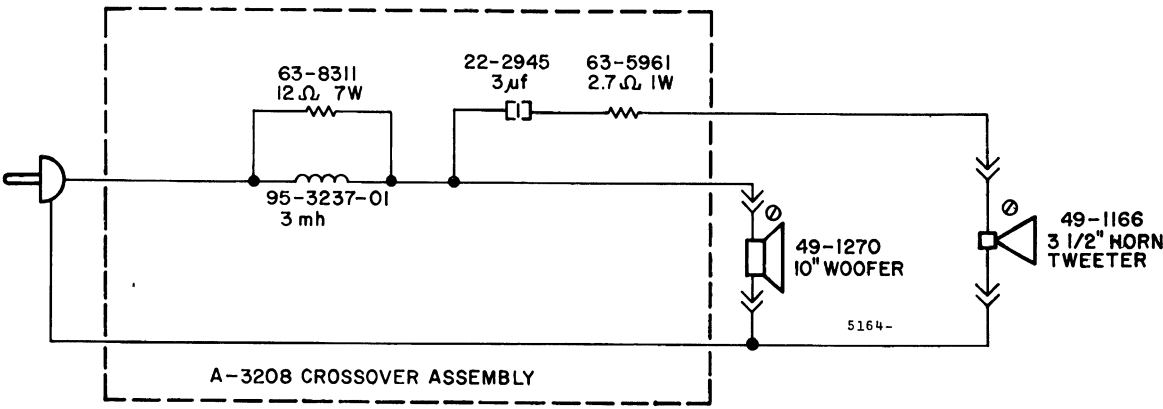
MODEL G3000W



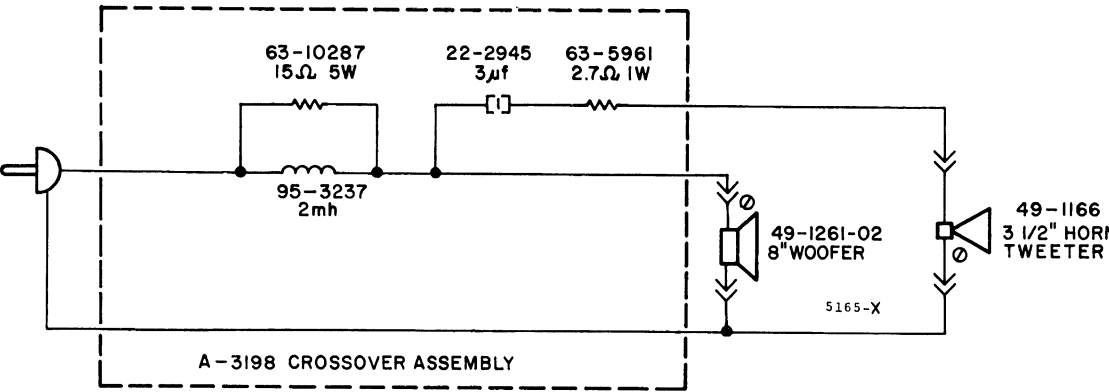
MODELS G2000W, G9014W



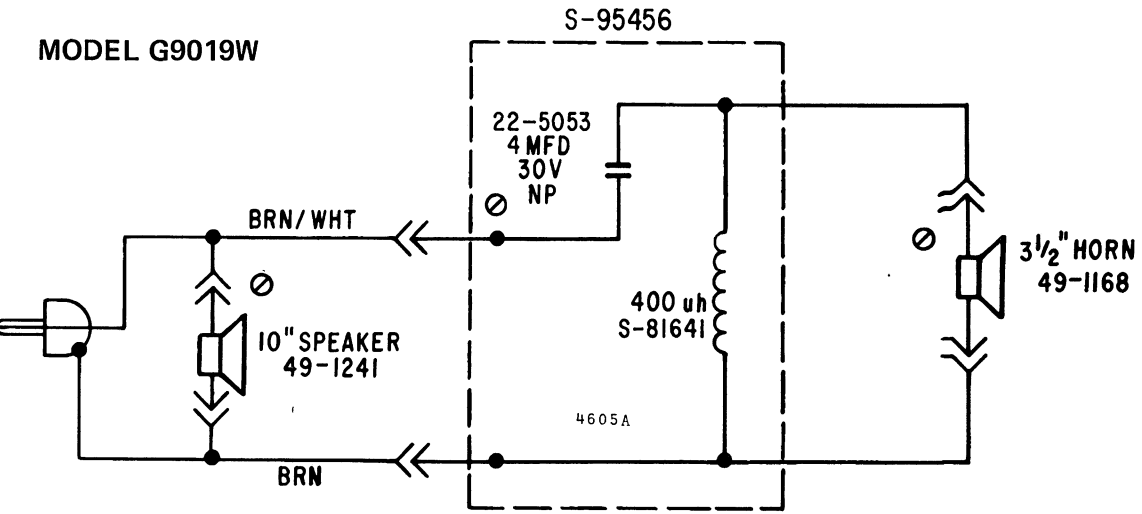
MODEL G3000W11



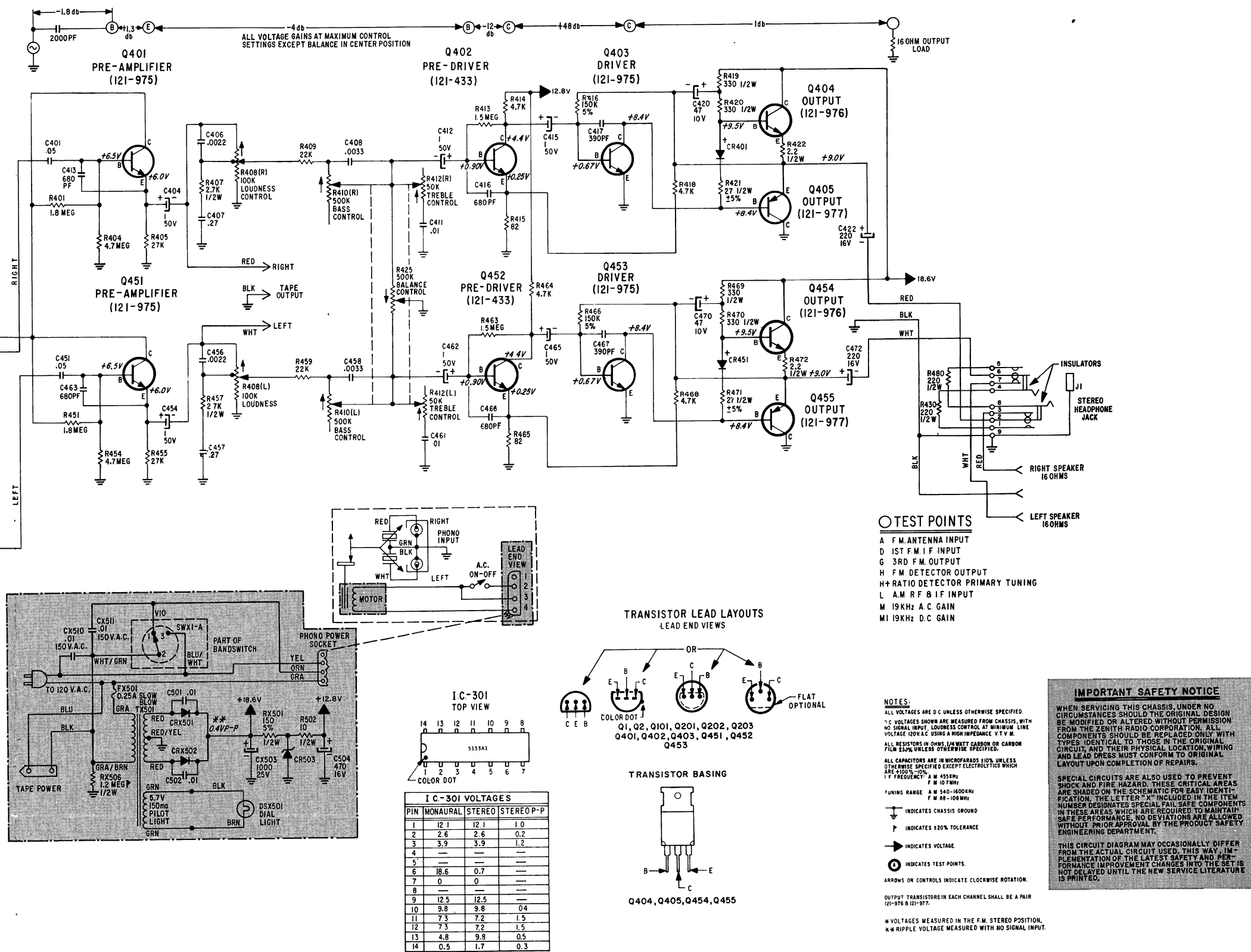
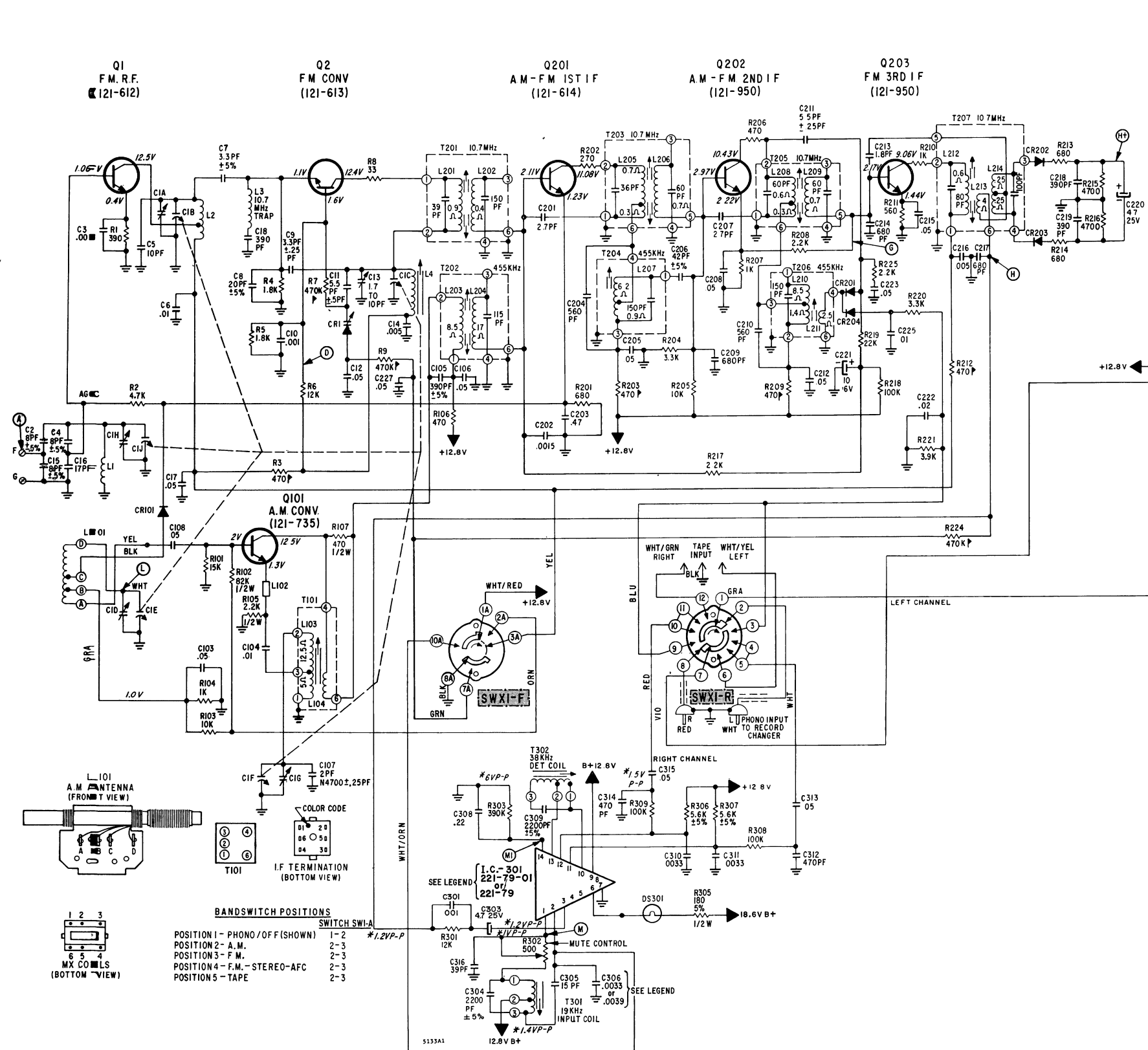
MODEL G2000W11



MODEL G9019W



⊙ INDICATES WHITE OR YELLOW VOICE COIL POLARITY IDENTIFICATION DOT ON SPEAKER.



TEST POINTS

- A F.M. ANTENNA INPUT
- D 1ST F.M. I.F. INPUT
- G 3RD F.M. OUTPUT
- H F.M. DETECTOR OUTPUT
- H+ RATIO DETECTOR PRIMARY TUNING
- L A.M. R.F. & I.F. INPUT
- M 19KHZ A.C. GAIN
- M1 19KHZ D.C. GAIN

NOTES:

- ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
- * C VOLTAGES SHOWN ARE MEASURED FROM CHASSIS, WITH NO SIGNAL INPUT. LOUDNESS CONTROL AT MINIMUM. LINE VOLTAGE 120V A.C. USING A HIGH IMPEDANCE V.T.V.M.
- ALL RESISTORS IN OHMS, UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED EXCEPT ELECTROLYTICS WHICH ARE IN FARADS.
- TUNING RANGE: A.M. 540-1600KHz; F.M. 88-108MHz.
- INDICATES CHASSIS GROUND.
- INDICATES 10% TOLERANCE.
- INDICATES VOLTAGE.
- INDICATES TEST POINTS.
- ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION.
- OUTPUT TRANSISTORS IN EACH CHANNEL SHALL BE A PAIR 121-976 & 121-977.
- * VOLTAGES MEASURED IN THE F.M. STEREO POSITION.
- ** RIPPLE VOLTAGE MEASURED WITH NO SIGNAL INPUT.

IMPORTANT SAFETY NOTICE

WHEN SERVICING THIS CHASSIS UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE ZENITH RADIO CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIRCUIT, AND THEIR PHYSICAL LOCATION, WIRING AND LEAD DRESS MUST CONFORM TO ORIGINAL LAYOUT UPON COMPLETION OF REPAIRS.

SPECIAL CIRCUITS ARE ALSO USED TO PREVENT SHOCK AND FIRE HAZARD. THESE CRITICAL AREAS ARE SHADDED ON THE SCHEMATIC FOR EASY IDENTIFICATION. THE LETTER "X" INCLUDED IN THE ITEM NUMBER DESIGNATES SPECIAL FAULT-SAFE COMPONENTS IN THESE AREAS WHICH ARE REQUIRED TO MAINTAIN SAFE PERFORMANCE. NO DEVIATIONS ARE ALLOWED WITHOUT PRIOR APPROVAL BY THE PRODUCT SAFETY ENGINEERING DEPARTMENT.

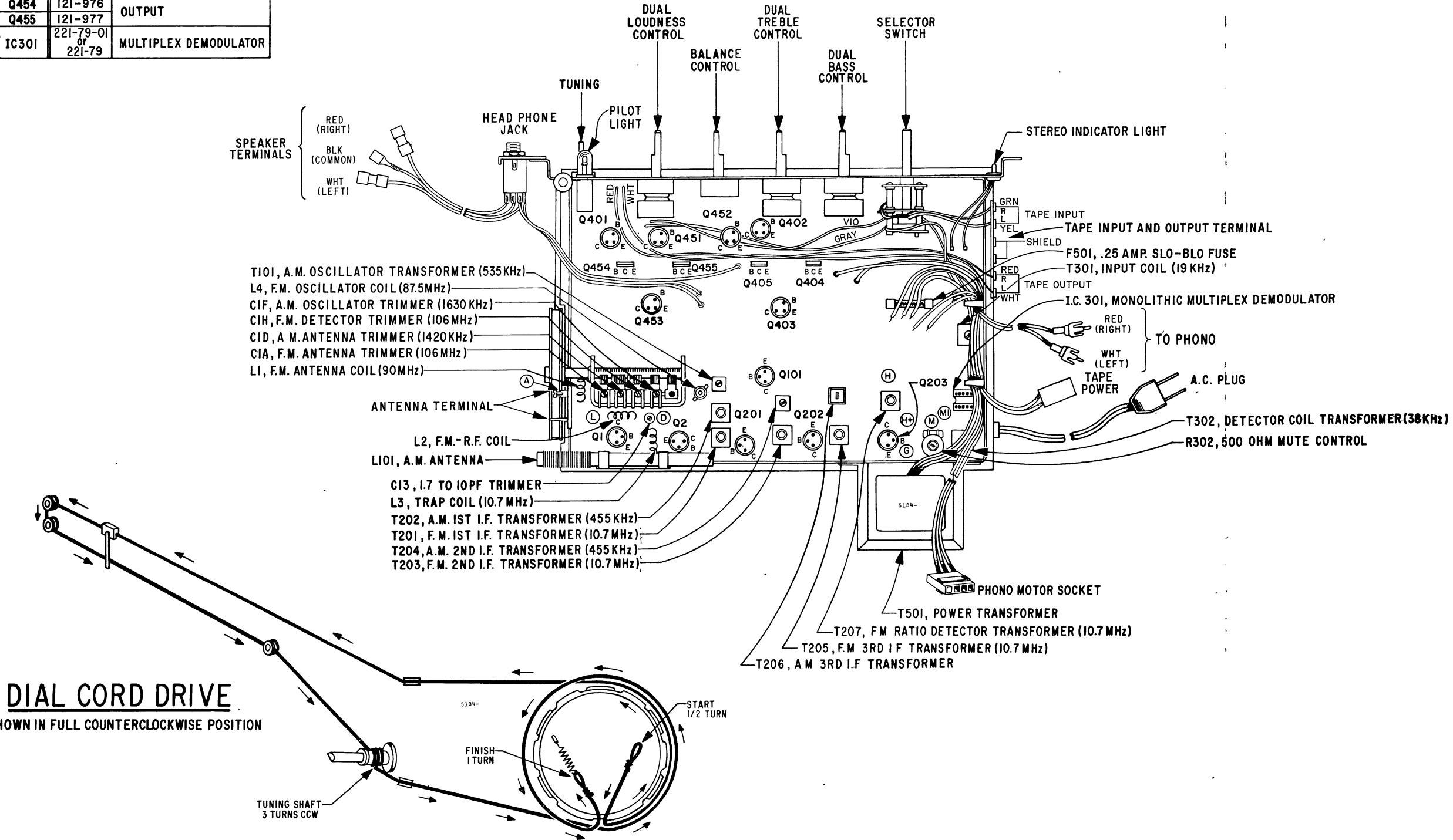
THIS CIRCUIT DIAGRAM MAY OCCASIONALLY DIFFER FROM THE ACTUAL CIRCUIT USED. THIS WAY OF IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

ITEM NO.	PART NUMBER	DESCRIPTION	ITEM NO.	PART NUMBER	DESCRIPTION	ITEM NO.	PART NUMBER	DESCRIPTION
C1A		FM DETECTOR TRIMMER	CXK101	22-905	.01 MFD DISC 150VAC	L1	20-3221	FM ANTENNA COIL
C1B		FM DETECTOR TUNING	CXK102	22-905	.01 MFD DISC 150VAC	L2	20-1648	FM RF COIL
C1C		FM OSCILLATOR TUNING	R1	63-9521-62	300 OHM 5% (ALT. 63-7768 1/2W 10%)	L3	20-1631	TRAP COIL 10.7 MHZ
C1D		AM ANTENNA TUNING	R2	7 OHM		L4	20-3597	FM OSCILLATOR COIL
C1E		AM ANTENNA TUNING	R3	63-9521-64	470 OHM 5% (ALT. 63-7772 1/2W 20%)	L101	93-222-01	AM ANTENNA ASSEMBLY
C1F	22-7134	AM OSCILLATOR TUNING	R4	63-9521-78	1.8K OHM 5% (ALT. 63-7798 1/2W 10%)	L102	149-311	PERMITE CORE SLEEVE
C1G		AM OSCILLATOR TRIMMER	R5	63-9521-78	1.8K OHM 5% (ALT. 63-7798 1/2W 10%)	L103	IN T101	AM OSCILLATOR TRANS. PRI.
C1H		AM ANTENNA TRIMMER	R6	63-9521-78	1.8K OHM 5% (ALT. 63-7798 1/2W 10%)	L104	IN T101	AM OSCILLATOR TRANS. SEC.
C1J		FM ANTENNA TUNING	R7	63-9521-98	12K OHM 5% (ALT. 63-7831 1/2W 10%)	L201	IN T201	1ST IF TRANSFORMER 10.7 MHZ PRI.
C2	22-2481	8 PF DISC ±0.5% 500V	R8	63-9522-36	470K OHM 5% (ALT. 63-7888 1/2W 20%)	L202	IN T201	1ST IF TRANSFORMER 10.7 MHZ SEC.
C3	22-2729	.001 MFD DISC 25V	R9	63-9522-36	470K OHM 5% (ALT. 63-7888 1/2W 20%)	L203	IN T202	1ST IF AM 455 KHz PRI.
C4	22-2481	8 PF DISC ±.5% 500V	R10	63-9522-36	470K OHM 5% (ALT. 63-7888 1/2W 20%)	L204	IN T202	1ST IF AM 455 KHz SEC.
C5	22-3676	10 PF DISC ±.5% 500V	R11	63-9522-36	470K OHM 5% (ALT. 63-7888 1/2W 20%)	L205	IN T202	2ND IF TRANSFORMER 10.7 MHZ PRI.
C6	22-3393	.01 MFD DISC 25V	R12	63-9522-36	470K OHM 5% (ALT. 63-7888 1/2W 20%)	L206	IN T202	2ND IF AM 455 KHz SEC.
C7	22-3541	2 PF DISC ±.5% 500V	R101	63-9522	15K OHM 5% (ALT. 63-7834 1/2W 10%)	L207	IN T204	2ND IF TRANSFORMER 10.7 MHZ PRI.
C8	22-3761	20 PF DISC ±.5% 500V	R102	63-9522	82K OHM 1/2W	L208	IN T204	2ND IF AM 455 KHz
C9	22-5879	3.3 PF DISC ±.25 PF 25V	R103	63-9521-08	10K OHM 5% (ALT. 63-7827 1/2W 10%)	L209	IN T205	3RD IF TRANSFORMER 10.7 MHZ PRI.
C10	22-2729	.001 MFD DISC 25V	R104	63-9521-72	1K OHM 5% (ALT. 63-7785 1/2W 10%)	L210	IN T205	3RD IF AM 455 KHz SEC.
C11	22-5879	3.3 PF DISC ±.25 PF 25V	R105	63-9521-72	1K OHM 5% (ALT. 63-7785 1/2W 10%)	L211	IN T206	3RD IF AM 455 KHz SEC.
C12	22-3034	.05 MFD DISC 25V	R106	63-9521-64	470 OHM 5% (ALT. 63-7771 1/2W 10%)	L212	IN T207	RATIO DETECTOR TRANS. 10.7 MHZ PRI.
C13	22-4886	.05 MFD DISC 25V	R107	63-1771	470 OHM 1/2W	L213	IN T207	RATIO DETECTOR TRANS. 10.7 MHZ SEC.
C14	22-3030	.05 MFD DISC 25V	R201	63-9521-68	680 OHM 5% (ALT. 63-7778 1/2W 10%)	L214	IN T207	RATIO DETECTOR TRANS. 10.7 MHZ SEC.
C15	22-4241	.05 MFD DISC 25V	R202	63-9521-68	680 OHM 5% (ALT. 63-7778 1/2W 10%)	T101	96-3307	AM OSCILLATOR TRANSFORMER
C16	22-3762	17 PF DISC ±.5% 500V	R203	63-9521-64	470 OHM 5% (ALT. 63-7772 1/2W 20%)			
C17	22-3034	.05 MFD DISC 25V	R204	63-9521-94	470 OHM 5% (ALT. 63-7806 1/2W 10%)			
C18	22-3177	390 PF DISC 500V	R205	63-9521-94	470 OHM 5% (ALT. 63-7806 1/2W 10%)			
C103	22-3034	.05 MFD DISC 25V	R206	63-9521-64	470 OHM 5% (ALT. 63-7771 1/2W 10%)			
C104	22-3393	.01 MFD DISC 25V	R207	63-9521-72	1K OHM 5% (ALT. 63-7785 1/2W 10%)			
C105	22-5879	3.3 PF DISC ±.25 PF 25V	R208	63-9521-72	1K OHM 5% (ALT. 63-7785 1/2W 10%)			
C106	22-3034	.05 MFD DISC 25V	R209	63-9521-64	470 OHM 5% (ALT. 63-7772 1/2W 20%)			
C107	22-4819	2 PF W4700 ±.25 PF 500V	R210	63-9521-72	1K OHM 5% (ALT. 63-7772 1/2W 20%)			
C108	22-3034	.05 MFD DISC 25V	R211	63-9521-72	1K OHM 5% (ALT. 63-7772 1/2W 20%)			
C201	22-3310	2.7 PF GIMMICK ± 10% 500V	R212	63-9521-72	1K OHM 5% (ALT. 63-7772 1/2W 20%)			
C202	22-5443	.0015 MFD DISC 25V	R213	63-9521-68	680 OHM 5% (ALT. 63-7778 1/2W 10%)			
C203	22-54							



TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-612	F.M.-R.F.
Q2	121-613	F.M. CONVERTER
Q101	121-735	A.M. CONVERTER
Q201	121-614	A.M.-F.M. 1st I.F.
Q202	121-950	A.M.-F.M. 2nd I.F.
Q203		F.M. 3rd I.F.
Q401	121-975	PRE-AMPLIFIER
Q402	121-433	PRE-DRIVER
Q403	121-975	DRIVER
Q404	121-976	OUTPUT
Q405	121-977	
Q451	121-975	PRE-AMPLIFIER
Q452	121-433	PRE-DRIVER
Q453	121-975	DRIVER
Q454	121-976	OUTPUT
Q455	121-977	
IC301	221-79-01 or 221-79	MULTIPLEX DEMODULATOR

TEST POINTS	
A	F.M. ANTENNA INPUT
D	1st F.M. I.F. INPUT
G	3rd F.M. OUTPUT
H	F.M. DETECTOR OUTPUT
H+	RATIO DETECTOR PRIMARY TUNING
L	A.M. R.F. & I.F. INPUT
M	19KHz A.C. GAIN
M1	19KHz D.C. GAIN



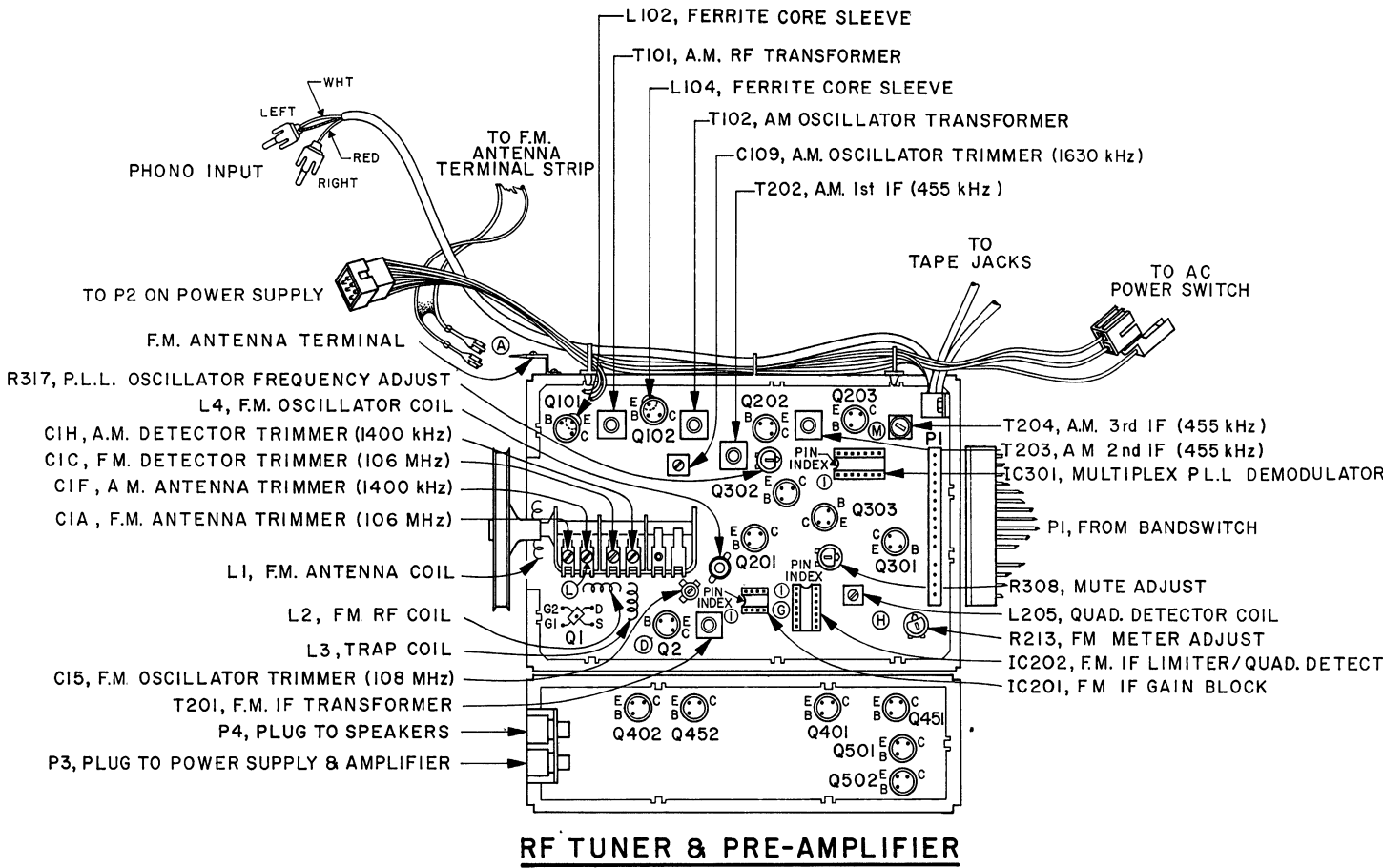
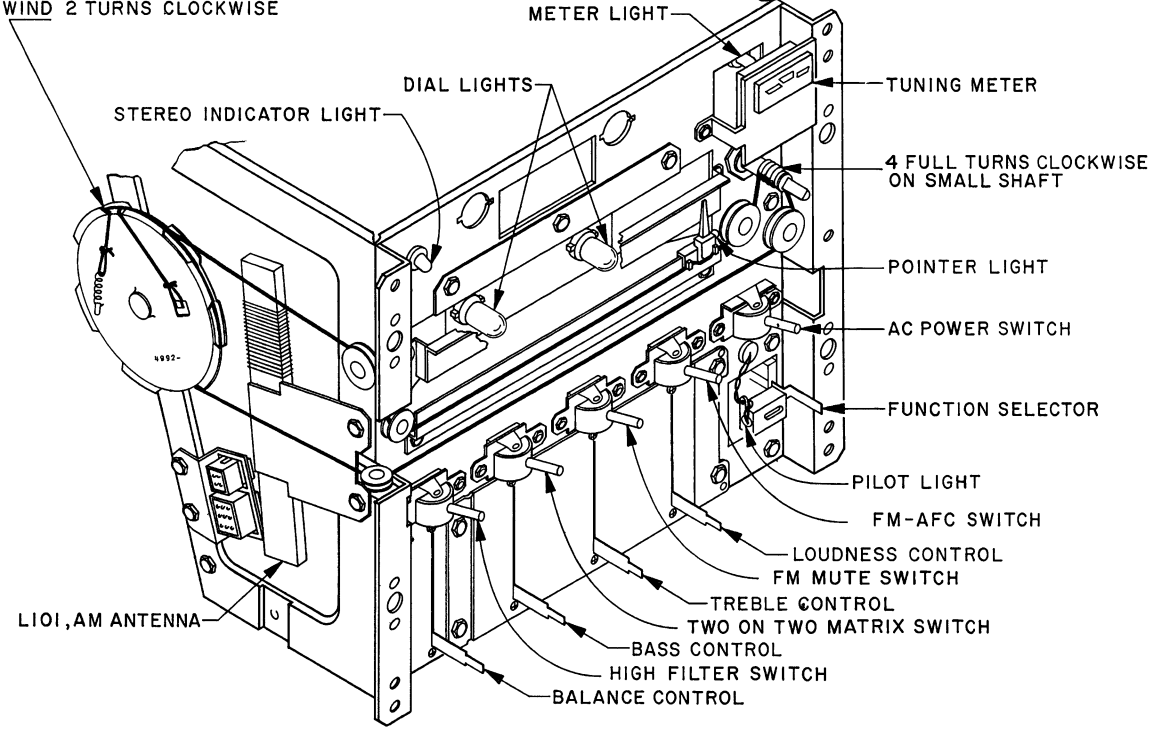
CHASSIS 1WGR50 - CHASSIS LAYOUT

TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	I21-953	FM-RF
Q2	I21-613	FM CONVERTER
Q101	I21-850	AM-RF
Q102	I21-735	AM CONVERTER
Q201		AGC AMPLIFIER
Q202	I21-950	AM 1st IF
Q203		AM 2nd IF
Q301	I21-603	MUTE BUFFER
Q302		MUTE AMPLIFIER
Q303	I21-950	MUTE SWITCH
Q401	I21-433	PRE-AMPLIFIER
Q402		AUDIO AMPLIFIER
Q403	I21-1005	PRE-DRIVER
Q404	I21-877	DRIVER
Q407	I21-1013	
Q408	I21-1012	OUTPUT
Q451		PRE-AMPLIFIER
Q452	I21-433	AUDIO AMPLIFIER
Q453	I21-1005	PRE-DRIVER
Q454	I21-877	DRIVER
Q457	I21-1013	
Q458	I21-1012	OUTPUT
Q501	I21-774	FM POWER SWITCH
Q502	I21-768	
IC201	221-89	FM IF GAIN BLOCK
IC202	221-90	FM IF LIMITER/QUAD. DETECTOR
IC301	221-91	MULTIPLEX PLL DEMODULATOR

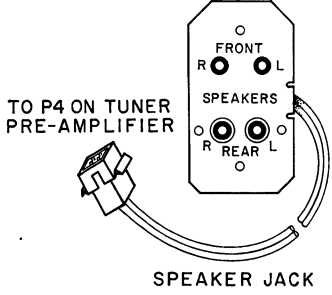
TEST POINTS	
A	FM ANTENNA INPUT
D	FM IF INPUT
G	FM IF OUTPUT
H	FM DETECTOR OUTPUT
L	AM RF INPUT
M	19 kHz OSCILLATOR OUTPUT
AB	AUDIO BIAS
AC	
AD	
AE	

DIAL CORD DRIVE

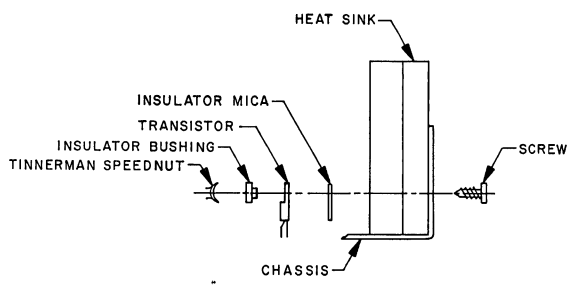
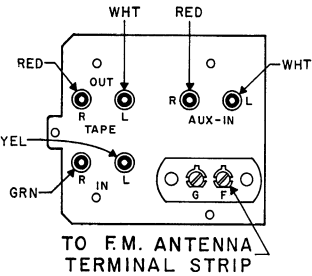
SHOWN IN FULL CLOCKWISE POSITION
WIND 2 TURNS CLOCKWISE



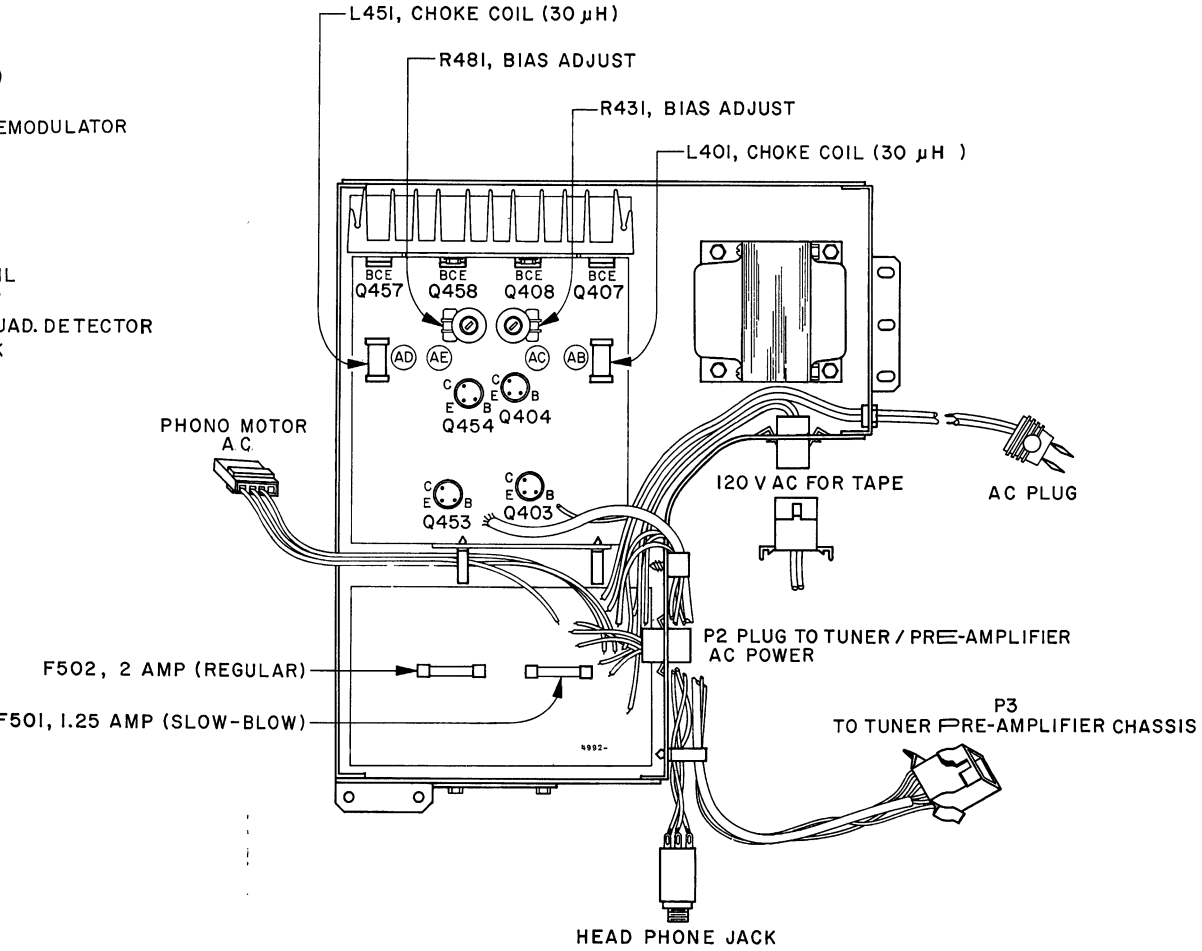
RF TUNER & PRE-AMPLIFIER



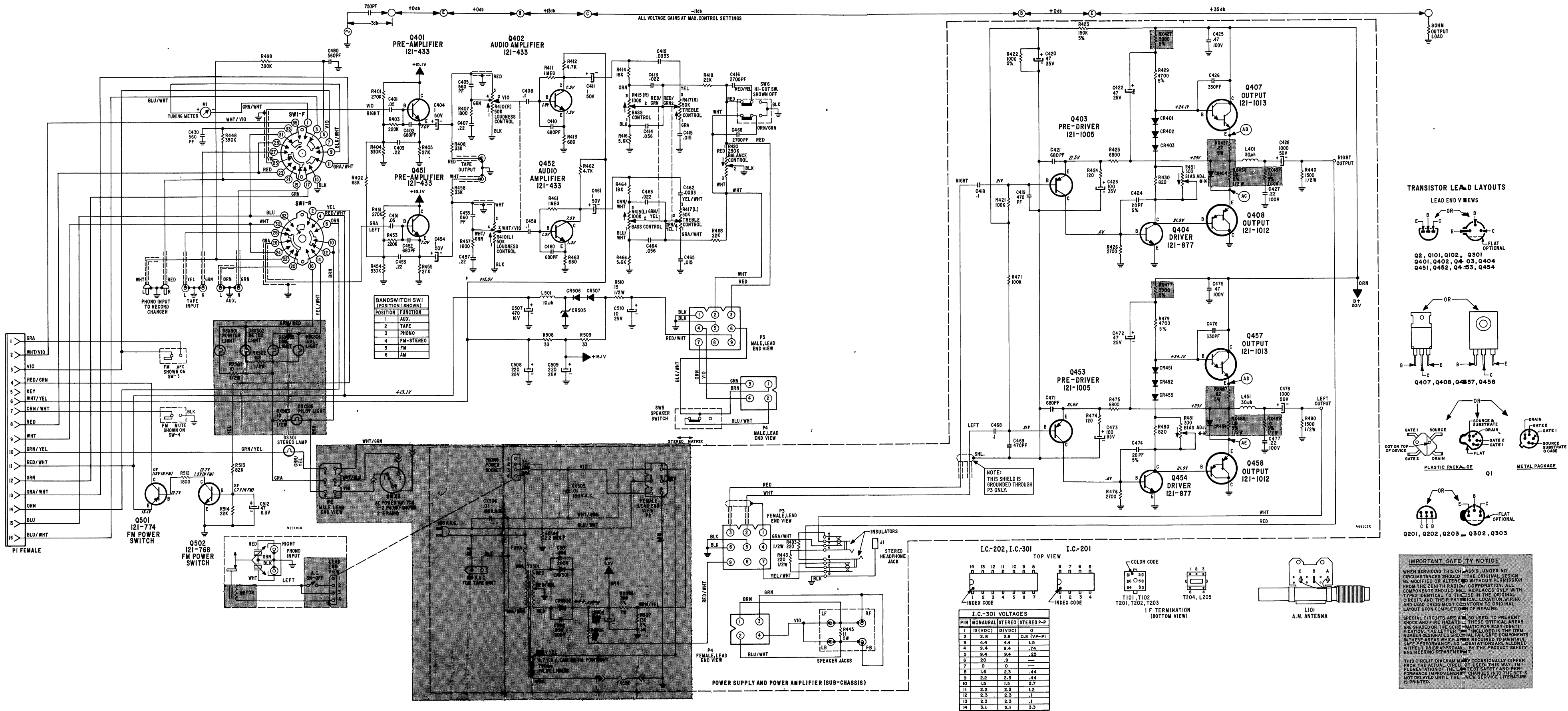
SPEAKER JACK



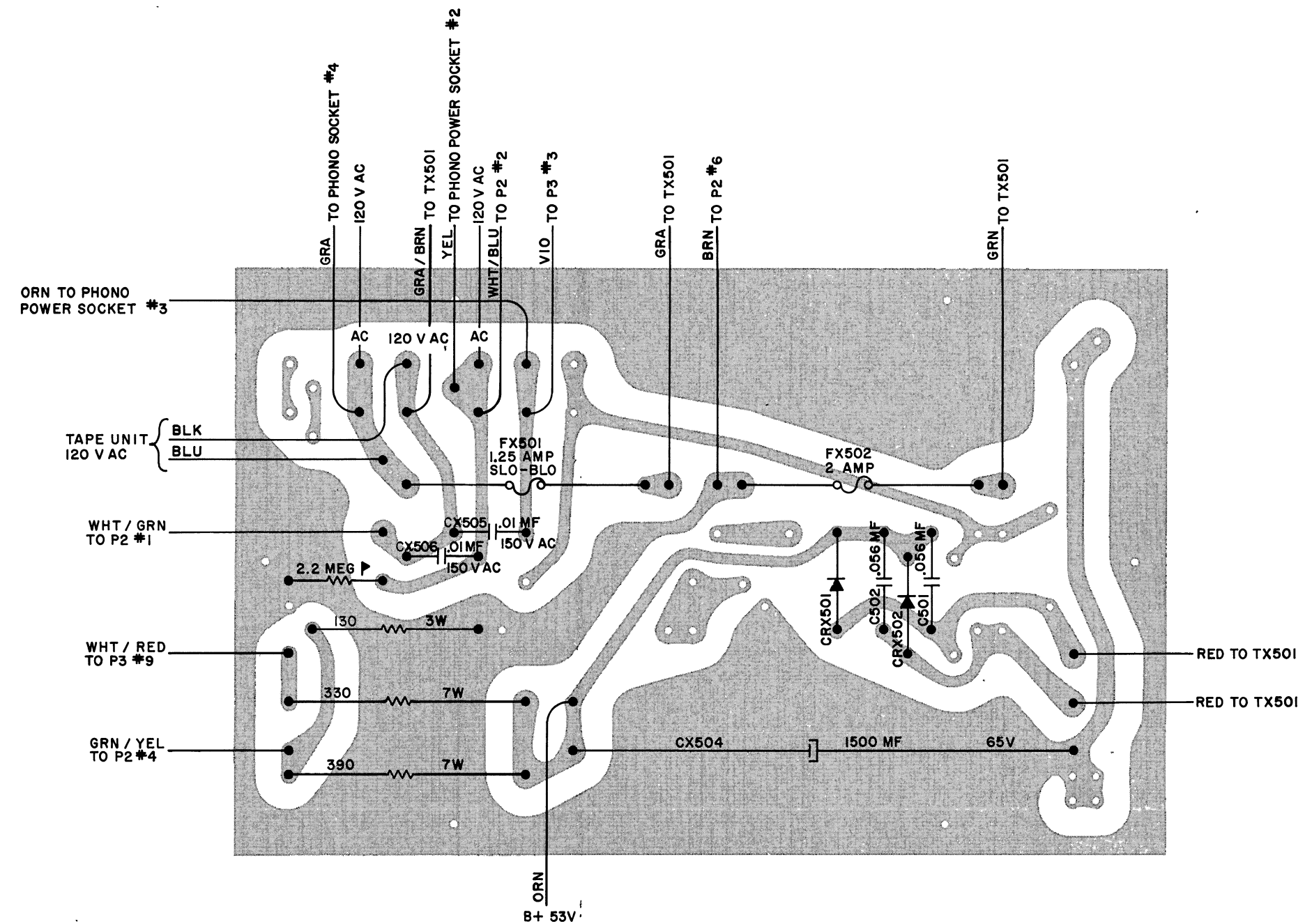
TRANSISTOR MOUNTING VIEW



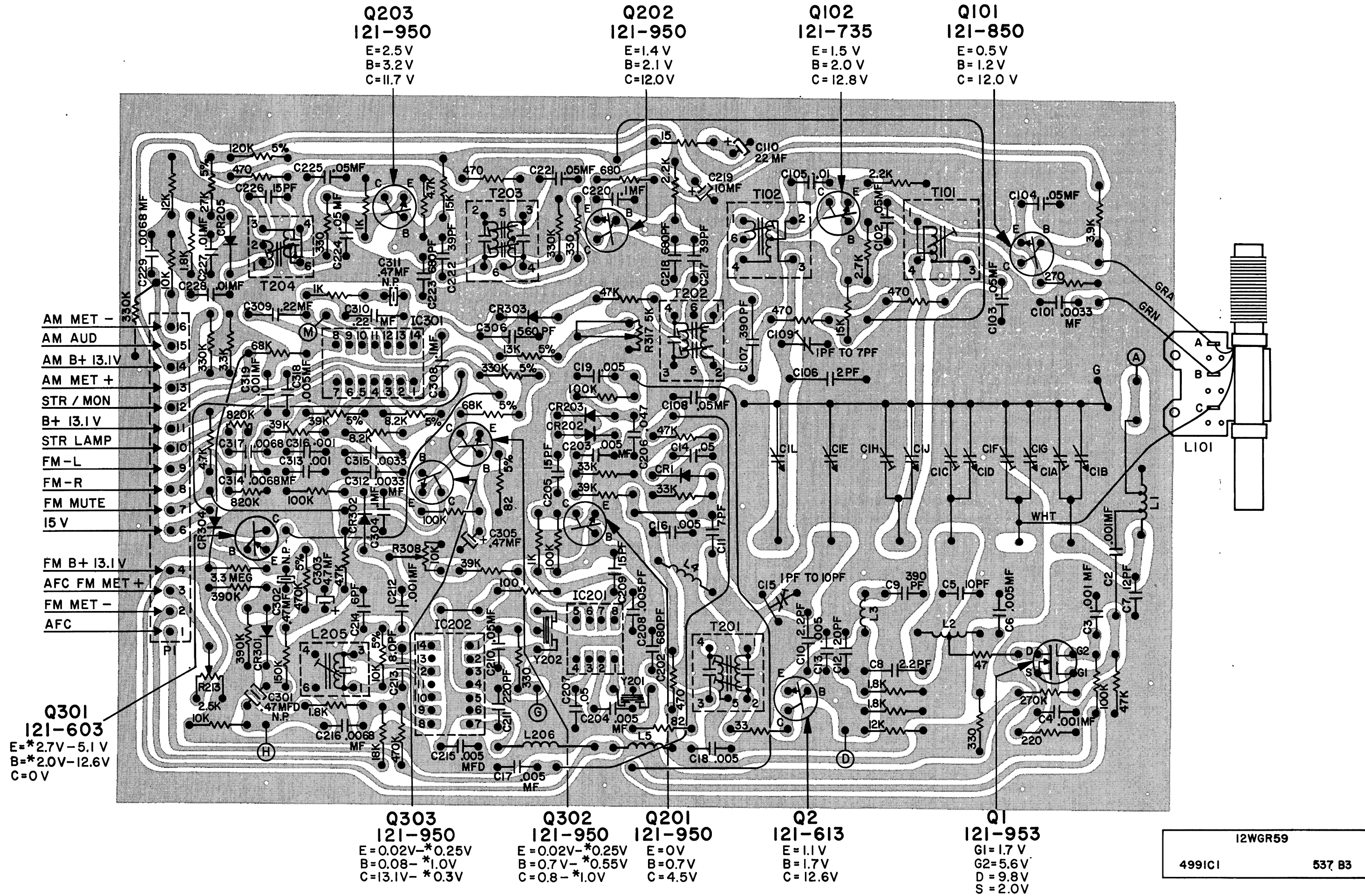
AUDIO AMPLIFIER & POWER SUPPLY



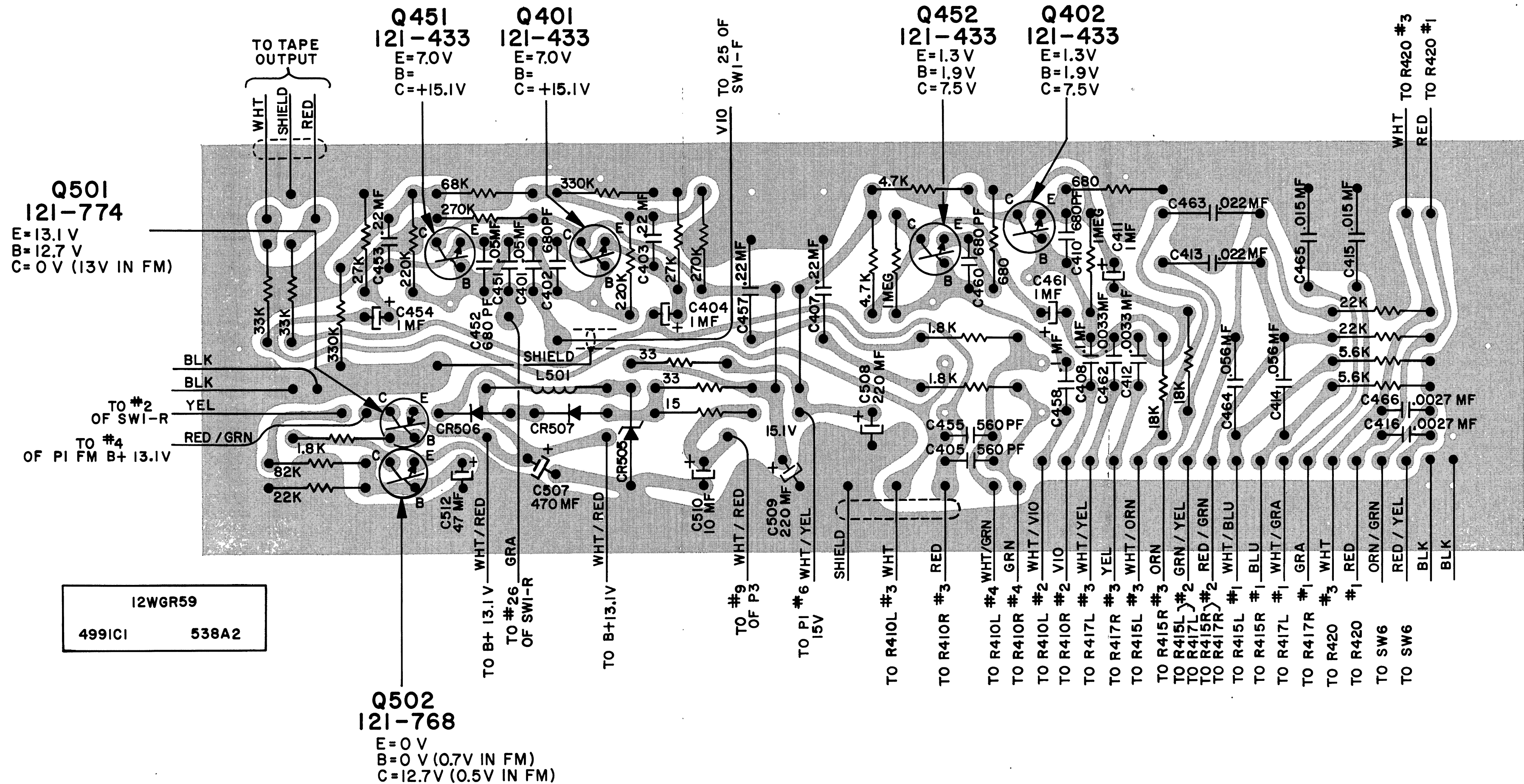
CHASSIS 12WGR59 - SCHEMATIC



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CHASSIS 12WGR59 - CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE - RF/IF/MPX



HF-31S1