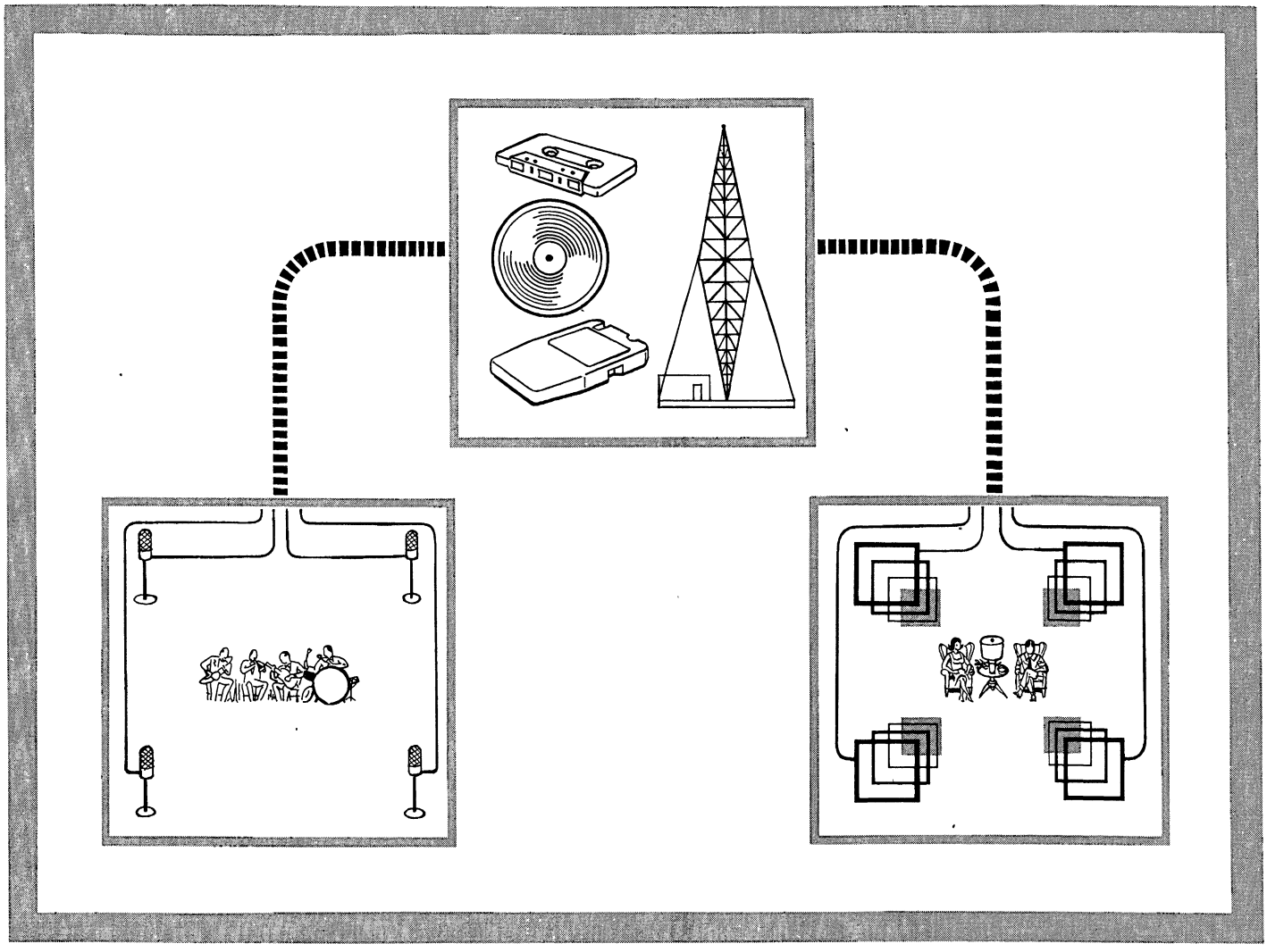
HF-33

ZENITH®

SERVICE MANUAL



MODULAR AND CONSOLE AUDIO PRODUCTS

ZENITH RADIO CORPORATION

PARTS AND SERVICE DIVISION

11000 SEYMOUR AVENUE, FRANKLIN PARK, ILLINOIS 60131

HF 33
25M - RR

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To the Service Technician

PRODUCT SAFETY SERVICING GUIDELINES FOR ALL AUDIO AMPLIFIERS AND RADIO RECEIVERS

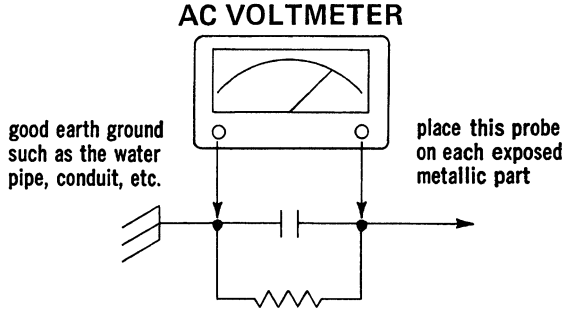
CAUTION: No modification of any circuit should be attempted. Service work should be performed only after you are thoroughly familiar with all of the following safety checks and servicing guidelines. To do otherwise increases the risk of potential hazards and injury to the user.

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 fraved 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.



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TECHNICAL APPLICATIONS 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 Biplex 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, Audio). General Product Information – Audio Circuitry (including Two on Two Speaker Matrix, Allegro Speaker Systems), "G" Line Disassembly Procedures.

HF 31S2: Applications – Four Channel Sound Reproduction Input Vs. Output, Repairing Push Button Switches, Record Changer and Phono Cartridge Inter Changeability, Chassis 12WGR59 Accessibility.

HF 32: Applications – "H" Line Disassembly Procedures, Part Number Identification, Record Changer and Phono Cartridge Interchangeability, Allegro Speaker Systems and Repair Procedures.

HF 33: Theory and Applications – Chassis 3WJR52 (Ceramic Filters, IF IC's for AM and FM, Quadrature Detector, PLL Multiplex IC, Audio). General Product Information – Audio Circuitry (including Output IC), "J" Line Disassembly Procedures.

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PRODUCT FEATURES
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CABINET			CHASSIS		SPEAKERS			RECORD CHANGER	OTHER FEATURES		
MODEL	COLOR	STYLE NOTE A	MODEL	TYPE	PART NUMBER	IMPED. (In Ohms)	QTY. AND SIZE (In Inches)	PART NUMBER NOTE B	TAPE PROVISION NOTE C	SPEAKER PROVISION NOTE D	MISC. NOTE E
J584W	Walnut	M, LL	3WJR51	AM/FM/FM Stereo/Phono	Note D2	—	—	169-554	TM	A1,A2,A3	DL, H, TIO
J584W1	Walnut	M, LL	3WJR51	AM/FM/FM Stereo/Phono	Note D2	—	—	169-512A	TM	A1,A2,A3	DL, H, TIO
J587W	Walnut	M, LL	3WJR52	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-554	8TK-P 169-544	A1,A2,A3	AUX, DL, H, TO
JR587W	Walnut	M, LL	3WJR52	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-554	8TK-R/P 169-546	A1,A2,A3	AUX, DL, H, TO
JR588W	Walnut	M, LL	3WJR52	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-554	CASS - R/P 169-543	A1,A2,A3	AUX, DL, H, TO
J590W	Walnut	M, LL	8WJR57	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-555	8TK-P 169-510C	A1,A2,A3 SPK	AUX, DL,F, H, T,TIO, UNI
JR590W	Walnut	M, LL	8WJR57	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-555	8TK - R/P 169-507-02	A1,A2,A3 SPK	AUX, DL, F, H, T, TIO, UNI
JR590W1	Walnut	M, LL	8WJR57	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-555	8TK-R/P 169-507	A1,A2,A3 SPK	AUX, DL, F, H, T, TIO, UNI
JR591W	Walnut	M, LL	8WJR57	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-555	CASS- R/P 169-539	A1,A2,A3 SPK	AUX, DL, F, H, T, TIO, UNI
J596W	Walnut	M, LL	15WJR29	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-556	8TK-P 169-505B	A2,A3 SPK	AUX, DL, F, H, T, TIO
JR596W	Walnut	M, LL	15WJR29	AM/FM/FM Stereo/Phono/ Tape	Note D2	—	—	169-556	8TK-R/P 169-506B	A2,A3 SPK	AUX, DL, F, H, T, TIO
J635W	Walnut	M	—	Tape	—	—	—	—	8TK-P 169-536-01	—	PL
JR638W	Walnut	M	—	Tape	—	—	—	—	8TK-R/P 169-537-01	—	PL
JR639W	Walnut	M	—	Tape	—	—	—	—	CASS-R/P 169-539	—	PL
JR684W	Walnut	M	8WJR56	AM/FM/FM Stereo/Tape	Note D2	—	—	—	8TK-R/P 169-507-02	A1,A2,A3 SPK	AUX, DL, F, H, T, TIO UNI

PRODUCT FEATURES
SEE NOTES ON PAGE 4

CABINET			CHASSIS		SPEAKERS			RECORD CHANGER	OTHER FEATURES		
MODEL	COLOR	STYLE NOTE A	MODEL	TYPE	PART NUMBER	IMPED. (In Ohms)	QTY. AND SIZE (In Inches)	PART NUMBER NOTE B	TAPE PROVISION NOTE C	SPEAKER PROVISION NOTE D	MISC. NOTE E
JR684W1	Walnut	M	8WJR56	AM/FM/FM Stereo/Tape	Note D2	—	—	—	8TK-R/P 169-507	A1,A2,A3 SPK	AUX, DL, F, H, T, TIO, UNI
J900P	Pecan	C, LL	1WJR55	AM/FM/FM Stereo/Phono/ Tape	49-115302 49-109401	16 45	2-6x9 2-3½	169-557	8TK-P 169-544	—	DL, H
JR900P	Pecan	C, LL	1WJR55	AM/FM/FM Stereo/Phono/ Tape	49-115302 49-109401	16 45	2-6x9 2-3½	169-557	8TK-R/P 169-545	—	DL, H
JR900P1	Pecan	C, LL	1WJR55	AM/FM/FM Stereo/Phono/ Tape	49-115302 49-109401	16 45	2-6x9 2-3½	169-541	8TK-R/P 169-545	—	DL, H
J902P	Pecan	C, LL	1WJR55	AM/FM/FM Stereo/Phono/ Tape	49-115302 49-109401	16 45	2-6x9 2-3½	169-557	8TK-P 169-544	—	DL, H, RS
JR902P	Pecan	C, LL	1WJR55	AM/FM/FM Stereo/Phono/ Tape	49-115302 49-109401	16 45	2-6x9 2-3½	169-557	8TK-R/P 169-545	—	DL, H, RS
J903PN	Pine	C, LL	1WJR55	AM/FM/FM Stereo/Phono/ Tape	49-115302 49-109401	16 45	2-6x9 2-3½	169-557	8TK-P 169-544	—	DL, H, RS
JR903PN	Pine	C, LL	1WJR55	AM/FM/FM Stereo/Phono/ Tape	49-115302 49-109401	16 45	2-6x9 2-3½	169-557	8TK-R/P 169-545	—	DL, H, RS
J915P	Pecan	C, LL	3WJR50	AM/FM/FM Stereo/Phono/ Tape	49-126102 49-125102	8 8	2-8 2-3	169-558	8TK-P 169-544	A1,A2,A3 SPK	A, AUX,DL, H, RS, T, TO
JR915P	Pecan	C, LL	3WJR50	AM/FM/FM Stereo/Phono/ Tape	49-1261-02 49-1251-02	8 8	2-8 2-3	169-558	8TK-R/P 169-545	A1,A2,A3 SPK	A, AUX, DL, H, RS, T, TO
J916M	Maple	C, LL	3WJR50	AM/FM/FM Stereo/Phono/ Tape	49-1261-02 49-1251-02	8 8	2-8 2-3	169-558	8TK-P 169-544	A1,A2,A3 SPK	A, AUX, DL, H, RS, T, TO
JR916M	Maple	C, LL	3WJR50	AM/FM/FM Stereo/Phono/ Tape	49-1261-02 49-1251-02	8 8	2-8 2-3	169-558	8TK-R/P 169-545	A1,A2,A3 SPK	A, AUX, DL, H, RS, T, TO
JR919P	Pecan	C, LL	3WJR50	AM/FM/FM Stereo/Phono/ Tape	49-1261-02 49-1251-02	8 8	2-8 2-3	169-558	8TK-R/P 169-545	A1,A2,A3 SPK	A, AUX, DL, H, RS, T, TO
JR920AE	Antique Oak	C, LL	3WJR50	AM/FM/FM Stereo/Phono/ Tape	49-1217 49-1166	8 8	2-10 2-3½	169-559	8TK-R/P 169-546	A1,A2,A3 SPK	A, AUX, DL, H, RS,T, TO

PRODUCT FEATURES
SEE NOTES BELOW

CABINET			CHASSIS		SPEAKERS			RECORD CHANGER	OTHER FEATURES		
MODEL	COLOR	STYLE NOTE A	MODEL	TYPE	PART NUMBER	IMPED. (In Ohms)	QTY. AND SIZE (In Inches)	PART NUMBER NOTE B	TAPE PROVISION NOTE C	SPEAKER PROVISION NOTE D	MISC. NOTE E
JR922M	Maple	C, LL	3WJR50	AM/FM/FM Stereo/Phono/ Tape	49-1217 49-1166	8 8	2-10 2-3½	169-559	8TK-R/P 169-546	A1,A2,A3 SPK	A, AUX, DL, H, RS, T, TO
JR966P	Pecan	C, LL	15WJR29	AM/FM/FM Stereo/Phono/ Tape	49-1271 49-1166	8 8	2-12 2-3½	169-556-01	8TK-R/P 169-506-01A	A2,A3 SPK	A, AUX, DL, F, H, T, TIO
J1000W1	Walnut	M, SP	—	—	49-1277 49-1278	8 8	1-6½ 1-2	—	—	—	A1
J1000W2	Walnut	M, SP	—	—	49-1249 49-125101	8 8	1-6½ 1-3	—	—	—	A1
J2000W1	Walnut	M, SP	—	—	49-126102 49-1166	8 8	1-8 1-3½	—	—	—	A2
J2000W2	Walnut	M, SP	—	—	49-126102 49-1166	8 8	1-8 1-3½	—	—	—	A2
J3000W1	Walnut	M, SP	—	—	49-1270 49-1166	8 8	1-10 1-3½	—	—	—	A3
J9026W	Walnut	M	—	—	—	—	—	169-556-01	—	—	—
SJ2597P	Pecan	C, 2LL	3WJR50	AM/FM/FM Stereo/Phono/ Tape/ Color Combo	49-1275 49-1166	8 8	2-10 2-3½	169-559	8TK-R/P 169-546	A1,A2,A3 SPK	A, AUX, DL, H, RS, T, TO
SJ2599P	Pecan	C, 2LL	15WJR29	AM/FM/FM Stereo/Phono/ Tape/ Color Combo	49-1275 49-1166	8 8	2-10 2-3½	169-556	8TK-R/P 169-506-01A	A2, A3 SPK	A, AUX, DL, F, H, T, T10

NOTES

NOTE A – CABINET STYLE:
C = Console, M = Modular, LL = Lift Lid, 2LL = Two Lift Lids, SP = Speaker System.

NOTE B – RECORD CHANGERS
Record Changers having alpha suffixes (ie. 169-511A) denote variations of internal mechanical and/or electrical components (refer to Record Changer Features charts on page 5) but otherwise are interchangeable with other alpha suffix and non-suffix versions.

NOTE C – TAPE INPUT AND OUTPUT PROVISIONS:
Factory Installed: 8TK - Eight Track Cartridge.
Cass = Cassette, P = Play, R = Record.
TM = Top of Set Model for installation with the designated console or modular models:
Model J635W – Cartridge Tape Player.
Model J638W – Cartridge Tape Player/Recorder.
Model J639W – Cassette Tape Player/Recorder.

Tape Units having alpha suffixes (ie. 169-510A) denote variations of internal mechanical and/or electrical components (refer to Tape Unit Features charts on pages 6 and 7) but are otherwise interchangeable with other alpha suffix and nonsuffix versions. Units having numeric (ie. 169-506-01) or numeric/alpha (ie. 169-506-01A) suffixes may have a one way interchangeability under some conditions (refer to Product Features charts on pages 2, 3 and 4).

NOTE D – SPEAKER PROVISIONS:
NOTE D1: Models E9012 series, G1000W, G2000W, W11, G3000W, W11, G9012W1, G9014W, G9019W, H1000W series, H2000W series and H3000W series are 8 ohm Allegro Speaker Systems. Allegro Models in the E9014 and E9018 series were 16 ohm systems.

NOTE D2: "J" Line Modular Models may use either J1000W, J2000W, or J3000W series 8 ohm Allegro Speaker Systems (See Speaker Provisions). Use only J2000W or J3000W series systems with Models J596W, JR596W and JR966P.
A1 = Model J1000W Series Allegro 1000 Speaker System may be used.
A2 = Model J2000W Series Allegro 2000 Speaker System may be used.
A3 = Model J3000W Series Allegro 3000 Speaker System may be used.
SPK = Switch to select Internal, External or Both.

NOTE E – 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 certain optional Record Changers or Tape Units listed under Note B.
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.
TIO = Tape Input/Output.
TO = Tape Output.
UNI = Uniband Dial Scale Light.

RECORD CHANGER FEATURES
SEE NOTES BELOW

Part No.	Mfg. Code	Stylus Pressure -Grams-	Cartridge & Stylus Note 2	45 RPM Adapter	Turntable		Function Selector	Record Size/ Selector Note 3	Record Stack Capacity	Base-Plate Color	Turntable Pad Color	Pressure Arm Color	Misc. Features
					RPM Selector	Diameter Inches							
169-512A	BSR	2.5-4.0	142-185 56-638 D	S-72648	33, 45, 78 Slide	11"	Stop, Start, Auto Slide	7, 10, 12 Manual Slide	See Note 5	Black	Black	Black	Cue Lever, Stylus Brush
169-541	VM	3.5-4.5	142-187 56-639 D-S	S-82964	16, 33, 45 78 Slide	10"	Off, On, Rej. Slide	7, 10, 12, M Manual Slide	See Note 5	Black	Black	Black and Silver	Cue Lever
169-554	BSR	3.5-4.5	142-190 56-643 D-S	S-72648	33, 45, 78 Slide	11"	Stop, Start, Auto Slide	7, 10, 12 Manual Slide	See Note 5	Black	Black	Black	Cue Lever
160-555	BSR	3.0-4.0	142-189 56-641 D Note 7	S-72648	33, 45, 78 Slide	11"	Stop, Start, Auto Slide	7, 10, 12 Manual Slide	See Note 5	Black	Black	Black	Cue Lever
169-556	BSR	3.0-4.0	142-189 56-641 D Note 7	S-72648	33, 45, 78 Slide	11"	Stop, Start, Auto Slide	7, 10, 12 Manual Slide	See Note 5	Black	Black	Black	Viscous Cue Lever, Stylus Brush
169-556-01	BSR	3.0-4.0	142-189 56-641 D Note 7	S-72648	33, 45, 78 Slide	11"	Stop, Start, Auto Slide	7, 10, 12 Manual Slide	See Note 5	Black	Black	Black	Viscous Cue Lever, Stylus Brush
169-557	VM	3.5-4.5	142-191 56-642 D-S	S-82964	16, 33, 45, 78 Slide	11"	Off, On, Rej. Rotary	7, 10, 12, M Manual Slide	See Note 6	Black	Black	Black and Silver	Cue Lever
169-558	VM	3.5-4.5	142-192 56-643 D-S	S-82964	16,33,45, 78 Slide	11"	Off, On, Rej. Slide	7, 10, 12, M Manual Slide	See Note 6	Black	Black	Black and Silver	Cue Lever
169-559	VM	3.5-4.5	142-192 56-643 D-S	S-82964	16, 33, 45, 78 Slide	11"	Off, On, Rej. Slide	7, 10, 12, M Manual Slide	See Note 6	Black	Black	Black and Silver	Cue Lever

NOTE:
1. All record changers have 120VAC 60Hz motors.
2. D = Diamond, S = Manufactured Sapphire.
3. When Size Control is in "M", Tone Arm must be placed on record manually.
4. Stylus 56-632 and 56-638 are dual radius diamond stylus with universal truncated tip for playing both LP (33 and 45 RPM) and 78 RPM discs.
5. 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.
6. Record changers will play as many as six (flat and unwarped) records in 12-inch, 10-inch or 7-inch size. Sizes cannot be intermixed.
7. Cartridge 142-189 is of the moving magnet (magnetic) type. Stylus 56-641 has a 0.6 mil spherical tip.

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/MF/Z	8-Track	2	–	–	AC	–	C	A1,C1
169-490B	AMI/MF/Z	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/MF/Z	8-Track	2	–	–	AC	–	W	A2,C1
169-505B	AMI/ML	8-Track	2	–	–	DC/M	–	W	A2,C1
169-505D	AMI/EE	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
169-506B	AMI/ML	8-Track	2	2	Full	DC/M	Full	W	A2,C1,FF,I, M, P2,R
169-506C	AMI/MC/Z	8-Track	2	2	Full	DC/M	Full	W	A1,C1,FF,I, M,P1,R
169-506D	AMI/MC/Z	8-Track	2	2	Full	DC/M	Full	W	A2,C1,FF,I, M,P1,R
169-506-01A	AMI/ML	8-Track	2	2	Full	DC/M	Full	C	A2,C1,FF,I, M,P2,R
169-506-01B	AMI/MC	8-Track	2	2	Full	DC/M	Full	C	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/MC/Z	8-Track	2	2	Full	DC/M	Full	M	A2,C1,FF,I, M,P1,R
169-507-02	AMI/ML	8-Track	2	2	Full	DC/M	Full	M	A2,C1,FF,I, M,P2,R
169-508	AMI/MF	8-Track	2	2	ALC	AC	Four	C	A2,C1,I,R
169-508B	AMI/ML	8-Track	2	2	ALC	DC/M	Four	C	A2,C1,I,R
169-508B	AMI/ML	8-Track	2	2	ALC	DC/M	Four	M	A2,C1,I,R
169-510	AMI/MF	8-Track	2	–	–	AC	–	M	A2,C1
169-510A	AMI/MC/Z	8-Track	2	–	–	AC	–	M	A2,C1
169-510B	AMI/MC/Z	8-Track	2	–	–	AC	–	M	A2, C1
169-510C	AMI/ML	8-Track	2	–	–	DC/M	–	M	A2,C1
169-510E	AMI/EE	8-Track	2	–	–	AC	–	M	A2,C1
169-510F	AMI/MF/Z	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					
169-510G	AMI/MF/Z	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
169-520C	AMI/EE	8-Track	2	–	–	AC	–	M	A2,C1
169-520D	AMI/MF/Z	8-Track	2	–	–	AC	–	M	A2,C1
169-521	AMI/MF	8-Track	2	–	–	AC	–	C	A2,C1
169-521A	AMI/MF/Z	8-Track	2	–	–	AC	–	C	A2,C1
169-521D	AMI/EE	8-Track	2	–	–	AC	–	C	A2,C1
169-521E	AMI/MF/Z	8-Track	2	–	–	AC	–	C	A1,C1
169-521F	AMI/MF/Z	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
169-536-01	AMI/ML	8-Track	2	–	–	DC/M	–	MA	A1,C1
169-536-01A	AMI/ML/Z	8-Track	2	–	–	DC/M	–	MA	A1,C1
169-537	AMI/ML	8-Track	2	2	ALC	DC/M	Four	C	A2,C2,I,R
169-537-01	AMI/ML	8-Track	2	2	ALC	DC/M	Four	MA	A1,C1,I,R
169-537-01A	AMI/ML/Z	8-Track	2	2	ALC	DC/M	Four	MA	A1,C1
169-539	AMI/CA	Cassette	2	2	ALC	DC/E	Tape All	M	A2,C1,E,FF, I,P2,RL,T, TB,TC,TE
169-542	AMI/CW	Cassette	2	2	ALC	DC/E	Tape All	W	A2,C1,E,FF, I,P2,RL,T, TB,TC,TE
169-543	AMI/CW	Cassette	2	2	ALC	DC/E	Tape All	M	A3,C,E, FF,RL,TC
169-544	AMI/ML	8-Track	2	–	–	DC/M	–	M,C	A3,C3
169-545	AMI/ML	8-Track	2	2	ALC	DC/M	Four	C	A3,C3,I,R
169-546	AMI/ML	8-Track	2	2	ALC	DC/M	Four	M,C	A3,C3,FF, I,P2,R

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). Selected by three position slide control.
Four = Stops after fourth program in Record only.
Tape = Tape tension sensor at end of tape in Play and Record only.
Tape All = Stops at end of tape in Play/Record/Fast Forward/Rewind modes.

NOTE D – USED IN
C = Console
M = Modular
MA = Modular Accessory
W = Wedge Modular

NOTE E – MISC. FEATURES
A1 = Parallel Blade AC Connector.
A2 = Molex Type AC Connector.
A3 = Hard Wire Connector.
B = Bias Frequency Switch.
C1 = RCA Type Audio Connector.
C2 = Spade Lug Audio Connector.
C3 = Hard Wire Connector.
E = Eject
FF = Fast Forward Button (Push-Push Type).
I = Interlocked Record Button.
M = Record Level Meter (Illuminated).
P1 = Pause Button (Push In, Slide Left to Lock).
P2 = Pause Button (Push-Push).
Q = Automatic 2/4 Channel Switching, with mode indicator.
R = Ready Light or Auto Stop Light.
RL = Record Light.
T = Tape Run Light.
TB = Tape Bias Switch ($Cr O_2$ / Normal)
TC = Tape Counter.
TE = Tape Equalization Switch ($Cr O_2$ / Normal)

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 inside front cover 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.): 3WJR50, 50Z, 3WJR51, 3WJR52, 52Z, 8WJR56, 8WJR57, 15WJR29.

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 Castall No. 832M heat conductive grease between the transistor and the insulator. Also between the insulator and the chassis. The Castall grease can be obtained in quantities by ordering Part No. 205-303: 8WJR56, 8WJR57, 15WJR29.

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.

7. Check bias adjustment control (on chassis so equipt) if any components have been changed in the pre-driver thru output stages. See schematic for added information.

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 microvolt 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 3WJR51 – Test Point "C" at base of Q1; located between Transistors Q101 (A.M. Converter) and Q201 (1st. I.F.).

Chassis 8WJR56, 8WJR57 – Test Point at junction of R2 and R229; either end of orange wire at pulley end of gang.

Chassis 3WJR51		Chassis 8WJR56, 8WJR57	
Micro Volts Input	Voltage AGC Voltage at Test Point "C"	Micro Volts Input	Reverse AGC Voltage At Gate 2 of FM RF
0	1.23	0	5.4
25	1.10	25	4.5
100	0.88	100	3.3
200	0.79	200	2.85
500	0.71	500	2.5
1K	*0.67	1K	*2.1
5K	0.60	5K	1.22
50K	0.12	50K	0.15
100K	0.06	100K	–0.08

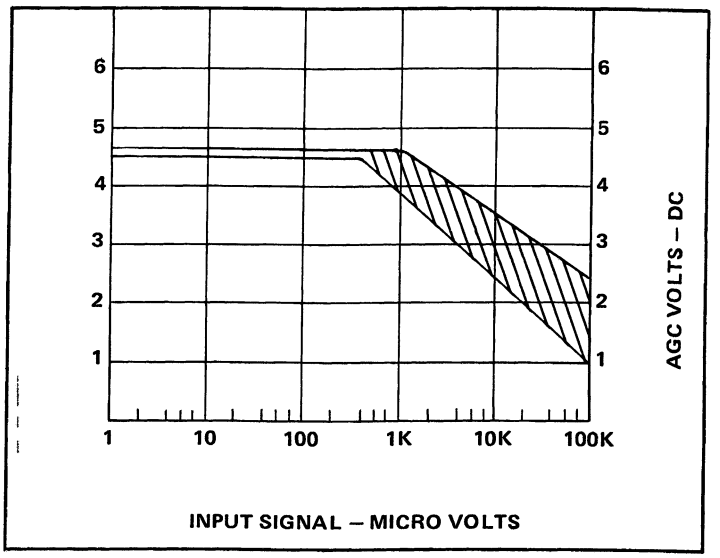
FM AGC VOLTAGE CURVE CHASSIS 1WJR55, 3WJR50, 50Z, 3WJR52, 52Z AND 15WJR29

In past years we provided a table of typical AGC vs. FM input signal voltages measured at a given point in the FM AGC circuit. These voltages would correspond to a given signal level at the FM RF input. Those tables could be provided because of the limited number of transistors in the circuit. Integrated circuits have a large number of transistors included within the chip (compared with a transistor only circuit), and even though all transistors on a given chip can be held to a very tight tolerance among themselves, the tolerances create a unique condition. Voltage developed at the AGC terminal of the IF IC (pin 7 of 221-89 and pin 15 of 221-108) varies depending on the IF voltage sampled in the chip. If a fixed input signal level were applied to several samples of a given chassis model, the measured AGC voltage for that input level will vary among the samples. Voltage measured under these conditions is not a complete indicator of proper AGC action.

As an alternate to the voltage charts, we are now showing a typical AGC Voltage Curve. Two important points must be observed:

1. General shape of the voltage curve (when the voltages are ploted for a curve).

2. AGC voltage will start to drop as the RF input level increases to approximately 1000 microvolts.



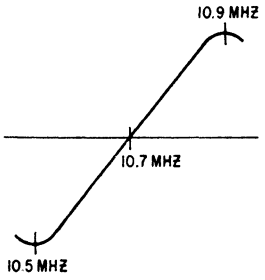
TYPICAL IC AGC VOLTAGES

Chassis 1WJR55		Chassis 3WJR50, 50Z, 3WJR52, 52Z	
Micro Volts Input	AGC Voltage at Test Point "G"	Micro Volts Input	AGC Voltage at Test Point "G"
0	4.70	0	4.78
25	4.65	25	4.70
100	4.65	100	4.65
200	4.58	200	4.58
500	4.50	500	4.50
1K	*4.50	1K	*4.30
5K	3.60	5K	2.72
50K	2.70	50K	1.45
100K	2.45	100K	1.11

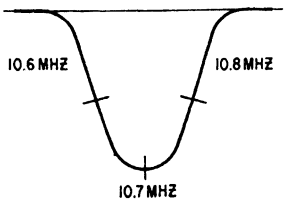
MINIMUM RATED POWER OUTPUT PER CHANNEL INTO 8 OHMS (SINE WAVE CONTINUOUS AVERAGE POWER - OFTEN CALLED RMS POWER)

Chassis	Number of Channels	Watts Per Channel	Power Bandwidth	Total Harmonic Distortion (THD) No More Than
3WJR50, 50Z	2	2.5	100Hz - 10kHz	1.0%
8WJR56	2	7.0	60Hz - 15kHz	1.0%
8WJR57	2	7.0	60Hz - 15kHz	1.0%
15WJR29	2	15.0	40Hz - 18kHz	0.5%

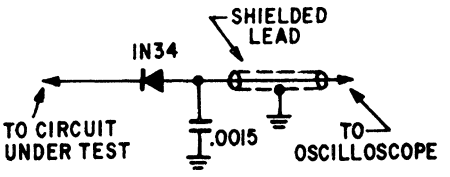
FM/AM/MULTIPLEX ALIGNMENT



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 most AM, IF and RF adjustments. See preferred alignment procedure for Chassis 1WJR55, 3WJR50, 50Z, 3WJR52, 52Z.

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 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, IF AND MPX ALIGNMENT PROCEDURE FOR CHASSIS 1WJR55 , 3WJR50, 50Z, 3WJR52, 52Z

STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT VTVM/ SCOPE TO	INPUT SIGNAL FREQ.	SET DIAL TO	ADJUST	PURPOSE
PREFERRED METHOD – WITH AM SWEEP GENERATOR NOTE: For AM IF Alignment Use AM Sweep Signal Generator Of 10 KHz Deviation, 60 Hz Modulation For Full Bandpass Display. Bandswitch In AM. Also Connect Modulation Frequency To Scope Horizontal. (If AM Sweep Not Available, See Steps 8 Through 16.)							
1	Short Test Point "L" (AM Gang Antenna Section) To Chassis Ground.						
2	Test Point "K" – AM 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 – Detector Output Across R107	± 455 KHz	Gang Closed	–	Adjust Generator To Center Frequency Of Ceramic Filter.
3				Tune Generator To Center Total Bandpass Waveform. Do Not Change Generator Frequency For Remainder Of AM IF Alignment.			
4				Center Freq. Of Ceramic Filter In T102	Gang Closed	L103, L104 (T102)	Adjust For Maximum Gain And Symmetry.
5						T103	Adjust For Maximum.
6	Remove Short Between Test Point "L" And Chassis Ground.						
7	Test Point "L" – AM Ant. Input	As Above	Scope – Detector Output	Center Freq. Of Ceramic Filter In T102	Gang Closed	L102	Adjust For Symmetrical Pattern, With Maximum Attenuation At IF Center Frequency.
ALTERNATE METHOD – IF AM SWEEP GENERATOR IS NOT AVAILABLE NOTE: For AM IF Alignment Use A Signal With 400 Hertz Modulation. Bandswitch In AM.							
8	Short Test Point "L" (AM Gang Antenna Section) To Chassis Ground.						
9	Test Point "K" – AM 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.	VTVM – Detector Output Across R107	± 455 KHz	Gang Closed	–	–
10				Rock Generator While Adjusting L103 (T102 Primary) For Maximum.			Adjust For Maximum.
11				Rock Generator While Adjusting L104 (T102 Secondary) For Maximum.			
12				Repeat Steps 10 & 11 For Minimum Change.			
13				Equal Output Should Be Found If Generator Is Detuned Equal Frequency Each Side Maximum.			
14				Center Freq. Of Ceramic Filter In T102	Gang Closed	T103	
15	Remove Short Between Test Point "L" And Chassis Ground.						
16	Test Point "L" – AM Ant. Input	As Above	VTVM – Detector Output	Center Freq. Of Ceramic Filter In T102	Gang Closed	L102	Adjust IF Trap For Minimum.
17	One Turn Loosely Coupled To AM Wavemagnet Antenna	None		1600 KHz	1600 KHz	C103	Set Oscillator to dial scale.
18				600 KHz	600 KHz	T101	
19				Repeat Steps 17 & 18 for minimum change.			
20				1400 KHz	1400 KHz	C1F	Align Antenna stage.
21				600 KHz	600 KHz	L101 if necessary	
22				Repeat Steps 20 & 21 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 R211 And R302 To Mid Rotation Before Connecting Generator. Connect Generator Cable Ground To Gang Frame.							
23	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"	10.7 MHz	Gang Closed	L201, L202 (T201)	Align I.F. transformer for maximum output and symmetry as indicated in Scope Pattern "B".

RF, IF, AND MPX ALIGNMENT PROCEDURE FOR CHASSIS 1WJR55, 3WJR50, 50Z, 3WJR52, 52Z - Cont'd.

STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT VTVM/ SCOPE TO	INPUT SIGNAL FREQ.	SET DIAL TO	ADJUST	PURPOSE
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 24C.) Minimum Distortion Can Only Be Achieved By Use Of Step 24A Below.							
24	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 Scope. See Fig. 2.	Center Frequency of Ceramic Filter Y201. See Fig. 3	Gang Closed	L204 (on 1WJR55), L203 (on 3WJR50, 50Z, 3WJR52, 52Z)	A. Preferred Method: Distortion Analyzer at Test Point "H" should read minimum distortion, approx. 46 to 55 dB below 0 dB set level.
			B. Scope				B. Alternate Method: Adjust for linear scope trace - no curve at ends of trace. Disregard meter reading.
			C. Scope				C. Alternate Method: Adjust for maximum length and symmetry, similar to Scope Pattern "A".
25			Test Point "H"			R211	Adjust for center reading on Tuning Meter On Chassis 3WJR50, 50Z; Or For Null With VTVM Connected Between Points "AFC" and "AFC REF" On Chassis 1WJR55, 3WJR52, 52Z.
26	Test Point "A" FM Antenna Post (Disconnect Antenna)	300 Ohm		106 MHz	106 MHz	C14	Set Oscillator to dial scale.
27				90 MHz	90 MHz	L4	
28				Repeat Steps 26 & 27 for minimum change.			
29				106 MHz	106 MHz	C1C	Align FM Detector stage for maximum.
30				90 MHz	90 MHz	L2 if necessary	
31				106 MHz	106 MHz	C1A	Align FM Antenna stage for maximum.
32				90 MHz	90 MHz	L1 if necessary	
33				Repeat Steps 31 & 32 for minimum change.			
NOTE: Apply Sufficient Signal Level — Approx. 100 Microvolts — To Obtain Full Limiting At Point Near 98 MHz.							
34			Frequency Counter and/ or Scope	Unmodulated RF Carrier		R302	A. Frequency Counter should read 19 KHz, ± 100 Hz.
			Test Point "M"				B. Alternate Method: Connect Test Point "M" Signal to scope vertical and an accurate 19 KHz signal to scope horizontal input. Adjust for one square synchronized waveform.
35			Scope and/or AC VTVM	98 MHz 10% Pilot (L+R) (L−R) (L Only)		—	Check for separation. Maximum left output.
			Left Tape Output				
36			Right Tape Output.				Check for separation. Minimum right output.
NOTE: Do Not Readjust Control R302 After Step 34.							

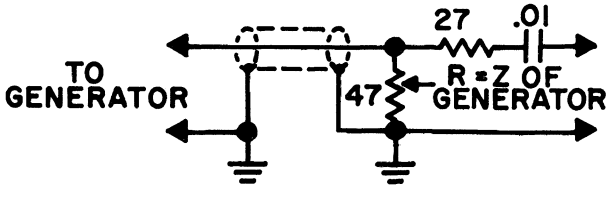


FIGURE 1. — RF INPUT PROBE

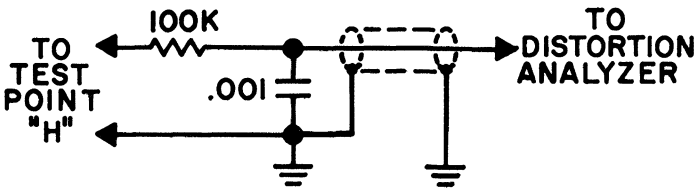


FIGURE 2 — DE-EMPHASIS PROBE

CERAMIC FILTERS CHASSIS 1WJR55, 3WJR50, 50Z, 3WJR52, 52Z			
PART NO.	COLOR CODE	NOMINAL CENTER FREQUENCY	FREQUENCY RANGE
224-2	Black	10.64 MHz	10.61 to 10.67 MHz
224-2-01	Blue	10.67 MHz	10.64 to 10.70 MHz
224-2-02	Red	10.70 MHz	10.67 to 10.73 MHz
224-2-03	Orange	10.73 MHz	10.70 to 10.76 MHz
224-2-04	White	10.76 MHz	10173 to 10.79 MHz

FIGURE 3 — CERAMIC FILTER TABLE

RF AND IF ALIGNMENT PROCEDURE
CHASSIS 3WJR51, 8WJR56, 8WJR57

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				535KHz	Gang Closed	T101	Set Oscillator to dial scale.
3				1630KHz	Gang Open	C1G	
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	Base of Q2 Test Point "D"		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						L205 & L206 (T203)	
10						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 8WJR56, 8WJR57, No Signal Input.							
20	None	None	None	None	None	R233	Zero center tuning meter.

MULTIPLEX ALIGNMENT PROCEDURE

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.

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.
						NOTE: — Stereo Indicator Lamp may be on or off during the above steps.	
2				98 MHz 5% Pilot		R302	Adjust mute control to point where stereo lamp lights up.
						NOTE: — Stereo Indicator Lamp must remain on during the following steps.	
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.			To provide maximum separation.

RF, IF AND MPX ALIGNMENT PROCEDURE FOR CHASSIS 15WJR29

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. B. Scope C. Scope Test Point "H"	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. Alternate Method: Adjust L205 for linear scope trace - no curve at ends of trace. Disregard meter reading. 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 15WJR29 – 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 VTM 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.							

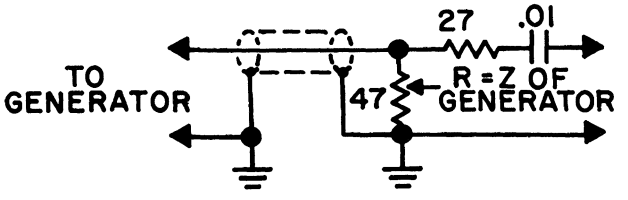


FIGURE 1. – RF INPUT PROBE

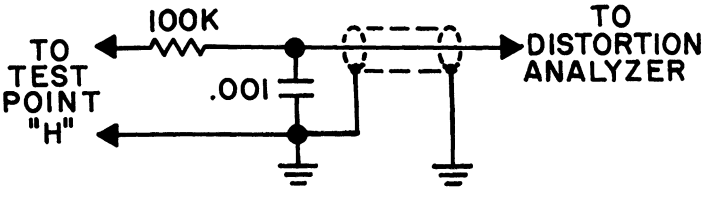


FIGURE 3 – DE-EMPHASIS PROBE

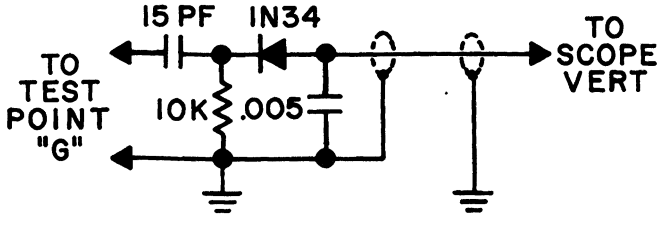


FIGURE 2. – DIODE DETECTOR PROBE

CERAMIC FILTERS – CHASSIS 12WJR29			
NOTE: BOTH CERAMIC FILTERS IN A GIVEN CHASSIS MUST BE THE SAME PART NUMBER AND COLOR CODE.			
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

SECTION FOUR

THEORY AND APPLICATIONS

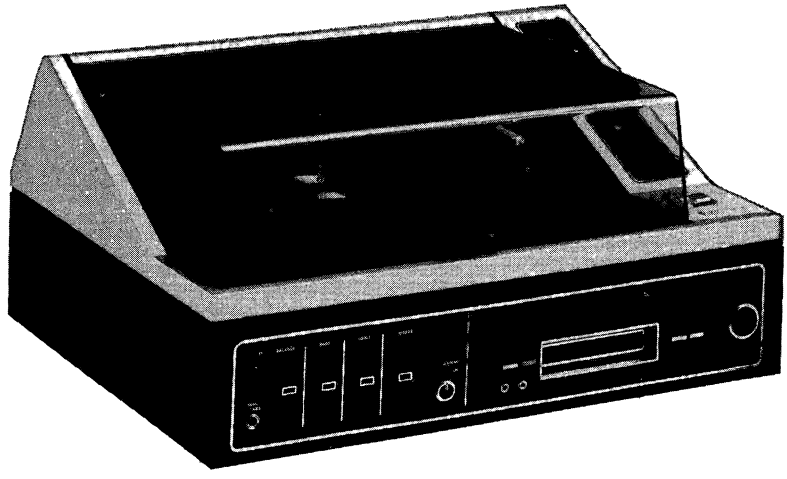


FIGURE 1 – MODEL JR587W

INTRODUCTION

"J Line" chassis can be divided into three basic catagories:

1. Continued chassis designs.
2. Modified chassis designs.
3. New chassis designs.

Table A provides a ready comparison between the various "J Line" chassis, as well as a comparison with corresponding "H Line" chassis. Chassis 3WJR51 is the only design concept that is continued without change from the "H Line".

RF/IF/MPX circuitry of Chassis 1WJR55, 3WJR50 and 3WJR52 is basically the same. However, the mechanical layout of each chassis and their physical locations in the cabinet are significantly different. Some of these differences will be illustrated as we proceed through this service manual. In order to facilitate understanding, explanations will be in the following subject groups:

1. Chassis 3WJR50, 50Z and 3WJR52, 52Z RF/IF/MPX/ Audio. Discussions of Chassis 3WJR52 will also apply to the Chassis 3WJR50 Series, except as noted.
2. Chassis 1WJR55 Audio. The greatest number of technological advances incorporated in a new "J Line" chassis includes design concepts introduced in the "J Line" "Mini Wedge" plus an audio output IC not previously used in any of our Stereo Audio Products.
3. Chassis 8WJR56, 8WJR57 and 15WJR29. New Magnetic Phono Preamp, and increased power output.
4. Chassis 8WJR56 and 8WJR57. Audio circuitry includes Hi Cut and Lo Cut Switches.
5. Models J587W, JR587W and JR588W. Disassembly procedures.
6. Models J596W and JR596W. Disassembly procedures.
7. Other modular models, disassembly procedures.

CHASSIS 3WJR52

In the "G Line", "Wedge" Modular models G596W and GR596W (using Chassis 12WGR59) were introduced. These were followed by their "H Line" counterparts, Chassis 12WHR29, used in Modular Models H596W and HR596W, as well as in Console Model HR966P. Those two chassis incorporated several state of the art concepts making a first appearance in a Zenith Stereo Audio Product and those concepts will be continued in "J Line" Models J596W, JR596W and JR966P. Among new concepts that were introduced in "G and H Line" "Wedge" chassis were the following:

1. Separate RF and IF circuits for AM and FM.
2. Separately mounted AM Oscillator Trimmer.
3. Ceramic Filters in the FM IF.
4. Integrated Circuit IF Gain Block.
5. Integrated Circuit IF Limiter and Quadrature Detector.
6. Integrated Circuit Phase Locked Loop (PLL) Multiplex Detector.

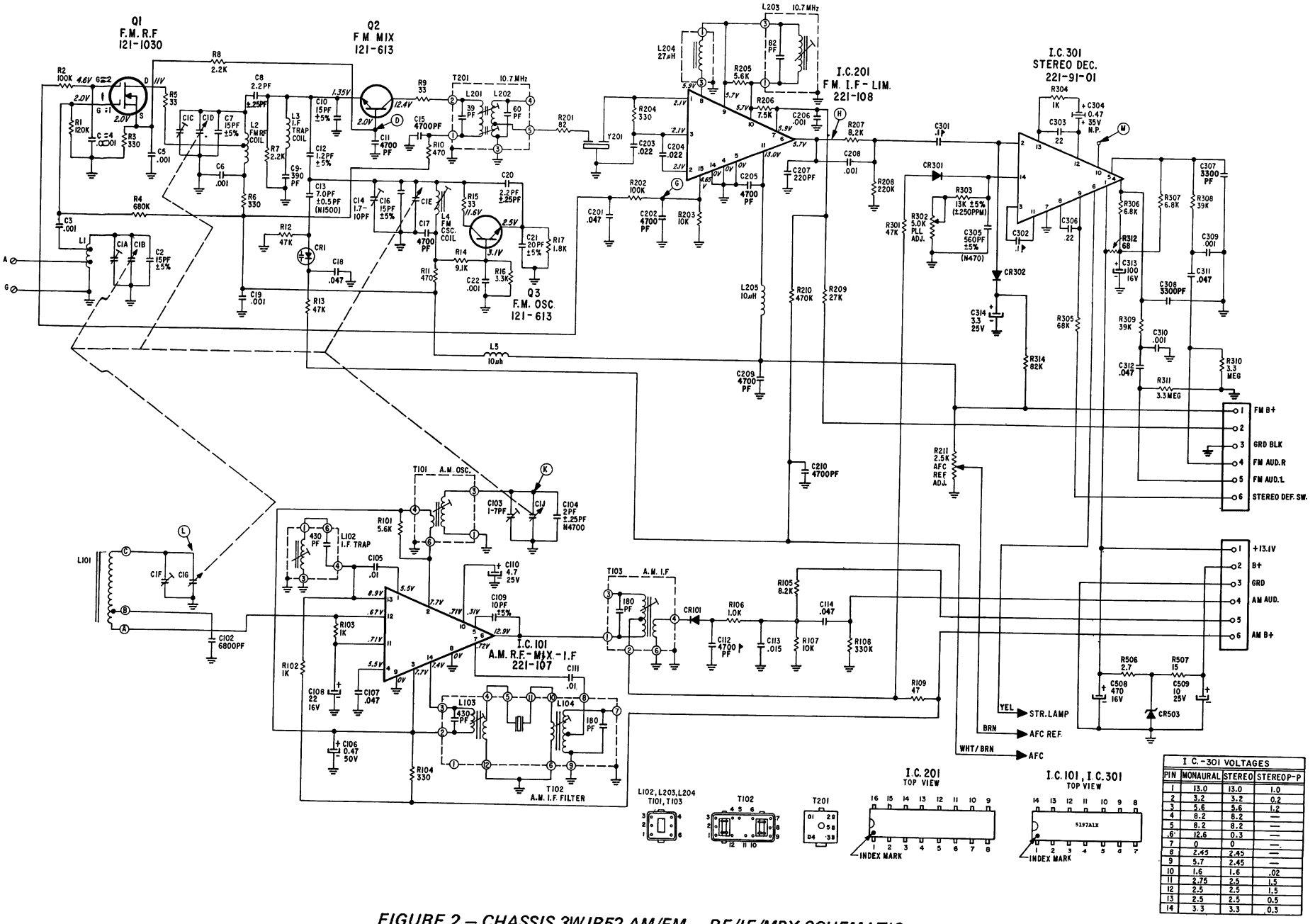
TABLE A – "J LINE" STEREO CHASSIS COMPARISON

CHASSIS	MODELS	DESCRIPTION
1WJR55	Consoles J900P JR900P JR900P1 J902P JR902P J903PN JR903PN	New one circuit board chassis. FM uses separate Bipolar RF, Oscillator and Mixer transistors with one IF IC and one PLL Multiplex IC. AM uses one IC for RF, Oscillator, Mixer and IF. Audio uses one transistor and one Output IC in each channel.
3WJR50, 50Z	Consoles J915P JR915P J916M JR916M JR919P JR920AE JR922M	New two circuit board chassis with boards being common to both chassis. FM uses separate Dual Gate MOSFET RF, Bipolar Oscillator and Mixer transistors with one IF IC and one PLL Multiplex IC. AM uses one IC for RF, Oscillator, Mixer and IF. Audio uses discrete transistor circuitry. Chassis 3WJR50 is also provided with a tuning meter.
3WJR52, 52Z	Modulars J587W JR587W JR588W	
3WJR51	Modulars J584W J584W1	Chassis continued similar to "H Line" 3WHR50 and 3WHR52.
8WJR56	Modulars JR684W JR684W1	Chassis similar to 6WHR56, 6WHR57 and 12WHR29 but with the addition of a preamp circuit (bipolar transistors) for a magnetic phono cartridge and also an increase in the rated power output.
8WJR57	Modulars J590W JR590W JR590W1 JR591W	
15WJR29	Modulars/Console J596W JR596W JR966P	

New "J Line" chassis designs exhibit changes in both mechanical structure and electronic circuitry. "Mini-Wedge" Models J587W, JR587W and JR588W use Chassis 3WJR52. Model JR587 is illustrated in Figure 1. As you will note, this model continues the "Wedge" concept, but at a reduced size, resulting in a "Mini-Wedge" appearance. Mechanical structure of Models J587W, JR587W, JR588W and Chassis 3WJR52 will be discussed in some detail later, but for now we will look at the chassis electronics. Features listed above for Chassis 12WGR59 and 12WHR29 provide some insight as to what may be expected in the "Mini-Wedge" concept. (Chassis 3WJR50 has a tuning meter in addition to the same circuitry as chassis 3WJR52.)

Features included in Chassis 3WJR52 are:

1. Separate RF and IF circuits for AM and FM.
2. One Integrated Circuit for AM RF/Oscillator/Mixer/IF (IC101).
3. Separately mounted AM Oscillator Trimmer (C103).
4. Ceramic Filter in AM IF (Part of T102).
5. Separate FM RF, Oscillator and Mixer Transistors (Q1, Q2, Q3).
6. Ceramic Filter in FM IF (Y201) and only one FM IF Transformer (T201).
7. One Integrated Circuit for FM IF Gain Block, Limiter and Quadrature Detector (IC201) with one adjustable coil (L203).



I C.-301 VOLTAGES			
PIN	MONAURAL	STEREO	STEREOP-P
1	13.0	13.0	1.0
2	3.2	3.2	0.2
3	5.6	5.6	1.2
4	8.2	8.2	—
5	8.2	8.2	—
6	12.6	0.3	—
7	0	0	—
8	2.45	2.45	—
9	5.7	2.45	—
10	1.6	1.6	.02
11	2.75	2.5	1.5
12	2.5	2.5	1.5
13	2.5	2.5	0.5
14	3.3	3.3	0.3

FIGURE 2 – CHASSIS 3WJR52 AM/FM – RF/IF/MPX SCHEMATIC

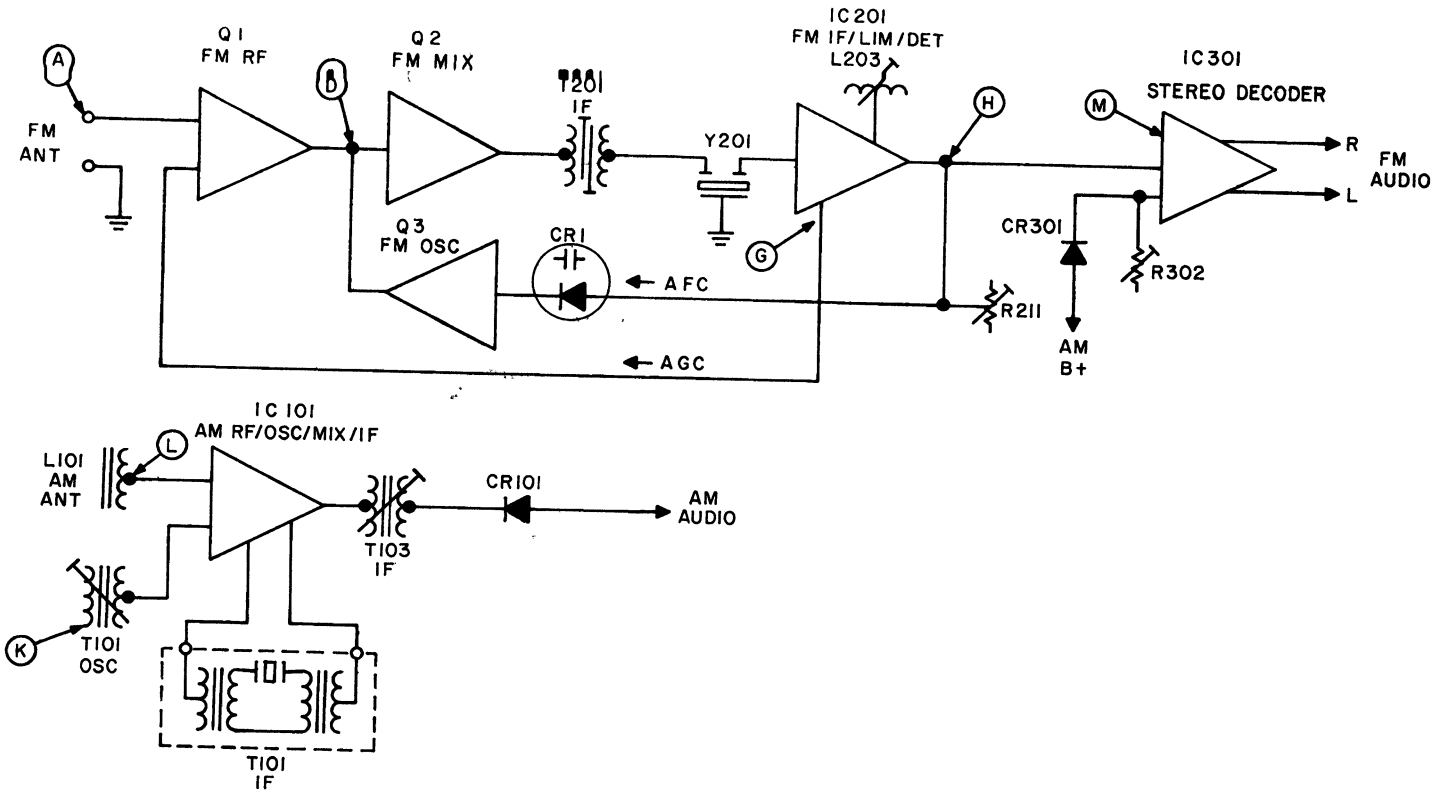


FIGURE 3 – CHASSIS 3WJR52 BLOCK DIAGRAM

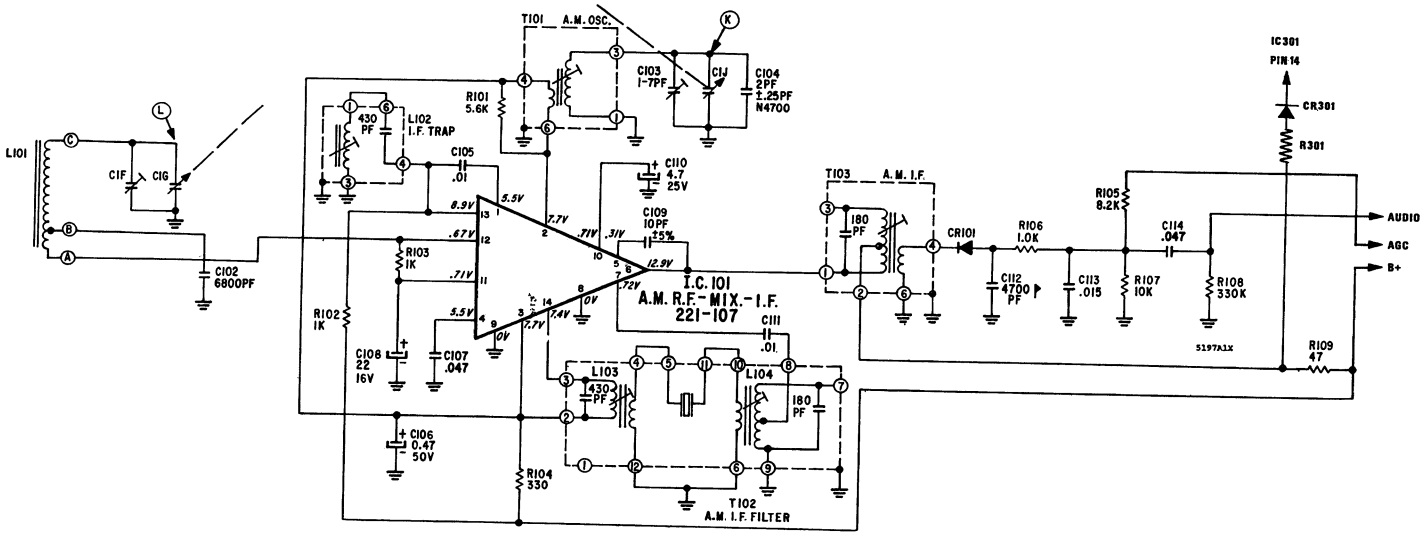


FIGURE 4 – CHASSIS 3WJR52 AM RF/IF SCHEMATIC

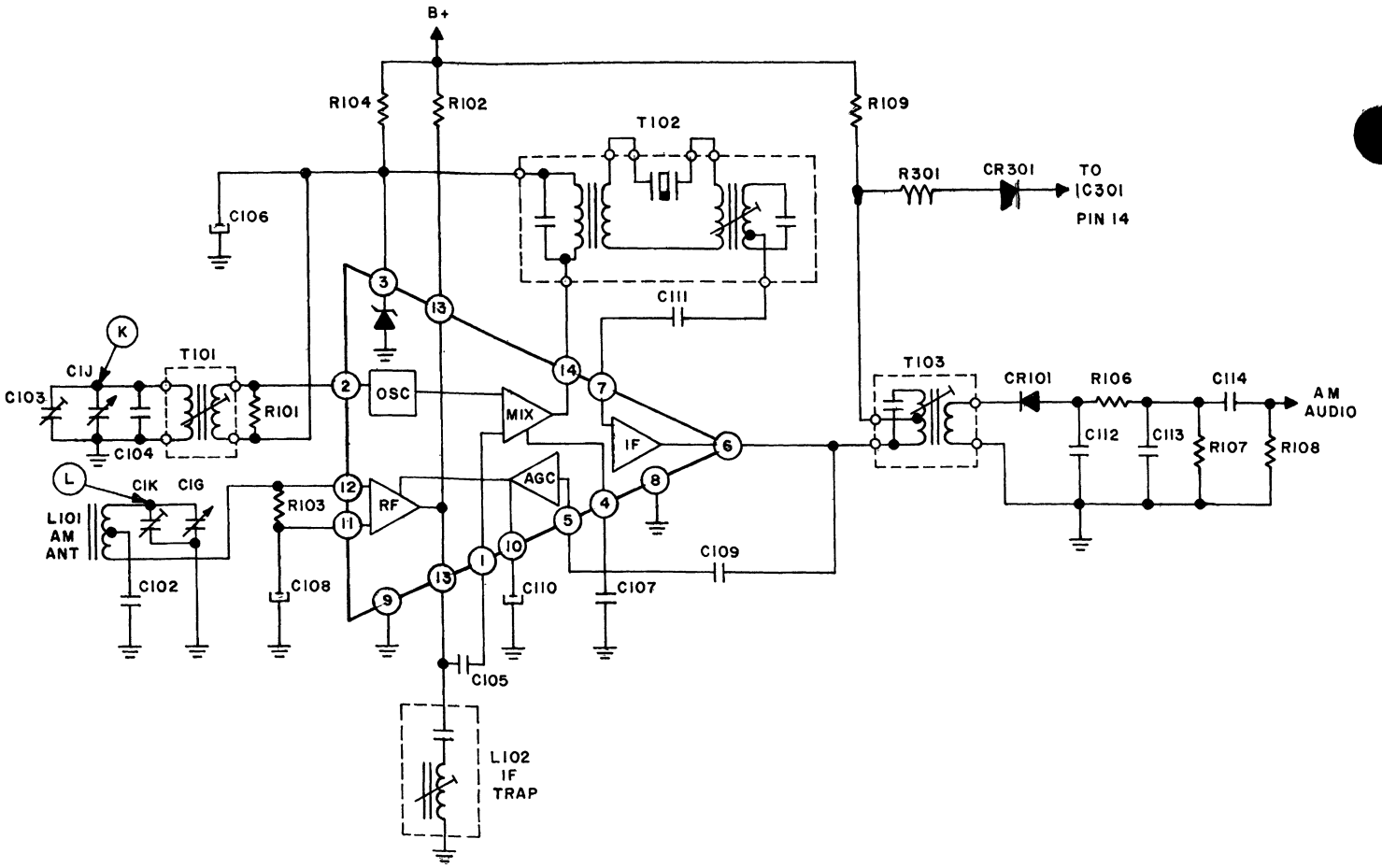


FIGURE 5 – AM RF/OSC/MIX/IF IC BLOCK WITH EXTERNAL COMPONENTS

8. One Integrated Circuit for Phase Locked Loop (PLL) Multiplex Detector (IC301) with one variable resistor adjustment (R302).

RF/IF/MPX

As in the "G and H Line Wedges", the new "J Line Mini-Wedge" (Chassis 3WJR52) continues the use of separated RF and IF circuitry for FM and AM. This is illustrated by the RF/IF/MPX schematic in Figure 2, as well as the Block Diagram in Figure 3.

AM RF/OSCILLATOR/MIXER/IF

Most noticeable change in the "J Line" AM circuitry is introduction of a single Integrated Circuit to handle RF/Oscillator/Mixer/IF functions on the AM band (See Figure 4). Figure 5 illustrates the same circuit redrawn to identify the various functions interconnected within the Integrated Circuit (IC101), and also includes external circuitry. RF signal voltage developed across the AM Antenna (L101) is connected to IC101's RF Amplifier, via pin 12, where it is amplified and fed to pin 13. Amplified RF is coupled, from pin 13, via C105, to pin 1 and then to the internal Mixer. Also at pin 13 is a 455 kHz trap (L102) which is designed to remove any 455 kHz signals present at the output of the RF Amplifier. The Local Oscillator, with an external tank circuit at pin 2, is connected internally to the Mixer. Output of the Mixer at pin 14, is coupled to the 1st IF Transformer (T102). This transformer is not only double tuned, but also contains a Ceramic Filter within the transformer can.

NOTE: When aligning IF circuits containing ceramic filters, in either the AM or FM IF circuit of this chassis, it is important that the alignment be done at the center frequency of that filter. To do otherwise will reduce the circuit performance. See additional comments under FM-IF Ceramic Filters.

AM IF signals from T102 are coupled back to the chips IF Amplifier, via pin 7, where it is amplified. The signal then leaves the IC at pin 6 going to AM Detector Transformer T103 and AM Detector Diode CR101. Signal at pin 6 is sampled, via C109, to be used in the internal AGC Amplifier whose input is connected at pin 5. Output of the AGC Amplifier is then internally coupled to the RF Amplifier providing overload protection. A Zener Diode is also located within IC101 (connected at pin 3). Capacitor C110 is the AGC bypass.

When B+ is applied to the AM circuitry, via the bandswitch, a portion of that voltage is applied via R109 and R301, to forward bias CR301, placing a positive voltage on pin 14 of Multiplex chip IC301. This will turn-off the Voltage Controlled Oscillator (VCO) in IC301, thereby preventing possible "birdies" when the receiver is in the AM mode.

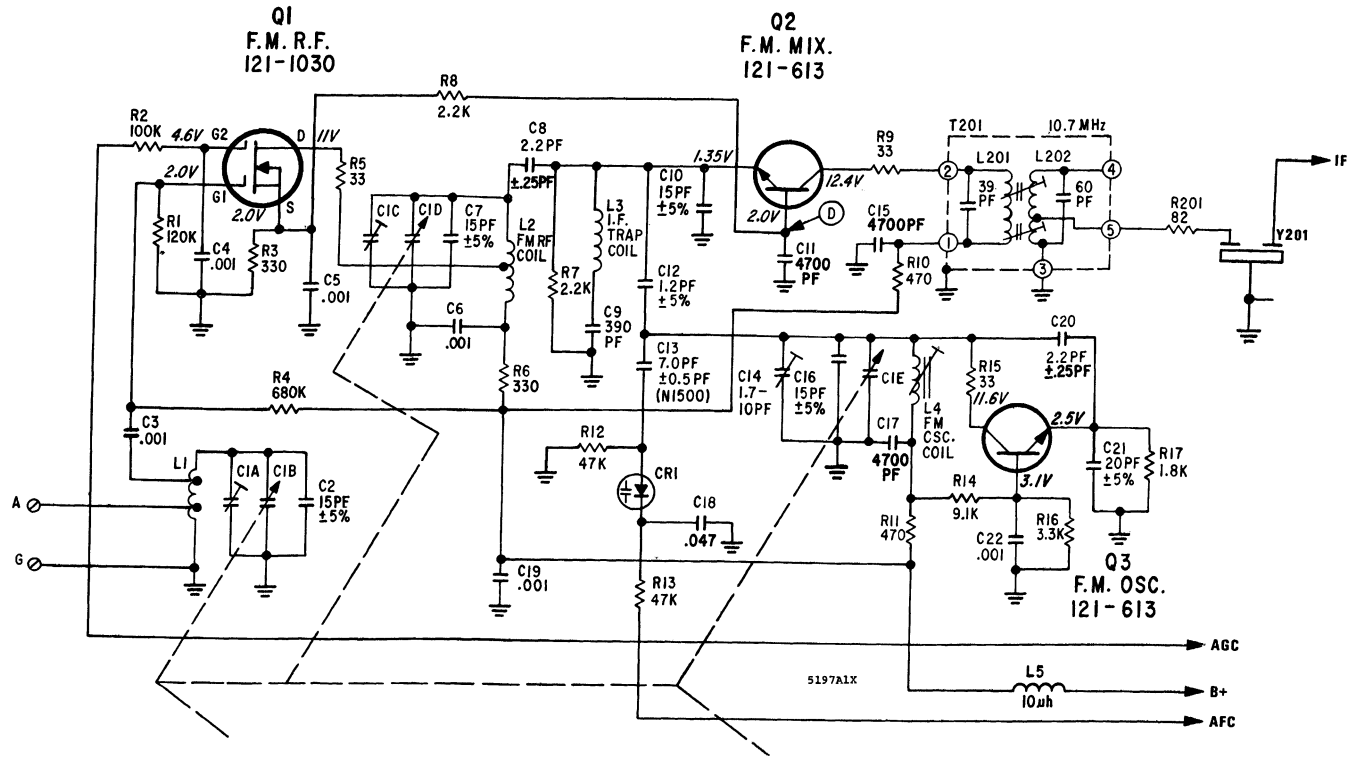


FIGURE 6 – CHASSIS 3WJR52 FM RF SCHEMATIC

FM – RF

Q1, the RF amplifier, is a Dual Insulated Gate MOS Field Effect Transistor (See Figure 6). FM Antenna coil (L1), FM RF coil (L2), and Oscillator coil (L4) are all precisely tuned to insure that the tuner will reject unwanted and undesired combinations of RF signals present in many areas due to todays complex communication systems. Coil L3 is part of a 10.7 Megahertz trap in the emitter lead of the Mixer transistor (Q2).

Under no signal conditions, voltages are applied as follows to the MOSFET elements of Q1. Resistors R1 and R4 form a voltage divider across the B+ line providing a fixed bias to Gate 1 (G1). The FM RF signal from L1 is also applied to G1. Delayed AGC voltage from pin 15 of the FM IF IC201 is applied, via R202 and R2, to G2 of Q1. Under no signal conditions the G2 voltage will be approximately 4.6 volts. Q1 drain voltage is applied from B+ via R6, the RF coil L2 and R5.

At this point lets recap the existing voltage conditions:

Gate 1 to Source	– approx.	–0.0 volts,
Gate 2 to Source	– approx.	+2.6 volts,
Drain to Source	– approx.	+9.0 volts,
Drain current	– approx.	10 milliamp.

(A variation can be expected due to circuit component tolerances.)

As the gain of the IF stages in IC201 increases, reverse AGC voltage will be developed at IC201 (pin 15) and applied to the gate terminal (G2) of the RF Amplifier Q1. This increasing AGC voltage, when added to the gate bias voltage, will cause the gate voltages to go more negative, driving the FET toward cut-off. When this occurs, the current flow is reduced, thereby reducing the FET's gain. This stage is designed for optimum circuit performance and minimum noise. In this application, the drain current is at approximately one-half of the saturation current.

MOSFET PROTECTION

When these devices are being handled out of circuit, it is possible for static charges to build up between gate and source. This charge could reach a value which would exceed the gate breakdown voltage. To reduce this condition, MOSFET'S of early design would be shipped with all leads twisted together, or with a wire wrapped around all leads. Since all leads were shorted together, there would be no impedance across which a voltage could develop.

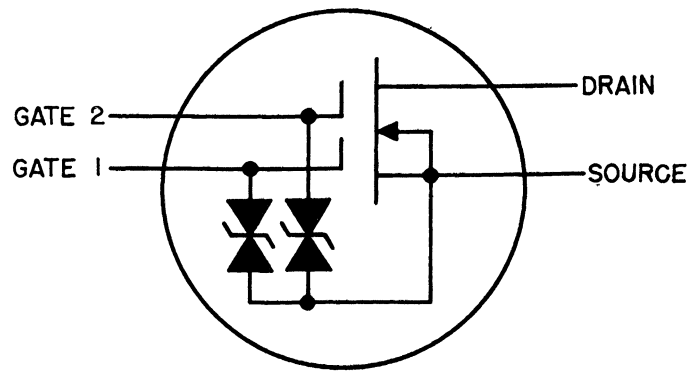


FIGURE 7 – MOSFET GATE PROTECTION

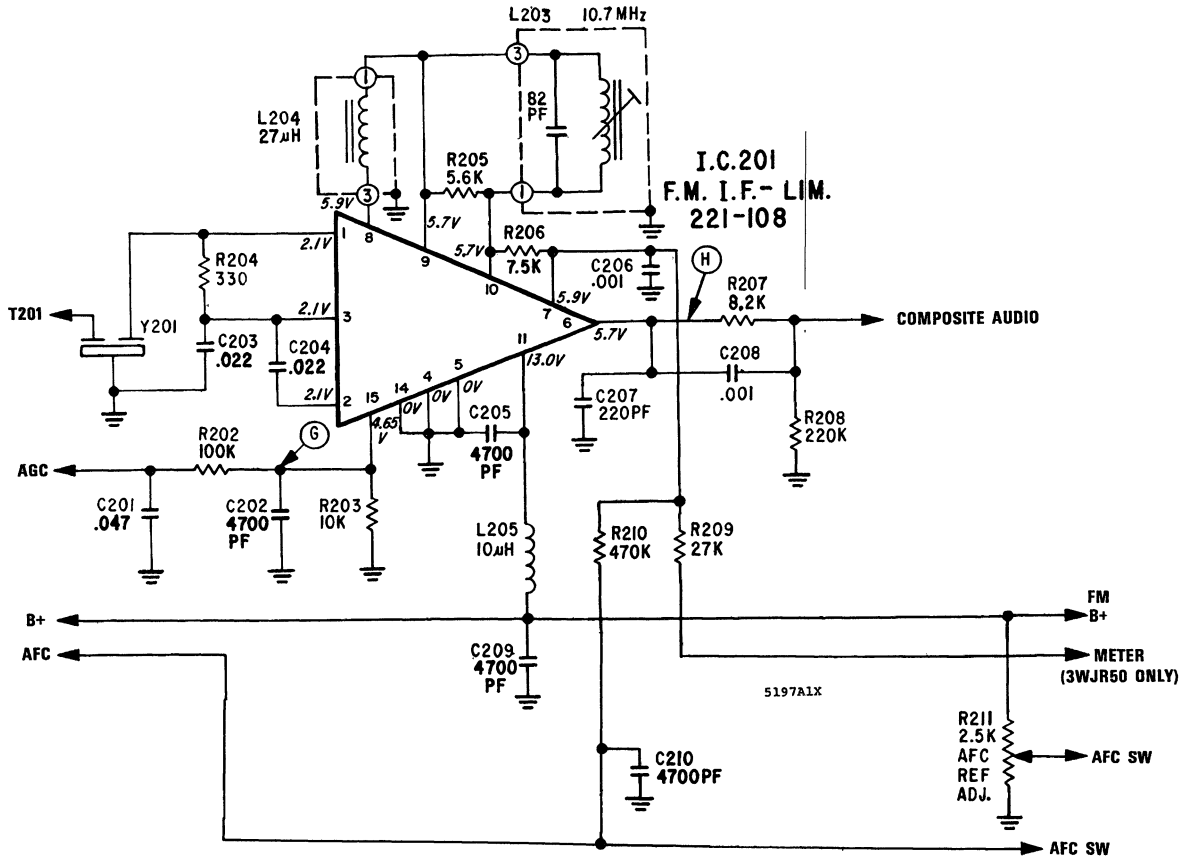


FIGURE 8 – CHASSIS 3WJR52 FM IF SCHEMATIC

Although that method was effective, handling could be improved if protection were included within the FET package. A schematic of the internal configuration of such a package is shown in Figure 7. Back-to back zener diodes connected from each gate are diffused into the FET while it is being constructed. When a voltage of sufficient value is developed across the zeners, they will conduct, bypassing voltage transients which approach the gate breakdown voltage. This protects the gate structure, while allowing the FET to retain the wide dynamic signal range capability.

Even though gate protection has been included in the design of most MOS devices, certain precautions should be observed while handling either MOSFETS or MOS Integrated Circuits:

A. Do not generate static.

B. Keep relative humidity above 60%.

C. Do not have rugs (especially nylon) in the service area.

D. Do not use nylon or polyester pants, shirts or jackets.

E. Do not wear rubber gloves. Cotton is recommended.

F. Do not insert MOS devices in foam plastic holders.

G. Leave MOS devices in their protective carriers (if supplied) until used in a circuit.

H. Benches and soldering irons should be grounded.

FM – AFC

Oscillator stability is important, therefore it is desirable to provide Automatic Frequency Control (A.F.C.) which is guided by a voltage directly related to oscillator frequency shift. This is accomplished by taking a DC voltage from pin 7 of IC201 (the IF, Limiter and Detector) and feeding it back, via R210 and R13, to voltage controlled diode CR1 (See Figures 2, 6 and 8). This diode is connected across the oscillator tuned circuit and acts as a frequency controlling device. If the oscillator shifts frequency, it causes a change in detector output voltage which is fed back, changing the diode capacitance of the oscillator circuit, automatically adjusting the oscillator frequency to compensate for the original oscillator frequency shift. There is a possibility that some component may fail in the oscillator circuit, shifting the frequency beyond the +/– .4 Megahertz control range of the diode. In addition, an AFC disabling switch has been provided, should it be desired to receive a weak FM station within the AFC pull-in range of a strong FM station. In the AFC-OFF position a fixed DC voltage is applied to the AFC line from B+, via the AFC Reference Adjust (R211) and AFC Switch SW2.

FM-IF

This chassis incorporates several technological advances seen in "Wedge" chassis 12WGR59 and 12WHR29 FM-IF (See Figure 8) including the use of:

1. 10.7 MHz Ceramic Filter (Y201).

2. Integrated Circuit for gain, limiting and quadrature detector (IC201).

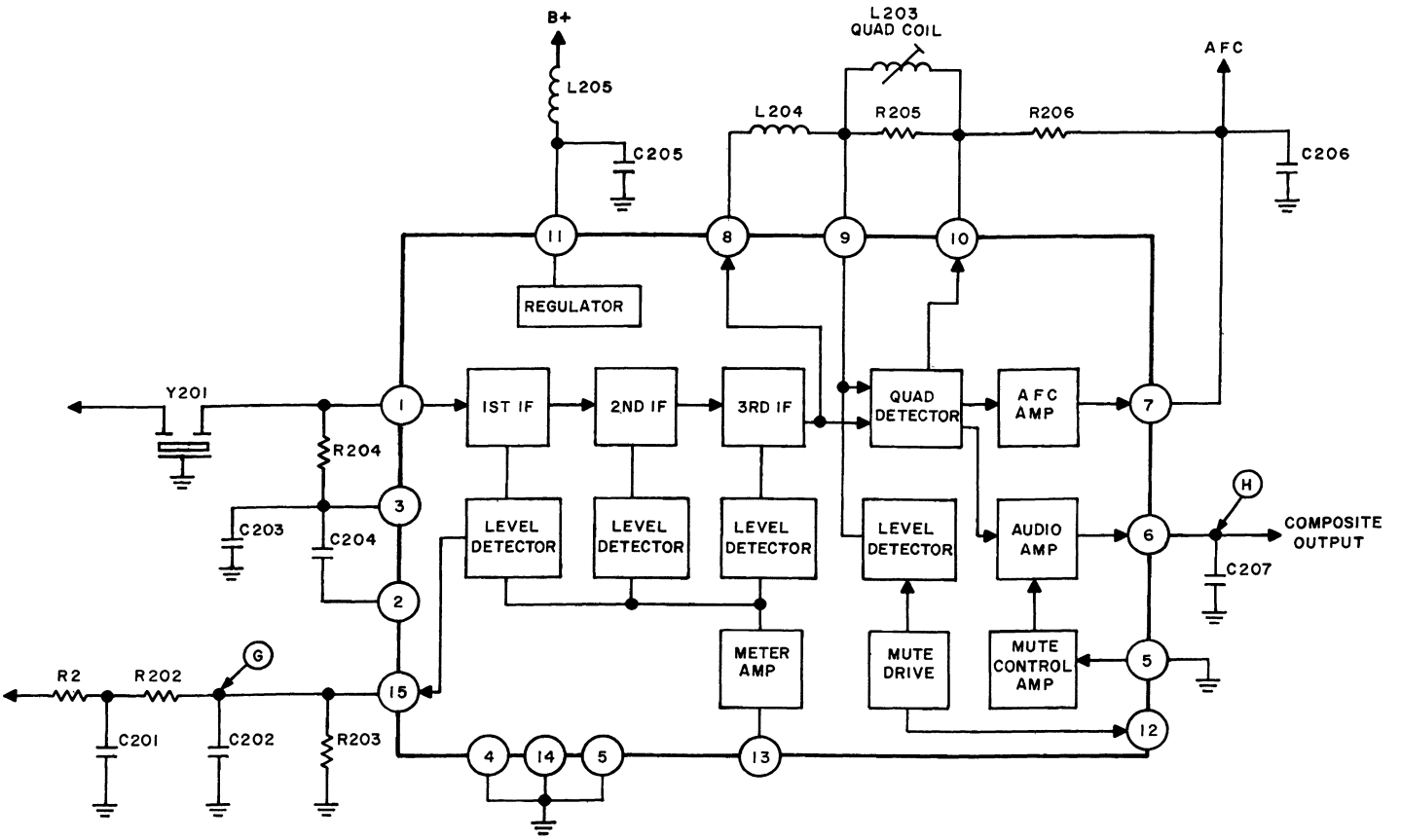


FIGURE 9 – CHASSIS 3WJR52 FM IF IC BLOCK WITH EXTERNAL COMPONENTS

CERAMIC FILTERS

Referring to Figure 8 there are only two tuneable LC devices in the FM-IF. One is the 1st IF Transformer (T201) and the other is the Quadrature Coil (L203). Y201 is the ceramic filter, used in the FM-IF. This reduction of tuneable circuits should simplify alignment in the field, if alignment becomes necessary. Being highly selective, ceramic filters provide approximately 90% of the IF selectivity. Ceramic filters, as manufactured, are fixed frequency devices and fall into one of five overlaping groups, based on the center frequency of each filter. Table B shows the nominal center frequency of each filter and its frequency range, etc. When you align this type of IF, follow the instructions in the alignment procedure. Remember, you must set the signal generator to the frequency of the ceramic filters, then align the chassis (T201, L203, etc.). Do not assume that your generator is at the correct center frequency until you have checked.

TABLE B – CERAMIC FILTERS – CHASSIS 3WJR52

PART NO.	COLOR CODE	NOMINAL CENTER FREQUENCY	FREQUENCY RANGE
224-2	Black	10.64 MHz	10.61 to 10.67 MHz
224-2-01	Blue	10.67 MHz	10.64 to 10.70 MHz
224-2-02	Red	10.70 MHz	10.67 to 10.73 MHz
224-2-03	Orange	10.73 MHz	10.70 to 10.76 MHz
224-2-04	White	10.76 MHz	10.73 to 10.79 MHz

FM-IF INTEGRATED CIRCUIT

IC201, the FM-IF Integrated Circuit, consists of three IF Amplifier stages with Level Detectors for each of the stages, a Doubly-Balanced Quadrature Detector, AFC Amplifier, Audio Amplifier, and Internal Voltage Regulators. Outputs of IC201 are (See Figure 9):

1. Delayed AGC (pin 15).
2. AFC and FM Meter (pin 7).
3. Composite Audio (pin 6).

FM – AGC

Delayed FM AGC Voltage is derived from circuitry located within FM-IF IC201. Output of the 1st IF Amplifier in IC201 is amplified by its Level Detector. Since the 1st IF Amplifier is the last IF Amplifier to go into limiting, the Level Detector will develop a current which will appear as a voltage across R203 at pin 15 of the IC. This is the Delayed AGC Voltage which is applied, via R2 and R202, to Gate 2 (G2) of the FM

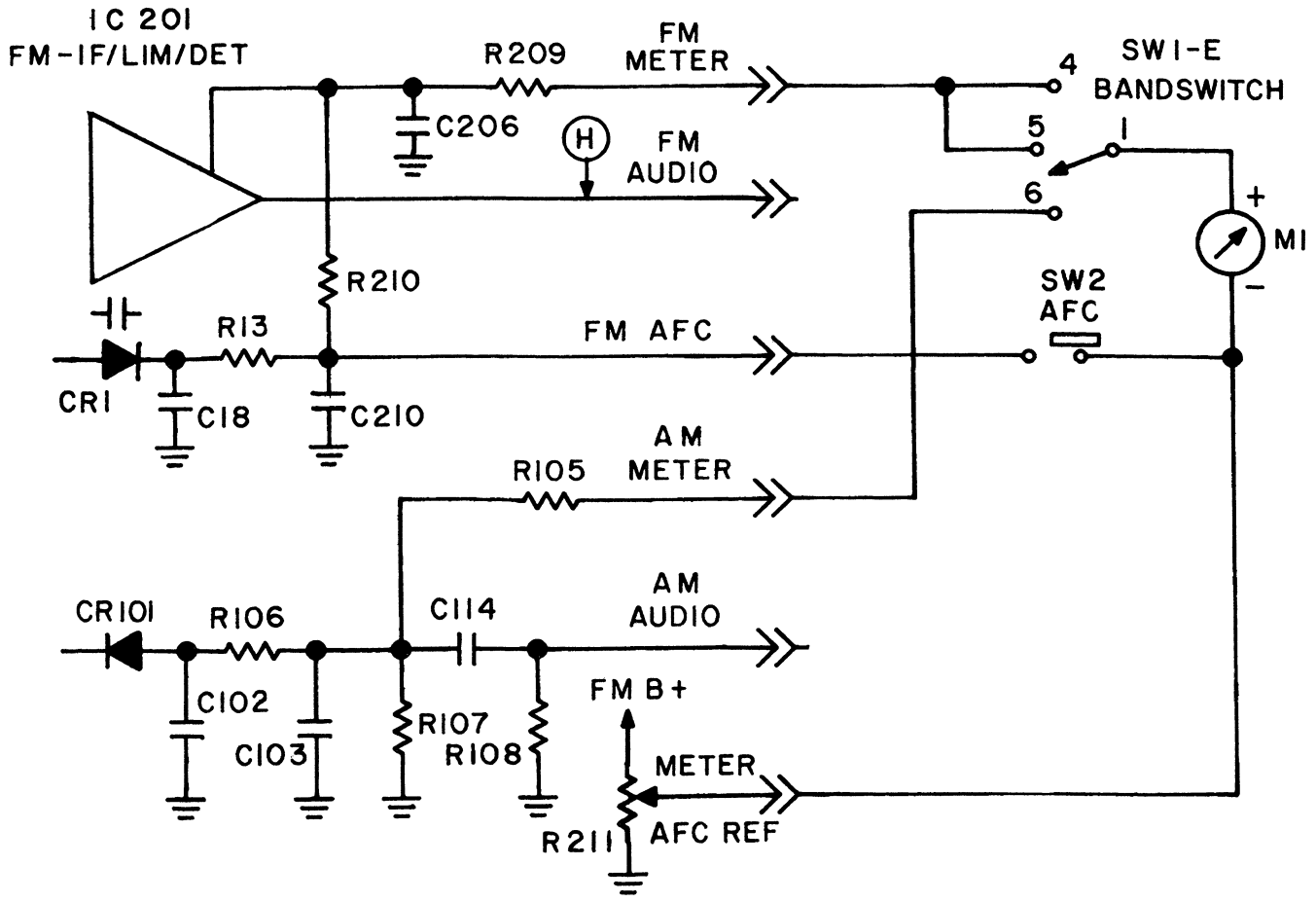


FIGURE 10 – CHASSIS 3WJR50 TUNING METER CIRCUIT

RF Transistor Q1. When the IF signal level reaches sufficient amplitude, Q1's G2 voltage is reduced from +4.6 volts, thereby lowering the gain of Q1.

FM – QUADRATURE DETECTOR

Output of the amplified and limited IF signal in IC201 appears at pin 8 and is coupled, via L204, to the Quadrature Detector at pin 9. Connected externally between pins 9 and 10 is the quad coil (L203). Voltage appearing across L203 is a function of the signal frequencies appearing at the ends of L203. Signals at these pins will be 90 degrees apart, or in quadrature, resulting in the circuit being called a quad detector. Signals at the center frequency will produce equal voltages at pins 9 and 10, while signals off center frequency will create different voltages on pins 9 and 10. Being a differential circuit, only the difference of the signals appearing at pins 9 and 10 will be amplified. Identical signals on those pins will not be amplified.

AM/FM – TUNING METER – CHASSIS 3WJR50

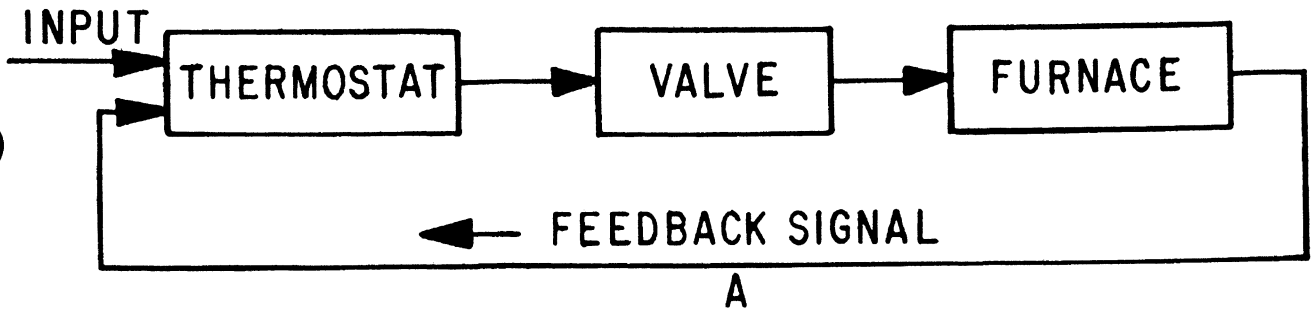
As has been noted, Chassis 3WJR50 (used in console models) has the same circuitry as Chassis 3WJR52 with one significant difference. The difference being that Chassis 3WJR50 has a tuning meter which is common to both AM and FM. Figure 10 is a partial schematic of the tuning meter circuit. Tuning meter (M1) is maximum reading on AM and zero center on FM.

When Chassis 3WJR50 is in the AM mode, meter signal will be via AM Detector CR101, R106, R105, Bandswitch SW1-E6 and 1, meter M1 and the low side of the AFC/Meter Adjustment R211 to ground. In FM or FM Stereo the meter signal will be via pin 7 of FM-IF (IC201), R209, Bandswitch SW1-E5 or 4 and 1, meter M1 and the low side of the AFC/Meter Adjustment R211 to ground.

Meter Adjustment R211 is adjusted for zero center as part of the FM IF alignment. As mentioned previously when we discussed ceramic filters, FM alignment of this chassis requires that you set your generator to the frequency of the ceramic filters, then align the IF transformer (T201), the Quad Detector (L203), then Meter Adjustment 211 (See Figure 10).

FM-MULTIPLEX

Chassis 3WJR52 makes use of a circuit called Phase Locked Loop (PLL), which can be compared to a thermostat controlled heating system. Figure 11A illustrates a basic heating system in which the furnace will generate heat. A thermostat will sense the temperature and compare it with the thermostat's manual setting. The thermostat will turn the fuel supply valve on or off, connecting or disconnecting the fuel source to the furnace, controlling heat generation from the furnace. This system functions in a closed loop.



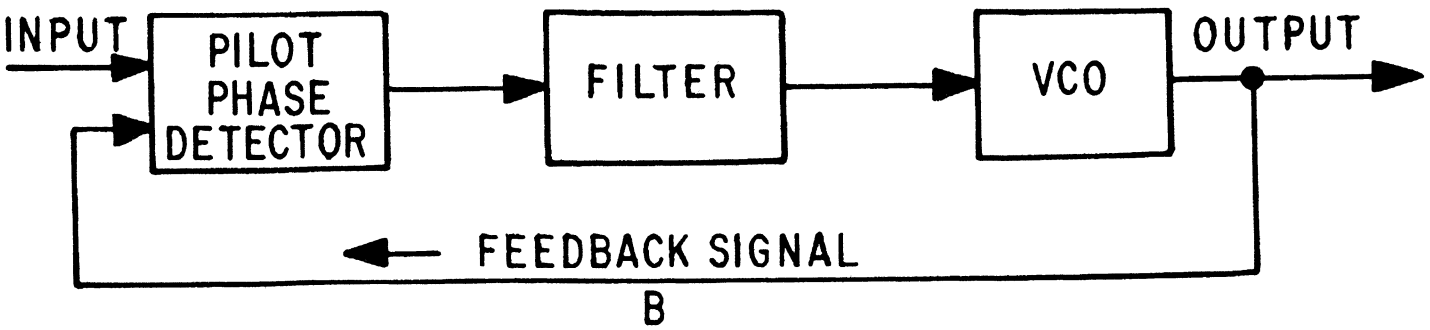


FIGURE 11 – PHASE LOCKED LOOP CONCEPT

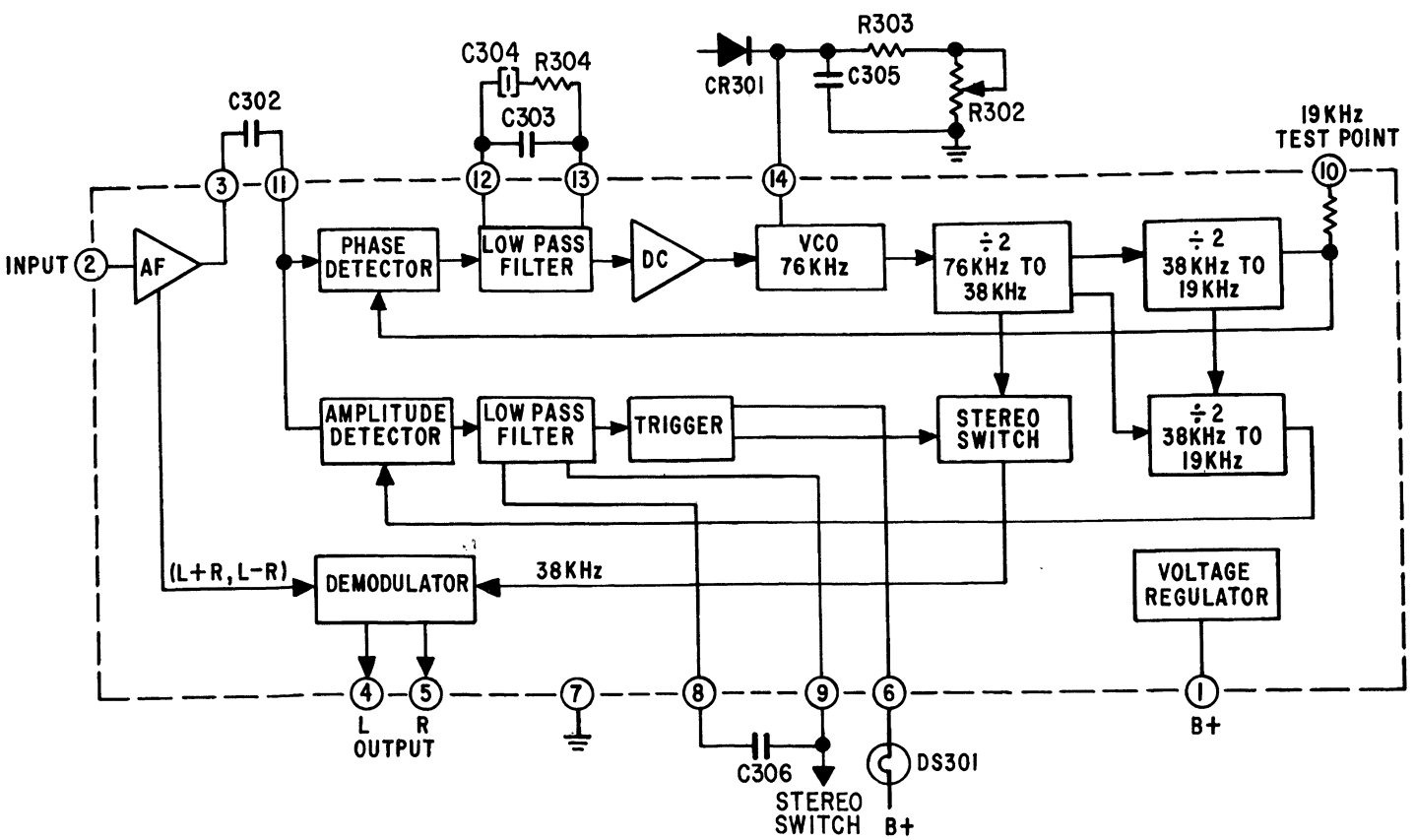
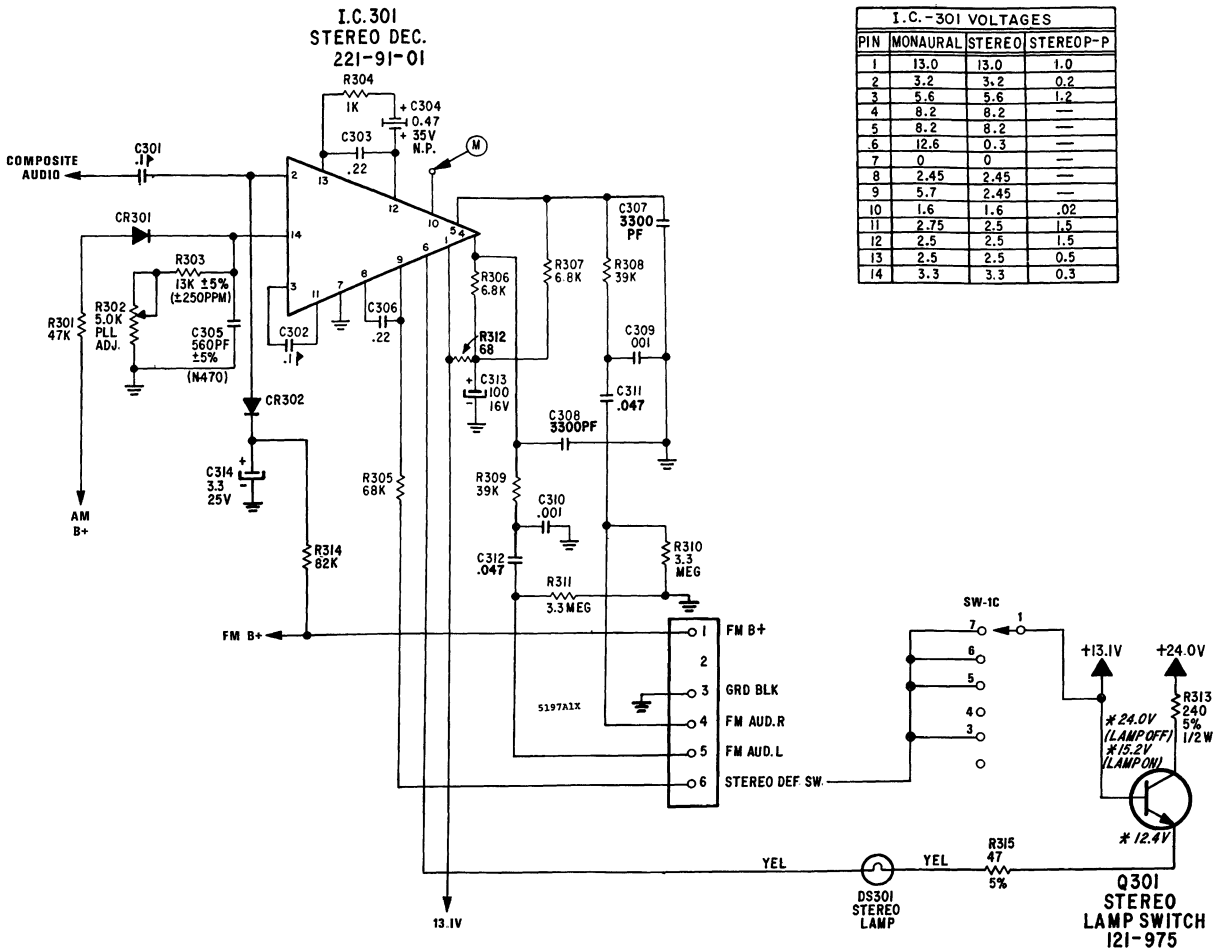


FIGURE 12 – MULTIPLEX DECODER BLOCK DIAGRAM WITH EXTERNAL COMPONENTS



I.C.-301 VOLTAGES			
PIN	MONAURAL	STEREO	STEREOP-P
1	13.0	13.0	1.0
2	3.2	3.2	0.2
3	5.6	5.6	1.2
4	8.2	8.2	—
5	8.2	8.2	—
6	12.6	0.3	—
7	0	0	—
8	2.45	2.45	—
9	5.7	2.45	—
10	1.6	1.6	.02
11	2.75	2.5	1.5
12	2.5	2.5	1.5
13	2.5	2.5	0.5
14	3.3	3.3	0.3

FIGURE 13 – CHASSIS 3WJR52 FM MULTIPLEX SCHEMATIC

Figure 11B illustrates the basic concept of a Phase Locked Loop (PLL). A Voltage Controlled Oscillator (VCO) is tuned to a given free running frequency. A portion of the VCO output is fed back to a phase detector, which also receives an external signal (19kHz in this case). These signals are compared for frequency and phase. Any difference is fed to a filter, the output of which will be a correction voltage applied to the VCO. This voltage keeps the VCO output on frequency and in phase with the input signal.

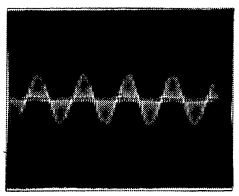
Proper adjustment of the VCO is made by connecting a frequency counter to test point "M" (pin 10 of IC301) and adjusting R302 for 19kHz. In an emergency, if a frequency counter is not available, you might try the following: tune in a station broadcasting stereo and adjust R302 until the stereo indicator turns on, then adjust control R302 to the center of the turn-on range.

Figure 12 is a block diagram, while Figure 13 is a schematic, of the PLL mutliplex decoder (IC301). The three basic functions of IC301 include:

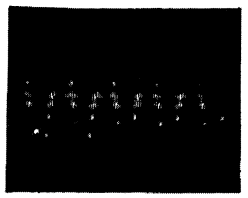
1. Regeneration of the 38kHz subcarrier frequency.
2. Stereo indicator switch.
3. Decoding (matrixing the L+R, and L–R/38kHz to provide the L and R outputs).

At the left in the upper row of Figure 12 is the input amplifier connected between pins 2 and 3. There are three outputs of this amplifier: The first output is to the Demodulator which we will discuss later. At pin 3 the signal is coupled, via C302, to pin 11 from which the signal goes to both the Phase Detector and the Amplitude Detector. Lets move three stages to the right of the Phase Detector where we find the 76kHz VCO who's free running frequency is controlled by C305, R302 and R303. Output of the VCO goes to two divide by two stages, resulting in outputs of 38kHz and 19kHz respectively. This 19kHz is available for external measurement at pin 10 (Test Point "M"), as well as being fed back to the Phase Detector, where the phase and frequency of this 19kHz is compared with the input 19kHz. Any difference is fed to the low pass filter (including external components at pins 12 and 13), and converted to a DC correction voltage; to be applied to the VCO if the VCO changes frequency.

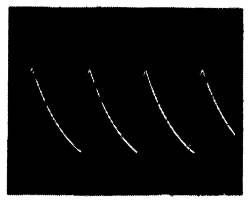
Also at pin 11 is the Amplitude Detector which receives both the input 19kHz and the 19kHz output from a third divide by two stage. The Amplitude Detector will sense the level of the incoming 19kHz pilot level. If the level exceeds minimum, it will have an output applied to the low pass filter (including external components at pins 8 and 9) and to the trigger stage. The trigger stage will activate the Stereo Indicator Light (DS301) and permit the Stereo Switch to pass 38kHz to the Demodulator.



PIN 2-COMPOSITE INPUT L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 0.5V P/P (0.5 MILLISEC.)

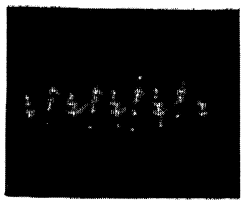


PINS 3 AND 11-COMPOSITE AMPLIFIED L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 1.4V P/P (0.5 MILLISEC.)

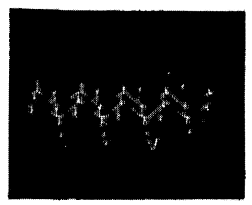


PIN 14-VOLTAGE CONTROLLED OSCILLATOR ADJUSTMENT 3.5V P/P (5.0 MICROSEC.)

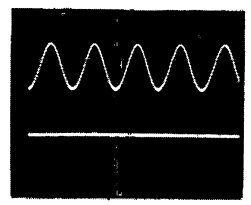
PIN 10-19 KHZ TEST POINT 2.7V P/P (10.0 MICROSEC.)



PINS 12 AND 13-FILTER-PHASE DETECTOR 0.14V P/P (0.5 MILLISEC.)



PINS 8 AND 9-FILTER-AMPLITUDE DETECTOR 0.47V P/P (0.5 MILLISEC.)



P1, #9-(UPPER) LEFT OUTPUT 0.57V P/P (0.5 MILLISEC.) P1, #8-(LOWER) RIGHT OUTPUT 0.05V P/P (0.5 MILLISEC.)

FIGURE 14 – MULTIPLEX DECODER WAVEFORMS

In the demodulator the Sum (L+R), difference (L–R) and 38kHz are combined to derive the L and R outputs.

Diode CR301 is connected to the AM B+ point at pin 14. When AM is turned on, a positive voltage forward biases CR301, applies a positive voltage to pin 14, turning off the VCO. This prevents "birdies" from appearing on the AM band.

To reduce the possibility of "pop" in the speaker system when switching to FM or FM Stereo, three components (CR302, C314 and R314) have been added at composite input pin 2 of IC301. When the mode selector switch is moved to the FM or FM Stereo positions FM B+ (13.1V) is connected, via R314, to C314. As capacitor C314 charges, the voltage at the + side of C314 will slowly increase from 0 volts. 3.2 volts always appears on the anode side of CR302 (anode connected to pin 2 of IC301). When FM is first turned "on", the voltage at the cathode of CR302 will be less than 3.2 volts causing the diode to be forward biased. While forward biased the composite signal at pin 2 will effectively be shunted to ground, muting the FM audio. As the voltage on the + side of C314 increases past 3.2 volts, diode CR302 will become reverse biased, opening the shunt path allowing the composite audio to pass to IC301 for processing. This will effectively mute pops or related noise occurring during switching into FM or FM Stereo.

Manual Stereo/Mono switching occurs as follows. When the bandswitch is in Phono, AM, FM Mono or Tape, 13.1 volts from the bandswitch will be connected, via R305, to pin 9 of IC301. This pin is at the output ~~of~~ the Amplitude Detector Filter connected between pins 8 and 9. In the above position approximately 5.7 volts will appear at pin 9, effectively cutting off IC301's internal automatic stereo switching, causing it to go to mono operation. When the bandswitch is in the FM Stereo position voltage will not be applied to pin 9, resulting in approximately 2.5 volts appearing at pin 9, allowing a 19kHz pilot signal to control the internal switching, passing stereo to the output.

A regulator located with-in IC301 is connected to pin 1 (the +13.1 volt supply) and supplies most stages, while the unregulated +13.1 volts powers certain circuits.

Stereo Indicator Lamp (DS301) is now part of a solid state switching circuit. The base and collector of Q301 are connected to the 13.1V regulated and the 24V supplies respectively. When IC301 detects the presence of a stereo pilot, pin 6 of IC301 will be enabled, completing a path through Stereo Indicator Lamp DS301, R315, the emitter/collector circuit of Q301 and R313 to the 24V supply. With the connections shown, transistor Q301 will function as a series pass regulator providing DS301 with a fixed current. R313 is current limiting for Q301 while R315 is current limiting for DS301.

Typical waveforms as found at IC301 terminals are shown in Figure 14.

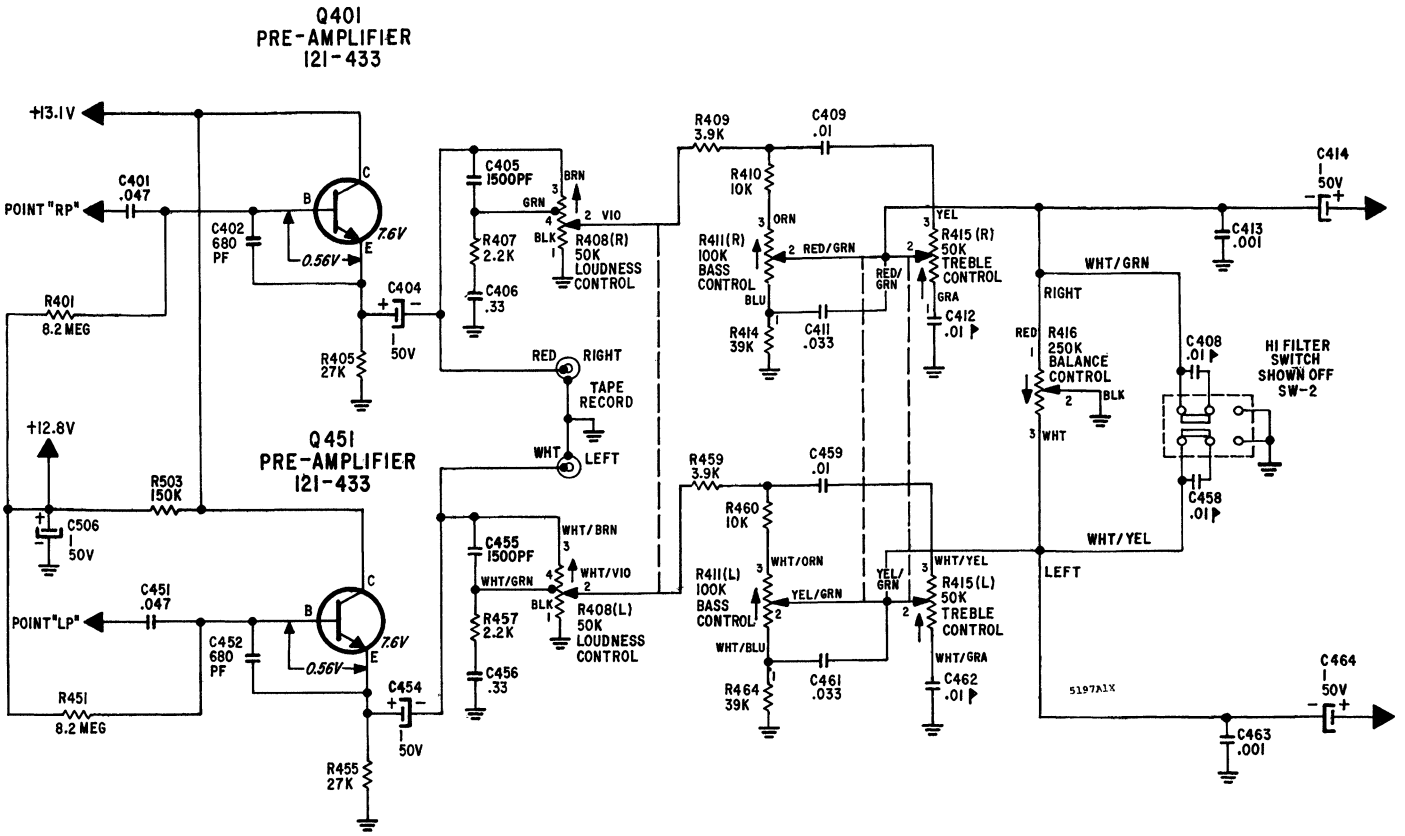


FIGURE 15 – CHASSIS 3WJR52 AUDIO PREAMP

CHASSIS 3WJR52-AUDIO CIRCUITRY

Figure 15 shows the schematic for the Pre-Amplifier and related controls. Explanations will refer to the right channel, but will also apply to the left channel. Audio from the band-switch will be applied to point "RP", C401 and to the base of Pre-Amplifier Q401 which is an emitter follower stage. From the emitter of Q401 the signal will go to the tape output jack as well as to the high side of Loudness Control R408, then to the familiar Bass (R411) and Treble (R415) controls. Following these controls is the Balance Control (R416). Connected from each end of R416 is a series circuit consisting of a capacitor C408 and one section of Hi Cut Switch (SW5). When this switch is in the "OFF" position, as shown, frequency response will be normal. On the other hand, when the Hi Cut Switch (SW2) is in the "ON" position, higher frequencies will be shunted to ground through SW2 and C408.

Following the controls, the signal is applied, via C414, to Pre-Driver Q402 and Driver Q403 (See Figure 16). A brief look at the complementary symmetry output circuit will reveal direct coupling between the collector of the driver transistor (Q403) and the base of the output transistor nearest ground (Q405). Direct coupling will decrease distortion and provide consistent output measurements. The output circuit design is such that there is a center point between the emitters of Q404, and Q405. This point has a DC voltage which, under no-signal conditions, is equal to approximately one-half of the voltage on the collector of the transistor Q404 nearest the high side of the supply voltage. Connected to this center point are:

1. A feedback loop (via resistors R423 and R428) to the emitter of the pre-driver (Q402).

2. A feedback loop, via resistor R421, to the base of the driver transistor.

3. An output coupling capacitor C422 to the speaker.

Between the base of each output transistor there is a series connected resistor-diode circuit (R426, CR401). Bias voltage is developed across this resistor-diode combination and controls idling current in the output stage. Under no signal conditions voltage drops across the resistor-diode are equal to base-emitter voltages of the output transistors, plus the voltage drop across emitter resistor R427. Due to the very low value of the emitter resistor, and the voltage drop across it, voltage on the emitter can be considered to be same as the center point voltage. While many refer to this as a class "B" circuit, it should be called class "AB" due to the idling current. Bias diode CR401 has non-linear voltage/current relationships resulting in the following characteristics:

1. Voltage across the diode changes more slowly than current flowing through it.

2. Current is approximately proportional to supply voltage.

3. Voltage across the diode will decrease with rising temperature.

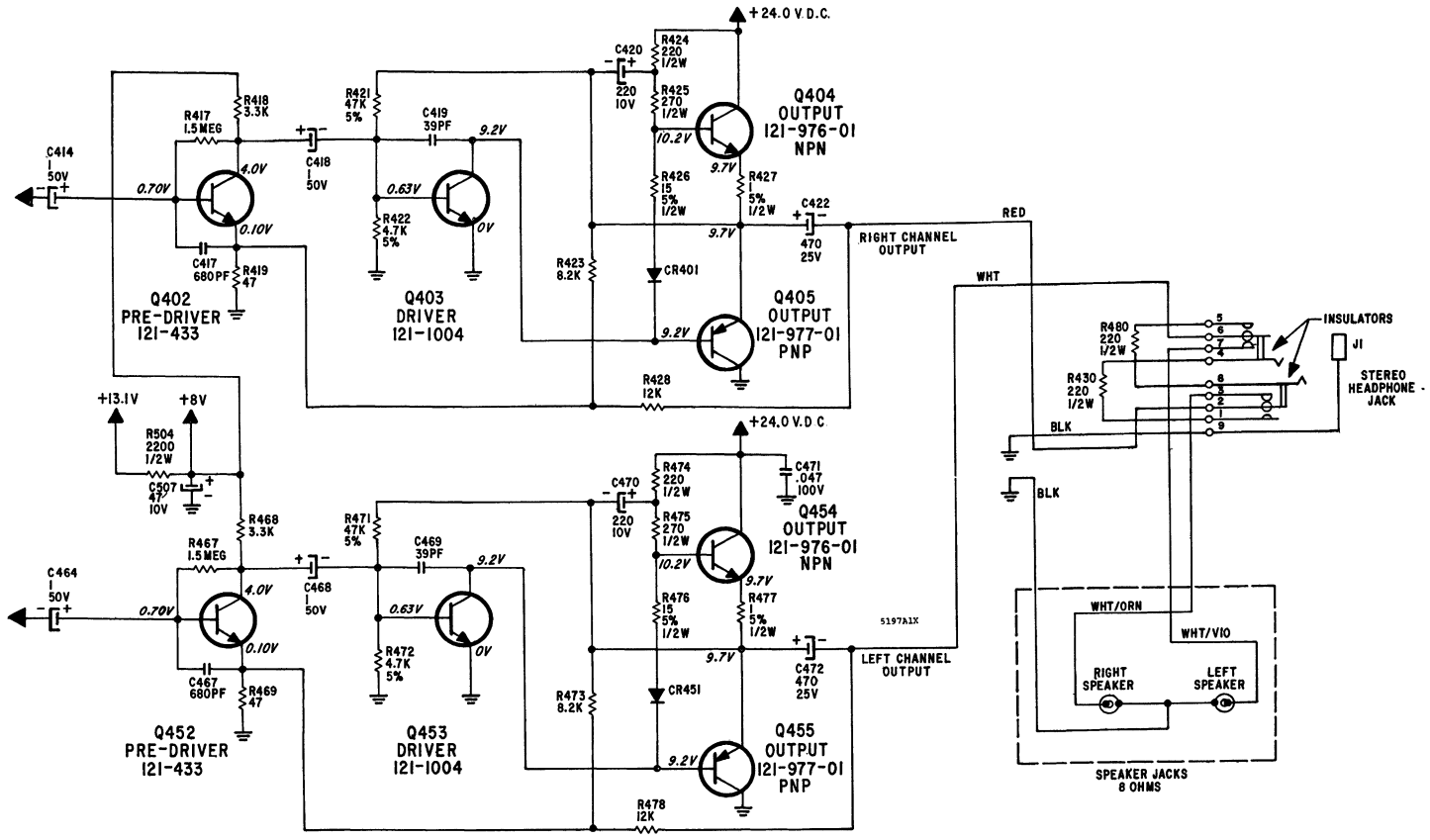


FIGURE 16 – CHASSIS 3WJR52 AUDIO OUTPUT

This non-linear diode voltage/current curve is similar to that of the output transistors allowing a near linear temperature relationship to exist between diode and transistors. Under no-signal conditions, both the diode and transistors will show similar effects due to any temperature change. If there is an increase in temperature, both the diode and transistors will show decreased diode and base-emitter voltages. The reduced diode voltage will offset decreased base-emitter voltage in the transistor and stabilize bias current. Since this diode has a low AC resistance, any changes in current of the driver stage results in less effect on the output stage than would be true with only biasing resistors.

Operating conditions for the driver transistor are determined by base-emitter voltage and driver transistor beta. Also effecting the operating point are values of the driver base resistor, feedback resistor to driver base, and two resistors in the driver's collector circuit. All these factors will effect voltage at the previously mentioned center point.

When a negative going signal is applied to the driver base, current gain of the driver is reduced. At the same time, however, the charge on electrolytic C420 will maintain a near constant current through resistor R425 connected in the base circuit of the upper output transistor Q404. This will cause voltage across the resistor to maintain an almost constant value, which in turn determines base-emitter bias of transistor Q404. Notice that current flow from this bias resistor not only goes through the diode and collector circuit of the driver transistor but also goes to the base of transistor Q404, causing this output transistor to conduct. When transistor Q404 is conducting, Q405 is cut-off since it is reverse biased.

When a positive going signal is applied to the base of the driver (Q403) its collector current will increase, electrolytic C420 will still maintain a near constant voltage across the bias resistor of the upper transistor. Under these conditions the upper transistor Q404 is now reverse biased to cut-off, and the lower transistor Q405 is conducting.

Since each output transistor conducts on alternating halves of each cycle, voltage change at the center point will result in an output signal that will duplicate input. Use of complementary symmetry circuitry results in lower distortion and better frequency response.

CHASSIS 1WJR55

Chassis 1WJR55 circuitry is similar to that of Chassis 3WJR52 (1WJR55 has a bipolar FM RF) however, new audio circuitry will be found in Chassis 1WJR55, in the form of separate integrated circuits in the output of each channel. This IC circuit provides improved performance in a small package, compared to prior low power output chassis (such as 1WGR50 introduced two years ago). Due to high internal gain of this IC, more feedback can be applied, resulting in lower Total Harmonic Distortion (THD), improved signal to noise ratio (S/N) and better thermal tracking.

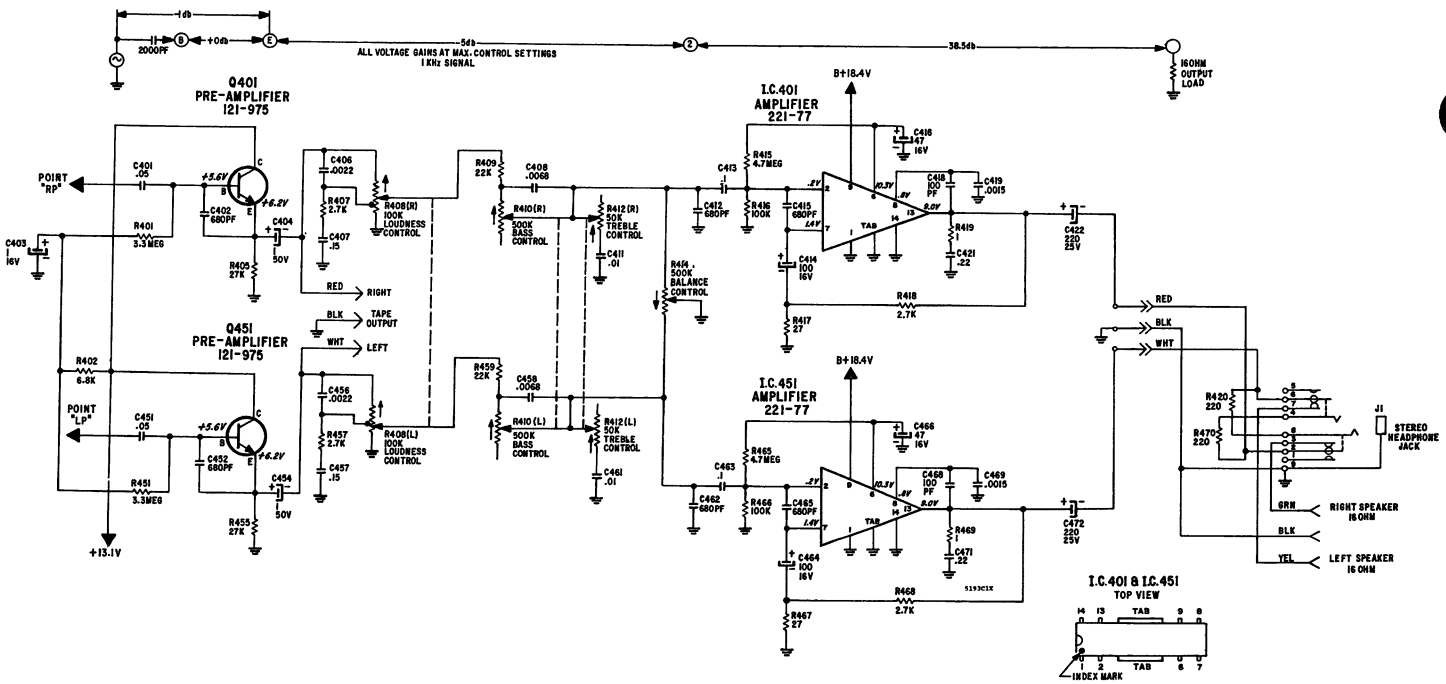


FIGURE 17 – CHASSIS 1WJR55 AUDIO SCHEMATIC

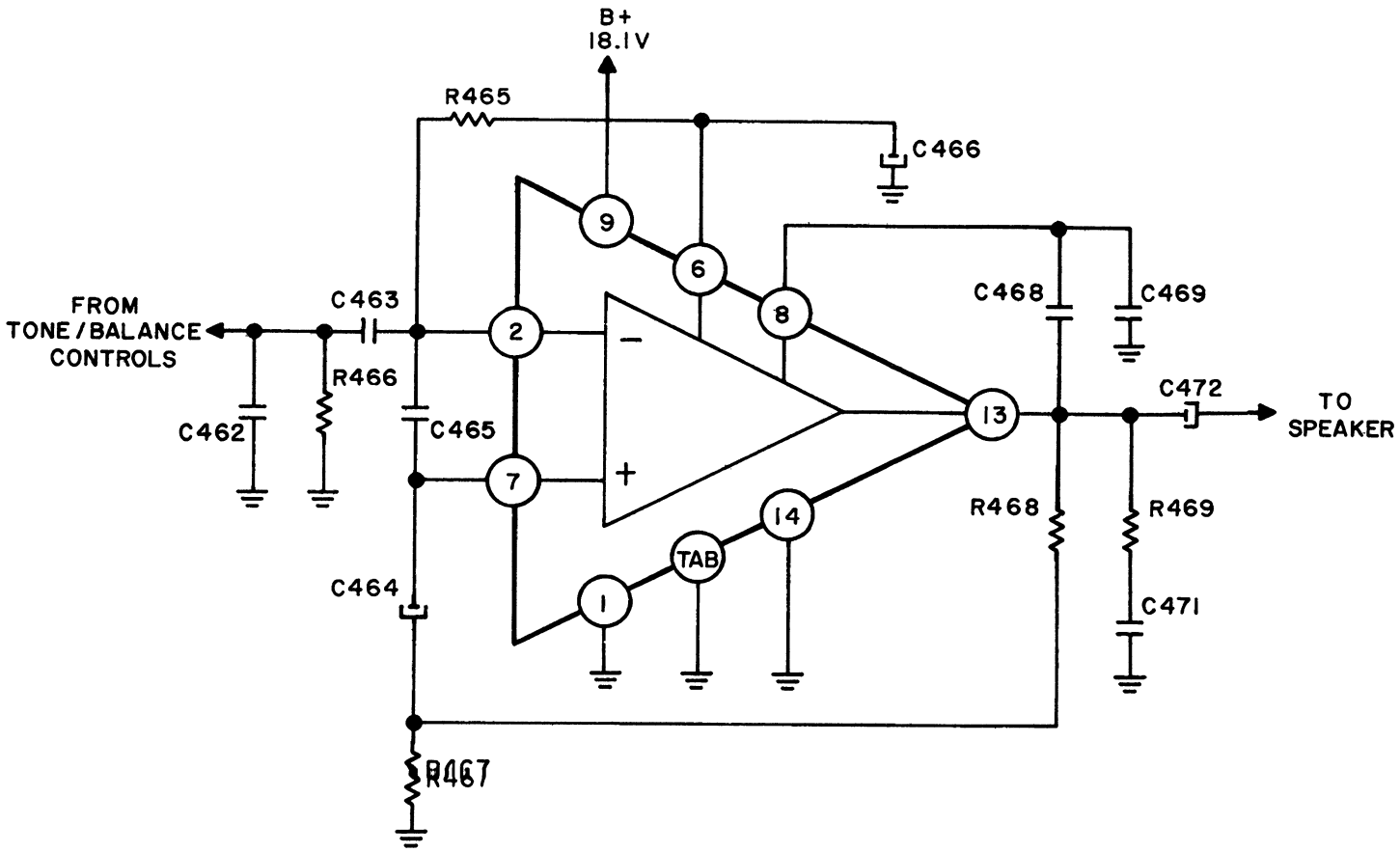


FIGURE 18 – CHASSIS 1WJR55 AUDIO OUTPUT IC

Figure 17 is a schematic of the 1WJR55 IC output stage, while Figure 18 is a block diagram of the IC with external components. Signal from the conventional Loudness, Tone and Balance controls is applied to the circuit shown, to be coupled to pin 2 of the IC via C463. Capacitors C462 and C465, at either side of C463, are for RFI (audio rectification) suppression. In addition to output coupling capacitor C472 at pin 13, there is a resistive divider consisting of R467 and R468 which are part of the feedback loop, determining gain of the chip. C464 provides dc decoupling of the feedback loop to pin 7. Also at pin 13 are C468 and C469 which provide high frequency compensation (roll off) for higher stability. C471 and R469 are also incorporated to prevent possible high frequency oscillation that could occur due to the high gain of this chip. C466 provides additional decoupling for the chip. R465 is in the inputs base bias circuit.

Several precautions must be noted while troubleshooting or servicing this chassis:

1. Do not permit output pin 13 (or its foil path) to be shorted to either B+ or ground. Shorting pin 13 to B+ or ground could destroy the chip. Ground is located both at pin 14 on one side of pin 13 and also the ground tab on the otherside of pin 13.

2. When replacing a IC, be certain that the heat sink tabs of the IC (the equivalent of pins 3, 4, 5, 10, 11 and 12) are completely soldered to the foil.

3. Use only a 16 ohm load. To use a smaller load (8 ohm) could cause the IC to overheat and be destroyed.

POLARIZED AC PLUGS

"J" Line" Stereo Chassis 3WJR50 and 15WJR29 (used in Modular, Console and Color Combination models) are equipped with a polarized two contact AC plug of the general type illustrated in Figure 19. One of the two parallel blades is of a distinctive shape and is wider than the other blade. This will insure that the plug is properly inserted into a two contact polarized socket.

In Chassis 3WJR50 power supply schematic of Figure 20, the lower contact of the plug is the wide blade and is connected to the common return of the chassis AC circuit. It also has a very high value resistor RX502 between AC common and ground. Using a plug and socket combination of this type is intended to minimize hum and also increase consumer and product safety. Under no circumstances should anyone attempt to defeat the plugs design, or intent.

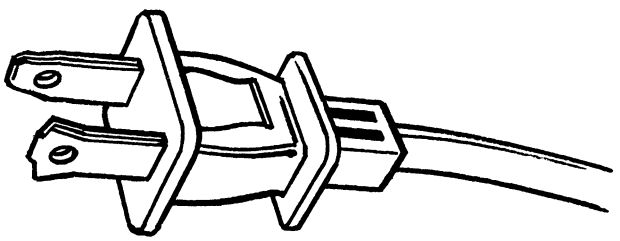


FIGURE 19 – POLARIZED AC PLUG

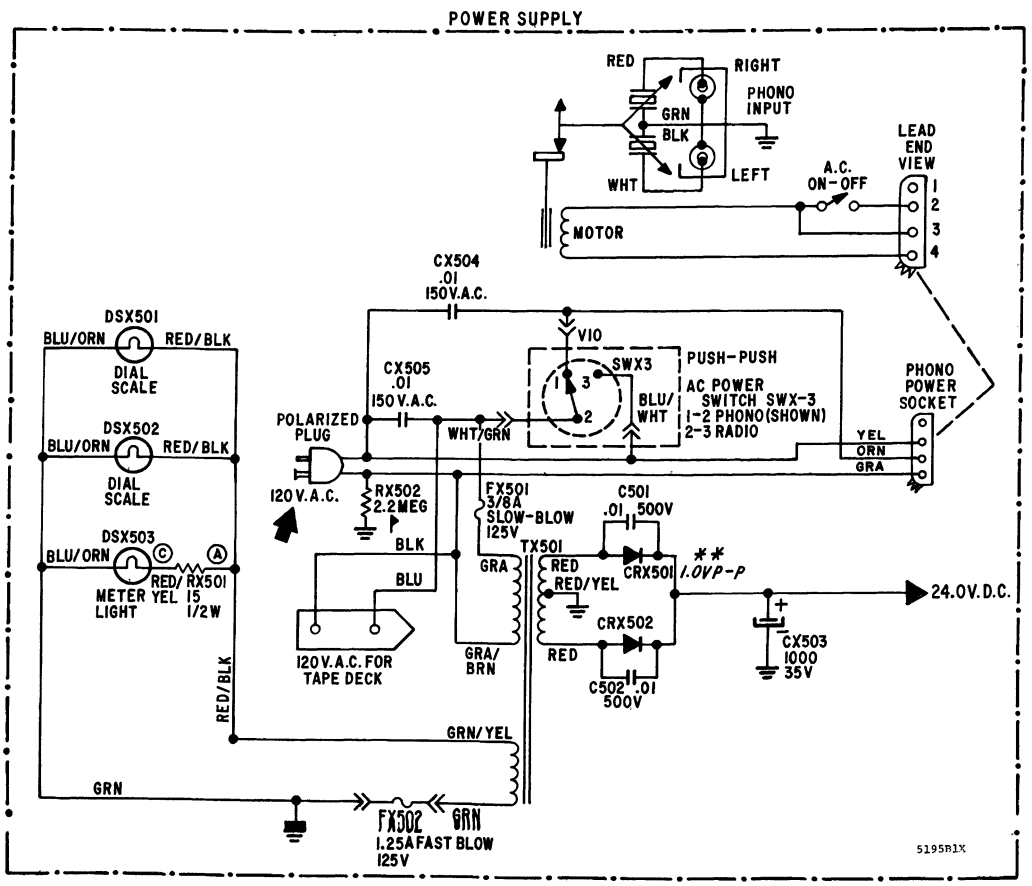


FIGURE 20 – CHASSIS 3WJR50 POWER SUPPLY USING POLARIZED AC PLUG

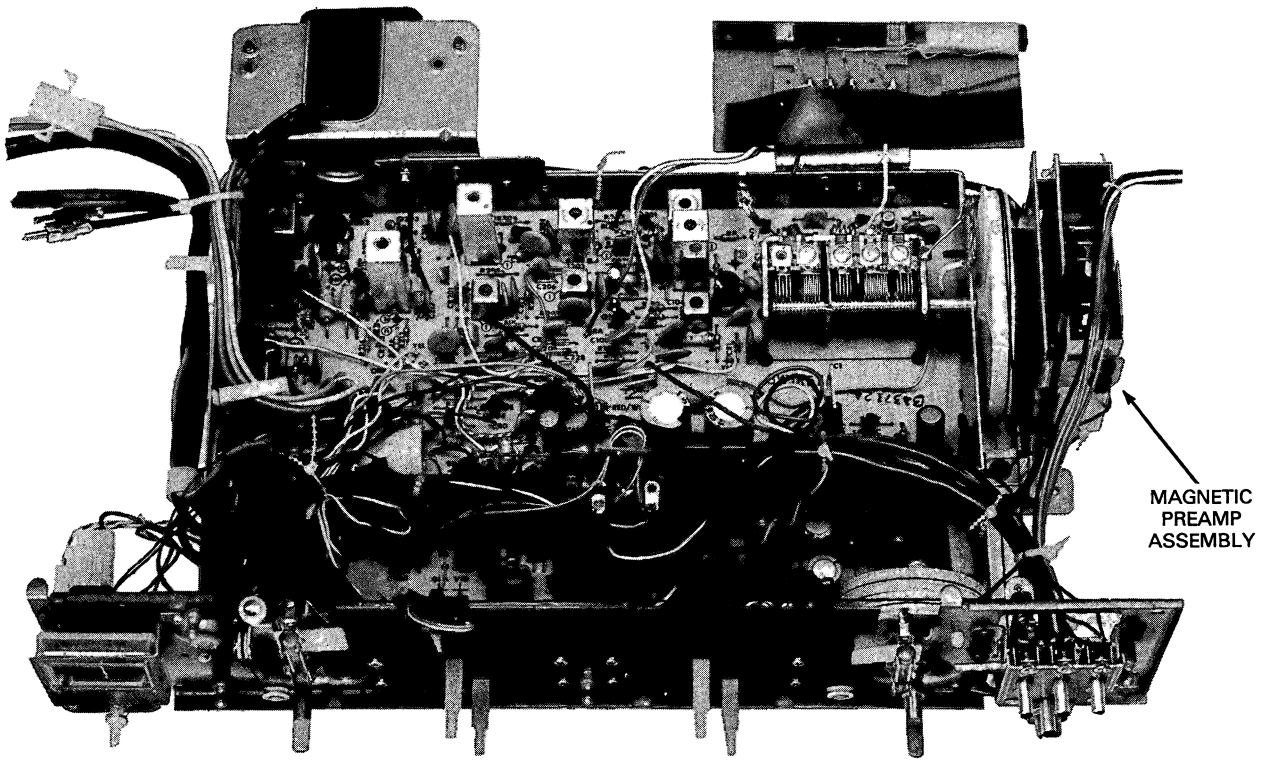


FIGURE 21 – CHASSIS 8WJR57 WITH MAGNETIC PREAMP

CHASSIS 8WJR56, 8WJR57 AND 15WJR29 MAGNETIC PHONO CARTRIDGE PREAMP

As indicated in Table A, Chassis 8WJR56, 8WJR57 and 15WJR29 are basically the same as the "H Line Chassis 6WHR56, 6WHR57 and 12WHR29 but are equipped with a new preamp circuit to provide the gain and RIAA equalization required for the magnetic phono cartridges installed in record changers used in models having these chassis. (Chassis 8WJR56 is installed in Models JR684W and JR684W1 which do not contain record changers but a "Magnetic Phono/Aux Switch" is provided so that an accessory record changer with either a magnetic or a ceramic phono cartridge may be connected. Model J9026W is a current accessory that is equipped with a magnetic phono cartridge.)

Circuitry for the preamp is located on a separate shielded circuit board assembly mounted adjacent to the tuning capacitor pulley on Chassis 8WJR56 and 8WJR57 (See Figure 21), or mounted piggy-back on the RF/IF/MPX assembly of chassis 15WJR29. A photograph of the circuit board assembly, with the shield removed, is shown in Figure 22. Figure 23 is a schematic of the circuit while an illustration of the cartridge appears in Figure 24.

As you will note from the schematic in Figure 21 the preamp (right channel shown) consists of two NPN transistors in a conventional AC coupled circuit. Collector current is via R704 and R706, while bias is established with R703 and R707. Emitter resistors R705 and R710 are selected to provide both a low Total Harmonic Distortion (THD) and also low Transient Intermodulation Distortion (TIM). Between base and emitter of each transistor are RFI (audio rectification) suppression capacitors C703 and C705.

At the input, resistor R701 and capacitor C701 are selected to provide the proper matching for the low impedance of the magnetic phono cartridge. The series/parallel combination of C706, C707, R708 and R709 is a feedback path and equalization to provide reproduction using the established RIAA equalization curve.

Output of the preamp is via capacitor C708 to either the bandswitch directly in Chassis 8WJR57 and 15WJR29, or to the bandswitch via the "Magnetic Phono/Aux Input" Switch on Chassis 8WJR56.

Due to the low output level of a magnetic cartridge, and high gain of the preamp, in comparison to a ceramic cartridge, it is necessary to provide the magnetic cartridge preamp with a dc supply voltage that is much cleaner (less hum ripple or noise) than would be true for a ceramic cartridge. Therefore two additional RC sections (C709, C710, R711 and R712 or R713) are included in the B+ decoupling network.

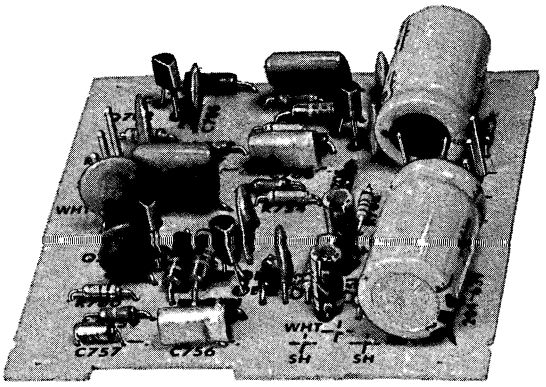


FIGURE 22 – MAGNETIC PREAMP

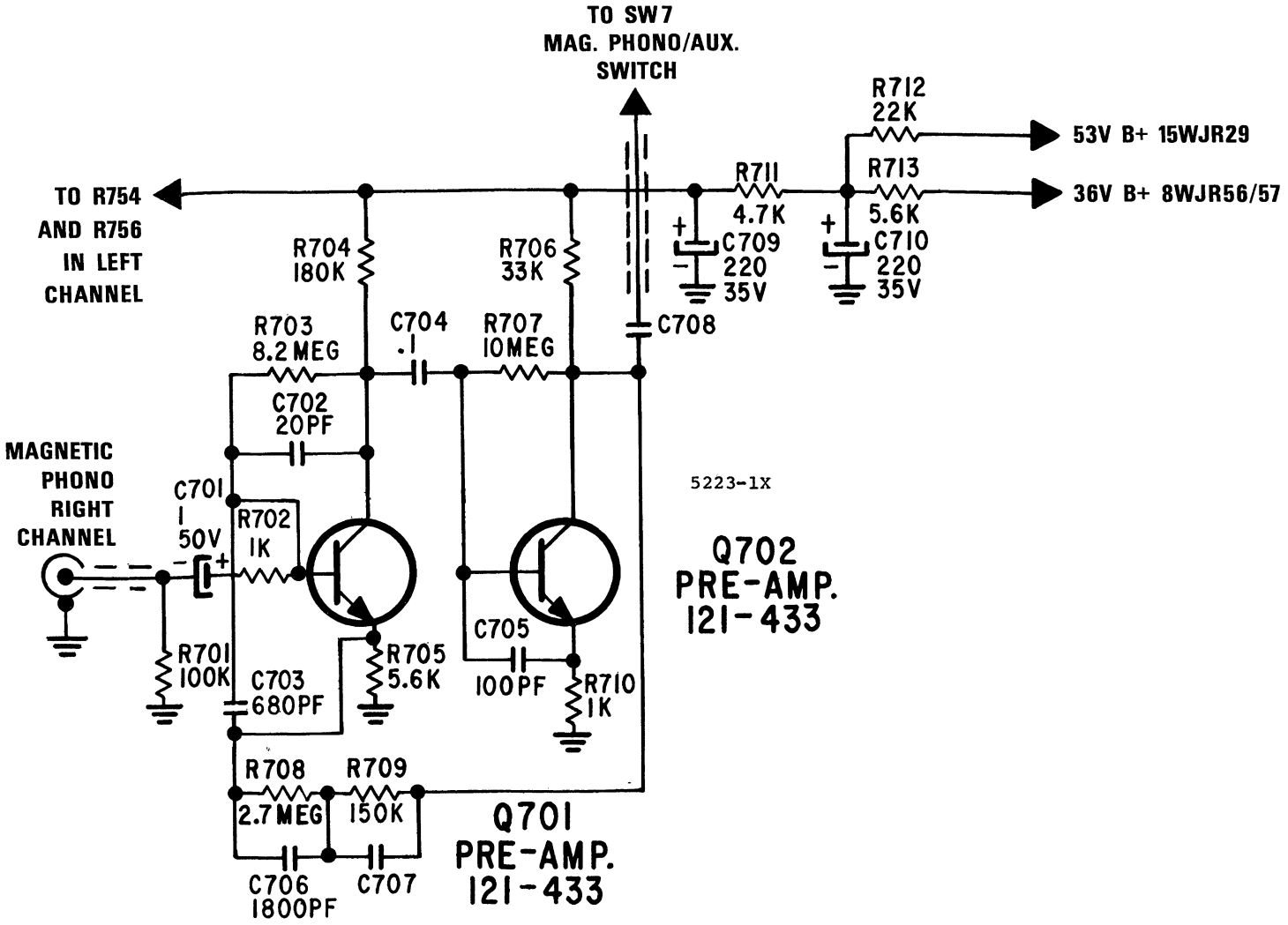


FIGURE 23 – MAGNETIC PREAMP SCHEMATIC

Since this preamp assembly is common to both the 8WJR56/8WJR57 and the 15WJR29 chassis which have different B+ supply voltages, it is necessary to provide different dropping resistor (on the preamp circuit board) in the B+. The magnetic preamp is connected to the 36V B+ on 8WJR56/8WJR57 while it is connected to the 53V B+ on Chassis 15WJR29.

Because of the higher gain of this magnetic preamp, it is most important to avoid ground loops and also ensure that all leads from the phono cartridge and the magnetic cartridge preamp assembly are properly dressed. Ground loops and improper lead dress can result in hum or other unwanted interference.

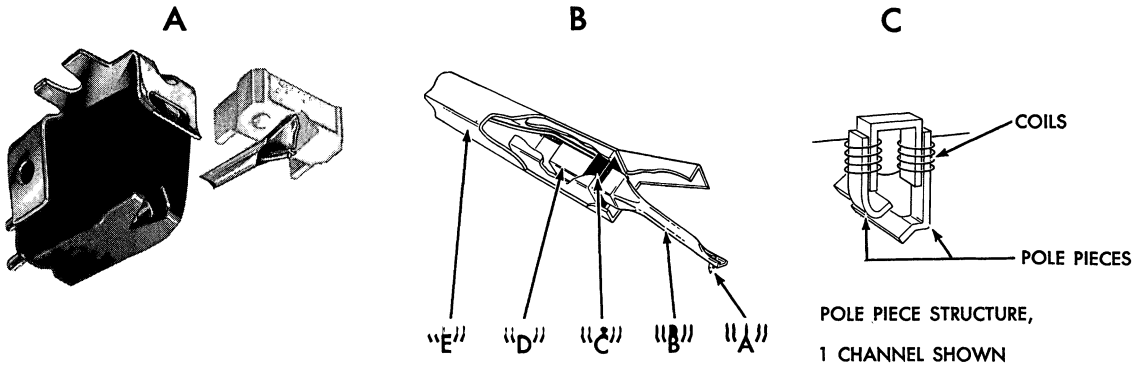


FIGURE 24 – MAGNETIC PHONO CARTRIDGE

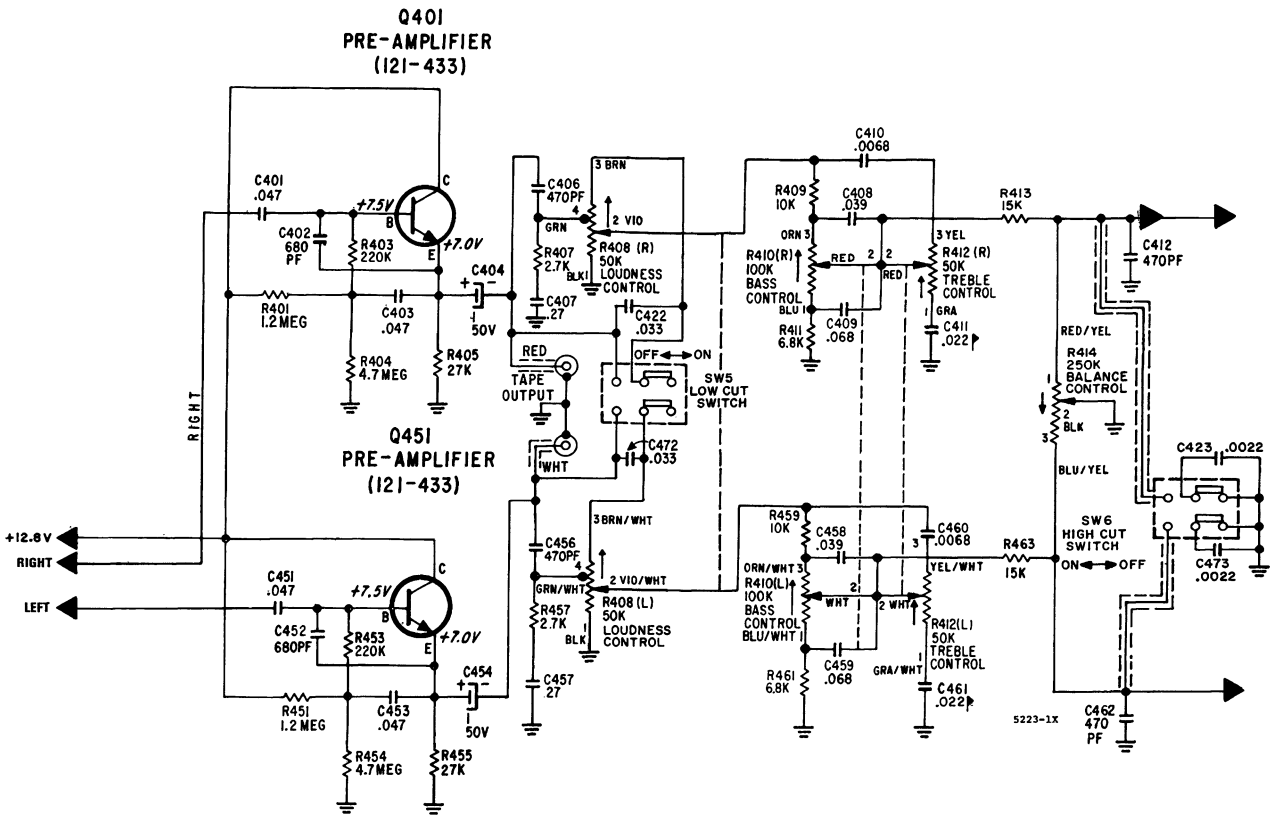


FIGURE 25 – CHASSIS 8WJR57 PREAMP CIRCUIT

CHASSIS 8WJR56, 8WJR57, AND 15WJR29 MAGNETIC PHONO CARTRIDGES (See Figure 24)

Since we are introducing magnetic phono cartridges to the product line, it would be wise to review the basics of magnetic cartridges. Although all magnetic phono cartridges function on the same basic magnetic principle, they can be divided into three general types, depending on the mechanical relationships of the stylus/stylus shank, magnet and coils.

MOVING ARMATURE – Movement of the stylus in the record groove causes the stylus shank (which is in the field of a stationary permanent magnet) to move in the center of the stationary coils. This varies the number of lines of magnetic force cutting the coil, thereby changing the electrical output of the coil.

MOVING COIL – A coil of very fine wire is wound on the stylus shank. This coil moves in a magnetic field created by a stationary permanent magnet. As the stylus moves in the record grooves, the moving coil (on the stylus shank) will cut the lines of force of the magnetic field, inducing a voltage in the coil.

MOVING MAGNET – A permanent magnet is mounted on the rear portion of the stylus shank subassembly. As the stylus moves in the record grooves, motion is conveyed to the magnet, causing a change in the flux in the stationary coils, resulting in a voltage being induced in the coils. This design generally provides a lower effective mass (of the tip touching the record groove) compared with other magnetic types, resulting in lower wear of both stylus and record.

Figure 24A is a photograph of a moving magnet magnetic phono cartridge (Zenith P/N 142-189) manufactured for Zenith by Shure Brothers. In the illustration, the stylus assembly has been pulled partly out of the body of the cartridge showing the two major assemblies that make up the total cartridge.

STYLUS ASSEMBLY (See Figure 24B)

A phantom partial view of the magnetic cartridge stylus assembly appears in Figure 24B. "A" is the .6 mil spherical diamond tip which is first mounted to stylus shank "B" by press fit and then additionally secured by use of a high temperature epoxy cement. This method helps insure permanent axial orientation of the styli. A shank of a special heat treated aluminum alloy gives the necessary rigidity but is only a minimum part of the total mass. A visco-elastic suspension block "C" can be considered the "heart" of the bearing in which the stylus shank assembly will pivot. A high compliance bearing offers better frequency response and lower distortion. As the stylus tip moves in the record grooves, the stylus shank follows that movement, causing magnet "D" to move between the coils. A high energy Alnico magnet provides an extremely strong magnetic field for its small size, yet contributes less than 20% to the effective mass of the stylus assembly. Various components just described are housed in carrier "E" which, when the total stylus assembly is inserted into the cartridge body, will correctly position the magnet relative to the coils in the cartridge body. One major part of the stylus assembly

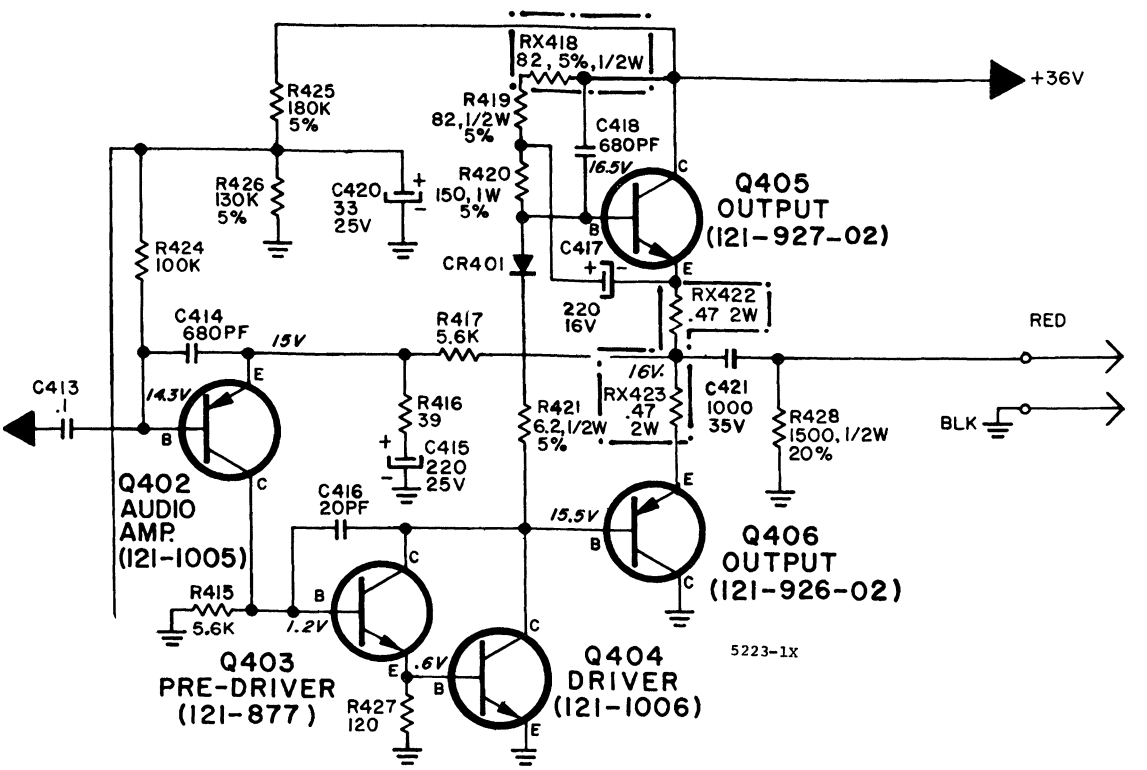


FIGURE 26 – CHASSIS 8WJR57 AUDIO OUTPUT CIRCUIT

not shown in Figure 24B, the molded stylus grip, is shown in Figure 24A. A customer can easily grasp the stylus grip, without touching the stylus tip, should they desire to replace the stylus.

COIL ASSEMBLY

Figure 24C illustrates the coil and pole piece assembly required for one channel of a stereo moving magnet cartridge. You will note that two coils and two pole pieces are required for each assembly. When two of these assemblies are combined for stereo, the four pole pieces form a square. The moving magnet of the stylus assembly will be positioned so it will move between the pole pieces, inducing voltage in the coil.

Output of a magnetic cartridge is extremely low (approximately 5 to 10 millivolts) compared to the much higher level of ceramic cartridges (approximately 300 to 500 millivolts), therefore the need for the added preamp described above.

CHASSIS 8WJR56 AND 8WJR57 AUDIO CIRCUITRY

In addition to an increase in rated power output and wider bandwidth incorporated into Chassis 8WJR56 and 8WJR57 (over their "H Line" counterparts), these two chassis incorporate Low Cut (SW5) and High Cut (SW6) switches.

Figure 25 is a partial schematic of the preamp and audio control section of Chassis 8WJR56. The preamp is a emitter follower circuit, followed by the tape output jack, Loudness (R408) and Tone Controls (R410, R412). Connected at the Loudness control is a Low Cut Switch (SW5). When the switch is in the "OFF" position, C422 is shorted, connecting the "–" side of C404 to the high side of the Loudness Control, resulting in normal operation. When in the "ON" position, C422 will be connected from the "–" side of C404 to the high side of the Loudness Control providing low frequency cut. The Hi Cut Switch (SW6) is connected from the balance control to ground. With SW6 in the "ON" position, high frequencies are shunted to ground via C423.

Figure 26 illustrates most of the audio output circuitry used in Chassis 8WJR56 and 8WJR57. This circuit is somewhat similar to the basic complementary symmetry circuit shown in Figure 16 for Chassis 3WJR52. Amplifier transistor Q402 is now direct coupled to the pre-driver Q403. Q403 and Q404 are effectively a class A Darlington circuit. Resistors R415 and R427 serve as collector loads for Q402 and Q403 respectively. Collectors of Q403 and Q404 are dc coupled to the base of Q406 (directly) and also to the base of Q405 (via resistor R421 and bias diode CR401). AC signals will see CR401 as a short circuit. Boot strap capacitor C417 is now connected directly to the emitter of Q405, instead of at the center point (junction of RX422 and RX423. At the center point are:

1. Output coupling capacitor C401 and bleeder resistor R428. The bleeder resistor provides protection should the set accidentally be operated without any load.

2. A feedback circuit to the emitter of Q402, consisting of voltage divider R416 and R417, determines the AC feedback to Q402. Capacitor C415 is included for dc insolation because the circuit is direct coupled.

Voltage at the junction of R425 and R426, determines the center point dc voltage. C418 provides added high frequency stability. Operation of this circuit is the same as explained for Chassis 3WJR52 shown in Figure 16.

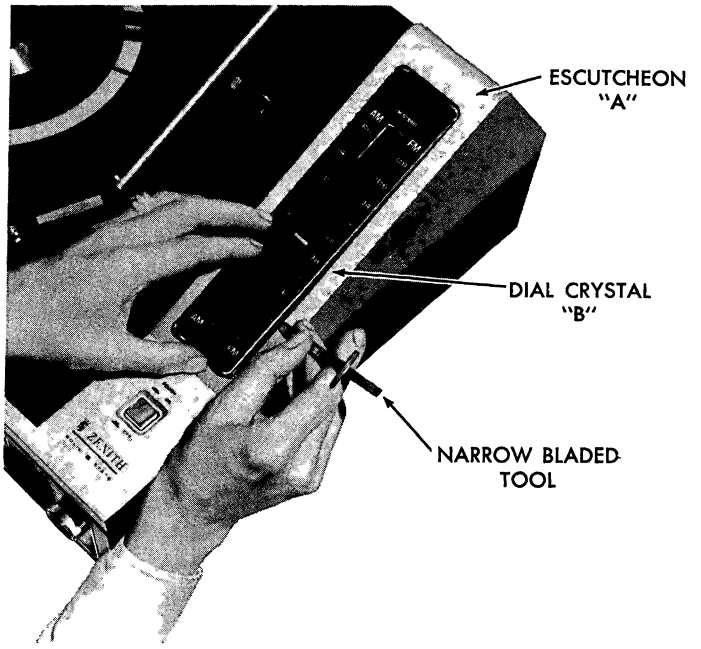


FIGURE 27 – DIAL SCALE REMOVAL

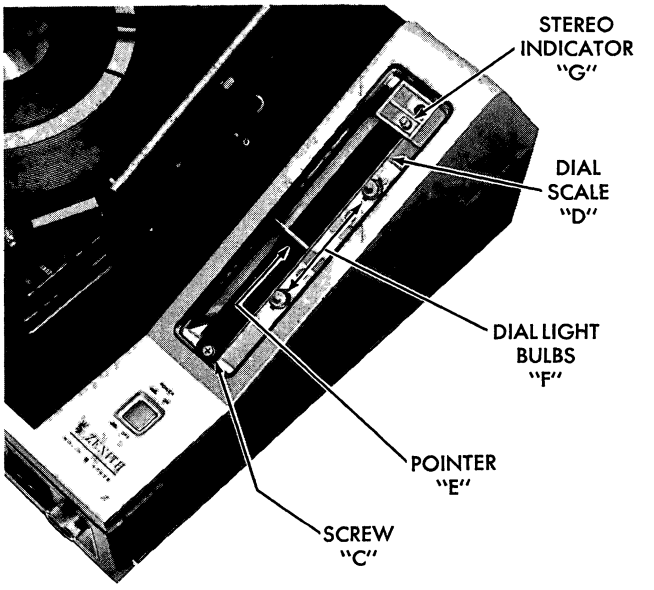


FIGURE 28 – DIAL AND STEREO LIGHT ACCESS

DISASSEMBLY PROCEDURE MODELS J587W, JR587W AND JR588W

All three of the above models share a common design concept with the only difference being in the type of tape unit being used (Refer to Model Features Chart on Page 2). The electronics of these models can be divided into four groups (removal of which will be explained below):

1. Record Changer.
2. Tape Unit.
3. Audio Chassis.
4. Tuner Chassis.

DIAL AND STEREO LAMP REMOVAL (See Figures 27 and 28)

To remove either a dial light or the stereo indicator lamp, proceed as follows (See Figure 27):

1. Using a very thin blade, place the blade between the escutcheon "A" and the dial crystal "B" at the point shown, prying the crystal upward until it unsnaps. (Be careful not to mar escutcheon).
2. Lift crystal, noting the slot into which the upper end fits.
3. Remove crystal.
4. Remove screw "C" holding dial scale "D" (See Figure 28).
5. Slide dial scale "D" out from under pointer "E", being careful not to bend pointer.
6. Remove and replace dial light bulbs "F" or stereo lamp "G" as required (stereo lamp "G" is a wedge fit type - remove with caution).

RECORD CHANGER REMOVAL (See Figure 29)

Removal of only the record changer will permit access to major areas of both the Audio and Tuner Chassis Assemblies. The record changer may be removed as follows:

1. Remove record changer dust cover.
2. With power disconnected, place set on its side on top of a soft clean surface.
3. Remove plug button "H" in Figure 29, on bottom of cabinet.
4. Reach finger into hole "I" and release one record changer mounting clip.
5. Place set in upright position.
6. Lift record changer upward and slide to rear of cabinet (while lifting) causing record changer mounting clip at right front of record changer to disengage.
7. While holding record changer up, disconnect AC and audio cables at record changer baseplate.
8. Record changer is now free to remove.
9. Reinstall record changer reversing the above procedure. Be certain to resecure clip accessible through hole "I".

NOTE: The record changer may also be removed with it still mounted to the cabinet top as explained next.

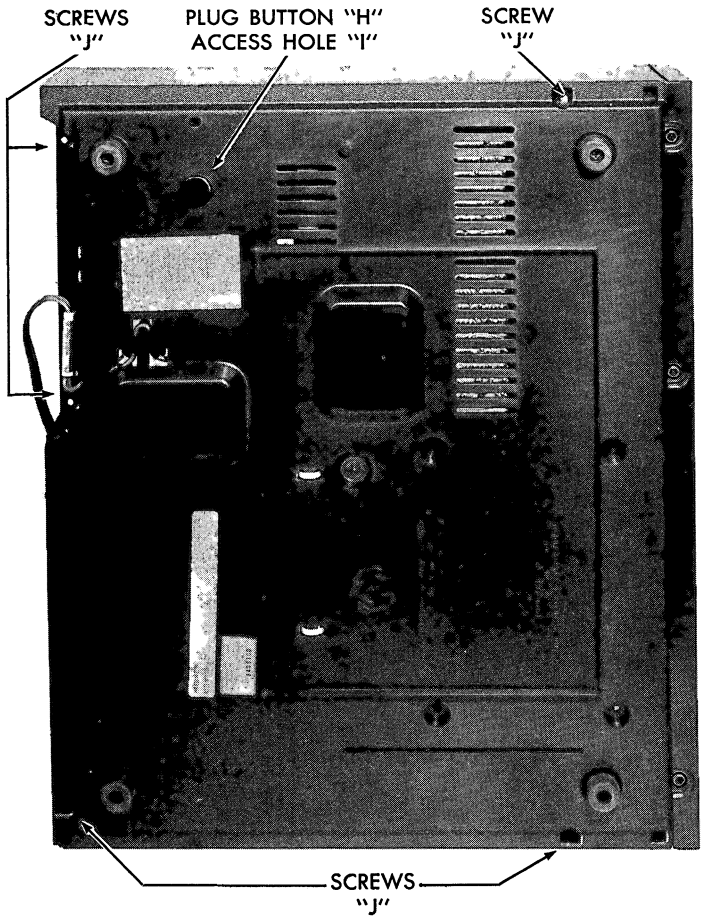


FIGURE 29 – CABINET BOTTOM REMOVAL

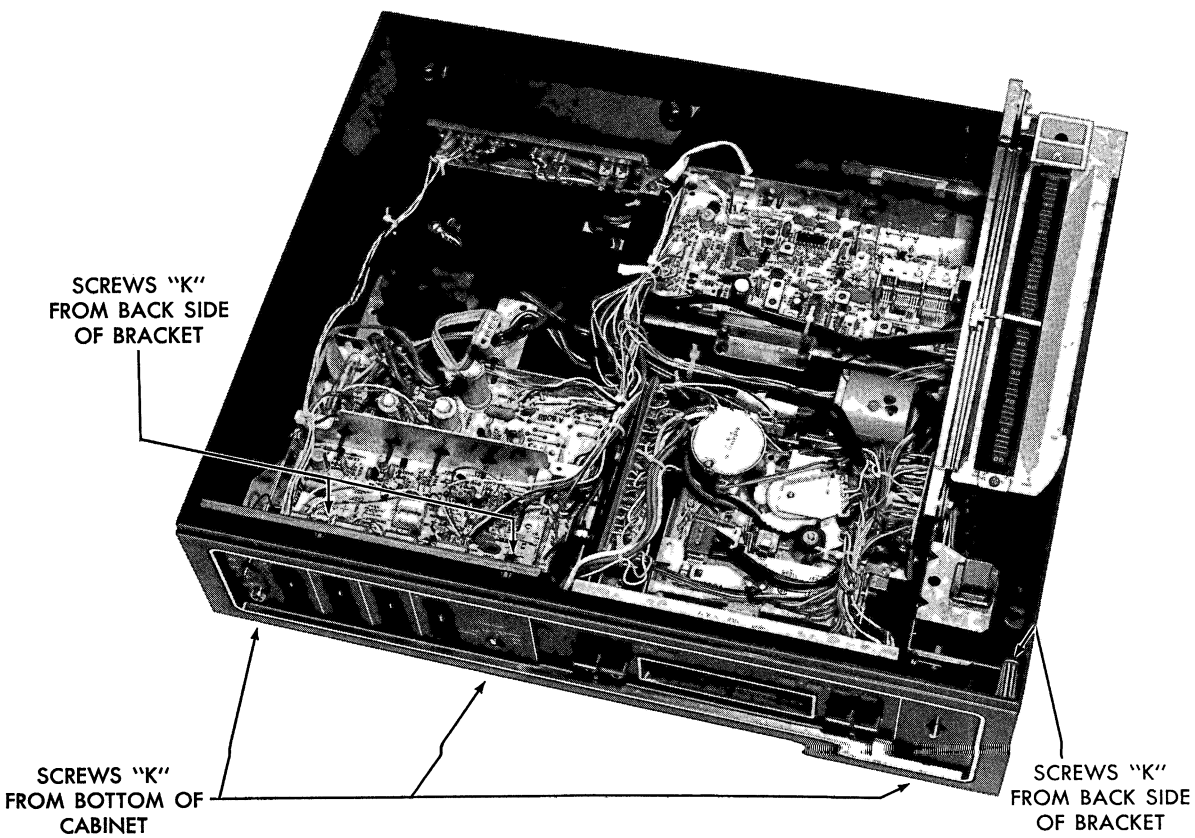


FIGURE 30 – ESCUTCHEON REMOVAL

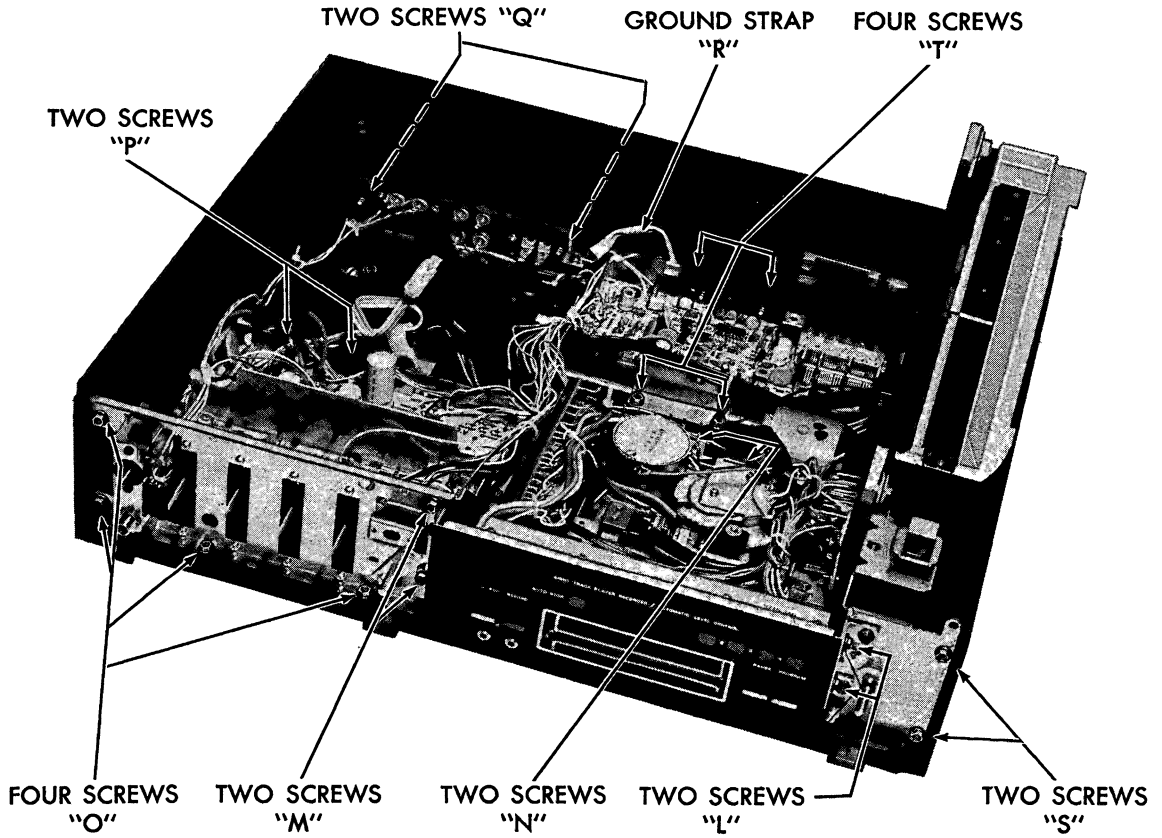


FIGURE 31 – CHASSIS AND TAPE UNIT MOUNTING SCREWS

CABINET TOP REMOVAL (See Figure 29)

In order to gain access to the total chassis and tape areas (or to remove either), it is necessary to remove the cabinet top as follows.

1. With power disconnected, and dust cover removed, place set on its side on top of a soft clean surface.
2. Remove five (5) screws ("J" in Figure 29) located in wells in cabinet bottom.
3. With screws removed, place set in upright position.
4. Slowly lift cabinet top from set, reach inside and disconnect AC and audio cables from record changer.
5. Move cabinet top, with record changer still mounted to cabinet top, away from set.

ESCUTCHEON REMOVAL (See Figure 30)

If either the audio chassis assembly or the tape unit will be removed, it is first necessary to remove the escutcheon. Proceed as follows:

1. Remove cabinet top as above.
2. With set in upright position, remove Tuning, Function, Tone, Balance and Loudness Knobs, and also the headphone jack nut.
3. Remove six (6) screws ("K" in Figure 30) including three (3) from back side of bracket.
4. Pull escutcheon forward to remove.

WIRE-WRAP CONNECTIONS

A method of interconnection, relatively new to consumer products, has been used in the telephone industry for some years. Cables or wires between chassis and/or a tape unit may be soldered on one end but wire-wrapped on the other (or wire-wrapped at both ends). When the chassis are being interconnected, a special power tool that looks like a drill is used. The stripped end of a wire is inserted into one hole in the bit. The tool is then placed over the terminal to which connection is to be made (the terminal will fit into a second hole in the bit). Power is applied to the tool and the wire wraps tightly around (and bites into) the terminal, resulting in a firm, solid connection. If it is necessary to unwrap one or more of these connections, it is recommended that the stripped lead be rewrapped as you would normally do, then solder the connection. This repair method is recommended because:

1. The wire may lose it's strength from the wrapping, unwrapping and rewrapping, resulting in a connection of questionable reliability.

2. Proper tools are not readily available in most service shops (normal hand tools and techniques are not intended for this type of application).

TAPE UNIT REMOVAL
(See Figure 31)

1. Proceed as for "Cabinet Top Removal" and "Escutcheon Removal".
2. Remove four (4) screws "L" and "M" on front of bracket.
3. Remove two (2) screws "N" at rear of Tape Unit.
4. Tape Unit is free to remove (See prior comments "Wire-wrap Connections"). Undo cable retainers as required.

AUDIO CHASSIS REMOVAL
(See Figure 31)

1. Proceed as for "Cabinet Top Removal" and "Escutcheon Removal".
2. Remove four (4) screws "O" at front left and bottom of front bracket.
3. Remove two (2) screws "M" at left of Tape Unit.
4. Remove two (2) screws "P" adjacent to power transformer.
5. Remove two (2) screws "Q" holding audio connector assembly to cabinet rear (disconnect any externally connected cables).
6. Remove ground strap "R" between Tuner Chassis and audio connector assembly.
7. Audio Chassis is free to remove (See prior comments "Wire-wrap Connections"). Undo cable retainers as required.

TUNER CHASSIS REMOVAL
(See Figure 31)

1. Proceed as for "Cabinet Top Removal" and "Escutcheon Removal".
2. Remove two (2) screws "S" at right of front bracket.
3. Remove two (2) screws "L" at right of Tape Unit.
4. Remove for (4) screws "T" (two on either side of Tuner Circuit board assembly).
5. Remove ground strap "R" between Tuner Chassis and audio connector assembly.
6. Tuner Chassis is free to remove (See prior comments "Wire-wrap Connections"). Undo cable retainers as required.

DISASSEMBLY PROCEDURE MODELS J596W AND JR596W

Basic disassembly procedure for the above models, using Chassis 15WJR29, is simplified due to modular construction techniques with the use of convenient cable connectors. This is illustrated by the accompanying photos, in Figures 32 through 36. The procedure is similar to their "G" and "H" line counterparts.

CABINET BOTTOM REMOVAL
(See Figure 32)

1. With power disconnected, place main unit on right side (as viewed from front) on top of a soft clean surface.
2. Remove fourteen (14) screws holding bottom cover ("A").

RECORD CHANGER REMOVAL
(See Figure 33)

1. Proceed as for "Cabinet Bottom Removal".
2. Release one (1) record changer mounting clip (located above headphone jack – "C").
3. Lift record changer upward and disconnect AC and audio cables at record changer (visible above amplifier chassis – "B").
4. Using caution, slide record changer forward while lifting outward to remove.

POWER SUPPLY/AMPLIFIER REMOVAL
(See Figure 33)

1. Proceed as for "Cabinet Bottom Removal".
2. Release interconnecting cables from retainers ("D", "E" and "F").
3. Unplug record changer AC cable "B" at record changer.
4. Unplug two connectors "G" and "H" on this chassis.
5. Unplug connector "N" on tuner chassis.
6. Disconnect FM antenna connector "M".
7. Disconnect speaker connector "U".
8. Remove nine (9) screws "J" holding chassis assembly and mounting brackets.
9. Remove chassis by sliding in direction of arrow "K".
10. When replacing chassis be certain that insulating shield "L" is between chassis and rear grille.

TAPE UNIT REMOVAL
(See Figure 33 unless indicated)

1. Proceed as for "Cabinet Bottom Removal".
2. Unclip and disconnect tape unit audio cables "M" at rear panel connectors.

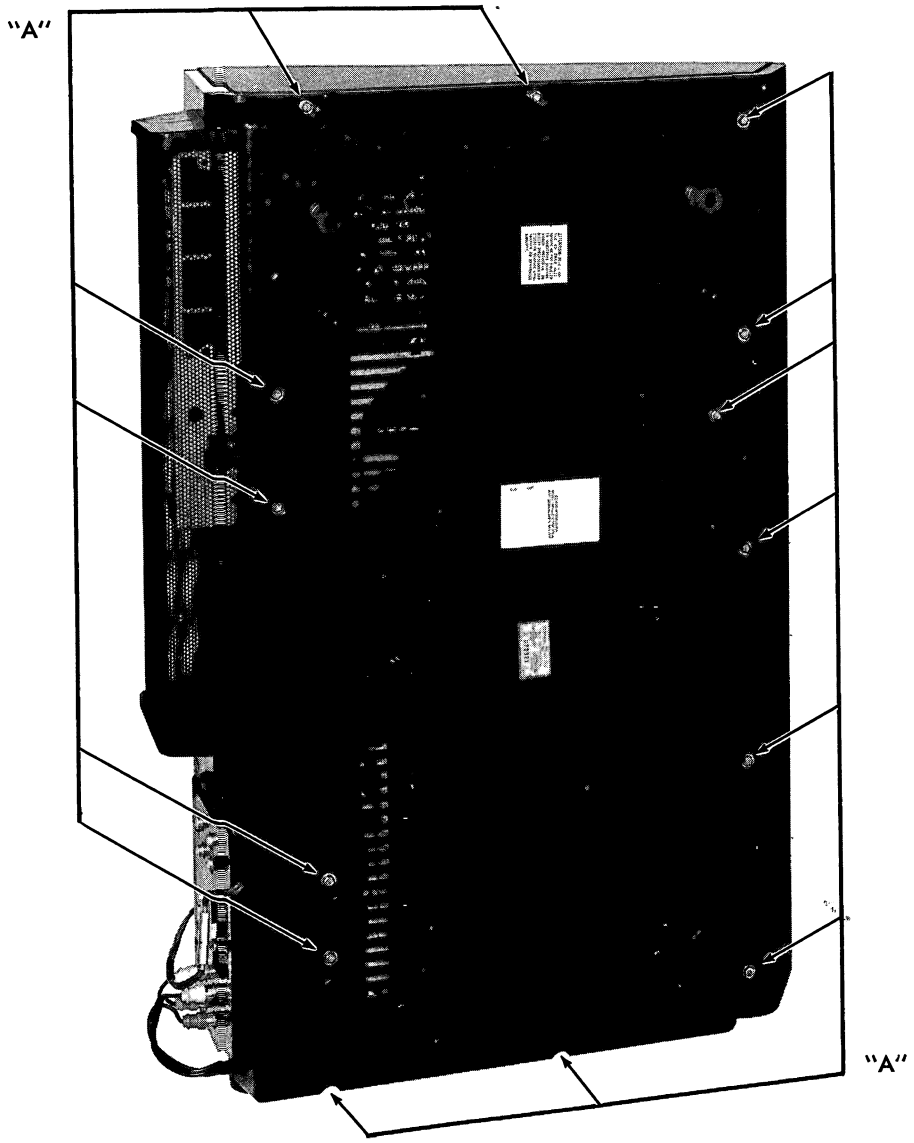


FIGURE 32 – MODELS J596W AND JR596W CABINET BOTTOM SCREW LOCATIONS

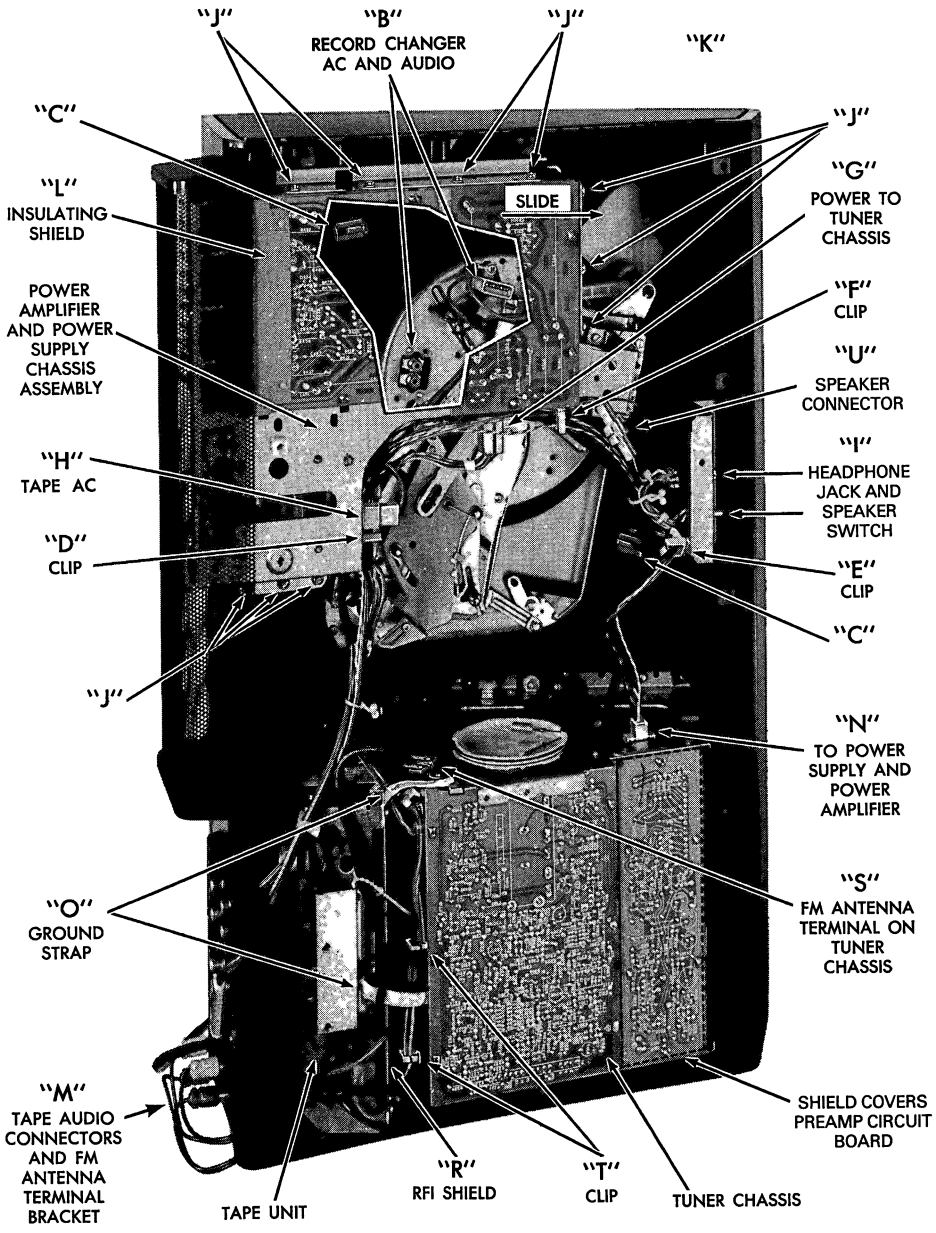


FIGURE 33 – MODELS J596W AND JR596W CABINET BOTTOM REMOVED

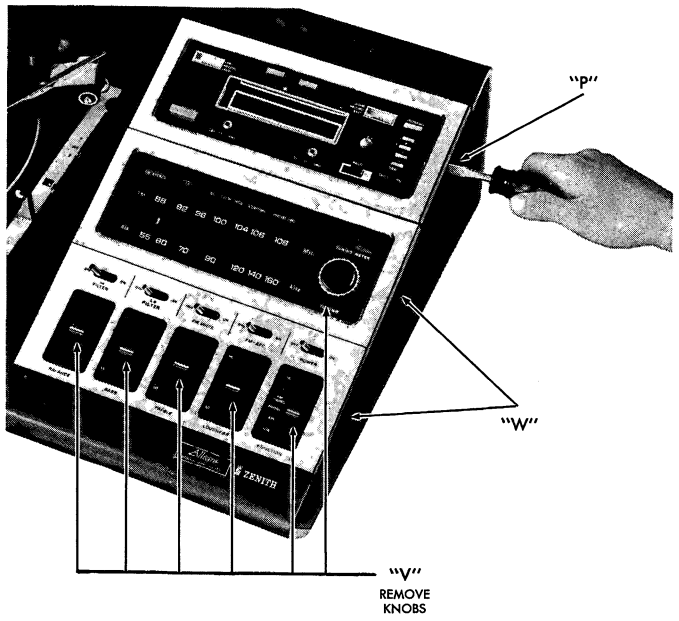


FIGURE 34 – MODELS J596W AND JR596W ESCUTCHEON REMOVAL

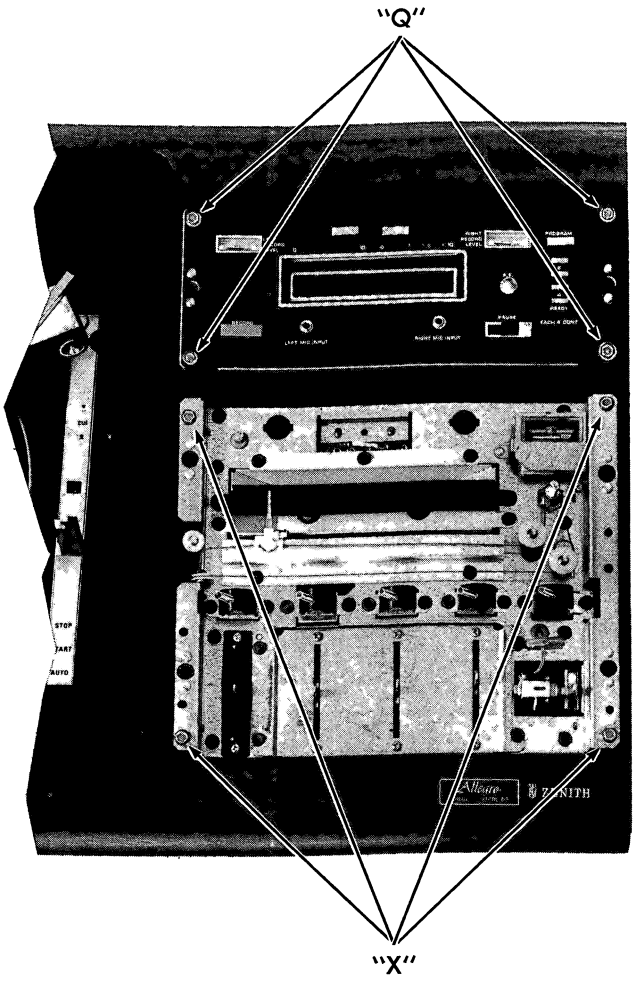


FIGURE 35 – MODELS J596W AND JR596W TAPE UNIT AND TUNER CHASSIS MOUNTING SCREWS

3. Unclip and disconnect tape unit AC cables "D" and "H" at power supply chassis.

4. Disconnect ground strap "O" between tape unit and tuner chassis.

5. The tape unit mounting screws are covered by a "snap off" escutcheon. A notch will be found at the center of the outer edge of the escutcheon ("P" in Figure 34). Insert a thin blade screwdriver into this notch between the escutcheon and the cabinet proper, being careful not to mar the surface. Force the escutcheon upward, causing it to disengage the first stud. Grasp the escutcheon along the top, lifting to disengage second stud. Remove escutcheon.

6. Remove (4) screws holding tape unit to front panel ("Q" in Figure 35).

7. Slide tape unit out through front panel (noting location of RFI shield "R" on Model JR596W).
CAUTION: When replacing tape unit in Model JR596W be certain RFI shield is in proper location.
NOTE: Main unit should be in horizontal position when reinstalling tape unit.

TUNER CHASSIS REMOVAL
(See Figure 33 unless indicated)

1. Proceed as for "Cabinet Bottom Removal".

2. Remove four (4) screws holding FM Antenna and Tape Bracket "M".

3. Unclip and disconnect cables "D", "G", and "N".

4. Disconnect ground strap "O" between tape and tuner chassis.

5. Remove six (6) knobs ("V" in Figure 34).

6. The tuner chassis mounting screws are covered by a "snap-off" escutcheon. Two notches will be found on the bottom of the outer edge of the escutcheon ("W" in Figure 34). Insert a thin blade screwdriver into these notches between the escutcheon and the cabinet proper, being careful not to mar any surface. Force the escutcheon upward, causing it to disengage first two studs. Grasp the escutcheon along the top, lifting to disengage second two studs.

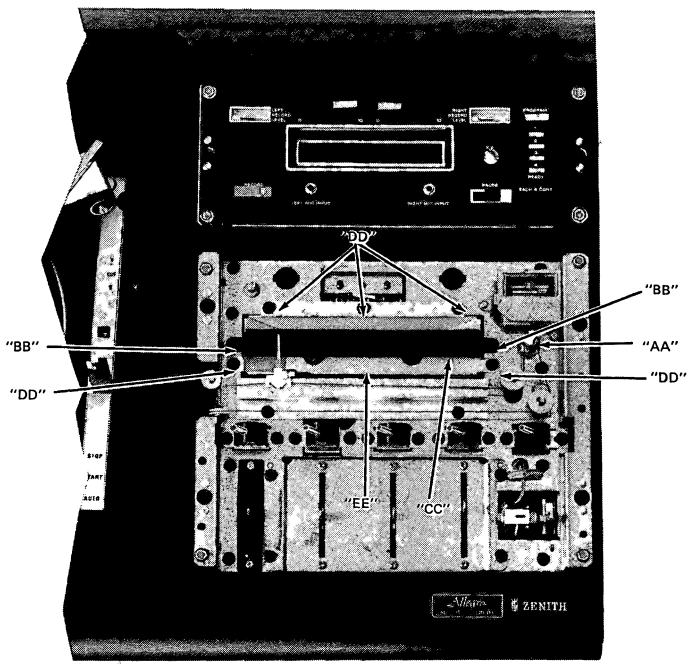


FIGURE 36 – MODELS J596W AND JR596W ACCESSIBILITY TO CHASSIS 15WJR29

7. Remove four (4) screws ("X" in Figure 35), holding tuner chassis to front panel.

8. Slide tuner chassis out through front panel (noting location of RFI shield "R" on Model JR596W).
   CAUTION: When replacing tuner chassis in Model JR596W be certain RFI shield is in proper location.
   NOTE: Main unit should be in horizontal position when reinstalling tuner chassis.

CHASSIS 15WJR29 ACCESSIBILITY FOR SERVICING AND ALIGNMENT (See Figures 33 and 36)

Once the bottom cover has been removed from Models J596W and JR596W, you will see that there is ready accessibility to the foil sides of both the tuner and the combined power supply/power amplifier chassis for servicing and also some alignment points (See Figure 33 for bottom view), But, what if you want to make adjustments on the gang, or at other points not accessible from the foil side? In most cases it is not necessary to remove the tuner chassis! Just remove the snap-off escutcheon as explained!

Once the escutcheon is removed, locate the dial light well "EE" (See Figure 36).

1. Rotate the tuning shaft "AA" counter-clockwise (gang closed).

2. Remove two screws "BB" holding dial pointer background strip "CC".

3. Remove five screws "DD" holding dial light well "EE".

4. Lift dial light well "EE" and move it out of way, being careful not to create a short.

You now have access to most components on the component side of the tuner circuit board (without the time required to remove the chassis) for alignment, visual inspection and limited parts replacement. This unique service tip will save considerable time when servicing this area of Chassis 15WJR29.

ADDITIONAL DISASSEMBLY PROCEDURES

In addition to the disassembly procedure for Models J596W and JR596W outlined above, there are two other procedures (Groups "B" and "C" below) which apply to various "G", "H" and "J" line models that also use the snap-off escutcheon and the outfront chassis removal concepts. On such models the escutcheon is held in place by three (or more depending on model) studs and clips. This method facilitates access for cleaning the back side of the escutcheon lens and also for access to chassis mounting screws. The chassis (and/or some tape units) may be removed thru the front of modular models, or thru the top mounting panel of console models.

GROUP "B" models include:

CHASSIS MODELS	1WGR50 G901P GR901P1 H901P, P11 HR901P, P11 HR902P, P11 HR903PN, PN11 SR917M SR918P	CHASSIS MODEL	6WGR55 G920AE G921P G922M
		CHASSIS MODELS	3WHR50 H914P H915AE H916M
CHASSIS MODELS	3WGR50 G914P, P11 G915AE, AE11 G916M, M11	CHASSIS MODELS	3WHR52 H584W H587W HR587W
CHASSIS MODELS	3WGR52 G584W1, W2 G587W2, W3 GR587W1, W2	CHASSIS MODELS	6WHR55 HR920AE HR921P HR922M
CHASSIS MODEL	3WGR54 G680W2	CHASSIS MODEL	3WJR51 J584W, W1

Model J584W is representative of those models which have the above features, and will be used in the following explanation.

ESCUTCHEON REMOVAL – GROUP "B"

Figure 37 illustrates the technique used:

1. Remove all knobs (except AFC) from the control panel.

2. Rotate tuning shaft so that the "flat" is vertical, and the cut-away portion is facing the headphone jack.

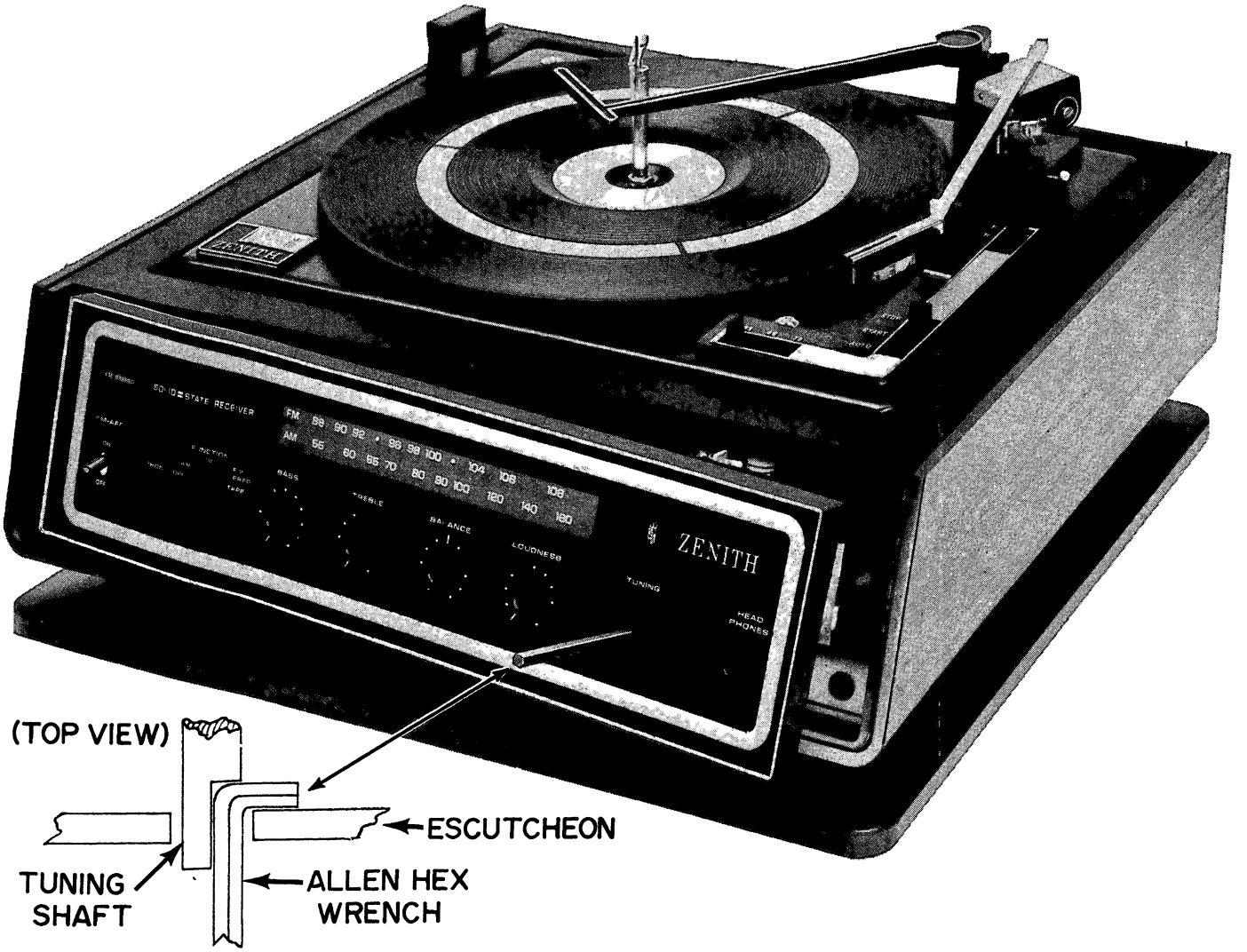


FIGURE 37 – ESCUTCHEON REMOVAL – GROUP "B"

3. Referring to the top view in Figure 37, insert the short end of a 1/8" (size may vary) "L" shaped Allen hex wrench between the shaft and the escutcheon.

4. Position the short end of the wrench behind the escutcheon, with the wrench against the step of the shaft.

5. Moving wrench to left will apply pressure to the back of the escutcheon, causing the nearest stud and clip to disengage.

6. Remove wrench.

7. Grasp loosened end of escutcheon and firmly pull escutcheon outward until all studs and clips are disengaged.

CAUTION – Refer to Figure 38. On some models the Stereo Indicator and Uniband Dial Scale lamps are mounted in grommets on the chassis, while on other models these lamps (in grommets) are fitted into the escutcheon.

8. Escutcheon is now removed.

OUT FRONT CHASSIS REMOVAL – GROUP "B"

Figure 38 identifies the location of certain components involved. While Model J584W is representative of the disassembly procedure for the above models, there are some minor variations that must be noted. These variations will be denoted with the model number and variation shown in ( ).

1. Remove escutcheon as explained above.

2. Remove screws holding cabinet back and remove back (G584W1, H584W, J584W, W1 – Remove screws holding cabinet bottom, and remove bottom).

3. Unmount both the Speaker Jack Assembly Bracket and the Antenna/Tape/Phono Connector Assembly Bracket from the cabinet back.

4. Untie cable retainers. (Disconnect record changer and tape unit cables when used.)

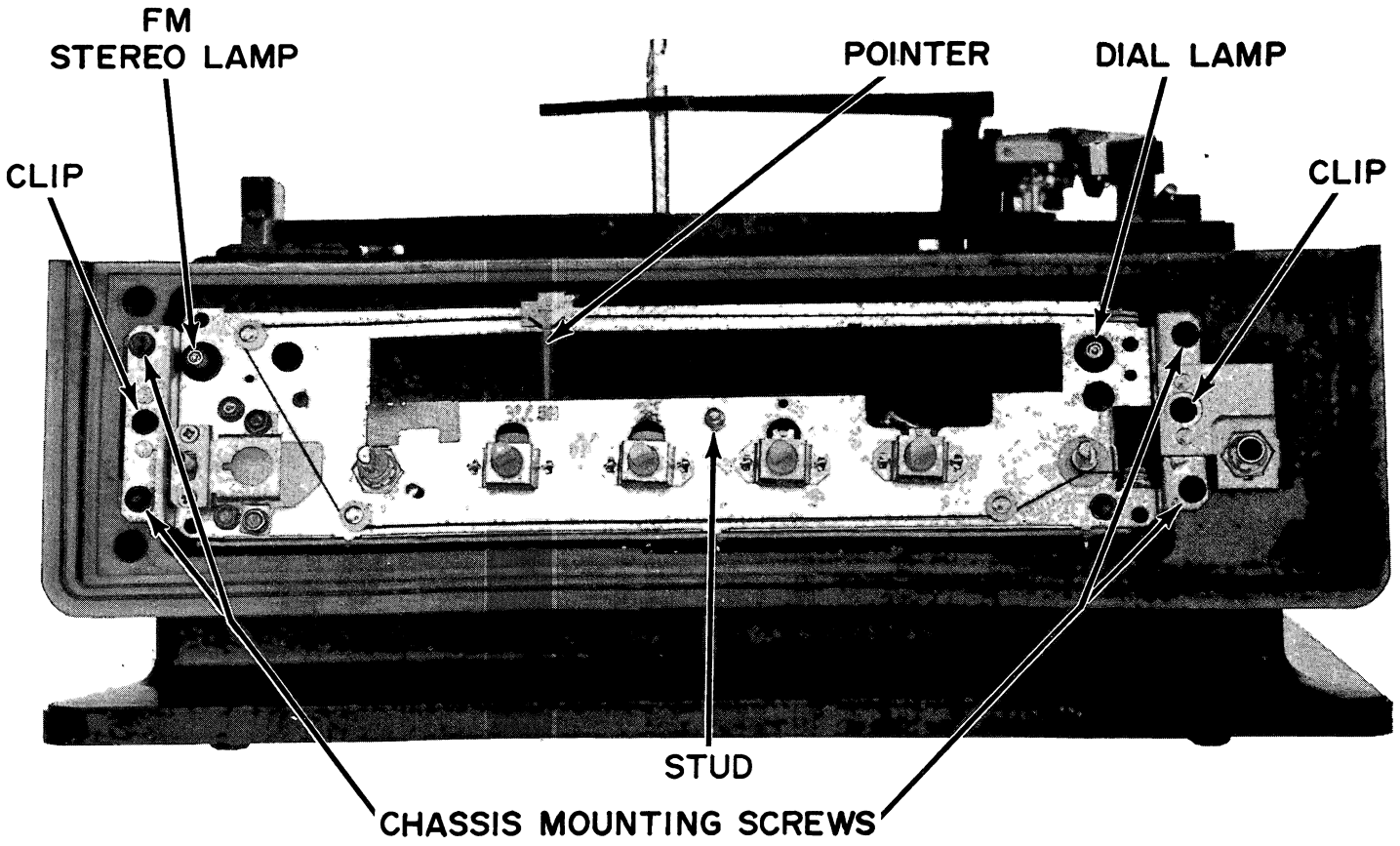


FIGURE 38 – OUT FRONT CHASSIS REMOVAL – GROUP "B"

5. Remove one screw from bottom of cabinet under center of chassis (G584W1, H584W, J584W, W1 – Four screws to remove bottom base, then two screws under chassis.) (G587W2, GR587W1, G680W2, H587W, HR587W – Also four screws under tape assembly.)

6. Remove four screws from front of chassis. (G587W2, GR587W1, G680W2, H587W, HR587W – Tape unit is secured to radio chassis with a bracket. There are two additional screws to the left of the tape unit.)

7. Slide radio chassis (G680W, G587W2, GR587W1, G680W2, H587W, HR587W – Tape unit is mounted to radio chassis with a bracket), with attached brackets and cables, out thru front of cabinet.

This completes chassis removal.

When reinstalling chassis, be certain to reconnect cables, retie cable retainers, etc.

ESCUTCHEON REMOVAL – GROUP "C"

CHASSIS	6WGR56
MODEL	GR684W
CHASSIS	6WGR57
MODELS	G590W
	GR590W
	GR591W
CHASSIS	6WHR57
MODELS	H590W
	HR590W, W1
	HR591W
CHASSIS	8WJR56
MODELS	JR684W, W1
CHASSIS	6WHR56
MODELS	HR684W, W1
CHASSIS	8WJR57
MODELS	J590W
	JR590W, W1
	JR591W

Models identified in Group "C" have access provisions similar to those in Group "B" above, with the significant difference being in the method of escutcheon removal.

Figure 39 illustrates the technique used:

1. Remove all knobs (except Power, AFC and Matrix). Also remove the nut on the headphone jack.

2. Group "C" models have three notches formed into the under side of the escutcheon (visible from the bottom).

3. Insert screwdriver blade into these notches, between the escutcheon and the cabinet proper, being careful not to mar the surface. Force the escutcheon outward, causing it to disengage each stud.

4. Remove the escutcheon.

OUT FRONT CHASSIS REMOVAL – GROUP "C"

1. Remove escutcheon as explained above.

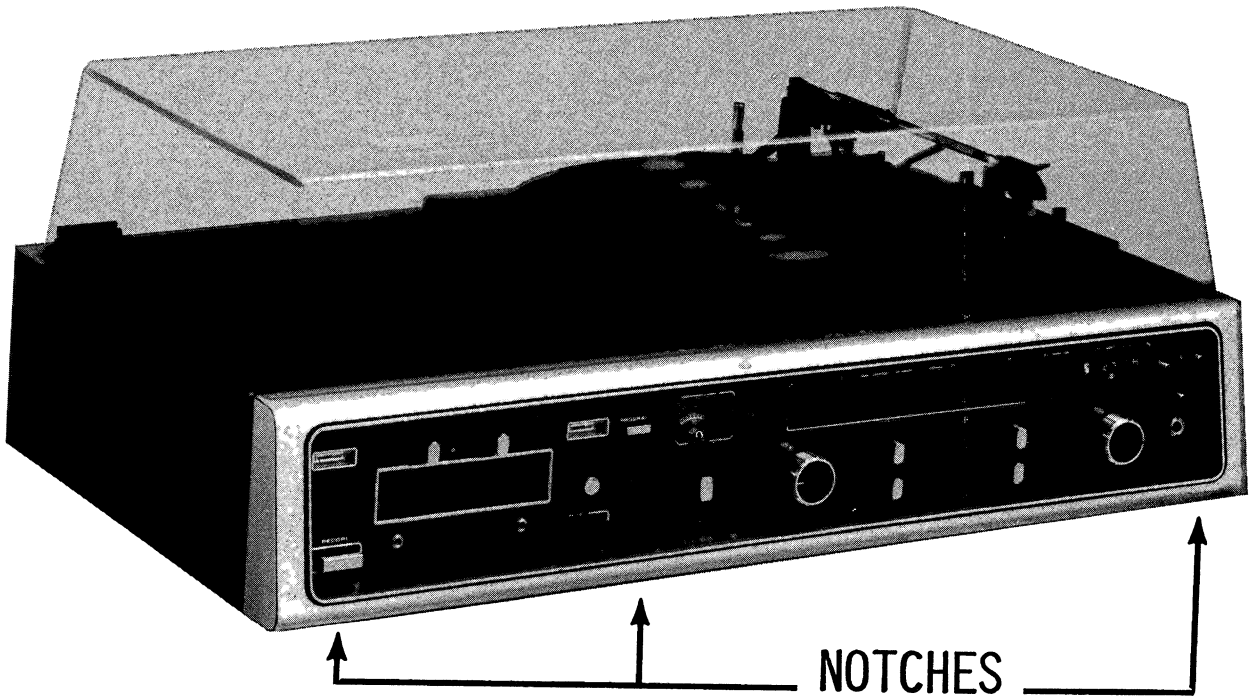


FIGURE 39 – ESCUTCHEON REMOVAL – GROUP "C"

2. Remove screws holding cabinet back, and remove back.

3. Unmount both the Speaker Jack Assembly Bracket and the Antenna/Tape/Phone Connector Assembly Bracket from the cabinet back.

4. Untie cable retainers. (Disconnect record changer and tape unit cables when used.)

5. Remove three screws from bottom of cabinet under tuner chassis, then four screws under tape assembly.

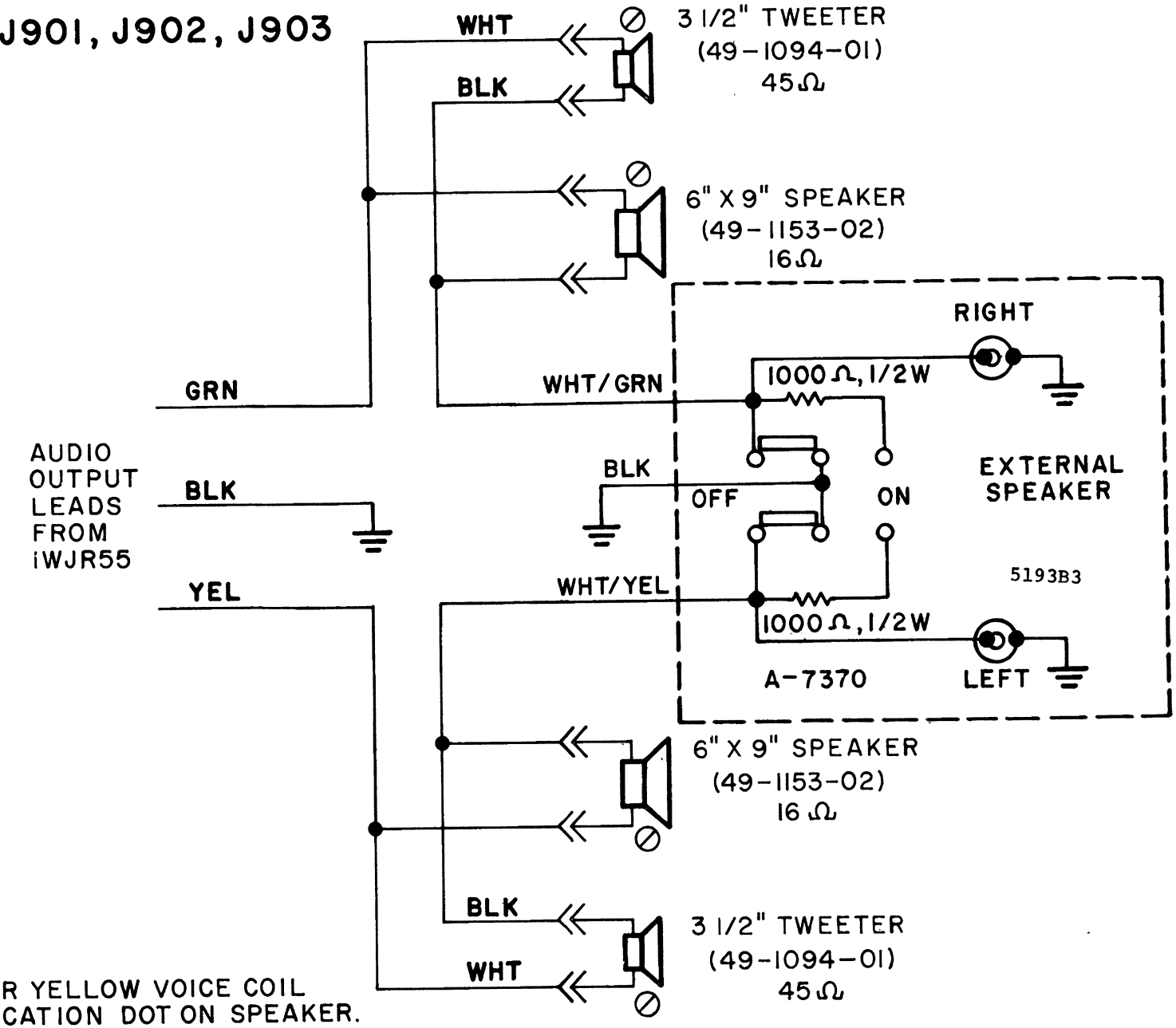
6. Remove three screws from front of chassis. Tape unit is secured to radio chassis with a bracket.

7. Slide radio chassis (Tape unit is mounted to radio chassis with a bracket), with attached brackets and cables, out thru front of cabinet.

This completes chassis removal.

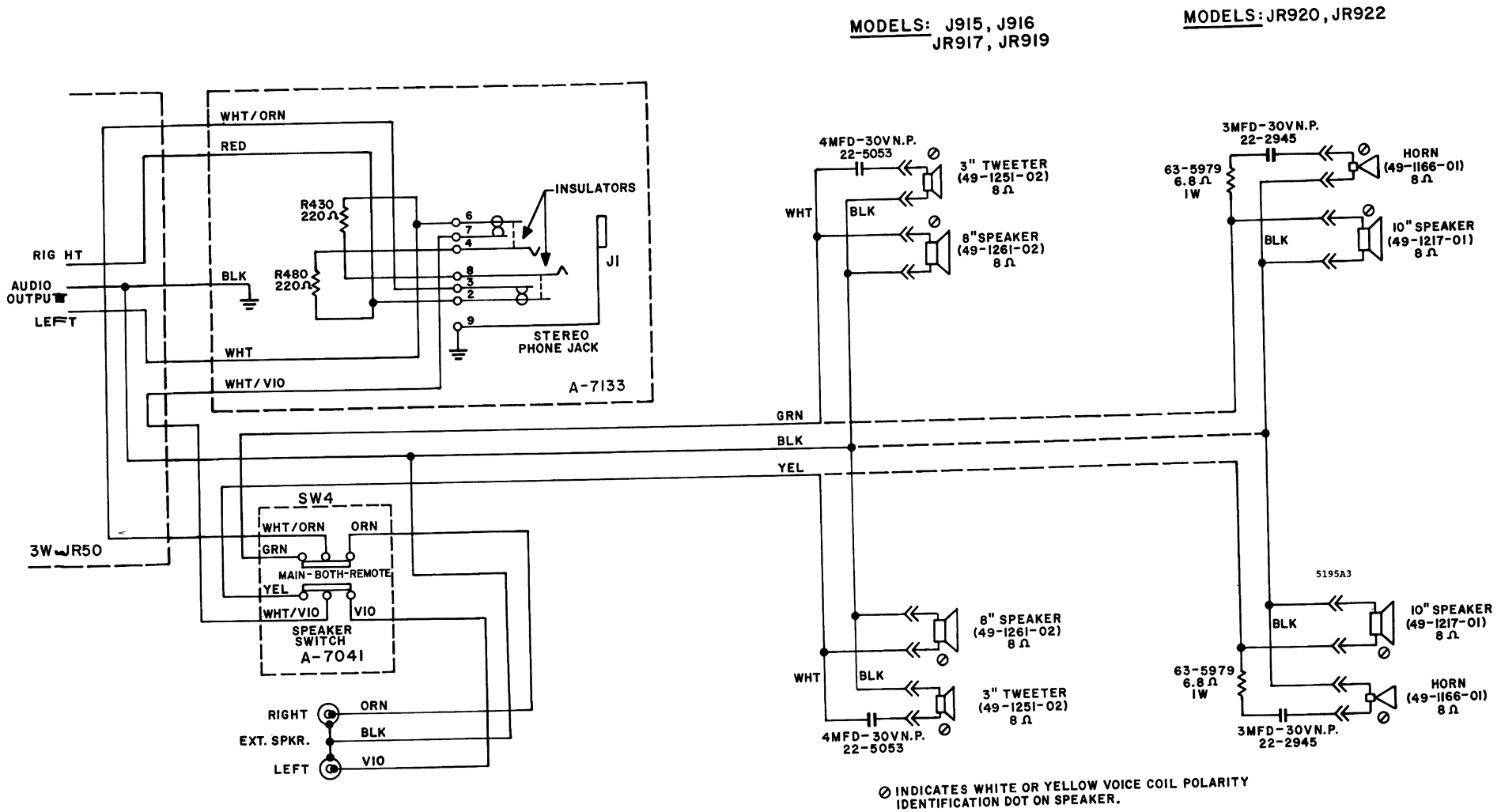
When reinstalling chassis, be certain to reconnect cables, retie cable retainers, etc.

MODELS: J900, J901, J902, J903
JR901



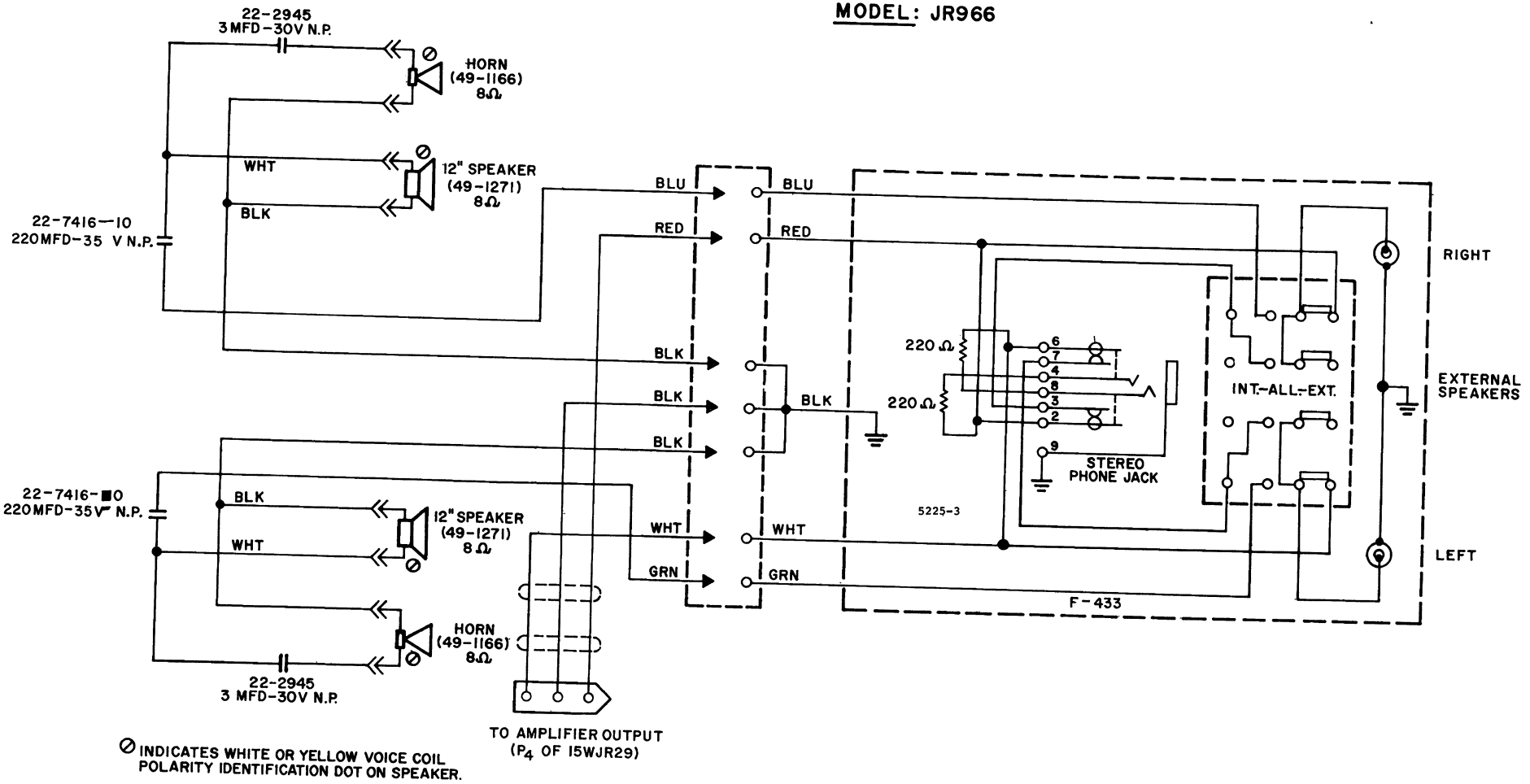
⊘ INDICATES WHITE OR YELLOW VOICE COIL POLARITY IDENTIFICATION DOT ON SPEAKER.

SPEAKER WIRING SCHEMATICS



SPEAKER WIRING SCHEMATICS

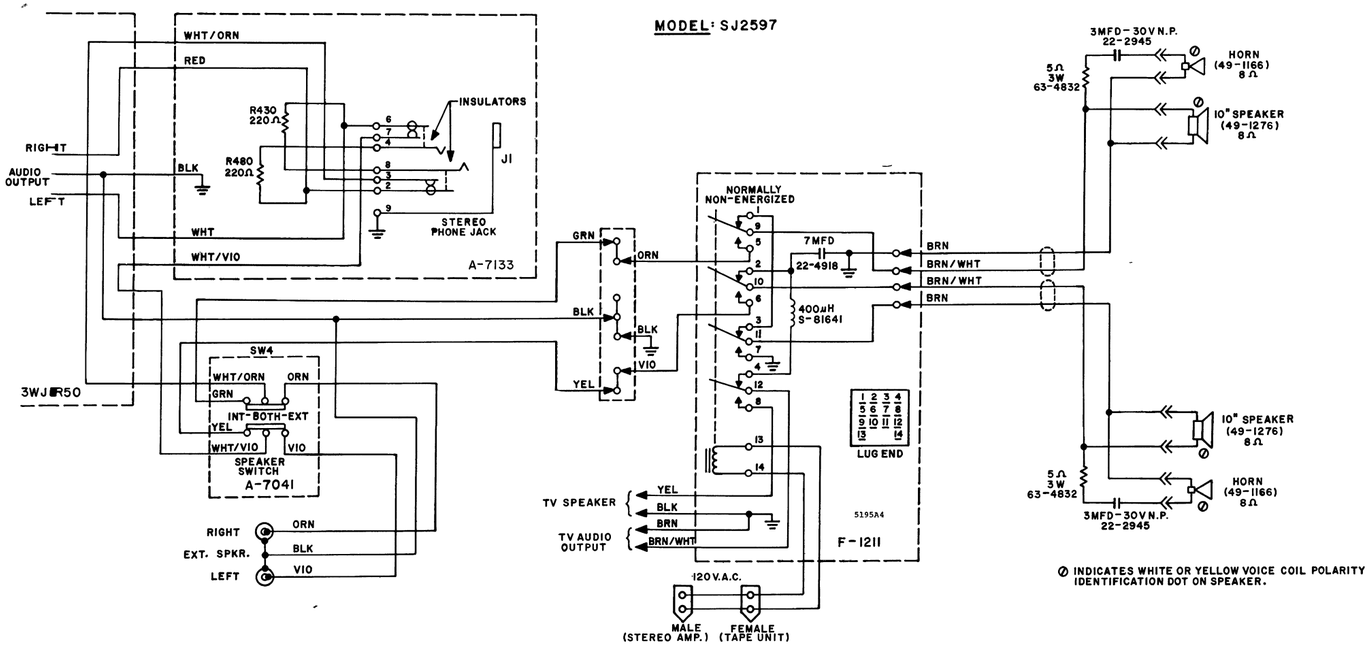
MODEL: JR966



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

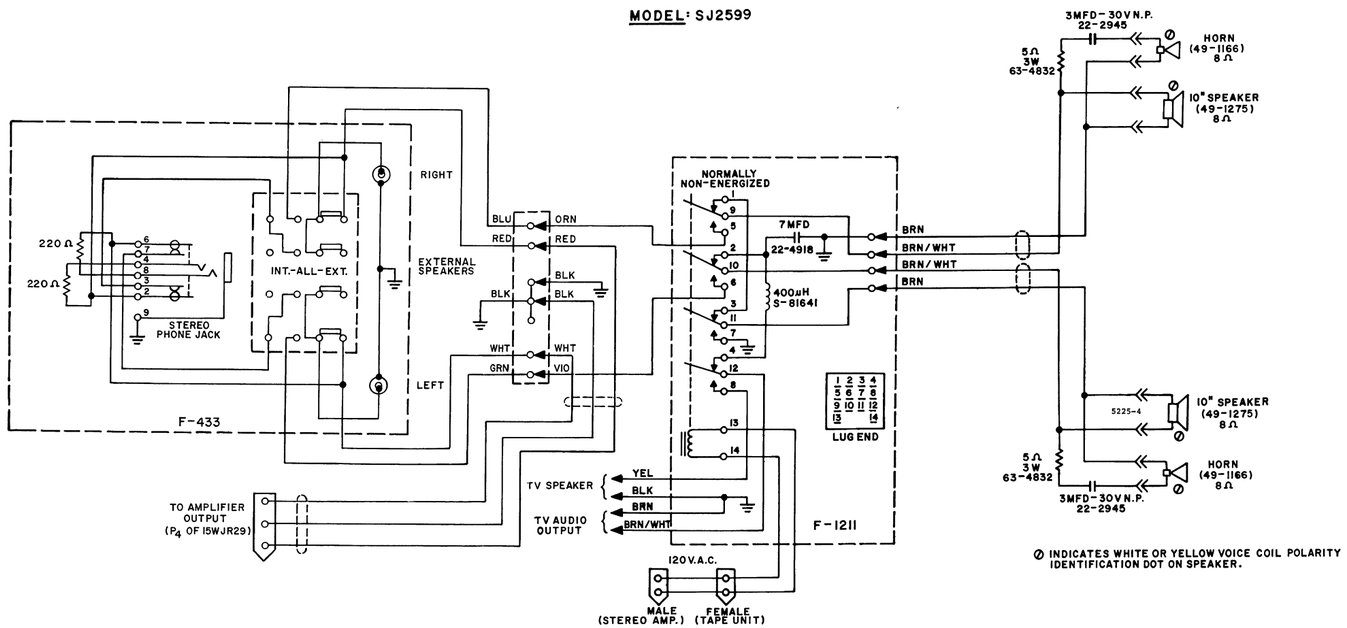
SPEAKER WIRING SCHEMATICS

MODEL: SJ2597



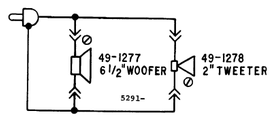
Ø INDICATES WHITE OR YELLOW VOICE COIL POLARITY IDENTIFICATION DOT ON SPEAKER.

MODEL: SJ2599

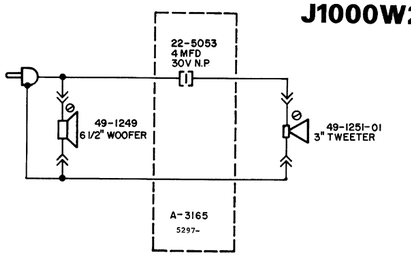


Ø INDICATES WHITE OR YELLOW VOICE COIL POLARITY IDENTIFICATION DOT ON SPEAKER.

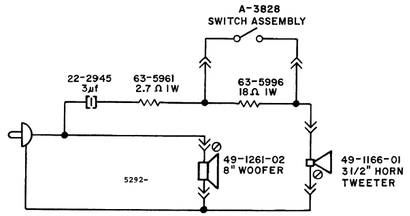
J1000W1



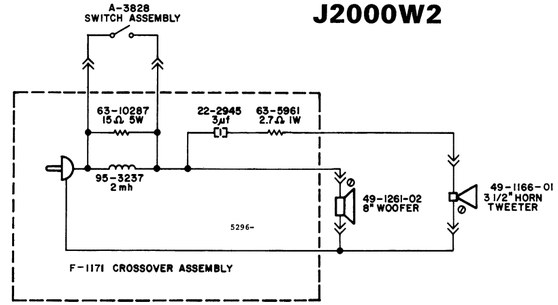
J1000W2



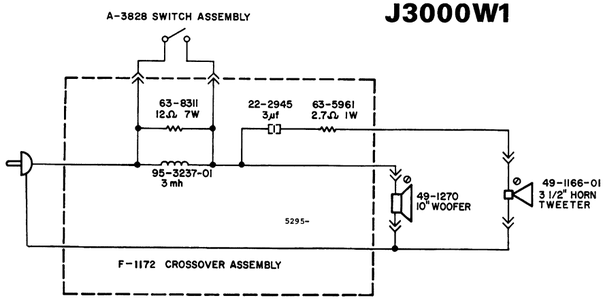
J2000W1



J2000W2



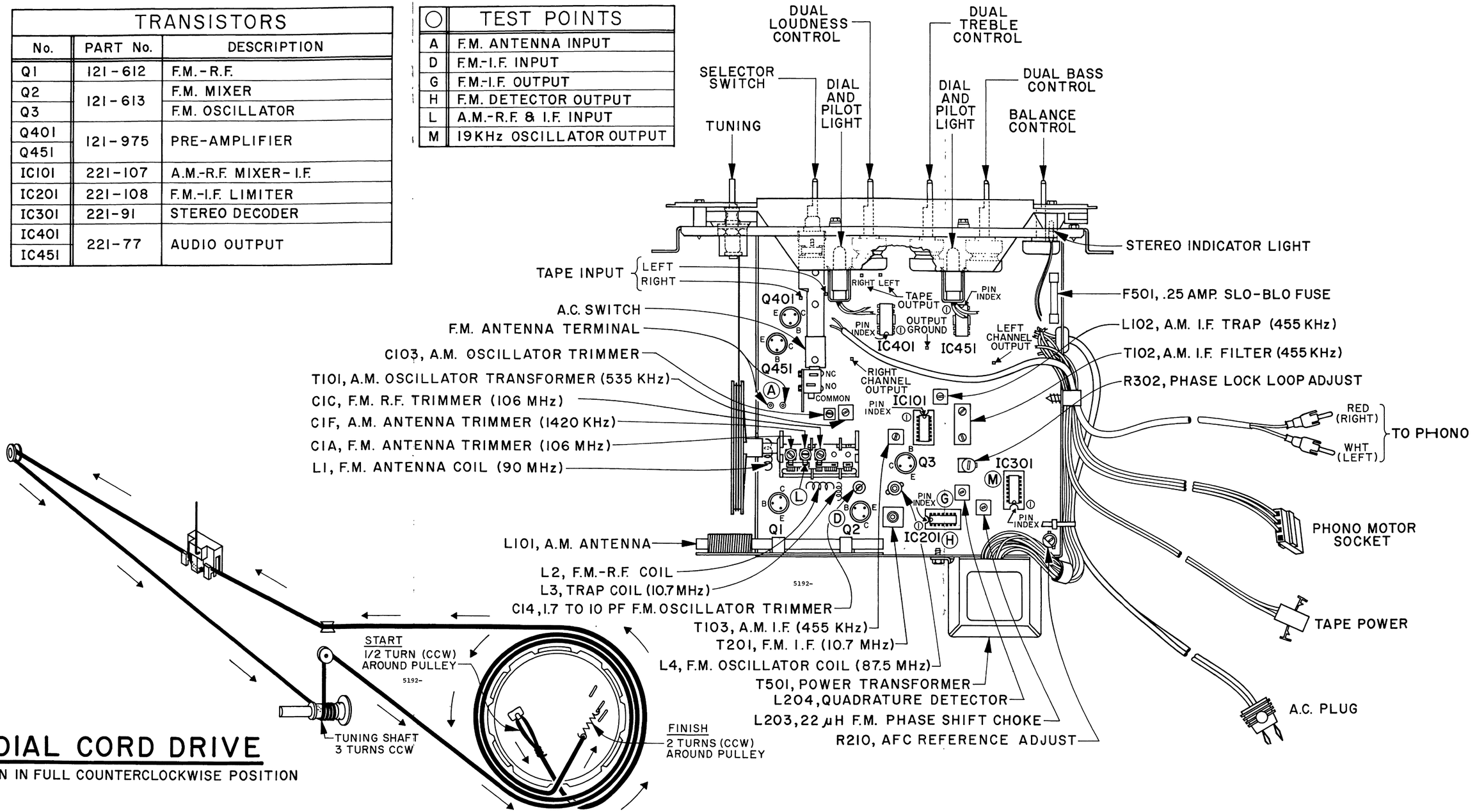
J3000W1



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

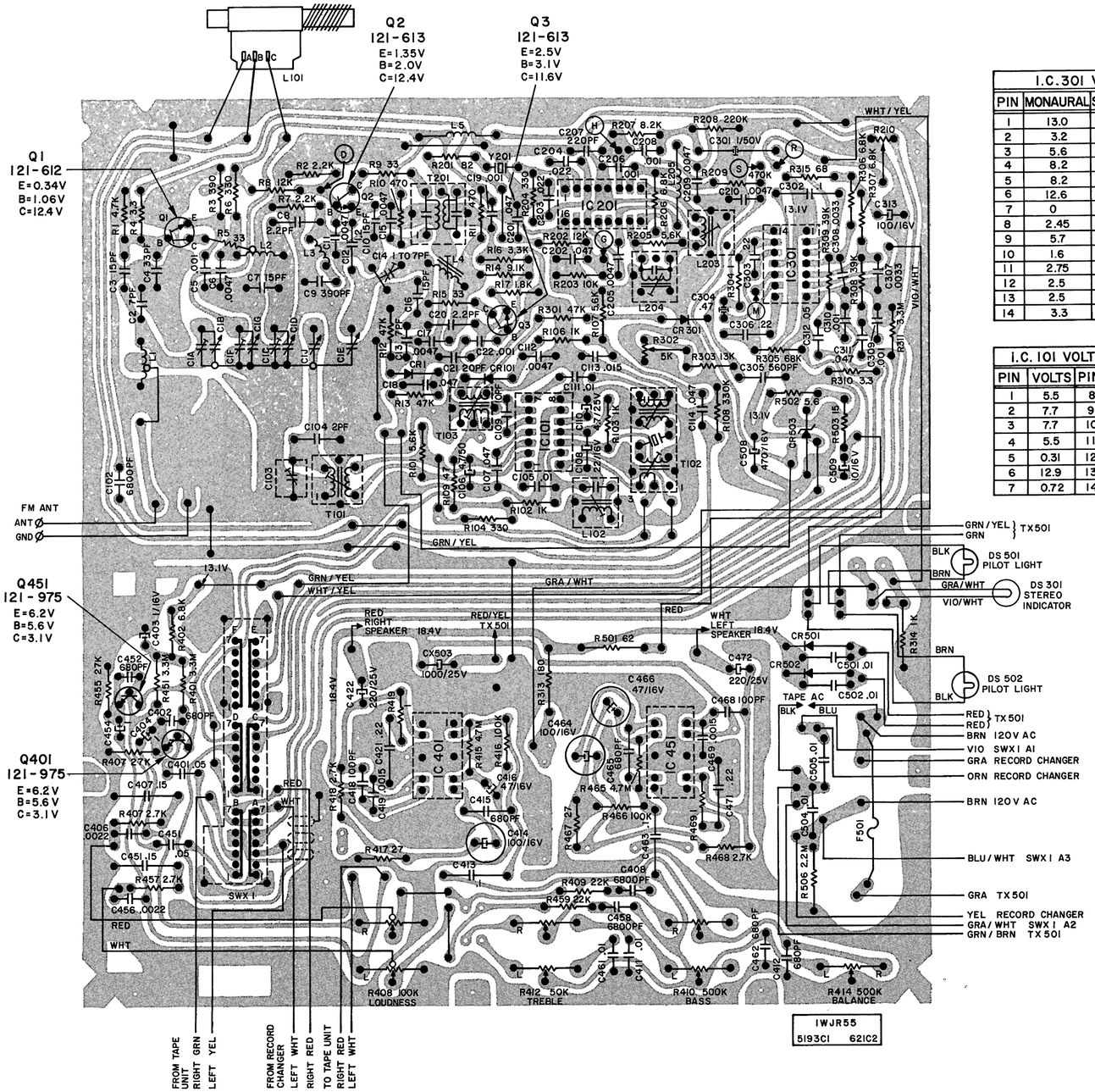
TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-612	F.M.-R.F.
Q2	121-613	F.M. MIXER
Q3		F.M. OSCILLATOR
Q401	121-975	PRE-AMPLIFIER
Q451		
IC101	221-107	A.M.-R.F. MIXER-I.F.
IC201	221-108	F.M.-I.F. LIMITER
IC301	221-91	STEREO DECODER
IC401	221-77	AUDIO OUTPUT
IC451		

○	TEST POINTS
A	F.M. ANTENNA INPUT
D	F.M.-I.F. INPUT
G	F.M.-I.F. OUTPUT
H	F.M. DETECTOR OUTPUT
L	A.M.-R.F. & I.F. INPUT
M	19KHz OSCILLATOR OUTPUT



DIAL CORD DRIVE

SHOWN IN FULL COUNTERCLOCKWISE POSITION



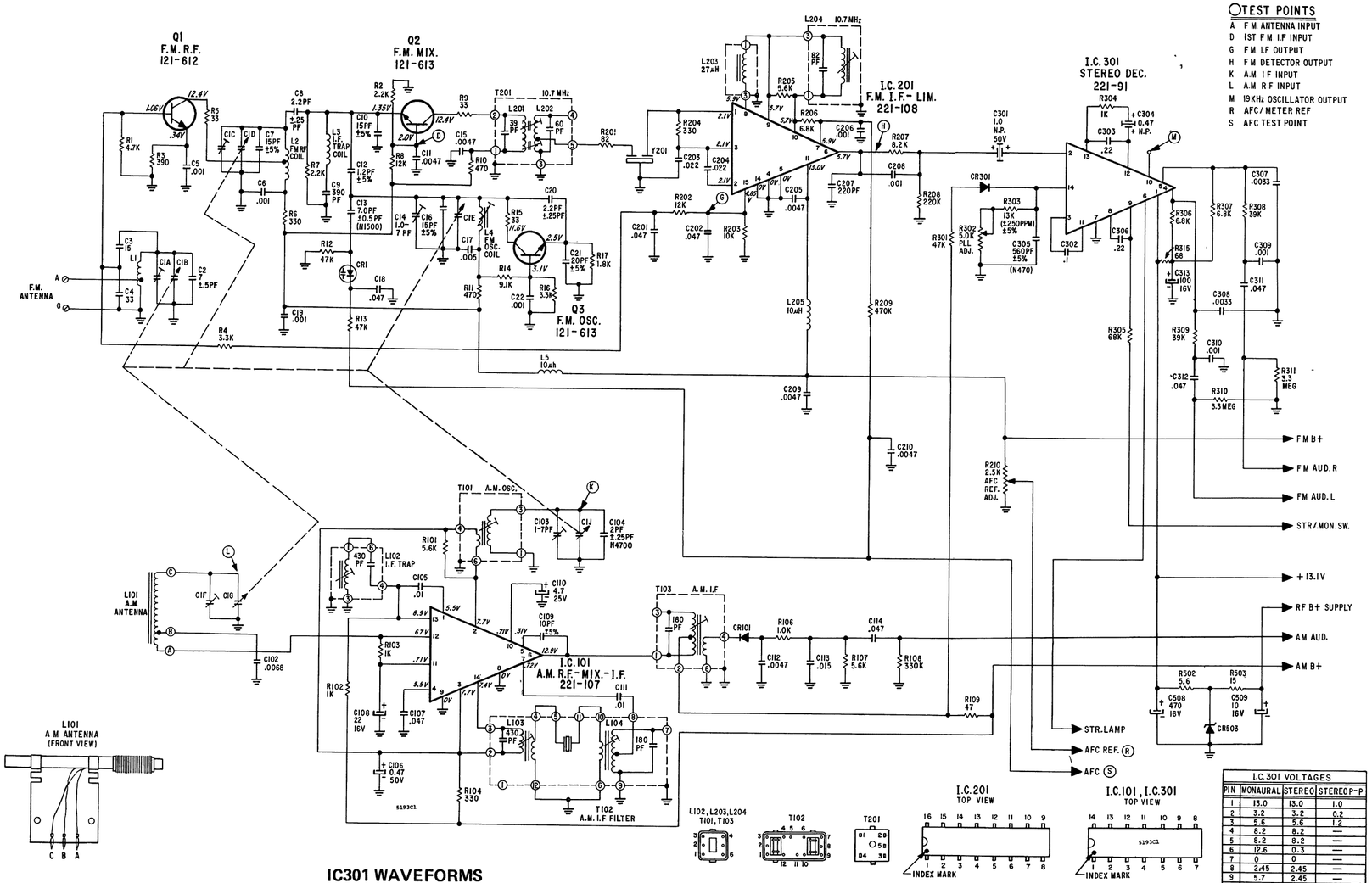
I.C. 301 VOLTAGES			
PIN	MONAURAL	STEREO	STEREO P-P
1	13.0	13.0	1.0
2	3.2	3.2	0.2
3	5.6	5.6	1.2
4	8.2	8.2	—
5	8.2	8.2	—
6	12.6	0.3	—
7	0	0	—
8	2.45	2.45	—
9	5.7	2.45	—
10	1.6	1.6	.02
11	2.75	2.5	1.5
12	2.5	2.5	1.5
13	2.5	2.5	0.5
14	3.3	3.3	0.3

I.C. 101 VOLTAGES			
PIN	VOLTS	PIN	VOLTS
1	5.5	8	0.0
2	7.7	9	0.0
3	7.7	10	0.71
4	5.5	11	0.71
5	0.31	12	0.67
6	12.9	13	8.9
7	0.72	14	7.4

I.C. 201 VOLTAGES			
PIN	VOLTS	PIN	VOLTS
1	2.1	9	5.7
2	2.1	10	5.7
3	2.1	11	13.0
4	0.0	12	—
5	0.0	13	—
6	5.7	14	0.0
7	5.9	15	4.65
8	5.9	16	—

I.C. 401/451 VOLTAGES			
PIN	VOLTS	PIN	VOLTS
1	0.0	8	0.8
2	0.2	9	18.4
TAB	0.0	TAB	0.0
6	10.3	13	9.0
7	1.4	14	0.0

CHASSIS 1WJR55 –
CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE



I.C. 301 VOLTAGES			
PIN	MONAURAL	STEREO	STEREO P-P
1	13.0	13.0	1.0
2	5.2	5.2	0.2
3	5.6	5.6	1.2
4	8.2	8.2	—
5	8.2	8.2	—
6	12.6	0.3	—
7	0	0	—
8	2.45	2.45	—
9	5.7	2.45	—
10	1.6	1.6	.02
11	2.75	2.5	1.5
12	2.5	2.5	1.5
13	2.5	2.5	0.5
14	3.3	3.3	0.3

IC301 WAVEFORMS

PIN 2-COMPOSITE INPUT L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 0.5V P/P (0.5 MILLISEC.)

PINS 3 AND 11-COMPOSITE AMPLIFIED L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 1.4V P/P (0.5 MILLISEC.)

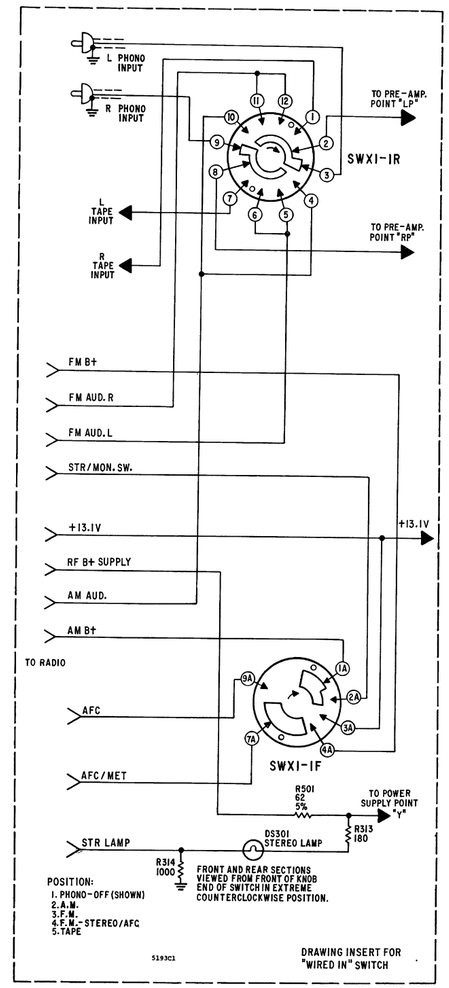
PIN 14-VOLTAGE CONTROLLED OSCILLATOR ADJUSTMENT 3.5V P/P (5.0 MICROSEC.)

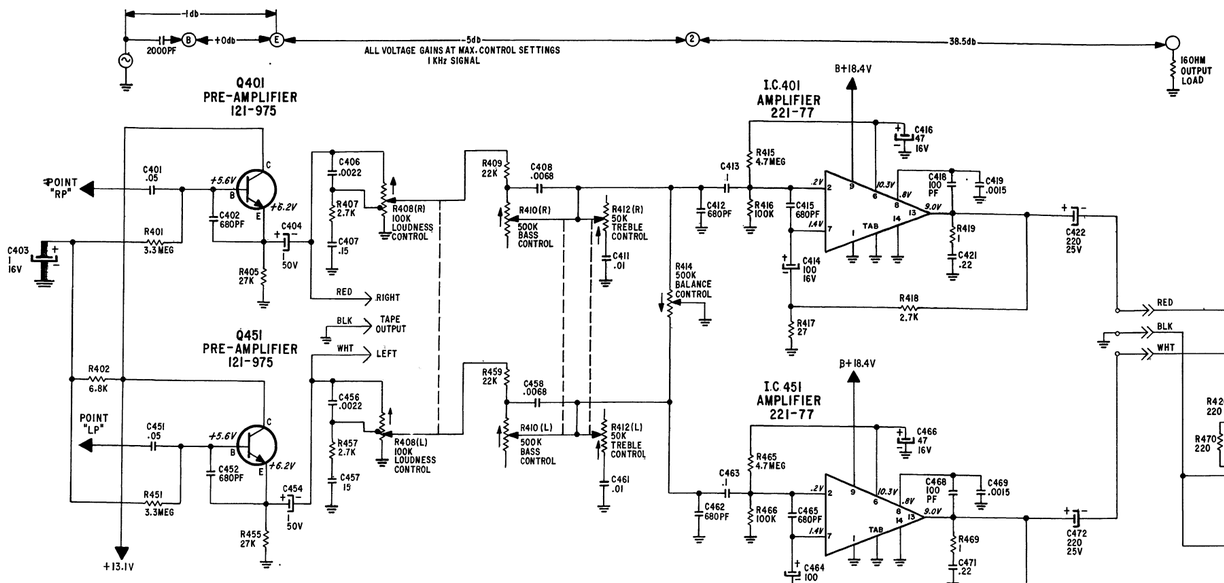
PIN 10-19 KHZ TEST POINT 2.7V P/P (10.0 MICROSEC.)

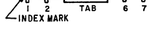
PINS 12 AND 13-FILTER-PHASE DETECTOR 0.14V P/P (0.5 MILLISEC.)

PINS 8 AND 9-FILTER-AMPLITUDE DETECTOR 0.47V P/P (0.5 MILLISEC.)

P1, #9-(UPPER) LEFT OUTPUT 0.57V P/P (0.5 MILLISEC.)
P1, #8-(LOWER) RIGHT OUTPUT 0.05V P/P (0.5 MILLISEC.)







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 SHADED ON THE SCHEMATIC FOR EASY IDENTIFICATION. THE LETTER "X" INCLUDED IN THE ITEM NUMBER DESIGNATES SPECIAL FAIL 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, IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

NOTE:
EITHER "WIRED IN" OR "PRINTED CIRCUIT" SWITCH TO BE USED.

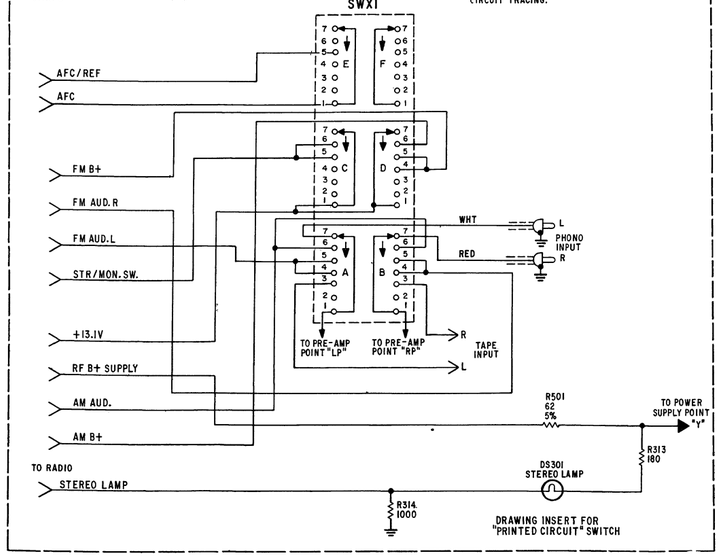
SWITCH:

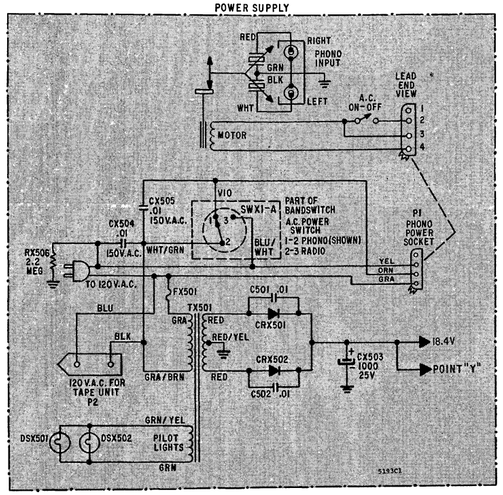
POSITIONS	CONNECTIONS
1. PHONO-OFF (SHOWN)	1-7
2. A.M.	1-6
3. F.M.	1-5
4. F.M.-STEREO/AFC	1-4
5. TAPE	1-3

(TERMINAL 2 IS NOT INTERNALLY CONNECTED)

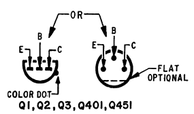
PRINTED CIRCUIT SWITCH NOTES:
ARROW INDICATES MOVEMENT OF WIPER CORRESPONDING TO CLOCKWISE ROTATION OF SHAFT.

SWITCH CONTACTS HAVE BEEN ASSIGNED ALPHANUMERIC DESIGNATIONS TO ASSIST SERVICE TECHNICIANS IN CIRCUIT TRACING.





TRANSISTOR LEAD LAYOUTS
LEAD END VIEWS



Q1, Q2, Q3, Q401, Q451

NOTES:
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS, WITH NO SIGNAL INPUT, LOUDNESS CONTROL AT MINIMUM, LINE VOLTAGE 120 V.A.C. USING A HIGH IMPEDANCE V.T.V.M.

ALL RESISTORS IN OHMS, 1/4 WATT CARBON OR CARBON FILM, ± 10% UNLESS OTHERWISE SPECIFIED

ALL CAPACITORS ARE IN MICROFARADS ± 10% UNLESS OTHERWISE SPECIFIED, EXCEPT ELECTROLYTICS WHICH ARE $^{+100\%}_{-10}$.

I.F. FREQUENCY: A.M. 455KHz
F.M. 10.7MHz

TUNING RANGE: A.M. 540-1600KHz
F.M. 88-108MHz

⏚ INDICATES CHASSIS GROUND.

INDICATES ±20% TOLERANCE.

INDICATES VOLTAGE.

(A) INDICATES TEST POINTS.

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION ON ROTARY CONTROLS AND UPWARD MOVEMENT ON SLIDE CONTROLS.

* VOLTAGES MEASURED IN THE F.M. STEREO POSITION

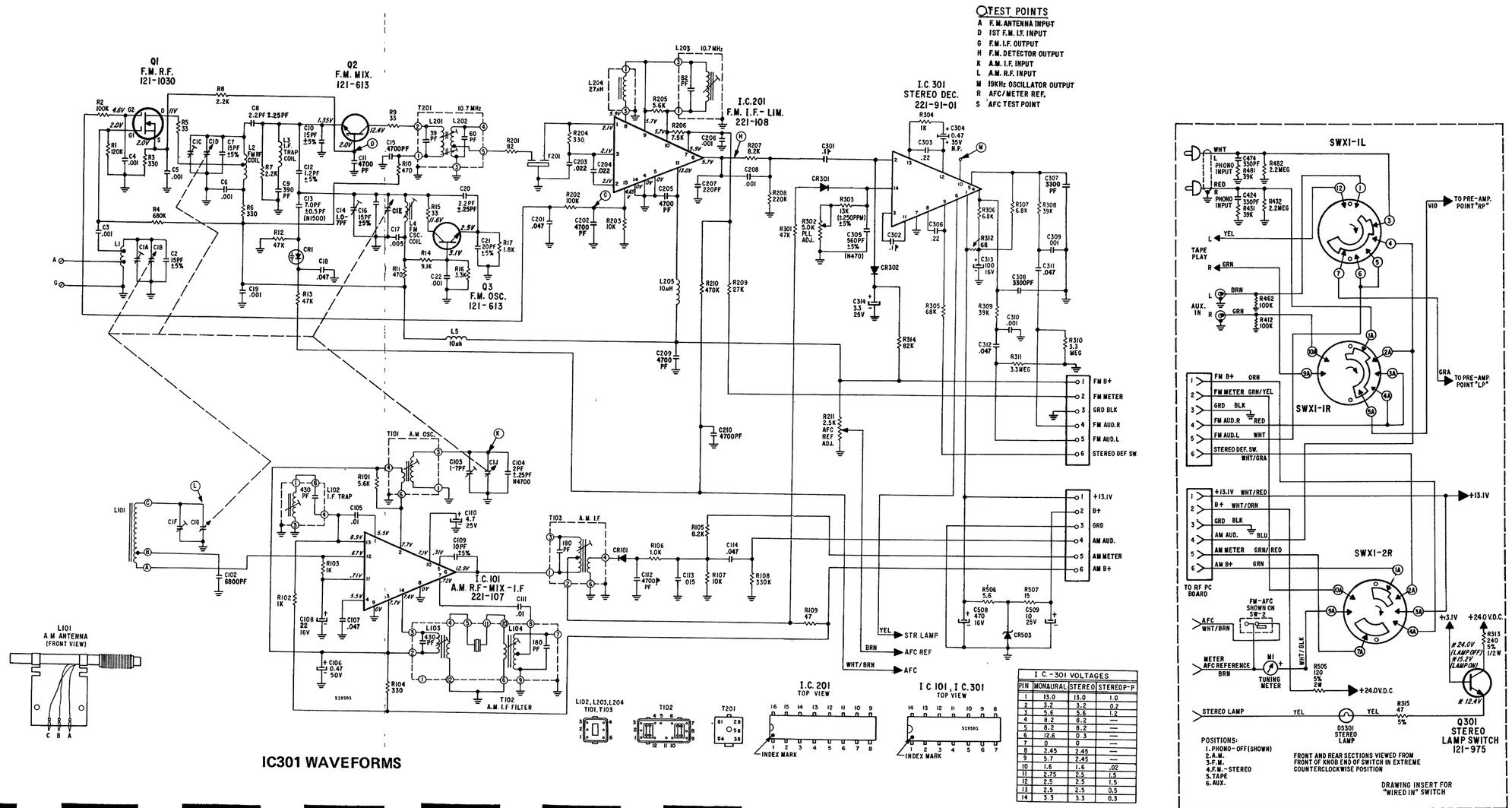
** RIPPLE VOLTAGE MEASURED WITH NO SIGNAL INPUT.

CHASSIS 1WJR55

ITEM NO.	PART NO.	DESCRIPTION
C1A		FM ANTENNA TRIMMER
C1B		FM ANTENNA TUNING
C1C		FM RF TRIMMER
C1D	22-7578	FM RF TUNING
C1E		FM OSCILLATOR TUNING
C1F		AM ANTENNA TRIMMER
C1G		AM ANTENNA TUNING
C1J		AM OSCILLATOR TUNING
C2	22-2513	7 PF DISC 500V
C3	22-2642	15 PF DISC 500V
C4	22-7621-22	33 PF DISC 50V
C5	22-2729	.001 MFD DISC 25V
C6	22-2729	.001 MFD DISC 25V
C7	22-2642	15 PF DISC 500V
C8	22-6226-26	2.2 PF DISC 500V
C9	22-3177	390 PF DISC 500V
C10	22-2642	15 PF DISC 500V
C11	22-7615-04	.0047 MFD DISC 50V
C12	22-5164	1.2 PF GIMMICK 500V
C13	22-6344	7 PF DISC 500V
C14	22-7460	1.0 TO 7 PF FM OSCILLATOR CERAMIC TRIMMER
C15	22-7615-04	.0047 MFD DISC 50V
C16	22-2642	15 PF DISC 500V
C17	22-3080	.005 MFD DISC 25V
C18	22-7615-10	.047 MFD DISC 50V
C19	22-2729	.001 MFD DISC 25V
C20	22-6225-26	2.2 PF DISC 500V
C21	22-7621-17	20 PF DISC 50V
C22	22-2729	.001 MFD DISC 25V
C102	22-7613-22	.0068 MFD DISC 50V
C103	22-7460	1.7 PF TRIMMER AM OSCILLATOR
C104	22-4819	2 PF TUBULAR 500V
C105	22-7615-08	.01 MFD 50V
C106	22-7153-25	0.47 MFD ELECTROLYTIC 50V
C107	22-7615-10	.047 MFD DISC 50V
C108	22-7151-05	22 MFD ELECTROLYTIC 16V
C109	22-3675	10 PF DISC 500V
C110	22-7152-03	4.7 MFD ELECTROLYTIC 25V
C111	22-7615-08	.01 MFD DISC 50V
C112	22-7613-20	.0047 MFD DISC 50V
C113	22-7614-26	.015 MFD DISC 50V
C114	22-7615-10	.047 MFD DISC 50V
C201	22-7615-10	.047 MFD DISC 50V
C202	22-7615-04	.0047 MFD DISC 50V
C203	22-7615-08	.022 MFD DISC 50V
C204	22-7615-08	.022 MFD DISC 50V
C205	22-7615-04	.0047 MFD DISC 50V
C206	22-2729	.001 MFD DISC 25V
C207	22-2703	220 PF DISC 500V
C208	22-3748	.001 MFD DISC 1000V
C209	22-7615-04	.0047 MFD DISC 50V
C210	22-7615-04	.0047 MFD DISC 50V
C301	22-7417-01	1 MFD NON-POLAR ELECTROLYTIC 50V
C302	22-5907	.1 MFD MYLAR 50V
C303	22-3527	.22 MFD DISC 12V
C304	22-7406	.047 MFD NON-POLAR ELECTROLYTIC 35V
C305	22-7493	560 PF DISC 500V
C306	22-3527	.22 MFD DISC 12V
C307	22-7613-18	.0033 MFD DISC 50V
C308	22-7613-18	.0033 MFD DISC 50V
C309	22-2729	.001 MFD DISC 25V
C310	22-2729	.001 MFD DISC 25V
C311	22-7615-10	.047 MFD DISC 50V
C312	22-7615-10	.047 MFD DISC 50V
C313	22-7151-08	100 MFD ELECTROLYTIC 16V
C401	22-7615-10	.047 MFD DISC 50V
C402	22-2939	680 PFD DISC 500V
C403	22-7153	.1 MFD ELECTROLYTIC 50V
C404	22-7153	.1 MFD ELECTROLYTIC 50V
C406	22-7613-16	.0022 MFD DISC 50V
C407	22-7548	.15 MFD 50V
C408	22-7613-22	.0068 MFD DISC 50V
C411	22-7614-24	.01 MFD DISC 50V
C412	22-2939	680 PFD DISC 500V
C413	22-5862	.1 MFD MYLAR 100V
C414	22-7151-08	100 MFD ELECTROLYTIC 16V
C415	22-2939	680 PFD DISC 500V
C416	22-7151-07	47 MFD ELECTROLYTIC 16V
C418	22-3383	100 PFD DISC 500V
C419	22-7613-14	.0015 MFD DISC 50V
C421	22-6048	.22 MFD MYLAR 50V
C422	22-7152-09	220 MFD ELECTROLYTIC 25V
C451	22-7615-10	.047 MFD 50V
C452	22-2939	680 PF DISC 500V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C456	22-7613-16	.0022 MFD DISC 50V
C457	22-7548	.15 MFD MYLAR 50V
C458	22-7613-22	.0068 MFD DISC 50V
C461	22-7614-24	.01 MFD DISC 50V
C462	22-2939	680 PFD DISC 500V
C463	22-7615-08	.01 MFD 50V
C464	22-7153	.1 MFD ELECTROLYTIC 50V
C465	22-2729	.001 MFD DISC 25V
C466	22-7615-08	.022 MFD DISC 50V
C468	22-7615-08	.022 MFD DISC 50V
C469	22-7613-14	.0015 MFD DISC 50V
C471	22-6048	.22 MFD MYLAR 50V
C472	22-7152-09	220 MFD ELECTROLYTIC 25V
R401	22-2513	7 PF DISC 500V
R402	22-7621-22	33 PF DISC 50V
R405	22-2729	.001 MFD DISC 25V
R407	22-2729	.001 MFD DISC 25V
R408	22-2642	15 PF DISC 500V
R409	22-6226-26	2.2 PF DISC 500V
R410	22-3177	390 PF DISC 500V
R411	22-2642	15 PF DISC 500V
R412	22-7621-11	470 MFD ELECTROLYTIC 16V
R414	22-7460	1.0 TO 7 PF FM OSCILLATOR CERAMIC TRIMMER
R415	22-7615-04	.0047 MFD DISC 50V
R416	22-2642	15 PF DISC 500V
R417	22-3080	.005 MFD DISC 25V
R418	22-7615-10	.047 MFD DISC 50V
R419	22-2729	.001 MFD DISC 25V
R420	22-6225-26	2.2 PF DISC 500V
R421	22-7621-17	20 PF DISC 50V
R422	22-2729	.001 MFD DISC 25V
R451	22-7615-10	.047 MFD DISC 50V
R452	22-7615-04	.0047 MFD DISC 50V
R455	22-7615-08	.022 MFD DISC 50V
R457	22-7615-08	.022 MFD DISC 50V
R458	22-7615-04	.0047 MFD DISC 50V
R459	22-7613-22	.0068 MFD DISC 50V
R460	22-7460	1.7 PF TRIMMER AM OSCILLATOR
R461	22-4819	2 PF TUBULAR 500V
R462	22-7615-08	.01 MFD 50V
R463	22-7153-25	0.47 MFD ELECTROLYTIC 50V
R464	22-7615-10	.047 MFD DISC 50V
R465	22-7151-05	22 MFD ELECTROLYTIC 16V
R466	22-3675	10 PF DISC 500V
R467	22-7152-03	4.7 MFD ELECTROLYTIC 25V
R468	22-7615-08	.01 MFD DISC 50V
R469	22-7613-20	.0047 MFD DISC 50V
R470	22-7614-26	.015 MFD DISC 50V
R471	22-7615-10	.047 MFD DISC 50V
R472	22-7153	.1 MFD ELECTROLYTIC 50V

ITEM NO.	PART NO.	DESCRIPTION
C462	22-2939	680 PFD DISC 500V
C463	22-5862	.1 MFD MYLAR 100V
C464	22-7151-08	100 MFD ELECTROLYTIC 16V
C465	22-2939	680 PF DISC 500V
C466	22-7151-07	47 MFD ELECTROLYTIC 16V
C468	22-3383	100 PFD DISC 500V
C469	22-7613-14	.0015 MFD DISC 50V
C471	22-6048	.22 MFD MYLAR 50V
C472	22-7152-09	220 MFD ELECTROLYTIC 25V
C501	22-4905	.01 MFD DISC 500V
C502	22-4905	.01 MFD DISC 500V
CX503*	22-7152-12	1000 MFD ELECTROLYTIC 25V
CX504*	22-7431-07	.01 MFD DISC 150VAC
CX505*	22-7431-07	.01 MFD DISC 150VAC
C508	22-7151-11	470 MFD ELECTROLYTIC 16V
C509	22-7151-04	10 MFD ELECTROLYTIC 16V
R1	63-9921-88	4.7K OHM
R2	63-9921-80	2.2K OHM
R3	63-9921-62	390 OHM
R4	63-9921-84	3.3K OHM
R5	63-4122	33 OHM
R6	63-9921-60	330 OHM
R7	63-9921-80	2.2K OHM
R8	63-9921-98	12K OHM
R9	63-9921-36	33 OHM
R10	63-9921-64	470 OHM
R11	63-8807	470 OHM
R12	63-9922-12	47K OHM
R13	63-9922-12	47K OHM
R14	63-9921-95	9.1K OHM
R15	63-8819	33 OHM
R16	63-9921-84	3.3K OHM
R17	63-9921-78	1.8K OHM
R101	63-9921-90	5.6K OHM
R102	63-9921-72	1K OHM
R103	63-9921-72	1K OHM
R104	63-9921-60	330 OHM
R106	63-9921-72	1K OHM
R107	63-9921-90	5.6K OHM
R108	63-9922-32	330K OHM
R109	63-10353-40	47 OHM
R201	63-9921-46	82 OHM
R202	63-9921-98	12K OHM
R203	63-9921-96	10K OHM
R204	63-9921-60	330 OHM
R205	63-9921-90	5.6K OHM
R206	63-9921-92	6.8K OHM
R207	63-9921-94	8.2K OHM
R208	63-9922-28	220K OHM
R209	63-9922-36	470K OHM
R210	63-10851-02	2.5K OHM AFC REF. ADJUST
R301	63-9922-12	47K OHM
R302	63-10851-03	5K OHM PLL ADJUST
R303	63-10311-99	13K OHM
R304	63-9921-72	1K OHM
R305	63-9922-16	68K OHM
R306	63-9921-92	6.8K OHM
R307	63-8832	6.8K OHM
R308	63-9922-10	39K OHM
R309	63-9922-10	39K OHM
R310	63-9924-56	3.3 MEG OHM
R311	63-9924-56	3.3 MEG OHM
R313	63-7754	180 OHM 1/2W
R314	63-7785	1000 OHM 1/2W
R315	63-9921-44	68 OHM
R401	63-9924-56	3.3 MEG OHM
R402	63-9921-92	6.8K OHM
R405	63-9922-06	27K OHM
R407	63-9921-82	2.7K OHM
R408R	63-10653	100K DUAL LOUDNESS CONTROL
R408L		
R409	63-9922-04	22K OHM
R410R	63-10654	500K BASS CONTROL
R410L		
R412R	63-10655	50K TREBLE CONTROL
R412L		
R414	63-10656	500K BALANCE CONTROL
R415	63-9924-60	4.7 MEG OHM
R416	63-9922-20	100K OHM
R417	63-9921-34	27 OHM
R418	63-9921-82	2.7K OHM
R419	63-9921	1 OHM
R420	63-1757	220 OHM 1/2W 10%
R451	63-9924-56	3.3 MEG OHM
R455	63-9922-06	27K OHM
R457	63-9921-82	2.7K OHM
R459	63-9922-04	22K OHM
R465	63-9924-60	4.7 MEG OHM
R466	63-9922-20	100K OHM

ITEM NO.	PART NO.	DESCRIPTION
R467	63-9921-34	27 OHM
R468	63-9921-82	2.7K OHM
R469	63-9921	1 OHM
R470	63-1757	220 OHM 1/2W 10%
R501	63-7734	62 OHM 5% 1/2W
R502	63-9921-18	5.6 OHM
R503	63-9921-28	15 OHM
RX506*	63-10657-01	2.2 OHM 20% 1/2W
L1	20-3771	FM ANTENNA COIL
L2	20-3789	FM R.F. COIL
L3	20-1631	TRAP COIL 10.7 MHz
L4	20-3772	FM OSCILLATOR COIL
L5	20-2033	10μH RF CHOKE
L101	A-4781	AM ANTENNA ASSEMBLY
L102	20-3776	TRAP COIL 455 KHz
L103	IN T102	AM FILTER PRIMARY
L104	IN T102	AM FILTER SECONDARY
L201	IN T201	10.7 MHz IF PRIMARY
L202	IN T201	10.7 MHz IF SECONDARY
L203	20-3775	FM 27 μH COIL
L204	20-3774	FM QUADRATURE DETECTOR
L205	20-2033	10μH RF CHOKE
CR1	103-47-01	AFC DIODE
CR101	103-23-01	GERMANIUM DIODE
CR301	103-142-01	SILICON DIODE
CRX501*	212-76-02	SILICON RECTIFIER
CRX502*	212-76-02	SILICON RECTIFIER
CR503	103-96	ZENER DIODE
I.C.101	221-107	A.M.I.C.
I.C.201	221-108	F.M.I.C.
I.C.301	221-91-01	STEREO DECODER PHASE LOCK LOOP (PREFERRED)
	221-91	(ALTERNATE)
I.C.401	221-77	MONOLITHIC I.C. AUDIO AMPLIFIER
I.C.451	221-77	MONOLITHIC I.C. AUDIO AMPLIFIER
DS301	100-658-01	STEREO INDICATOR LIGHT
DSX501*	100-368-04	PILOT AND DIAL LIGHT
DSX502*	100-368-04	PILOT AND DIAL LIGHT
PC	204-621	CIRCUIT BOARD
FX501*	138-117-16	.25 AMP SLO-BLO FUSE
T101	95-3268	AM OSCILLATOR TRANSFORMER
T102	A-4782	AM IF FILTER
T103	95-3266	AM DETECTOR COIL
T201	95-3269	10.7 MHz IF
TX501*	95-3328	POWER TRANSFORMER
SWX1*	85-1483 OR	BANDSWITCH (PC TYPE)
	85-1482	BANDSWITCH (ALTERNATE)
SWX1-A*	85-1497	A.C. SWITCH
Y201	224-2 OR	CERAMIC FILTER 10.64 MHz (BLACK)
	224-2-01 OR	CERAMIC FILTER 10.67 MHz (BLUE)
	224-2-02 OR	CERAMIC FILTER 10.70 MHz (RED)
	224-2-03 OR	CERAMIC FILTER 10.73 MHz (ORANGE)
	224-2-04	CERAMIC FILTER 10.76 MHz (WHITE)
Q1	121-612	F.M. R.F. N.P.N.
Q2	121-613	F.M. MIXER N.P.N.
Q3	121-613	F.M. OSCILLATOR N.P.N.
Q401	121-975	AUDIO PRE-AMP. N.P.N.
Q451	121-975	AUDIO PRE-AMP N.P.N.
J1	78-2252	STEREO HEADPHONE JACK
P1	43-519	PHONO A.C.
P2	43-1203	TAPE A.C. CABLE
		*CRITICAL CIRCUIT COMPONENT
		5193C2



PIN 2-COMPOSITE INPUT L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 0.5V P/P (0.5 MILLISEC.)

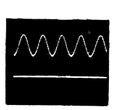
PINS 3 AND 11-COMPOSITE AMPLIFIED L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 1.4V P/P (0.5 MILLISEC.)

PIN 14-VOLTAGE CONTROLLED OSCILLATOR ADJUSTMENT 3.5V P/P (5.0 MICROSEC.)

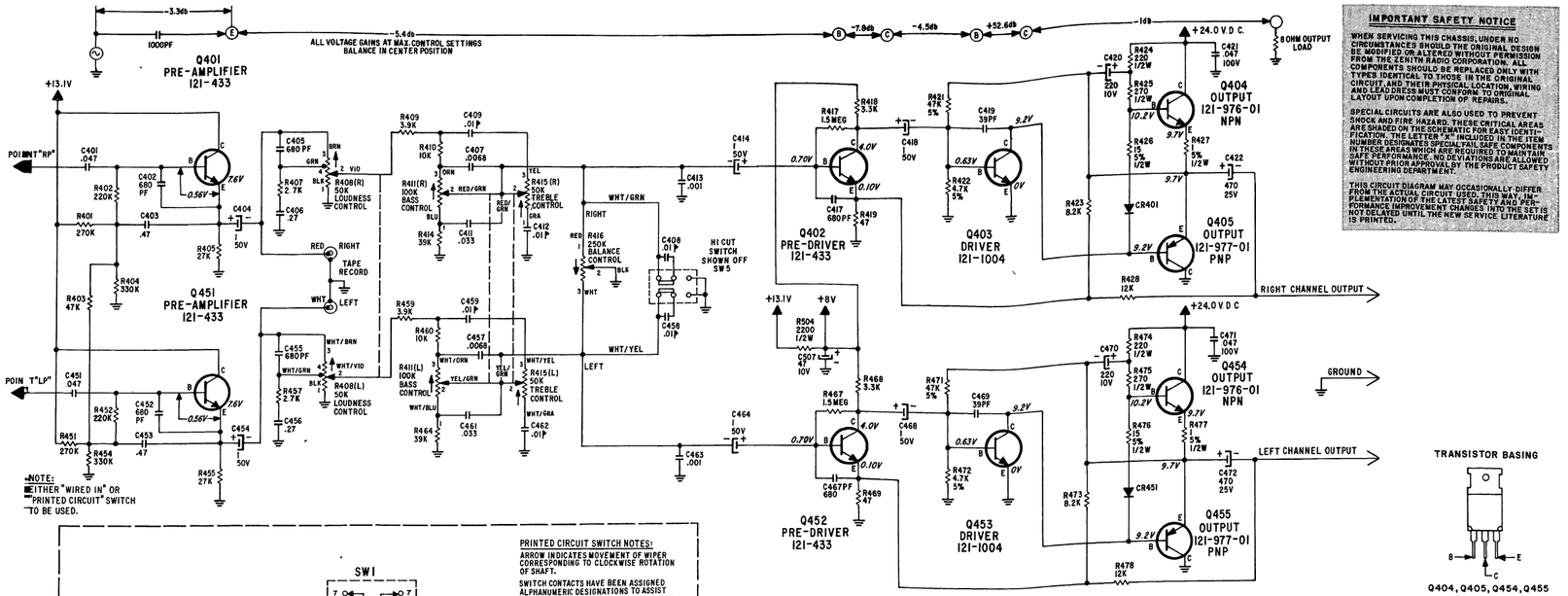
PIN 10-19 KHZ TEST POINT 2.7V P/P (10.0 MICROSEC.)

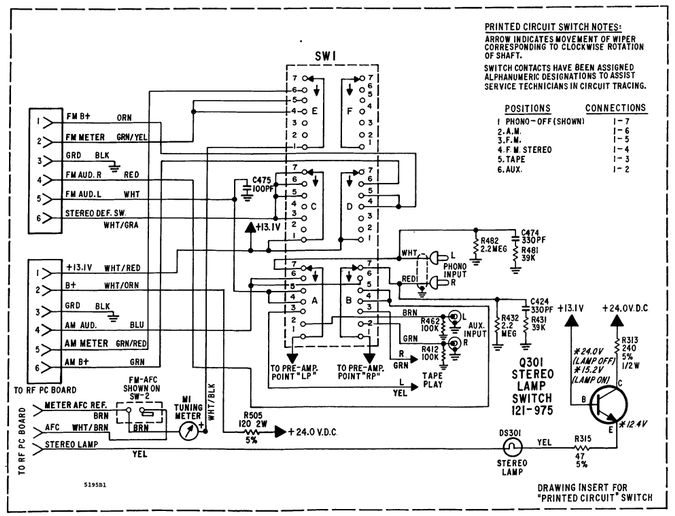
PINS 12 AND 13-FILTER-PHASE DETECTOR 0.14V P/P (0.5 MILLISEC.)

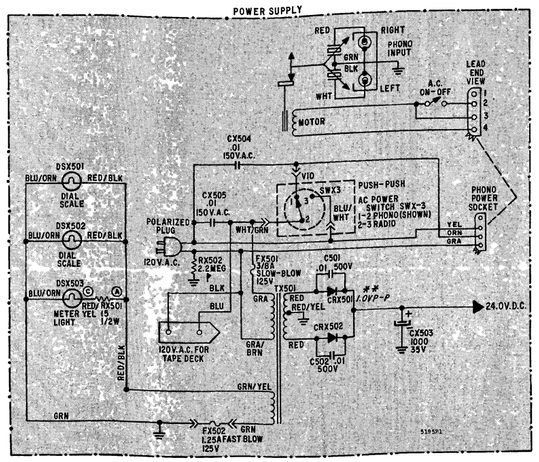
PINS 8 AND 9-FILTER-AMPLITUDE DETECTOR 0.47V P/P (0.5 MILLISEC.)

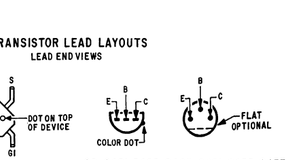


P1, #9-(UPPER) LEFT OUTPUT 0.57V P/P (0.5 MILLISEC.)
P1, #8-(LOWER) RIGHT OUTPUT 0.05V P/P (0.5 MILLISEC.)









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 SHADED ON THE SCHEMATIC FOR EASY IDENTIFICATION. THE LETTER "X" INCLUDED IN THE PART NUMBER DESIGNATES SPECIAL 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 MAY BE IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

NOTES:

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS, WITH NO SIGNAL INPUT, LOUDNESS CONTROL AT MINIMUM, LINE VOLTAGE 120 V.A.C. USING A HIGH IMPEDANCE V.T.V.M.

ALL RESISTORS IN OHMS, 1/4 WATT CARBON OR CARBON FILM, ±10% UNLESS OTHERWISE SPECIFIED.

ALL CAPACITORS ARE IN MICROFARADS ±10% UNLESS OTHERWISE SPECIFIED, EXCEPT ELECTROLYTICS WHICH ARE +100% -10%.

I.F. FREQUENCY: A.M. 455kHz
F.M. 10.7MHz

TUNING RANGE: A.M. 540~1600kHz
F.M. 88~108MHz

⏚ INDICATES CHASSIS GROUND.

INDICATES ± 20% TOLERANCE.

INDICATES VOLTAGE.

Ⓐ INDICATES TEST POINTS.

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION ON ROTARY CONTROLS AND UPWARD MOVEMENT ON SLIDE CONTROLS.

121-976-01 IS INSULATED FROM CHASSIS. OUTPUT TRANSISTORS IN EACH CHANNEL SHALL BE A PAIR (121-976-01 & 121-977-01.

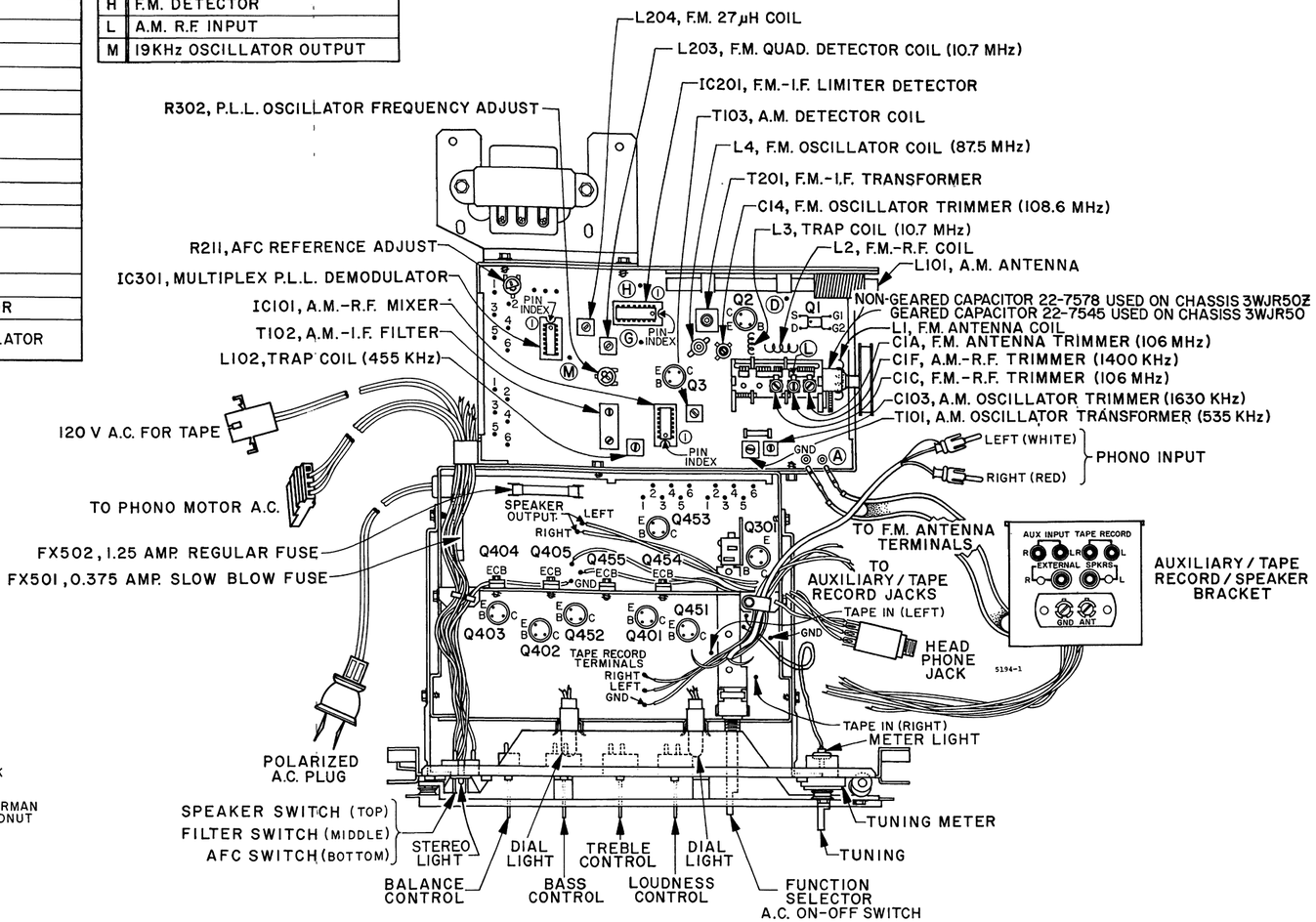
** VOLTAGES MEASURED IN THE F.M. STEREO POSITION.
** RIPPLE VOLTAGE MEASURED WITH NO SIGNAL INPUT PHONO POSITION.

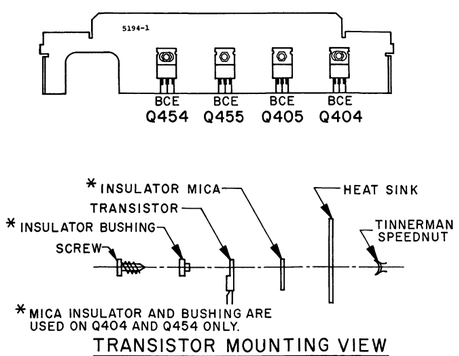
CHASSIS 3WJR50, 50Z

ITEM NO.	PART NO.	DESCRIPTION
C1A		FM ANTENNA TRIMMER
C1B		FM ANTENNA TUNING
C1C	22-7545	FM RF TRIMMER
C1D	(2PK1050)	FM RF TUNING
C1E	22-7578	FM OSCILLATOR TUNING
C1F	(3WJR502)	AM ANTENNA TRIMMER
C1G		AM ANTENNA TUNING
C1J		AM OSCILLATOR TUNING
C2	22-2642	15 PF DISC ±5% 500V
C3	22-2729	.001 MFD DISC 25V
C4	22-2729	.001 MFD DISC 25V
C5	22-2729	.001 MFD DISC 25V
C6	22-2729	.001 MFD DISC 25V
C7	22-2642	15 PF DISC ±5% 500V
C8	22-6225-26	2.2 PF DISC ± .25 PF 500V
C9	22-3177	390 PF DISC 500V
C10	22-2642	15 PF DISC ±5% 500V
C11	22-7615-04	4700 PF DISC 50V
C12	22-5164	1.2 PF GIMMICK ±5% 500V
C13	22-6344	7 PF DISC ± .5 PF N1500 500V
C14	22-7400	1.0 PF TO 7 PF CERAMIC TRIMMER
C15	22-7615-04	4700 PF DISC 50V
C16	22-2642	15 PF DISC ±5% N33 500V
C17	22-3060	.005 MFD DISC 25V
C18	22-7615-10	.047 MFD DISC 50V
C19	22-2729	.001 MFD DISC 25V
C20	22-6225-26	2.2 PF DISC ± .25 PF 500V
C21	22-7621-17	20 PF DISC ±5% 50V
C22	22-2729	.001 MFD DISC 25V
C102	22-7613-22	6800 PF DISC 50V
C103	22-7460	1 PF TO 7 PF AM OSCILLATOR TRIMMER
C104	22-4619	2 PF ±0.25 PF N4700 TUB 500V
C105	22-7615-04	.01 MFD DISC 50V
C106	22-7153-25	.47 MFD ELECTROLYTIC 50V
C107	22-7615-10	.047 MFD DISC 50V
C108	22-7151-05	.22 MFD ELECTROLYTIC 16V
C109	22-3076	10 PF DISC ±5% 500V
C110	22-7152-03	4.7 MFD ELECTROLYTIC 25V
C111	22-7615-04	.01 MFD DISC 50V
C112	22-7613-20	4700 PF DISC 50V
C113	22-7614-28	.015 MFD DISC 50V
C114	22-7615-10	.047 MFD DISC 50V
C201	22-7615-10	.047 MFD DISC 50V
C202	22-7615-04	4700 PF DISC 50V
C203	22-7615-06	.022 MFD DISC 50V
C204	22-7615-08	.022 MFD DISC 50V
C205	22-7613-20	4700 PF DISC 50V
C206	22-2729	.001 MFD DISC 25V
C207	22-2703	330 PF DISC 500V
C208	22-3748	.001 MFD DISC 1000V
C209	22-7615-04	.01 MFD DISC 50V
C210	22-7615-04	4700 PF DISC 50V
C301	22-6907	1 MFD MYLAR 20% 50V
C302	22-2007	3.3 MFD MYLAR 20% 50V
C303	22-3527	.22 MFD DISC 12V
C304	22-7006	.47 MFD MF ELECTROLYTIC 35V
C305	22-7493	560 PF ±5% N470 DISC 500V
C306	22-3527	.22 MFD DISC 12V
C307	22-7613-18	3300 PF DISC 50V
C308	22-7613-18	3300 PF DISC 50V
C309	22-2729	.001 MFD DISC 25V
C310	22-2729	.001 MFD DISC 25V
C311	22-7615-10	.047 MFD DISC 50V
C312	22-7615-10	.047 MFD DISC 50V
C313	22-7151-06	100 MFD ELECTROLYTIC 16V
C314	22-7152-02	3.3 MFD ELECTROLYTIC 25V
C401	22-7615-10	.047 MFD DISC 50V
C402	22-2039	680 PF DISC 500V
C403	22-6467	.47 MFD DV
C404	22-7153	1 MFD ELECTROLYTIC 50V
C405	22-2039	680 PF DISC 500V
C406	22-6964	.27 MFD MYLAR 50V
C407	22-3416	.0068 MFD DISC 25V
C408	22-7614-24	.01 MFD DISC 20% 50V
C409	22-7614-24	.01 MFD DISC 20% 50V
C411	22-6683	.033 MFD MYLAR 10% 50V
C412	22-7614-24	.01 MFD DISC 20% 50V
C413	22-6688	.001 MFD DISC ±20% 500V
C414	22-7153	1 MFD ELECTROLYTIC 50V
C417	22-2039	680 PF DISC 500V
C418	22-7153	1 MFD ELECTROLYTIC 50V
C419	22-3381	39 PF DISC 10% 500V
C420	22-7150-09	220 MFD ELECTROLYTIC 10V
C421	22-6447-01	.047 MFD 100V
C422	22-7152-11	470 MFD ELECTROLYTIC 25V
C424	22-6665	330 PF DISC 500V
C451	22-7615-10	.047 MFD DISC 50V
C452	22-2039	680 PF DISC 500V
C453	22-6467	.47 MFD DISC 3V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C455	22-2039	680 PF DISC 500V
C456	22-6964	.27 MFD MYLAR 50V
C457	22-3415	.0068 MFD DISC 25V
C458	22-7614-24	.01 MFD DISC 20% 50V
C459	22-7614-24	.01 MFD DISC 20% 50V
C461	22-6683	.033 MFD MYLAR 10% 50V
C462	22-7614-24	.01 MFD DISC 20% 50V
C463	22-6688	.001 MFD DISC ±20% 500V
C464	22-7153	1 MFD ELECTROLYTIC 50V
C467	22-2039	680 PF DISC 500V
C468	22-7153	1 MFD ELECTROLYTIC 50V
C469	22-3381	39 PF DISC ±5% 500V
C470	22-7150-09	220 MFD ELECTROLYTIC 10V
C471	22-6447-01	.047 MFD MYLAR 100V
C472	22-7152-11	470 MFD ELECTROLYTIC 25V
C474	22-7602	330 PF DISC 1000V
C476	22-3383	100 PF DISC 500V
C501	22-4617	.01 MFD DISC 500V
C502	22-4617	.01 MFD DISC 500V
C503*	22-7615-12	.068 MFD DISC 50V
C504*	22-2631-07	.01 MFD 160VAC
C505*	22-7631-07	.01 MFD 160VAC
C507	22-7150-07	47 MFD ELECTROLYTIC 16V
C508	22-7151-11	470 MFD ELECTROLYTIC 16V
C509	22-7152-04	10 MFD ELECTROLYTIC 25V
R1	63-6922-22	100K OHM 5% 1/4W
R2	63-6922-20	100K OHM 5% 1/4W
R3	63-6921-60	330 OHM 5% 1/4W
R4	63-6922-40	680K OHM 5% 1/4W
R5	63-4122	33 OHM 10% 1/4W
R6	63-6921-60	330 OHM 5% 1/4W
R7	63-6921-80	2.2K OHM 5% 1/4W
R8	63-6921-80	2.2K OHM 5% 1/4W
R9	63-6921-36	33 OHM 5% 1/4W
R10	63-6921-64	470 OHM 5% 1/4W
R11	63-4171	470 OHM 10% 1/4W
R12	63-6922-12	47K OHM 5% 1/4W
R13	63-6922-12	47K OHM 5% 1/4W
R14	63-6921-96	1.0 PF TO 7 PF CERAMIC TRIMMER
R15	63-4122	33 OHM 10% 1/4W
R16	63-6921-84	3.3K OHM 5% 1/4W
R17	63-6921-78	1.8K OHM 5% 1/4W
R101	63-6921-90	5.6K OHM 5% 1/4W
R102	63-6921-72	1K OHM 5% 1/4W
R103	63-6921-72	1K OHM 5% 1/4W
R104	63-6921-60	330 OHM 5% 1/4W
R105	63-6921-84	8.2K OHM 5% 1/4W
R106	63-6921-72	1K OHM 5% 1/4W
R107	63-6921-96	10K OHM 5% 1/4W
R108	63-6922-32	330K OHM 5% 1/4W
R109	63-6921-40	47 OHM 5% 1/4W
R201	63-6921-46	82 OHM 5% 1/4W
R202	63-6921-60	330 OHM 5% 1/4W
R203	63-6921-96	10K OHM 5% 1/4W
R204	63-6921-40	47 OHM 5% 1/4W
R205	63-6921-90	5.6K OHM 5% 1/4W
R206	63-6921-83	7.5K OHM 5% 1/4W
R207	63-6921-84	8.2K OHM 5% 1/4W
R208	63-6922-28	220K OHM 5% 1/4W
R209	63-6922-08	27K OHM 5% 1/4W
R210	63-6922-36	470K OHM 5% 1/4W
R211	63-1081-02	2.5K OHM AFC REF. ADJUST
R301	63-6922-12	47K OHM 5% 1/4W
R302	63-1081-03	5K OHM P.L.L. ADJUST
R303	63-1031-99	10K OHM 5% 1/2W
R304	63-6921-72	1K OHM 5% 1/4W
R305	63-6922-18	680 OHM 5% 1/4W
R306	63-6921-92	6.8K OHM 5% 1/4W
R307	63-6921-92	6.8K OHM 5% 1/4W
R308	63-6922-10	39K OHM 5% 1/4W
R309	63-6922-10	39K OHM 5% 1/4W
R310	63-6924-58	3.3 MEG OHM 10% 1/4W
R311	63-6924-58	3.3 MEG OHM 10% 1/4W
R312	63-6921-44	68 OHM 5% 1/4W
R313	63-6946-07	240 OHM 5% 1/2W
R314	63-6922-18	82K OHM 5% 1/4W
R315	63-6921-40	47 OHM 5% 1/4W
R401	63-6922-30	270K OHM 5% 1/4W
R402	63-6922-28	220K OHM 5% 1/4W
R403	63-6922-12	47K OHM 5% 1/4W
R404	63-6922-32	330K OHM 5% 1/4W
R405	63-6922-08	27K OHM 5% 1/4W
R406	63-6922-40	680K OHM 5% 1/4W
R407	63-6922-02	2.7K OHM 5% 1/4W
R408	63-1099-02	50K OHM LOUDNESS CONTROL DUAL
R409	63-6921-68	3.9K OHM 5% 1/4W
R410	63-6921-96	10K OHM 5% 1/4W
R411	63-6982-02	100K OHM BASS CONTROL DUAL
R412	63-6922-20	100K OHM 5% 1/4W
R413	63-6922-10	39K OHM 5% 1/4W
R414	63-6963-02	50K OHM TREBLE CONTROL DUAL
R416	63-6961-02	250K BALANCE CONTROL
R417	63-6924-48	1.5 MEG OHM 10% 1/4W
R418	63-6921-84	3.3K OHM 5% 1/4W
R419	63-6923-40	47 OHM 5% 1/4W
R421	63-6922-12	47K OHM 5% 1/4W
R422	63-6921-68	4.7K OHM 5% 1/4W
R423	63-6921-84	8.2K OHM 5% 1/4W
R424	63-6946-56	220 OHM 5% 1/2W
R425	63-6946-58	270 OHM 5% 1/2W
R426	63-6946-28	15 OHM 5% 1/2W
R427	63-10585	1.0 OHM 5% 1/2W
R428	63-6921-98	12K OHM 5% 1/4W
R430	63-1797	220 OHM 10% 1/2W (SEE HEADPHONE JACK ASS'Y.)
R431	63-6922-10	39K OHM 5% 1/4W
R432	63-6922-52	2.2 MEG OHM 5% 1/4W
R451	63-6922-30	270K OHM 5% 1/4W
R452	63-6922-28	220K OHM 5% 1/4W
R454	63-4289	330K OHM 5% 1/4W
R455	63-6922-08	27K OHM 5% 1/4W
R457	63-6921-42	2.7K OHM 5% 1/4W
R459	63-6921-64	470 OHM 5% 1/4W
R460	63-6921-96	10K OHM 5% 1/4W
R461	63-6922-06	22K OHM 5% 1/4W
R462	63-6922-10	39K OHM 5% 1/4W
R463	63-6922-10	39K OHM 5% 1/4W
R468	63-6921-84	3.3K OHM 5% 1/4W
R469	63-6921-40	47 OHM 5% 1/4W
R471	63-6922-12	47K OHM 5% 1/4W
R472	63-6921-68	4.7K OHM 5% 1/4W
R473	63-6921-84	8.2K OHM 5% 1/4W
R474	63-6946-58	220 OHM 5% 1/2W
R475	63-6946-58	270 OHM 5% 1/2W
R476	63-6946-28	15 OHM 5% 1/2W
R477	63-10585	1.0 OHM 5% 1/2W
R478	63-6921-98	12K OHM 5% 1/4W
R480	63-1757	220 OHM 10% 1/2W (SEE HEADPHONE JACK ASS'Y.)
R481	63-6922-10	39K OHM 5% 1/4W
R482	63-10356-02	2.2 MEG OHM 10% 1/4W
R501*	63-10356-52	2.2 MEG OHM 10% 1/4W
R502*	63-6946-28	15 OHM 5% 1/2W
R503*	63-6922-18	82K OHM 5% 1/4W
R504*	63-6922-08	27K OHM 5% 1/4W
R505*	63-6921-18	680 OHM 5% 1/4W
R506*	63-6921-72	1K OHM 5% 1/4W
R507*	63-6921-96	10K OHM 5% 1/4W
R508*	63-6921-40	47 OHM 5% 1/4W
CR1	103-47-01	AFC DIODE
CR101	103-23-01	GERMANIUM DIODE
CR301	103-142-01	SILICON DIODE
CR302	103-142-01	SILICON DIODE
CR401	103-222-01	SILICON DIODE
CR451	103-222-01	SILICON DIODE
CR503*	103-98-01	SILICON RECTIFIER
CR504*	212-76-02	SILICON RECTIFIER
CR505*	212-76-02	SILICON RECTIFIER
CR503	103-98-01	ZENER DIODE
L1	20-3771	FM ANTENNA COIL
L2	20-3773	FM RF COIL
L3	20-1631	TRAP COIL 10.7 MHz
L4	20-3772	FM OSCILLATOR COIL
L5	20-2033	10 MICROHENRY COIL RF CHOKE
L101	A-4781	AM ANTENNA ASSEMBLY
L102	20-3276	TRAP COIL 455 kHz
L103	IN T102	AM FILTER PRIMARY
L104	IN T102	AM FILTER SECONDARY
L201	IN T201	10.7 MHz IF PRIMARY
L202	IN T201	10.7 MHz IF SECONDARY
L203	20-3774	FM QUADRATURE DETECTOR
L204	20-3775	FM 27 M.H. COIL
L205	20-2033	10 MICROHENRY COIL RF CHOKE
T101	96-3268	AM OSCILLATOR TRANSFORMER
T102	A-4782	AM I.F. FILTER
T103	96-3266	AM DETECTOR COIL
T201	96-3269	10.7 MHz I.F.
TX501*	95-3268-01	POWER TRANSFORMER
FX501*	135-117-12	3/8 SLO BLOW FUSE 125V
FX502*	135-113-15	1.25 A FAST BLOW 125V
IC101	221-107	AM IC
IC201	221-108	FM IC
IC301	221-0101 OR 221-91	STEREO DECODER PHASE LOCK LOOP (PREFERRED) STEREO DECODER PHASE LOCK LOOP (ALTERNATE)
DS301	100-6958-01	STEREO INDICATOR LIGHT
DS501*	100-961	DIAL SCALE
DS502*	100-961	DIAL SCALE
DS503*	100-958	PILOT LIGHT
J1	78-2252	HEADPHONE JACK (SEE HEADPHONE JACK ASS'Y.)
PC	204-620	CIRCUIT BOARD RF
PC	204-622	CIRCUIT BOARD AUDIO AND POWER SUPPLY
SW-1	85-1489	BAND SWITCH
SW-2	85-1506	FM AFC SWITCH
SW3*	A-4803	POWER SWITCH
SW-4	85-1508	SPEAKER SWITCH (SEE SPEAKER SWITCH ASS'Y.)
SW-5	85-1507	HI CUT SWITCH
Y201	224-2 OR 224-201 OR 224-202 OR 224-203 OR 224-204	CERAMIC FILTER, 10.64 MHz (BLACK) CERAMIC FILTER, 10.67 MHz (BLUE) CERAMIC FILTER, 10.70 MHz (RED) CERAMIC FILTER, 10.73 MHz (ORANGE) CERAMIC FILTER, 10.76 MHz (WHITE)
Q1	121-1030	FM RF FIELD EFFECT TRANSISTOR
Q2	121-613	MIXER TRANSISTOR
Q3	121-613	FM OSCILLATOR TRANSISTOR
Q301	121-975	STEREO LAMP SWITCH
Q401	121-433	PRE-AMPLIFIER TRANSISTOR
Q402	121-433	PRE-DRIVER TRANSISTOR
Q403	121-1004	DRIVER TRANSISTOR
Q404	121-976-01	NPN OUTPUT TRANSISTOR
Q405	121-977-01	PNP OUTPUT TRANSISTOR
MI	122-68-04	METER
		ADDITIONAL CIRCUIT CONSUMER 519582

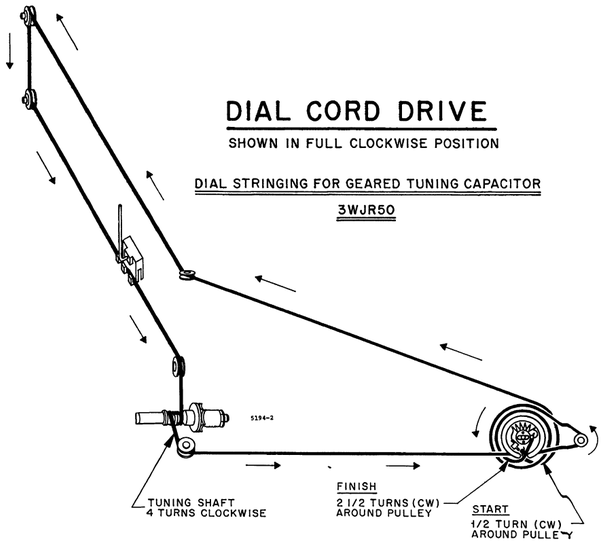
TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-1030	F.M.-R.F.
Q2	121-613	F.M. MIXER
Q3		F.M. OSCILLATOR
Q301	121-975	STEREO LAMP SWITCH
Q401	121-433	PRE-AMPLIFIER
Q402		PRE-DRIVER
Q403	121-1004	DRIVER
Q404	121-976-01	OUTPUT
Q405	121-977-01	
Q451	121-433	PRE-AMPLIFIER
Q452		PRE-DRIVER
Q453	121-1004	DRIVER
Q454	121-976-01	OUTPUT
Q455	121-977-01	
IC101	221-107	A.M.-R.F. MIXER-I.F.
IC201	221-108	F.M.-I.F. LIMITER DETECTOR
IC301	221-91-01 or 221-91	MULTIPLEX P.L.L. DEMODULATOR

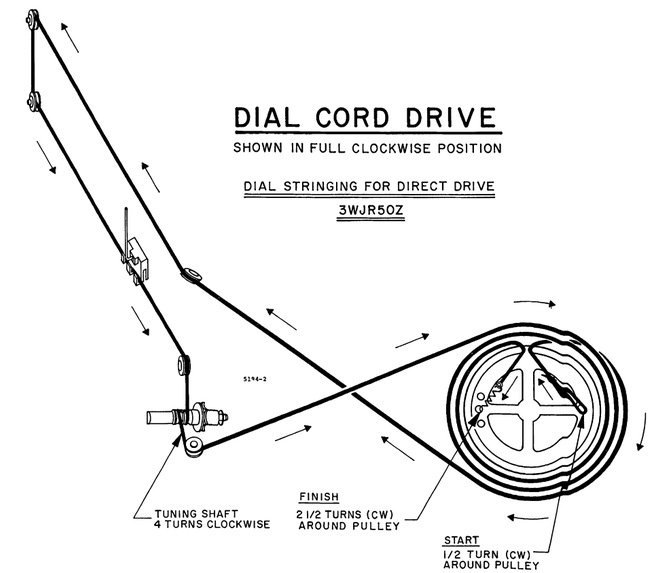
○	TEST POINTS
A	F.M. ANTENNA INPUT
D	F.M. I.F. INPUT
G	F.M. I.F. OUTPUT
H	F.M. DETECTOR
L	A.M. R.F. INPUT
M	19KHz OSCILLATOR OUTPUT

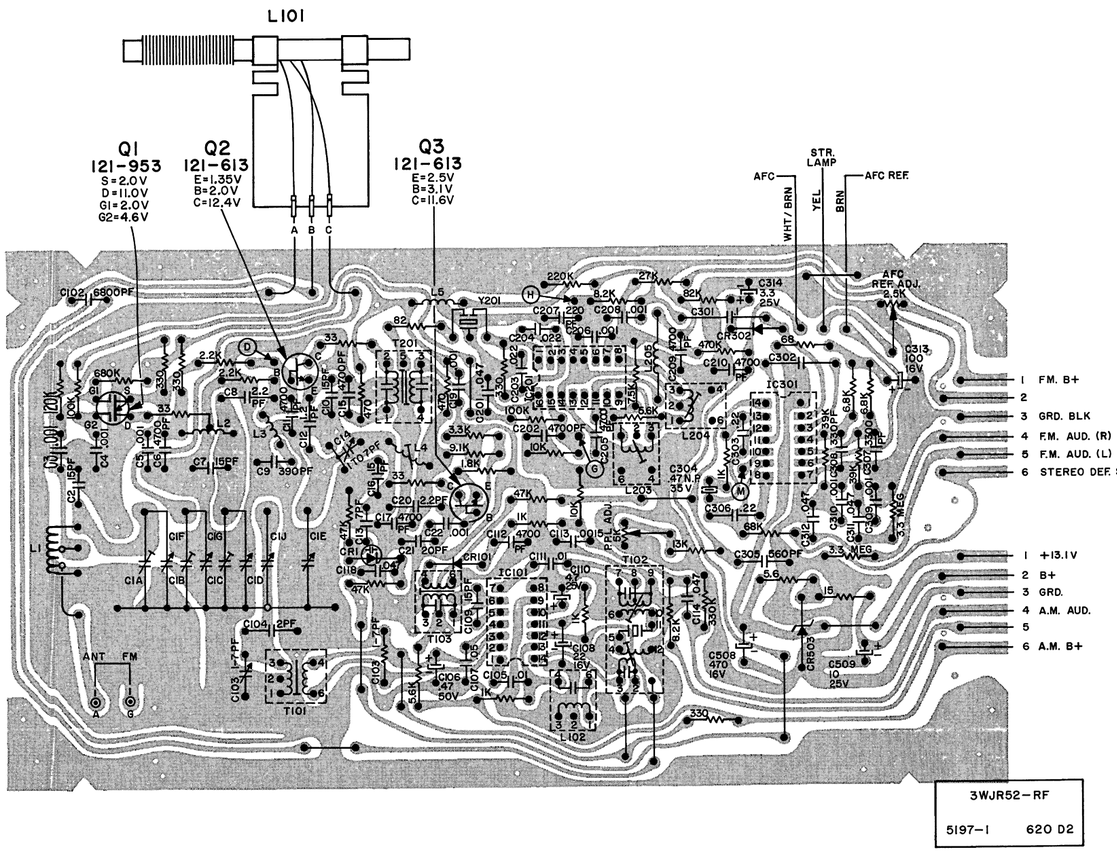




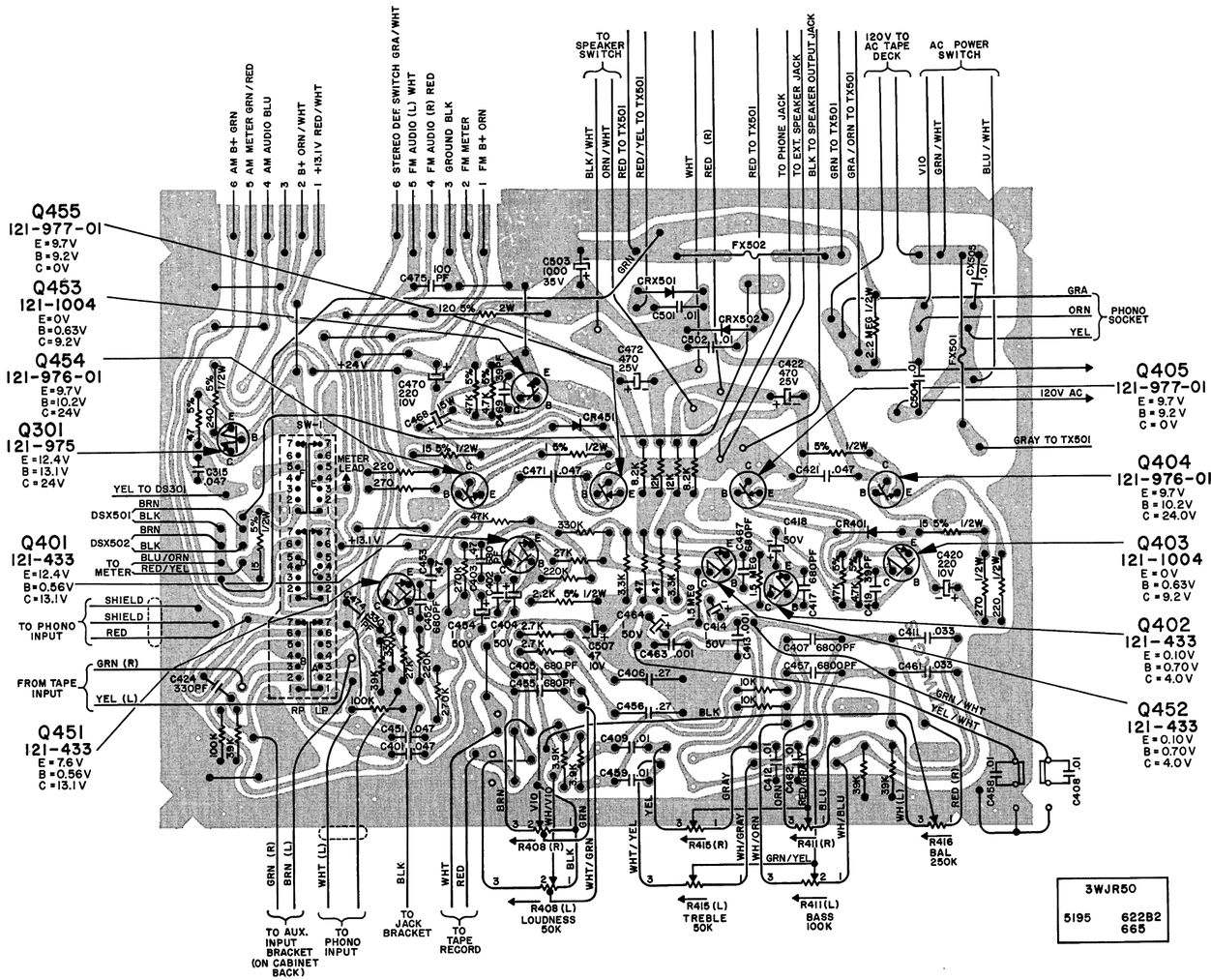
TRANSISTOR MOUNTING VIEW



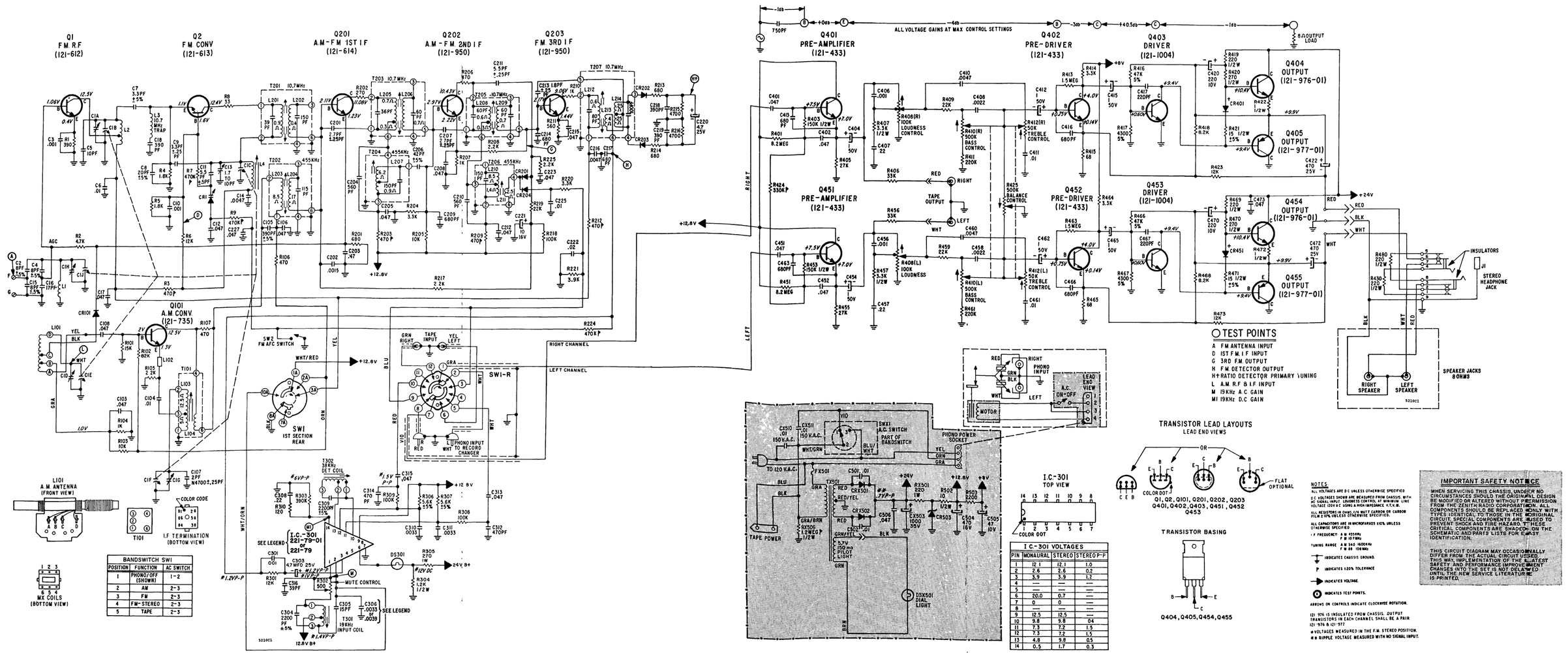




CHASSIS 3WJR50, 50Z – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – RF/IF/MPX



CHASSIS 3WJR50, 50Z – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – AUDIO AND POWER SUPPLY



IC301 WAVEFORMS

PIN 3 COMPOSITE L&R, L-R (L) KHZ. LEFT ONLY) 19 KHZ PILOT 10% 1 V P/P

PIN 2 19 KHZ (WITH L ONLY) 200 MV P/P

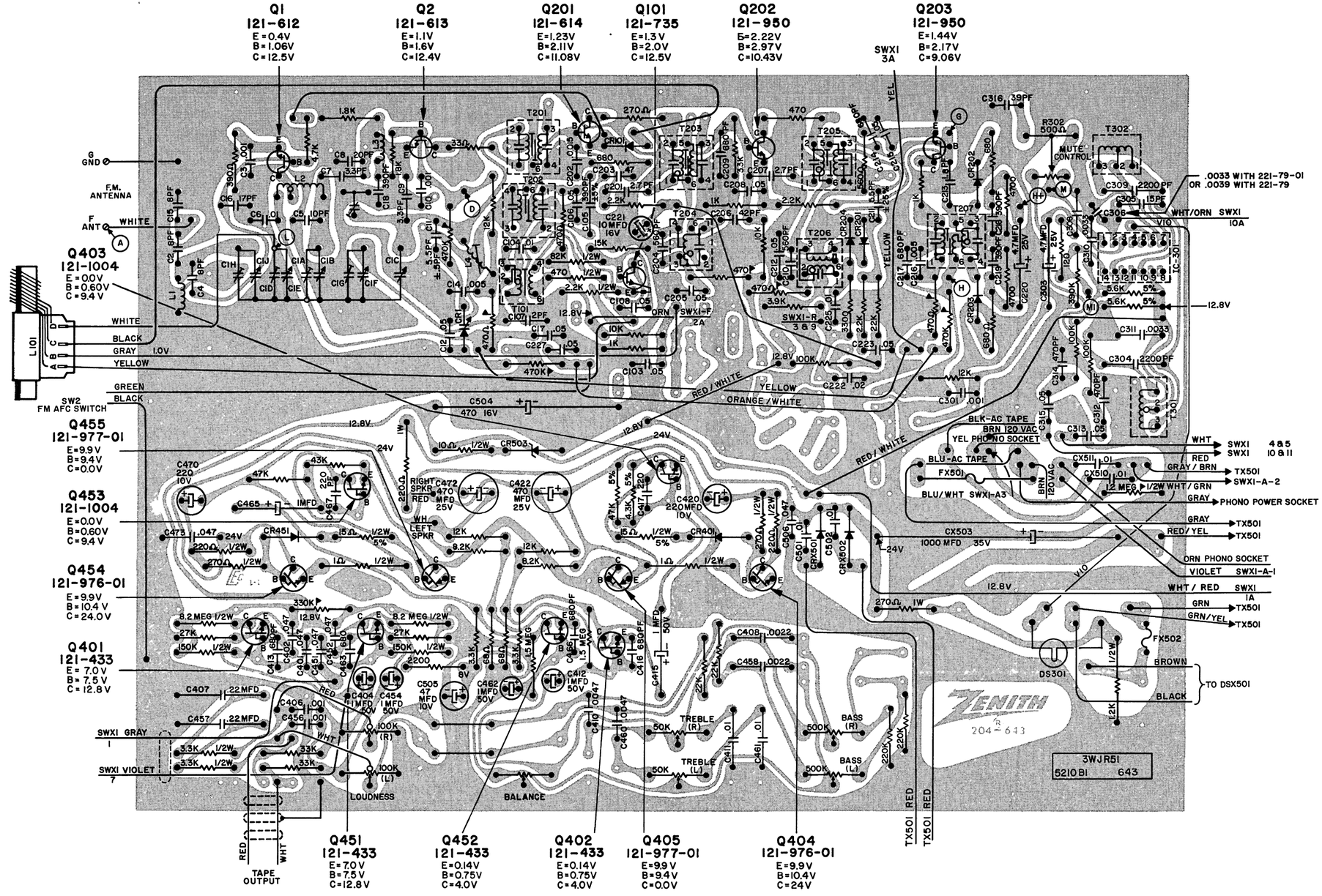
PIN 1 19 KHZ 1.2V P/P

PIN 10 38 KHZ PULSES 80MV P/P

38 KHZ TANK END 38 KHZ 13V P/P

PIN 13 38 KHZ 1.4V P/P

PIN 12 (UPPER) RIGHT OUTPUT PIN 11 (LOWER) LEFT OUTPUT (L INPUT ONLY) 1 V P/P



CHASSIS 3WJR51

ITEM NO.	PART NO.	DESCRIPTION
C1A,B		F.M. DETECTOR TRIMMER
C1C		F.M. OSCILLATOR TUNING
C1D,E		F.M. OSCILLATOR TRIMMER
C1F		A.M. ANTENNA TRIMMER
C1G	22-7134	A.M. ANTENNA TUNING
C1H		A.M. OSCILLATOR TUNING
C1J		A.M. OSCILLATOR TRIMMER
C1K		F.M. ANTENNA TRIMMER
C1L		F.M. ANTENNA TUNING
C2	22-2681	.001 MFD DISC 25V
C3	22-2729	.001 MFD DISC 25V
C4	22-2681	8 PF DISC ±0.25 50V
C5	22-3677	10 PF DISC ±5% 500V
C6	22-7605-06	17 PF DISC ±5% 500V
C7	22-2681	2.1 PF DISC ±0.25 50V
C8	22-7607-17	20 PF DISC ±5% 50V
C9	22-2679	3.3 PF DISC ±.25 PF 25V
C10	22-2729	.001 MFD DISC 25V
C11	22-2619	5.5 PF DISC ±0.5 PF 25V
C12	22-7615-10	.047 MFD DISC 50V
C13	22-5805	1.7 TO 10 PF CERAMIC TRIMMER
C14	22-7615-04	.0047 MFD DISC 50V
C15	22-2681	8 PF DISC ±0.25 50V
C16	22-3792	17 PF DISC ±5% 500V
C17	22-7615-10	.047 MFD DISC 50V
C18	22-3177	390 PF DISC 500V
C101	22-7615-10	.047 MFD DISC 50V
C102	22-7615-06	.01 MFD DISC 50V
C103	22-5872	390 PF ±5% POLYSTYRENE 125V
C104	22-7615-10	.047 MFD DISC 50V
C105	22-4619	2 PF NEGO ±0.5 PF 500V
C106	22-7615-10	.047 MFD DISC 50V
C201	22-5960	2.7 PF DISC ±.25 PF 500V
C202	22-5682	.0018 MFD DISC 50V
C203	22-5681	.47 MFD DISC 3V
C204	22-5681	.47 MFD DISC 3V
C205	22-7615-10	.047 MFD DISC 50V
C206	22-7539-23	42 PF DISC ±5% 50V
C207	22-5960	2.7 PF DISC ±.25 PF 500V
C208	22-7615-10	.047 MFD DISC 50V
C209	22-5682	680 PF DISC 500V
C210	22-5681	680 PF DISC 500V
C211	22-2715	5.5 PF DISC ±.25 PF 500V
C212	22-7615-10	.047 MFD DISC 50V
C213	22-5625-19	1.5 PF DISC ±.25 PF 500V
C214	22-5682	680 PF DISC 500V
C215	22-5682-03	390 PF DISC 500V
C216	22-7615-04	.0047 MFD DISC 50V
C217	22-5682	680 PF DISC 500V
C218	22-5682	680 PF DISC 500V
C219	22-3177	390 PF DISC 500V
C220	22-7615-10	.047 MFD DISC 50V
C221	22-7151-04	10 MFD ELECTROLYTIC 25V
C222	22-5869	.02 MFD DISC 500V
C223	22-7615-10	.047 MFD DISC 50V
C224	22-7615-06	.01 MFD DISC 50V
C225	22-7613-24	.01 MFD DISC 50V
C227	22-7615-10	.047 MFD DISC 50V
C301	22-2726	.001 MFD DISC 50V
C302	22-7151-03	47 MFD ELECTROLYTIC 25V
C303	22-7615-04	10 PF DISC ±5% 500V
C304	22-7615-10	.047 MFD DISC 50V
C305	22-7615-10	.047 MFD DISC 50V
C306	22-7613-18	.0033 MFD DISC ISUED WITH 221-79-01 50V
	OR	
	22-5581	.0039 MFD DISC ISUED WITH 221-79 500V
C307	22-5827	.22 MFD DISC 25V
C308	22-5932	2200 PF DISC POLYSTYRENE ±5% 500V
C309	22-7613-18	.0033 MFD DISC 50V
C311	22-7613-18	.0033 MFD DISC 50V
C312	22-2715	470 PF DISC 500V
C313	22-7615-10	.047 MFD DISC 50V
C314	22-2715	470 PF DISC 500V
C315	22-7615-10	.047 MFD DISC 50V
C316	22-7613-24	.01 MFD DISC 50V
C401	22-7615-10	.047 MFD DISC 50V
C402	22-7615-10	.047 MFD DISC 50V
C403	22-7153	1 MFD ELECTROLYTIC 50V
C404	22-6048	.22 MFD MYLAR 50V
C405	22-6048	.22 MFD MYLAR 50V
C406	22-7615-10	.047 MFD DISC 50V
C407	22-7615-10	.047 MFD DISC 50V
C408	22-7615-10	.047 MFD DISC 50V
C409	22-7615-10	.047 MFD DISC 50V
C410	22-7615-10	.047 MFD DISC 50V
C411	22-7614-24	.01 MFD DISC 50V
C412	22-7615-10	.047 MFD DISC 50V
C413	22-2930	680 PF DISC 500V
C414	22-2930	680 PF DISC 500V
C415	22-2703	330 PF DISC 500V
C416	22-7160-09	220 MFD ELECTROLYTIC 16V
C417	22-7152-11	470 MFD ELECTROLYTIC 25V
C418	22-7613-20	.0047 MFD DISC 50V
C451	22-7615-10	.047 MFD DISC 50V
C452	22-7615-10	.047 MFD DISC 50V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C456	22-6048	.001 MFD DISC 500V
C457	22-6042	.22 MFD MYLAR 50V
C458	22-7613-18	.0022 MFD DISC 50V
C460	22-7613-20	.0047 MFD DISC 50V
C461	22-7614-24	.01 MFD DISC 50V

ITEM NO.	PART NO.	DESCRIPTION
C462	22-7153	1 MFD ELECTROLYTIC 50V
C463	22-2939	680 PF DISC 500V
C466	22-7163	1 MFD ELECTROLYTIC 50V
C467	22-2939	680 PF DISC 500V
C470	22-7150-09	220 MFD ELECTROLYTIC 10V
C472	22-7152-11	470 MFD ELECTROLYTIC 25V
C473	22-6447-01	.047 MFD MYLAR 100V
C501	22-4617	.01 MFD DISC 500V
C502	22-4617	.01 MFD DISC 500V
C503	22-7151-13	100 MFD ELECTROLYTIC 25V
C505	22-7160-07	47 MFD ELECTROLYTIC 16V
C506	22-6447-01	.047 MFD MYLAR 100V
CX510	22-5005	.01 MFD DISC 500V AC
CX511	22-5005	.01 MFD DISC 500V AC
R1	63-9021-62	390 OHM 5% (ALT. 63-7768 1/2W 10%)
R2	63-4213	4.7K OHM
R3	63-9021-64	470 OHM 5% (ALT. 63-7772 1/2W 20%)
R4	63-9021-78	1.2K OHM 5% (ALT. 63-7798 1/2W 10%)
R5	63-9021-28	1.8K OHM 5% (ALT. 63-10183-76 1/4W 10%)
R6	63-9021-98	12K OHM 5% (ALT. 63-7831 1/2W 10%)
R7	63-9022-36	470K OHM 5% (ALT. 63-7898 1/2W 10%)
R8		33 OHM
R9	63-9022-36	470K OHM 5% (ALT. 63-7898 1/2W 20%)
R101	63-9922	15K OHM 5% (ALT. 63-7834 1/2W 10%)
R102	63-1996	82K OHM 1/2W
R103	63-9021-98	10K OHM 5% (ALT. 63-7827 1/2W 10%)
R104	63-9021-72	1K OHM 5% (ALT. 63-7768 1/2W 10%)
R106	63-1799	2.2K OHM 1/2W
R108	63-9021-64	470 OHM 5% (ALT. 63-7771 1/2W 10%)
R107	63-1771	470 OHM 1/2W
R201	63-9021-68	680 OHM 5% (ALT. 63-7775 1/2W 10%)
R202	63-9021-69	270 OHM 5% (ALT. 63-7765 1/2W 10%)
R203	63-9021-64	470 OHM 5% (ALT. 63-7771 1/2W 10%)
R204	63-9021-84	3.3K OHM 5% (ALT. 63-7806 1/2W 10%)
R205	63-9021-98	10K OHM 5% (ALT. 63-7827 1/2W 10%)
R206	63-9021-64	470 OHM 5% (ALT. 63-7771 1/2W 10%)
R207	63-9021-72	1K OHM 5% (ALT. 63-7768 1/2W 10%)
R208	63-9021-80	2.2K OHM 5% (ALT. 63-7799 1/2W 10%)
R209	63-9021-64	470 OHM 5% (ALT. 63-7772 1/2W 20%)
R210	63-9021-72	1K OHM 5% (ALT. 63-10183-72 1/4W 10%)
R211	63-9021-64	390 OHM 5% (ALT. 63-7775 1/2W 10%)
R212	63-9021-64	470 OHM 5% (ALT. 63-7772 1/2W 20%)
R213	63-9021-64	470 OHM 5% (ALT. 63-7772 1/2W 20%)
R214	63-9021-68	680 OHM 5% (ALT. 63-7775 1/2W 10%)
R215	63-9021-88	4.7K OHM 5% (ALT. 63-7813 1/2W 10%)
R216	63-9021-88	4.7K OHM 5% (ALT. 63-7813 1/2W 10%)
R217	63-9021-80	2.2K OHM 5% (ALT. 63-7799 1/2W 10%)
R218	63-9022-00	100K OHM 5% (ALT. 63-7808 1/2W 10%)
R219	63-9022-04	22K OHM 5% (ALT. 63-7841 1/2W 10%)
R220	63-9021-84	3.3K OHM 5% (ALT. 63-7806 1/2W 10%)
R221	63-1810	3.9K OHM 5%
R224	63-9022-36	470K OHM 5% (ALT. 63-7898 1/2W 20%)
R225	63-9021-60	2.2K OHM 5% (ALT. 63-7799 1/2W 10%)
R301	63-9021-98	10K OHM 5% (ALT. 63-7827 1/2W 10%)
R302	63-9027-26	500 OHM MUTE CONTROL
R303	63-9022-36	390K OHM 5% (ALT. 63-7804 1/2W 10%)
R304	63-1782	1.2K OHM 1/2W 10%
R305	63-4045	270 OHM 1W
R306	63-9021-60	1.6K OHM 5% (ALT. 63-7815 1/2W 5%)
R307	63-9021-60	1.6K OHM 5% (ALT. 63-7815 1/2W 5%)
R308	63-9022-20	100K OHM 5% (ALT. 63-7869 1/2W 10%)
R309	63-9022-00	100K OHM 5% (ALT. 63-7808 1/2W 10%)
R310	63-9021-50	120 OHM 5%
R401	63-9922-66	6.2 MEG OHM 5% (ALT. 63-7950 1/2W 10%)
R402	63-1828	100K OHM 1/2W
R403	63-9022-06	27K OHM 5% (ALT. 63-7845 1/2W 10%)
R404	63-9022-68	33K OHM 5% (ALT. 63-7848 1/2W 10%)
R405	63-1808	68 OHM 5%
R406R	63-9255	100K DUAL LOUDNESS CONTROL (ALT. 63-10160)
R406L		
R407	63-9022-04	22K OHM 5% (ALT. 63-7841 1/2W 10%)
R410R	63-9267	5K DUAL BASS CONTROL
R410L		
R411	63-9922-28	220K OHM 5% (ALT. 63-7883 1/2W 10%)
R412R	63-9256	50K DUAL TREBLE CONTROL (ALT. 63-10161)
R412L		
R413	63-9021-48	1.8 MEG OHM (ALT. 63-7918 1/2W 10%)
R414	63-9021-84	3.3K OHM 5% (ALT. 63-7806 1/2W 10%)
R415	63-9021-44	68 OHM 5% (ALT. 63-7728 1/2W 10%)
R416	63-9022-12	47K OHM 5% (ALT. 63-7854 1/2W 5%)
R417	63-9021-67	4.3K OHM 5% (ALT. 63-7811 1/2W 5%)
R418	63-9021-84	8.2K OHM 5% (ALT. 63-7826 1/2W 10%)
R419	63-9022-28	220 OHM 10% (ALT. 63-7737 1/2W 10%)
R420	63-9021-64	470 OHM 5% (ALT. 63-7771 1/2W 10%)
R421	63-9022-28	220 OHM 10% (ALT. 63-7737 1/2W 5%)
R422	63-10066	1 OHM 1/2W
R423	63-9021-98	12K OHM 5% (ALT. 63-7831 1/2W 10%)
R424	63-9022-52	330K OHM 5% (ALT. 63-7880 1/2W 20%)
R425	63-9254	500K BALANCE CONTROL (ALT. 63-10158)
R430	63-1757	220 OHM 1/2W

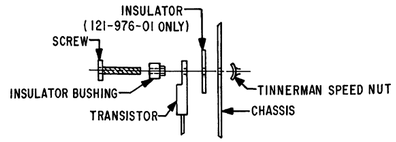
ITEM NO.	PART NO.	DESCRIPTION
R451	63-9022-66	6.2 MEG OHM 5% (ALT. 63-7950 1/2W 10%)
R453	63-1978	150K OHM 1/2W
R455	63-9022-06	27K OHM 5% (ALT. 63-7845 1/2W 10%)
R457	63-9022-08	33K OHM 5% (ALT. 63-7848 1/2W 10%)
R458	63-1808	68 OHM 5% 1/2W
R459	63-9022-04	22K OHM 5% (ALT. 63-7841 1/2W 10%)
R461	63-9022-38	220K OHM 5% (ALT. 63-7883 1/2W 10%)
R463	63-9024-68	1.5 MEG OHM 10% (ALT. 63-7910 1/2W 10%)
R464	63-9021-84	3.3K OHM 5% (ALT. 63-7806 1/2W 10%)
R465	63-9021-44	68 OHM 5% (ALT. 63-7728 1/2W 10%)
R466	63-9022-12	47K OHM 5% (ALT. 63-7854 1/2W 5%)
R467	63-9021-67	4.3K OHM 5% (ALT. 63-7811 1/2W 5%)
R468	63-9021-68	6.8K OHM 5% (ALT. 63-7824 1/2W 10%)
R469	63-9946-08	220 OHM 10% 5W (ALT. 63-7752 1/2W 10%)
R470	63-9946-08	270 OHM 10% 5W (ALT. 63-7761 1/2W 10%)
R471	63-9946-20	1.2K OHM 10% 5W (ALT. 63-7797 1/2W 5%)
R472	63-9021-98	12K OHM 5% (ALT. 63-7831 1/2W 10%)
R480	63-1797	220 OHM 1/2W
RX1016	63-10042	220 OHM 1/2W
R502	63-9946-24	10 OHM 1/2W (ALT. 63-7701 1/2W 10%)
R503	63-9021-60	2.2K OHM 5% (ALT. 63-7799 1/2W 10%)
RX1009	63-10628-03	12 MEG OHM 1/2W 1/2W
L1	20-3291	FM ANTENNA COIL
L2	20-1848	FM COIL
L3	20-1631	TRAP COIL 10.7 MHz
L4	20-3687	FM OSCILLATOR COIL
L101	5-80282-01	AM ANTENNA ASSEMBLY
L102	148-311	FERRITE CONE SLEEVE
L103	IN T101	AM OSCILLATOR TRANS. PRI.
L104	IN T101	AM OSCILLATOR TRANS. SEC.
L201	IN T201	1ST IF TRANSFORMER 10.7 MHz PRI.
L202	IN T201	1ST IF TRANSFORMER 10.7 MHz SEC.
L203	IN T202	1ST IF AM 455 Khz PRI.
L204	IN T202	1ST IF AM 455 Khz SEC.
L205	IN T203	2ND IF TRANSFORMER 10.7 MHz PRI.
L206	IN T203	2ND IF TRANSFORMER 10.7 MHz SEC.
L207	IN T204	2ND IF AM 455 Khz PRI.
L208	IN T204	2ND IF AM 455 Khz SEC.
L209	IN T205	3RD IF TRANSFORMER 10.7 MHz PRI.
L210	IN T205	3RD IF TRANSFORMER 10.7 MHz SEC.
L211	IN T206	3RD IF AM 455 Khz PRI.
L212	IN T206	3RD IF AM 455 Khz SEC.
L213	IN T207	RATIO DETECTOR TRANS. 10.7 MHz PRI.
		RATIO DETECTOR TRANS. 10.7 MHz SEC.
T201		TERTIARY
T214	IN T207	RATIO DETECTOR TRANS. 10.7MHz SEC.
T101	95-3271	AM OSCILLATOR TRANSFORMER
T201	95-3545	FM 1ST IF TRANSFORMER 10.7 MHz
T202	95-3561	AM 1ST IF AM 455 Khz
T203	95-3547	FM 2ND IF TRANSFORMER 10.7 MHz
T204	95-3562	AM 2ND IF AM 455 Khz
T205	95-3548	FM 3RD IF TRANSFORMER 10.7 MHz
T206	95-3699	AM 3RD IF AM 455 Khz
T207	95-3545	FM RATIO DETECTOR 10.7 MHz
T301	95-3268	INPUT COIL 19 Khz
T302	95-3023	DETECTOR COIL 38 Khz
TX501A	95-3523-05	POWER TRANSFORMER
TX501B	95-3270-01	BAND SWITCH
SW2	85-1437-01	AFC SWITCH (SL1DE SP-DT)
J1	79-2137-01	STEREO HEADPHONE JACK
CR1	103-47 OR 103-189	AFC DIODE
CR101	103-142-01	SILICON DIODE
CR201	103-23-01	GERMANIUM DIODE
CR202	103-60	GERMANIUM DIODES (MATCHED PAIR)
CR203	103-30	GERMANIUM DIODE
CR204	103-23	
CR401	103-222	DIODE
CR451	103-222	DIODE
CR501	212-26	SILICON RECTIFIER
CR502	212-26	SILICON RECTIFIER
CR602	103-79-01	DIODE
IC-301	221-79-01 OR 221-79	MONOLITHIC MULTIPLEX DEMODULATOR
DS301	100-611	STEREO INDICATOR LIGHT
DS302,3,4	100-243	PILOT LIGHT
PC#	204-643	CIRCUIT BOARD
FX501	126-117-05	2½ AMP SLO-BLO FUSE
		SCHEMATIC CIRCUIT COMPONENT LOCATOR

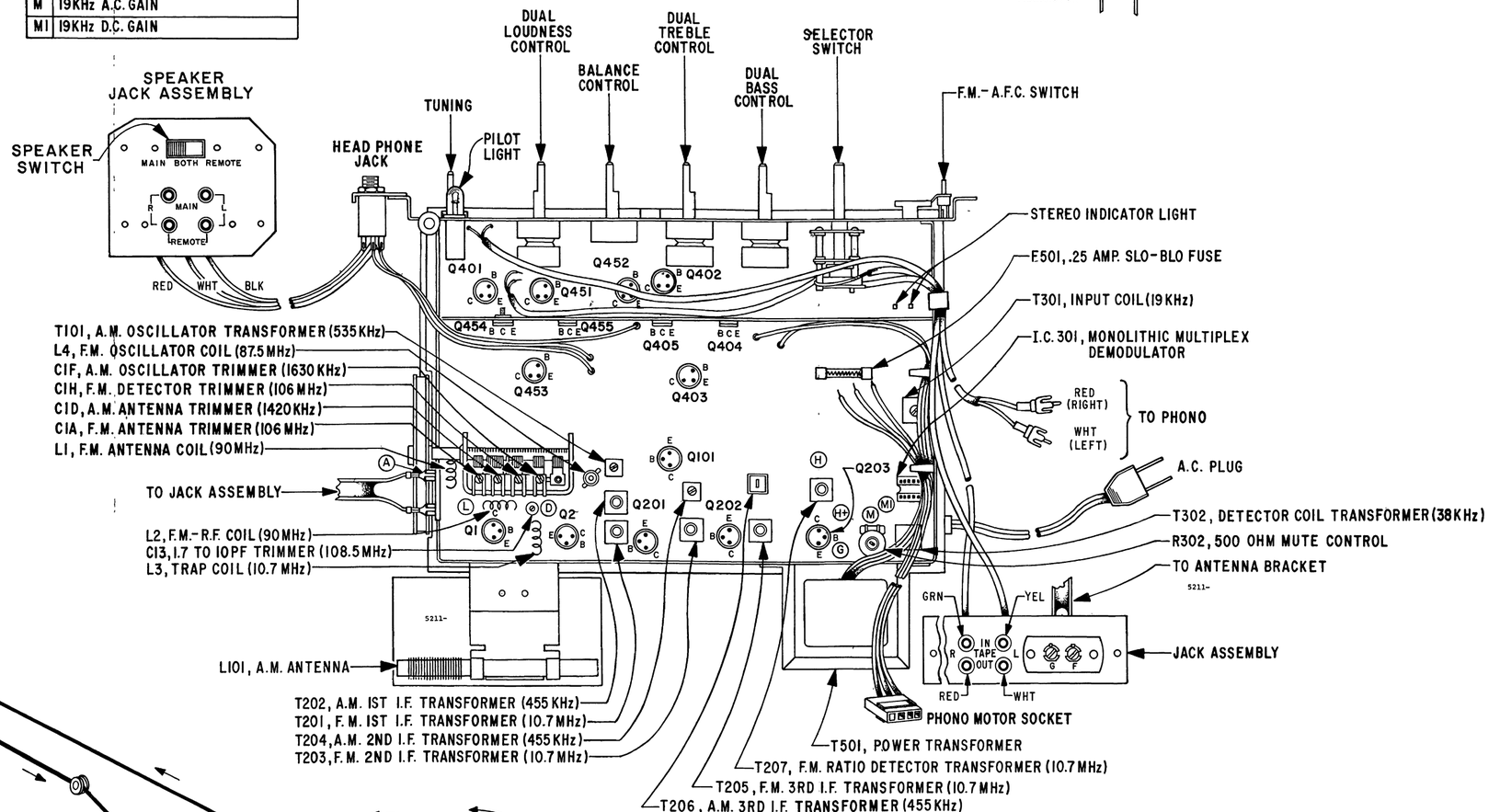
CHASSIS 3WJR51 —
CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE

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	121-433	PRE-AMPLIFIER
Q402		PRE-DRIVER
Q403	121-1004	DRIVER
Q404	121-976-01	OUTPUT
Q405	121-977-01	
Q451	121-433	PRE-AMPLIFIER
Q452		PRE-DRIVER
Q453	121-1004	DRIVER
Q454	121-976-01	OUTPUT
Q455	121-977-01	
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
MI	19KHz D.C. GAIN

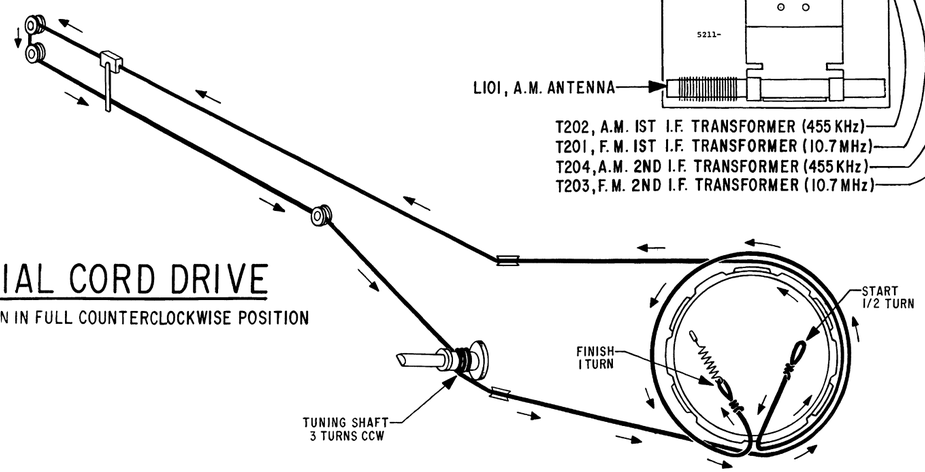
TRANSISTOR MOUNTING VIEW
121-976-01 & 121-977-01

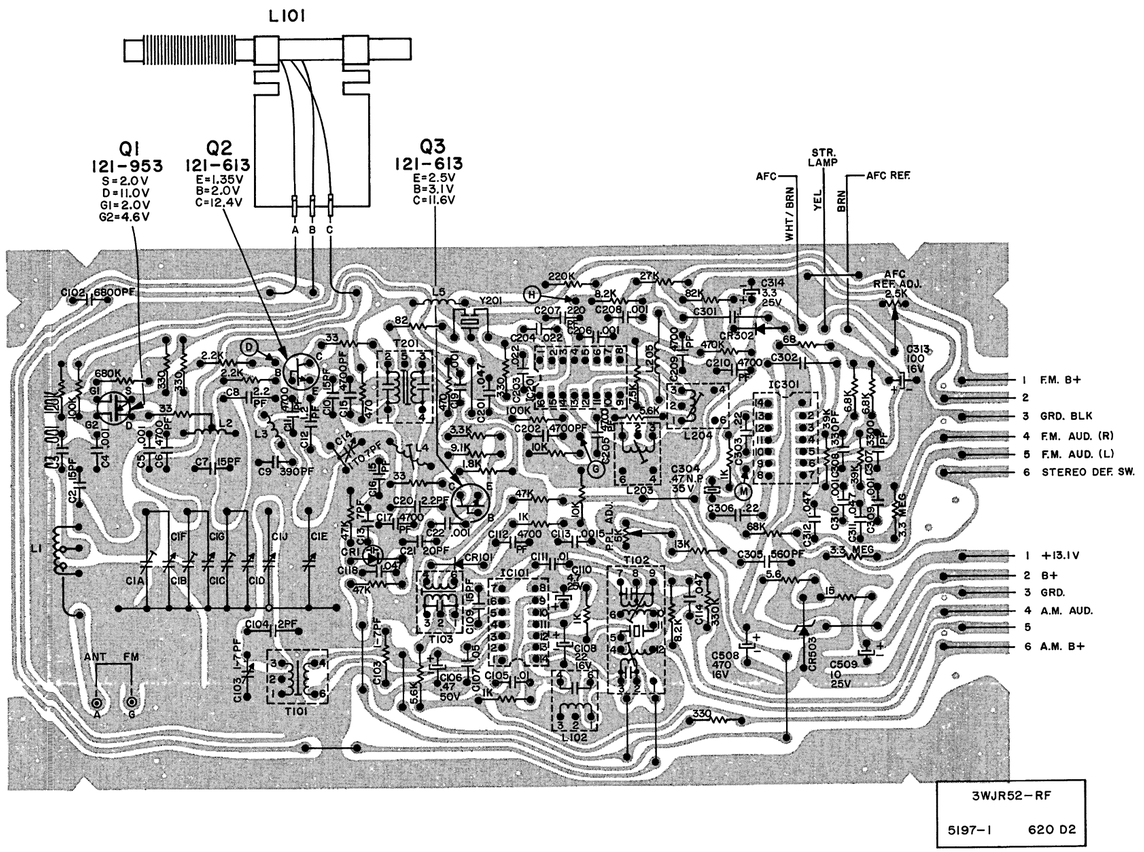




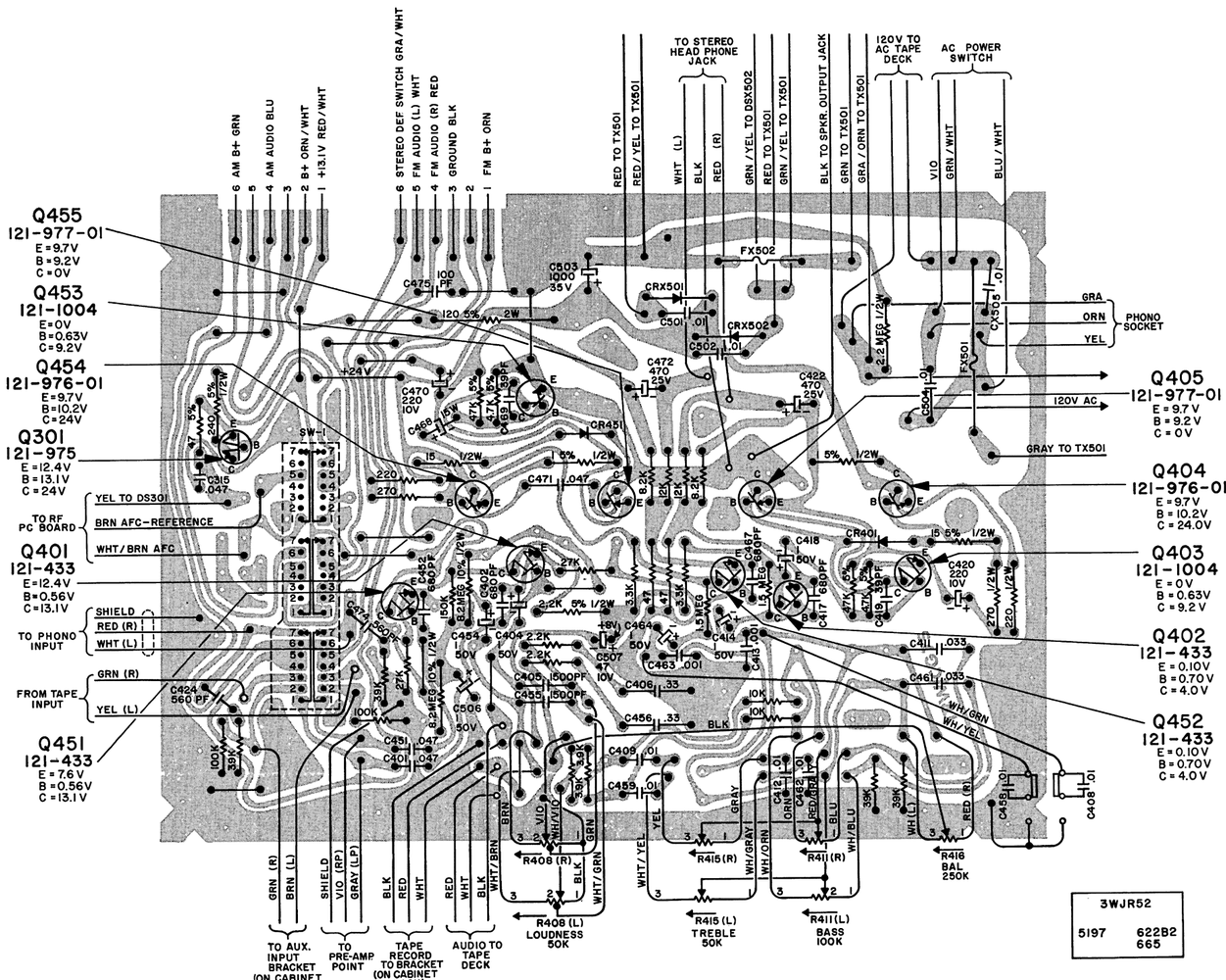
DIAL CORD DRIVE

SHOWN IN FULL COUNTERCLOCKWISE POSITION

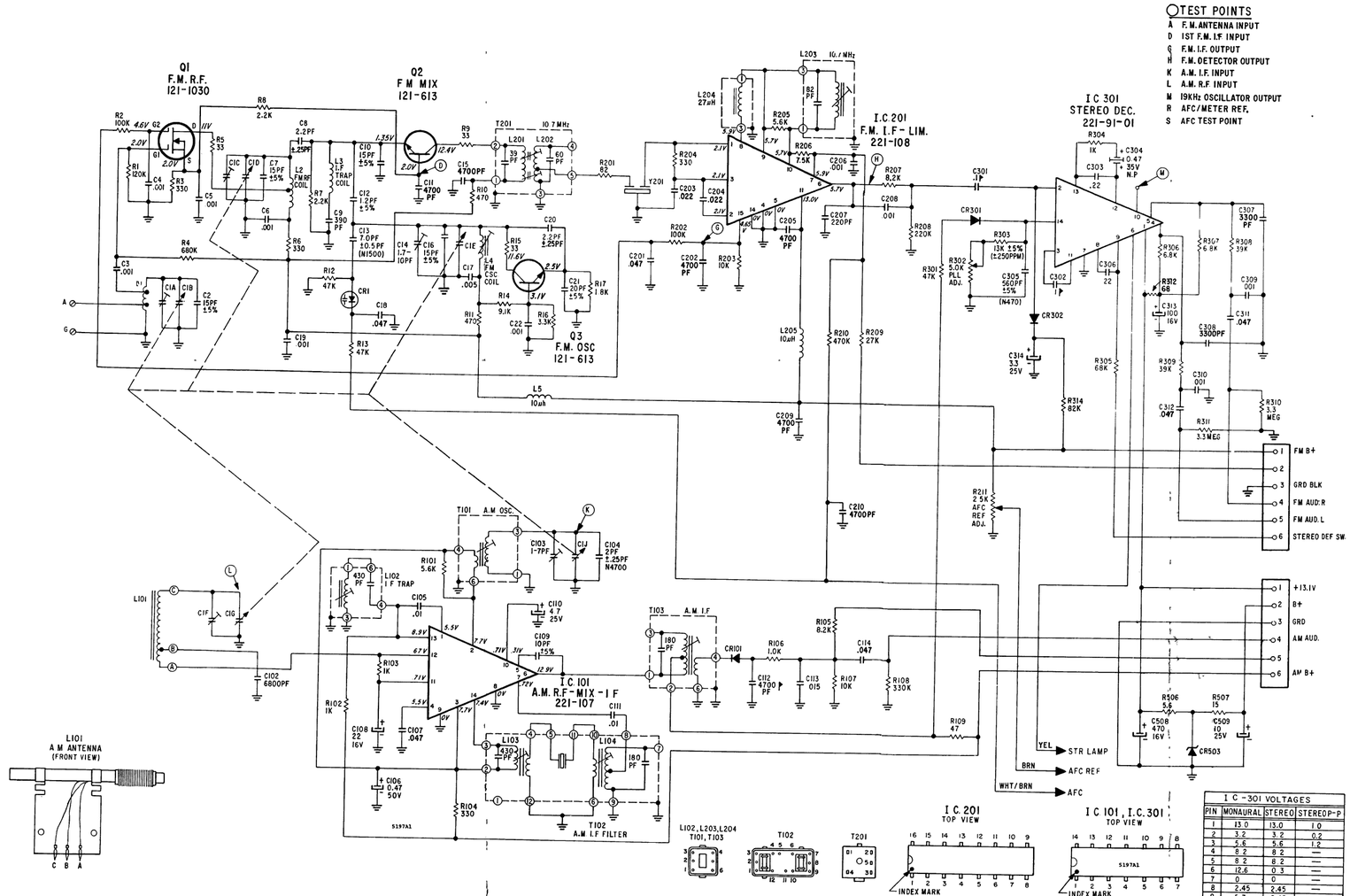




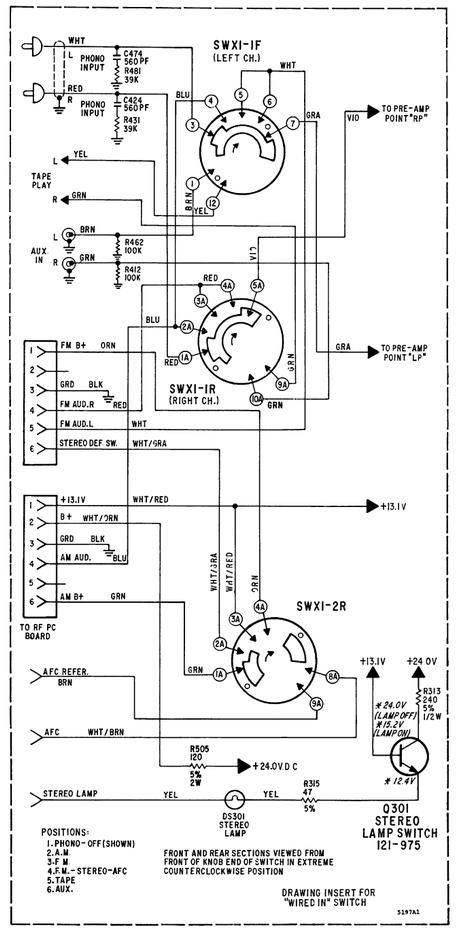
CHASSIS 3WJR52, 52Z – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – RF/IF/MPX



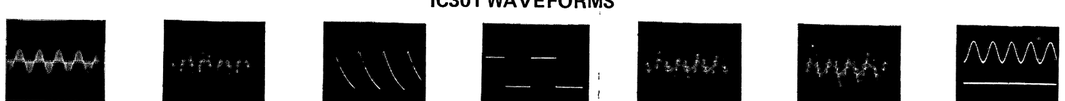
CHASSIS 3WJR52, 52Z – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – AUDIO AND POWER SUPPLY



I C -301 VOLTAGES			
PIN	MONAURAL	STEREO	STEREOP-P
1	13.0	13.0	1.0
2	3.2	3.2	0.2
3	5.6	5.6	1.2
4	8.2	8.2	—
5	8.2	8.2	—
6	12.6	0.3	—
7	0	0	—
8	2.45	2.45	—
9	5.7	2.45	—
10	1.6	1.6	.02
11	2.75	2.5	1.5
12	2.5	2.5	1.5
13	2.5	2.5	0.5
14	3.3	3.3	0.3



IC301 WAVEFORMS



PIN 2-COMPOSITE INPUT L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 0.5V P/P (0.5 MILLISEC.)

PINS 3 AND 11-COMPOSITE AMPLIFIED L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 1.4V P/P (0.5 MILLISEC.)

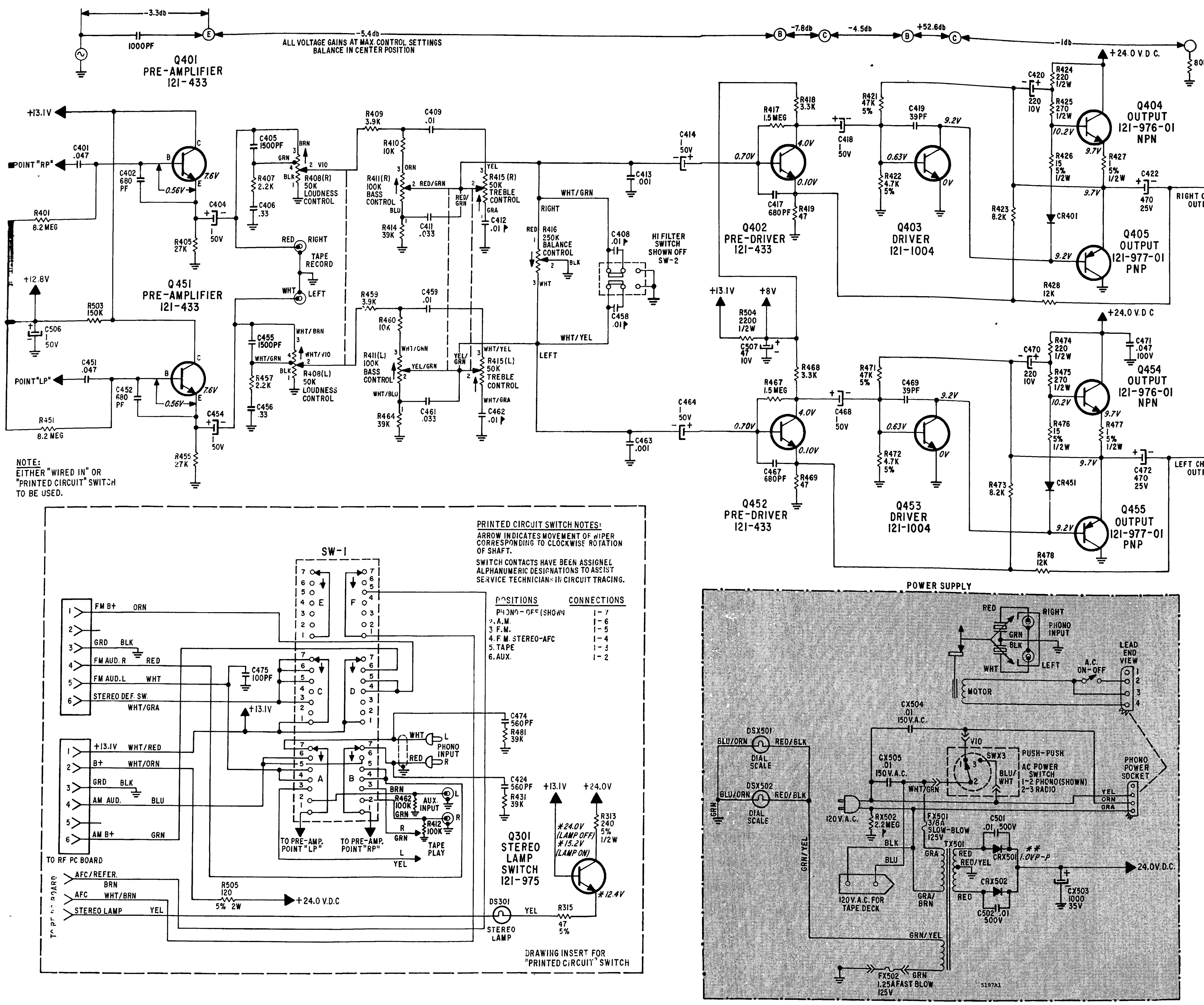
PIN 14-VOLTAGE CONTROLLED OSCILLATOR ADJUSTMENT 3.5V P/P (5.0 MICROSEC.)

PIN 10-19 KHZ TEST POINT 2.7V P/P (10.0 MICROSEC.)

PINS 12 AND 13-FILTER-PHASE DETECTOR 0.14V P/P (0.5 MILLISEC.)

PINS 8 AND 9-FILTER-AMPLITUDE DETECTOR 0.47V P/P (0.5 MILLISEC.)

P1, #9-(UPPER) LEFT OUTPUT 0.57V P/P (0.5 MILLISEC.) P1, #8-(LOWER) RIGHT OUTPUT 0.05V P/P (0.5 MILLISEC.)



IMPORTANT SAFETY NOTICE

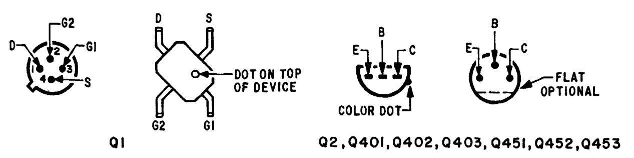
WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE ZENITH RADIO CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIRCUIT, AND THEIR PHYSICAL LOCATION, WIRING AND LEAD DRESS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

SPECIAL CIRCUITS ARE ALSO USED TO PREVENT SHOCK AND FIRE HAZARD. THESE CRITICAL AREAS ARE SHADED ON THE SCHEMATIC FOR EASY IDENTIFICATION. THE LETTER "X" INCLUDED IN THE ITEM NUMBER DESIGNATES SPECIAL FAIL 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.

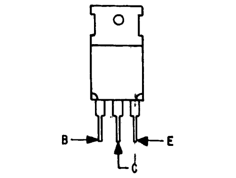
THIS CIRCUIT DIAGRAM MAY OCCASIONALLY DIFFER FROM THE ACTUAL CIRCUIT USED. THIS WAY, IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

TRANSISTOR LEAD LAYOUTS

LEAD END VIEWS



TRANSISTOR BASING



Q404,Q405,Q454,Q455

NOTES:

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS, WITH NO SIGNAL INPUT, LOUDNESS CONTROL AT MINIMUM, LINE VOLTAGE 120 V.A.C. USING A HIGH IMPEDANCE V.T.V.M.

ALL RESISTORS IN OHMS, 1/4 WATT CARBON OR CARBON FILM, ±10% UNLESS OTHERWISE SPECIFIED.

ALL CAPACITORS ARE IN MICROFARADS ±10% UNLESS OTHERWISE SPECIFIED, EXCEPT ELECTROLYTICS WHICH ARE $^{+100}_{-10}$%.

I.F. FREQUENCY: A.M. 455KHz
F.M. 10.7MHz

TUNING RANGE: A.M. 540-1600KHz
F.M. 88-108MHz

INDICATES CHASSIS GROUND.

INDICATES ±20% TOLERANCE.

INDICATES VOLTAGE.

(A) INDICATES TEST POINTS.

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION ON ROTARY CONTROLS AND UPWARD MOVEMENT ON SLIDE CONTROLS.

121-976-01 IS INSULATED FROM CHASSIS. OUTPUT TRANSISTORS IN EACH CHANNEL SHALL BE A PAIR 121-976-01 & 121-977-01.

** VOLTAGES MEASURED IN THE F.M. STEREO POSITION.

** RIPPLE VOLTAGE MEASURED WITH NO SIGNAL INPUT PHONO POSITION.

CHASSIS 3WJR52, 3WJR52Z

ITEM NO.	PART NO.	DESCRIPTION
C1A	22-7545 ON 3WJR52	FM ANTENNA TRIMMER
C1B		AM ANTENNA TUNING
C1C		FM RF TRIMMER
C1D		FM RF TUNING
C1E	22-7578 ON 3WJR52Z	FM OSCILLATOR TUNING
C1F		AM ANTENNA TRIMMER
C1G		AM ANTENNA TUNING
C1J		AM OSCILLATOR TUNING
C2	22-2642	15 PF DISC ±5% 500V
C3	22-2729	.001 MFD DISC 25V
C4	22-2729	.001 MFD DISC 25V
C5	22-2729	.001 MFD DISC 25V
C6	22-2729	.001 MFD DISC 25V
C7	22-2642	15 PF DISC ±5% 500V
C8	22-6225-26	2.2 PF DISC ±.25 PF 500V
C9	22-3177	390 PF DISC 500V
C10	22-2642	15 PF DISC ±5% 500V
C11	22-7615-04	4700 PF DISC 50V
C12	22-5164	1.2 PF GIMMICK ±5% 500V
C13	22-6344	7 PF DISC ±.5 PF N1500 500V
C14	22-7460	1.0 PF TO 7 PF CERAMIC TRIMMER
C15	22-7615-04	4700 PF DISC 50V
C16	22-2642	15 PF DISC ±5% N33 500V
C17	22-3080	.005 MFD DISC 25V
C18	22-7615-10	.047 MFD DISC 50V
C19	22-2729	.001 MFD DISC 25V
C20	22-6225-26	2.2 PF DISC ±.25 PF 500V
C21	22-7621-17	20 PF DISC ±5% 50V
C22	22-2729	.001 MFD DISC 25V
C102	22-7613-22	6800 PF DISC 50V
C103	22-7460	1 PF TO 7 PF AM OSCILLATOR TRIMMER
C104	22-4819	2 PF ±0.25 PF N4700 TUB. 500V
C105	22-7615-06	.01 MFD DISC 50V
C106	22-7153-25	.47 MFD ELECTROLYTIC 50V
C107	22-7615-10	.047 MFD DISC 50V
C108	22-7151-05	22 MFD ELECTROLYTIC 16V
C109	22-3676	10 PF DISC ±5% 500V
C110	22-7152-03	4.7 MFD ELECTROLYTIC 25V
C111	22-7615-06	.01 MFD DISC 50V
C112	22-7613-20	4700 PF DISC 50V
C113	22-7614-26	.015 MFD DISC 50V
C114	22-7615-10	.047 MFD DISC 50V
C201	22-7615-10	.047 MFD DISC 50V
C202	22-7615-04	4700 PF DISC 50V
C203	22-7615-08	.022 MFD DISC 50V
C204	22-7615-08	.022 MFD DISC 50V
C205	22-7615-04	4700 PF DISC 50V
C206	22-2729	.001 MFD DISC 25V
C207	22-2703	220 PF DISC 500V
C208	22-3748	.001 MFD DISC 1000V
C209	22-7615-04	4700 PF DISC 50V
C210	22-7615-04	4700 PF DISC 50V
C301	22-5907	1 MFD MYLAR 20% 50V
C302	22-5907	1 MFD MYLAR 20% 50V
C303	22-3527	.22 MFD DISC 12V
C304	22-7406	.47 MFD NP ELECTROLYTIC 35V
C305	22-7493	560 PF ±5% N470 DISC 500V
C306	22-3527	.22 MFD DISC 12V
C307	22-7613-18	3300 PF DISC 50V
C308	22-7613-18	3300 PF DISC 50V
C309	22-2729	.001 MFD DISC 25V
C310	22-2729	.001 MFD DISC 25V
C311	22-7615-10	.047 MFD DISC 50V
C312	22-7615-10	.047 MFD DISC 50V
C313	22-7151-08	100 MFD ELECTROLYTIC 16V
C314	22-7152-02	3.3 MFD ELECTROLYTIC 25V
C401	22-7615-10	.047 MFD DISC 50V
C402	22-2939	680 PF DISC 500V
C404	22-7153	1 MFD ELECTROLYTIC 50V
C405	22-7613-14	1500 PF DISC 50V
C406	22-7586	.33 MFD MYLAR 50V
C408	22-7614-24	.01 MFD DISC 20% 50V
C409	22-7614-24	.01 MFD DISC 20% 50V
C411	22-5883	.033 MFD MYLAR 100V
C412	22-7614-24	.01 MFD DISC 50V
C413	22-5688	.001 MFD DISC ±20% 500V
C414	22-7153	1 MFD ELECTROLYTIC 50V
C417	22-2939	680 PF DISC 500V
C418	22-7153	1 MFD ELECTROLYTIC 50V
C419	22-3381	39 PF DISC ±5% 500V
C420	22-7150-09	220 MFD ELECTROLYTIC 10V
C422	22-7152-11	470 MFD ELECTROLYTIC 25V
C424	22-3362	560 PF DISC 500V
C451	22-7615-10	.047 MFD DISC 50V
C452	22-2939	680 PF DISC 500V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C455	22-7613-14	1500 PF DISC 50V
C456	22-7856	.33 MFD MYLAR 50V
C458	22-7614-24	.01 MFD DISC 20% 50V
C459	22-7614-24	.01 MFD DISC 20% 50V
C461	22-5883	.033 MFD MYLAR 100V
C462	22-7614-24	.01 MFD DISC 20% 50V
C463	22-5688	.001 MFD DISC ±20% 500V
C464	22-7153	1 MFD ELECTROLYTIC 50V
C467	22-2939	680 PF DISC 500V
C468	22-7153	1 MFD ELECTROLYTIC 50V
C469	22-3381	39 PF DISC ±5% 500V
C470	22-7150-09	220 MFD ELECTROLYTIC 10V
C471	22-6447-01	.047 MFD MYLAR 100V
C472	22-7152-11	470 MFD ELECTROLYTIC 25V
C474	22-3362	560 PF DISC 500V
C475	22-3383	100 PF DISC 500V
C501	22-4617	.01 MFD DISC 500V
C502	22-4617	.01 MFD DISC 500V

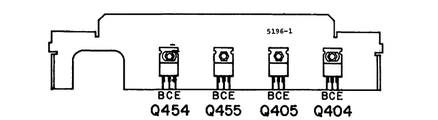
ITEM NO.	PART NO.	DESCRIPTION
CX503■	22-7154-12	1000 MFD ELECTROLYTIC 35V
CX504■	22-7431-07	.01 MFD DISC 150VAC
CX505■	22-7431-07	.01 MFD DISC 150VAC
C506	22-7153	1 MFD ELECTROLYTIC 50V
C507	22-7150-07	47 MFD ELECTROLYTIC 10V
C508	22-7151-11	470 MFD ELECTROLYTIC 16V
C509	22-7152-04	10 MFD ELECTROLYTIC 25V
R1	63-9922-22	120K OHM 5% 1/4W
R2	63-9922-20	100K OHM 5% 1/4W
R3	63-9921-60	330 OHM 5% 1/4W
R4	63-9922-40	680K OHM 5% 1/4W
R5	63-4122	33 OHM 10% 1/4W
R6	63-9921-60	330 OHM 5% 1/4W
R7	63-9921-80	2.2K OHM 5% 1/4W
R8	63-9921-80	2.2K OHM 5% 1/4W
R9	63-9921-36	33 OHM 5% 1/4W
R10	63-9921-64	470 OHM 5% 1/4W
R11	63-4171	470 OHM 10% 1/4W
R12	63-9922-12	47K OHM 5% 1/4W
R13	63-9922-12	47K OHM 5% 1/4W
R14	63-9921-95	9.1K OHM 5% 1/4W
R15	63-4122	33 OHM 10% 1/4W
R16	63-9921-84	3.3K OHM 5% 1/4W
R17	63-9921-78	1.8K OHM 5% 1/4W
R101	63-9921-90	5.6K OHM 5% 1/4W
R102	63-9921-72	1K OHM 5% 1/4W
R103	63-9921-72	1K OHM 5% 1/4W
R104	63-9921-60	330 OHM 5% 1/4W
R105	63-9921-94	8.2K OHM 5% 1/4W
R106	63-9921-72	1K OHM 5% 1/4W
R107	63-9921-96	10K OHM 5% 1/4W
R108	63-9922-32	330K OHM 5% 1/4W
R109	63-9921-40	47 OHM 5% 1/4W
R201	63-9921-46	82 OHM 5% 1/4W
R202	63-9922-20	100K OHM 5% 1/4W
R203	63-9921-96	10K OHM 5% 1/4W
R204	63-9921-60	330 OHM 5% 1/4W
R205	63-9921-90	5.6K OHM 5% 1/4W
R206	63-9921-93	7.5K OHM 5% 1/4W
R207	63-9921-94	8.2K OHM 5% 1/4W
R208	63-9922-28	220K OHM 5% 1/4W
R209	63-9922-06	27K OHM 5% 1/4W
R210	63-9922-36	470K OHM 5% 1/4W
R211	63-10651-02	2.5K OHM AFC REF. ADJUST
R301	63-9922-12	47K OHM 5% 1/4W
R302	63-10661-03	5K OHM P.L.L. ADJUST
R303	63-10311-99	13K OHM 5% 1/4W
R304	63-9921-72	1K OHM 5% 1/4W
R305	63-9922-16	68K OHM 5% 1/4W
R306	63-9921-92	6.8K OHM 5% 1/4W
R307	63-9921-92	6.8K OHM 5% 1/4W
R308	63-9922-10	39K OHM 5% 1/4W
R309	63-9922-10	39K OHM 5% 1/4W
R310	63-9924-56	3.3 MEG OHM 10% 1/4W
R311	63-9924-56	3.3 MEG OHM 10% 1/4W
R312	63-9921-44	68 OHM 5% 1/4W
R313	63-9946-57	240 OHM 5% 1/2W
R314	63-9922-18	82K OHM 5% 1/4W
R315	63-9921-40	47 OHM 5% 1/4W
R401	63-7950	8.2 MEG OHM 10% 1/2W
R405	63-9922-06	27K OHM 5% 1/4W
R407	63-9921-80	2.2K OHM 5% 1/4W
R408R, R408L	63-10189-02	50K OHM LOUDNESS CONTROL DIAL
R409	63-9921-86	3.9K OHM 5% 1/4W
R410	63-9921-96	10K OHM 5% 1/4W
R411R, R411L	63-8982-02	100K OHM BASS CONTROL DUAL
R412	63-9922-20	100K OHM 5% 1/4W
R414	63-9922-10	39K OHM 5% 1/4W
R415R, R415L	63-8983-02	50K OHM TREBLE CONTROL DUAL
R416	63-8981-02	250K BALANCE CONTROL
R417	63-9924-48	1.5 MEG OHM 10% 1/4W
R418	63-9921-84	3.3K OHM 5% 1/4W
R419	63-9921-40	47 OHM 5% 1/4W
R421	63-9922-12	47K OHM 5% 1/4W
R422	63-9921-88	4.7K OHM 5% 1/4W
R423	63-9921-94	8.2K OHM 5% 1/4W
R424	63-9946-56	220 OHM 5% 1/2W
R425	63-9946-58	270 OHM 5% 1/2W
R426	63-9946-28	15 OHM 5% 1/2W
R427	63-10565	1.0 OHM 5% 1/2W
R428	63-9921-98	12K OHM 5% 1/4W
R430	63-1757	220 OHM 10% 1/2W
R431	63-9922-10	39K OHM 5% 1/4W
R451	63-7950	8.2 MEG OHM 1/2W 10%
R455	63-9922-06	27K OHM 5% 1/4W
R457	63-9921-80	2.2K OHM 5% 1/4W
R459	63-9921-86	3.9K OHM 5% 1/4W
R460	63-9921-96	10K OHM 5% 1/4W
R462	63-9922-20	100K OHM 5% 1/4W
R464	63-9922-10	39K OHM 5% 1/4W
R467	63-9924-48	1.5 MEG OHM 10% 1/4W
R468	63-9921-84	3.3K OHM 5% 1/4W
R469	63-9921-40	47 OHM 5% 1/4W

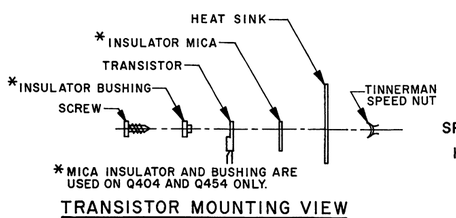
ITEM NO.	PART NO.	DESCRIPTION
R471	63-9922-12	47K OHM 5% 1/4W
R472	63-9921-88	4.7K OHM 5% 1/4W
R473	63-9921-94	8.2K OHM 5% 1/4W
R474	63-9946-56	220 OHM 5% 1/2W
R475	63-9946-58	270 OHM 5% 1/2W
R476	63-9946-28	15 OHM 5% 1/2W
R477	63-10565	1.0 OHM 5% 1/2W
R478	63-9921-98	12K OHM 5% 1/4W
R480	63-1757	220 OHM 10% 1/2W
R481	63-9922-10	39K OHM 5% 1/4W
RX502■	63-10526-01	2.2 MEG 20% 1/2W
R503	63-9922-24	150K OHM 5% 1/4W
R504	63-9946-80	2.2K OHM 5% 1/2W
R505	63-10371-50	120 OHM 5% 2W
R506	63-9921-18	5.6 OHM 5% 1/4W
R507	63-9921-28	15 OHM 1/4W
CR1	103-47-01	AFC DIODE
CR101	103-23-01	GERMANIUM DIODE
CR301	103-142-01	SILICON DIODE
CR302	103-142-01	SILICON DIODE
CR401	103-222-01	SILICON DIODE
CR451	103-222-01	SILICON DIODE
CRX501■	212-76-02	SILICON RECTIFIER
CRX502■	212-76-02	SILICON RECTIFIER
CR503	103-96-01	ZENER DIODE
L1	20-3771	FM ANTENNA COIL
L2	20-3773	FM RF COIL
L3	20-1631	TRAP COIL 10.7 MHz
L4	20-3772	FM OSCILLATOR COIL
L5	20-2033	10 MICROHENRY COIL RF CHOKE
L101	A-4781	AM ANTENNA ASSEMBLY
L102	20-3776	TRAP COIL 455 KHz
L103	IN T102	AM FILTER PRIMARY
L104	IN T102	AM FILTER SECONDARY
L201	IN T201	10.7 MHz IF PRIMARY
L202	IN T201	10.7 MHz IF SECONDARY
L203	20-3774	FM QUADRATURE DETECTOR
L204	20-3775	FM 27 M.H. COIL
L205	20-2033	10 MICROHENRY COIL RF CHOKE
T101	95-3268	AM OSCILLATOR TRANSFORMER
T102	A-4782	AM IF FILTER
T103	95-3266	AM DETECTOR COIL
T201	95-3269	10.7 MHz I.F.
TX501■	95-3289	POWER TRANSFORMER
FX501■	136-117-12	3/8 SLO BLOW FUSE 125V
FX502■	136-113-16	1.25 A FAST BLOW 125V
IC101	221-107	AM IC
IC201	221-108	FM IC
IC301	221-91-01	STEREO DECODER PHASE LOCK LOOP (PREFERRED)
	OR	
	221-91	STEREO DECODER PHASE LOCK LOOP (ALTERNATE)
DS301	100-658-01	STEREO INDICATOR LIGHT
DSX501■	100-661	DIAL SCALE
DSX502■	100-661	DIAL SCALE
J1	78-2137-04	HEADPHONE JACK
PC	204-620	CIRCUIT BOARD RF
PC	204-622	CIRCUIT BOARD AUDIO AND POWER SUPPLY
SW-1	85-1489	BAND SWITCH
SW-2	85-1521	HI FILTER SWITCH
SWX-3■	85-1448	POWER SWITCH
Y201	224-2	CERAMIC FILTER, 10.64 MHz (BLACK)
	OR	
	224-2-01	CERAMIC FILTER 10.67 MHz (BLUE)
	OR	
	224-2-02	CERAMIC FILTER, 10.70 MHz (RED)
	OR	
	224-2-03	CERAMIC FILTER, 10.73 MHz (ORANGE)
	OR	
	224-2-04	CERAMIC FILTER, 10.76 MHz (WHITE)
Q1	121-1030	FM RF FIELD EFFECT TRANSISTOR
Q2	121-613	MIXER TRANSISTOR
Q3	121-613	FM OSCILLATOR TRANSISTOR
Q301	121-975	STEREO LAMP SWITCH
Q401	121-433	PRE-AMPLIFIER TRANSISTOR
Q402	121-433	PRE-DRIVER TRANSISTOR
Q403	121-1004	DRIVER TRANSISTOR
Q404	121-976-01	NPN OUTPUT TRANSISTOR
Q405	121-977-01	PNP OUTPUT TRANSISTOR
Q451	121-433	PRE-AMPLIFIER TRANSISTOR
Q452	121-433	PRE-DRIVER TRANSISTOR
Q453	121-1004	DRIVER TRANSISTOR
Q454	121-976-01	NPN OUTPUT TRANSISTOR
Q455	121-977-01	PNP OUTPUT TRANSISTOR
		■CRITICAL CIRCUIT COMPONENT
		5197A2

CHASSIS 3WJR52, 52Z — SCHEMATIC

TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-1030	F.M.-R.F.
Q2	121-613	F.M. MIXER
Q3		F.M. OSCILLATOR
Q301	121-975	STEREO LAMP SWITCH
Q401	121-433	PRE-AMPLIFIER
Q402		PRE-DRIVER
Q403	121-1004	DRIVER
Q404	121-976-01	OUTPUT
Q405	121-977-01	
Q451	121-433	PRE-AMPLIFIER
Q452		PRE-DRIVER
Q453	121-1004	DRIVER
Q454	121-976-01	OUTPUT
Q455	121-977-01	
IC101	221-107	A.M.-R.F. MIXER-I.F.
IC201	221-108	F.M.-I.F. LIMITER DETECTOR
IC301	221-91	MULTIPLEX P.L.L. DEMODULATOR

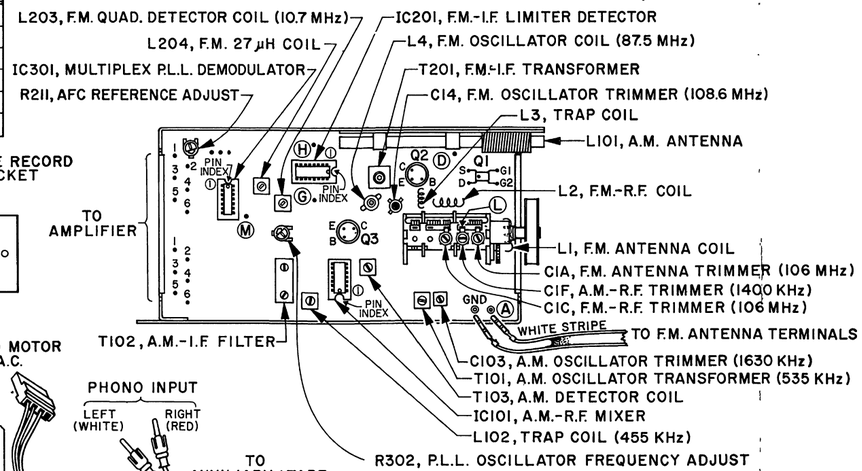
TEST POINTS	
A	F.M. ANTENNA INPUT
D	F.M. I.F. INPUT
G	F.M. I.F. OUTPUT
H	F.M. DETECTOR OUTPUT
L	A.M. R.F. INPUT
M	19 KHz OSCILLATOR OUTPUT

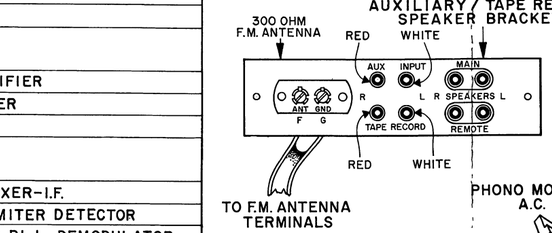


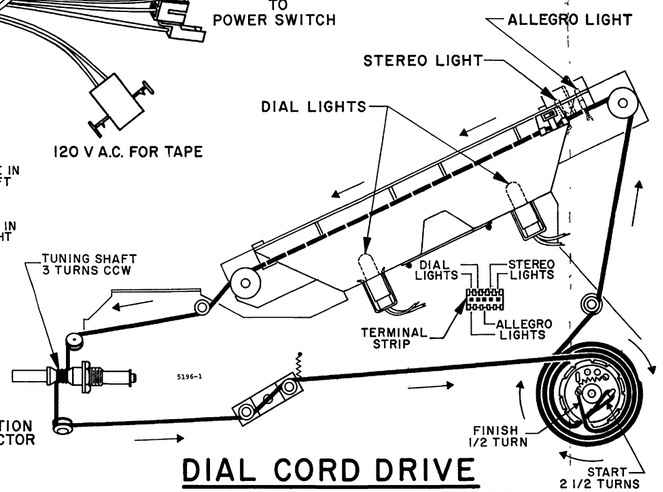


TRANSISTOR MOUNTING VIEW

RF TUNER

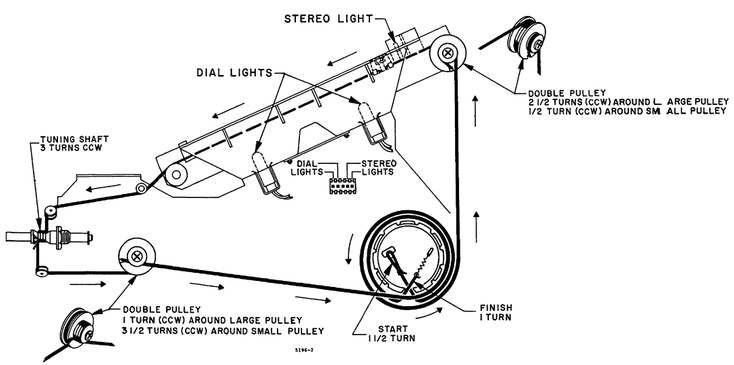






DIAL CORD DRIVE

SHOWN IN FULL COUNTERCLOCKWISE POSITION
TUNING DRIVE-3WJR52

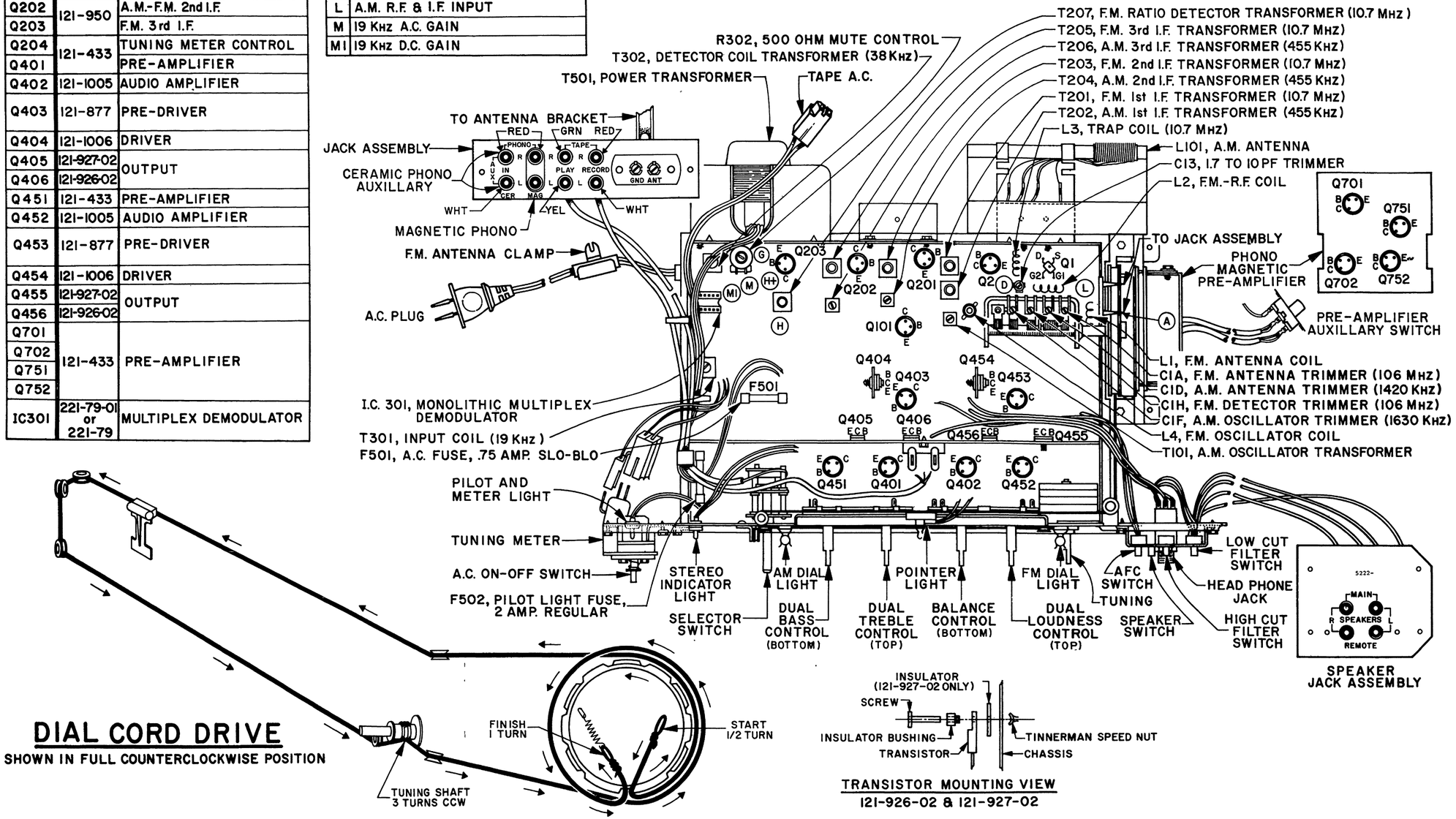


DIAL CORD DRIVE

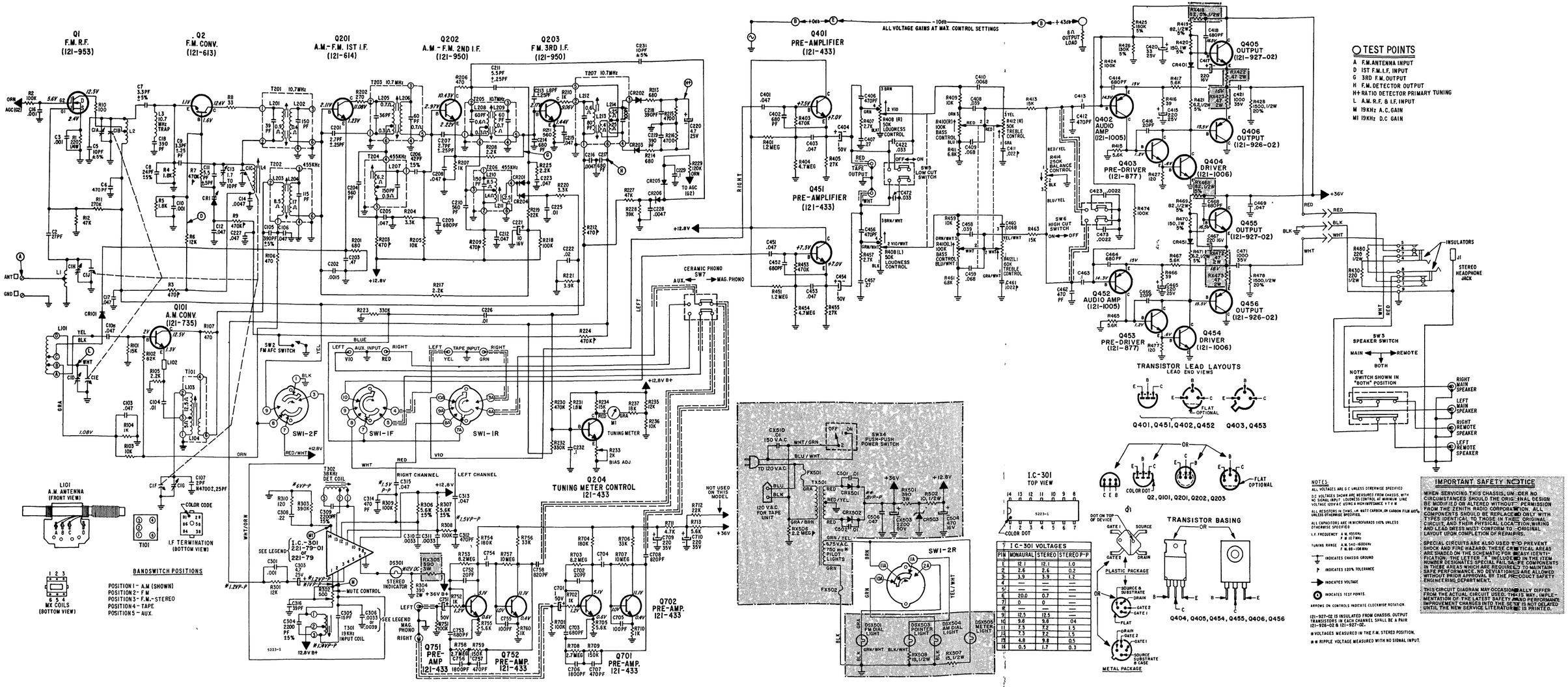
SHOWN IN FULL COUNTERCLOCKWISE POSITION
TUNING DRIVE-3WJR52Z

TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-953	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.
Q204	121-433	TUNING METER CONTROL
Q401		PRE-AMPLIFIER
Q402	121-1005	AUDIO AMPLIFIER
Q403	121-877	PRE-DRIVER
Q404	121-1006	DRIVER
Q405	121-927-02	OUTPUT
Q406	121-926-02	
Q451	121-433	PRE-AMPLIFIER
Q452	121-1005	AUDIO AMPLIFIER
Q453	121-877	PRE-DRIVER
Q454	121-1006	DRIVER
Q455	121-927-02	OUTPUT
Q456	121-926-02	
Q701	121-433	PRE-AMPLIFIER
Q702		
Q751		
Q752		
IC301	221-79-01 or 221-79	MULTIPLEX DEMODULATOR

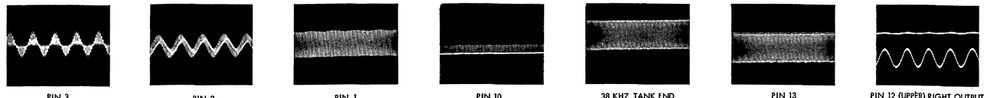
◯	TEST POINTS
A	F.M. ANTENNA INPUT
D	1st F.M. I.F. INPUT
G	3rd F.M. OUTPUT
H	F.M. DETECTOR OUTPUT
H+	RATIO DETECTOR PRIMARY TUNING
L	A.M. R.F. & I.F. INPUT
M	19 KHz A.C. GAIN
MI	19 KHz D.C. GAIN



CHASSIS 8WJR56 – CHASSIS LAYOUT



IC301 WAVEFORMS



PIN 3 COMPOSITE L&R, L-R (1 KHZ LEFT ONLY) 19 KHZ PILOT 10% 1 V P/P

PIN 2 19 KHZ (WITH L ONLY) 200 MV P/P

PIN 1 19 KHZ 1.2V P/P

PIN 10 38 KHZ PULSES 80MV P/P

38 KHZ TANK END 38 KHZ 13V P/P

PIN 13 38 KHZ 1.4 V P/P

PIN 12 (UPPER) RIGHT OUTPUT PIN 11 (LOWER) LEFT OUTPUT (L INPUT ONLY) 1 V P/P

CHASSIS 8WJR56

ITEM NO.	PART NO.	DESCRIPTION
C1A		F.M. DETECTOR TRIMMER
C1B		F.M. DETECTOR TUNING
C1C		F.M. OSCILLATOR TUNING
C1D		A.M. ANTENNA TRIMMER
C1E	22-7134	A.M. ANTENNA TUNING
C1F		A.M. OSCILLATOR TUNING
C1G		A.M. OSCILLATOR TRIMMER
C1H		F.M. ANTENNA TRIMMER
C1I		F.M. ANTENNA TUNING
C2	22-7622-20	27 PF DISC 50V
C3	22-2729	.001 MFD DISC 25V
C5	22-3675	10 PF DISC ±5% 500V
C6	22-5761	470 PF DISC 1000V
C7	22-3541	3.3 PF GIMMICK ±5% 500V
C8	22-7621-19	24 PF DISC ±5% 50V
C9	22-5879	3.3 PF DISC ±.25 PF 25V
C10	22-2729	.001 MFD DISC 25V
C11	22-5878	5.5 PF DISC ±0.5 PF 500V
C12	22-7615-10	.047 MFD DISC 50V
C13	22-4855	1.7 TO 10 PF CERAMIC TRIMMER
C14	22-7615-04	.0047 MFD DISC 50V
C16	22-2729	.001 MFD DISC 25V
C17	22-7615-10	.047 MFD DISC 50V
C18	22-3177	390 PF DISC 500V
C103	22-7615-10	.047 MFD DISC 50V
C104	22-7615-06	.01 MFD DISC 50V
C105	22-6972	390 PF ±5% POLYSTYRENE 125V
C106	22-7615-10	.047 MFD DISC 50V
C107	22-4819	2 PF N4700 ±.25 PF 500V
C108	22-7615-10	.047 MFD DISC 50V
C201	22-5660	2.7 PF DISC ±.25 PF 500V
C202	22-5483	.0015 MFD DISC 500V
C203	22-5487	.47 MFD DISC 3V
C204	22-5681	560 PF DISC 500V
C205	22-7615-10	.047 MFD DISC 50V
C206	22-7639-23	42 PF DISC ±5% 50V
C207	22-5660	2.7 PF DISC ±.25 PF 500V
C208	22-7615-10	.047 MFD DISC 50V
C209	22-5482	680 PF DISC 500V
C210	22-5481	560 PF DISC 500V
C211	22-3770	5.6 PF DISC ±.25 PF 500V
C212	22-7615-10	.047 MFD DISC 50V
C213	22-6225-19	1.8 PF DISC ±.25 PF 500V
C214	22-5482	680 PF DISC 500V
C215	22-7615-10	.047 MFD DISC 50V
C216	22-7615-04	.0047 MFD DISC 50V
C217	22-5482	680 PF DISC 500V
C218	22-3177	390 PF DISC 500V
C219	22-3177	390 PF DISC 500V
C220	22-7142-03	4.7 MFD ELECTROLYTIC 25V
C221	22-7151-04	10 MFD ELECTROLYTIC 16V
C222	22-5869	.02 MFD DISC 25V
C223	22-7615-10	.047 MFD DISC 50V
C225	22-7615-04	.01 MFD DISC 50V
C226	22-3393	.01 MFD DISC 25V
C227	22-7615-10	.047 MFD DISC 50V
C228	22-7615-04	.0047 MFD DISC 50V
C229	22-3652	1 MFD DISC 16V
C231	22-3675	10 PF DISC ±5% 500V
C232	22-3652	1 MFD DISC 10V
#C301	22-2729	.001 MFD DISC 25V
#C302	22-7142-03	4.7 MFD ELECTROLYTIC 25V
#C304	22-6782	2200 PF POLYSTYRENE ±5% 500V
#C305	22-3728	15 PF DISC 500V
#C306	22-7613-18	.0033 MFD DISC 500V (USED WITH 221-79-01) OR 22-6581 .0039 MFD DISC 500V (USED WITH 221-79)
#C308	22-3527	.22 MFD DISC 12V
#C309	22-6782	2200 PF POLYSTYRENE ±5% 500V
#C310	22-7613-18	.0033 MFD DISC 50V
#C311	22-7613-18	.0033 MFD DISC 50V
#C312	22-16	470 PF DISC 500V
#C313	22-7615-10	.047 MFD DISC 50V
#C314	22-16	470 PF DISC 500V
#C315	22-7615-10	.047 MFD DISC 50V
#C316	22-7641-22	39 PF ±5% DISC 50V
#C401	22-7615-10	.047 MFD DISC 50V
#C402	22-2939	680 PF DISC 500V
#C403	22-7615-10	.047 MFD DISC 50V
#C404	22-7153	1 MFD ELECTROLYTIC 50V
#C408	22-16	470 PF DISC 500V
#C407	22-6964	.27 MFD MYLAR 50V
#C408	22-7202	.039 MFD MYLAR 50V
#C409	22-6722	.068 MFD MYLAR 100V
#C410	22-7613-22	.0068 MFD DISC 50V
#C411	22-5814	.022 MFD MYLAR 20% 100V
#C412	22-16	470 PF DISC 500V
#C413	22-6905 ,	1 MFD MYLAR 10% 50V
#C414	22-2939	680 PF DISC 500V
#C415	22-7152-09	220 MFD ELECTROLYTIC 25V
#C416	22-2693	20 PF DISC ±5% 500V
#C417	22-7151-09	220 MFD ELECTROLYTIC 16V
#C418	22-2939	680 PF DISC 500V
#C419	22-7152-06	33 MFD ELECTROLYTIC 25V
#C421	22-7154-12	1000 MFD ELECTROLYTIC 35V
#C422	22-7601	.033 MFD MYLAR 50V
C423	22-7613-16	.0022 MFD DISC 50V
C451	22-7615-10	.047 MFD DISC 50V
C452	22-2939	680 PF DISC 500V
C453	22-7615-10	.047 MFD DISC 50V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C456	22-16	470 PF DISC 500V
C457	22-6964	.27 MFD MYLAR 50V
C458	22-7202	.039 MFD MYLAR 50V
C459	22-6722	.068 MFD MYLAR 100V
C460	22-7613-22	.0068 MFD DISC 50V
C461	22-5814	.022 MFD MYLAR 20% 100V
C462	22-16	470 PF DISC 500V
C463	22-6905	1 MFD MYLAR 10% 50V
C464	22-2939	680 PF DISC 500V
C465	22-7152-09	220 MFD ELECTROLYTIC 25V
C466	22-2693	20 PF DISC ±5% 500V
C467	22-7151-09	220 MFD ELECTROLYTIC 16V
C468	22-2939	680 PF DISC 500V
C469	22-7226	.047 MYLAR ±20% 100V
C470	22-7154-12	1000 MFD ELECTROLYTIC 35V
C472	22-7601	.033 MFD MYLAR 50V
C473	22-7613-16	.0022 MFD DISC 50V
C501	22-4905	.01 MFD DISC 500V
C502	22-4905	.01 MFD DISC 500V
#C503	22-2589	2200 MFD ELECTROLYTIC 50V
C504	22-7141-11	470 MFD ELECTROLYTIC 16V
C505	22-7326	.047 MFD MYLAR ±20% 100V
#CX510	22-7431-07	.01 MFD DISC 1500 VAC
C701	22-7153	1 MFD ELECTROLYTIC 50V
C702	22-2593	20 PFD DISC 500V
C703	22-2939	680 PFD DISC 500V
C704	22-6905	1 MFD MYLAR 50V
C705	22-3383	100 PFD DISC 500V
C706	22-7602	1800 PFD 50V
C707	22-6761	470 PFD 1000V
C708	22-3412	820 PFD DISC 500V
C709	22-7154-09	220 MFD ELECTROLYTIC 25V
C710	22-7154-09	220 MFD ELECTROLYTIC 35V
C751	22-7153	1 MFD ELECTROLYTIC 50V
C752	22-2593	20 PFD DISC 500V
C753	22-2939	680 PFD DISC 500V

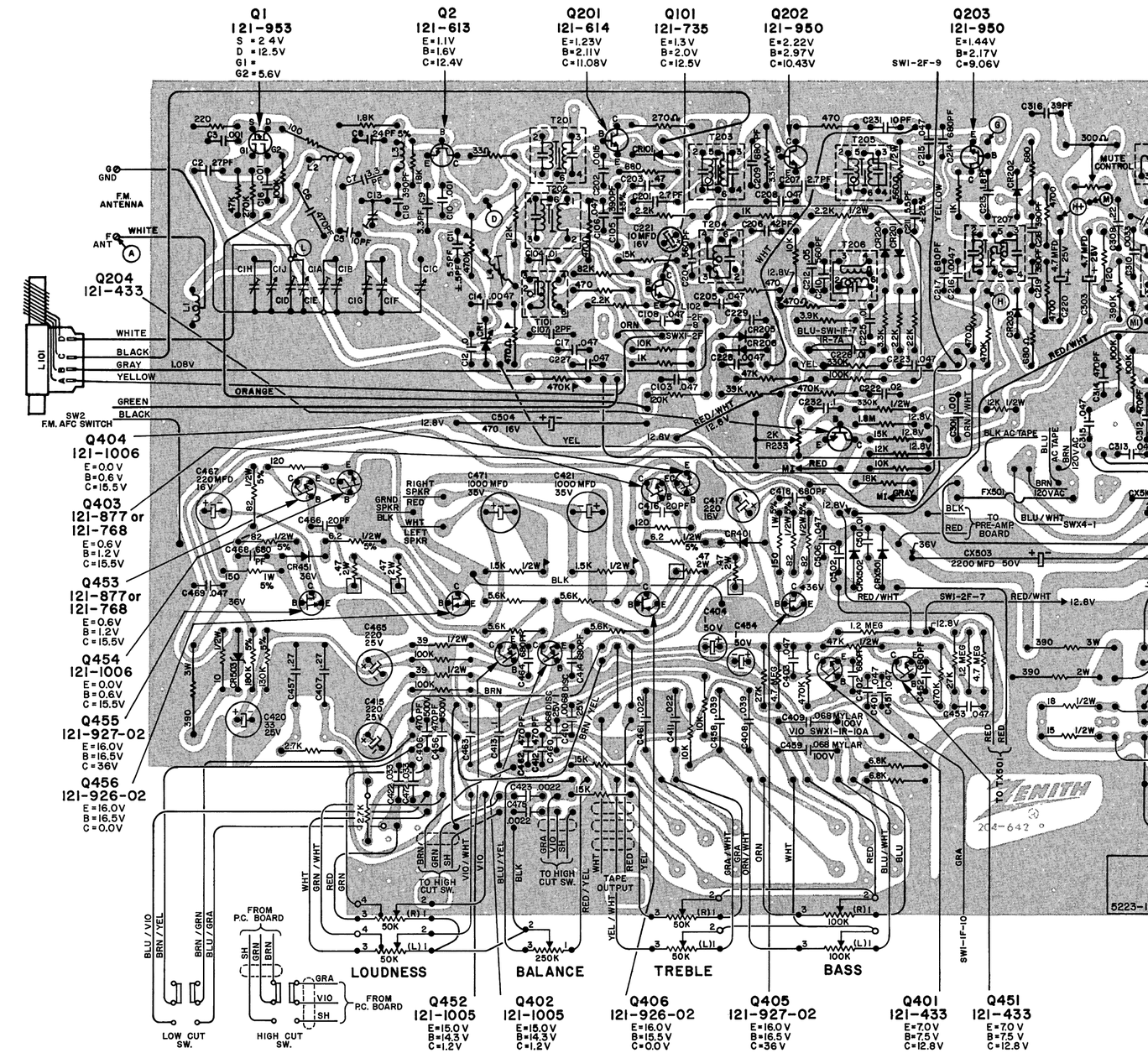
ITEM NO.	PART NO.	DESCRIPTION
C754	22-6905	1 MFD MYLAR 50V
C755	22-3383	100 PFD DISC 500V
C756	22-7602	1800 PFD 50V
C757	22-6761	470 PFD 1000V
C758	22-3412	820 PFD DISC 500V
R1	63-9921-56	220 OHM 5%
R2	63-9922-20	100K OHM 5%
R3	63-9921-64	470 OHM 5%
R4	63-9921-78	1.8 OHM 5%
R5	63-9921-72	1K OHM 5%
R6	63-9921-98	12K OHM 5%
R7	63-9922-36	470K OHM 5%
R8	63-9921-38	33 OHM 5%
R9	63-9922-38	470K OHM 5%
R10	63-4142	100 OHM 1/4W 5%
R11	63-9922-30	270K OHM 5%
R12	63-9922-12	47K OHM 5%
R101	63-9922-00	15K OHM 5%
R102	63-9922-18	82K OHM 5%
R103	63-9921-96	10K OHM 5%
R104	63-9921-72	1K OHM 5%
R105	63-9921-80	2.2K OHM 5%
R106	63-9921-64	470 OHM 5%
R107	63-9921-64	470 OHM 5%
R201	63-9921-68	680 OHM 5%
R202	63-9921-68	270 OHM 5%
R203	63-9921-64	470 OHM 5%
R204	63-9921-82	3.3K OHM 5%
R205	63-9921-96	10K OHM 5%
R206	63-9921-64	470 OHM 5%
R207	63-9921-72	1K OHM 5%
R208	63-9921-80	2.2K OHM 5%
R209	63-9921-64	470 OHM 5%
R210	63-9921-72	1K OHM 5%
R211	63-9921-68	680 OHM 1/4W 5%
R212	63-9921-64	470 OHM 5%
R213	63-9921-68	680 OHM 5%
R214	63-9921-68	680 OHM 5%
R215	63-9921-88	4700 OHM 5%
R216	63-9921-88	4700 OHM 5%
R217	63-9921-80	2.2K OHM 5%
R218	63-9922-20	100K OHM 5%
R219	63-9922-04	22K OHM 5%
R220	63-9921-64	3.3K OHM 5%
R221	63-1810	3.8K OHM 5%
R223	63-9922-32	330K OHM 5%
R224	63-9922-38	470K OHM 5%
R225	63-9921-80	2.2K OHM 5%
R227	63-9922-12	47K OHM 5%
R228	63-9922-10	39K OHM 5%
R229	63-9922-32	330K OHM 5%
R230	63-9922-38	470K OHM 5%
R231	63-9924-50	1.8 MEG OHM 10%
R232	63-9922-32	330K OHM 5%
R233	63-9250	2K OHM METER CONTROL
R234	63-9922-00	15K OHM 5%
R235	63-9921-98	12K OHM 5%
R236	63-9921-96	10K OHM 5%
R237	63-9922-02	18K OHM 5%
R301	63-1831	12K OHM 1/2W 10%
R302	63-9697-26	500 OHM MUTE CONTROL (ALT 63-9261 1/4W 20%) OR 103-189
R303	63-9922-34	390K OHM 5%
R304	63-1458	390 OHM 2W
#RX305	63-1043-08	280 OHM 2W
R308	63-9921-90	5.6K OHM ±5%
R307	63-9921-90	5.6K OHM ±5%
R308	63-9922-20	100K OHM 5%
R309	63-9922-20	100K OHM 5%
R310	63-4147	120 OHM 1/4W
R401	63-9922-46	1.2 MEG OHM ±5%
R403	63-9922-36	470K OHM 5%
R404	63-9924-60	4.7 MEG OHM 10%
R405	63-9922-00	27K OHM 5%
R407	63-9921-82	2.7K OHM 5%
R408R	63-10189-03	50K DUAL LOUDNESS CONTROL (ALT 63-10189-01)
R408L		
R409	63-9921-96	10K OHM 5%
R410R	63-8982-03	50K DUAL BASS CONTROL (ALT 63-8982-01)
R410L		
R411	63-9921-92	8.2K OHM 5%
R412R	63-8983-03	50K DUAL TREBLE CONTROL (ALT 63-8983-01)
R412L		
R413	63-9922-00	15K OHM 5%
R414	63-8981-03	250K BALANCE CONTROL (ALT 63-8981-01)
R415	63-9921-90	5.6K OHM 5%
R416	63-1729	39 OHM
R417	63-9921-90	5.6K OHM 5%
#RX418	63-9946-48	82 OHM 5% 1/2W
R419	63-9946-48	82 OHM 5% 1/2W
R420	63-6036	150 OHM 5% 1W
R421	63-9946-19	4.2 OHM 5% 1/2W
#RX422	63-9784	.47 OHM 2W
#RX423	63-9784	.47 OHM 2W
R424	63-9922-20	100K OHM 5%
R425	63-9922-28	180K OHM ±5%
R426	63-9922-23	130K OHM 5%
R427	63-9921-60	120 OHM 5%
R428	63-9946-76	1500 OHM 5%
R430	63-1757	220 OHM
R451	63-9922-46	1.2 MEG OHM 5%
R453	63-9922-36	470K OHM 5%
R454	63-9924-60	4.7 MEG OHM 10%
R455	63-9922-04	22K OHM 5%
R457	63-9921-82	2.7K OHM 5%
R459	63-9921-96	10K OHM 5%
R461	63-9921-92	8.8K OHM 5%
R463	63-9922-00	15K OHM 5%
R464	63-9921-90	5.6K OHM 5%
R466	63-9921-38	39 OHM
R467	63-9921-90	5.6K OHM 5%
#RX468	63-9946-42	22 OHM 5%
R469	63-9946-48	82 OHM 5%
R470	63-6036	150 OHM 1W 5%
R471	63-9946-19	4.2 OHM 5% 1/2W
#RX472	63-9784	.47 OHM 2W
#RX473	63-9784	.47 OHM 2W
R474	63-9922-20	100K OHM 5%
R477	63-9921-60	120 OHM 5%
R478	63-9946-76	1500 OHM ±5%
R480	63-1757	220 OHM 1/2W
#RX501	63-10450-06	350 OHM 3W
#R502	63-9946-24	10 OHM 5% 1/2W
#RX503	63-10025-01	2.2 MEG OHM ±20%
#RX507	63-9946-28	16 OHM 5% 1/2W
#RX508	63-9946-30	18 OHM
R701	63-9922-20	100K OHM
R702	63-9921-72	1K OHM
R703	63-7949	8.2 MEG OHM 1/2W
R704	63-9922-28	180K OHM
R705	63-9921-90	5.6K OHM
R706	63-9922-08	33K OHM
R707	63-7952	10 MEG OHM
R708	63-9922-64	2.7 MEG OHM

ITEM NO.	PART NO.	DESCRIPTION
R709	63-9922-24	150K OHM
R710	63-9921-72	1K OHM
R711	63-9921-88	4.7K OHM
R712	63-9922-04	22K OHM
R713	63-9921-90	5.6K OHM
R751	63-9922-20	100K OHM
R752	63-9921-72	1K OHM
R753	63-7949	8.2 MEG OHM 1/2W
R754	63-9922-26	180K OHM
R755	63-9921-90	5.6K OHM
R756	63-9922-08	33K OHM
R757	63-7952	10 MEG OHM
R758	63-9922-54	2.7 MEG OHM
R759	63-9922-24	150K OHM
R760	63-9921-72	1K OHM
L1	20-3684	FM ANTENNA COIL
L2	20-3685	FM RF COIL
L3	20-1631	TRAP COIL 10.7 MHz
L4	20-3597	FM OSCILLATOR COIL
L101	5-93292-01	AM ANTENNA ASSEMBLY
L102	148-315	FERRITE CORE SLEEVE
L103	IN T101	AM OSCILLATOR TRANS. PRI.
L104	IN T101	AM OSCILLATOR TRANS. SEC.
L201	IN T201	1ST IF TRANSFORMER 10.7 MHz PRI.
L202	IN T201	1ST IF TRANSFORMER 10.7 MHz SEC.
L203	IN T202	1ST IF AM 455 KHz PRI.
L204	IN T202	1ST IF 455 KHz SEC.
L205	IN T203	2ND IF TRANSFORMER 10.7 MHz PRI.
L206	IN T203	2ND IF TRANSFORMER 10.7 MHz SEC.
L207	IN T204	2ND IF AM 455 KHz
L208	IN T205	3RD IF TRANSFORMER 10.7 MHz PRI.
L209	IN T205	3RD IF TRANSFORMER 10.7 MHz SEC.
L210	IN T206	3RD IF AM 455 KHz PRI.
L211	IN T206	3RD IF AM 455 KHz SEC.
L212	IN T207	RATIO DETECTOR TRANS. 10.7 MHz PRI.
L213	IN T207	RATIO DETECTOR TRANS. 10.7 MHz TERTIARY
L214	IN T207	RATIO DETECTOR TRANS. 10.7 MHz SEC.
T101	95-3271	AM OSCILLATOR TRANSFORMER
T201	95-2546	FM 1ST TRANSFORMER 10.7 MHz
T202	95-2561	AM 1ST IF AM 455 KHz
T203	95-2547	FM 2ND IF TRANSFORMER 10.7 MHz
T204	95-2562	AM 2ND IF AM 455 KHz
T205	95-2548	FM 3RD IF TRANSFORMER 10.7 MHz
T206	95-2549	AM 3RD IF AM 455 KHz
T207	95-2545	FM RATIO DETECTOR 10.7 MHz
T301	95-3248	INPUT COIL 19 KHz
T302	95-3023	DETECTOR COIL 38 KHz
#TX951	95-5174-01	POWER TRANSFORMER
SW1	85-1441	BAND SWITCH
SW2	85-1437-01	AFC SWITCH (SLIDE SP-DT) PREFERRED OR 85-1372-01 ALTERNATE
SW3	85-1498	SPEAKER SWITCH (DP-3T)
#SW4	85-1448-01	PUSH-PUSH POWER SWITCH
SW5	85-1515-01	LOW CUT FILTER (DP-DT)
SW6	85-1515-01	HIGH CUT FILTER (DP-DT)
SW7	85-1516	MAGNETIC CERAMIC PHONO SWITCH
CR1	103-47-01 OR 103-189	AFC DIODE
CR101	103-142	SILICON DIODE
CR201	103-23-01	GERMANIUM DIODE
CR202	103-90	GERMANIUM DIODES (MATCHED PAIR)
CR203	103-90	
CR204	103-23-01	GERMANIUM DIODE
CR205	103-23-01	GERMANIUM DIODE
CR206	103-23-01	GERMANIUM DIODE
CR401	103-222-01	SILICON DIODE
CR451	103-222-01	SILICON DIODE
#CR3501	212-76	SILICON RECTIFIER
#CR3502	212-76	SILICON RECTIFIER
CR503	103-98	DIODE (ZENER)
I.C.-301	221-79-01 OR 221-79	MONOLITHIC MULTIPLEX DEMODULATOR (SEE C306)
DS301	100-611	STEREO INDICATOR LIGHT
#DSX501	100-606	FM DIAL LIGHT
#DSX502	100-606	POINTER LIGHT
#DSX504	100-606	AM DIAL LIGHT
#DSX505	100-610	PILOT AND METER LIGHT
PC	204-642	CIRCUIT BOARD
#FX501	136-17-17	.75 AMP SLO-BLO FUSE
#FX502	136-14-20	1 AMP SLO-BLO FUSE
MI	122-65	TUNING METER
Q1	121-953	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	121-950	F.M. 3RD I.F.
Q204	121-433	TUNING METER CONTROL
Q401	121-433	PRE AMPLIFIER
Q402	121-1005	AUDIO AMPLIFIER
Q403	121-877 OR 121-768	PRE DRIVER
Q404	121-1006	DRIVER
Q405	121-927-02	AUDIO OUTPUT
Q406	121-926-02	AUDIO OUTPUT
Q451	121-433	PRE AMPLIFIER
Q452	121-1005	AUDIO AMPLIFIER
Q453	121-877 OR 121-768	PRE DRIVER
Q454	121-1006	DRIVER
Q455	121-927-02	AUDIO OUTPUT
Q456	121-926-02	AUDIO OUTPUT
Q701	121-433	PRE AMPLIFIER
Q702	121-433	PRE AMPLIFIER
Q751	121-433	PRE AMPLIFIER
Q752	121-433	PRE AMPLIFIER

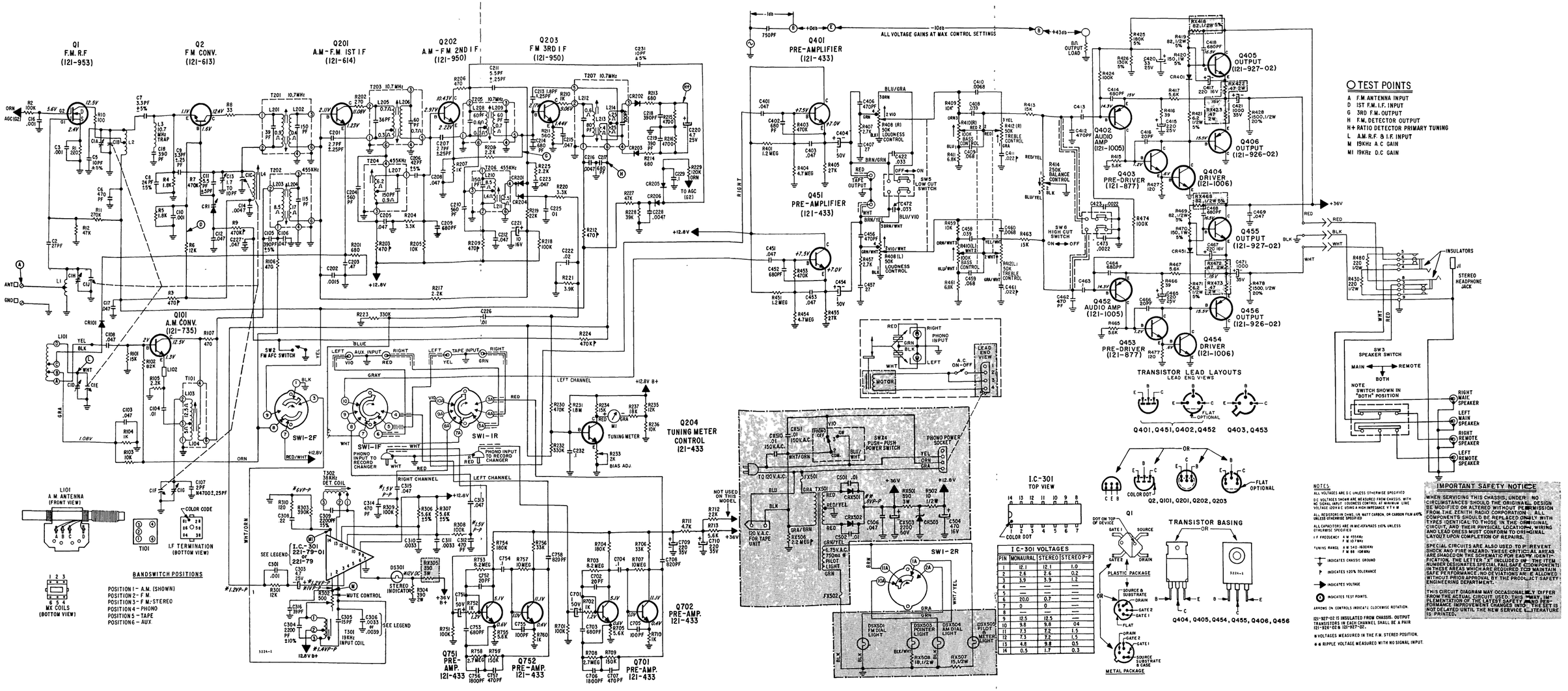
#CRITICAL CIRCUIT COMPONENT

5223-2

MAGNETIC PREAMP CIRCUIT BOARD
DRAWING APPEARS ON PAGE 77



CHASSIS 8WJR56 —
CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE



IC301 WAVEFORMS

PIN 3 COMPOSITE L&R, L-R (1 KHZ LEFT ONLY) 19 KHZ PILOT 10% 1 V P/P

PIN 2 19 KHZ (WITH L ONLY) 200 MV P/P

PIN 1 19 KHZ 1.2 V P/P

PIN 10 38 KHZ PULSES 80MV P/P

38 KHZ TANK END 38 KHZ 13 V P/P

PIN 13 38 KHZ 1.4 V P/P

PIN 12 (UPPER) RIGHT OUTPUT PIN 11 (LOWER) LEFT OUTPUT (L INPUT ONLY) 1 V P/P

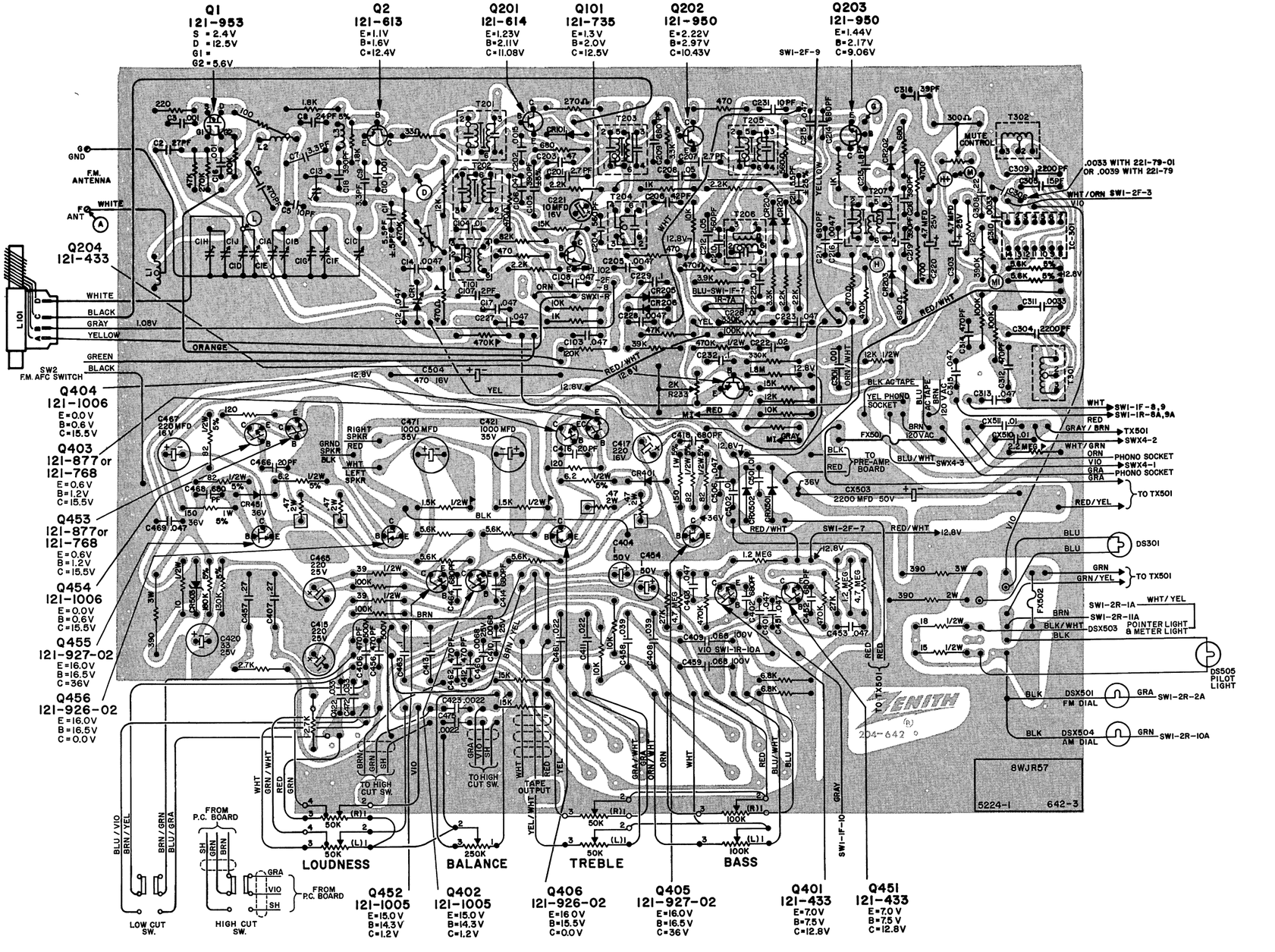
CHASSIS 8WJR57

ITEM NO.	PART NO.	DESCRIPTION
■C1A		F.M. DETECTOR TRIMMER
■C1B		F.M. DETECTOR TUNING
■C1C		F.M. OSCILLATOR TUNING
■C1D		A.M. ANTENNA TRIMMER
■C1E	22-7134	A.M. ANTENNA TUNING
■C1F		A.M. OSCILLATOR TUNING
■C1G		A.M. OSCILLATOR TRIMMER
■C1H		F.M. ANTENNA TRIMMER
■C1J		F.M. ANTENNA TUNING
■C2	22-2396	27 PF DISC 500V
■C3	22-2729	.001 MFD DISC 25V
C5	23-3675	10 PF DISC ±5% 500V
■C6	22-6761	470 PF 1000V
■C7	22-3641	3.3 PF GIMMICK ±5% 500V
C8	22-2815	24 PF DISC ±5% 500V
C9	22-6879	3.3 PF DISC ± .25 PF 25V
■C10	22-2729	.001 MFD DISC 25V
C11	22-6878	5.5 PF DISC ±0.5 PF 500V
C12	22-7615-10	.047 MFD DISC 50V
C13	22-4095	1.7 TO 10 PF CERAMIC TRIMMER
C14	22-7615-04	.0047 MFD DISC 50V
C16	22-2729	.001 MFD DISC 25V
C17	22-7615-10	.047 MFD DISC 50V
C18	23-3177	390PF DISC 500V
C103	22-7615-10	.047 MFD DISC 50V
C104	22-7615-06	.01 MFD DISC 50V
C105	22-5972	390 PF ±5% POLYSTYRENE 125V
C106	22-7615-10	.047 MFD DISC 50V
C107	22-4819	2 PF NH750 ±.25 PF 500V
C108	22-7615-10	.047 MFD DISC 50V
C201	22-5660	2.7 PF DISC ±.25 PF 500V
C202	22-5483	.0015 MFD DISC 500V
C203	22-5487	.47 MFD DISC 3V
C204	22-5481	560 PF DISC 500V
C205	22-7615-10	.047 MFD DISC 50V
C206	22-3791	42 PF DISC ±5% 500V
C207	22-5660	2.7 PF DISC ±.25 PF 500V
C208	22-7615-10	.047 MFD DISC 50V
C209	22-5482	680 PF DISC 500V
C210	22-5481	560 PF DISC 500V
C211	22-3770	5.5 PF DISC ±.25 PF 500V
C212	22-7615-10	.047 MFD DISC 50V
C213	22-4529-19	1.8 PF DISC ±.25 PF 500V
C214	22-5482	680 PF DISC 500V
C215	22-7615-10	.047 MFD DISC 50V
C216	22-7615-04	.0047 MFD DISC 50V
C217	22-5482	680 PF DISC 500V
C218	23-3177	390 PF DISC 500V
C219	23-3177	390 PF DISC 500V
C220	22-7142-03	10 MFD ELECTROLYTIC 25V
C221	22-7161-04	10 MFD ELECTROLYTIC 16V
C222	22-6089	.02 MFD DISC 25V
C223	22-7615-10	.047 MFD DISC 50V
C225	22-7615-06	.01 MFD DISC 50V
C226	22-3393	.01 MFD DISC 25V
C227	22-7615-10	.047 MFD DISC 50V
C228	22-7615-04	.0047 MFD DISC 50V
C229	22-3652	1 MFD DISC 10V
C231	22-3676	10 PF DISC ±5% 500V
C232	22-3652	1 MFD DISC 10V
C301	22-2729	.001 MFD DISC 25V
◄C303	22-7142-03	4.7 MFD ELECTROLYTIC 25V
◄C304	22-6762	2200 PF POLYSTYRENE ±5% 500V
■C305	22-3728	15 PF DISC 500V
◄C306	22-7613-18	.0033 MFD DISC 50V (TO BE USED WITH 221-79-01)
	OR	
	22-6581	.0039 MFD DISC 500V (TO BE USED WITH 221-79)
■C308	22-3527	.22 MFD DISC 12V
■C309	22-5782	2200 PF POLYSTYRENE ±5% 500V
■C310	22-7613-18	.0033 MFD DISC 50V
■C311	22-7613-18	.0033 MFD DISC 50V
■C312	22-16	470 PF DISC 500V
■C313	22-7615-10	.047 MFD DISC 50V
■C314	22-16	470 PF DISC 500V
■C315	22-7615-10	.047 MFD DISC 50V
■C316	22-3381	39 PF ±5% DISC 500V
C401	22-7615-10	.047 MFD DISC 50V
C402	22-2939	680 PF DISC 500V
C403	22-7615-10	.047 MFD DISC 50V
C404	22-7153	1 MFD ELECTROLYTIC 50V
C406	22-16	470 PF DISC 500V
C407	22-6964	.27 MFD MYLAR 50V
C408	22-7202	.039 MFD MYLAR 50V
C409	22-5722	.068 MFD MYLAR 100V
C410	22-7613-22	.0068 MFD DISC 50V
C411	22-5814	.022 MFD MYLAR 20% 100V
C412	22-16	470 PF DISC 500V
C413	22-6905	1 MFD MYLAR 10% 50V
C414	22-2939	680 PF DISC 500V
C415	22-7152-09	220 MFD ELECTROLYTIC 25V
C416	22-2693	20 PF DISC 5% 500V
C417	22-7151-09	220 MFD ELECTROLYTIC 16V
C418	22-2939	680 PF DISC 500V
C419	22-7152-06	33 MFD ELECTROLYTIC 25V
C420	22-7154-12	1000 MFD ELECTROLYTIC 35V
C421	22-7601	.033 MFD MYLAR 50V
C423	22-7613-16	.0022 MFD DISC 50V
C451	22-7615-10	.047 MFD DISC 50V
C452	22-2939	680 PF DISC 500V
C453	22-7615-10	.047 MFD DISC 50V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C456	22-16	470 PF DISC 500V
C457	22-6964	.27 MFD MYLAR 50V
C458	22-7202	.039 MFD MYLAR 50V
C459	22-5722	.068 MFD MYLAR 100V
C460	22-7613-22	.0068 MFD DISC 50V
C461	22-6814	.022 MFD MYLAR 20% 100V
C462	22-16	470 PF DISC 25V
C463	22-6905	1 MFD MYLAR 10% 50V
C464	22-2939	680 PF DISC 500V
C465	22-7152-09	220 MFD ELECTROLYTIC 25V
C466	22-2693	20 PF DISC 5% 500V
C467	22-7151-09	220 MFD ELECTROLYTIC 16V
C468	22-2939	680 PF DISC 500V
C469	22-7326	.047 MYLAR ±20% 100V
C470	22-7154-12	1000 MFD ELECTROLYTIC 35V
C472	22-7601	.033 MFD MYLAR 50V
C473	22-7613-16	.0022 MFD DISC 50V
C501	22-4905	.01 MFD DISC 500V
C502	22-4905	.01 MFD DISC 500V
C503A	22-7585	2200 MFD ELECTROLYTIC 50V
C504	22-7141-11	470 MFD ELECTROLYTIC 16V
C506	22-7326	.047 MFD MYLAR ±20% 100V
C510K	22-7831-07	.01 MFD DISC 150 VAC
C511K	22-7431-07	.01 MFD DISC 150 VAC
C701	22-7153	1 MFD ELECTROLYTIC 50V
C702	22-2693	20 PFD DISC 500V
C703	22-2939	680 PFD DISC 500V
C704	22-6905	1 MFD MYLAR 50V
C705	22-5383	100 PFD DISC 500V
C706	22-7602	1800 PFD MYLAR 50V
C707	22-6761	470 PFD DISC 1000V
C708	22-3412	820 PFD DISC 500V
C709	22-7154-09	220 MFD ELECTROLYTIC 35V
C710	22-7154-09	220 MFD ELECTROLYTIC 35V
C751	22-7153	1 MFD ELECTROLYTIC 50V
C752	22-2693	20 PFD DISC 500V
C753	22-2939	680 PFD DISC 500V
C754	22-6905	.1 MFD MYLAR 50V
C755	22-5383	100 PFD DISC 500V
C756	22-7602	1800 PFD MYLAR 50V
C757	22-6761	470 PFD DISC 1000V

ITEM NO.	PART NO.	DESCRIPTION
C758	22-3412	820 PFD DISC 500V
R1	63-9921-56	220 OHM 5%
R2	63-9923-25	100K OHM 5%
R3	63-9921-64	470 OHM 5%
R4	63-9921-78	1.8K OHM 5%
R5	63-9921-78	1.8K OHM 5%
R6	63-9921-88	12K OHM 5%
R7	63-9922-36	470K OHM 5%
R8	63-9921-56	33 OHM 5%
R9	63-9922-36	470K OHM 5%
R10	63-4142	100 OHM 1/4W 5%
R11	63-9922-36	470K OHM 5%
R12	63-9922-12	47K OHM 5%
R101	63-9922-00	15K OHM 5%
R102	63-9922-18	82K OHM 5%
R103	63-9921-96	10K OHM 5%
R104	63-9921-72	1K OHM 5%
R105	63-9921-80	2.2K OHM 5%
R106	63-9921-64	470 OHM 5%
R107	63-9921-64	470 OHM 5%
R201	63-9921-68	680 OHM 5%
R202	63-9921-56	220 OHM 5%
R203	63-9921-64	470 OHM 5%
R204	63-9921-80	2.2K OHM 5%
R205	63-9921-96	10K OHM 5%
R206	63-9922-44	220K OHM 5%
R207	63-9921-72	1K OHM 5%
R208	63-9921-80	2.2K OHM 1/2W
R209	63-9921-64	470 OHM 5%
R210	63-9921-72	1K OHM 5%
R211	63-9921-60	560 OHM 1/4W
R212	63-9921-64	470 OHM 5%
R213	63-9921-68	680 OHM 5%
R214	63-9921-68	680 OHM 5%
R216	63-9921-68	4700 OHM 5%
R217	63-9921-80	2.2K OHM 5%
R218	63-9922-36	470K OHM 5%
R219	63-9922-04	22K OHM 5%
R220	63-9921-64	3.3K OHM 5%
R221	63-9921-86	3.9K OHM 1/2W
R223	63-9922-32	330K OHM 1/2W
R224	63-9922-36	470K OHM 5%
R225	63-9921-80	2.2K OHM 5%
R227	63-9922-12	47K OHM 5%
R228	63-9922-10	39K OHM 5%
R229	63-9922-32	330K OHM 5%
R230	63-9922-36	470K OHM
R231	63-9924-60	1.8 MEG OHM 10%
R232	63-9922-32	330K OHM 5%
R233	63-9250	2K OHM METER CONTROL
R234	63-9922-04	22K OHM 5%
R235	63-9921-88	12K OHM 5%
R236	63-9921-96	10K OHM 5%
R237	63-9922-02	18K OHM 5%
R301	63-1831	12K OHM 1/2W 10%
R302	63-9697-26	500 OHM MUTE CONTROL (ALT 63-9261)
R303	63-9922-34	390K OHM 5%
R304	63-1468	390 OHM 2W
R305B	63-9922-28	220K OHM 5%
R306	63-9921-90	5.6K OHM 5%
R307	63-9921-90	5.6K OHM 5%
R308	63-9922-20	100K OHM 5%
R309	63-9922-20	100K OHM 5%
R310	63-4147	120 OHM 1/4W
R401	63-9922-48	1.2 MEG OHM 5%
R403	63-9922-38	470K OHM 5%
R404	63-9924-60	4.7 MEG OHM 10%
R405	63-9922-06	27K OHM 5%
R407	63-9921-82	2.7K OHM 5%
R408R	63-10199-03	50K DUAL LOUDNESS CONTROL (ALT 63-10189-01)
R408L		
R409	63-9921-96	10K OHM 5%
R410R	63-8982-03	100K DUAL BASS CONTROL
R410L		(ALT 63-8982-01)
R411	63-9921-62	6.8K OHM 5%
R412R	63-8983-03	50K DUAL TREBLE CONTROL
R412L		(ALT 63-8983-01)
R413	63-9922-00	15K OHM 5%
R414	63-8981-03	250K BALANCE CONTROL (ALT 63-8981-01)
R415	63-9921-90	5.6K OHM 5%
R416	63-9921-38	39 OHM
R417	63-9921-90	5.6K OHM 5%
RX418	63-9946-80	62 OHM 5% 1/2W
R419	63-9946-46	82 OHM 5% 1/2W
R420	63-9036	150 OHM 5% 1/2W
R421	63-9946-19	6.2 OHM 5% 1/2W
RX422*	63-9788	.33 MFD ELECTROLYTIC 25V
RX423*	63-9784	.47 OHM 2W
R424	63-9922-20	100K OHM 5%
R425	63-9922-26	180K OHM ±5%
R426	63-9922-23	130K OHM ±5%
R427	63-9921-90	120 OHM 5%
R428	63-9946-76	1500 OHM ±5%
R430	63-1757	220 OHM
R451	63-9922-46	1.2 MEG OHM 5%
R453	63-9922-38	470K OHM 5%
R454	63-9924-60	4.7 MEG OHM 10%
R456	63-9922-06	27K OHM 5%
R459	63-9921-96	10K OHM 5%
R460	63-9921-90	5.6K OHM 5%
R461	63-9946-46	82 OHM 5% 1/2W
R470	63-9036	150 OHM 5% 1W
R471	63-9946-19	6.2 OHM 5% 1/2W
RX472*	63-9784	.47 OHM 2W
RX473*	63-9784	.47 OHM2W
R474	63-9922-20	100K OHM 5%
R475	63-9921-50	120 OHM 5%
R476	63-9946-76	1500 OHM 5%
R480	63-1757	220 OHM 1/2W
RX501*	63-10130-90	300 OHM 3W
R502	63-9946-24	10 OHM 5% 1/2W
R506	63-10697-01	2.2 MEG OHM ±20%
RX507*	63-9946-28	15 OHM 5% 1/2W

ITEM NO.	PART NO.	DESCRIPTION
RX508*	63-9946-30	18 OHM
R701	63-9922-20	100K OHM
R702	63-9921-72	1K OHM
R703	63-7949	8.2 MEG OHM 1/2W
R704	63-9922-28	180K OHM
R705	63-9921-90	5.6K OHM
R706	63-9922-08	33K OHM
R707	63-7952	10 MEG OHM
R708	63-9922-54	2.7 MEG OHM
R709	63-9922-24	150K OHM
R713	63-9921-90	5.6K OHM
R751	63-9921-72	1K OHM
R752	63-9921-72	1K OHM
R753	63-7949	8.2 MEG OHM 1/2W
R754	63-9922-28	180K OHM
R755	63-9921-90	5.6K OHM
R756	63-9922-08	33K OHM
R757	63-7952	10 MEG OHM
R758	63-9922-54	2.7 MEG OHM
R759	63-9922-24	150K OHM
R760	63-9921-72	1K OHM
L1	20-3664	FM ANTENNA COIL
L2	20-3665	FM RF COIL
L3	20-1631	TRAP COIL 10.7 MHz
L4	20-3697	FM OSCILLATOR COIL
L101	5-83292-01	AM ANTENNA ASSEMBLY
L102	148-311	FERRITE CORE SLEEVE
L103	IN T101	AM OSCILLATOR TRANS. PRI.
L104	IN T101	AM OSCILLATOR TRANS. SEC.
L201	IN T201	1ST I.F TRANSFORMER 10.7 MHz PRI.
L202	IN T201	1ST I.F TRANSFORMER 10.7 MHz SEC.
L203	IN T202	1ST I.F IM 455 KHz PRI.
L204	IN T202	1ST I.F 455 KHz SEC.
L205	IN T203	2ND I.F TRANSFORMER 10.7 MHz PRI.
L206	IN T203	2ND I.F TRANSFORMER 10.7 MHz SEC.
L207	IN T204	2ND I.F AM 455 KHz
L208	IN T205	3RD I.F TRANSFORMER 10.7 MHz PRI.
L209	IN T205	3RD I.F TRANSFORMER 10.7 MHz SEC.
L210	IN T206	3RD I.F AM 455 KHz PRI.
L211	IN T206	3RD I.F AM 455 KHz SEC.
L212	IN T207	RATIO DETECTOR TRANS. 10.7 MHz PRI.
L213	IN T207	RATIO DETECTOR TRANS. 10.7 MHz TERTIARY
L214	IN T207	RATIO DETECTOR TRANS. 10.7 MHz SEC.
T101	95-3271	AM OSCILLATOR TRANSFORMER
T201	95-2546	FM 1ST TRANSFORMER 10.7 MHz
T202	95-2541	AM 1ST I.F AM 455 KHz
T203	95-2547	FM 2ND I.F TRANSFORMER 10.7 MHz
T204	95-2542	AM 2ND I.F AM 455 KHz
T205	95-2548	FM 3RD I.F TRANSFORMER 10.7 MHz
T206	95-2869	AM 3RD I.F AM 455 KHz
T207	95-2545	FM RATIO DETECTOR 10.7 MHz
T301	95-3248	INPUT COIL 19 KHz
T302	95-3023	DETECTOR COIL 38 KHz
TX201*	96-3174-01	POWER TRANSFORMER
SW1	85-1442	BAND SWITCH
SW2	85-1437-01	F.M. AFC SWITCH (SLIDE SP-DT) PREFERRED
	OR	
	85-1372-01	ALTERNATE
SW3	85-1498	SPEAKER SWITCH (DP-3T)
SWX4*	85-1446-01	PUSH-PUSH POWER SWITCH
SWS	85-1615-01	LOW CUT F.I.TER
SWS	85-1615-01	HIGH CUT FILTER
J1	78-2137-01	STEREO HEADPHONE JACK
CR1	109-47-01	
	OR	A.F.C DIODE
	109-189	
CR101	103-142-01	SILICON DIODE
CR201	103-23-01	GERMANIUM DIODE
CR202	103-90	GERMANIUM DIODES (MATCHED PAIR)
CR203	109-90	
CR204	103-23-01	GERMANIUM DIODE
CR205	103-23-01	GERMANIUM DIODE
CR206	103-23-01	GERMANIUM DIODE
CR401	103-222-01	SILICON DIODE
CR451	103-222-01	SILICON DIODE
CRX501*	212-79	SILICON RECTIFIER
CRX502*	212-79	SILICON RECTIFIER
CR503	103-96	DIODE (ZENER)
IC-301	221-79-01	MONOLITHIC MULTIPLEX
	OR	
	221-79-1	DEMODULATOR (SEE C306)
DS301	100-611	STEREO INDICATOR LIGHT
DSX501*	100-604	FM DIAL LIGHT
DSX503*	100-633	POINTER LIGHT
DSX504*	100-604	AM DIAL LIGHT
DSX505*	100-634	PILOT AND METER LIGHT
PC	204-642	CIRCUIT BOARD
FX501*	136-117-47	.75 AMP SLO-BLOW FUSE
FX502*	136-116-20	2 AMP REGULAR FUSE
M1	122-85	TUNING METER
Q1	121-953	F.M. R.F. F.E.T
Q2	121-613	F.M. CONVERTER N.P.N.
Q101	121-735	A.M. CONVERTER N.P.N.
Q201	121-614	A.M. F.M. 1ST I.F. N.P.N.
Q202	121-950	A.M. F.M. 2ND I.F. N.P.N.
Q203	121-950	F.M. 3RD I.F. N.P.N.
Q204	121-433	TUNING METER CONTROL N.P.N.
Q401	121-433	PRE AMPLIFIER N.P.N.
Q402	121-1005	AUDIO AMPLIFIER P.N.P.
Q403	121-877	PRE DRIVER N.P.N.
	OR	
	121-768	
Q404	121-1006	DRIVER N.P.N.
Q405	121-927-02	AUDIO OUTPUT N.P.N.
Q406	121-926-02	AUDIO OUTPUT P.N.P.
Q451	121-433	PRE AMPLIFIER N.P.N.
Q452	121-1005	AUDIO AMPLIFIER P.N.P.
Q453	121-877	PRE DRIVER N.P.N.
	OR	
	121-768	
Q454	121-1006	DRIVER N.P.N.
Q455	121-927-02	AUDIO OUTPUT N.P.N.
Q456	121-926-02	AUDIO OUTPUT P.N.P.

5224-2

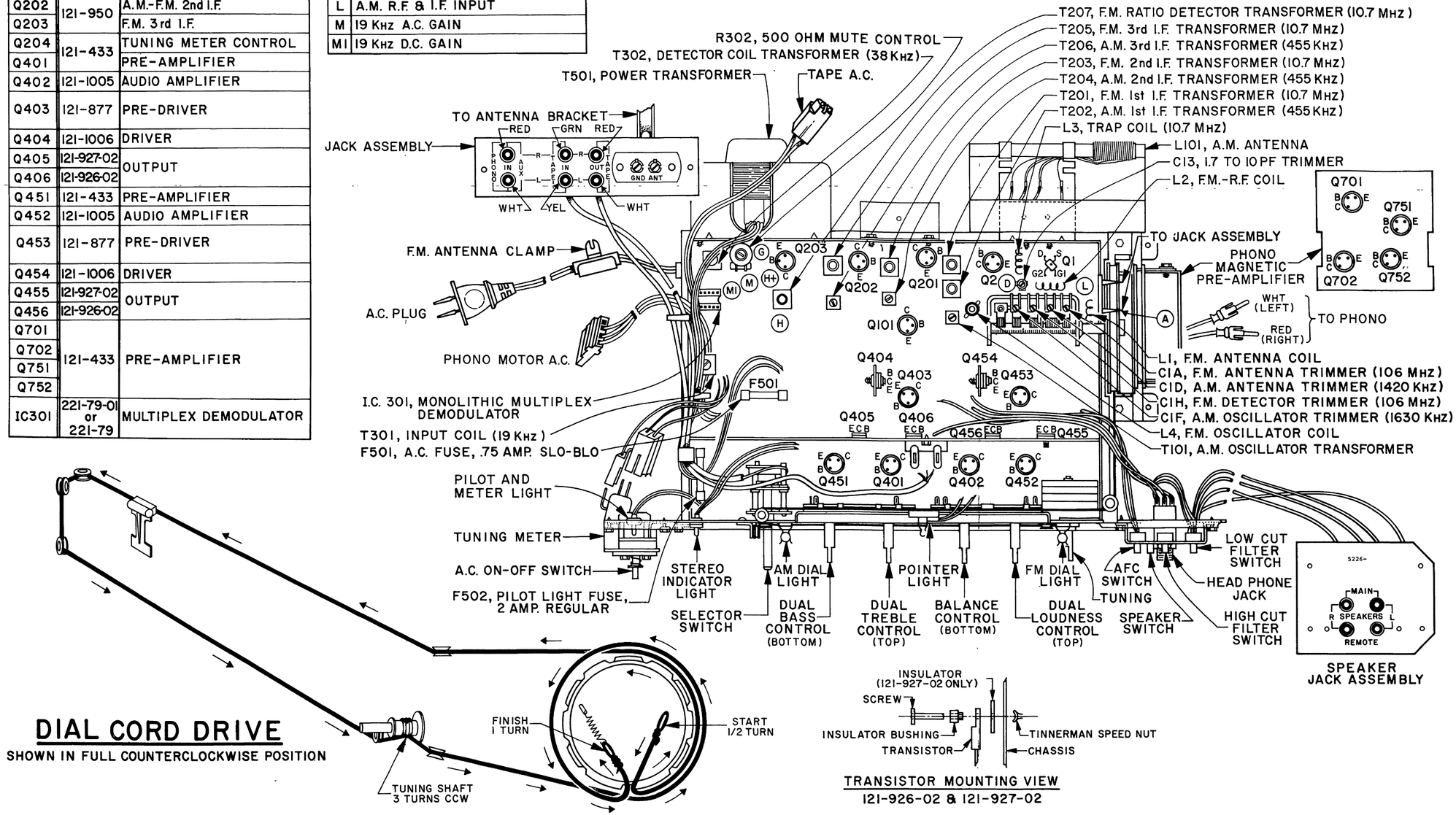


MAGNETIC PREAMP CIRCUIT BOARD DRAWING APPEARS ON PAGE 77

CHASSIS 8WJR57 — CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE

TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-953	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.
Q204	121-433	TUNING METER CONTROL
Q401		PRE-AMPLIFIER
Q402	121-1005	AUDIO AMPLIFIER
Q403	121-877	PRE-DRIVER
Q404	121-1006	DRIVER
Q405	121-927-02	OUTPUT
Q406	121-926-02	
Q451	121-433	PRE-AMPLIFIER
Q452	121-1005	AUDIO AMPLIFIER
Q453	121-877	PRE-DRIVER
Q454	121-1006	DRIVER
Q455	121-927-02	OUTPUT
Q456	121-926-02	
Q701	121-433	PRE-AMPLIFIER
Q702		
Q751		
Q752		
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	19 KHz A.C. GAIN
M1	19 KHz D.C. GAIN



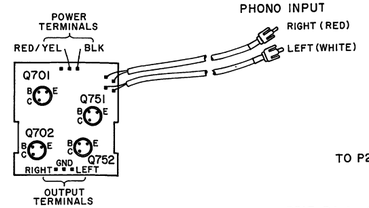
DIAL CORD DRIVE

SHOWN IN FULL COUNTERCLOCKWISE POSITION

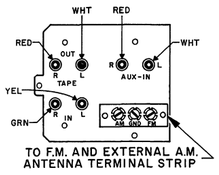
TRANSISTOR MOUNTING VIEW
121-926-02 & 121-927-02

TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-1024	FM-RF (121-953 USED IN EARLY PRODUCTION)
Q2	121-613	FM CONVERTER
Q101	121-850	AM-RF
Q102	121-735	AM CONVERTER
Q201	121-950	AGC AMPLIFIER
Q202		AM 1st IF
Q203		AM 2nd IF
Q301	121-603	MUTE BUFFER
Q302	121-950	MUTE AMPLIFIER
Q303		MUTE SWITCH
Q401	121-433	PRE-AMPLIFIER
Q402		AUDIO AMPLIFIER
Q403	121-1005	PRE-DRIVER
Q404	121-877	DRIVER
Q407	121-1013	OUTPUT
Q408	121-1012	
Q451	121-433	PRE-AMPLIFIER
Q452		AUDIO AMPLIFIER
Q453	121-1005	PRE-DRIVER
Q454	121-877	DRIVER
Q457	121-1013	OUTPUT
Q458	121-1012	
Q501	121-774	FM POWER SWITCH
Q502	121-768	
Q701 Q702 Q751 Q752	121-433	PHONO PRE-AMPLIFIER
IC201	221-89	FM IF GAIN BLOCK
IC202	221-90	FM IF LIMITER/QUAD. DETECTOR
IC301	221-91	MULTIPLEX P.L.L. DEMODULATOR

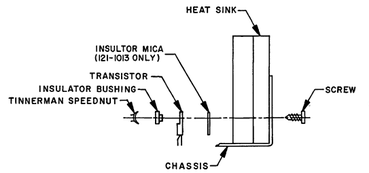
	TEST POINTS
A	FM ANTENNA INPUT
D	FM IF INPUT
G	FM IF OUTPUT
H	FM DETECTOR OUTPUT
L	AM RF INPUT
M	19 kHz OSCILLATOR OUTPUT
AB AC AD AE	AUDIO BIAS



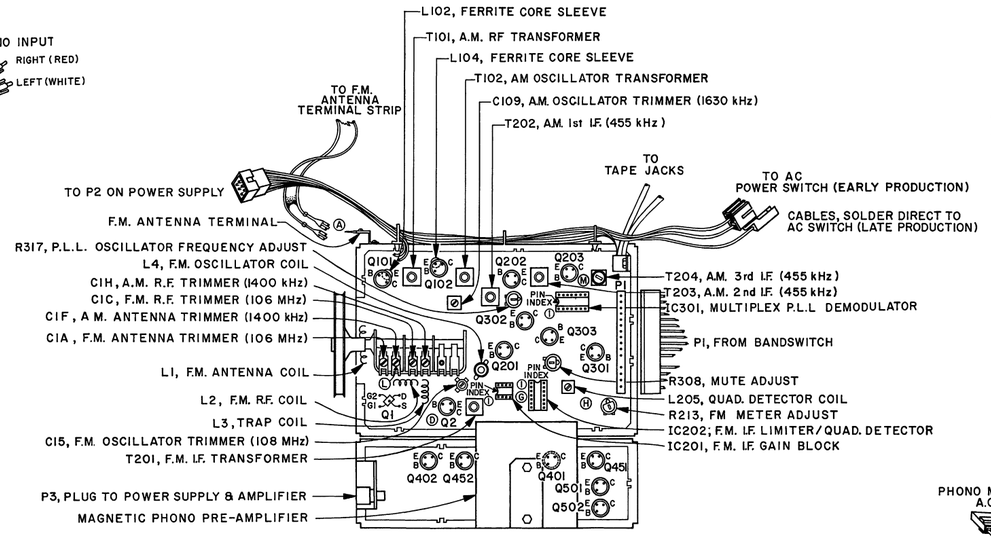
MAGNETIC PHONO PRE-AMPLIFIER
PART OF RF TUNER



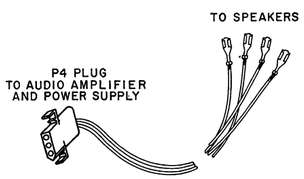
TO F.M. AND EXTERNAL A.M. ANTENNA TERMINAL STRIP



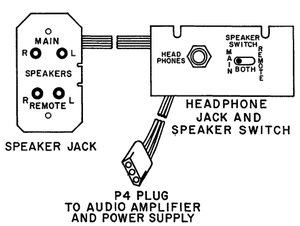
TRANSISTOR MOUNTING VIEW



RF TUNER & PRE-AMPLIFIER

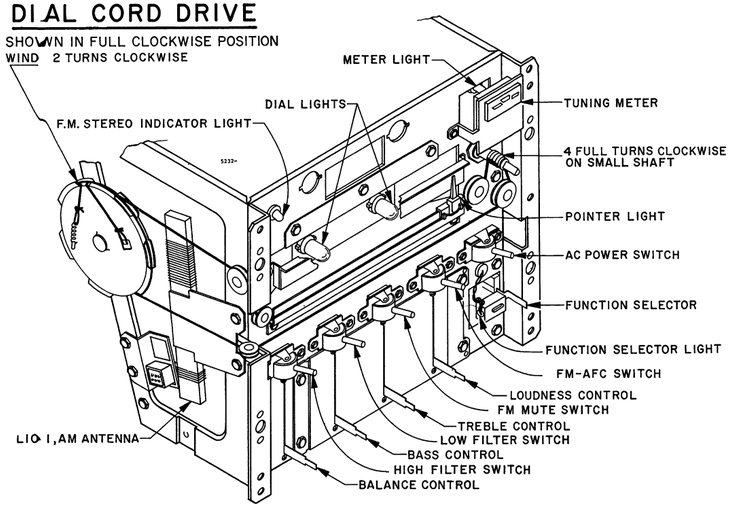


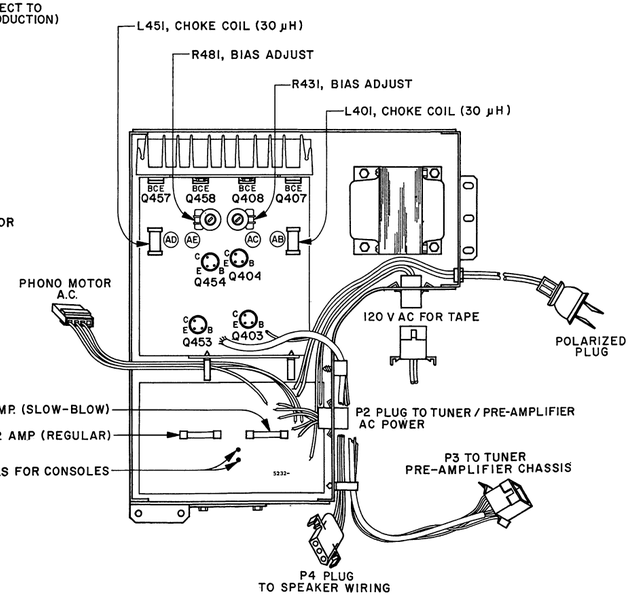
(FOR CONSOLES USE ONLY)



DIAL CORD DRIVE

SHOWN IN FULL CLOCKWISE POSITION
WIND 2 TURNS CLOCKWISE





AUDIO AMPLIFIER & POWER SUPPLY

CHASSIS 15WJR29

ITEM NO.	PART NO.	DESCRIPTION
C1A		F.M. ANTENNA TRIMMER
C1B		F.M. ANTENNA TUNING
C1C		F.M. RF TRIMMER
C1D		F.M. RF TUNING
C1E		F.M. OSCILLATOR TUNING
C1F	22-6245-01	A.M. ANTENNA TRIMMER
C1G		A.M. ANTENNA TUNING
C1H		A.M. RF TRIMMER
C1J		A.M. RF TUNING
C1L		A.M. OSCILLATOR TUNING
C2	22-2729	.001 MFD DISC 25V
C3	22-2729	.001 MFD DISC 25V
C4	22-2729	.001 MFD DISC 25V
C5	22-3675	10 PF DISC ±5% 500V
C6	22-7615-04	4700 PF DISC 50V
C7	22-3035	12 PF DISC ±5% 500V
C8	22-2468	2.2 PF GIMMICK ±5%
C9	22-3177	390 PF DISC 500V
C10	22-2468	2.2 PF GIMMICK ±5% 500V
C11	22-6344	7 PF DISC ±.5 PF N1500 500V
C12	22-7621-17	20 PF DISC ±5% 50V
C13	22-7615-04	4700 PF DISC 50V
C14	22-7615-10	.047 MFD DISC 50V
C15	22-4855	1.7 TO 10 PF CERAMIC TRIMMER
C16	22-7615-04	4700 PF DISC 50V
C17	22-7615-04	4700 PF DISC 50V
C18	22-7615-04	4700 PF DISC 50V
C19	22-7615-04	4700 PF DISC 50V
C101	22-7613-18	3300 PF DISC 500V
C102	22-7615-10	.047 MFD DISC 50V
C103	22-7615-10	.047 MFD DISC 50V
C104	22-7615-10	.047 MFD DISC 50V
C105	22-7615-06	.01 MFD DISC 50V
C106	22-4819	2 PF ±0.25 PF N4700 TUB. 500V
C107	22-5972	390 PF ±5% POLYSTYRENE TUB. 125V
C108	22-7615-10	.047 MFD DISC 50V
C109	22-7460	1 PF TO 7 PF AM OSC. TRIMMER
C110	22-7151-05	22 MFD ELECTROLYTIC 16V
C202	22-5482	680 PF DISC 500V
C203	22-7615-04	4700 PF DISC 50V
C204	22-7615-04	4700 PF DISC 50V
C205	22-2642	15 PF DISC ±5% 500V
C206	22-6447-01	.047 MFD MYLAR 100V
C207	22-7615-10	.047 MFD DISC 50V
C208	22-7615-04	4700 PF DISC 50V
C209	22-2642	15 PF DISC ±5% 500V
C210	22-7615-10	.047 MFD DISC 50V
C211	22-2703	220 PF ±10% DISC 500V
C212	22-2729	.001 MFD DISC 25V
C213	22-5805	8 PF ±5% DISC 500V
C214	22-2381	6 PF ±5% DISC 500V
C215	22-7615-04	4700 PF DISC 50V
C216	22-7613-22	6800 PF DISC 50V
C217	22-7641-22	39 PF DISC ±5% 50V
C218	22-2939	680 PF DISC 500V
C219	22-7151-04	10 MFD ELECTORLYTIC 16V
C220	22-3652	1 MFD DISC 10V
C221	22-7615-10	.047 MFD DISC 50V
C222	22-7641-22	39 PF ±5% DISC 50V
C223	22-2939	680 PF DISC 500V
C224	22-7615-10	.047 MFD DISC 50V
C225	22-7615-10	.047 MFD DISC 50V
C226	22-2642	15 PF DISC ±5% 500V
C227	22-7615-06	.01 MFD 50V
C228	22-7615-06	.01 MFD DISC 50V
C229	22-7614-22	6800 PF DISC 20% 50V
C301	22-7406	.47 MFD NP ELECTROLYTIC 35V
C302	22-7406	.47 MFD NP ELECTROLYTIC 35V
C303	22-7152-03	4.7 MFD ELECTROLYTIC 25V
C304	22-3652	.1 MFD DISC 10V
C305	22-7153-25	.47 MFD ELECTROLYTIC 50V
C306	22-7493	560 PF ±5% N470 DISC 500V
C308	22-5907	.1 MFD MYLAR 50V
C309	22-3527	.22 MFD DISC 12V
C310	22-3527	.22 MFD DISC 12V
C311	22-7406	.47 MFD N.P. ELECTROLYTIC 35V
C312	22-7613-18	3300 PF DISC 50V
C313	22-2729	.001 MFD DISC 25V
C314	22-7614-22	6800 PF DISC 20% 50V
C315	22-7613-18	3300 PF DISC 50V
C316	22-2729	.001 MFD DISC 25V
C317	22-7614-22	6800 PF DISC 20% 50V
C318	22-7152-08	100 MFD ELECTROLYTIC 25V
C319	22-2729	.001 MFD DISC 25V
C401	22-7615-10	.047 MFD DISC 50V
C402	22-2939	680 PF DISC 500V
C403	22-7390-06	.82 MFD ELECTROLYTIC 50V
C404	22-7153	1 MFD ELECTROLYTIC 50V
C405	22-3362	560 PF DISC 500V
C407	22-5964	.27 MFD MYLAR 50V
C408	22-5722	.068 MFD MYLAR 100V
C410	22-2939	680 PF DISC 500V
C411	22-7153	1 MFD ELECTROLYTIC 50V
C412	22-7613-18	3300 PF DISC 50V
C413	22-5632	.022 MFD MYLAR 200V (ALT. 22-7179)
C414	22-5722	.068 MFD MYLAR 100V
C415	22-7613-26	.015 MFD DISC 50V
C416	22-7613-17	2700 PF DISC 50V
C417	22-3383	100 PF DISC 500V
C418	22-6048	.22 MFD MYLAR 50V
C419	22-16	470 PF DISC 500V
C420	22-7154-07	47 MFD ELECTROLYTIC 35V
C421	22-2939	680 PF DISC 500V
C422	22-7154-07	47 MFD ELECTROLYTIC 35V
C423	22-7154-08	100 MFD ELECTROLYTIC 35V
C424	22-3751	20 PF DISC ±5% 500V
C425	22-7496	.47 MFD MYLAR 100V
C426	22-3255	330 PF DISC 500V
C427	22-5639	.22 MFD MYLAR 100V
C428	22-7113	1500 MFD ELECTROLYTIC 65V
C431	22-7601	.033 MFD POLYESTER 50V
C451	22-7615-10	.047 MFD DISC 50V
C452	22-2939	680 PF DISC 500V
C453	22-7390-06	.82 MFD ELECTROLYTIC 50V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C455	22-3362	560 PF DISC 500V
C457	22-5964	.27 MFD MYLAR 50V
C458	22-5722	.068 MFD MYLAR 100V
C460	22-2939	680 PF DISC 500V
C461	22-7153	1 MFD ELECTROLYTIC 50V
C462	22-7613-18	3300 PF DISC 50V
C463	22-5632	.022 MFD MYLAR 200V (ALT. 22-7179)
C464	22-5722	.068 MFD MYLAR 100V
C465	22-7613-26	.015 MFD DISC 50V
C466	22-7613-17	2700 PF DISC 50V
C468	22-6048	.22 MFD MYLAR 50V
C469	22-16	470 PF DISC 500V
C471	22-2939	680 PF DISC 500V
C472	22-7154-07	47 MFD ELECTROLYTIC 35V
C473	22-7154-08	100 MFD ELECTROLYTIC 35V
C474	22-3751	20 PF DISC ±5% 500V
C475	22-7496	.47 MFD MYLAR 100V
C476	22-3255	330 PF DISC 500V
C477	22-5639	.22 MFD MYLAR 100V
C478	22-7113	1500 MFD ELECTROLYTIC 65V
C481	22-7601	.033 MFD POLYESTER 50V
C501*	22-4350	.056 MFD MYLAR 200V
C502*	22-4350	.056 MFD MYLAR 200V
CX504*	22-7113	1500 MFD ELECTROLYTIC 65V
CX505*	22-6005	.01 MFD DISC 150VAC
CX506*	22-6005	.01 MFD DISC 150VAC
C507	22-7151-11	470 MFD ELECTROLYTIC 16V
C508	22-7152-09	220 MFD ELECTROLYTIC 25V
C509	22-7152-09	220 MFD ELECTROLYTIC 25V
C510	22-7152-04	10 MFD ELECTROLYTIC 25V
CX511*	22-7113	1500 MFD ELECTROLYTIC 65V
C512	22-7149-07	47 MFD ELECTROLYTIC 6.3V
C701	22-7153	1 MFD ELECTROLYTIC 50V
C702	22-2593	20 PF DISC 500V
C703	22-2939	680 PF DISC 500V
C704	22-6905	.1 MFD MYLAR 50V
C705	22-3383	100 PF DISC 500V
C706	22-7602	1800 PF ±5% POLYESTER 50V
C707	22-5761	470 PF DISC 1000V
C708	22-3412	820 PF DISC 500V
C709	22-7154-09	220 MFD ELECTROLYTIC 35V
C710	22-7154-09	220 MFD ELECTROLYTIC 35V
C751	22-7153	1 MFD ELECTROLYTIC 50V
C752	22-2593	20 PF DISC 500V
C753	22-2939	680 PF DISC 500V
C754	22-6905	.1 MFD MYLAR 50V
C755	22-3383	100 PF DISC 500V
C756	22-7602	1800 PF ±5% POLYESTER 50V
C757	22-5761	470 PF DISC 1000V
C758	22-3412	820 PF DISC 500V

ITEM NO.	PART NO.	DESCRIPTION
R2	63-9922-20	100K OHM 5% 1/2W (ALT. 63-10184-20±10% 1/4W)
R3	63-9922-12	47K OHM ±5% 1/4W (ALT. 63-10184-12±10% 1/4W)
R4	63-9921-56	220 OHM ±5% 1/4W (ALT. 63-10183-56±10% 1/4W)
R5	63-4129	47 OHM 10% 1/4W
R6	63-9922-30	270K OHM ±5% 1/4W (ALT. 63-10184-30±10% 1/4W)
R7	63-9921-60	330 OHM ±5% 1/4W (ALT. 63-10183-60 ±10% 1/4W)
R8	63-9921-78	1.8K OHM ±5% 1/4W (ALT. 63-10183-78±10% 1/4W)
R9	63-9922-08	33K OHM ±5% 1/4W (ALT. 63-10184-08±10% 1/4W)
R11	63-4255	47K OHM ±10% 1/4W
R12	63-9921-36	33 OHM ±5% 1/4W (ALT. 63-10183-36±10% 1/4W)
R13	63-9921-78	1.8K OHM ±5% 1/4W (ALT. 63-10183-78±10% 1/4W)
R14	63-9921-98	12K OHM ±5% 1/4W (ALT. 63-10183-98±10% 1/4W)
R15	63-9921-64	470 OHM ±5% 1/4W (ALT. 63-10183-64±10% 1/4W)
R101	63-9922	15K OHM ±5% 1/4W (ALT. 63-10184 ±10% 1/4W)
R102	63-9921-82	2.7K OHM ±5% 1/4W (ALT. 63-10183-82±10% 1/4W)
R103	63-9921-80	2.2K OHM ±5% 1/4W (ALT. 63-10183-80±10% 1/4W)
R104	63-9921-64	470 OHM ±5% 1/4W (ALT. 63-10183-64±10% 1/4W)
R105	63-9921-58	270 OHM ±5% 1/4W (ALT. 63-10183-58±10% 1/4W)
R106	63-9921-86	3.9K OHM ±5% 1/4W (ALT. 63-10183-86±10% 1/4W)
R107	63-9921-64	470 OHM ±5% 1/4W (ALT. 63-10183-64±10% 1/4W)
R108	63-9921-28	15 OHM ±5% 1/4W (ALT. 63-10183-28±10% 1/4W)
R201	63-9922-10	39K OHM ±5% 1/4W (ALT. 63-10184-10±10% 1/4W)
R202	63-9922-08	33K OHM ±5% 1/4W (ALT. 63-10184-08 ±10% 1/4W)
R203	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-10184-20±10% 1/4W)
R204	63-9921-72	1K OHM ±5% 1/4W (ALT. 63-10183-72±10% 1/4W)
R205	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-10184-20±10% 1/4W)
R206	63-9921-48	100 OHM ±5% 1/4W (ALT. 63-10183-48±10% 1/4W)
R207	63-9921-60	330 OHM ±5% 1/4W (ALT. 63-10183-60±10% 1/4W)
R208	63-9921-96	10K OHM ±5% 1/4W (ALT. 63-10181-96±5% 1/4W)
R209	63-9921-78	1.8K OHM ±5% 1/4W (ALT. 63-10183-78±10% 1/4W)
R210	63-9921-96	10K OHM ±5% 1/4W (ALT. 63-10183-96±10% 1/4W)
R211	63-9922-02	18K OHM ±5% 1/4W (ALT. 63-10184-02±10% 1/4W)
R212	63-9922-36	470K OHM ±5% 1/4W (ALT. 63-10184-36±10% 1/4W)
R213	63-10651-02	2.5K OHM FM METER ADJUST
R214	63-9921-80	2.2K OHM ±5% 1/4W (ALT. 63-10183-80±10% 1/4W)
R215	63-9921-60	330 OHM ±5% 1/4W (ALT. 63-10183-60±10% 1/4W)
R216	63-9921-68	680 OHM ±5% 1/4W (ALT. 63-10183-68±10% 1/4W)
R217	63-9922-32	330K OHM ±5% 1/4W (ALT. 63-10184-32±10% 1/4W)
R218	63-9921-64	470 OHM ±5% 1/4W (ALT. 63-10183-64±10% 1/4W)
R219	63-9922-22	120K OHM ±5% 1/4W (ALT. 63-10182-22±5% 1/4W)
R220	63-9922-06	27K OHM ±5% 1/4W (ALT. 63-10182-06±5% 1/4W)
R221	63-9921-88	4.7K OHM ±5% 1/4W (ALT. 63-10183-88±10% 1/4W)
R222	63-9922	15K OHM ±5% 1/4W (ALT. 62-10184±10% 1/4W)
R223	63-9921-72	1K OHM ±5% 1/4W (ALT. 63-10183-72±10% 1/4W)
R224	63-9921-60	330 OHM ±5% 1/4W (ALT. 63-10183-60±10% 1/4W)
R225	63-4171	470 OHM ±10% 1/4W
R226	63-9922-32	330K OHM ±5% 1/4W (ALT. 63-10184-32±10% 1/4W)
R227	63-9921-84	3.3K OHM ±5% 1/4W (ALT. 63-10183-84±10% 1/4W)
R228	63-9921-78	1.8K OHM ±5% 1/4W (ALT. 63-10183-78±10% 1/4W)
R229	63-9921-98	12K OHM ±5% 1/4W (ALT. 63-10183-98±10% 1/4W)
R230	63-9921-96	10K OHM ±5% 1/4W (ALT. 63-10183-96±10% 1/4W)
R231	63-9921-46	82 OHM ±5% 1/4W (ALT. 63-10183-46±10% 1/4W)
R232	63-4290	330K OHM ±10% 1/4W
R301	63-9924-56	3.3 MEG OHM ±10% 1/4W (ALT. 63-10184-56 ±10% 1/4W)
R302	63-9922-32	330K OHM ±5% 1/4W (ALT. 63-10182-32±5% 1/4W)
R303	63-9922-34	390K OHM ±5% 1/4W (ALT. 63-10184-34±10% 1/4W)
R304	63-9922-24	150K OHM ±5% 1/4W (ALT. 63-10184-24±10% 1/4W)
R305	63-9922-34	390K OHM ±5% 1/4W (ALT. 63-10184-34±10% 1/4W)
R306	63-9922-36	470K OHM ±5% 1/4W (ALT. 63-10182-36±5% 1/4W)
R307	63-9922-10	39K OHM ±5% 1/4W (ALT. 63-10184-10±10% 1/4W)
R308	63-10651-04	10K OHM MUTE ADJUST
R309	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-10184-20±10% 1/4W)
R310	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-10184-20±10% 1/4W)
R311	63-9922-16	68K OHM ±5% 1/4W (ALT. 63-10182-16±5% 1/4W)
R312	63-9921-88	4.7K OHM ±5% 1/4W (ALT. 63-10183-88±10% 1/4W)
R313	63-9921-88	4.7K OHM ±5% 1/4W (ALT. 63-10183-88±10% 1/4W)
R314	63-9921-46	82 OHM ±5% 1/4W (ALT. 63-10181-46±5% 1/4W)
R315	63-9921-72	1K OHM ±5% 1/4W (ALT. 63-10183-72±10% 1/4W)
R316	63-10311-99	13K OHM ±5% 1/4W
R317	63-10651-03	5K PHASE LOCKED LOOP ADJUST
R318	63-9922-12	47K OHM ±5% 1/4W (ALT. 63-10184-12±10% 1/4W)
R319	63-9921-94	8.2K OHM ±5% 1/4W (ALT. 63-10181-94±5% 1/4W)
R320	63-9922-16	68K OHM ±5% 1/4W (ALT. 63-10184-16±10% 1/4W)
R321	63-9922-10	39K OHM ±5% 1/4W (ALT. 63-10184-10±10% 1/4W)
R322	63-9921-94	8.2K OHM ±5% 1/4W (ALT. 63-10181-94±5% 1/4W)
R323	63-9922-10	39K OHM ±5% 1/4W (ALT. 63-10184-10±10% 1/4W)
R324	63-4308	820K OHM ±10% 1/4W
R325	63-4308	820K OHM ±10% 1/4W
R401	63-9922-30	270K OHM ±5% 1/4W (ALT. 63-7887±10% 1/2W)
R403	63-9922-26	180K OHM ±5% 1/4W (ALT. 63-7880±10% 1/2W)
R404	63-9922-32	330K OHM ±5% 1/4W (ALT. 63-7890±10% 1/2W)
R405	63-9922-06	27K OHM ±5% 1/4W (ALT. 63-7845±10% 1/2W)
R407	63-9921-78	1800 OHM ±5% 1/4W (ALT. 63-7796±10% 1/2W)
R408	63-9922-08	33K OHM ±5% 1/4W (ALT. 63-7848±10% 1/2W)
R410R, R410L	63-10169-02	50K OHM DUAL LOUDNESS CONTROL (ALT. 63-10169)
R411	63-9922-44	1 MEG OHM ±5% 1/4W (ALT. 63-7911±10% 1/2W)
R412	63-9921-88	4.7K OHM ±5% 1/4W (ALT. 63-7813±10% 1/2W)
R413	63-9921-68	680 OHM ±5% 1/4W (ALT. 63-7778±10% 1/2W)
R414	63-9922-02	18K OHM ±5% 1/4W (ALT. 63-7838±10% 1/2W)
R415R, R415L	63-8982-02	100K OHM DUAL BASS CONTROL (ALT. 63-8982)
R416	63-9921-90	5.6K OHM ±5% 1/4W (ALT. 63-7817±10% 1/2W)
R417R, R417L	63-8983-02	50K OHM DUAL TREBLE CONTROL (ALT. 63-8983)
R418	63-9922-04	22K OHM ±5% 1/4W (ALT. 63-7841±10% 1/2W)
R420	63-8981-02	250K OHM BALANCE CONTROL (ALT. 63-8981)
R421	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-7869±10% 1/2W)
R422	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-7868±5% 1/2W)
R423	63-9922-24	150K OHM ±5% 1/4W (ALT. 63-7875±5% 1/2W)
R424	63-9921-50	120 OHM ±5% 1/4W (ALT. 63-7747±10% 1/2W)
R425	63-9921-92	6800 OHM ±5% 1/4W (ALT. 63-7820±10% 1/2W)
R426	63-9921-82	2700 OHM ±5% 1/4W (ALT. 63-7803±10% 1/2W)
RX427*	63-9921-86	3900 OHM ±5% 1/4W (ALT. 63-7809±5% 1/2W)
R429	63-9921-88	4700 OHM ±5% 1/4W (ALT. 63-7812±5% 1/2W)
R430	63-9921-70	820 OHM ±5% 1/4W (ALT. 63-7782±10% 1/2W)
R431	63-8328	300 OHM BIAS ADJUST
RX437*	63-10444-22	.82 OHM ±10% 5W
RX438*	63-4511	1.8 OHM ±5% 1/2W
RX439*	63-10565-24	10 OHM ±5% 1/2W
R440	63-9946-76	1500 OHM ± 1/2W (ALT. 63-7792±10% 1/2W)
R443	63-1757	220 OHM ±10% 1/2W
R451	63-9922-30	270K OHM ±5% 1/4W (ALT. 63-7887±10% 1/2W)
R453	63-9922-26	180K OHM ±5% 1/4W (ALT. 63-7880±10% 1/2W)
R454	63-9922-32	330K OHM ±5% 1/4W (ALT. 63-7890±10% 1/2W)
R455	63-9922-06	27K OHM ±5% 1/4W (ALT. 63-7845±10% 1/2W)
R457	63-9921-78	1800 OHM ±5% 1/4W (ALT. 63-7796±10% 1/2W)
R458	63-9922-08	33K OHM ±5% 1/4W (ALT. 63-7848±10% 1/2W)
R461	63-9922-44	1 MEG OHM ±5% 1/4W (ALT. 63-7911±10% 1/2W)
R462	63-9921-88	4.7K OHM ±5% 1/4W (ALT. 63-7813±10% 1/2W)
R463	63-9921-68	680 OHM ±5% 1/4W (ALT. 63-7778±10% 1/2W)
R464	63-9922-02	18K OHM ±5% 1/4W (ALT. 63-7838±10% 1/2W)
R466	63-9921-90	5.6K OHM ±5% 1/4W (ALT. 63-7817±10% 1/2W)
R468	63-9922-04	22K OHM ±5% 1/4W (ALT. 63-7841±10% 1/2W)
R471	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-7869±10% 1/2W)
R474	63-9921-50	120 OHM ±5% 1/4W (ALT. 63-7747±10% 1/2W)
R475	63-9921-92	6800 OHM ±5% 1/4W (ALT. 63-7820±10% 1/2W)
R476	63-9921-82	2700 OHM ±5% 1/4W (ALT. 63-7803±10% 1/2W)
RX477*	63-9921-86	3900 OHM ±5% 1/4W (ALT. 63-7809±5% 1/2W)
R479	63-9921-88	4700 OHM ±5% 1/4W (ALT. 63-7812±5% 1/2W)
R480	63-9921-70	820 OHM ±5% 1/4W (ALT. 63-7782±10% 1/2W)
R481	63-8328	300 OHM BIAS ADJUST
RX487*	63-10444-22	.82 OHM ±10% 5W
RX488*	63-4511	1.8 OHM ±5% 1/2W
RX489*	63-10565-24	10 OHM ±5% 1/2W
R490	63-9946-76	1500 OHM ±5% 1/2W (ALT. 63-7792±10% 1/2W)
R493	63-1757	220 OHM ±10% 1/2W
RX501*	63-1701	10 OHM ±10% 1/2W
RX502*	63-4538	6.8 OHM ±10% 1/2W
RX503*	63-1701	10 OHM ±10% 1/2W
RX504*	63-10526-01	2.2 MEG OHM ±20% 1/2W
RX505*	63-10449-86	390 OHM ±5% 7W
RX506*	63-10451-64	330 OHM ±10% 7W
R507	63-10428-75	130 OHM ±5% 3W
R508	63-9921-36	33 OHM ±5% 1/4W (ALT. 63-7722±10% 1/2W)
R509	63-9921-36	33 OHM ±5% 1/4W (ALT. 63-7722±10% 1/2W)
R510	63-9946-28	15 OHM ±5% 1/2W (ALT. 63-7708±10% 1/2W)
R512	63-9921-78	1800 OHM ±5% 1/4W (ALT. 63-7796±10% 1/2W)
R513	63-9922-18	82K OHM ±5% 1/4W (ALT. 63-7866±10% 1/2W)
R514	63-9922-04	22K OHM ±5% 1/4W (ALT. 63-7841±10% 1/2W)
R701	63-9922-20	100K OHM ±5% 1/4W
R702	63-9921-72	1K OHM ±5% 1/4W
R703	63-7949	8.2 MEG OHM ±5% 1/2W
R704	63-9922-26	180K OHM ±5% 1/4W
R705	63-9921-90	5.6K OHM ±5% 1/4W
R706	63-9922-08	33K OHM ±5% 1/4W
R707	63-7952	10 MEG OHM ±5% 1/2W
R708	63-9922-54	2.7 MEG OHM ±5% 1/4W
R709	63-9922-24	150K OHM ±5% 1/4W
R710	63-9921-72	1K OHM ±5% 1/4W
R711	63-9921-88	4.7K OHM ±5% 1/4W
R712	63-9922-04	22K OHM ±5% 1/4W
R713	63-9921-90	5.6K OHM ±5% 1/4W
R751	63-9922-20	100K OHM ±5% 1/4W

ITEM NO.	PART NO.	DESCRIPTION
R752	63-9921-72	1K OHM ±5% 1/4W
R753	63-7949	8.2 MEG OHM ±5% 1/2W
R754	63-9922-26	180K OHM ±5% 1/4W
R755	63-9921-90	5.6K OHM ±5% 1/4W
R756	63-9922-08	33K OHM ±5% 1/2W
R757	63-7952	10 MEG OHM ±5% 1/2W
R758	63-9922-54	2.7 MEG OHM ±5% 1/4W
R759	63-9922-24	150K OHM ±5% 1/4W
R760	63-9921-72	1K OHM ±5% 1/4W
CR1	103-47-01	AFC DIODE
CR202	103-23-01	GERMANIUM DIODE
CR203	103-23-01	GERMANIUM DIODE
CR205	103-23-01	GERMANIUM DIODE
CR301	103-142	SILICON DIODE
CR302	103-23-01	GERMANIUM DIODE
CR303	103-142-01	SILICON DIODE
CR401	103-145-01	SILICON DIODE
CR402	103-145-01	SILICON DIODE
CR403	103-145-01	SILICON DIODE
CR404	212-76	SILICON DIODE
CR451	103-145-01	SILICON DIODE
CR452	103-145-01	SILICON DIODE
CR453	103-145-01	SILICON DIODE
CR454	212-76	SILICON DIODE
CRX501*	212-76	SILICON RECTIFIER
CRX502*	212-76	SILICON RECTIFIER
CR505	103-256	ZENER DIODE
CR506	103-142-01	SILICON DIODE
CR507	103-142-01	SILICON DIODE
L1	20-3595	FM ANTENNA COIL
L2	20-3594	FM RF COIL
L3	20-1631	10.7 MHz TRAP COIL
L4	20-3545	FM OSCILLATOR COIL
L5	20-2033	10 MICROHENRY COIL
L101	A-6872	AM ANTENNA COIL ASSEMBLY
L102	149-311	FERRITE CORE SLEEVE
L103	IN T101	BC-RF TRANSFORMER
L104	149-311	FERRITE CORE SLEEVE
L105	IN T102	AM OSCILLATOR TRANSFORMER PRI.
L106	IN T102	AM OSCILLATOR TRANSFORMER SEC.
L107	149-311	FERRITE CORE SLEEVE
L201	IN T201	1ST IF TRANSFORMER 10.7 MHz PRI.
L202	IN T201	1ST IF TRANSFORMER 10.7 MHz SEC.
L203	IN T202	1ST IF AM 455KHz PRI.
L204	IN T202	1ST IF AM 455KHz SEC.
L205	20-3702	10.7 MHz QUAD DETECTOR COIL
L206	20-2033	10 MICROHENRY COIL
L207	IN T203	2ND IF AM 455 KHz PRI.
L208	IN T203	2ND IF AM 455 KHz SEC.
L209	IN T204	3RD IF AM 455 KHz PRI.
L210	IN T204	3RD IF AM 455 KHz SEC.
L401	20-3824	CHOKE COIL 20 MICROHENRY
L451	20-3824	CHOKE COIL 20 MICROHENRY
L501	20-2033	10 MICROHENRY COIL
T101	95-2750	BC RF TRANSFORMER
T102	95-2544	AM OSCILLATOR TRANSFORMER
T201	95-2753	FM IF TRANSFORMER 10.7 MHz
T202	95-2751	AM 1ST IF 455 KHz
T203	95-2752	AM 2ND IF 455 KHz
T204	95-2689	AM 3RD IF 455 KHz
TX501*	95-3198-02	POWER TRANSFORMER
FX501*	136-117-21	1.25 SLO-BLO FUSE
FX502*	136-114-20	2 AMP REGULAR BLOW FUSE
IC201	221-89	F.M. IF GAIN BLOCK
IC202	221-90	F.M. IF LIMITER-QUAD DETECTOR
IC301	221-91	MULTIPLEX P L L DEMODULATOR
DS301	100-611	STEREO INDICATOR LIGHT
DSX501*	100-625	POINTER LIGHT
DSX502*	100-610	METER LIGHT
DSX503*	100-368-04	DIAL LIGHT
DSX504*	100-368-04	DIAL LIGHT
DSX505*	100-633	PILOT LIGHT
DSX506*	100-249	CABINET LIGHT
DSX507*	100-249	CABINET LIGHT
M1	122-72	TUNING METER
J1	78-2137-03	HEADPHONE JACK
PC	204-585	CIRCUIT BOARD, RF
PC	204-583	CIRCUIT BOARD, AUDIO
PC	204-586	CIRCUIT BOARD, POWER AMPLIFIER
PC	204-640	CIRCUIT BOARD, POWER SUPPLY
SW1	85-1501	BAND SWITCH
SWX2*	85-1458-01	POWER SWITCH
SW3	85-1446-01	FM MUTE SWITCH
SW4	85-1446-01	FM MUTE SWITCH
SW5	85-1447-01	LOW FILTER SWITCH
SW6	85-1447-01	HIGH FILTER SWITCH
SW7	85-1496	SPEAKER SWITCH
	224-1	CERAMIC FILTER, 10.64 MHz (BLACK)
	OR	
	224-1-01	CERAMIC FILTER, 10.67 MHz (BLUE)
	OR	
Y201	224-1-02	CERAMIC FILTER, 10.70 MHz (RED)
Y202	OR	
	224-1-03	CERAMIC FILTER, 10.73 MHz (ORANGE)
	OR	
	224-1-04	CERAMIC FILTER, 10.76 MHz (WHITE)
Q1	121-1024	FM-RF
Q2	121-613	FM CONVERTER
Q101	121-850	AM-RF
Q102	121-735	AM CONVERTER
Q201	121-950	AGC AMPLIFIER
Q202	121-950	AM 1ST IF
Q203	121-950	AM 2ND IF
Q301	121-603	MUTE BUFFER
Q302	121-950	MUTE AMPLIFIER
Q303	121-950	MUTE SWITCH
Q401	121-433	PRE-AMPLIFIER
Q402	121-433	AUDIO AMPLIFIER
Q403	121-1005	PRE-DRIVER
Q404	121-877	DRIVER
Q407	121-1013	OUTPUT, DARLINGTON
Q408	121-1012	OUTPUT, DARLINGTON
Q451	121-433	PRE-AMPLIFIER
Q452	121-433	AUDIO AMPLIFIER
Q453	121-1005	PRE-DRIVER
Q454	121-877	DRIVER
Q457	121-1013	OUTPUT, DARLINGTON
Q458	121-1012	OUTPUT, DARLINGTON
Q501	121-774	FM POWER SWITCH
Q502	121-768	FM POWER SWITCH
Q701	121-433	PRE-AMPLIFIER
Q702	121-433	PRE-AMPLIFIER
Q751	121-433	PRE-AMPLIFIER
Q752	121-433	PRE-AMPLIFIER
IC201	221-89	FM IF GAIN BLOCK
IC202	221-90	FM IF LIMITER QUAD. DETECTOR
IC301	221-91	MULTIPLEX P.L.L. DEMODULATOR
		*CRITICAL CIRCUIT COMPONENT

5225-2

MAGNETIC PREAMP CIRCUIT BOARD DRAWING APPEARS ON PAGE 77

○ TEST POINTS

- A F.M. ANTENNA INPUT
- D F.M. I.F. INPUT
- G F.M. I.F. OUTPUT
- H F.M. DETECTOR OUTPUT
- L A.M. R.F. INPUT
- M 19 KHz OSC. OUTPUT

NOTES:

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS, WITH NO SIGNAL INPUT, LOUDNESS CONTROL AT MINIMUM, LINE VOLTAGE 120 V.A.C. USING A HIGH IMPEDANCE V.T.V.M.

ALL RESISTORS IN OHMS, 1/4 WATT CARBON OR CARBON FILM, ±10% UNLESS OTHERWISE SPECIFIED.

ALL CAPACITORS ARE IN MICROFARADS ±10% UNLESS OTHERWISE SPECIFIED, EXCEPT ELECTROLYTICS WHICH ARE +100-10%.

I.F. FREQUENCY: A.M. 455 KHz
F.M. 10.7 MHz APPROXIMATELY

CERAMIC FILTERS MUST BE OF SAME CENTER FREQUENCY GROUPING. T201 AND L205 MUST BE ADJUSTED TO THE SAME FREQUENCY AS THE CERAMIC FILTERS.

TUNING RANGE: A.M. 540-1600 KHz
F.M. 88-108 MHz

INDICATES CHASSIS GROUND.

INDICATES ±20% TOLERANCE.

INDICATES VOLTAGE

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION ON ROTARY CONTROLS AND UPWARD OR RIGHT HAND MOVEMENT ON SLIDE CONTROLS.

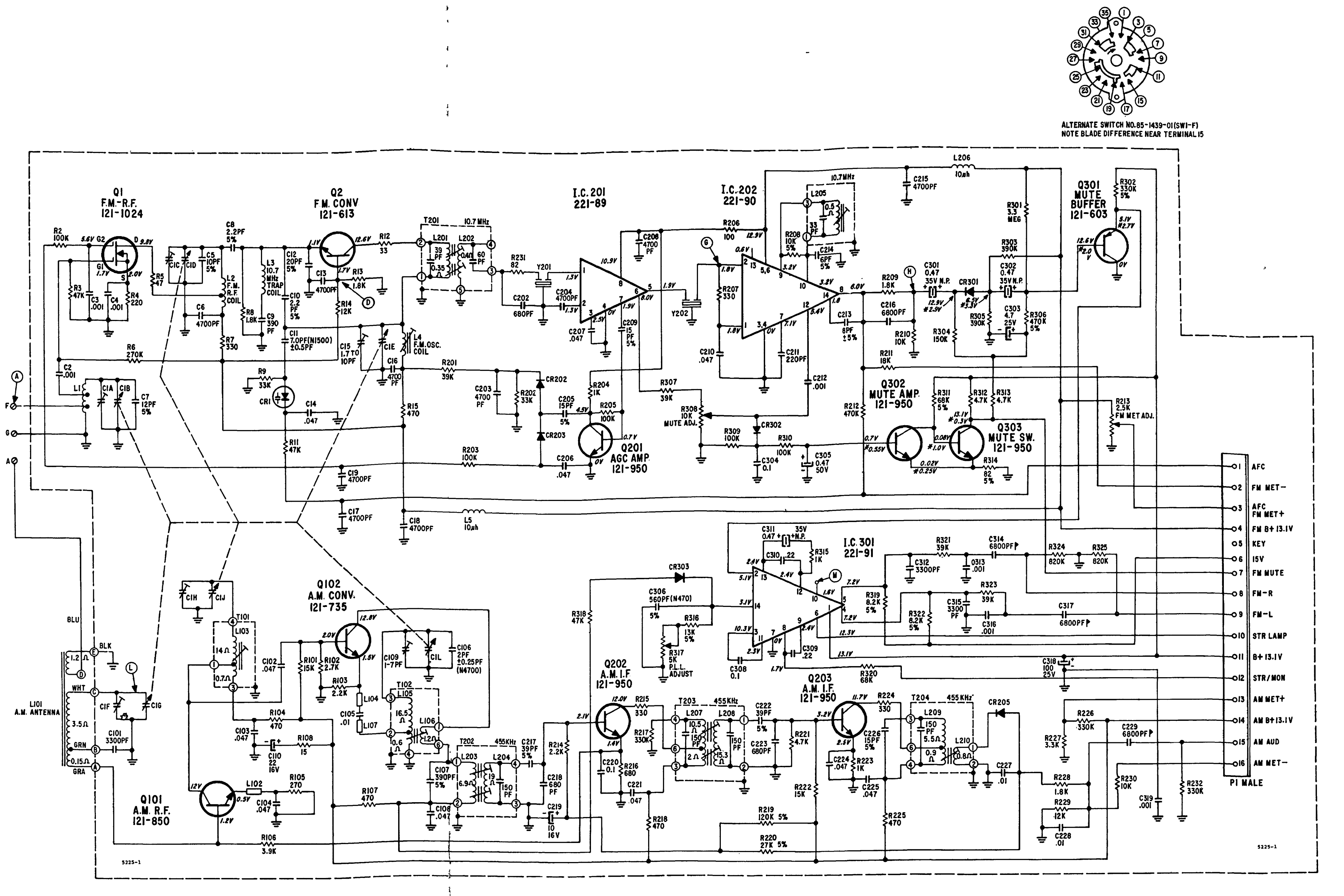
* VOLTAGES MEASURED WITH 110µV SIGNAL INPUT.

(AB), (AC), (AD), (AE) BIAS TEST POINTS.

** TO ADJUST BIAS, SET LINE AT 120 V.A.C., LET SET WARM UP FOR ONE MINUTE WITH NO SIGNAL. CONNECT LOW RANGE VOLTMETER ACROSS TEST POINTS AB-AC AND ADJUST R431 FOR .025V TO .030V.
REPEAT ABOVE ADJUSTMENT FOR TEST POINTS AD-AE AND ADJUST R481 FOR .025V TO .030V.

*** RIPPLE VOLTAGE MEASURED WITH NO SIGNAL INPUT.

Q407 AND Q457 ARE INSULATED FROM CHASSIS.
Q1-121-953 USED IN EARLY PRODUCTION.



PC1 AM/FM, RF, IF & FM MPX

IC301 WAVEFORMS

PIN 2-COMPOSITE INPUT L+R, L−R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 0.5V P/P (0.5 MILLISEC.)

PINS 3 AND 11-COMPOSITE AMPLIFIED L+R, L−R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10% 1.4V P/P (0.5 MILLISEC.)

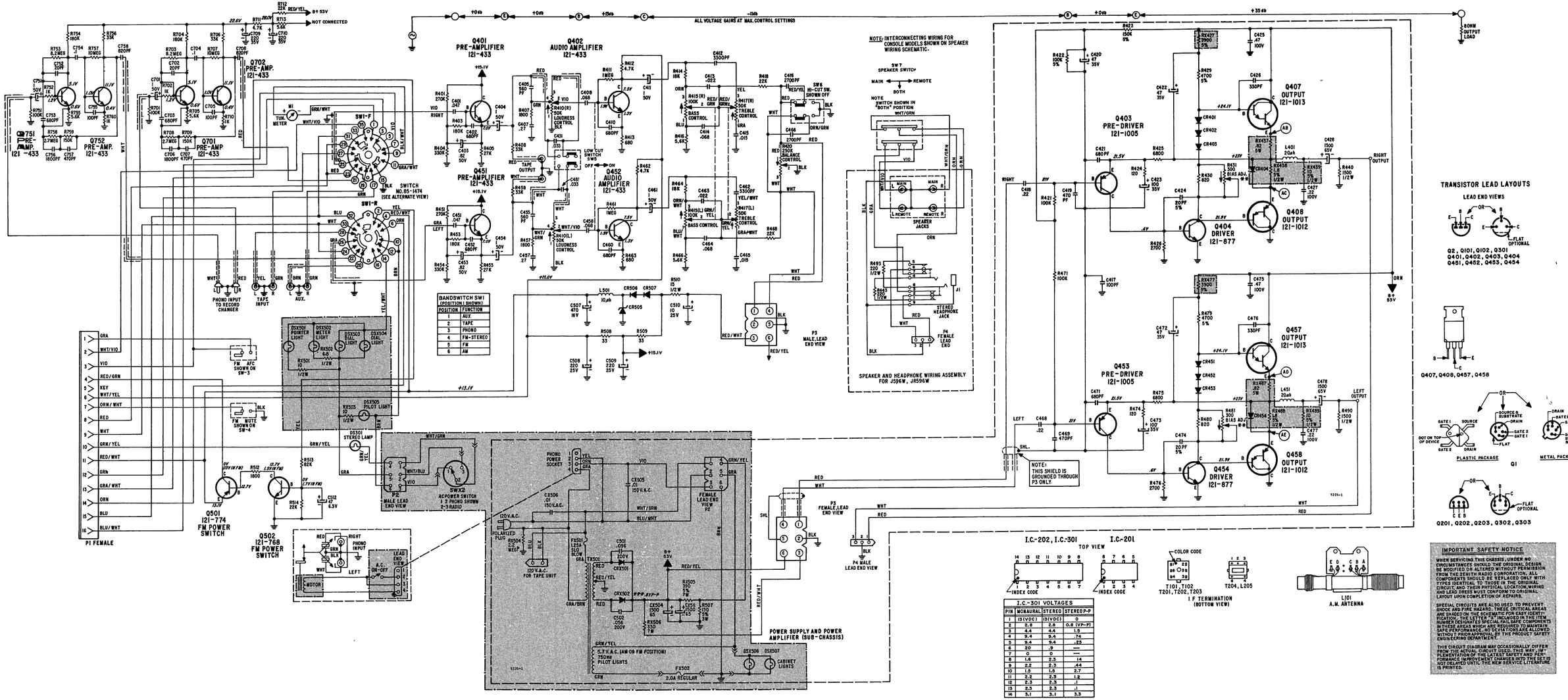
PIN 14-VOLTAGE CONTROLLED OSCILLATOR ADJUSTMENT 3.5V P/P (5.0 MICROSEC.)

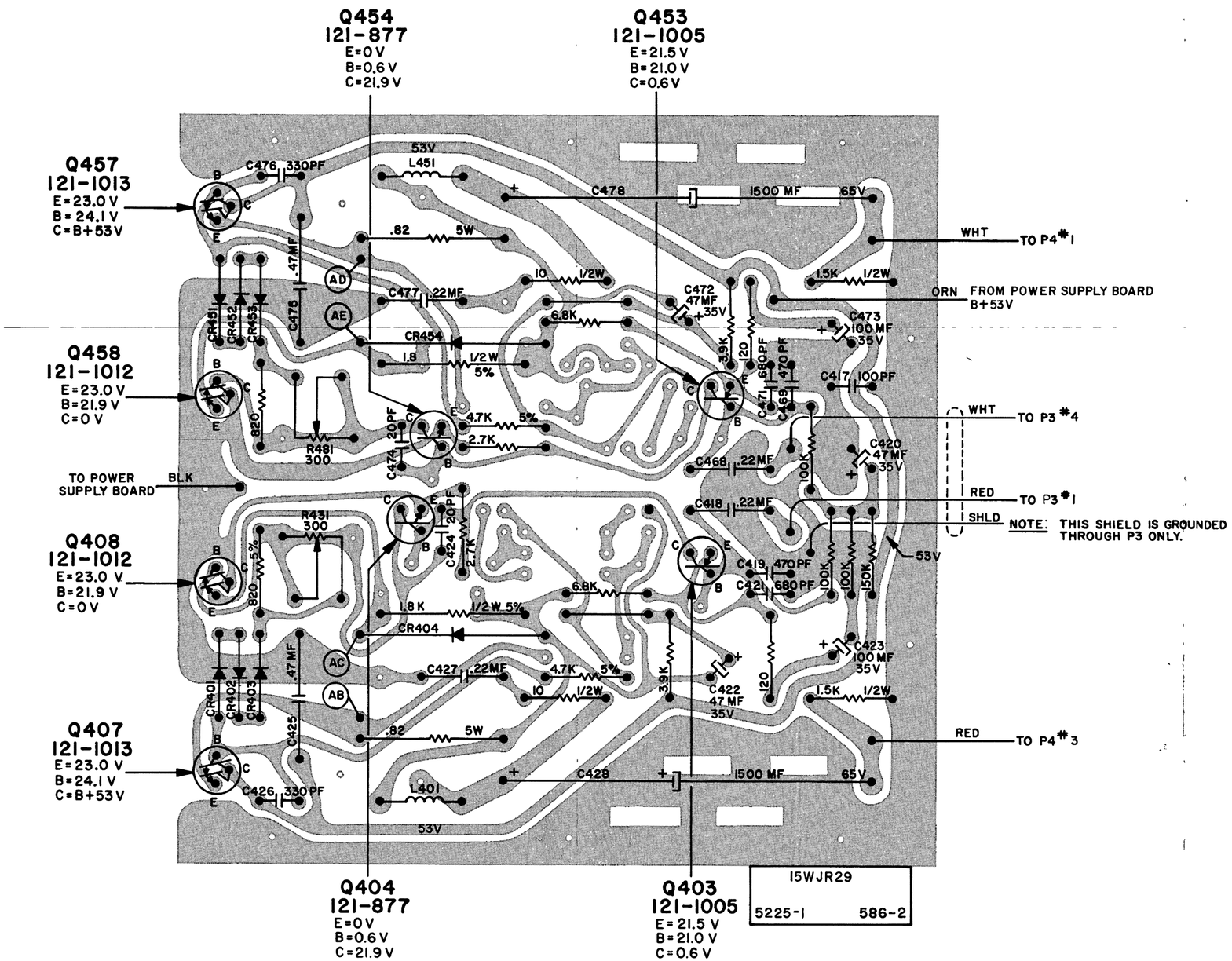
PIN 10-19 KHZ TEST POINT 2.7V P/P (10.0 MICROSEC.)

PINS 12 AND 13-FILTER-PHASE DETECTOR 0.14V P/P (0.5 MILLISEC.)

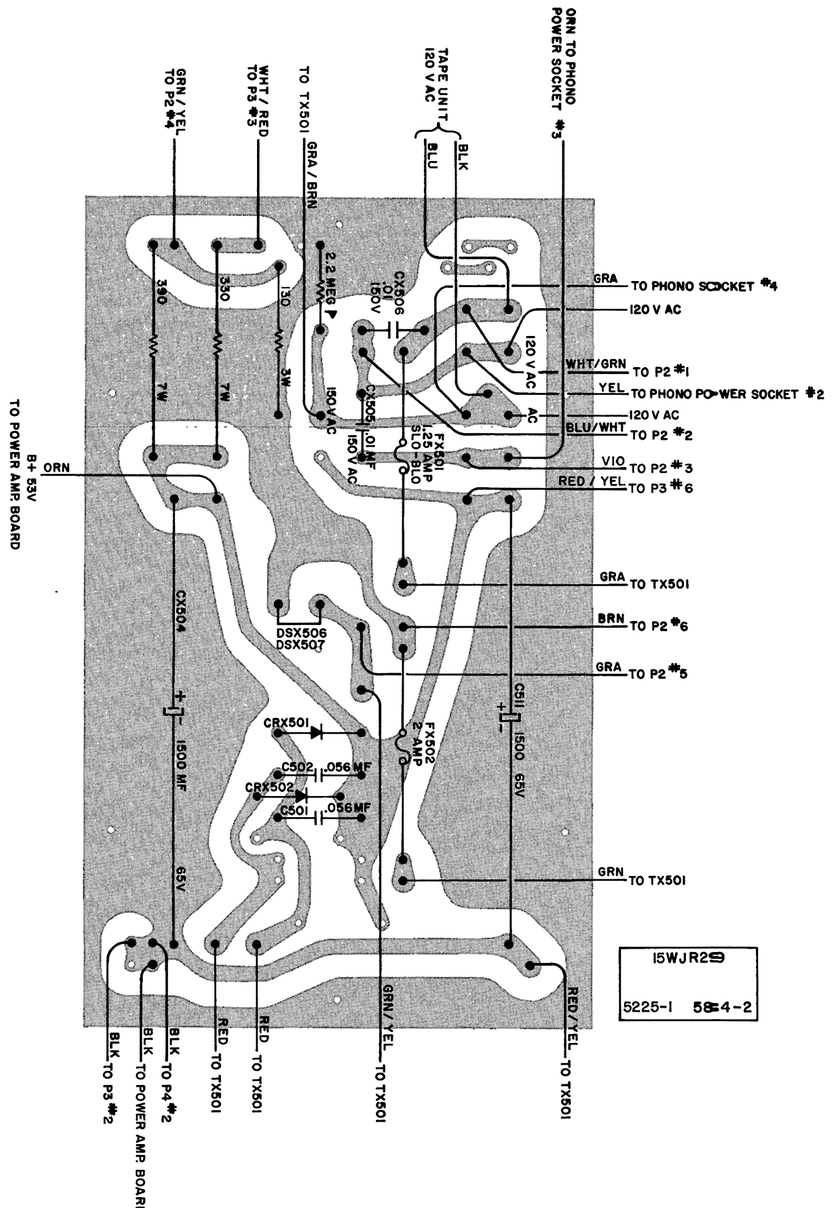
PINS 8 AND 9-FILTER-AMPLITUDE DETECTOR 0.47V P/P (0.5 MILLISEC.)

P1, #9-(UPPER) LEFT OUTPUT 0.57V P/P (0.5 MILLISEC.) P1, #8-(LOWER) RIGHT OUTPUT 0.05V P/P (0.5 MILLISEC.)

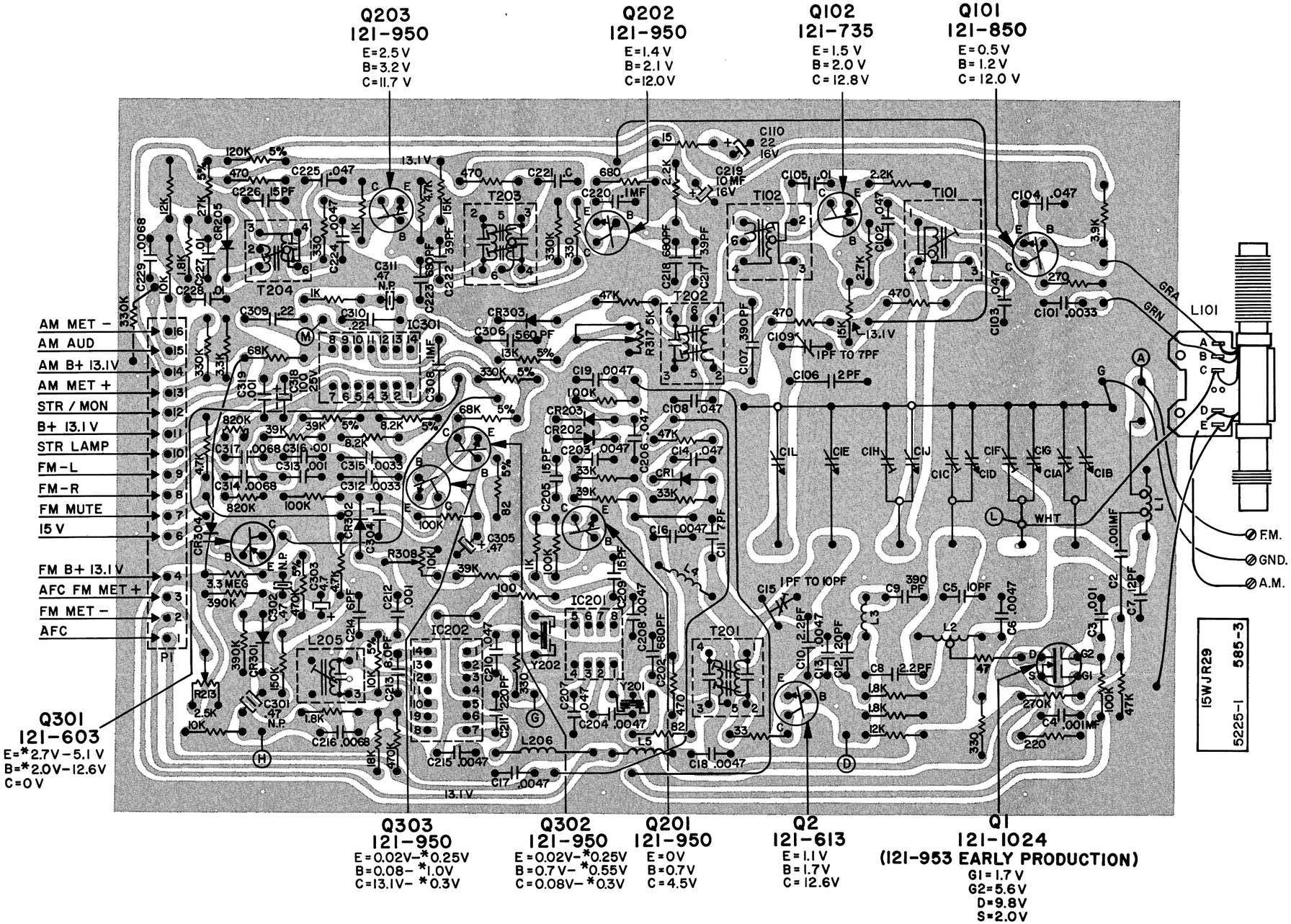

ALL VOLTAGE GAINS AT MAX. CONTROL SETTINGS
Q401 PRE-AMPLIFIER 121-433
Q402 AUDIO AMPLIFIER 121-433
Q451 PRE-AMPLIFIER 121-433
Q452 AUDIO AMPLIFIER 121-433
Q751 PRE-AMP. 121-433
Q752 PRE-AMP. 121-433
Q702 PRE-AMP. 121-433
Q701 PRE-AMP. 121-433
Q403 PRE-DRIVER 121-1005
Q407 OUTPUT 121-1013
Q404 DRIVER 121-877
Q408 OUTPUT 121-1012
Q453 PRE-DRIVER 121-1005
Q457 OUTPUT 121-1013
Q454 DRIVER 121-877
Q458 OUTPUT 121-1012
Q501 121-774 FM POWER SWITCH
Q502 121-768 FM POWER SWITCH
SW1-F
SW1-R
SWITCH NO.85-1476 (SEE ALTERNATE VIEW)
BANDSWITCH SW1 (POSITION 1 SHOWN)
POSITION | FUNCTION
1 AUX
2 TAPE
3 PHONO
4 FM-STEREO
5 FM
6 AM
PHONO INPUT TO RECORD CHANGER
TAPE INPUT
AUX.
NOTE: INTERCONNECTING WIRING FOR CONSOLE MODELS SHOWN ON SPEAKER WIRING SCHEMATIC.
SW7 SPEAKER SWITCH
MAIN
REMOTE
BOTH
NOTE SWITCH SHOWN IN "BOTH" POSITION
SPEAKER JACKS
STEREO HEADPHONE JACK
SPEAKER AND HEADPHONE WIRING ASSEMBLY FOR J556W, J855W
8 OHM OUTPUT LOAD
RIGHT OUTPUT
LEFT OUTPUT
P1 FEMALE
P2 MALE LEAD END VIEW
P3 MALE LEAD END VIEW
P4 FEMALE LEAD END
P2 FEMALE LEAD END VIEW
P4 MALE LEAD END VIEW
SWX2 ACPOWER SWITCH 1-2 PHONO SHOWN 2-3 RADIO
POWER SUPPLY AND POWER AMPLIFIER (SUB-CHASSIS)
FM AFC SHOWN ON SW-3
FM MUTE SHOWN ON SW-4
NOTE: THIS SHIELD IS GROUNDED THROUGH P3 ONLY.
I.C.-202, I.C.-301
I.C.-201
TOP VIEW
INDEX CODE
I.C.-301 VOLTAGES
PIN | MONAURAL (9VDC) | STEREO (9VDC) | STEREO P-P
1 | 9.0 | 9.0 | 0
2 | 2.8 | 2.8 | 0.8 (VP-P)
3 | 4.4 | 4.4 | 1.5
4 | 9.4 | 9.4 | .74
5 | 9.4 | 9.4 | .25
6 | 20 | .9 | —
7 | 0 | 0 | —
8 | 1.6 | 2.3 | 14
9 | 2.2 | 2.3 | .44
10 | 1.5 | 1.5 | 2.7
11 | 2.2 | 2.3 | 1.2
12 | 2.3 | 2.3 | .1
13 | 2.3 | 2.3 | .1
14 | 3.1 | 3.1 | 5.3
COLOR CODE
T101, T102 T201, T202, T203
I F TERMINATION (BOTTOM VIEW)
T204, L205
L101 A.M. ANTENNA
TRANSISTOR LEAD LAYOUTS
LEAD END VIEWS
Q2, Q101, Q102, Q301 Q401, Q402, Q403, Q404 Q451, Q452, Q453, Q454
Q407, Q408, Q457, Q458
PLASTIC PACKAGE
METAL PACKAGE
Q1
Q201, Q202, Q203, Q302, Q303
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 SHADED ON THE SCHEMATIC FOR EASY IDENTIFICATION. USE ONLY FACTORY-SPECIFIED SYSTEM REPLACEMENT PARTS. CRITICAL LOW LEAKAGE 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 WE IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET. IF NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.



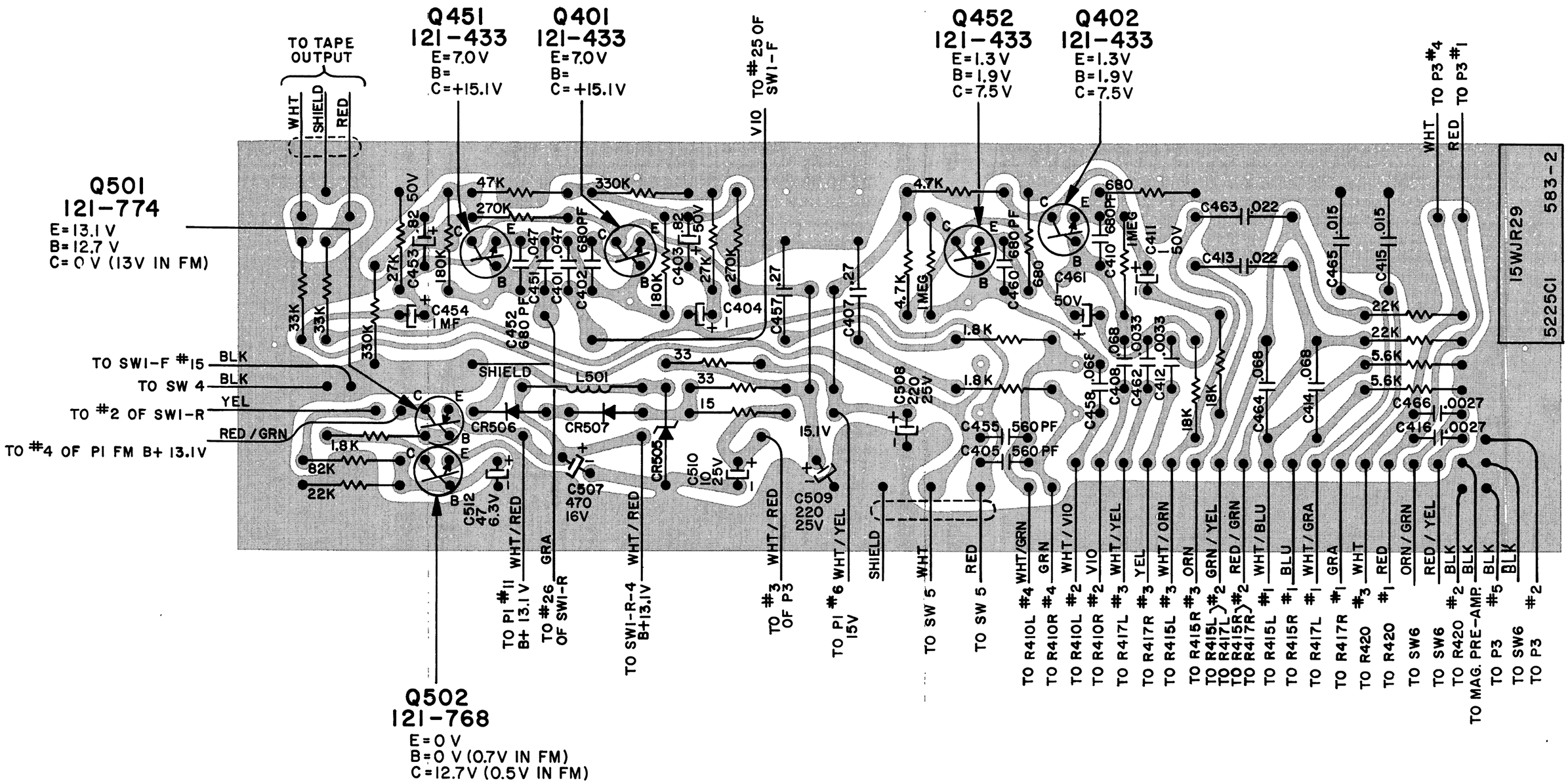
CHASSIS 15WJR29 – CHASSIS WIRING
AND COMPONENTS VIEWED FROM FOIL SIDE – POWER AMPLIFIER



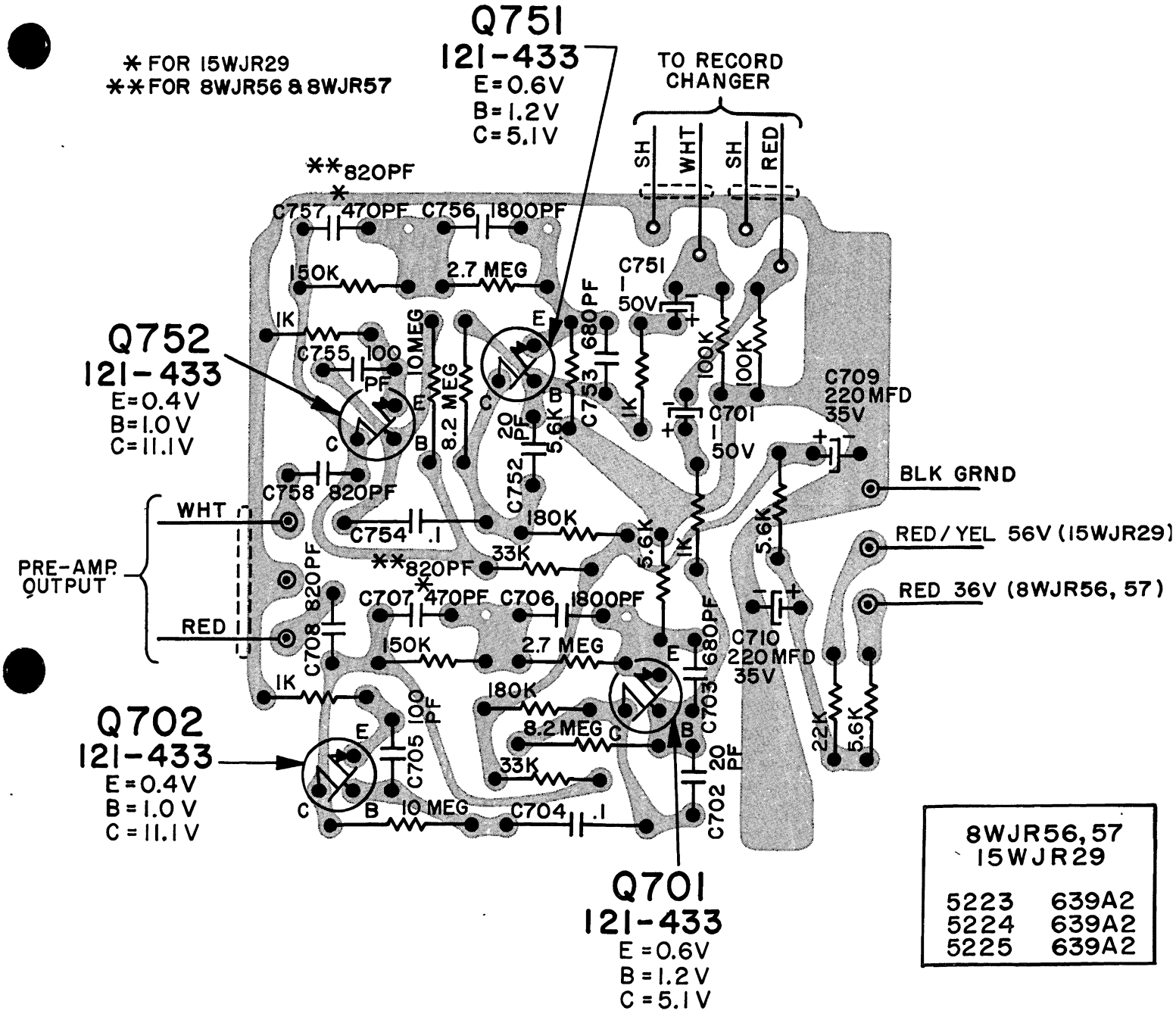
CHASSIS 15WJR29 – CHASSIS WIRING
AND COMPONENTS VIEWED FROM FOIL SIDE – POWER SUPPLY



CHASSIS 15WJR29 — CHASSIS WIRING
AND COMPONENTS VIEWED FROM FOIL SIDE — RF/IF/MPX



CHASSIS 15WJR29 — CHASSIS WIRING
AND COMPONENTS VIEWED FROM FOIL SIDE — PREAMPLIFIER



CHASSIS 8WJR56, 8WJR57 AND 15WJR29
CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE
MAGNETIC PHONO PREAMP