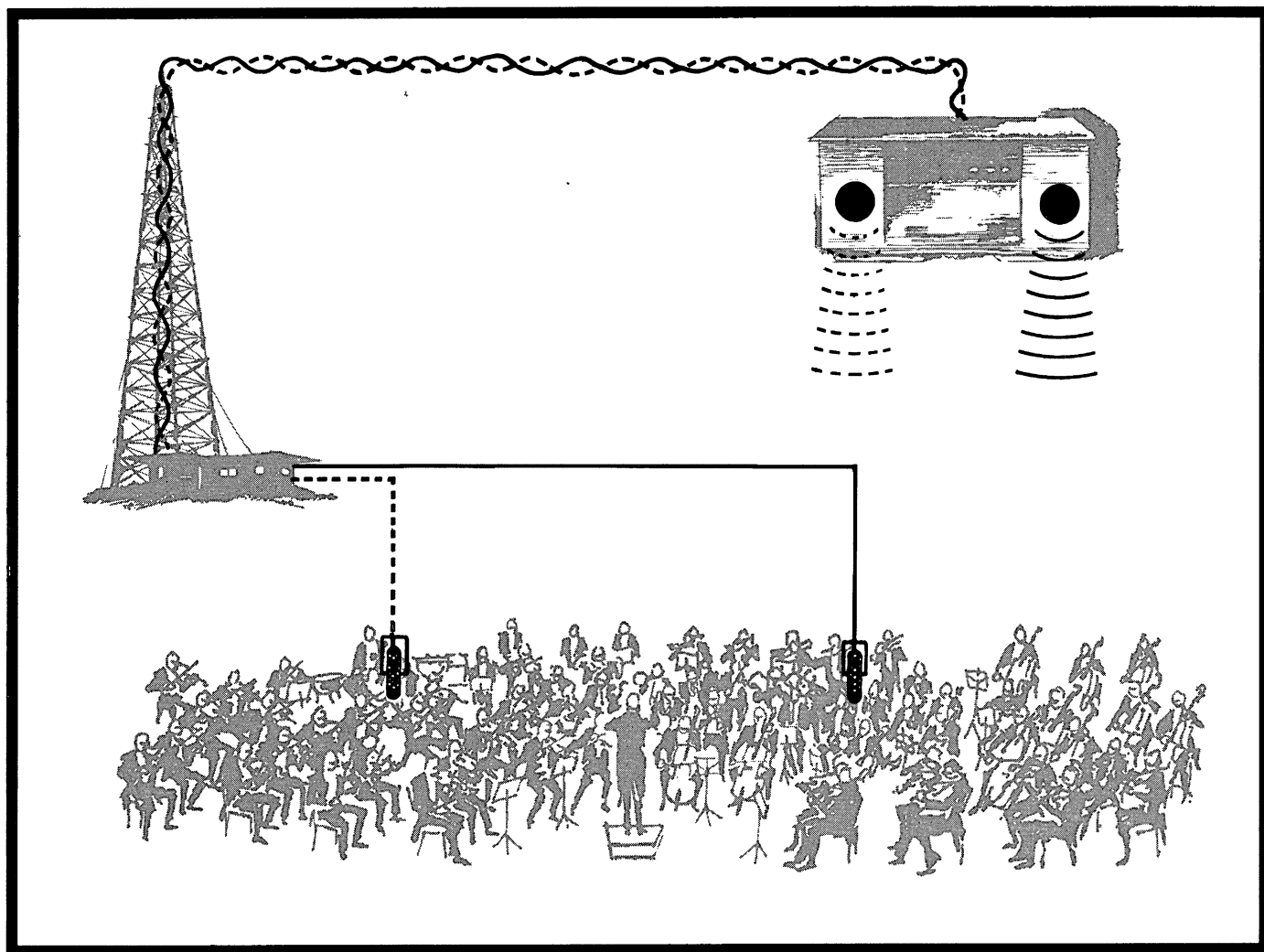


HF 28

HF 28

ZENITH

SERVICE MANUAL



HIGH FIDELITY AND STEREO FM MODELS

ZENITH RADIO CORPORATION

1900 N. AUSTIN AVENUE

CHICAGO, ILLINOIS 60639

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HF 17 is Part No. 923-521	HF 17-1 is Part No. 923-529	HF 17-2 is Part No. 923-555
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HF 19 is Part No. 923-606	HF 20 is Part No. 923-610	HF 21 is Part No. 923-626
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HF 25 is Part No. 923-669	HF 26 is Part No. 923-702	HF 27 is Part No. 923-707
RA 7 is Part No. 923-631	RA 21 is Part No. 923-667	RC5 is Part No. 923-657

Solid State Device Theory and Circuit Applications are found in the following Service Manuals:
 HF 18: Theory — Diodes (including Zener and SCR), Transistors (PNP, NPN, Darlington, and JFET), Applications — Chassis 29AT24 (JFET FM-RF Multiplex, Electronic Touch Switching), Complementary Symmetry, Chassis 11ZT27 (Electronic Filter).
 HF 22: Theory — JFET, IGFET, MOSFET, Applications — Dual Gate MOSFET FM-RF, JFET Biphase Detector, Quasi-Complementary Symmetry.
 HF 23: Applications — Model C9029/Chassis 15WCA10 Four Channel Decoder.
 HF 26: Applications — Chassis 15WDR51 (JFET Meter Circuit, Multiplex IC, Four Channel Decoding).
 HF 27: Applications — Model SD2568 Speaker Switching Circuitry.

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

CABINET			CHASSIS			SPEAKERS		
MODEL	STYLE	COLOR	MODEL	TYPE	MPO OUTPUT NOTE II	PART NUMBER	VOICE COIL IMPED. (In Ohms)	SIZE (In Inches)
B505B Note 2 (RA7)	Portable (Removable Lid)	Blue & . White	—	Phono Only	—	849-48B	8	1-3½
B505F Note 2 (RA7)	Portable (Removable Lid)	Green & White	—	Phono Only	—	849-48B	8	1-3½
D507F11	Portable (With Handle, Lift Lid)	Green	3AT20Z1	Phono Only	1x1W	49-1184	32	1-2x6
D507L11	Portable (With Handle, Lift Lid)	Beige	3AT20Z1	Phono Only	1x1W	49-1184	32	1-2x6
B525J Note 2 (RA7)	Portable (Removable Lid)	Brown & Beige	—	AM/Phono	—	849-48B	8	1-3½
C526R Note 2 (RA29)	Portable (Removable Lid)	Rosewood	—	FM/AM/Phono	—	849-66B	8	1-3½
D535L1	Portable (With Handle, Lift Lid, Detachable Speaker Enclosures)	Beige	1WDA10 Z1	Phono Only	2x1W	49-1230	16	2-4
B545W Note 2 (HF24)	Portable (With Handle, Detachable Speaker Enclosures)	Walnut	—	Phono Only	2x1W	964-24020	16	2-5¼
D546W(1)	Portable (With Handle, Detachable Speaker Enclosures)	Walnut	—	Phono Only	2x1W	964-24020	16	2-5¼
D554W(1)	Modular Table (Lift Lid)	Walnut	—	Phono Only	2x4W	849-77B	16	2-6½
D556W(1)	Modular Table (Lift Lid)	Walnut	—	Phono Only	2x6W	849-80 849-81	16 45	2-8 2-4
C565W1 Note 2 (HF 26)	Modular Table (Lift Lid) (Circle Of Sound Speakers)	Walnut	16CT21	Phono Only	2x25W	49-1168 49-1214	8 6.4	2-Horn 2-6

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

RECORD CHANGER					OTHER FEATURES			
PART NUMBER	MOUNTING	CARTRIDGE	STYLUS NOTE 1	45 RPM ADAPTER	POWER INDICATOR LIGHT	TAPE PROVISION	RECORD STORAGE	REMOTE SPEAKER PROVISION
Manual Player	Integral	942-8B	S 856-15B	827-18B	—	—	—	—
Manual Player	Integral	942-8B	S 856-15B	827-18B	—	—	—	—
169-460	Integral	142-170	D-S 56-567	S-85021	—	—	—	—
169-460	Integral	142-170	D-S 56-567	S-85021	—	—	—	—
Manual	Integral	942-8B	S 856-15B	827-17B	—	—	—	—
Manual	Integral	942-17B	856-22B	827-21B	—	—	—	—
169-459	Integral	142-178	D-S 56-598	S-72910	—	—	—	—
169-407	Hinged Shelf	142-175	D-S 56-560	S-72648	—	—	—	—
169-455	Hinged Shelf	142-167	D-S S-82621	S-82964	—	—	—	—
169-418	Shelf	142-176	D-S 56-621	S-78980	—	—	—	Note 5
169-445	Shelf	142-167	D-S S-82621	S-78980	—	Note 7	—	—
169-436	Shelf	142-167	D-S S-82621	S-82964	—	Note 7	—	Note 6

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

CABINET			CHASSIS			SPEAKERS		
MODEL	STYLE	COLOR	MODEL	TYPE	MPO OUTPUT NOTE II	PART NUMBER	VOICE COIL IMPED. (In Ohms)	SIZE (In Inches)
D583W Note 2 (HF26)	Modular Table (Lift Lid)	Walnut	—	FM/AM/Phono	2x4W	849-78B	8	2-6½
D587W Note 2 (HF27)	Modular Table (Lift Lid)	Walnut	25WDR50	FM/AM/Phono	2x25W	Note 12	—	—
D587W1 Note 2 (HF27)	Modular Table (Lift Lid)	Walnut	25WDR50Z1	FM/AM/Phono	2x25W	Note 12	—	—
C590W2 Note 2 (HF27)	Modular Table (Lift Lid) (Circle Of Sound Speakers)	Walnut	29CT21Z2	FM/AM/Phono	2x25W	49-1168 49-1214	8 6.4	2-Horn 2-6
C590W3 Note 2 (HF27)	Modular Table (Lift Lid) (Circle Of Sound Speakers)	Walnut	29CT21Z2	FM/AM/Phono	2x25W	49-1168 49-1214	8 6.4	2-Horn 2-6
D593W Note 2 (HF27)	Modular Table (Lift Lid)	Walnut	25WDR50	FM/AM/Phono/ Tape	2x25W	49-1237 49-1239	8 8	2-3 2-6½
D593W1 Note 2 (HF27)	Modular Table (Lift Lid)	Walnut	25WDR50Z1	FM/AM/Phono/ Tape	2x25W	49-1237 49-1239	8 8	2-3 2-6½
D593W2 Note 2 (HF 27)	Modular Table (Lift Lid)	Walnut	25WDR50Z1	FM/AM/Phono/ Tape	2x25W	49-1237 49-1239	8 8	2-3 2-6½
D715W Note 2 (HF 27)	Modular Table (Lift Lid)	Walnut	15WDR51	FM/AM/Phono	4x15W	49-1168 49-1231	8 16	4-Horn 4-6½
D742W(1)	Portable (With Handle, Detachable Speaker Enclosures)	Walnut	—	Phono Only	2x4W	964-28872	8	4-6x9
D901W Note 2 (HF26)	Console (Lift Lid)	Walnut	4WDR50X	FM/AM/Phono	2x4W	49-1094 49-1224-01	45 8	2-3½ 2-6x9
D902W11 Note 2 (HF26)	Console (Lift Lid)	Walnut	4WDR50X	FM/AM/Phono	2x4W	49-1094 49-1224-01	45 8	4-3½ 2-6x9
D903M Note 2 (HF26)	Console (Lift Lid)	Maple	4WDR50X	FM/AM/Phono	2x4W	49-1094 49-1224-01	45 8	2-3½ 2-6x9

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

RECORD CHANGER					OTHER FEATURES			
PART NUMBER	MOUNTING	CARTRIDGE	STYLUS NOTE I	45 RPM ADAPTER	POWER INDICATOR LIGHT	TAPE PROVISION	RECORD STORAGE	REMOTE SPEAKER PROVISION
169-418	Shelf	142-176	D-S 56-621	S-78980	—	Note 7	—	Note 6
169-436	Shelf	142-167	D-S S-82621	S-82964	—	Note 7	—	Note 6
169-436	Shelf	142-167	D-S S-82621	S-82964	—	Note 7	—	Note 6
169-436	Shelf	142-167	D-S S-82621	S-82964	—	Note 7	—	Note 6
169-436	Shelf	142-167	D-S S-82621	S-82964	—	Note 7	—	Note 6
169-436	Shelf	142-167	D-S S-82621	S-82964	—	Note 7	—	Note 6
169-436	Shelf	142-167	D-S S-82621	S-82964	—	169-456	—	Note 6
169-436	Shelf	142-167	D-S S-82621	S-82964	—	169-456	—	Note 6
169-436	Shelf	142-167	D-S S-82621	S-82964	—	169-456-01	—	Note 6
169-420	Shelf	142-167	D-S S-82621	S-82964	—	Note 7	—	Note 6
169-457	Hinged Shelf	142-167	D-S S-82621	S-72648	—	—	—	—
169-415	Shelf	142-177	D-S 56-560	S-82964	—	Note 7	Yes	Note 5
169-415	Shelf	142-177	D-S 56-560	S-82964	—	Note 8	Yes	Note 5
169-415	Shelf	142-177	D-S 56-560	S-82964	—	Note 8	Yes	Note 5

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

CABINET			CHASSIS			SPEAKERS		
MODEL	STYLE	COLOR	MODEL	TYPE	MPO OUTPUT NOTE II	PART NUMBER	VOICE COIL IMPED. (In Ohms)	SIZE (In Inches)
D904DE Note 2 (HF26)	Console (Lift Lid)	Dark Oak	4WDR50X	FM/AM/Phono	2x4W	49-1094 49-1224-01	45 8	4-3½ 2-6x9
D907M11 Note 2 (HF 26)	Console (Lift Lid)	Maple	15WDR50Z1	FM/AM/Phono	2x15W	49-1094 49-1153	45 16	4-3½ 2-6x9
D908DE11 Note 2 (HF 26)	Console (Lift Lid)	Dark Oak	15WRD50Z1	FM/AM/Phono	2x15W	49-1094 49-1153	45 16	4-3½ 2-6x9
D908P11 Note 2 (HF 26)	Console (Lift Lid)	Pecan	15WRD50Z1	FM/AM/Phono	2x15W	49-1094 49-1153	45 16	4-3½ 2-6x9
D910W11 Note 2 (HF 26)	Console (Lift Lid)	Walnut	15WDR50Z1	FM/AM/Phono	2x15W	49-1094 49-1153	45 16	4-3½ 2-6x9
DT920W Note 2 (HF 26)	Console (Lift Lid)	Walnut	15WDR50Z1	FM/AM/Phono/ Tape	2x15W	49-1094 49-1166 49-1218	45 8 16	2-3½ 2-Horn 2-10
D921DE Note 2 (HF 26)	Console (Lift Lid)	Dark Oak	15WDR50Z1	FM/AM/Phono	2x15W	49-1094 49-1166 49-1221	45 8 16	2-3½ 2-Horn 2-10
D921P Note 2 (HF 26)	Console (Lift Lid)	Pecan	15WDR50Z1	FM/AM/Phono	2x15W	49-1094 49-1166 49-1221	45 8 16	2-3½ 2-Horn 2-10
D922M Note 2 (HF 26)	Console (Lift Lid)	Maple	15WDR50Z1	FM/AM/Phono	2x15W	49-1094 49-1166 49-1221	45 8 8	2-3½ 2-Horn 2-10
D924W Note 2 (HF 26)	Console (Lift Lid)	Walnut	15WDR50Z1	FM/AM/Phono	2x15W	49-1094 49-1166 49-1221	45 8 8	2-3½ 2-Horn 2-10
DT930W Note 2 (HF 26)	Console (Lift Lid)	Walnut	15WDR50Z1	FM/AM/Phono/ Tape	2x15W	49-1168 49-1243	8 8	2-Horn 2-10
D931W	Console (Lift Lid)	Walnut	35WDR50	FM/AM/Phono	2x35W	49-1094 49-1166 49-1217	45 8 8	2-3½ 2-Horn 2-10
D935M	Console (Lift Lid)	Maple	35WDR50	FM/AM/Phono	2x35W	49-1094 49-1166 49-1217	45 8 8	2-3½ 2-Horn 2-10
D937M	Console (Lift Lid)	Maple	35WDR50	FM/AM/Phono	2x35W	49-1094 49-1166 49-1217	45 8 8	2-3½ 2-Horn 2-10
D939P	Console (Lift Lid)	Pecan	35WDR50	FM/AM/Phono	2x35W	49-1094 49-1166 49-1217	45 8 8	2-3½ 2-Horn 2-10
D945DE	Console (Lift Lid)	Dark Oak	35WDR50	FM/AM/Phono	2x35W	49-1094 49-1162 49-1203	45 6.4 8	2-3½ 2-Horn 2-8x12

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

RECORD CHANGER					OTHER FEATURES			
PART NUMBER	MOUNTING	CARTRIDGE	STYLUS NOTE I	45 RPM ADAPTER	POWER INDICATOR LIGHT	TAPE PROVISION	RECORD STORAGE	REMOTE SPEAKER PROVISION
169-415	Shelf	142-177	D-S 56-560	S-82964	—	Note 8	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	—	Note 8	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	—	Note 8	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	—	Note 8	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	—	Note 8	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	Yes	D631	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 5
169-419	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 5
169-420	Shelf	142-167	D-S S-82621	S-82964	Yes	D631	Yes	Note 4
169-420	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 4
169-420	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 4
169-420	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 4
169-420	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 7	Yes	Note 4
169-420	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 4

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

CABINET			CHASSIS			SPEAKERS		
MODEL	STYLE	COLOR	MODEL	TYPE	MPO OUTPUT NOTE II	PART NUMBER	VOICE COIL IMPED. (In Ohms)	SIZE (In Inches)
D952X	Console (Lift Lid)	White	35WDR50	FM/AM/Phono	2x35W	49-1168 49-1241	8 8	2-3½ 2-10
DT953DE	Console (Lift Lid)	Dark Oak	35WDR50	FM/AM/Phono/ Tape	2x35W	49-1094 49-1162 49-1171	45 8 8	4-3½ 2-Horn 2-12
D966DE Note 2 (HF26)	Console (Lift Lid)	Dark Oak	29AT24Z2 6AT24	FM/AM/Phono	2x80W	49-1073 49-1094 49-1190	6.4 45 6.4	2-15 4-3½ 2-Horn
D966P Note 2 (HF26)	Console (Lift Lid)	Pecan	29AT24Z2 6AT24	FM/AM/Phono	2x80W	49-1073 49-1094 49-1190	6.4 45 6.4	2-15 4-3½ 2-Horn
SD2568X5 (Also see HF 26)	Console Combination (Lift Lid) (W/Remote Speaker Systems)	White	5WDR50X1 25WDA10 Note 3	FM/AM/Tape Amplifier Color TV	2x5W 2x25W	49-1094 49-1168 49-1240 49-1238	45 8 16 8	2-3½ 2-3½ 2-10 2-5
SD2568X9 (Also see HF 26)	Console Combination (Lift Lid) (W/Remote Speaker Systems)	White	5WDR50X 25WDA10 Note 3	FM/AM/Tape Amplifier Color TV	2x5W 2x25W	49-1094 49-1168 49-1240 49-1238	45 8 16 8	2-3½ 2-3½ 2-10 2-5
SD2569P	Console Combination (Lift Lids)	Pecan	35WDR50 Note 3	FM/AM/Phono Color TV	2x35W	49-1094 49-1162 49-1177	45 6.4 6.4	2-3½ 2-Horn 2-9x15
D8725W Note 2 (HF24)	Console Combination (Lift Lids)	Pecan	29CT30 Note 3	FM/AM/Phono Color TV	2x25W	49-1162 49-1177	6.4 6.4	2-Horn 2-9x15
D9011W Note 2 (HF26)	Table Extension Speaker	Walnut	—	—	—	49-1237 49-1239	8 8	1-3 1-6½
D9013W Note 2 (HF26)	Table Extension Speaker	Walnut	—	—	—	49-1168 49-1241	8 8	1-Horn 1-10
C9016W Note 2 (HF25)	Table Extension Speaker	Walnut	—	—	—	849-74B 849-75B	16 16	1-6x9 1-2½
S9017W1 Note 2 (HF22)	Table Extension Speaker	Walnut	—	—	—	49-1102 49-1162	6.4 8	1-12 1-Horn
S9017W2	Table Extension Speaker	Walnut	—	—	—	49-1102 49-1162	6.4 8	1-12 1-1Horn

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

RECORD CHANGER					OTHER FEATURES			
PART NUMBER	MOUNTING	CARTRIDGE	STYLUS NOTE I	45 RPM ADAPTER	POWER INDICATOR LIGHT	TAPE PROVISION	RECORD STORAGE	REMOTE SPEAKER PROVISION
169-420	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 7	Yes	Note 4
169-420	Shelf	142-167	D-S S-82621	S-82964	Yes	D631	Yes	Note 4
169-421	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 4
169-421	Shelf	142-167	D-S S-82621	S-82964	Yes	Note 8	Yes	Note 4
—	—	—	—	—	Yes	Built-in D631	—	Note 4A
—	—	—	—	—	Yes	Built-in D631	—	Note 4A
169-420	Shelf	142-167	D-S S-82621	S-82965	Yes	Note 7	—	Note 4
169-434	Shelf	142-167	D-S S-82621	S-82965	Yes	Note 7	—	Note 4
—	—	—	—	—	—	—	—	Note 12
—	—	—	—	—	—	—	—	Note 12
—	—	—	—	—	—	—	—	Note 9
—	—	—	—	—	—	—	—	Note 10
—	—	—	—	—	—	—	—	Note 10

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

CABINET			CHASSIS			SPEAKERS		
MODEL	STYLE	COLOR	MODEL	TYPE	MPO OUTPUT NOTE II	PART NUMBER	VOICE COIL IMPED. (In Ohms)	SIZE (In Inches)
C9024W Note 2 (RC5)	Component Record Changer	Walnut	—	—	—	—	—	—
D9026W Note 2 (*)	Component Record Changer	Walnut	—	—	—	—	—	—
C9029W Note 2 (HF24)	Component Decoder	Walnut	15WCA10	Amplifier	2x15	49-1168 49-1220	8 8	2-Horn 2-6

NOTES

1. Stylus: S = Manufactured Sapphire, D = Diamond.
2. Model listed for reference only. For chassis information refer to Service Manual shown in parenthesis ().
(*) Denotes Service Manual number has not been assigned.
3. Refer to Color TV Service Manuals for Color chassis information.
4. Built-in Sound Control Center with external speaker terminals and headphone jack.
4A. Head phones connect to radio only.
5. External speaker terminals.
6. Headphone jack.
7. Tape Input and Output - May be used with the following:
Model D635 - Cartridge Tape Player.
Model A636 - Cassette Tape Player/Recorder.
Model D638 - Cartridge Tape Player/Recorder.
Model D762 - Cartridge Tape Player.
8. Tape Input and Output - May be used with the following:
Model D631 - Cartridge Tape Player,
Model D632 - Cassette Tape Player/Recorder,
Model D635 - Cartridge Tape Player,
Model A636 - Cassette Tape Player/Recorder,
Model D638 - Cartridge Tape Player/Recorder,
Model D762 - Cartridge Tape Player.
9. One pair of Model C9015W or Model C9016W Extension Speakers may be used with any Zenith stereo model (not exceeding 25 watts, MPO, per channel) which have external speaker terminals (see notes 4 and 5 above).
10. One pair of Models S9017W, S9017W1, or S9017W2 Extension Speakers may be used with any Zenith stereo model which has external speaker terminals (see notes 4 and 5 above).
11. Indicates number of channels and Momentary Power Output per channel. Less than 5% Total Harmonic Distortion, all channels added.
12. Model D587W is not supplied with speaker systems. One pair of Model D9011W, or D9013W Extension Speakers are designed for use with Model D587W only.

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

RECORD CHANGER					OTHER FEATURES			
PART NUMBER	MOUNTING	CARTRIDGE	STYLUS NOTE I	45 RPM ADAPTER	POWER INDICATOR LIGHT	TAPE PROVISION	RECORD STORAGE	REMOTE SPEAKER PROVISION
169-446	Shelf	142-172	D-S 56-597	S-78980	—	—	—	—
169-435	Shelf	142-167	D-S S-82621	S-82965	—	—	—	—
—	—	—	—	—	Yes	Yes	—	—

RECORD CHANGER FEATURES

PART NO.	MFG.	BASE PLATE	TURNTABLE
169-407	(BSR)	Black	Black
169-415	(VM)	Black	Light Gray
169-418	(BSR)	Black	Black
169-419	(VM)	Black	Light Gray
169-420	(VM)	Black	Light Gray
169-421	(VM)	Black	Aluminum
169-423	(BSR)	Brown	Brown and White
169-427	(BSR)	Black	Black and White
169-434	(VM)	Dark Brown	Light Beige
169-435	(VM)	Tree Bark Brown	Light Beige
169-436	(VM)	Black	Light Gray and Metal
169-445	(BSR)	Black	Light Gray and Metal
169-446	(BSR)	Black	Black
169-455	(VM)	Black	Black
169-457	(VM)	Black	Light Gray
169-459	(BSR)	Brown	Brown and White
169-460	(BSR)	Black	Black and White

SECTION TWO

FM/MX/AM ALIGNMENT AND GENERAL INFORMATION

THEORY

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

MULTIPLEX ALIGNMENT

These receivers have been properly aligned at the factory and will not require further adjustment. As a result, it is not recommended that any attempt be made to alter the multiplex stages. However, should any major components in these circuits require replacement or should anyone tamper with the multiplex adjustments then, of course, realignment will be necessary.

MUTING CONTROL

A muting control (some models), which supplies a reverse bias voltage to the base of the 19KHz amplifier, is factory adjusted, and should not require readjustment. However, if the receiver is operated in an extremely noisy area, there is a possibility that there may be noise bursts of sufficient magnitude to overcome this mute voltage. . . when this occurs, the Stereophonic FM Indicator will light up. To further cut off the 19KHz amplifier, carefully rotate the muting control in a clockwise direction. This should only be done when a stereo signal is on the air since the mute control must only be advanced to a point where the Stereo Indicator does not light up on noise, but is should not be advanced to a point where the desired stereo signal is cut off.

ANTENNAS FOR STEREO FM

Due to the characteristics of the stereo FM system, it will require more signal for proper performance than does monaural FM. As a result, it may be necessary to operate the stereo FM receiver with an external antenna. The necessity for an external antenna will be determined by the signal conditions at each individual installation.

EXTERNAL FM ANTENNA

If the receiver is operated in an area of either low signal strength, high noise, or where multipath (FM ghosts) signals are present, a good external FM antenna will be required. The necessity of an external antenna as a result of weak signal or noise, will be quite evident since the set will not limit, and/or noise will be quite evident. It is extremely difficult to determine if multipath (FM ghosts) signals are present, however, should the program material be distorted, the best manner to decide if multipath signals are the cause of the problem, is to connect an external FM antenna to the receiver. Usually a TV antenna may be available for trial, but even then the results can be misleading, since many TV antennas are of low gain on FM frequencies. Reduction of multipath distortion under high signal conditions may be accomplished by relocation of the receivers antenna system.

FM CABINET ANTENNA

Certain models contain an FM antenna built into the cabinet. This antenna is a folded dipole cut to the desired frequency, and is attached to the internal periphery of the cabinet. The following models use line cord antennas: D583, D587, C590, D593, D715, D901, D902, D903, and D904.

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 4WDR50X, (X1), Model D583 – Test Point "C". Located between Transistor Q1 (FM-RF) and AM Antenna (L101).

Chassis 5WDR50X, (X1) – Test Point at junction of R1, R2, and C3. Located adjacent to Q1.

Chassis 15WDR50Z1 – Test Point "C". Located between Transistors Q101 (A.M. Converter) and Q201 (1ST. I.F.).

Chassis 15WDR51 – Test Point Q101 end of Purple wire going around pulley end of gang.

Chassis 25WDR50, (Z1), 29CT20, 29CT21, (Z1), (Z2), 29CT30, 35WDR50 – Test Point at junction of R2, R229; either end of purple wire at pulley end of gang.

Chassis 29AT24, (Z1), (Z2) – Test Point "C" RF Amplifier AGC Feed Thru on FM Tuner.

**Chassis 4WDR50X, (X1),
Model D583**

Micro Volts Input	Reverse AGC Voltage at Test Point "C"
0	1.50
25	1.48
100	1.36
200	1.20
500	1.04
1K	*0.96
5K	0.92
50K	0.60
100K	0.49

Chassis 5WDR50X, (X1)

Micro Volts Input	Reverse AGC Voltage at Test Point "C"
0	.016
25	.012
100	-.037
200	-.124
500	-.312
1K	*-.470
5K	-.710
50K	-3.49
100K	-4.55

Chassis 15WDR50Z1

Micro Volts Input	Reverse AGC Voltage at Test Point "C"
0	1.34
25	1.23
100	0.91
200	0.82
500	0.73
1K	*0.70
5K	0.58
50K	0.10
100K	0.06

Chassis 15WDR51

Micro Volts Input	Reverse AGC Voltage at Test Point "C"
0	5.00
25	4.20
100	2.80
200	2.40
500	1.70
1K	*1.10
5K	0.05
50K	-2.40
100K	-3.20

**Chassis 25WDR50, (Z1), 29CT20,
29CT21, (Z1), (Z2), 29CT30,
35WDR50**

Chassis 29AT24, (Z1), (Z2)

Micro Volts Input	Reverse AGC Voltage At Gate 2 of FM RF	Micro Volts Input	AGC Voltage At 1st.I.F. (See Note)
0	5.7	0	1.50
25	4.5	25	1.40
100	2.8	100	1.10
200	2.2	200	.95
500	1.5	500	.80
1K	*-0.96	1K	*.75
5K	-0.22	5K	.65
50K	-1.10	50K	.52
100K	-1.20	100K	.40

AGC ADJUSTMENT NOTE

Chassis 29AT24, (Z1), (Z2) – Adjust AGC control so that under no signal conditions a voltage of 1.5 volts is measured across the 820 ohm resistor connected from 1st IF emitter to “B-” (-12.4V) when in A.M.

TROUBLE SHOOTING AND SIGNAL TRACING

The old technique of “screwdriver testing” is definitely not recommended while trouble shooting any solid state product. In that method various circuit points were touched or shorted to ground to cause a hum or click in the speaker. This must be avoided because a solid state component can be destroyed if excessive voltage or if wrong voltage polarity is applied. Only standard point to point signal tracing with the proper RF, IF, and Audio Signal Sources should be used.

RESISTANCE MEASUREMENTS

It is recommended that you use an ohmmeter having a very low voltage in the meter circuit. If the voltage is too high at the meter terminals, it could bias solid state devices into conduction, resulting in misleading readings. As an alternate procedure, remove transistor, or other solid state devices from the circuit before making measurements.

SPEAKER PHASING

It is important that coded speaker leads be connected to coded terminals on speakers for proper polarity within each speaker group. It is then important that the speaker groups be in phase with each other. One excellent method is to play a monaural record with the volume of each speaker group equal. The sound should appear to come from a point midway between the speaker groups. If the sound comes from other than midpoint, you should check polarity. One of the easiest methods of checking polarity within the speaker group is to momentarily place a 4½ volt battery across the speaker feed terminals. All the speaker cones should simultaneously move in the same direction.

POWER AMPLIFIERS

Power transistors and their circuits are unique in operation, therefore, repair procedure differs from those steps followed when repairing tube type-circuits.

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.) (In chassis using quasi-complementary symmetry circuits, the outputs consist of two matched

NPN's. The drivers, which are matched NPN and PNP should also be replaced as matched pairs): 3AT20, (Z1) 4WDR50X, (X1), 6AT24, 15WCA10, 15WDR50Z1, 15WDR51, 16CT21, 25WDA10, 25WDR50, (Z1), 29CT20, 29CT21, (Z1), (Z2), 29CT30, 35WDR50, B545, D546, (1), D583, D742, (1).

2. When a power transistor is replaced the insulator (when used) between the transistor and the heat sink should also be replaced. On the following be certain to apply Dow Corning No. 340 heat conductive grease between the transistor and the insulator. Also between the insulator and the chassis. The Dow Corning grease can be obtained in 1 c.c. quantities by ordering Part No. 205-51: 4WDR50X, (X1), 6AT24, 15WCA10, 15WDR50Z1, 15WDR51, 16CT21, 25WDA10, 25WDR50, (Z1), 29CT20, 29CT21, (Z1), (Z2), 29CT30, 35WDR50.
3. On the following place the heat conductive grease in the clamp, or on the chassis, and all around the transistor: B545, D546, (1), D583, D742, (1).
4. Do not operate these amplifiers without their proper speaker load.
5. Do not short out the audio output of either channel when the amplifier is operating.
6. 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.
7. Remove plug-in transistors from their sockets before doing any soldering to the socket lugs.

CIRCUIT BOARD COMPONENT IDENTIFICATION

As a special feature to aid the Service Technician, Zenith has identified the location of components which are mounted on certain circuit boards. This information is printed on the circuit boards and also appears on the schematic. We also have prepared a two-color 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, as follows.

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.

CIRCUIT BOARD SERVICING

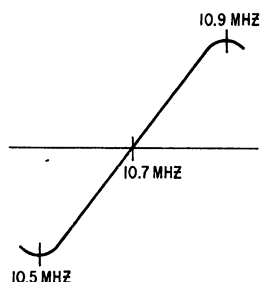
Servicing circuit board sets is, in general, much the same as servicing ordinary receivers. However, certain tools and techniques are helpful for this type of work.

1. Good pair of long-nose pliers.
2. Sharp wire cutters.

3. Small stiff glue brush (for solder removal).
4. Metal pick (soldering aid).
5. Pencil type soldering iron with a small tip (25 watts or less).
6. Tin leads on component before soldering.
7. Use only solder with an extremely low melting point, (60% Tin, 40% Lead).

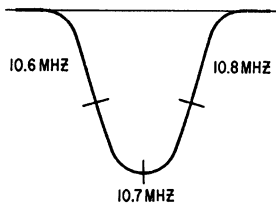
WARNING: Excessive heat may damage the circuit board foil during component replacement if a soldering pencil, iron or gun of higher wattage rating is used.

If a unit, such as the oscillator coil or I.F. transformer is to be removed, heat the mounting lugs with a pencil type soldering iron and move them away from the soldered connection with a long nose pliers or metal pick. Continue heating the lugs and brush away the molten solder with a small stiff glue brush. Remove the defective unit. Before inserting the new unit, be certain that the lug holes are open and free from solder. Forcing a lug against a solder filled hole may break the bond between the chassis base and the wiring foil. Exercise care when replacing units. An open or damaged section of circuit board wiring foil can be repaired by soldering a short jumper wire across the points to be connected. When soldering low voltage electrolytics, transistors and diodes, the wire should be held with a pair of long nose pliers. The long nose pliers will act as a heat sink.



Scope Pattern - A

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



Scope Pattern - B

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.

FM ALIGNMENT

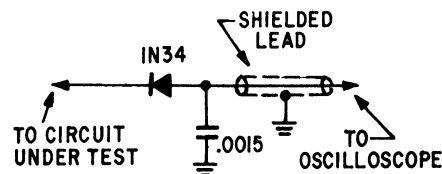
Alignment of these chassis will, in most cases, not be necessary unless an RF or IF transformer is replaced or if someone has tampered with the adjustment.

Because of the wide band pass required in the multiplex FM tuner, it is desirable to use an FM signal generator having a deviation of 400 KHz with a sweep rate of 60 Hertz as well as an oscilloscope when aligning both the IF and RF FM 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 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 all AM, IF and RF adjustments.



Detector Probe -

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

RF AND IF ALIGNMENT PROCEDURE FOR CHASSIS 25WDR50, Z1, 29CT20, 29CT21, Z1, Z2, 29CT30, 35WDR50

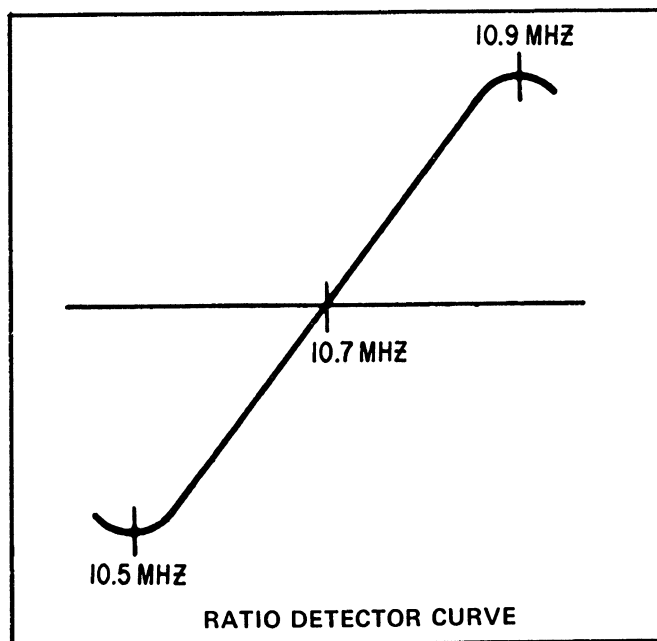
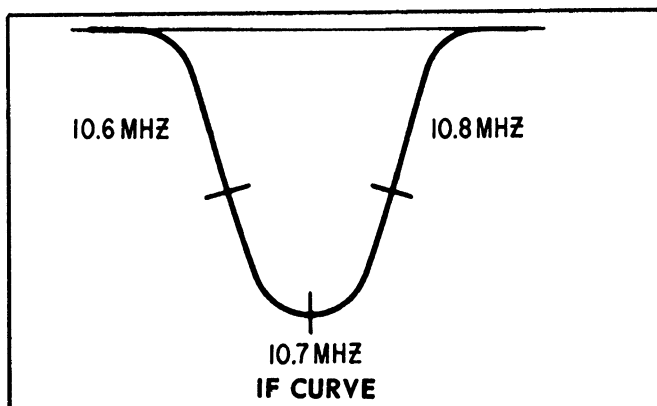
STEP	CONNECT VTVM / SCOPE TO	CONNECT GENERATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	SET DIAL TO	ADJUST	PURPOSE		
NOTE: For AM Alignment Use A Signal With 400 Hertz Modulation, Bandswitch in AM.									
1	VTVM Speaker Voice Coil	One turn loosely coupled to wavemagnet		455 KHz	600 KHz	L203, L204, L207, L210, L215	Align IF channel for maximum output		
2				1600 KHz	1600 KHz	C1K	Set oscillator to dial scale		
3				600 KHz	600 KHz	L103			
4				Repeat Steps No. 2 & 3					
5				1400 KHz	1400 KHz	C1H			
6				600 KHz	600 KHz	T101	Align RF stage		
7				Repeat Steps No. 5 & 6					
8						1400 KHz	1400 KHz	C1F	Align antenna stage.
NOTE: For FM Alignment Use A Signal With 400 KHz Deviation, Bandswitch in FM, AFC "OFF".									
9	Scope Ratio Detector Test Point "H"	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 MFD capacitor.	10.7 MHz	Gang Closed	L212	Adjust Primary and Secondary of ratio detector for maximum amplitude and symmetry, as shown in Scope Pattern "A"		
10						L214			
11	Scope Last FM IF Test Point "G"	Term. No. 3 of T203 2nd IF Trans. Test Point "F"				L208 & L209	Align I.F. transformer for maximum output and symmetry. This pattern is not necessarily identical to the overall Scope Pattern "B"		
12		Term. No. 4 of T201 1st IF Trans. Test Point "E"				L205 & L206			
13	Connect to Test Point "D"	Connect to Test Point "D"					L201 & L202	Readjust L201, L202, L205, L206, L208 & L209	Align I.F. transformer for maximum output and symmetry as indicated in Scope Pattern "B"
14									
NOTE: In Steps 13B and 14B Generator ground Must be Connected On Braid As Close To Gang As Possible									
15	Scope Last FM IF Test Point "G"	FM Antenna Post (Remove Antenna) Test Point "A"	300 ohm	106 MHz	106 MHz	C13	Set oscillator to dial scale		
16				90 MHz	90 MHz	L4			
17				Repeat Steps 15 & 16					
18				106 MHz	106 MHz	C1C	Align FM Detector stage for maximum		
19				90 MHz	90 MHz	L2 if necessary			
20				106 MHz	106 MHz	C1A	Align FM Antenna stage for maximum		
21				90 MHz	90 MHz	L1 if necessary			
22				Repeat Steps 15 thru 21					

NOTES

SECTION THREE

MULTIPLEX ALIGNMENT PROCEDURE

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



Because of the wide band pass required in a FM multiplex receiver, it is desirable to use a FM signal generator having a deviation of at least 200 KHz with a sweep rate of 60 Hertz, as well as an oscilloscope. During the IF and Ratio Detector alignment it is not only necessary to obtain maximum gain, but also extremely important to maintain symmetry.

To help achieve IF curve symmetry 10.6 and 10.8 megahertz markers must be positioned symmetrically to each side of the 10.7 megahertz marker, which must be at the center of the curve. When aligning the Ratio Detector, 10.5 and 10.9 megahertz

markers are desirable to achieve S curve symmetry. The pattern illustrating marker use to obtain S curve symmetry indicates it is most necessary to adjust for maximum gain and at the same time maintain linearity and symmetry. 10.7 megahertz must be on the curve at the reference line. 10.5 megahertz and 10.9 megahertz must be at the lower and upper turn of the S curve respectively. Only when the I.F. and Ratio Detector circuitry have been aligned in accordance with these specifications should the technician proceed to align the multiplex portion of the receiver.

Preliminary Procedures

Before using a FM multiplex signal generator, it is recommended that it be turned on, giving it a 10 to 20 minute warmup period. This will allow ample time for the RF, audio, and 19kHz oscillators to stabilize.

Although the 19kHz pilot generator oscillator is extremely stable, there is always the possibility that it could shift from its precisely assigned frequency. There is a very simple method to check the 19kHz pilot frequency using a FM multiplex receiver and a FM multiplex station as a frequency standard. Proceed as follows:

1. Tune your FM multiplex receiver to a FM multiplex station. When the pilot indicator lights up, it indicates the 19 kHz pilot amplifier is functioning. Since the 19kHz sine wave is from the transmitter it must be on frequency and can be used as a reference standard. Connect a cable between the output of the 19kHz amplifier and the vertical input of a good oscilloscope.
2. Connect the composite output terminal of the generator, directly to the horizontal input of the oscilloscope. Apply a 10% pilot carrier. The oscilloscope will display an oval Lissajous figure which should be motionless when the 19kHz output of the generator is synchronized with the 19kHz signal from the transmitter. Should the Lissajous figure rotate, it will only be necessary to adjust the pilot carrier frequency adjustment on the multiplex generator, until the Lissajous figure ceases to rotate. Refer to generator instruction book after the generator has been adjusted to zero beat, disconnect all cables.

Multiplex generators 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 is an excellent tool that can be used in signal tracing the multiplex portion of the receiver. We do not recommend that multiplex alignment be made using only the composite signal injected at the output terminal of the ratio detector tertiary winding, since there is always some phase shift occurring in the RF, IF or Ratio Detector circuits. As a result, multiplex alignment made by a signal injected at the Ratio Detector 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, and separation would be at the maximum for this receiver.

The RF signal should be injected at a point in the FM band where no other 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 will indicate the RF frequency adjustment is tuned to an image.

FM – MULTIPLEX ALIGNMENT PROCEDURE

CHASSIS – 10ZT30, 11AT30, 15WDR50Z1, 20AT21, 20AT21Z, 20AT30, 20AT30Z, 20AT31Z, 21BT30, 21BT34, (Z1), 25AT20, 25BT22, 25WDR50, (Z1), 27BT30, 29CT20, 29CT21, (Z1), (Z2), 29AT24, (Z1), (Z2), 29CT30, 35WDR50.

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 SCOPE AND/OR VTVM	CONNECT GENERATOR	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJUST	PURPOSE
NOTE: PLACE BANDSWITCH IN FM POSITION AND STEREO/MONO SWITCH IN STEREO. USE RF FREQUENCY NEAR CENTER SCALE								
1**	Test Point "M" Composite Amp VTVM(AC)	Test Point "A" FM ANT.	300 Ohm	98MHz, 67kHzSCA	FM	98MHz	(T301**)	Adjust 67kHz Trap for minimum.
2	Test Point "N" Doubler VTVM(DC)			98MHz, 10% Pilot			T301, T302, R308 (T302, T303, R309**)	Adjust 19kHz Amp and Doubler for maximum.
3				98MHz, 5% Pilot			R308(R309**)	Adjust mute control to point where stereo lamp lights up.
4	"L" Audio Output (After 38kHz filter) VTVM(AC)			98MHz, 10% Pilot L+R, L-R, (Mod. L Only)			T303(T304**)	Adjust 38kHz Detector for maximum at "L" Output. NOTE→ "L" Output should be approximately 10 (or greater) times "R" Output.
5	"R" Audio Output (After 38kHz filter) VTVM(AC)			Check "R" channel output				

**FOR CHASSIS 29AT24, (Z1), (Z2) ONLY.

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, limiter and ratio detector portions of the receiver, or whether the difficulty lies in the multiplex portion. A multiplex generator is an excellent signal tracing device to determine if the multiplex section of the receiver is functioning properly. The composite output of the multiplex generator can be injected at the output of the ratio detector.

To reduce possible extraneous signals coming through the 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.

67kHz Signal Tracing

1. Turn generator pilot carrier amplitude control to zero.
2. Move L+R and L-R switches to OFF position.
3. Move 67kHz generator ON. Sequentially connect an oscilloscope to the input and output of the 67kHz trap. The 67kHz signal at the output of the trap if it is properly nulled, will be much smaller than at the input. The voltage ratio should be approximately 20 to 1, input to output.

19kHz Signal Tracing

1. Move the 67kHz generator OFF.
2. Move the generator 19kHz pilot carrier amplitude control to 10% position.

3. Sequentially connect your scope to the base of composite amplifier, base of 19kHz amplifier and collector of 19kHz amplifier. The amplitude of the 19kHz signal should greatly increase as you proceed along the 19kHz chain.

Doubler and Subcarrier Signal Tracing

To determine if the doubler is functioning, place your scope at the junction of the two diodes and you will see 38kHz DC pulses. Placing the scope at the collector of the subcarrier amplifier, you should see a 38kHz sine wave which will indicate that the subcarrier amplifier and associated ringing circuitry is functioning properly.

Multiplex Detector Signal Tracing

1. Move the 19kHz pilot amplitude control to 10%.
2. Move the L - R generator switch to L - R. You should see equal amplitude 1000 hertz sine waves at both L and R outputs.
3. Move the L+R switch to L+R and look at the L audio output, and measure the magnitude of the 1000 Hertz sine wave. If the multiplex detector and preceding circuitry are aligned properly, the magnitude of the wave form at L should be greater than at R.

If all the waves are similar in form and magnitude to those indicated, then 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 wave forms are missing at a latter point but are apparent at a previous point, then something is amiss in the circuitry between the two test points.

FM – MULTIPLE ALIGNMENT PROCEDURE – CHASSIS 4WDR50X, (X1), MODEL D538

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 SCOPE AND/OR VTVM	CONNECT GENERATOR	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJUST	PURPOSE
NOTE – PLACE BANDSWITCH IN FM STEREO POSITION. USES RF FREQUENCY NEAR CENTER SCALE.								
1	Test Point "M"	Test Point "A" FM ANT.	300 Ohm	98MHz, 10% Pilot	FM	98MHz	L302	Adjust 19kHz Amp for maximum.
2							L303	
3	"L" Tape Output			98MHz, 10% Pilot, L+R, L-R, (Mod. L Only)			L301, L302, L303	Adjust for maximum L Channel reading.
4	"R" Tape Output						L303	Adjust for minimum R Channel reading.
5				Repeat Steps 3 and 4 for minimum change.				To provide maximum separation.

FM – MULTIPLEX ALIGNMENT PROCEDURE – CHASSIS 5WDR50X, (X1)

STEP	CONNECT SCOPE AND/OR VTVM	CONNECT GENERATOR	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJUST	PURPOSE		
NOTE → PLACE BANDSWITCH IN FM-STEREO AND AFC IN OFF. FOR FOLLOWING ADJUSTMENTS USE 98MHz OR OTHER CLEAR RF FREQUENCY NEAR CENTER SCALE.										
1	Test Point "R" Pin 4 on T301	Test Point "H" Disconnect FM Antenna	300 Ohm	98MHz 10% Pilot	FM	98MHz	T301	Adjust 19kHz Amp for maximum.		
2	Test Point "U" Junct. of CR301 and CR302			98MHz 10% Pilot L+R, L-R, (L only)			T302	Adjust 19kHz Amp for maximum.		
3	Test Point "Z" Left Output						T303	Adjust 38kHz Amp for maximum L Channel reading to provide maximum separation.		
4	Test Point "X" Right Output						R305	Adjust for minimum R Channel reading to provide maximum separation.		
5	Test Point "Z" Left Output			98MHz 10% Pilot L+R, L-R, (R only)				Adjust for minimum, should be equal to step 4.		

FM – MULTIPLEX ALIGNMENT PROCEDURE – CHASSIS 15WDR51

STEP	CONNECT SCOPE AND/OR VTVM	CONNECT GENERATOR	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJUST	PURPOSE
NOTE — PLACE BANDSWITCH IN FM STEREO POSITION. USE RF FREQUENCY NEAR CENTER SCALE.								
1	Test Point "M"	Test Point "A" FM Antenna	300 Ohm	98MHz 10% Pilot	FM	98MHz	T301	Adjust 19kHz Amp for maximum.
2				T302				
3				98MHz 5% Pilot			R302	Adjust mute control to point where stereo lamp lights up.
4	"L" Tape Output			98MHz 10% Pilot L+R, L — R, (Mod. L Only)			T303	Adjust for maximum L Channel reading.
5	"R" Tape Output						T303 if necessary	Adjust for minimum R Channel reading.
6								
REPEAT STEPS 4 and 5 for MINIMUM CHANGE.								To provide max. separation.

SECTION FOUR

THEORY AND APPLICATION

ALLEGRO SPEAKER SYSTEM – MODEL D9013W

Speaker system, Model D9013, is of the bass reflex type. Figure 1 is the schematic, while Figure 2 illustrates the cabinet design. As you will note, the enclosure has two openings in the front, one for each speaker. In the past, most bass reflex enclosures had a port on the front, with the remaining walls being solid. Model D9013, as illustrated in Figure 2, has a port in the rear panel of the enclosure, instead of the front.

It is interesting to note that a bass reflex speaker enclosure can be described as a tuned enclosure in which air in the port will resonate with the air in the main area of the cabinet, at a given frequency. This frequency determines the effective low frequency cutoff of the system (cabinet and enclosure combined). Below the selected frequency (45 Hz in the D9013W) the response drops very rapidly (approximately 18 db/octave).

It could also be described as an acoustical phase inverter. That is, at some frequency, within its normal operating range, the air in the port is moving in an outward direction (to the back), while the speaker cone is also moving in an outward direction (to the front). These two movements would occur at the same instant.

A basic advantage of the bass reflex system, as compared to a closed box enclosure, is that in a bass reflex system the designer can either extend the frequency response, while maintaining the same level of efficiency; or retain the frequency response while raising the efficiency approximately 3 - 4 db. In designing the Allegro, it was decided to improve the frequency response beyond that of an earlier model (S9017).

Sound level of signals radiated thru the port (in the 40-70 Hz range) is comparable to the sound level radiated by the woofer (in the range of 70 Hz to 1 kHz). This requires that the 2-5/8" diameter port must "pulsate" air at a much higher velocity than the woofer, which is approximately 8" in diameter. Several factors must be considered in order to maintain the required port velocity.

A. The woofer uses a highly efficient magnetic structure making it comparable to a powerful electrical motor. This forces air, in the port, to move at high velocities, even though the air in the box is attempting to stop motion of the speaker cone.

B. The internal air pressure in a bass reflex enclosure is much higher than that found in a conventional closed-box enclosure, therefore mechanical construction of a bass reflex enclosure must be more substantial than that of an air suspension type. All panels, walls and joints must be extremely rigid to withstand these air pressures.

C. Speakers (and other components) must be securely fastened to prevent air leaks. Leaks or loose components can result in losses which cause a deterioration of performance.

In order to effectively increase cabinet volume, and also to dampen internal resonances of the enclosure, three acoustic pads of variable density are placed adjacent to the internal walls. The area of each pad that has the highest density is adjacent to the wall surface. These pads must not obstruct the port.

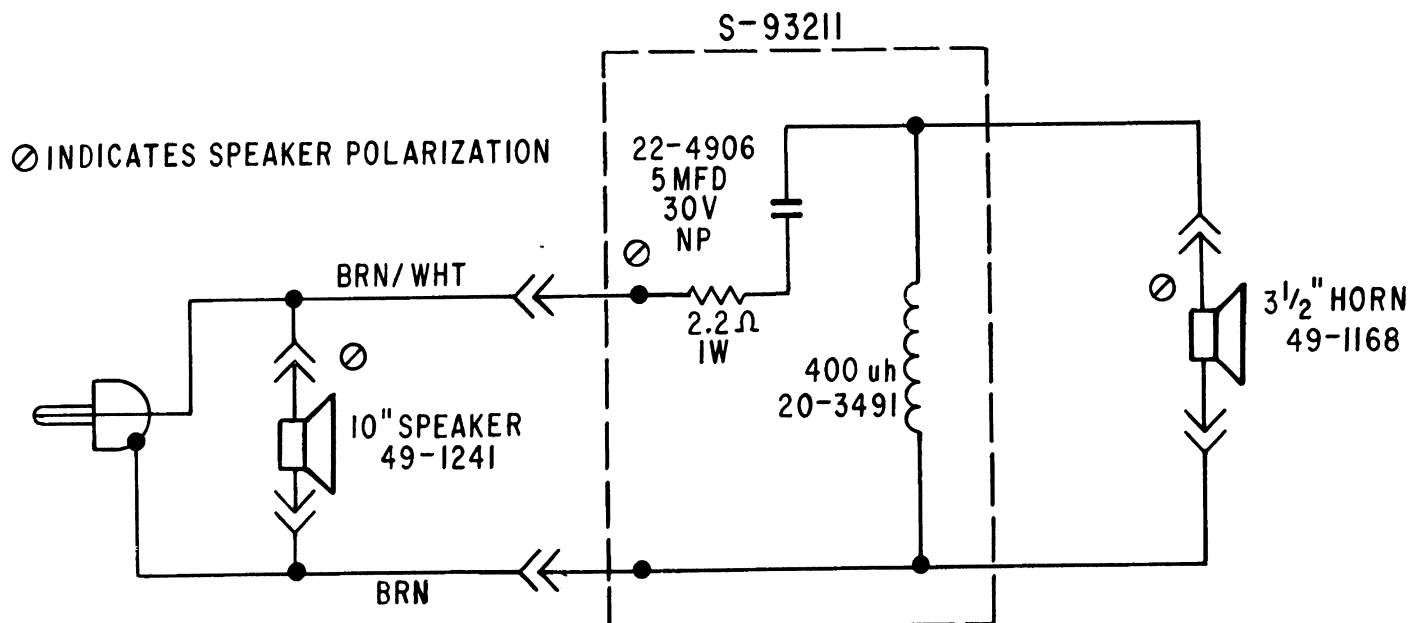


FIGURE 1 – MODEL D9013 – SCHEMATIC

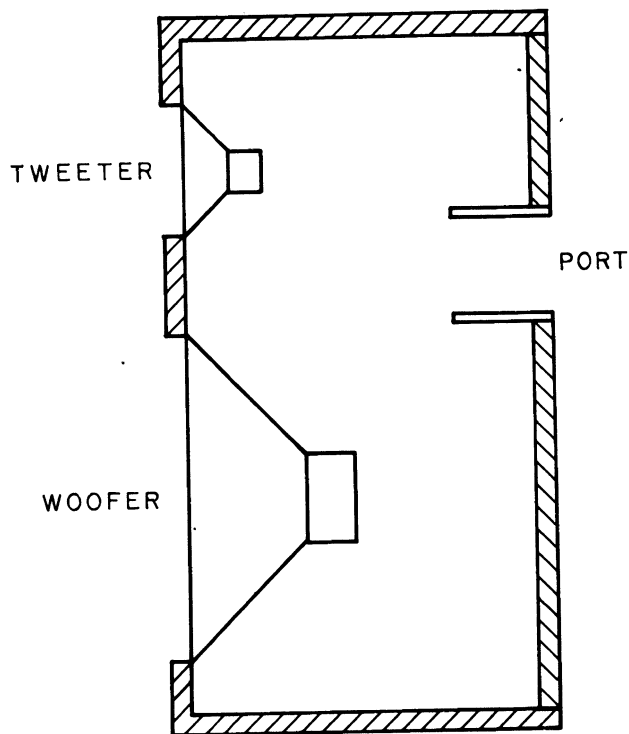


FIGURE 2 -- CABINET ENCLOSURE

When servicing these units (or for that matter most speaker enclosures) several precautions must be taken:

- A. When removing the back, be careful when handling the acoustical pads (they may tear easily).
- B. All speakers must be securely fastened to prevent leaks and rattles.
- C. If the front grille is removed, be certain that the baffle is tightly captivated by the mounting screws when reinstalled.
- D. When replacing the back, be certain that the acoustic pads don't interfere with the port.
- E. The screws holding the back must be secured by using a sufficient amount of torque in order to prevent air leaks.

Normal positioning of this enclosure in a listening room would be near a wall. While this would be normal, in fact, desirable, caution must be taken to avoid placing this enclosure in any position that would obstruct the port, as this would result in degraded bass response. The desired positioning would be one which allows at least 1½ inches between the back of the enclosure and the wall of the room (or similar obstruction).

Note: Certain mechanical components in the following parts lists are manufactured to metric standards. Caution should be used in selection of replacement hardware.

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
CHASSIS 1WDA10Z1			
12-5411	Mtg. Bracket - Control & P.C. Board	63-1831	12K Ohm Resistor - 1/2W, 10% (3 Req.)
22-6	470 PF Ceramic Capacitor - 100V.	63-1868	100K Ohm Resistor - 1/2W, 5% (2 Req.)
22-3010	.01 MF Ceramic Capacitor - 25V.	63-1918	1.5 Megohm Resistor - 1/2W, 10% (2 Req.)
22-3034	.05 MF Capacitor - 25V.	63-6424	1 Ohm Resistor - 5W, 10% (2 Req.)
22-3748	1000 PF Ceramic Disc Capacitor - 1KV.	63-8977	Bias Control (2 Req.)
22-3973	100 MF Electrolytic	83-7552	Transistor Insulating Strip (2 Part Of 121-880X)
22-4577	50 MF Electrolytic	*83-8549	3 Lug Terminal Strip
22-5167	1000 MF Electrolytic	*83-8550	3 Lug Terminal Strip
22-5188	.01 MF Mylar Capacitor - 50V.	*94-1274	Nylon Bushing (2 Part Of 121-880X)
22-5413	100 MF Electrolytic	114-77	6-20 x .312 x .25 Hex Hd. Self-Tap. Screw- Stat. Bronze (3 Mt. 126-1521)
52-1647	2 Conductor Shielded Cable	114-1144	4-24 x .50 x 3/16 Hex Hd. Self-Tap. Screw- Stat. Bronze (2 Mt. Ea. 121-880X)
63-1743	100 Ohm Resistor - 1/2W, 10% (2 Req.)	121-430B	Transistor - Phase Inverter Sound Amplifier (2 Req.)
63-1803	2700 Ohm Resistor - 1/2W, 10% (2 Req.)	121-767	Transistor - Bias (2 Req.)
63-1887	270K Ohm Resistor - 1/2W, 10% (2 Req.)	121-768	Transistor - Pre-Driver (2 Req.)
63-4529	4.7 Ohm Resistor - 1/2W, 10% (2 Req.)	121-773	Transistor - Driver (2 Req.)
63-9772	1.5M Ohm Volume Control (Left)	121-774	Transistor - Driver (2 Req.)
63-9773	500K Ohm Tone Control	121-880X	Transistor - Output (Match Pair) (2 Req.)
63-9778	1.5M Ohm Volume Control (Right)	126-1521	Heat Sink
86-329	Connector Terminal (4 Part Of 74674)		
94-1527	Snap Bushing (2 Req.)	CHASSIS 35WDR50	
212-76	Silicon Rectifier	*11-299	Line Cord
212-64	Integrated Circuit Package (2 Req.)	*12-5425	Pulley Mtg. Bracket (Part Of S-85563 & S-86475)
S-74674	Speaker Lead & Terminal Assem. (2 Req.)	*12-5508	Heat Sink Bracket
CHASSIS 3AT20Z1		12-5810	Bracket
12-5331	Chassis Support Bracket	17-143	Nylon Clamp (2 Req.)
22-3177	390 PF Ceramic Disc Capacitor - 500V.	19-480	Wire Retaining Clip
22-3652	.01 MF Ceramic Disc Capacitor - 10V.	19-485	Cable Retaining Clip (2 Req.)
22-3973	100 MF Electrolytic - 25V.	*20-1256	Trap Coil (10.7 MHz)
22-4568	100 MF Electrolytic - 15V.	*20-1649	FM Oscillator Coil
22-6096	470 MF Electrolytic - 35V.	*20-3076	FM Antenna Coil
63-1742	100 Ohm Resistor - 1/2W, 5%	*20-3077	FM Detector Coil
63-1775	560 Ohm Resistor - 1/2W, 10%	20-3080	Trap Coil - 67 KHz
63-1841	22K Ohm Resistor - 1/2W, 10%	22-13	.0033 MF Disc Capacitor - +10-10% 500V. (2 Req.)
63-1883	220K Ohm Resistor - 1/2W, 10%	22-14	.0047 MF Disc Capacitor - 500V. (3 Req.)
63-1908	820K Ohm Resistor - 1/2W, 10%	22-2428	1.8 PF Gimmick Capacitor - 500V.
63-1911	1 Megohm Resistor - 1/2W, 10%	22-2592	3.4 MF Ceramic Disc Capacitor - 500V.
63-4529	4.7 Ohm Resistor - 1/2W, 10% (2 Req.)	22-2729	.001 MF Disc Capacitor - 25V. (5 Req.)
63-8321	Volume Control	22-2884	5 MF Electrolytic Capacitor - 12V. (4 Req.)
86-329	Connector Terminal (2 Req.)	22-3034	.05 MF Disc Capacitor - 25V. (14 Req.)
103-145	Diode	22-3080	.005 MF Disc Capacitor - 25V. (2 Req.)
121-433	Transistor - Driver	22-3177	390 PF Disc Capacitor - 500V. (2 Req.)
-OR-		22-3255	330 PF Disc Capacitor - 500V. (2 Req.)
121-764	Transistor - Driver	22-3310	2.7 PF Gimmick Capacitor - 500V. (2 Req.)
212-76	Silicone Rectifier	22-3362	560 PF Disc Capacitor - 500V. (2 Req.)
800-305	Transistor - Output (Match Pairs) (PNP & NPN)	22-3381	39 PF Ceramic Disc Capacitor - +/- 5% 500V. (2 Req.)
25WDA10		22-3393	.01 MF Disc Capacitor - 25V. (6 Req.)
CHASSIS COMPONENTS		22-3415	.0068 MF Disc Capacitor - 25V.
22-2884	5 MF Electrolytic - 12V. (2 Req.)	22-3541	3.3 PF Gimmick Capacitor - 500V.
22-3362	560 PF Ceramic Disc - 500V. (2 Req.)	22-3652	.1 MF Disc Capacitor - 10V. (2 Req.)
22-3687	1 MF Electrolytic - 50V. (2 Req.)	22-3675	10 PF Disc Capacitor - 500V. (2 Req.)
22-5168	300 MF Electrolytic - 25V.	22-3687	1 MF Electrolytic Capacitor - 50V. (4 Req.)
22-5316	500 MF Electrolytic - 50V. (2 Req.)	22-3751	20 PF Capacitor - +/- 5% 500V.
22-5482	680 PF Ceramic Disc - 500V. (2 Req.)	22-3770	5.5 PF Disc Capacitor - 500V.
22-5866	.047 MF Mylar Capacitor - 100V. (4 Req.)	22-3896	5 MF Electrolytic Capacitor - 25V.
22-5986	50 MF Electrolytic - 25V. (2 Req.)	22-4573	1000 MF Electrolytic Capacitor - 15V.
33-377	Frame, Printed Circuit Board	22-4819	2 PF Capacitor - +/- .25% 500V.
54-808	Nut (1 Used On Ea. 114-1144)	22-4855	Trimmer Capacitor - 1.7 To 10 PF Ceramic
54-851	Palnut (7 Used On 33-377)	22-5233	.015 MF Mylar Capacitor - +/- 20% 50V. (2 Req.)
63-1701	10 Ohm Resistor - 1/2W, 10% (2 Req.)	22-5316	500 MF Electrolytic Capacitor - 50V. (2 Req.)
63-1715	22 Ohm Resistor - 1/2W, 10% (2 Req.)	22-5481	560 PF Disc Capacitor - 500V. (2 Req.)
63-1736	68 Ohm Resistor - 1/2W, 10% (2 Req.)	22-5482	680 PF Disc Capacitor - 500V. (7 Req.)
63-1757	220 Ohm Resistor - 1/2W, 10% (4 Req.)	22-5486	10 MF Electrolytic Capacitor - 6V.
63-1777	680 Ohm Resistor - 1/2W, 5% (2 Req.)	22-5780	270 PF Polystyrene Capacitor - 500V.
63-1794	1600 Ohm Resistor - 1/2W, 5% (2 Req.)	22-5781	1000 PF Polystyrene Capacitor - 500V. (2 Req.)
63-1805	3300 Ohm Resistor - 1/2W, 5% (2 Req.)	-OR-	
63-1810	3900 Ohm Resistor - 1/2W, 10% (2 Req.)	22-3613	1000 PF Mica Capacitor (2 Req.)
63-1813	4700 Ohm Resistor - 1/2W, 10% (4 Req.)	22-5782	2200 PF Capacitor - +/- 5% 500V.
		22-5862	.1 MF Mylar Capacitor - 100V. (2 Req.)
		22-5866	.047 MF Mylar Capacitor - 100V. (6 Req.)
		22-5883	.033 MF Mylar Capacitor - 100V. (2 Req.)

*Denotes parts not previously used.

PART NO.	DESCRIPTION
CHASSIS 35WDR50 (CONT'D.)	
22-5971	.0033 MF Mylar Capacitor (2 Req.)
22-5972	390 PF Polystyrene Capacitor - 125V.
*22-5986	50 MF Electrolytic Capacitor - 25V. (2 Req.)
*22-6111	.001 MF Mylar Capacitor - 50V. (2 Req.)
22-6343	.33 MF Mylar Capacitor +/- 20% - 50V.
22-6363	270 PF Ceramic Capacitor +/- 10% - 500V.
*22-6752	Gang Capacitor, Six Section (FM Antenna Trimmer, FM Antenna Tuning, FM Detector Trimmer, FM Detector Tuning, FM Oscillator Tuning, AM Antenna Trimmer, AM Antenna Tuning, AM Detector Trimmer, AM Detector Tuning, AM Oscillator Trimmer, AM Oscillator Tuning)
43-571	9 Contact Housing (Used With 86-390)
44-48	Connector Jack (4 Part Of S-89969 & S-92170)
52-1062	2 Conductor Twin Lead
52-1425	2 Conductor Shielded Phono Cable - Red, White (Used With 58-214)
52-1501	3 Conductor Cable - Red, Black, White Approx. 20" (Part Of S-87113)
*52-1588	2 Conductor Shielded Lead - Red, White (Used On S-89969)
*52-1589	2 Conductor Shielded Lead - Yellow, Green (Used On S-89969)
*52-1590	2 Conductor Shielded Lead - Purple, Gray (Used On Bandswitch)
*52-2022	2 Conductor Shielded Cable - Blue, Black (Used On S-89969)
*52-2023	2 Conductor Shielded Cable - Brown, Orange (Used On S-89969)
*52-2080	Shielded Lead Cable
*52-2081	Shielded Lead Cable
54-139	3/8-32 x 9/16 Palnut (5 Req.)
54-808	Tinnerman Speed Nut (1 Used On Ea, 114-1129)
54-828	1/2-20 Palnut
58-214	Single Prong Plug (2 Used On 52-1425)
58-338	Plug Shorting Bar (2 Used On S-89969)
59-1103	Dial Pointer
61-222	Idler Pulley (Part Of S-86475, S-85563, S-85564 & 2 Part Of S-89890, S-91614)
*61-349	Drive Pulley (Part Of S-92496)
63-4122	33 Ohm Resistor - 1/4W, 10%
63-4129	47 Ohm Resistor - 1/4W, 10%
63-4157	220 Ohm Resistor - 1/4W, 10%
63-4185	1000 Ohm Resistor - 1/4W, 10%
63-4196	1800 Ohm Resistor - 1/4W, 10%
63-4231	12K Ohm Resistor - 1/4W, 10%
63-4255	47K Ohm Resistor - 1/4W, 10%
63-4269	100K Ohm Resistor - 1/4W, 10%
63-4287	270K Ohm Resistor - 1/4W, 10%
63-5663	680 Ohm Resistor - 2W, 10%
63-6424	1 Ohm Resistor - 5W, 10% (2 Req.)
63-6495	Mute Control - 100K
*63-8708	Rotary Control, Single - 5K Ohm 30% 1/4W, Bias Adjust.
*63-8745	270K Ohm Resistor - 1/2W, 10%
*63-8746	470K Ohm Resistor - 1/2W, 20%
*63-8747	680K Ohm Resistor - 1/2W, 10%
*63-8748	1.5 Megohm Resistor - 1/2W, 10%
*63-8749	3.3 Megohm Resistor - 1/2W, 20%
*63-8750	130K Ohm Resistor - 1/2W, 5%
*63-8964	Rotary Control, Dual Treble - 250K Ohm 30% 1/8W.
*63-8965	Rotary Control, Dual Bass - 250K Ohm 30% 1/8W.
*63-8966	Rotary Control, Single Balance W/Switch 500K Ohm
*63-8967	Rotary Control, Dual Loudness - 100K Ohm
*63-9261	Rotary Control, Single Bias Adjust. (2 Req.)
64-6	1/8" Dia. x 3/16" Lg. Tubular Rivet (2 Part Of S-89969)
64-720	Rivet, Shoulder (Part Of S-86475)
64-288	Shoulder Rivet (1 Part Of Ea, S-85563, S-85564, 2 Part Of S-89890, S-91614) (6 Req.)
64-1033	Grip Eyelet (42 Req.)
*76-2032	Tuning Shaft
78-1988	Light Socket & Wire
80-1180	Wire Spring
*82-195	Ground Strap
82-208	Ground Strap
83-1961	Antenna Terminal Strip (Part Of S-89969)
83-3320	Retaining Strip
*83-7417	Antenna Protective Strip

PART NO.	DESCRIPTION
*83-7552	Transistor Insulating Washer (2 Part Of Ea, 121-853X)
83-7803	3 Lug Terminal Strip
83-8163	Antenna Mtg. Terminal Strip (2 Part Of S-88463)
83-8216	Insulating Strip
*85-1207	6 Pos. Bandswitch & On-Off Switch Assem.
85-1344	6 Pos. Bandswitch & On-Off Switch Assem.
86-344	Terminal, Connector (Used On 52-1062 & 52-1501) (6 Req.)
86-390	Connector Terminal (9 Used On 43-571)
86-449	Connector Terminal (Used On 52-1062)
-OR-	
86-357	Connector Terminal (Used On 52-1062)
86-500	Terminal (23 Req.)
86-543	Miniature Spring Terminal (88 Req.)
93-1906	No. 4 Flat Washer (1 Used On Ea, 114-1129)
94-1532	Nylon Shaft Bushing
94-1586	Shoulder Bushing (4 Req.)
95-2543	Transformer - 3rd. I.F. AM 455 KHz
95-2544	Transformer - AM Oscillator
*95-2750	Transformer - AM R.F.
*95-2751	Transformer - AM 1st. I.F. 455 KHz
*95-2752	Transformer - AM 2nd. I.F. 455 KHz
*95-2753	Transformer - FM 1st. I.F. 10.7 MHz
*95-2754	Transformer - FM 2nd. I.F. 10.7 MHz
*95-2755	Transformer - FM 3rd. I.F. 10.7 MHz
*95-2756	Transformer - FM Ratio Detector 10.7 MHz
*95-2856	Multiplex Doubler Coil - 19 KHz
*95-2857	Multiplex Detector Coil - 38 KHz
*95-2858	Multiplex Input Coil - 19 KHz
100-249	Indicator Lamp
103-23	Germanium Diode (6 Req.)
103-47	Diode AFC
103-90	Germanium Diode - Matched Pair (FM)
103-96	Diode, Zener
*105-107	Integnet - 38 KHz Filter (2 Req.)
114-801	8-18 x 5/16 Hex Hd. Self-Tap. Screw-Stat. Bronze (3 Mt. Chassis, 12-5508, 1 Mts. 83-7803 & 2 Mt. 12-5810) (6 Req.)
114-802	8-18 x 5/16 x 1/4 Hex Washer Self-Tap. Screw (2 Used On 83-7417)
114-864	8-18 x 3/8 Hex Washer Hd. Self-Tap. Screw-Stat. Bronze (1 Mts. Ea, 17-143) (2 Req.)
114-1144	4-24 x 0.500 x 0.187 Hex Washer Hd. Washer Hd. Screw-Stat. Bronze (4 Req.)
121-430	Transistor - Audio Amp. (2 Req.)
121-433	Transistor - Pre-Amp. (2 Req.)
121-546	Transistor - AM-FM 2nd. I.F., FM 3rd. I.F. (2 Req.)
121-613	Transistor - FM Converter
121-614	Transistor - AM-FM 1st. I.F.
121-639	Transistor - Comp. Amp., 19 KHz Amp., 38 KHz Amp., Tuning Meter Control (4 Req.)
121-714	Transistor - AM Converter
*121-737	Transistor - Stereo Indicator Switch
*121-767	Transistor - Bias Control (2 Req.)
121-826	Transistor - FM RF (FET)
121-850	Transistor - AM RF
*121-877	Transistor - Pre-Driver (2 Req.)
*121-878	Transistor - Driver (2 Req.)
121-879	Transistor - Driver (2 Req.)
121-880	Transistor - Output (2 Req.)
149-311	Ferrite Core (Sleeve) (2 Req.)
*149-426	Ferrite Core, Antenna Rod (Part Of S-88463)
188-140	Retaining Ring
188-155	Clamping Ring (Part Of S-92496)
199-319	Insulating Sleeve (6 Req.)
*199-567	Sleeving (Part Of S-88463)
205-51	Dow Corning Heat Conductive Grease
885-12	AC Switch Only SPST (Part Of 85-1207 Or 85-1344)
885-13	AC Switch Only SPDT (Part Of 85-1207 Or 85-1344)
S-82528	Antenna Cable & Terminal Assem. - FM
S-85563	Pulley & Bracket Assem. - Flat Bracket
S-85564	Pulley & Bracket Assem. - Angled Bracket
S-86475	Pulley Mounting Bracket
S-86608	Socket & Terminal Assem. - Pilot Light
S-87113	Speaker Cable, Terminal & Sleeve Assem. (3 Wire - Red, Black, White)
*S-88463	Wavemagnet Antenna Assem. - AM
S-88984	Dial Cord & Eyelet Assem. - Approx 27"

*Denotes parts not previously used.

PART NO.	DESCRIPTION
CHASSIS 35WDR50 (CONT'D.)	
S-88988	Dial Cord & Eyelet Assem. - Approx 44"
*S-89890	Pulley & Pointer Guide Bracket Assem.
S-89969	Tape Jack & Antenna Bracket Assem.
S-92170	Jack & Bracket Assem.
*S-92496	Pulley & Ring Assem.

MODEL D546 & W1 CHASSIS COMPONENTS

964-19610	200 MF Electrolytic - 15V.
964-19614	.001 MF Capacitor
964-19615	5 MF Electrolytic - 15V.
964-19638	.05 MF Capacitor - 100V.
964-19755	100 PF Capacitor - 500V.
964-19758	.1 MF Electrolytic - 15V.
964-23096	1000 MF Capacitor - 15V.
964-23464	1 MF Capacitor - 100V.
964-25922	33 MF Electrolytic - 16V.
*964-28826	33 PF Capacitor
*964-28854	270 PF Capacitor
*964-28859	.0068 MF Capacitor - 100V.
964-28892	.1 MF Capacitor - 10V.
*964-09306	390K Ohm Resistor - 1/2W. 10%
*964-09326	68K Ohm Resistor - 1/2W. 10%
*964-10303	150K Ohm Resistor - 1/2W. 10%
*964-10940	820K Ohm Resistor - 1/2W. 10%
*964-10943	470 Ohm Resistor - 1/2W. 10%
*964-12879	120K Ohm Resistor - 1/2W. 10%
*964-16587	330K Ohm Resistor - 1/2W. 10%
964-18014	4.7 Ohm Resistor - 1/2W. 10%
964-19582	1.8 Megohm Resistor - 1/2W. 10%
964-22099	4.7 Megohm Resistor - 1/2W. 10%
964-24412	Control, Treble - 3 Megohm
964-25868	43 Ohm Resistor - 1/2W. 5%
*964-25902	2.2 Ohm Resistor - 1/2W. 10% (Used only on D546W-1)
964-27674	4.7 Megohm Resistor - 1/2W. 5%
964-27675	820K Ohm Resistor - 1/2W. 5%
*964-28754	Control, Bass - 500K Ohm
*964-28850	Control, Volume - 50K Ohm
*964-28857	Control, Balance - 3 Megohm
964-22008	Transistor, Output - PNP
964-22009	Transistor, Darl
964-22158	Transistor, Output - NPN
964-21866	Rectifier
964-25046	Diode
964-25771	Transformer, Power
964-18243-3	Cord, Power
964-20746-03	Remote Cable Assem. (Used only on D546W)
964-24020	Speaker - 5.25 (2 Req.)
*964-23419	Heat Sink
*964-25157	Cable, Audio
*964-28501	Double Heat Sink (Used only on D546W)
*964-28504	Double Heat Sink Assem. (Used only on D546W-1)
*964-28855	Chassis Bracket
964-28858	Shield, Hum
964-28986	Fuse (Used only on D546W-1)
*964-29031	Label, Fuse Caution (Used only on D546W-1)
*964-29095-3	Remote Cable Assem. (Used only on D546W-1)
*964-29275	Power Cord Assem. (Used only on D546W-1)

MODEL D546W & W1 CABINET COMPONENTS

S-82621	Stylus Assem. (Part of 142-167)
S-82964	Adapter, Spindle
142-167	Cartridge, Dual Pickup
169-455	4 Speed Record Changer
*964-00857	Welting, Tee (2 used on 964-20745-03)
964-09197	Nut, Hex 6-32 (5 Req.)
964-12916-A	Eyelet (Used on bottom of Remote Speaker Cabinet)
964-13364-09	Screw, Truss - 6 x 3/8 (2 Req.)

*Denotes parts not previously used.

PART NO.	DESCRIPTION
964-13621	Terminal, Amp. (2 Req.)
964-14195	Bumper, Inside - Brown
964-14220	Housing Plug
964-14605-H	Screw, Truss - 6 x 1/2 (8 Req.)
964-15821	Retainer, Cable (3 Req.)
*964-16374-9	Button, Hole
964-16380	Screw, Machine - 1/4-20 x 1 (2 Mt. Pivot Assem. on Changer Drawer)
964-16579	Lockwasher (Pivot Assem.)
964-16580	Eyelet (Pivot Assem.)
964-16981	Grommet
964-17170	Terminal, Flat - .205 (4 Req.)
964-17310	Bumper - Brown (4 Req.)
964-17445	Clamp, Cable
964-17602	Bushing (2 used on Pivot Assem.)
964-18315	Nut, Tee (2 used on Pivot Assem.)
*964-18586-09	Clip Spindle
964-19998-9	Eyelet (Used on back of Cabinet)
964-20113	Screw, Mtg. 6-32 x 3/4 (5 Req.)
964-20122	Clip, Knob
*964-20288	Nut, Washer (8 Req.)
964-20622	Pin, Printed Circuit Board
964-20623	Terminal - .090 Dia. (2 Req.)
964-20641	Catch (Used on 964-29001)
964-22410	Terminal, Splice
964-23137	'U' Channel (Around Control Panel Assem.)
964-23138	Strike (Used with 964-20641)
964-23140-H	Strike
964-23141-3	Catch
964-23279	Emblem, Zenith (Used on Record Changer Cabinet Drawer)
964-23279-A	Emblem, Zenith
964-23362	Terminal, Double Amp.
*964-24783	Hinge-Male
*964-24784	Hinge-Female (2 Req.)
*964-24785	Hinge-Male
*964-24786	Hinge-Female (2 Req.)
*964-25134	Hinge-Male
*964-25136	Hinge, Short Pin-Male
964-25181	Screw (13 Mt. Chassis)
964-25273	Screw, Mtg. 6-32 x 1 3/16 (8 Req.)
*964-25778-9	Handle
*964-27728-9C	Knob Assem. (4 Req.)
*964-28732-F	Plate, Control
964-28752	Carton (Used only on D546W)
*964-28753	Layout, Transistor
*964-28755	Instruction Book
964-28996	Sleeve
*964-29001	Main Cabinet (Used only on D546W)
*964-29198	Carton (Used only on D546W-1)
*964-29333	Terminal Strip (Used only on D546W-1)
*964-29414	Main Cabinet (Used only on D546W-1)

MODEL D554W, W1 CHASSIS COMPONENTS

822-449B	.01 MF Capacitor - 1400V.
822-472B	500 PF Disc Capacitor - 20% (2 Req.)
822-554B	.005 MF Disc Capacitor - 20% (4 Req.)
*822-1065B	500 MF Electrolytic - 35V.
*822-1066B	5 MF Electrolytic - 25V. (2 Req.)
*822-1067B	.068 MF Mylar Capacitor - 100V. (2 Req.)
*822-1068B	150 PF Disc Capacitor - 20% (2 Req.)
*822-1069B	.0015 MF Disc Capacitor - 20% (2 Req.)
*822-1070B	.002 MF Disc Capacitor - 20% (2 Req.)
*822-1071B	.0018 MF Capacitor (2 Req.)
*822-1072B	250 MF Electrolytic - 25V. (2 Req.)
*822-1073B	68 PF Capacitor (2 Req.)
*822-1074B	4.7 PF Capacitor (2 Req.)
*822-1075B	5 MF Electrolytic - 35V.
*822-1076B	250 MF Electrolytic - 16V.
863-156B	2.2 Ohm Resistor - 1/2W. 10%
863-194B	1200 Ohm Resistor - 1/2W. 10%
863-197B	220K Ohm Resistor - 1/2W. 10%
863-215B	1 Megohm Resistor - 1/2W. 10%
863-560B	47K Ohm Resistor - 1/2W. 10%
*863-749B	Control, Single Balance - 3 Megohm

PART NO.	DESCRIPTION
MODEL D554W, W1	
CHASSIS COMPONENTS (CONT'D)	
*863-750B	Control, Bass - Treble (2 Req.)
*863-751B	Control, Dual Volume - 3 Megohm
*811-48B	Line Cord
*849-77B	Speaker - 6" (2 Req.)
*852-63B	Cable, Remote (2 Req.)
*852-64B	Cable (2 Req.)
*852-65B	Phono Cable Assem.
*852-66B	Cable
*852-67B	Speaker Cable Assem. - Red
*852-68B	Speaker Cable Assem. - White
*852-69B	Speaker Cable Assem. - Black
*895-375B	Transformer
*903-106B	Diode - 1 Amp. (2 Req.)
*905-27B	Integrated Circuit
*926-44B	Heat Sink
*936-4B	Fuse - 1 Amp. (Used Only On D554W1)

MODEL D554W, W1	
CABINET COMPONENTS	
*800-370B	Remote Speaker Assem.
*808-1B	45 Spindle Adapter
*812-446B	Bracket
*814-207B	Cabinet - Remote (With Back) (2 Req.)
*814-208B	Cabinet
*824-170B	Bottom
*824-171B	Cover, Dust
*827-25B	Insert, Dust Cover Disc
*827-26B	Insert, 45 Adapter
*841-23B	Holder, 45 Adapter
*843-65B	Amplock Sub Assem.
*843-66B	Housing
*846-358B	Knob (3 Req.)
*846-359B	Knob
*854-123B	Platnut - 6/32 (10 Req.)
*855-24B	Control Panel
*858-29B	Plug
*878-23B	Receptical (3 Req.)
*878-24B	Receptical (4 Req.)
*883-369B	Wraps, Cable (4 Req.)
*883-376B	Strip, Terminal
*886-89B	Terminal (10 Req.)
*886-90B	Faston, Malco - .205 (7 Req.)
*901-122B	Disc, Changer Instruction
*902-962B	Manual, Owners
*912-738B	Screw - 8 x 3/8 (2 Req.)
*912-739B	Screw, Hex - 6 x 1/2 (11 Req.)
*912-740B	Screw, Truss - 6 x 1/2 (2 Req.)
*912-741B	Screw, Pan Hd. - 8 x 3/8 (4 Req.)
*926-45B	Shield, Amplifier
*927-20B	Contact (2 Req.)
*927-21B	Contact
*966-37B	Bumper, Plastic (12 Req.)
*969-1B	Record Changer
*988-96B	Grip, Master (Hog Ring)
*999-39B	Sleeving - 3/4"
*999-40B	Bulk, Red
*999-41B	Bulk, White
*999-42B	Bulk, Black
*999-43B	Terminal, Sleeveing

MODEL D556W, W1	
CHASSIS COMPONENTS	
822-424B	.01 MF Disc Capacitor (2 Req.)
822-449B	.01 MF Capacitor - 1400V.
822-472B	500 PF Disc Capacitor - 20% (4 Req.)
822-554B	.005 MF Disc Capacitor - 20% (4 Req.)
*822-1065B	500 MF Electrolytic - 35V.
*822-1066B	5 MF Electrolytic - 25V. (2 Req.)
*822-1067B	.068 MF Mylar Capacitor - 100V. (2 Req.)
*822-1068B	150 PF Disc Capacitor - 20% (2 Req.)
*822-1069B	.0015 MF Disc Capacitor - 20% (2 Req.)
*822-1070B	.002 MF Disc Capacitor - 20% (2 Req.)
*822-1072B	250 MF Electrolytic - 25V. (3 Req.)
*822-1074B	4.7 PF Capacitor (2 Req.)

PART NO.	DESCRIPTION
*822-1075B	5 MF Electrolytic - 35V.
822-1105B	33 PF Capacitor (2 Req.)
863-156B	2.2 Ohm Resistor - 1/2W. 10% (2 Req.)
863-197B	220K Ohm Resistor - 1/2W. 10% (6 Req.)
863-214B	470K Ohm Resistor (2 Req.)
863-215B	1 Megohm Resistor - 1/2W. 10% (2 Req.)
863-560B	47K Ohm Resistor - 1/2W. 10% (2 Req.)
863-583B	220 Ohm Resistor (2 Req.)
*863-678B	560 Ohm Resistor (2 Req.)
*863-749B	Control, Single Balance - 3 Megohm
*863-750B	Control, Bass - Treble (2 Req.)
*863-751B	Control, Dual Volume - 3 Megohm
*863-765B	100K Ohm Resistor (4 Req.)
*811-51B	Line Cord
*844-46B	Head Phono Jack Assem.
*844-49B	Jack (Part Of 844-46B)
*844-50B	Jack Assem.
*849-80B	Speaker - 8" (2 Req.)
*849-81B	Speaker - 4" (2 Req.)
*852-61B	Cable Assem., Phono
*852-62B	Cable Assem., Tape In-Tape Out
*852-76B	Cable, Remote (2 Req.)
*852-77B	Cable (2 Req.)
*852-78B	Cable, Jumper - White (2 Req.)
*852-79B	Cable, Jumper - Black (2 Req.)
*852-80B	Cable & Plug
*852-81B	Cable, Bulk
*885-141B	Switch, Function
*895-387B	Transformer
*903-106B	Diode - 1 Amp. (2 Req.)
*905-28B	Integrated Circuit
*926-47B	Heat Sink
*936-10B	Fuse - 2 Amp. (Used Only On D556W1)

MODEL D556W, W1	
CABINET COMPONENTS	
*488-96B	Grip Master - Hog Ring
*800-369B	Remote Speaker Assem.
*802-19B	Cabinet, Back
*808-2B	45 Spindle Adapter
*812-453B	Bracket
*814-206B	Case Assem.
*814-212B	Cabinet, Master
*817-29B	Clamp, Cable
*823-14B	Splice, Butt
*824-181B	Cover, Switch Shield
*824-182B	Cover, Dust
*824-183B	Cover, Bottom
*827-26B	Insert, 45 Adapter
*827-27B	Disc, Changer - White
*827-28B	Logo, Dust Cover
*841-23B	Holder, 45 Adapter
*843-65B	Amplock Sub Assem. (Used Only On D556W)
*843-66B	Housing (Part Of 843-65B)
846-66B	Knob (5 Req.)
*854-123B	Platnut - 6/32 (17 Req.)
*854-126B	Nut, Nick - 3/8
*854-127B	Nut, Hex - 3/8
*854-128B	Nut - 3/8
*855-26B	Control Panel
*866-39B	Bumper (4 Req.)
*878-24B	Receptical (12 Req.)
*879-13B	Tubing (2 Req.)
*883-369B	Wraps, Cable (4 Req.)
*886-89B	Terminal (16 Req.)
*886-90B	Faston, Malco - .205 (14 Req.)
893-328B	Washer, Nick - 3/8
*902-1110B	Manual, Owners
*912-738B	Screw - 8 x 3/8 (2 Req.)
*912-739B	Screw, Hex - 6 x 1/2 (11 Req.)
*912-740B	Screw, Truss - 6 x 1/2 (2 Req.)
926-49B	Shield, Amplifier
*927-20B	Contact (3 Used On 843-65B)
*927-21B	Contact
*966-37B	Bumper, Plastic (8 Req.)
*969-2B	Record Changer
*999-39B	Sleeving - 3/4"

*Denotes parts not previously used.

PART NO.	DESCRIPTION
	MODEL D556W, W1
	CABINET COMPONENTS (CONT'D.)
*999-41B	Bulk - White
*999-43B	Terminal, Sleeveing
*999-45B	Sleeving

MODEL D742W, W1

CHASSIS COMPONENTS

964-19638	.05 MF Capacitor - 100V.
964-19755	100 PF Capacitor - 500V.
964-19758	1 MF Capacitor - 15V.
*964-19888	.0022 MF Capacitor - 20V.
*964-20061	10 MF Capacitor - 15V.
*964-21301	1 MF Capacitor - 15V.
*964-24481	2200 PF Capacitor - 20% 500V.
964-25784	1000 MF Capacitor - 35V.
964-25903	250 MF Capacitor - 25V.
964-25922	33 MF Capacitor - 16V.
964-27741	.0082 Capacitor
*964-28942	10 PF Capacitor - 10% 500V.
*964-28943	5600 PF Capacitor - 20% 500V.
*964-28944	.015 MF Capacitor - 20% 500V.
*964-09144	39K Ohm Resistor - 1/2W. 10%
*964-09326	68K Ohm Resistor - 2W. 10%
964-09513	220K Ohm Resistor - 1/2W. 10%
*964-09515	2.2 Megohm Resistor - 1/2W. 10%
964-10303	150K Ohm Resistor - 1/2W. 10%
964-10940	820K Ohm Resistor - 1/2W. 10%
964-10943	470 Ohm Resistor - 1/2W. 10%
*964-11141	100 Ohm Resistor - 1/2W. 10%
964-12879	120K Ohm Resistor - 1/2W. 10%
964-15621	1K Ohm Resistor - 1/2W. 10%
964-18014	4.7 Ohm Resistor - 1/2W. 10%
964-22099	4.7 Megohm Resistor - 1/2W. 10%
964-25902	2.2 Ohm Resistor - 1/2W. 10%
964-26371	15 Ohm Resistor - 1/2W.
964-27674	4.7 Megohm Resistor - 1/2W. 5%
*964-28969	470K Ohm Resistor - 1/2W. 5%
*964-28970	2.7 Ohm Resistor - 5W. 10%
*964-28884	Control, Balance
*964-28885	Control, Volume - 250K Ohm
*964-28928	Control, Tone Bass - 2 Megohm
*964-28930	Control, Tone - Treble - 3 Megohm
964-18243-03	AC Power Cord (Part of 964-29125)
964-21866	Rectifier (2 Req.)
964-22008	Transistor - PNP (2 Req.)
964-22009	Transistor - Driver (4 Req.)
964-22158	Transistor - NPN (2 Req.)
964-25046	Diode
*964-25157	Cable, Audio - 10
964-27172	Transformer, Power (Part of 964-29125)
964-27986	Transistor - NPN (4 Req.)
*964-28872	Speaker - 6 x 9 (4 Req.)
964-28986	Fuse (Used Only on D742W-1)
*964-29125	Power Cable & Transformer Assem.

MODEL D742W, W1

CABINET COMPONENTS

142-167	Cartridge, Dual Pickup
169-457	4 Speed Record Changer
964-09197	Nut, Hex - 6-32 (20 Req.)
*964-12128-09	Screw, Truss - 6 x 7/8 (4 Req.)
964-13364-09	Screw, Truss - 6 x 3/8 (30 Req.)
964-13621	Terminal (2 Part of 964-29125)
964-14195-09	Bumper (2 Used on 964-29094)
964-14220	Housing Plug (Part of 964-29125)
964-14902-09	Button (Used on 964-29094)
*964-15106	Motorboard Protector
964-15821	Retainer, Cable (3 Req.)
964-16380	Screw (2 Req.)
964-16579	Washer, Lock (2 Req.)
964-16580	Eyelet (2 Req.)
*964-17310-03	Bumper (Used on 964-29089)
964-17445	Clamp, Cable
*964-17602	Bushing (2 Req.)
964-18315	Nut, Tee (2 Req.)
964-18586-09	Clip (Used on S-82965)

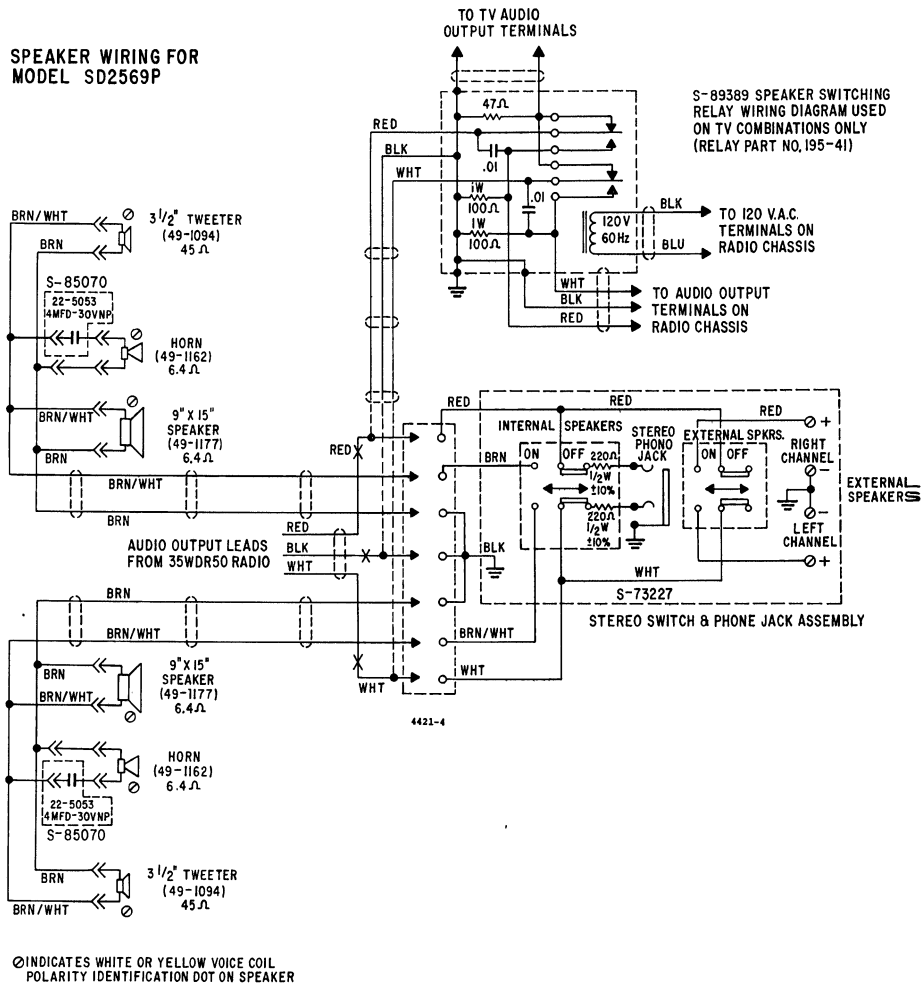
*Denotes parts not previously used.

PART NO.	DESCRIPTION
964-19998-09	Eyelet (Used on 964-29089)
964-20288	Nut, Washer
964-20622	Pin, Printed Circuit Board
964-20623	Terminal (Part of 964-29125)
964-20641	Catch - Chrome (2 Req.)
964-23138	Strike - Chrome (2 Req.)
*964-23140-09	Strike - Plastic (2 Req.)
*964-23141-09	Catch - Plastic Block (2 Req.)
964-23279	Emblem, Zenith (Used on 964-29094)
964-23362	Terminal (Part of 964-29125)
*964-24484	Hex Screw W/Washer - 6 x 1/4
964-24783-H	Hinge - Male, Long Pin
964-24784-H	Hinge - Female (2 Req.)
964-24785-H	Hinge - Male, Long Pin
964-24786-H	Hinge - Female (2 Req.)
964-25134-H	Hinge - Male, Short Pin
964-25136-H	Hinge - Male, Short Pin
964-25181	Screw - 6-32 x 1" (18 Req.)
964-25397	Handle
964-25398-09	Screw (2 Used on 964-25397)
964-25806	Screw - 6-32 x 1 1/4" (2 Req.)
*964-26551	Screw, Flat Hd. - 4 x 3/4
*964-28874	Cover, Remote Back (4 Req.)
*964-28877	Knob
*964-28881	Instruction Book
*964-28882	Carton
*964-28883	Plate, Control
*964-28888	Shield, Hum
*964-28889-03	Remote Cable Assem. - 10 (2 Req.)
*964-28890-03	Remote Cable Assem. - 25 (2 Req.)
*964-28929	Layout, Transistor
*964-28956	Motor Board
*964-28958-H	Hinge - Female (2 Req.)
*964-28959-H	Hinge - Female (2 Req.)
*964-28960-H	Hinge - Male, Long Pin
*964-28961-H	Hinge - Male, Long Pin
*964-28962-H	Hinge - Male, Short Pin
*964-28963-H	Hinge - Male, Short Pin
964-28972	Escutcheon
*964-28976	Sticker, Cable (FR)
*964-28977	Sticker, Cable (FL)
*964-28978	Sticker, Cable (RR)
*964-28979	Sticker, Cable (RL)
*964-29003	Fuse Holder Assem. - Primary
*964-29031	Label, Fuse Caution
964-29089	Main Cabinet (Used Only on D742W)
*964-29090	Remote Cabinet - Inside Right
*964-29091	Remote Cabinet - Outside Right
*964-29092	Remote Cabinet - Inside Left
*964-29093	Remote Cabinet - Outside Left
*964-29094	Changer Drawer Comp.
*964-29096	Welting, Tee (4 Used on Face of Remote)
*964-29097	Welting, Tee (2 Used on Main Case)
*964-29098	Welting, Tee (Used on 964-29094)
*964-29161	Pad, Speaker (4 Req.)
*964-29182	Knob (3 Req.)
*964-29211	Hum Shield
*964-29223	Transistor Layout
*964-29333	Terminal Strip
*964-29422	Main Cabinet (Used Only On D742W1)
S-82621	Stylus Assem. (Part of 142-167)
S-82964	45 RPM Spindle Adapter

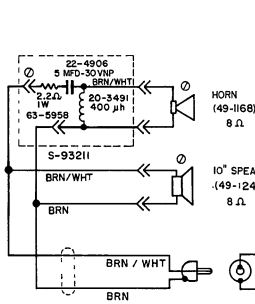
MODEL D9013W

*2-3681	Cabinet (2 Req.)
*14-10606	Main Speaker Cabinet (2 Req.)
*16-4398	Carton
20-3491	Cross-Over Coil (2 Req.)
22-4906	5 MF Electrolytic - 30V. (2 Req.)
49-1168	Horn Speaker (2 Req.)
*49-1241	Round Speaker - 10" (2 Req.)
54-424	8-32 x 11/32 Palnut Washer (16 Req.)
63-5958	2.2 Ohm Resistor - 1W. 10% (2 Req.)
83-4601	Terminal Strip (2 Req.)
*83-8466	Sound Pad (6 Req.)
86-329	Connector Terminal (8 Req.)
86-452	Connector Terminal (4 Req.)
157-22	Coil Fastener (4 Req.)
*S-92899	Speaker Lead & Plug Assem. (2 Req.)

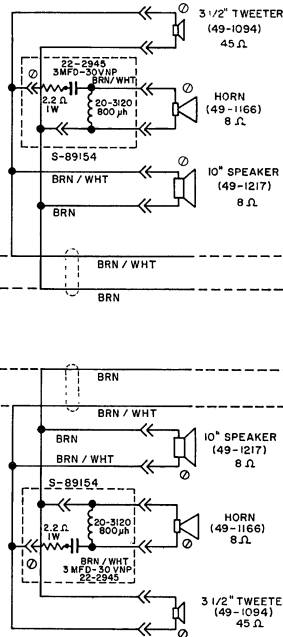
SPEAKER WIRING FOR MODEL SD2569P



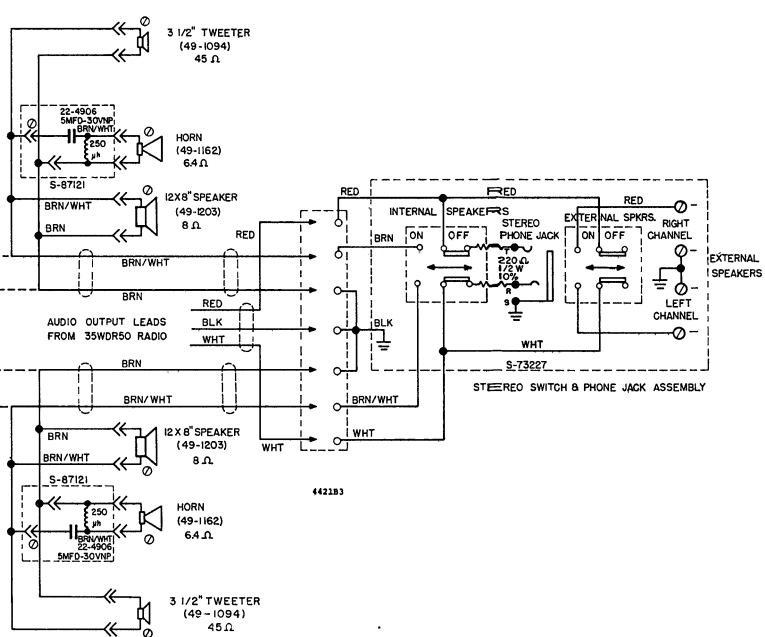
SPEAKER WIRING FOR MODEL D952X



SPEAKER WIRING FOR MODELS: D931W, D935M & D939P

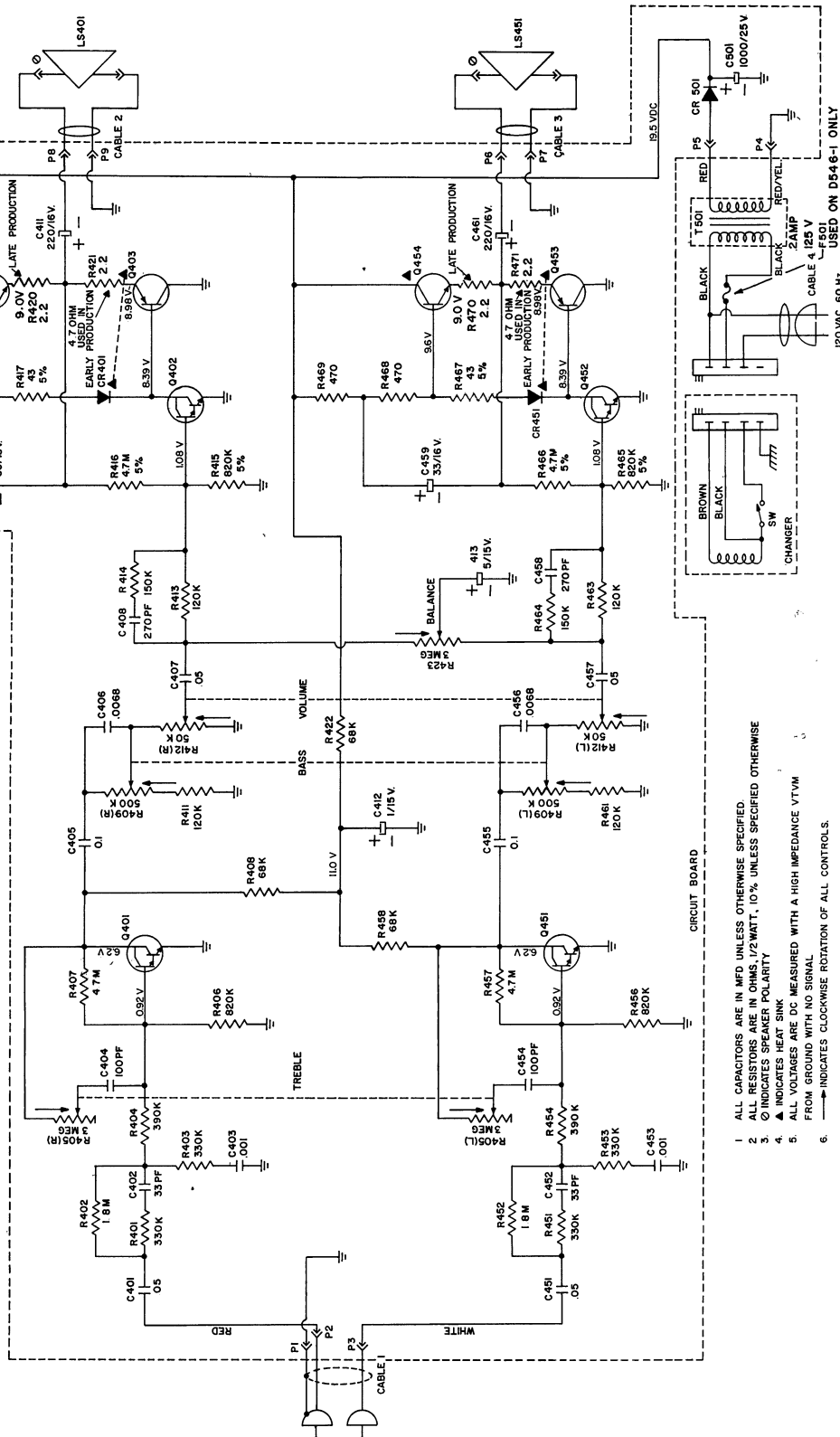
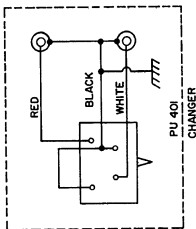
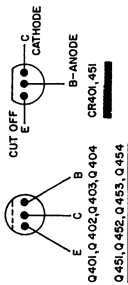


SPEAKER WIRING FOR MODEL S: D941W, D945DE & D948W



SPEAKER WIRING – SCHEMATIC

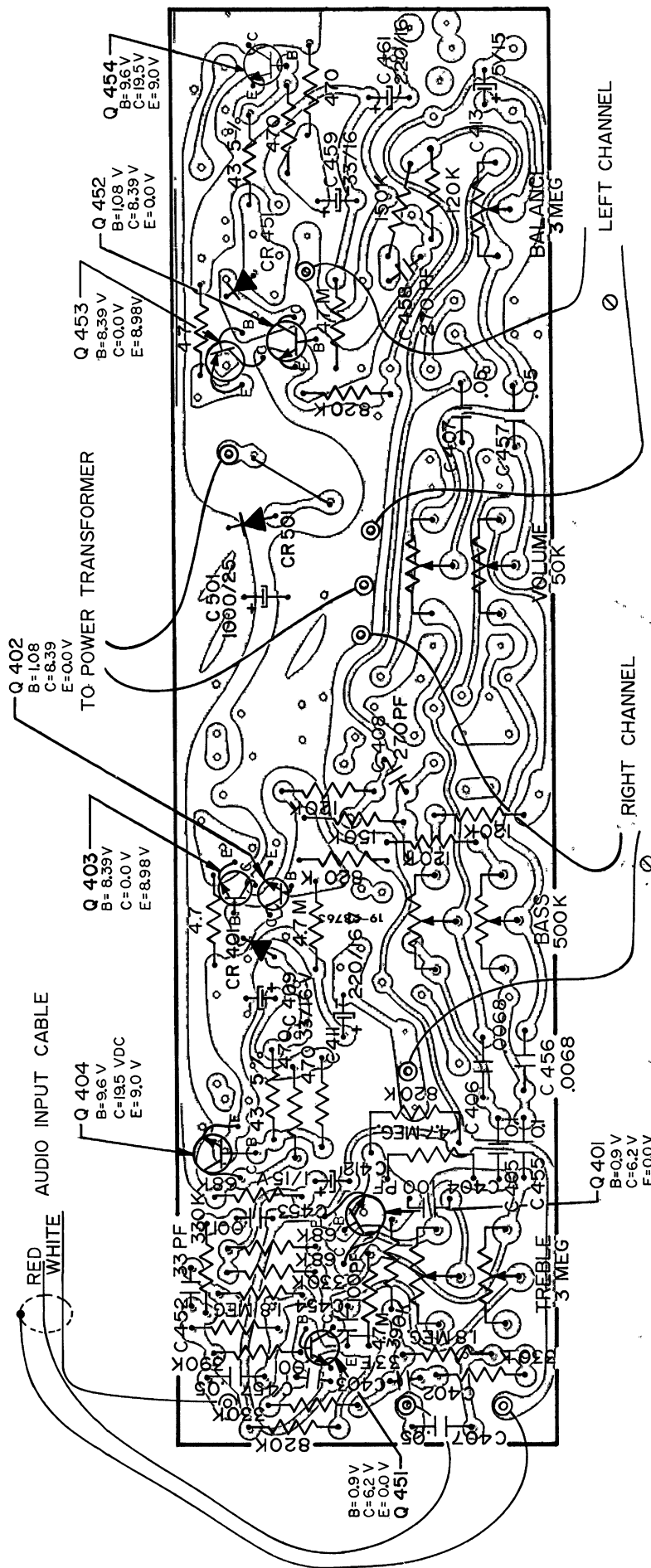
BOTTOM VIEW OF TRANSISTORS



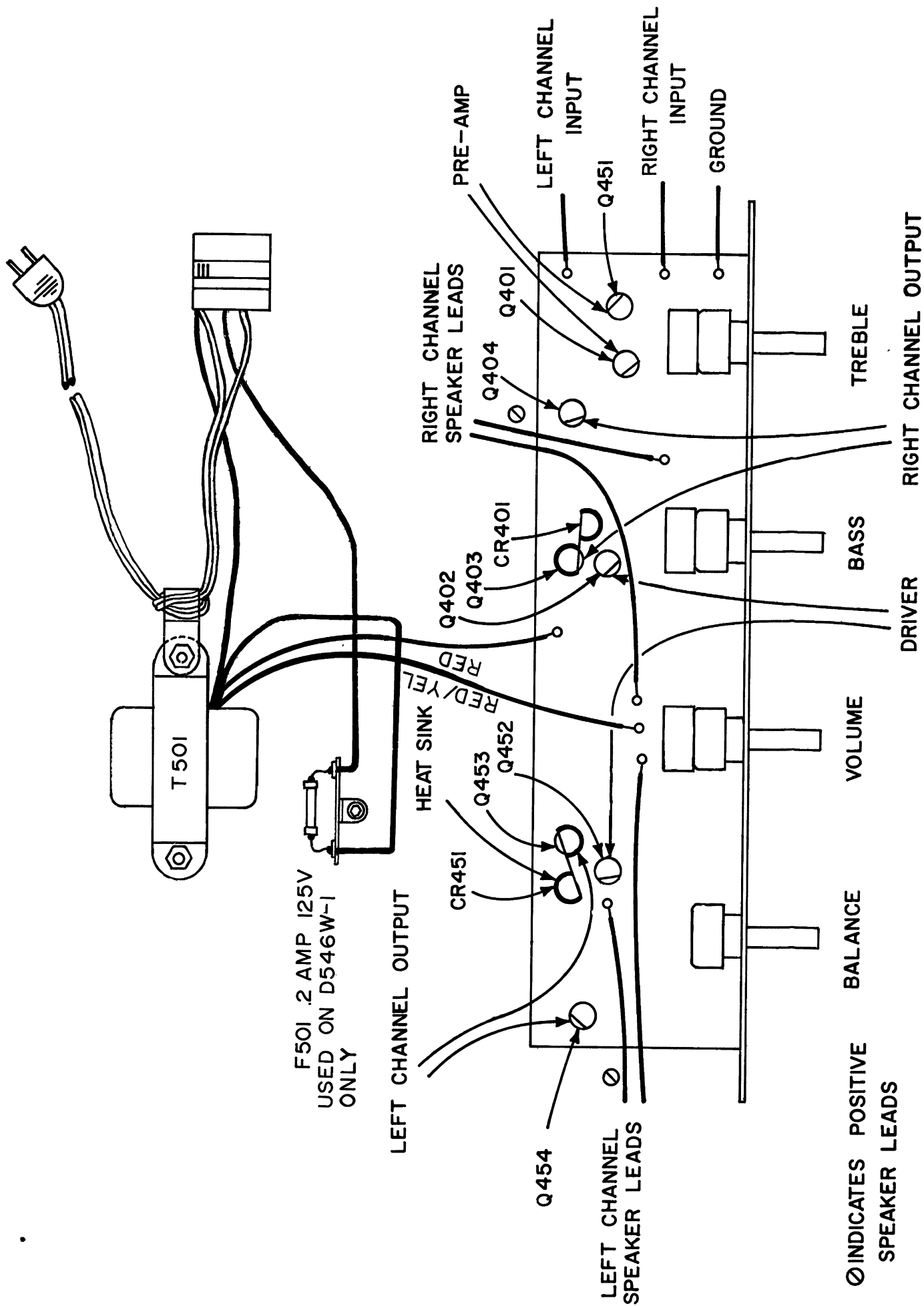
1. ALL CAPACITORS ARE IN MFD UNLESS OTHERWISE SPECIFIED
2. ALL RESISTORS ARE IN OHMS 1/2 WATT, 10% UNLESS SPECIFIED OTHERWISE
3. Ⓞ INDICATES SPEAKER POLARITY
4. ▲ INDICATES HEAT SINK
5. ALL VOLTAGES ARE DC MEASURED WITH A HIGH IMPEDANCE VTVM FROM GROUND WITH NO SIGNAL
6. → INDICATES CLOCKWISE ROTATION OF ALL CONTROLS.

LEGEND MODEL D546W AND D546W1

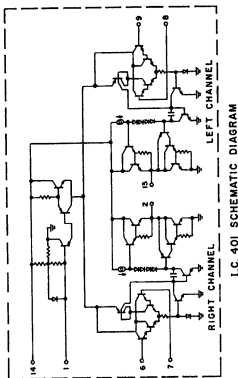
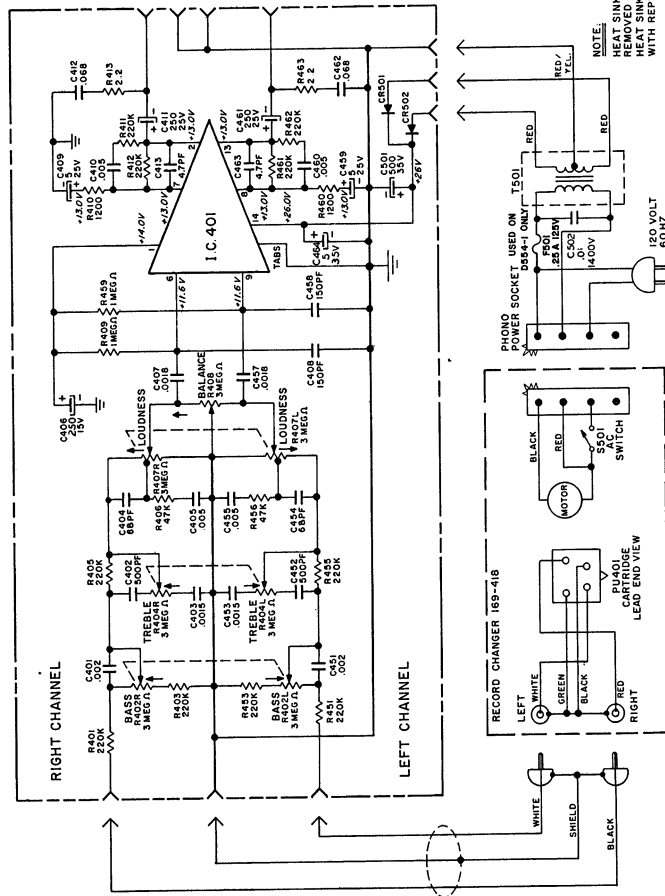
ITEM NO.	PART NO.	DESCRIPTION
CR401	864-19838	.05 MF 100V
CR402	864-19839	.05 MF 100V
CR403	864-19840	.05 MF 100V
CR404	864-19841	.05 MF 100V
CR405	864-19842	.05 MF 100V
CR406	864-19843	.05 MF 100V
CR407	864-19844	.05 MF 100V
CR408	864-19845	.05 MF 100V
CR409	864-19846	.05 MF 100V
CR410	864-19847	.05 MF 100V
CR411	864-19848	.05 MF 100V
CR412	864-19849	.05 MF 100V
CR413	864-19850	.05 MF 100V
CR414	864-19851	.05 MF 100V
CR415	864-19852	.05 MF 100V
CR416	864-19853	.05 MF 100V
CR417	864-19854	.05 MF 100V
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CR422	864-19859	.05 MF 100V
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CR441	864-19878	.05 MF 100V
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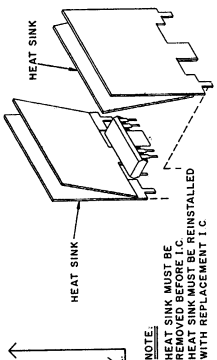
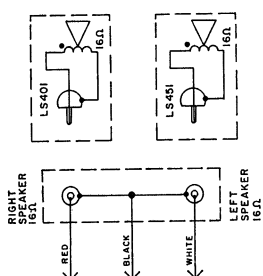
MODEL D546W (W1) – CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE – EARLY PRODUCTION



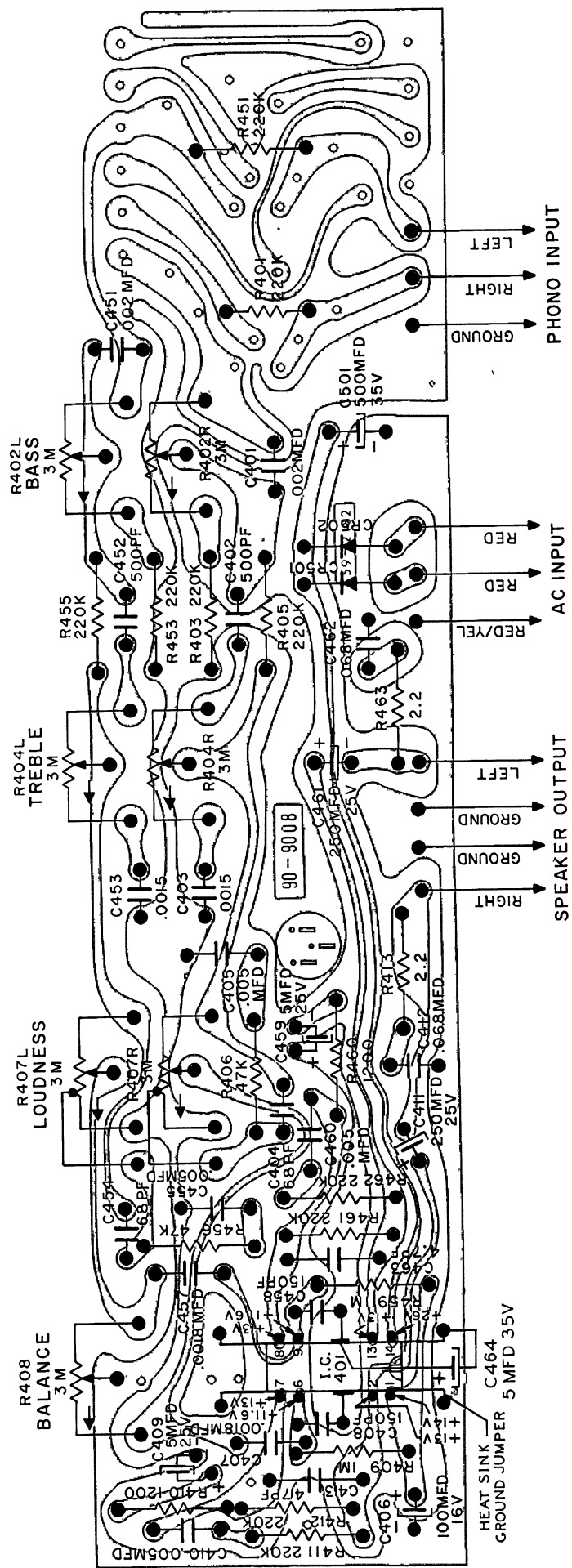
ITEM NO.	DESCRIPTION
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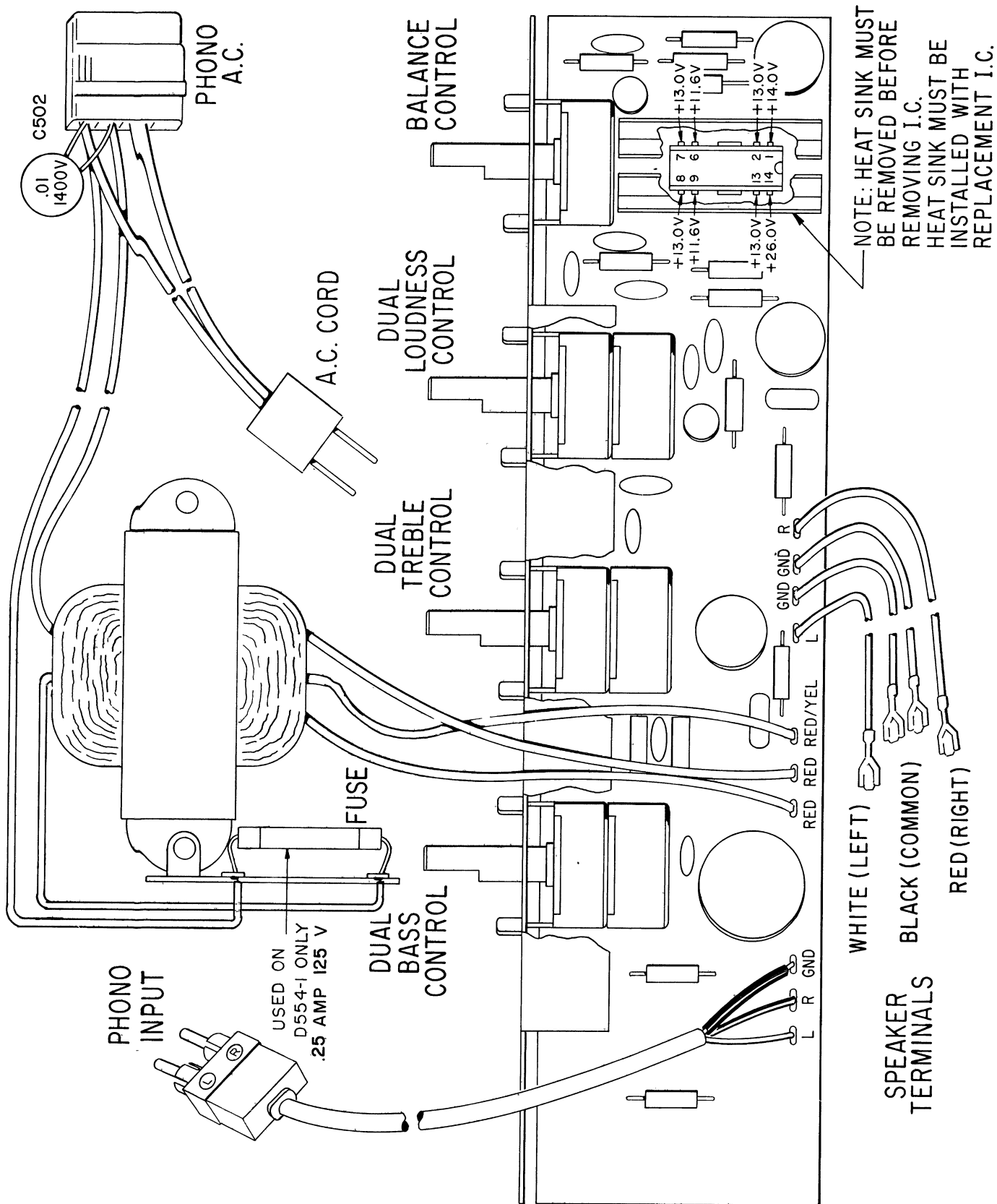
NOTES:
ALL RESISTORS IN OHMS $\pm 10\%$, 1/2 WATT CARBON UNLESS OTHERWISE SPECIFIED
ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE SPECIFIED
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED
D.C. VOLTAGES ARE MEASURED FROM CHASSIS WITH NO SIGNAL AND LOUDNESS CONTROL AT MINIMUM USING A HIGH INPUT IMPEDANCE V.T.V.M. WITH A SHIELDED PROBE TO PREVENT STRAY PICKUP LINE VOLTAGE AT 120 V.A.C.
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION.
⊥ INDICATES CHASSIS GROUND.
→ INDICATES CIRCUIT BOARD CONNECTOR TIE POINTS.



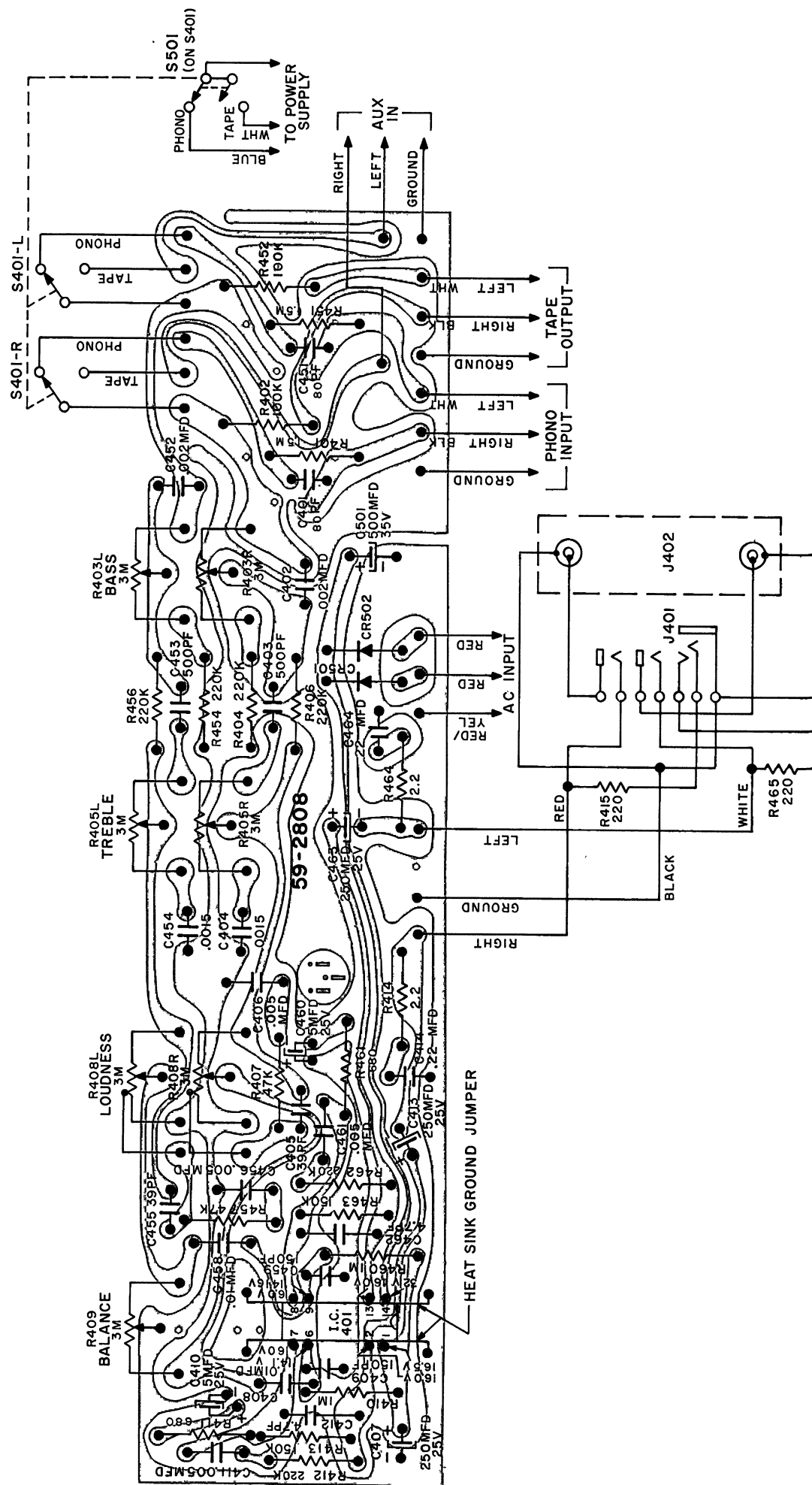
MODEL D554W (W1) - SCHEMATIC



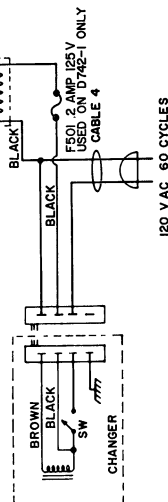
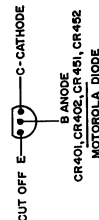
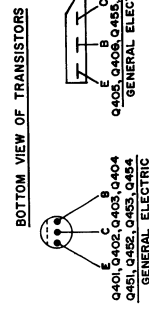
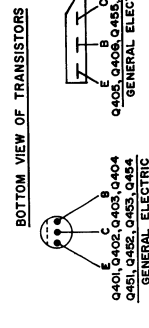
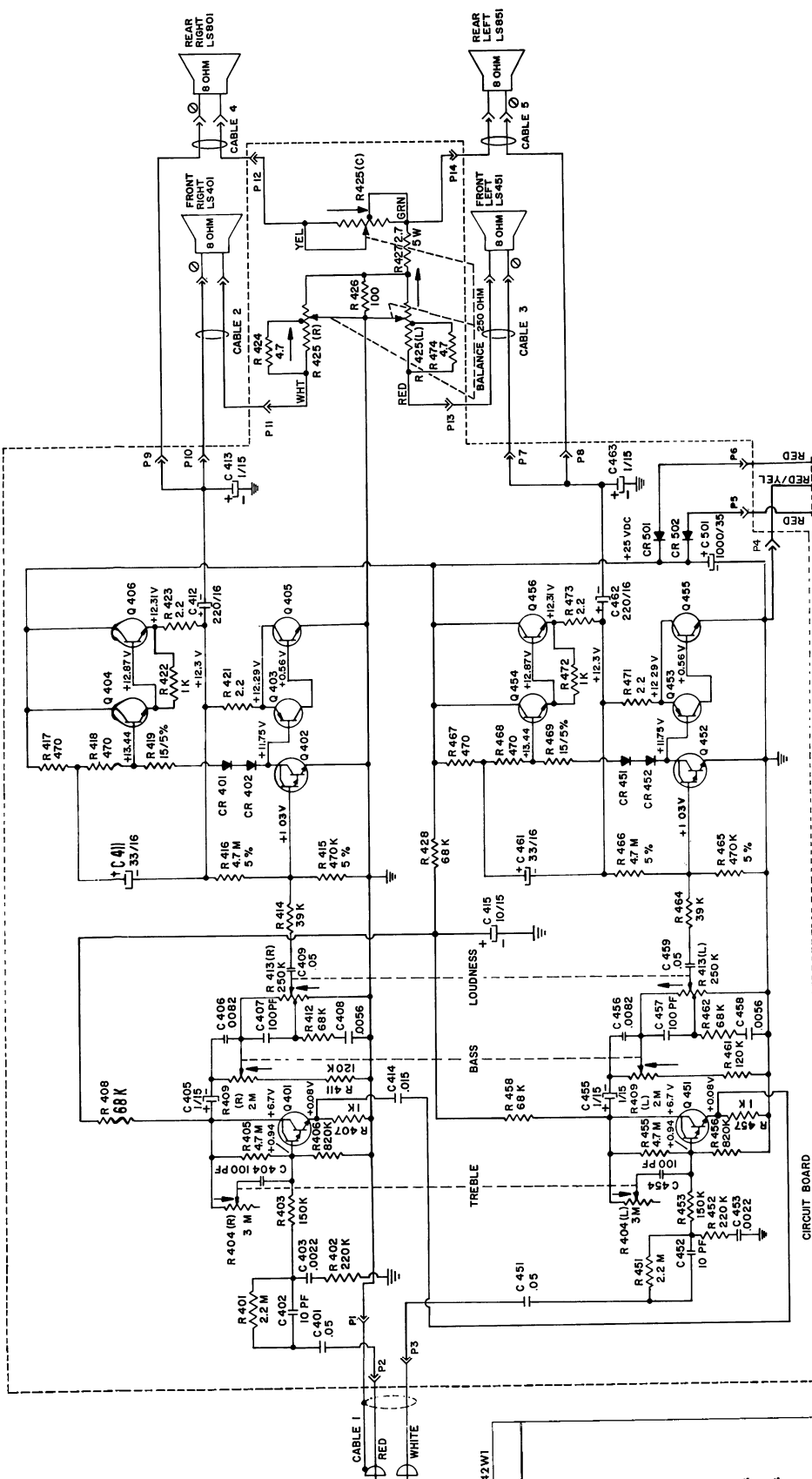
MODEL D554W (W1) — CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE



MODEL D554W (W1) - CHASSIS LAYOUT



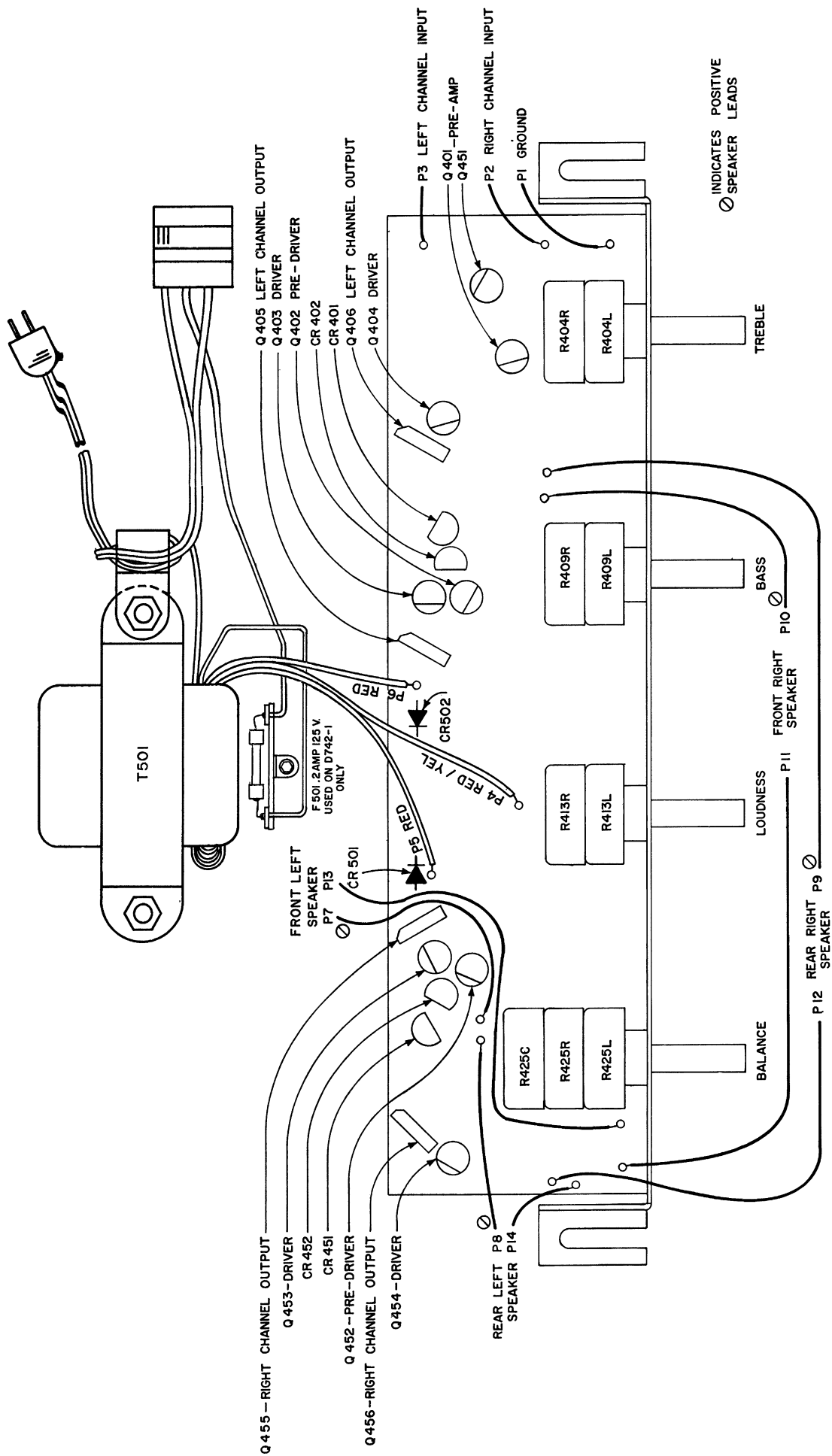
MODEL D556W (W1) — CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE



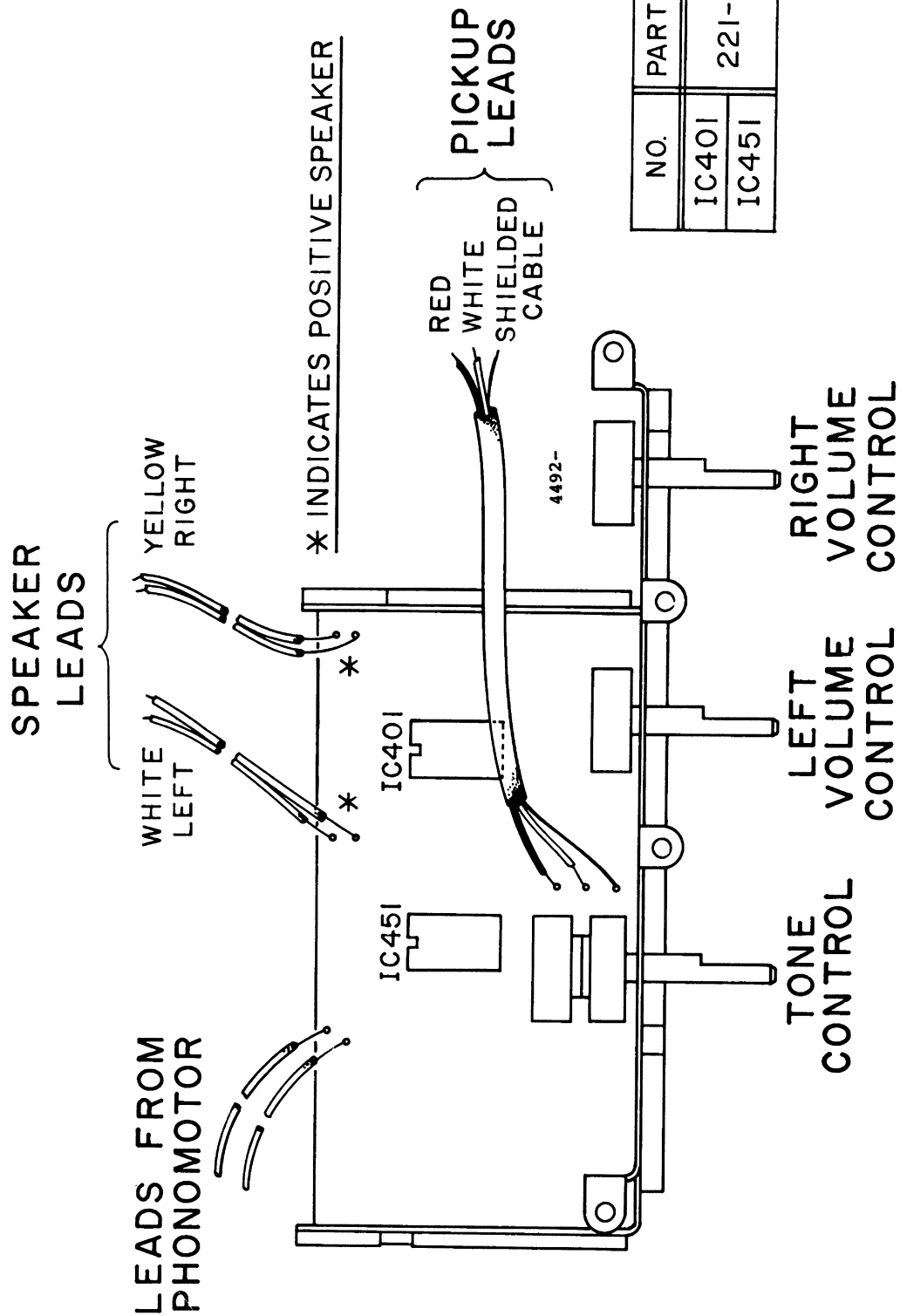
MODEL D742W (W1) – SCHEMATIC

LEGEND MODEL D742W AND D742W1

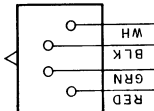
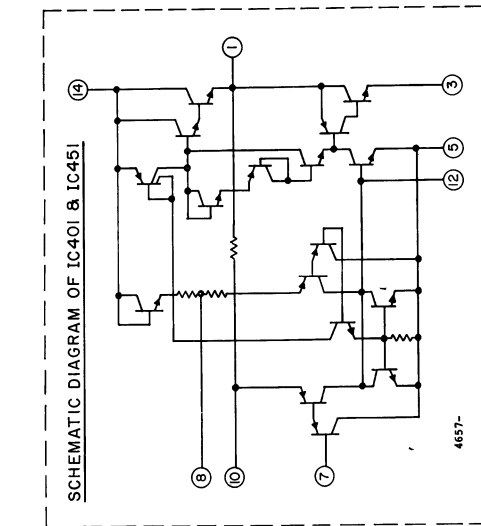
[illegible]



MODEL D742W (W1) – CHASSIS LAYOUT



NO.	PART NO.	DESCRIPTION
IC401	221-64	RIGHT AMPLIFIER
IC451		LEFT AMPLIFIER



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 VTVM
ALL RESISTORS IN OHMS, 1/2 WATT CARBON, $\pm 10\%$ UNLESS

ALL RESISTORS IN OHMS, 1/2 WATT CARBON, $\pm 10\%$ UNLESS

OTHERWISE SPECIFIED.
ALL CAPACITORS ARE IN MICROFARADS UNLESS

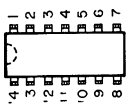
OTHERWISE SPECIFIED.

↑ INDICATES CHASSIS GROUND
ARROWS ON CONTROLS INDICATE

CHASSIS 1WDA10Z1 – SCHEMATIC

[illegible]

IC401-IC451
PIN END VIEW





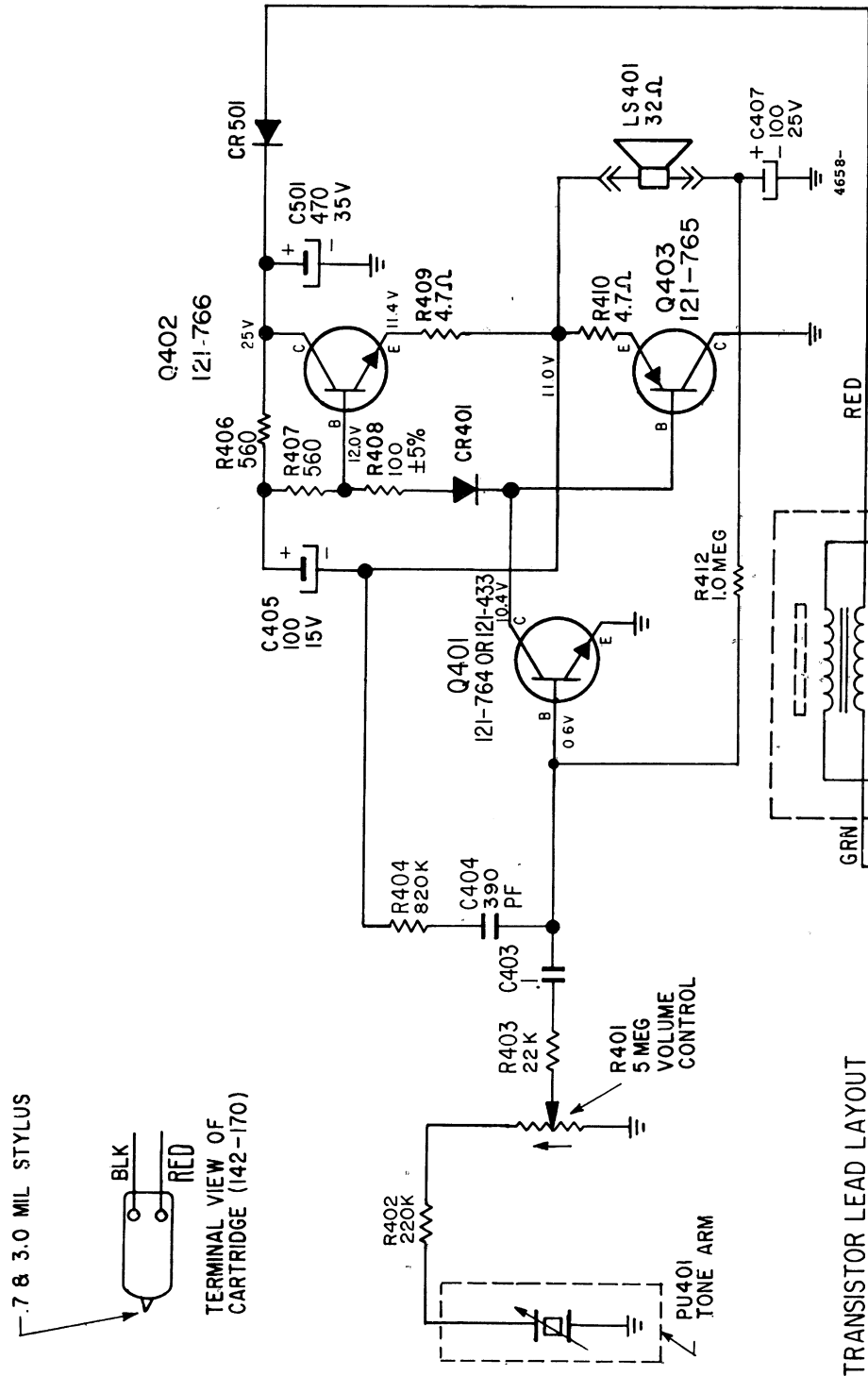
CHASSIS 3AT20Z1

ITEM NO.	PART NO.	DESCRIPTION
C401	22-3177	390 PF DISC. - 500V.
C402	22-3652	.1 MF DISC. - 10V.
C403	22-4668	100 MFD ELECTROLYTIC - 15V.
C404	22-6096	470 MFD ELECTROLYTIC - 35V.
C405	22-6096	100 MFD ELECTROLYTIC - 25V.
R401	63-8321	5 MEG OHMS VOLUME CONTROL
R402	63-1883	220K
R403	63-1883	22K
R404	63-1808	820K
R405	63-1775	560
R406	63-1775	560
R407	63-1742	100 - 5%
R408	63-4529	4.7
R409	63-4529	4.7
R410	63-1829	1.0 MEG
R412	103-145	BIASING DIODE
CR401	212-76	SILICON RECTIFIER
CR501	48-1184	SPEAKER (6 1/4 X 2 1/4)
LS401		

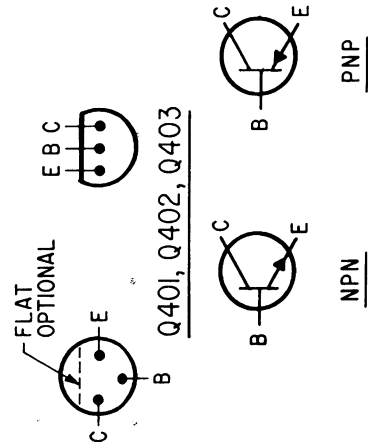
4658

7 & 3.0 MIL STYLUS

TERMINAL VIEW OF CARTRIDGE (142-170)

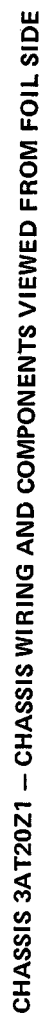


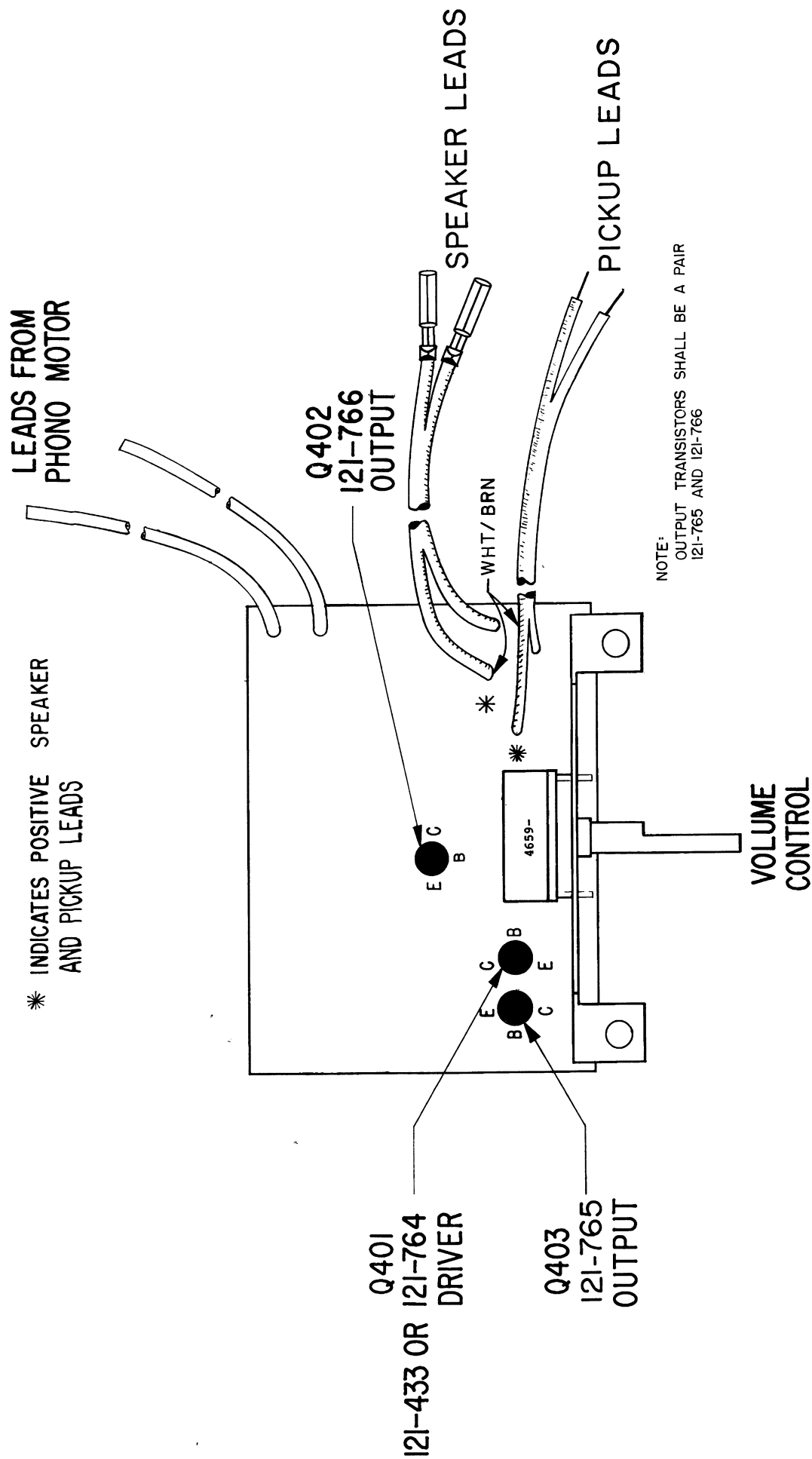
TRANSISTOR LEAD LAYOUT
LEAD END VIEWS



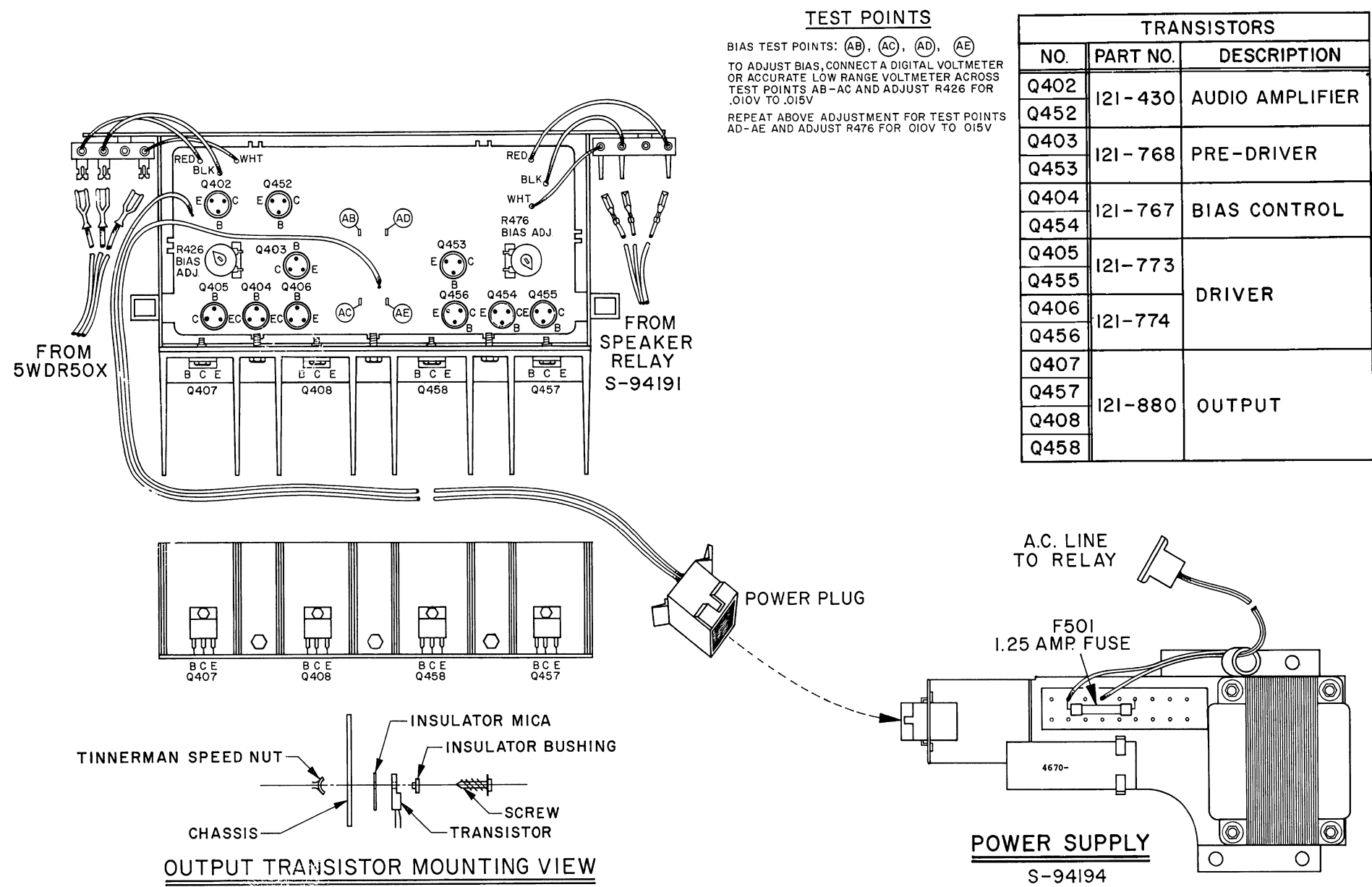
- NOTES:
1. INDICATES CHASSIS GROUND.
 2. ARROW ON CONTROL INDICATES CLOCKWISE POSITION.
 3. ALL RESISTANCES IN OHMS. 1/2 WATT CARBON $\pm 10\%$.
 4. ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
 5. D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS WITH NO SIGNAL USING A V.T.V.M. OF 11 MEGOHM INPUT RESISTANCE. LINE VOLTAGE 120 V.A.C.
 6. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
 7. OUTPUT TRANSISTORS SHALL BE A PAIR 121-765 AND 121-766 FROM THE SAME MANUFACTURER.

CHASSIS 3AT20Z1 - SCHEMATIC

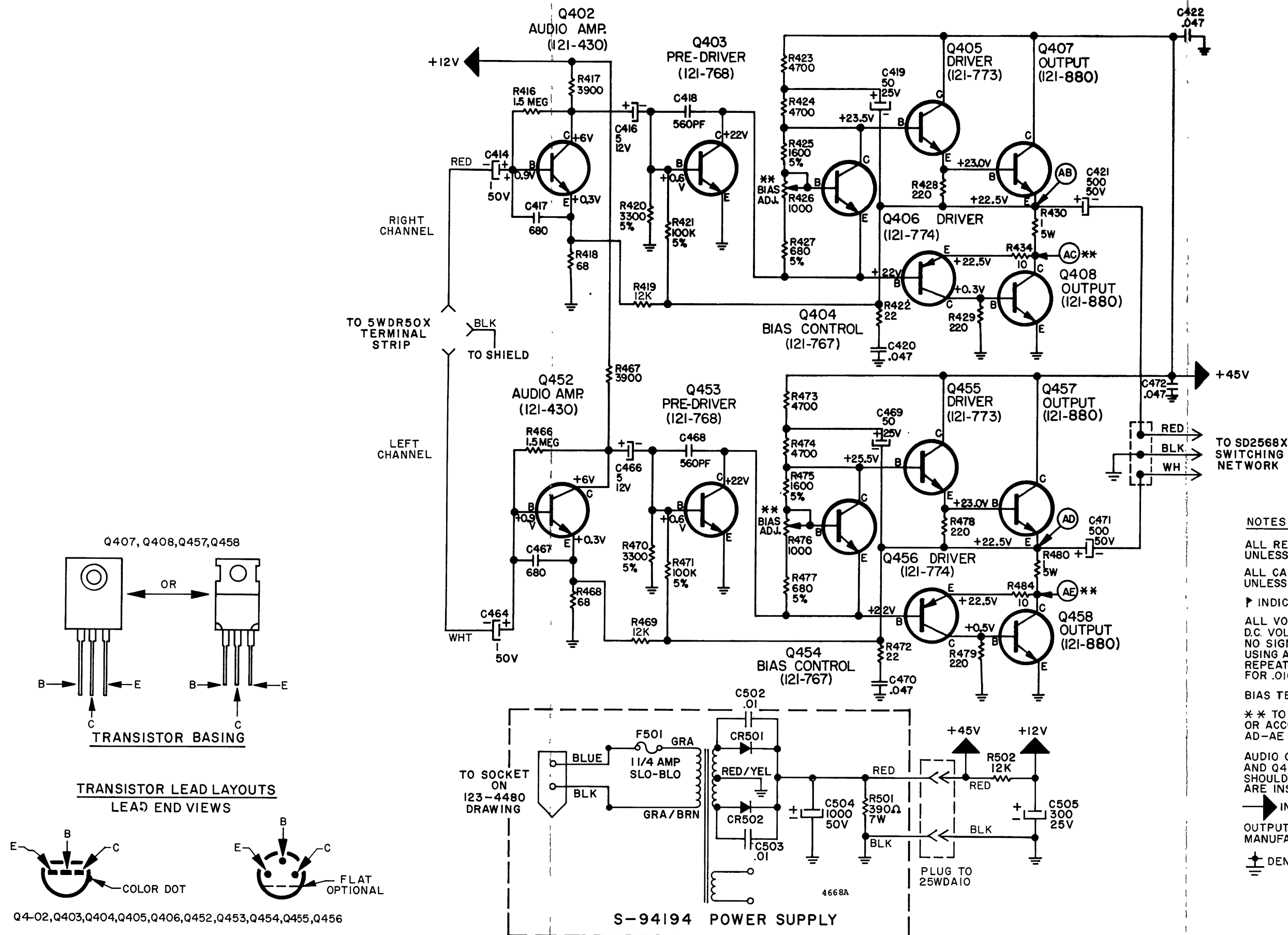




CHASSIS 3AT20Z1 - CHASSIS LAYOUT



CHASSIS 25WDA10 - CHASSIS LAYOUT



NOTE - A TEMPORARY GROUND WIRE MUST BE CONNECTED BETWEEN THE INPUT SHIELD AND THE NEGATIVE TERMINAL OF C505 WHEN SERVICING CHASSIS 25WDA10 (IF DISCONNECTED FROM CHASSIS 5WDR50X AND SWITCHING NETWORK).

NOTES

ALL RESISTORS IN OHMS, $\pm 10\%$, 1/2 WATT CARBON UNLESS OTHERWISE SPECIFIED.

ALL CAPACITORS IN MICROFARADS $\pm 10\%$ UNLESS OTHERWISE SPECIFIED.

► INDICATES $\pm 20\%$.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED. D.C. VOLTAGES ARE MEASURED FROM CHASSIS WITH NO SIGNAL AND LOUDNESS CONTROL AT MINIMUM USING A HIGH INPUT IMPEDANCE V.T.V.M. LINE VOLTAGE 120 V.A.C. REPEAT ABOVE ADJUSTMENT FOR TEST POINT AB-AC AND ADJUST R426 FOR .010V TO .015V.

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

** TO ADJUST BIAS CONNECT A DIGITAL VOLTMETER OR ACCURATE LOW RANGE VOLTMETER ACROSS TEST POINTS AD-AE AND ADJUST R476 FOR .010V TO .015V.

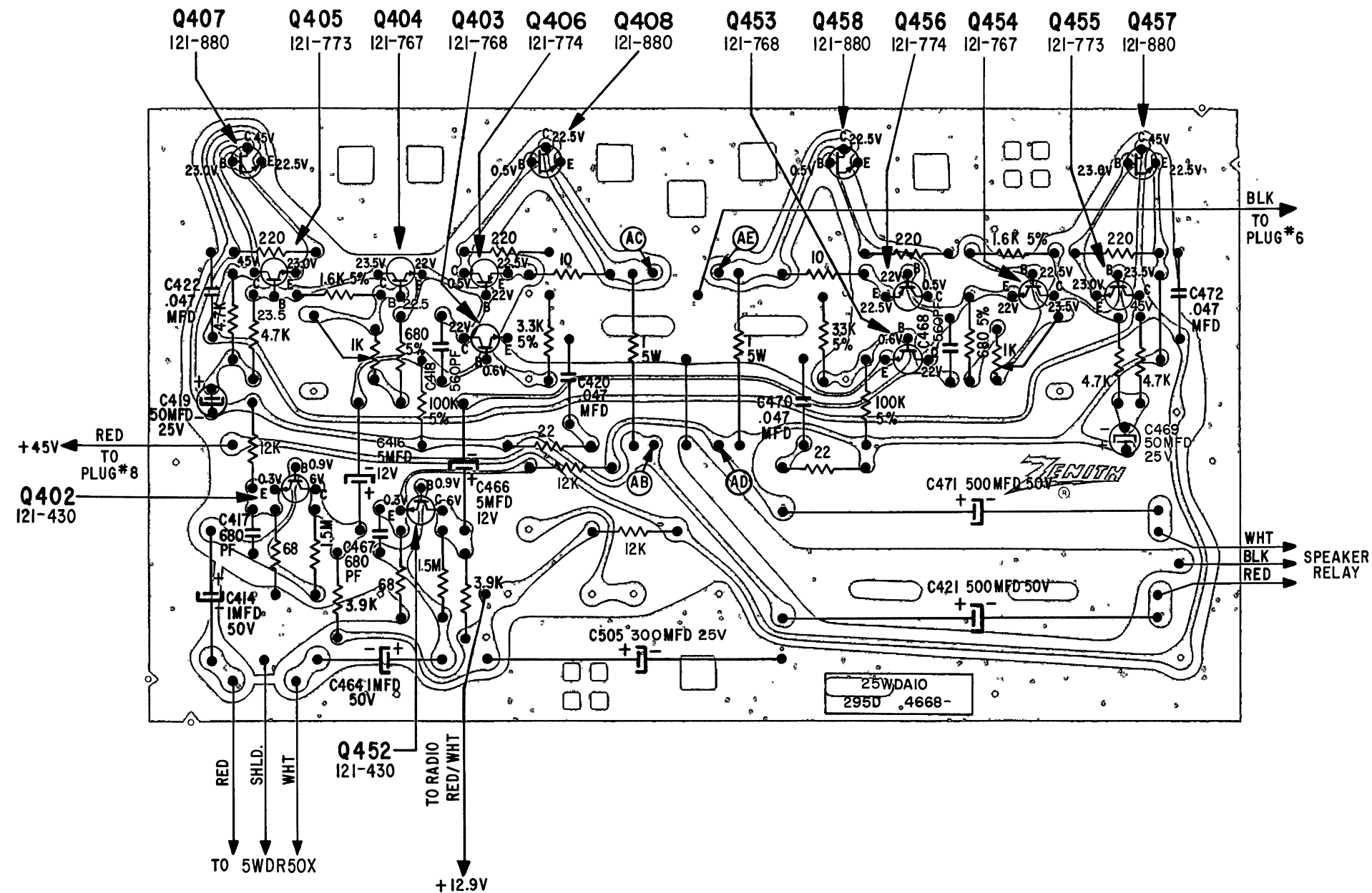
AUDIO OUTPUT TRANSISTORS Q403 TO Q408 (RIGHT CHANNEL) AND Q453 TO Q458 (LEFT CHANNEL) INCLUSIVE IN EACH GROUP SHOULD BE TESTED BEFORE REPLACEMENT TRANSISTORS ARE INSTALLED.

► INDICATES VOLTAGE SOURCE.

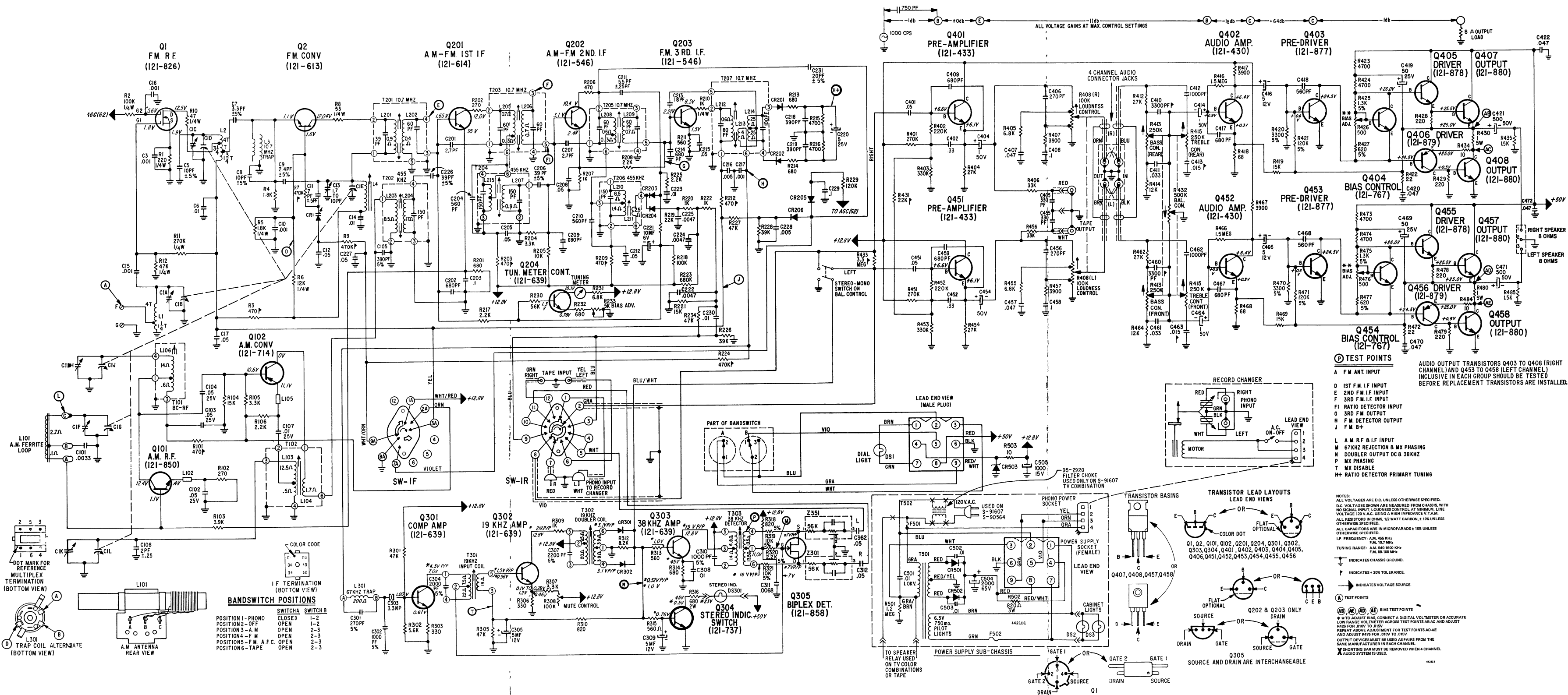
OUTPUT DEVICES MUST BE USED AS PAIRS FROM THE SAME MANUFACTURER IN EACH CHANNEL.

⊥ DENOTES CHASSIS GROUND.

CHASSIS 25WDA10		
ITEM NO.	PART NO.	DESCRIPTION
C414	22-3887	1 MFD ELECTROLYTIC - 50V.
C416	22-2884	5 MFD ELECTROLYTIC - 12V.
C417	22-5482	880 PF DISC. - 500V.
C418	22-3362	560 PF - 500V.
C419	22-5886	50 MFD ELECTROLYTIC - 25V.
C420	22-5886	.047 MFD - 100V.
C421	22-5316	500 MFD ELECTROLYTIC - 50V.
C422	22-5886	.047 MFD - 100V.
C464	22-3687	1 MFD ELECTROLYTIC - 50V.
C466	22-2884	5 MFD ELECTROLYTIC - 12V.
C467	22-5482	880 PF DISC. - 500V.
C468	22-3362	560 PF - 500V.
C469	22-5886	50 MFD ELECTROLYTIC - 25V.
C470	22-5886	.047 MFD - 100V.
C471	22-5316	500 MFD ELECTROLYTIC - 50V.
C472	22-5886	.047 MFD - 100V.
C502	22-4617	.01 MFD - 500V.
C503	22-4617	.01 MFD - 500V.
C504	22-5362	1000 MFD ELECTROLYTIC - 50V.
C505	22-5168	300 MFD - 25 V.
R416	63-1918	1.5 MEG
R417	63-1810	3900 OHM
R418	63-1736	68 OHM
R419	63-1831	12 K OHM
R420	63-1805	3300 OHM 5%
R421	63-1868	100 K OHM - 5%
R422	63-1715	22 OHM
R423	63-1813	4700 OHM
R424	63-1813	4700 OHM
R425	63-1794	1600 OHM 5%
R426	63-8977	1000 OHM BIAS ADJUST
R427	63-1777	680 OHM 5%
R428	63-1757	220 OHM
R429	63-1757	220 OHM
R430	63-6424	1 OHM - 5W
R434	63-1701	10 OHM
R468	63-1810	1.5 MEG
R469	63-1736	68 OHM
R470	63-1831	12 K OHM
R471	63-1805	3300 OHM - 5%
R472	63-1868	100 K OHM - 5%
R473	63-1813	4700 OHM
R474	63-1813	4700 OHM
R475	63-1794	1600 OHM 5%
R476	63-8977	1000 OHM BIAS ADJUST
R477	63-1777	680 OHM - 5%
R478	63-1757	220 OHM
R479	63-1757	220 OHM
R480	63-6424	1 OHM - 5W.
R484	63-1701	10 OHM
R501	63-4380	390 OHM - 10% - 7W.
R502	63-1831	12 K OHM - 10% - 1/2W.
T501	95-2940	POWER TRANSFORMER
F501	136-79	1 - 1/4 A SLO BLOW FUSE
CR501	212-41	SILICON RECTIFIER
CR502	212-41	SILICON RECTIFIER

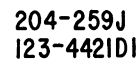


CHASSIS 25WDA10 - CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE



CHASSIS 35WDR50 - SCHEMATIC

ITEM NO.	PART NUMBER	DESCRIPTION	ITEM NO.	PART NUMBER	DESCRIPTION
C1A		FM ANT TRIMMER	R223	63-1904	680K OHM
C1B		FM ANT TUNING	R224	63-1888	470K OHM 20%
C1C		FM DETECTOR TRIMMER	R225	63-1788	30K OHM
C1D		FM DETECTOR TUNING	R226	63-1852	39K OHM
C1E		FM OSC. TUNING	R227	63-1888	30K OHM
C1F	22-6702	AM ANT TRIMMER	R228	63-1852	39K OHM
C1G		AM ANT TUNING	R229	63-1873	120K OHM
C1H		AM DETECTOR TRIMMER	R230	63-1852	30K OHM
C1J		AM DETECTOR TUNING	R231	63-1820	6.8K OHM
C1K		AM OSC. TRIMMER	R232	63-1773	30K OHM
C1L		AM OSC. TUNING	R233	63-8708	6% RIAS ADJUST
C2	22-2729	.001 MFD DISC 5V	R234	63-1852	30K OHM
C3	22-3575	.001 MFD DISC 5V 500V	R235	63-1852	47K OHM
C4	22-3575	.001 MFD DISC 5V 500V	R236	63-1817	30K OHM
C5	22-3541	3.3P FM GIMMICK & .5% 500V	R237	63-1764	330 OHM
C6	22-3575	.001 MFD DISC 5V 500V	R238		
C7	22-3541	3.3P FM GIMMICK & .5% 500V	R239	63-1855	470K OHM
C8	22-3575	.001 MFD DISC 5V 500V	R240	63-1764	330 OHM
C9	22-3541	3.3P FM GIMMICK & .5% 500V	R241	63-1764	330 OHM
C10	22-2729	.001 MFD DISC 5V	R242	63-1855	30K OHM
C11	22-3541	3.3P FM GIMMICK & .5% 500V	R243	63-1764	330 OHM
C12	22-2729	.001 MFD DISC 5V	R244	63-1855	30K OHM
C13	22-3541	3.3P FM GIMMICK & .5% 500V	R245	63-1764	330 OHM
C14	22-3541	3.3P FM GIMMICK & .5% 500V	R246	63-1764	330 OHM
C15	22-2729	.001 MFD DISC 5V	R247	63-1855	30K OHM
C16	22-2729	.001 MFD DISC 5V	R248	63-1855	30K OHM
C17	22-3541	3.3P FM GIMMICK & .5% 500V	R249	63-1855	30K OHM
C18	22-3541	3.3P FM GIMMICK & .5% 500V	R250	63-1855	30K OHM
C19	22-3541	3.3P FM GIMMICK & .5% 500V	R251	63-1855	30K OHM
C20	22-3541	3.3P FM GIMMICK & .5% 500V	R252	63-1855	30K OHM
C21	22-3541	3.3P FM GIMMICK & .5% 500V	R253	63-1855	30K OHM
C22	22-3541	3.3P FM GIMMICK & .5% 500V	R254	63-1855	30K OHM
C23	22-3541	3.3P FM GIMMICK & .5% 500V	R255	63-1855	30K OHM
C24	22-3541	3.3P FM GIMMICK & .5% 500V	R256	63-1855	30K OHM
C25	22-3541	3.3P FM GIMMICK & .5% 500V	R257	63-1855	30K OHM
C26	22-3541	3.3P FM GIMMICK & .5% 500V	R258	63-1855	30K OHM
C27	22-3541	3.3P FM GIMMICK & .5% 500V	R259	63-1855	30K OHM
C28	22-3541	3.3P FM GIMMICK & .5% 500V	R260	63-1855	30K OHM
C29	22-3541	3.3P FM GIMMICK & .5% 500V	R261	63-1855	30K OHM
C30	22-3541	3.3P FM GIMMICK & .5% 500V	R262	63-1855	30K OHM
C31	22-3541	3.3P FM GIMMICK & .5% 500V	R263	63-1855	30K OHM
C32	22-3541	3.3P FM GIMMICK & .5% 500V	R264	63-1855	30K OHM
C33	22-3541	3.3P FM GIMMICK & .5% 500V	R265	63-1855	30K OHM
C34	22-3541	3.3P FM GIMMICK & .5% 500V	R266	63-1855	30K OHM
C35	22-3541	3.3P FM GIMMICK & .5% 500V	R267	63-1855	30K OHM
C36	22-3541	3.3P FM GIMMICK & .5% 500V	R268	63-1855	30K OHM
C37	22-3541	3.3P FM GIMMICK & .5% 500V	R269	63-1855	30K OHM
C38	22-3541	3.3P FM GIMMICK & .5% 500V	R270	63-1855	30K OHM
C39	22-3541	3.3P FM GIMMICK & .5% 500V	R271	63-1855	30K OHM
C40	22-3541	3.3P FM GIMMICK & .5% 500V	R272	63-1855	30K OHM
C41	22-3541	3.3P FM GIMMICK & .5% 500V	R273	63-1855	30K OHM
C42	22-3541	3.3P FM GIMMICK & .5% 500V	R274	63-1855	30K OHM
C43	22-3541	3.3P FM GIMMICK & .5% 500V	R275	63-1855	30K OHM
C44	22-3541	3.3P FM GIMMICK & .5% 500V	R276	63-1855	30K OHM
C45	22-3541	3.3P FM GIMMICK & .5% 500V	R277	63-1855	30K OHM
C46	22-3541	3.3P FM GIMMICK & .5% 500V	R278	63-1855	30K OHM



TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	I21-826	F.M.-R.F.
Q2	I21-613	F.M. CONVERTER
Q101	I21-850	A.M.-R.F.
Q102	I21-714	A.M. CONVERTER
Q201	I21-614	A.M.-F.M. 1ST I.F.
Q202	I21-546	A.M.-F.M. 2ND I.F.
Q203	I21-546	F.M. 3RD I.F.
Q204	I21-639	TUN. METER CONT.
Q301	I21-639	COMP. AMPLIFIER
Q302	I21-639	19KHz AMPLIFIER
Q303	I21-639	38KHz AMPLIFIER
Q304	I21-737	STEREO INDICATOR
Q305	I21-858	BI-PLEX DETECTOR
Q401	I21-433	PRE AMPLIFIER
Q451		
Q402		
Q452		
Q403	I21-430	AUDIO AMPLIFIER
Q453		
Q404		
Q454		
Q405	I21-877	PRE DRIVER
Q455		
Q406		
Q456		
Q407	I21-878	DRIVER
Q457		
Q408		
Q458		
Q409	I21-879	DRIVER
Q459		
Q410		
Q460		
Q411	I21-880	OUTPUT
Q461		
Q462		
Q463		

TEST POINTS	
A	FM ANTENNA INPUT
D	1ST FM I.F. INPUT
E	2ND FM I.F. INPUT
F	3RD FM I.F. INPUT
FI	RATIO DETECTOR INPUT
G	3RD FM OUTPUT
H	FM DETECTOR OUTPUT
J	FM B+
L	A.M. RF & IF INPUT
M	67 KHz REJECTION & MX PHASING
N	DOUBLER OUTPUT DC & 38KHz
P	MX PHASING
T	MX DISABLE
HI	RATIO DETECTOR PRIMARY TUNING
AB	AUDIO BIAS
AC	
AD	
AE	

