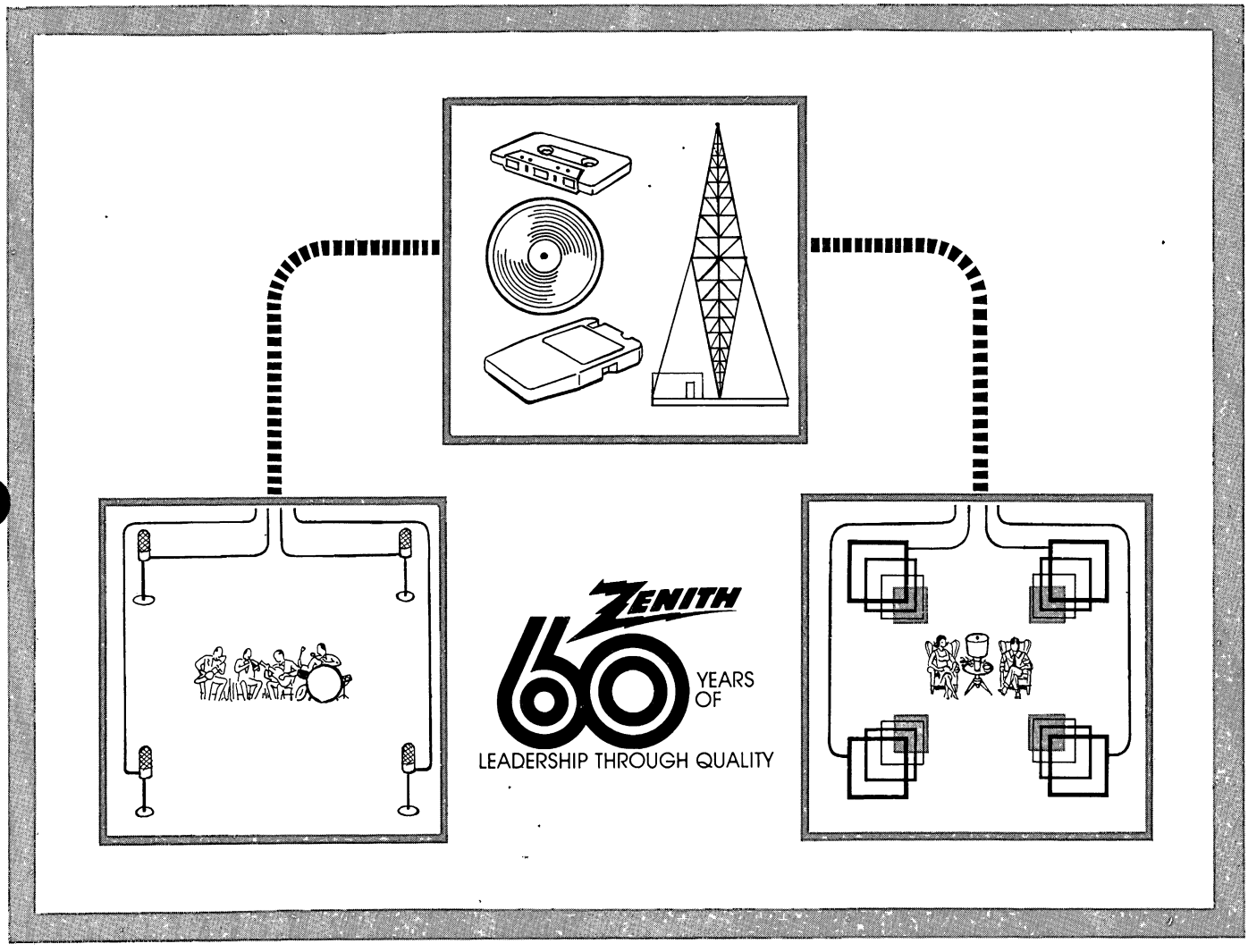
HF-34

ZENITH®

HF-34

SERVICE MANUAL



MODULAR AND CONSOLE AUDIO PRODUCTS

ZENITH RADIO CORPORATION

PARTS AND SERVICE DIVISION

11000 SEYMOUR AVENUE, FRANKLIN PARK, ILLINOIS 60131

HF-34
23M-CPC

OCTOBER, 1978
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To the Service Technician

PRODUCT SAFETY SERVICING GUIDELINES FOR ALL AUDIO AMPLIFIERS AND RADIO RECEIVERS

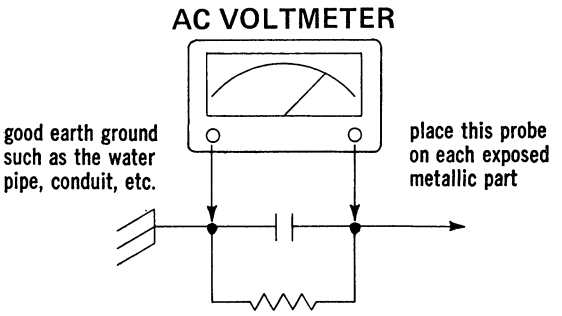
CAUTION: No modification of any circuit should be attempted. Service work should be performed only after you are thoroughly familiar with all of the following safety checks and servicing guidelines. To do otherwise increases the risk of potential hazards and injury to the user.

SAFETY CHECKS

SUBJECT: Fire & Shock Hazard

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

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



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TECHNICAL APPLICATIONS INDEX

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

HF 18: Theory – Diodes (Including Zener and SCR), Transistors, (PNP, NPN, Darlington, and JFET). Applications – Chassis 29AT24 (JFET FM-RF, Multiplex, Electronic Touch Switching), Complementary Symmetry, Chassis 11ZT27 (Electronic Filter).

HF 22: Theory – JFET, IGFET, MOSFET, Applications – Dual Gate MOSFET FM-RF, JFET Biplex Detector, Quasi-Complementary Symmetry.

HF 23: Applications – Model C9029/Chassis 15WCA10 Four Channel Decoder.

HF 26: Applications – Chassis 15WDR51 (JFET Meter Circuit, Multiplex IC, Four Channel Decoding).

HF 27: Applications – Model SD2568 Speaker Switching Circuitry.

HF 28: Applications – Model D9013W Allegro Speaker System.

HF 29: Theory – Light Emitting Diodes (LED). Applications – Three Light Tuning (Target Tuning), Multiplex IC.

HF 29S1: Applications – Snap-off Escutcheon and Out Front Chassis Removal, "E" Line Models.

HF 30: Applications – Snap-off Escutcheon and Out Front Chassis Removal, "F" Line Models.

HF 31: Theory and Applications - Chassis 12WGR59 (Ceramic Filters, IF IC, Quadrature Detector, Interstation Muting, PLL Multiplex IC, Audio). General Product Information – Audio Circuitry (including Two on Two Speaker Matrix, Allegro Speaker Systems), "G" Line Disassembly Procedures.

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

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

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

HF 33S1: Applications – "J" Line Allegro Speaker System Repair Procedures.

HF 34: Applications – "K" Line Allegro Speakers Systems and Repair Procedures. General Product Information.

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*REFER TO MASTER INDEX FOR CURRENT INFORMATION

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PRODUCT FEATURES

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CABINET			CHASSIS		SPEAKERS			RECORD CHANGER	OTHER FEATURES		
MODEL NOTE F	COLOR	STYLE NOTE A	MODEL	TYPE	PART NUMBER	IMPED. (In Ohms)	QTY. AND SIZE (In Inches)	PART NUMBER NOTE B	TAPE PROVISION NOTE C	SPEAKER PROVISION NOTE D	MISC. NOTE E
IS4020 *	Walnut	M, D	–	AM/FM/FM Stereo/Phono/ Tape	Note D2	–	–	169-573 or 169-554-01	8TK-R/P 969-51	A1, A2, SPKAB	AUX, DL, H, HIF, LD, T, TO
IS4030 *	Walnut	M, D	–	AM/FM/FM Stereo/Phono/ Tape	Note D2	–	–	169-573 or 169-554-01	CASS-R/P 969-52	A1, A2, SPKAB	AUX, DL, H, HIF, LD, T, TO
IS4040 *	Walnut	M, D	–	AM/FM/FM Stereo/Phono/ Tape	Note D2	–	–	169-573 or 169-554-01	CASS-R/P 969-52 8TK-R/P 969-51	A1, A2, SPKAB	AUX, DL, H, HIF, LD, T, TO
IS4060 *	Walnut	M, D	–	AM/FM/FM Stereo/Phono/ Tape	Note D2	–	–	169-574-01	8TK-R/P 969-55	A1, A2, A3, A4 SPKOAB	AUX, DL, F, H, HIF, LD, LOF, MS, MU, T, TO
IS4070 *	Walnut	M, D	–	AM/FM/FM Stereo/Phono/ Tape	Note D2	–	–	169-574-01	CASS-R/P 969-56	A1, A2, A3, A4 SPKOAB	AUX, DL, F H, HIF, LD, LOF, MS, MU, T, TO
IS4080 *	Walnut	M, D	–	AM/FM/FM Stereo/Phono/ Tape	Note D2	–	–	169-574-01	CASS-R/P 969-56 8TK-R/P 969-55	A1, A2, A3, A4 SPKOAB	AUX, DL, F, H, HIF, LD, LOF, MS, MU, T, TO
KR902P	Pecan	C, LL	3WJR50Z	AM/FM/FM Stereo/Phono/ Tape	49-1153-02 or 49-1224-02 49-1094-01	16 16 45	2-6x9 2-6x9 2-3½	169-573-01 or 169-554	8TK-R/P 169-545	A1, A2 SPK	AFC, AUX, DL, H, HIF, RS, T, TO
KR912AE	Antique Oak	C, LL	3WJR50Z	AM/FM/FM Stereo/Phono/ Tape	49-1261-02 49-1251-02	8 8	2-8 2-3	169-570	8TK-R/P 169-545	A1, A2 SPK	A, AFC, AUX, DL, H, HIF, RS, T, TO
KR915P	Pecan	C, LL	3WJR50Z	AM/FM/FM Stereo/Phono/ Tape	49-1261-02 49-1251-02	8 8	2-8 2-3	169-570	8TK-R/P 169-545	A1, A2 SPK	A, AFC, AUX, DL, H, HIF, RS, T, TO
KR916PN	Pine	C, LL	3WJR50Z	AM/FM/FM Stereo/Phono/ Tape	49-1261-02 49-1251-02	8 8	2-8 2-3	169-570	8TK-R/P 169-545	A1, A2 SPK	A, AFC, AUX, DL, H, HIF, RS, T, TO
KR919P	Pecan	C, LL	3WJR50Z	AM/FM/FM Stereo/Phono/ Tape	49-1261-02 49-1251-02	8 8	2-8 2-3	169-571	8TK-R/P 169-546	A1, A2 SPK	A, AFC, AUX, DL, H, HIF, RS, T, TO
KR920AE	Antique Oak	C, LL	3WJR50Z	AM/FM/FM Stereo/Phono/ Tape	49-1217-01 49-1166-01	8 8	2-10 2-H	169-571	8TK-R/P 169-546	A1, A2 SPK	A, AFC, AUX, DL, H, HIF, RS, T, TO
KR966P	Pecan	C, LL	15WJR29	AM/FM/FM Stereo/Phono/ Tape	49-1271 49-1166-01	8 8	2-12 2-H	169-575-01	8TK-R/P 169-506-01A	A2,A3,A4 SPK	A, AFC, AUX, DL, F, H, HIF, LOF, MU, T, TIO
MC1000	Walnut	M, SP	–	–	49-1277 49-1278	8 8	1-6½ 1-2	–	–	20 Watt Handling Capability	A1
MC2000	Walnut	M, SP	–	–	49-1261-02 or 49-1293 49-1166-01	8 8 8	1-8 1-8 1-3½	–	–	40 Watt Handling Capability	A2
MC3000	Walnut	M, SP	–	–	49-1290 49-1288	8 8	1-10 1-3½	–	–	60 Watt Handling Capability	A3
MC4000	Walnut	M, SP	–	–	49-1291 49-1289 49-1288	5.5 7.0 8.0	1-12 1-5 1-3½	–	–	100 Watt Handling Capability	A4
MC6010 *	Walnut	M	–	AM/FM/FM Stereo/Tape	Note D2	–	–	Note B3	8TK-R/P 969-54	A1, A2 SPKOAB	AFC, AUX, DL, F, H, HIF, LD, LOF, MS, T, TO
MC6060 *	Walnut	M	–	AM/FM/FM Stereo/Tape	Note D2	–	–	Note B3	CASS-R/P 969-57	A1, A2, A3, A4 SPKOAB	AFC, AUX, DL, F, H, HIF, LD, LOF, MS, MU, T, TO

PRODUCT FEATURES
SEE NOTES BELOW

CABINET			CHASSIS		SPEAKERS			RECORD CHANGER	OTHER FEATURES		
MODEL NOTE F	COLOR	STYLE NOTE A	MODEL	TYPE	PART NUMBER	IMPED. (In Ohms)	QTY. AND SIZE (In Inches)	PART NUMBER NOTE B	TAPE PROVISION NOTE C	SPEAKER PROVISION NOTE D	MISC. NOTE E
MC7030 *	Walnut	M	–	AM/FM/FM Stereo	Note D2	–	–	Note B3	TM	A2, A3, A4 SPKOAB	AFC, AUX, DE, DL, F, H, HIF, LD, LOF, MS, MU, TIO, TM, TS, TZ
MC7040 *	Walnut	M	–	AM/FM/FM Stereo	Note D2	–	–	Note B3	TM	A3, A4 SPKOAB	AFC, AUX, DE, DL, F, H, HIF, LD, LOF, MS, MU, TIO, TM, TS, TZ
MC7050 *	Walnut	M	–	AM/FM/FM Stereo	Note D2	–	–	Note B3	TM	A3, A4 SPKOAB	AUX, DE, DL, F, H, HIF, LD, LOF, MS, MU, 2TIO, TD, TM, TS, TZ
MC9020 *	Walnut	M, D	–	–	–	–	–	169-574	–	–	–
MC9030 *	Walnut	M, D	–	–	–	–	–	169-575	–	–	–
MC9040 *	Walnut	M, D	–	–	–	–	–	169-576	–	–	–
MC9070 *	Walnut	M	–	Tape	–	–	–	–	CASS-R/P 969-58	–	H
SK2579P	Pecan	C, 2LL	15WJR29	AM/FM/FM Stereo/Phono/ Tape/Color Combo	49-1275 49-1234-04 49-1166	8 16 8	2-10 1-5 2-H	169-575-01	8TK-R/P 169-506-01A	A2, A3, A4 SPK	A, AUX, DL, F, H, HIF, LOF, MU, T, TIO

NOTES

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

NOTE B – RECORD CHANGERS

NOTE B1: Provision for external record changer using a ceramic cartridge

NOTE B2: Provision for external record changer using a magnetic cartridge.

NOTE B3: Provision for external record changer using either a ceramic or magnetic cartridge

Record Changers having alpha suffixes (ie. 169-511A) denote variations of internal mechanical and/or electrical components (refer to Record Changer Features charts on page 4) but otherwise are interchangeable with other alpha suffix and non-suffix versions.

NOTE C – TAPE INPUT AND OUTPUT PROVISIONS:
Factory Installed: 8 TK - Eight Track Cartridge.
Cass = Cassette, P = Play, R = Record.
TM = Top of Set Model for installation with the designated console or modular models
Model MC9070 – Cassette Tape Player/Recorder.

Tape Units having alpha suffixes (ie. 169-510A) denote variations of internal mechanical and/or electrical components (refer to Tape Unit Features chart on page 5) but are otherwise interchangeable with other alpha suffix and non-suffix versions. Units having numeric (ie. 169-506-01) or numeric/alpha (ie. 169-506-01A) suffixes may have a one way interchangeability under some conditions (refer to Product Features chart on pages 2 and 3).

NOTE D – SPEAKER PROVISIONS:

NOTE D1: Models E9012 series, G1000W, G2000W, W11, G3000W, W11, G9012W1, G9014W, G9019W, H1000W series, H2000W series, H3000W series, J1000W series, J2000W series and J3000W series are 8 ohm Allegro Speaker Systems. Allegro Models in the E9014 and E9018 series were 16 ohm systems.

NOTE D2: "K" Line Modular Models may use either MC1000, MC2000, MC3000 or MC4000 8 ohm Allegro Speaker Systems as indicated. (See Speaker Provisions).

A1 = Model MC1000 Allegro 1000 Speaker System may be used.
A2 = Model MC2000 Allegro 2000 Speaker System may be used.
A3 = Model MC3000 Allegro 3000 Speaker System may be used.
A4 = Model MC4000 Allegro 4000 Speaker System may be used.
SPK = Switch to select Internal (Main), External (Remote) or Both Speaker Systems.
SPKAB = Switch to select A, B or Both Speaker Systems.
SPKOAB = Switch to select A, B or Both Speaker Systems or to switch all Speaker Systems off.

NOTE E – MISCELLANEOUS FEATURES:
A = Speaker System is Allegro.
A1 = Speaker System is Allegro 1000.
A2 = Speaker System is Allegro 2000.
A3 = Speaker System is Allegro 3000.
A4 = Speaker System is Allegro 4000.
AFC = AFC Defeat Switch.
AUX = Auxiliary input accepts certain optional Record Changers or Tape Units listed under Notes B and C.
DE = Deemphasis Switch.
DL = Dial Scale Light.
F = Flywheel Tuning.
H = Headphone Jack (Stereo).
HIF = Hi Filter Switch.
LD = Loudness Switch.
LOF = Lo Filter Switch.
MS = Mono/Stereo Switch.
MU = FM Mute Switch.
PL = Power Indicator Light (other than Dial Scale Light).
RS = Record Storage
T = Tuning Meter.
TD = Tape Dubbing Switch.
TIO = Tape Input/Output.
TM = Tape Monitor Switch.
TO = Tape Output.
TS = Signal Strength Meter (AM and FM).
TZ = Zero Center Tuning Meter (FM).

NOTE F – MODEL INFORMATION
Service information for models marked* will appear in other service manuals. Refer to Master Index for further information.

RECORD CHANGER FEATURES
SEE NOTES BELOW

PART NUMBER	MFG. CODE	CARTRIDGE, STYLUS NOTE 2 ------ PRESSURE IN GRAMS	45 RPM ADAPTER	MODES (TYPE)	SIZE (TYPE)	SPEED (TYPE)	RECORD STACK	TURNTABLE DIA.	BASE PLATE COLOR	TURNTABLE PAD COLOR	PRESSURE ARM COLOR	MISC. (TYPE)
169-554	BSR C129R	142-190 56-643 D-S 3.5-4.5	S-72648	Stop, Start Auto (Slide)	7,10,12 (Slide)	33,45,78 (Slide)	Note 5	11" Plastic	Black	Black	Black	Cue (Lever)
169-554-01	BSR C129R	142-186 56-643 D-S 3.5-4.5	S-72648	Stop, Start, Auto (Slide)	7,10,12 (Slide)	33,45,78 (Slide)	Note 5	11" Plastic	Black	Black	Black	Cue (Lever)
169-570	GAR 6200C	142-190 56-643 D-S 3.0-5.0	A-7545 ------ 76-2132 (Stub)	Off, Manual, Auto (Slide)	12", 33 7", 33 7", 45 10", 78 (Slide)		Note 5	10½" Metal	Black	Black	Chrome and Black	Cue (Lever)
169-571	GAR 630S	142-192 56-643 D-S 3 0-5.0	A-7545 ------ 76-2132 (Stub)	Off, Manual, Auto (Slide)	12", 33 7", 33 7", 45 10", 78 (Slide)		Note 5	10½" Metal	Black	Black	Chrome and Black	Viscous Cue (Lever) ------ Anti-Skate (Slide)
169-573	BSR C197	142-197 56-639 D-S 3.5-5.0	S-72648	Off, Manual, Auto (Slide)	7,10,12 (Slide)	33,45,78 (Slide)	Note 5	11" Metal	Black	Black	Black	Cue (Lever)
169-573-01	BSR C197	142-198 56-642 D-S 3.5-5 0	S-72648	Off, On, Auto (Slide)	7,10,12 (Slide)	33,45,78 (Slide)	Note 5	11" Metal	Black	Black	Black	Cue (Lever)
169-574	GAR 630S	142-194 56-641 D 3.5-5.0	A-7545 ------ 76-2132 (Stub)	Off, Manual, Auto (Slide)	12", 33 7", 33 7", 45 10", 78 (Slide)		Note 5	10½" Metal	Black	Black	Chrome and Black	Viscous Cue (Lever) ------ Anti-Skate (Slide)
169-574-01	GAR 630S	142-189 56-641 D 3.5-5.0	A-7545 ------ 76-2132 (Stub)	Off, Manual Auto (Slide)	12", 33 7", 33 7", 45 10", 78 (Slide)		Note 5	10½" Metal	Black	Black	Chrome and Black	Viscous Cue (Lever) ------ Anti-Skate (Slide)
169-575	GAR GT4	142-195 56-641-02 D 2 5-4.5	27-627 ------ 76-2132 (Stub)	Off, Manual, Auto, Repeat (Slide)	N.A	33, 45 (Slide)	Note 5	11¼" Metal ----- (Belt Drive)	N.A.	Black	N.A.	Viscous Cue (Slide) ----- Anti-Skate (Rotary) ----- Start/Reject (Button)
169-575-01	GAR GT4	142-189 56-641 D 2.5-4.5	27-627 ------ 76-2132 (Stub)	Off, Manual, Auto, Repeat (Slide)	N A	33, 45 (Slide)	Note 5	11¼" Metal ------ (Belt Drive)	N.A.	Black	N.A.	Viscous Cue (Slide) ------ Anti-Skate (Rotary) ------ Start/Reject (Button)
169-576	GAR GT25	142-196 56-641-03 D 1.5-3.0	27-627 ------ 76-2132 (Stub)	Off, Manual, Automatic, Repeat (Rotary)	7, 12 (Rotary)	33, 45 (Rotary)	Note 5	11¾" Metal ------ (Belt Drive)	Gray	Black	N.A.	Viscous Cue (Slide) ------ Anti-Skate (Rotary) ------ Start/Reject (Rotary)

NOTE 1 – All record changers have 120VAC 60Hz motors.

NOTE 2 – D = Diamond, S = Manufactured Sapphire

NOTE 3 – Stylus 56-641, has a 0.6 mil spherical tip 56-641-01 is an optional 2.5 mil mfg sapphire stylus for playing 78 RPM records. 56-641-02 and 56-641-03 are Bi-radial Eliptical stylus.

NOTE 4 –

NOTE 5 – Record changers will play as many as five (flat and unwarped records in 12-inch, 10-inch or 7-inch size. Sizes cannot be intermixed.)

NOTE 6 – Record changers will play as many as six (flat and unwarped records in 12-inch, 10-inch or 7-inch size. Sizes cannot be intermixed.)

TAPE UNIT FEATURES
SEE NOTES BELOW

PART NO. NOTE F	MFG. CODE	8-TRACK/ CASSETTE	CHANNELS		ALC/FULL FEATURE NOTE A	MOTOR NOTE B	AUTO STOP NOTE C	USE NOTE D	MISC. FEATURES NOTE E
			PLAY	RECORD					
169-506-01	AMI/ML	8-Track	2	2	Full	DC/M	Full	C	A2, C1, FF, I, M, P1, R
169-545	AMI/ML	8-Track	2	2	ALC	DC/M	Four R	C	A2, C3, I, R
169-546	AMI/ML	8-Track	2	2	ALC	DC/M	Four R/FFA	C	A2, C3, FF, I, P2, R
969-51	TAN	8-Track	2	2	ALC	DC/M	Four R/FF	M	A3, C3, FF, I, P2, RL
969-52	TAN	Cassette	2	2	ALC	DC/M	Tape P/R	M	A3, C3, CR, E, F, I, P2, RL, TC
969-54	TAN	8-Track	2	2	Full	DC/M	Four B P/R/FF	M	A3, C3, FF, I, M, P2, R, RL
969-55	TAN	8-Track	2	2	Full	DC/M	Four R/FF	M	A3, C3, FF, I, M, P2, RL, RP
696-56	TAN	Cassette	2	2	Full	DC/M	Tape P/R	M	A3, C3, CR, E, F, I, M, P2, RL, TB, TC, TE
969-57	TAN	Cassette	2	2	Full	DC/M	Tape P/R	M	A3, C3, E, F, I, M, P2, RL, T, TB, TC, TE
969-58	AMI	Cassette	2	2	Full	DC/E	Tape All	MA	A1, C1, D, E, H, I, M, P2, PRL, RL, TB3, TC, TE3

NOTES

NOTE A – RECORD

ALC = Automatic Level Control
Full = Full Feature with Record Level Controls and Meters.

NOTE B – MOTOR

E = Electronic Governor
M = Mechanical Governor
AC Motors require conversion kit if used on 50Hz.

NOTE C – AUTO STOP

Full = Stops after each program, fourth program or runs continuously (in both Play and Record modes). Selected by three position slide control.
Four R = Stops after fourth program in Record only
Four R/FF = Stops after fourth program in Record and Fast Forward only.
Four R/FFA = Stops after fourth program in Record and after all programs in Fast Forward.
Four B P/R/FF = Stops after fourth program in Play, Record and Fast Forward only if Auto Stop Button is depressed
Tape P/R = Tape tension sensor at end of tape in Play and Record only.
Tape All = Stops at end of tape in Play/Record/Fast Forward/Rewind modes.

NOTE D – USED IN

C = Console
M = Modular
MA = Modular Accessory
W = Wedge Modular

NOTE E – MISC. FEATURES

A1 = Parallel Blade AC Connector
A2 = Molex Type AC Connector.
A3 = Hard Wire AC Connector.
B = Bias Frequency Switch.
C1 = RCA Type Audio Connector.
C2 = Spade Lug Audio Connector
C3 = Hard Wire Audio Connector.
CR = Cue/Review.
D = Dolby Noise Reduction System. Dolby is a trademark of Dolby Laboratories, Inc.
E = Eject.
F = Interlocked Fast Forward Button.
FF = Fast Forward Button (Push-Push Type).
I = Interlocked Record Button.
M = Record Level Meter (Illuminated).
P1 = Pause Button (Push In, Slide Left to Lock).
P2 = Pause Button (Push-Push).
PRL = Peak Record Light.
Q = Automatic 2/4 Channel Switching, with mode indicator.
R = Ready Light or Auto Stop Light.
RL = Record Light
RP = Repeat Button.
T = Tape Run Light.
TB = Tape Bias Switch (C_rO_2 / Normal)
TB3 = Tape Bias Switch (C_rO_2 / FeC_r / Fe_3O_2)
TC = Tape Counter.
TE = Tape Equalization Switch (C_rO_2 / Normal)
TE3 = Tape Equalization Switch (High, Mid, Low)

NOTE F – PART NUMBERS

169- Base numbers identify units with electronics while 969- base numbers identify units without electronics (mechanism only). Features for 969 base numbers include electronics features.

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 inside front cover for further information.

CIRCUIT BOARD COMPONENT IDENTIFICATION

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

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

POWER AMPLIFIERS

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

1. Each channel of the following amplifiers use a pair of matched power transistors in the final output stage. Therefore, should one transistor fail, both transistors must be replaced simultaneously, since they will not perform properly unless matched. (In chassis using complementary symmetry circuits a matched pair consists of one NPN and one PNP transistor.): 3WJR50, 50Z, 15WJR29.

2. When a power transistor is replaced, the insulator (when used) between the transistor and the heat sink should also be replaced. On the following, be certain to apply Castall No. 832M heat conductive grease between the transistor and the insulator. Also between the insulator and the chassis. The Castall grease can be obtained in quantities by ordering Part No. 205-303: 15WJR29.

3. Do not operate these amplifiers without their proper speaker load.

4. Do not short out the audio output of either channel when the amplifier is operating.

5. Should a power transistor fail (short) be certain to replace the emitter resistors for the specific channel. Also be certain to check the condition of the silicon diode rectifiers, and driver transistors.

6. Remove plug-in transistors from their sockets before doing any soldering to the socket lugs.

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

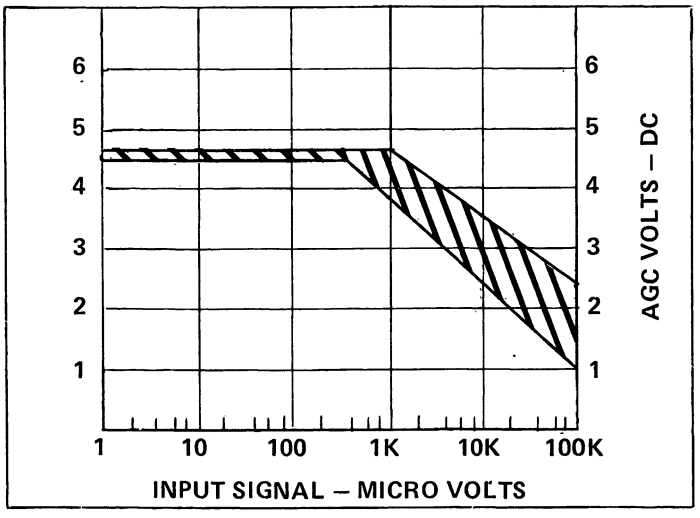
FM AGC VOLTAGE CURVE

Voltage developed at the AGC terminal of the IF IC (pin 7 of 221-89 and pin 15 of 221-108) varies depending on the IF voltage sampled in the chip. If a fixed input signal level were applied to several samples of a given chassis model, the measured AGC voltage for that input level will vary among the samples. Voltage measured under these conditions is not a complete indicator of proper AGC action.

Two important points must be noted:

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

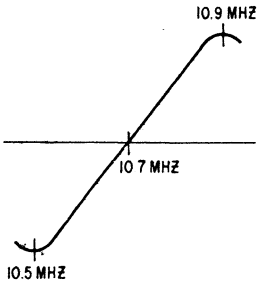
2. AGC voltage will start to drop as the RF input level increases to approximately 1000 microvolts.



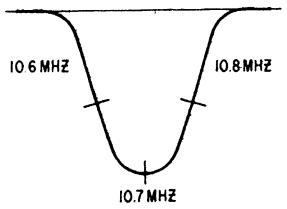
MINIMUM RATED POWER OUTPUT PER CHANNEL INTO 8 OHMS
(SINE WAVE CONTINUOUS AVERAGE POWER - OFTEN CALLED RMS POWER)

Chassis	Number of Channels	Watts Per Channel	Power Bandwidth	Total Harmonic Distortion (THD) Nor More Than
3WJR50, 50Z	2	2.5	100Hz – 10kHz	1.0%
15WJR29	2	15.0	40Hz - 18kHz	0.5%

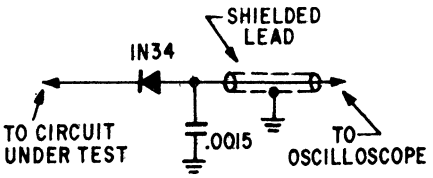
FM/AM/MULTIPLEX ALIGNMENT



Scope Pattern A — Ratio Detector
Adjust for maximum amplitude while maintaining linearity and symmetry. 10.7 MHZ marker must be on the curve at base line.



Scope Pattern-B — IF
10.6 and 10.8 MHZ markers must be symmetrically positioned with 10.7 MHZ at center of curve. This point must be adjusted for maximum.



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

GENERAL

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

FM ALIGNMENT

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

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

AM ALIGNMENT

A V.T.V.M. on low AC scale connected across the speaker voice coil output terminals (either left or right channels), will be satisfactory for most AM, IF and RF adjustments. See preferred alignment procedure for Chassis IWJR55, 3WJR50, 50Z, 3WJR52, 52Z.

MULTIPLEX ALIGNMENT

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

Most Multiplex generators are excellent troubleshooting devices because they provide a composite Multiplex signal as well as an RF signal (which is FM modulated by the composite multiplex signal). The composite signal is very useful since it can be used in signal tracing the Multiplex portion of the receiver. We do not recommend that Multiplex alignment be made using the composite signal injected at the output terminal of the Detector since there is always some phase shift occurring in the RF, IF or Detector circuits. As a result, Multiplex alignment made by a signal injected at the Detector input would not be correct. For proper Multiplex alignment the composite signal must FM modulate the RF carrier and then be fed into the FM antenna terminals. With the signal injected in this manner, the Multiplex alignment would then be the best that could possibly be obtained.

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

GENERAL TROUBLE-SHOOTING PROCEDURE

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

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

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

STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT VTVM/ SCOPE TO	INPUT SIGNAL FREQ.	SET DIAL TO	ADJUST	PURPOSE
PREFERRED METHOD — WITH AM SWEEP GENERATOR NOTE: For AM IF Alignment Use AM Sweep Signal Generator Of 10 KHz Deviation, 60 Hz Modulation For Full Bandpass Display. Bandswitch In AM. Also Connect Modulation Frequency To Scope Horizontal. (If AM Sweep Not Available, See Steps 8 Through 16.)							
1	Short Test Point "L" (AM Gang Antenna Section) To Chassis Ground.						
2	Test Point "K" — AM IF Input	47 Ohm in shunt with gen. output. Then from hot lead a 27 Ohm in series with a .01 MF capacitor. See Fig. 1.	Scope — Detector Output Across R107	± 455 KHz	Gang Closed	—	Adjust Generator To Center Frequency Of Ceramic Filter.
3				Tune Generator To Center Total Bandpass Waveform. Do Not Change Generator Frequency For Remainder Of AM IF Alignment.			
4				Center Freq. Of Ceramic Filter In T102	Gang Closed	L103, L104 (T102)	Adjust For Maximum Gain And Symmetry.
5						T103	Adjust For Maximum.
6	Remove Short Between Test Point "L" And Chassis Ground.						
7	Test Point "L" — AM Ant. Input	As Above	Scope — Detector Output	Center Freq. Of Ceramic Filter In T102	Gang Closed	L102	Adjust For Symmetrical Pattern, With Maximum Attenuation At IF Center Frequency.
ALTERNATE METHOD — IF AM SWEEP GENERATOR IS NOT AVAILABLE NOTE: For AM IF Alignment Use A Signal With 400 Hertz Modulation. Bandswitch In AM.							
8	Short Test Point "L" (AM Gang Antenna Section) To Chassis Ground.						
9	Test Point "K" — AM IF Input	47 Ohm in shunt with gen. output. Then from hot lead a 27 Ohm in series with a .01 MF capacitor. See Fig. 1.	VTVM — Detector Output Across R107	± 455 KHz	Gang Closed	—	—
10				Rock Generator While Adjusting L103 (T102 Primary) For Maximum.			Adjust For Maximum.
11				Rock Generator While Adjusting L104 (T102 Secondary) For Maximum.			
12				Repeat Steps 10 & 11 For Minimum Change.			
13				Equal Output Should Be Found If Generator Is Detuned Equal Frequency Each Side Maximum.			
14				Center Freq. Of Ceramic Filter In T102	Gang Closed	T103	
15	Remove Short Between Test Point "L" And Chassis Ground.						
16	Test Point "L" — AM Ant. Input	As Above	VTVM — Detector Output	Center Freq. Of Ceramic Filter In T102	Gang Closed	L102	Adjust IF Trap For Minimum.
17	One Turn Loosely Coupled To AM Wavemagnet Antenna	None		1600 KHz	1600 KHz	C103	Set Oscillator to dial scale.
18				600 KHz	600 KHz	T101	
19				Repeat Steps 17 & 18 for minimum change.			
20				1400 KHz	1400 KHz	C1F	Align Antenna stage.
21				600 KHz	600 KHz	L101 if necessary	
22				Repeat Steps 20 & 21 for minimum change.			
NOTE: For FM IF Alignment Use A Signal Of 250 KHz Deviation, 50 Hertz Modulation For Full Bandpass Display. FM In MONO, AFC OFF, Preset R211 And R302 To Mid Rotation Before Connecting Generator. Connect Generator Cable Ground To Gang Frame.							
23	Test Point "D" — FM IF Input	47 Ohm in shunt with gen. output. Then from hot lead a 27 Ohm in series with a .01 MF capacitor. See Fig. 1.	Scope — Test Point "G"	10.7 MHz	Gang Closed	L201, L202 (T201)	Align I.F. transformer for maximum output and symmetry as indicated in Scope Pattern "B".

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

STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT VTVM/ SCOPE TO	INPUT SIGNAL FREQ.	SET DIAL TO	ADJUST	PURPOSE
NOTE. For FM Detector Alignment Use A Signal Of 75 KHz Deviation, 1 KHz Modulation. Also Connect Generator Modulation Frequency To Scope Horizontal. Adjust Generator IF Frequency To Center Total Bandpass Waveform. Do Not Change Generator IF Frequency For Remainder Of IF Alignment. (If Your Generator Does Not Provide Output For Audio Modulation Frequency Use Horizontal Output From Generator, Or Scope Horizontal Sweep, And Follow Step 24C.) Minimum Distortion Can Only Be Achieved By Use Of Step 24A Below.							
24	Test Point "D" FM IF Input	47 Ohm in shunt with gen. output. Then from hot lead a 27 Ohm in series with a .01 MF capacitor.	A. Distortion Analyzer (thru a 100 usec de-emphasis network) and Scope. See Fig. 2.	Center Frequency of Ceramic Filter Y201. See Fig. 3	Gang Closed	L204 (on 1WJR55), L203 (on 3WJR50, 50Z, 3WJR52, 52Z)	A. Preferred Method: Distortion Analyzer at Test Point "H" should read minimum distortion, approx. 46 to 55 dB below 0 dB set level.
			B. Scope				B. Alternate Method: Adjust for linear scope trace - no curve at ends of trace. Disregard meter reading.
			C. Scope				C. Alternate Method: Adjust for maximum length and symmetry, similar to Scope Pattern "A".
25			Test Point "H"			R211	Adjust for center reading on Tuning Meter On Chassis 3WJR50, 50Z; Or For Null With VTVM Connected Between Points "AFC" and "AFC REF" On Chassis 1WJR55, 3WJR52, 52Z.
26	Test Point "A" FM Antenna Post (Disconnect Antenna)	300 Ohm		106 MHz	106 MHz	C14	Set Oscillator to dial scale.
27				90 MHz	90 MHz	L4	
28				Repeat Steps 26 & 27 for minimum change.			
29				106 MHz	106 MHz	C1C	Align FM Detector stage for maximum.
30				90 MHz	90 MHz	L2 if necessary	
31				106 MHz	106 MHz	C1A	Align FM Antenna stage for maximum.
32				90 MHz	90 MHz	L1 if necessary	
33				Repeat Steps 31 & 32 for minimum change.			
NOTE: Apply Sufficient Signal Level — Approx. 100 Microvolts — To Obtain Full Limiting At Point Near 98 MHz.							
34			Frequency Counter and/ or Scope	Unmodulated RF Carrier		R302	A. Frequency Counter should read 19 KHz, ± 100 Hz.
			Test Point "M"				B. Alternate Method: Connect Test Point "M" Signal to scope vertical and an accurate 19 KHz signal to scope horizontal input. Adjust for one square synchronized waveform.
35			Scope and/or AC VTVM Left Tape Output	98 MHz 10% Pilot (L+R) (L—R) (L Only)		—	Check for separation. Maximum left output.
36			Right Tape Output.				Check for separation. Minimum right output.
NOTE: Do Not Readjust Control R302 After Step 34.							

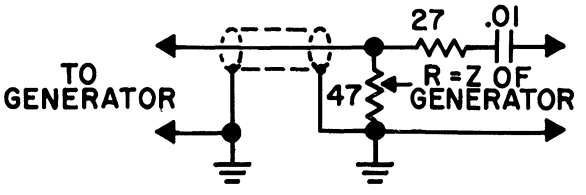


FIGURE 1. — RF INPUT PROBE

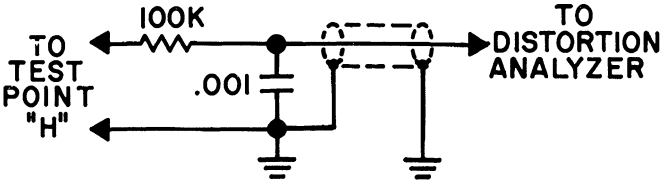


FIGURE 2 — DE-EMPHASIS PROBE

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

FIGURE 3 — CERAMIC FILTER TABLE

RF, IF AND MPX ALIGNMENT PROCEDURE FOR CHASSIS 15WJR29

STEP	CONNECT GENERATOR TO	DUMMY ANTENNA	CONNECT VTVM/ SCOPE TO	INPUT SIGNAL FREQ.	SET DIAL TO	ADJUST	PURPOSE
NOTE: For AM Alignment Use A Signal With 400 Hertz Modulation, Bandswitch In AM.							
1	One Turn Loosely coupled to AM Wavemagnet Antenna	None	VTVM Speaker Voice Coil	455 KHz	Gang Closed	L203, L204 (T202)	Align IF for maximum output.
2						L207, L208 (T203)	
3						L209 (T204)	
4				1600 KHz	1600 KHz	C109	Set Oscillator to dial scale.
5				600 KHz	600 KHz	L105 (T102)	
6				Repeat Steps No. 4 & 5 for minimum change.			
7				1400 KHz	1400 KHz	C1H	Align RF stage.
8				600 KHz	600 KHz	L103 (T101)	
9				Repeat Steps No. 7 & 8 for minimum change.			
10				1400 KHz	1400 KHz	C1F	Align Antenna stage.
11				600 KHz	600 KHz	L101if necessary	
12				Repeat Steps 10 & 11 for minimum change.			
NOTE: For FM IF Alignment Use A Signal Of 250 KHz Deviation, 50 Hertz Modulation For Full Bandpass Display. FM In MONO, AFC OFF, Preset R213, R308 and R317 To Mid Rotation Before Connecting Generator. Connect Generator Cable Ground To Gang Frame.							
13	Test Point "D" FM IF Input	47 Ohm in shunt with gen. output. Then from hot lead a 27 Ohm in series with a .01 MF capacitor. See Fig. 1.	Scope Test Point "G" Thru Diode Detector Probe, See Fig. 2.	10.7 MHz	Gang Closed	L201, L202 (T201)	Align I.F. transformer for maximum output and symmetry as indicated in Scope Pattern "B".
NOTE: For FM Detector Alignment Use A Signal Of 75 KHz Deviation, 1 KHz Modulation. Also Connect Generator Modulation Frequency To Scope Horizontal. Adjust Generator IF Frequency To Center Total Bandpass Waveform. Do Not Change Generator IF Frequency For Remainder Of IF Alignment. (If Your Generator Does Not Provide Output For Audio Modulation Frequency Use Horizontal Output From Generator, Or Scope Horizontal Sweep, And Follow Step 14C.) Minimum Distortion Can Only Be Achieved By Use Of Step 14A Below.							
14	Test Point "D" FM IF Input	47 Ohm in shunt with gen. output. Then from hot lead a 27 Ohm in series with a .01 MF capacitor.	A. Distortion Analyzer (thru a 100 usec de-emphasis network) and/or Scope. See Fig. 3.	Center Frequency of Ceramic Filters Y201 and Y202. See Fig. 4.	Gang Closed	L205	A. Preferred Method: Distortion Analyzer at Test Point "H" should read minimum distortion, approx. 50 to 55 dB below 0 dB set level.
			B. Scope				B. Alternate Method: Adjust L205 for linear scope trace - no curve at ends of trace. Disregard meter reading.
			C. Scope Test Point "H"				C. Alternate Method: Adjust L205 for maximum length and symmetry, Similar to Scope Pattern "A".
15						R213	Adjust for center reading on Tuning Meter.
16	Test Point "A" FM Antenna Post (Disconnect Antenna)	300 Ohm		106 MHz	106 MHz	C15	Set Oscillator to dial scale.
17				90 MHz	90 MHz	L4	
18				Repeat Steps 16 & 17 for minimum change.			
19				106 MHz	106 MHz	C1C	Align FM Detector stage for maximum.
20				90 MHz	90 MHz	L2 if necessary	
21				106 MHz	106 MHz	C1A	Align FM Antenna stage for maximum.
22				90 MHz	90 MHz	L1 if necessary	
23				Repeat Steps 19 thru 22 for minimum change.			

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

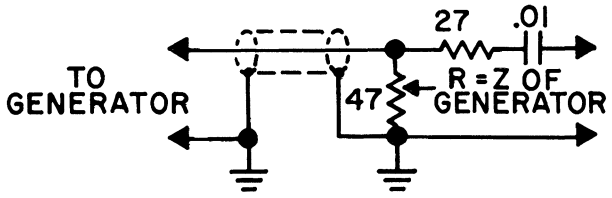


FIGURE 1. – RF INPUT PROBE

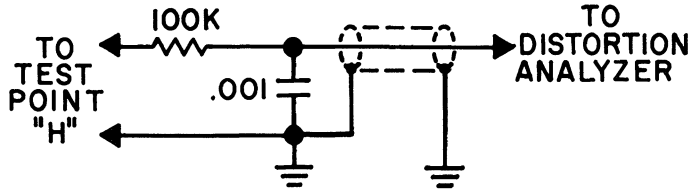


FIGURE 3 – DE-EMPHASIS PROBE

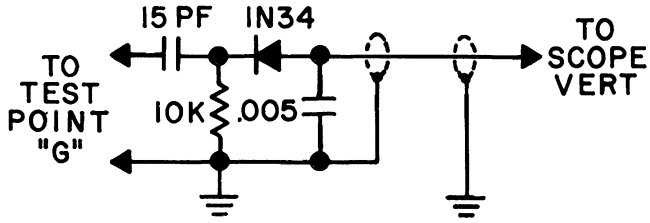
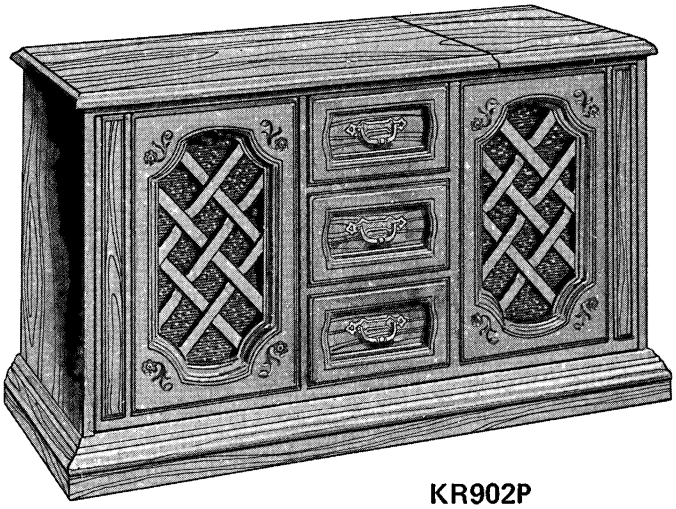


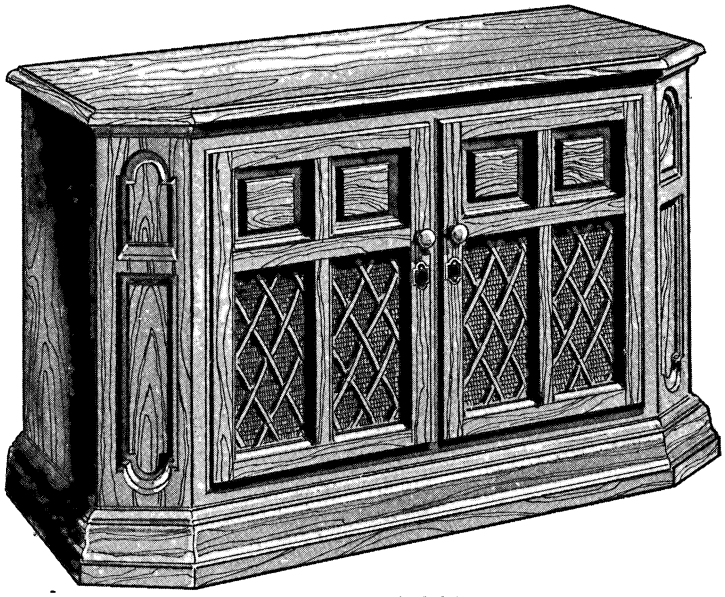
FIGURE 2. – DIODE DETECTOR PROBE

CERAMIC FILTERS – CHASSIS 12WJR29			
NOTE: BOTH CERAMIC FILTERS IN A GIVEN CHASSIS MUST BE THE SAME PART NUMBER AND COLOR CODE.			
PART NO.	COLOR CODE	NOMINAL CENTER FREQUENCY	FREQUENCY RANGE
224-1	Black	10.64 MHz	10.61 to 10.67 MHz
224-1-01	Blue	10.67 MHz	10.64 to 10.70 MHz
224-1-02	Red	10.70 MHz	10.67 to 10.73 MHz
224-1-03	Orange	10.73 MHz	10.70 to 10.76 MHz
224-1-04	White	10.76 MHz	10.73 to 10.79 MHz

FIGURE 4 – CERAMIC FILTER TABLE



KR902P



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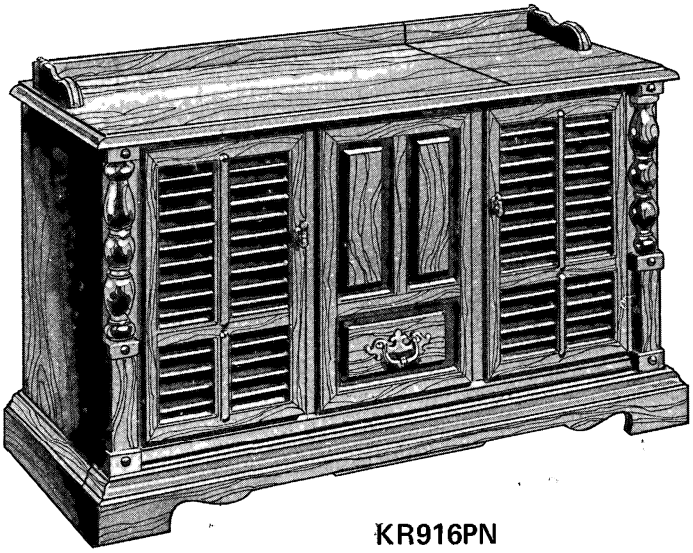

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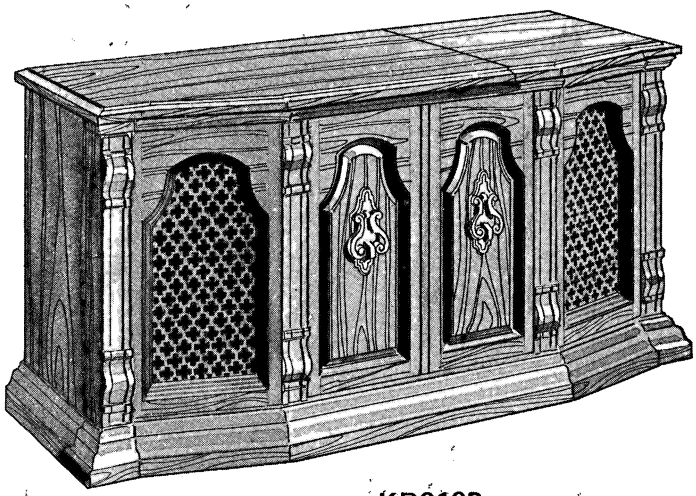

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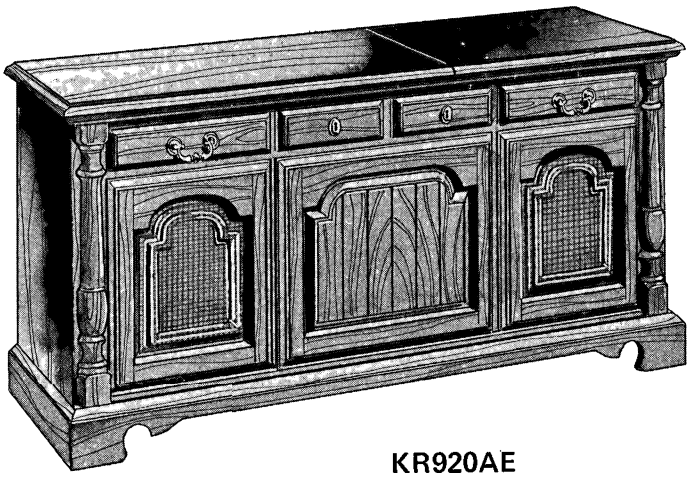


KR920AE

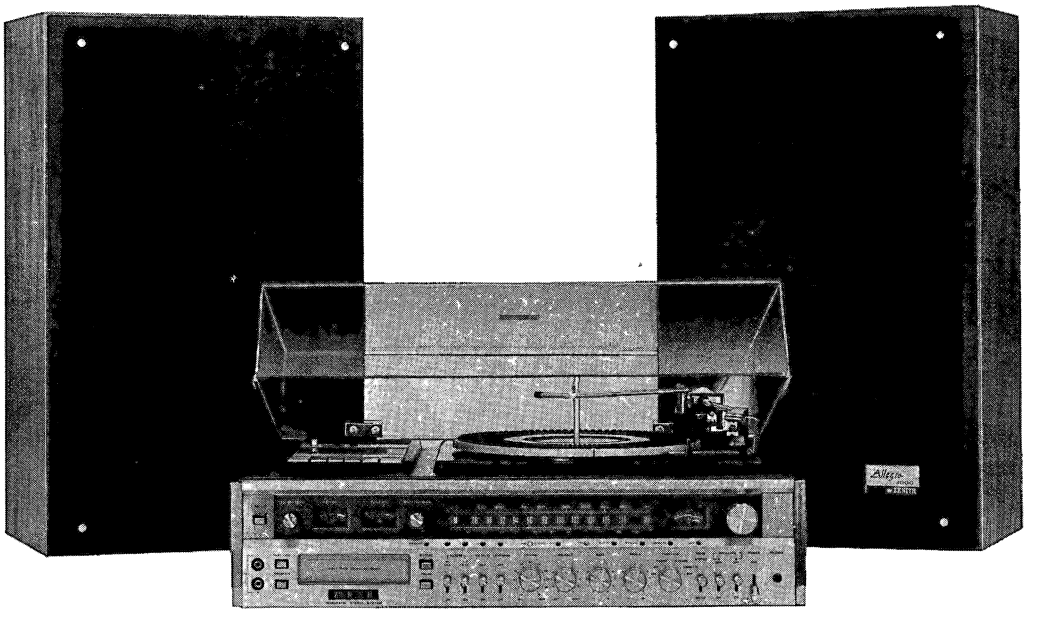
REPRESENTATIVE MODEL ILLUSTRATIONS

AUDIO - 1979

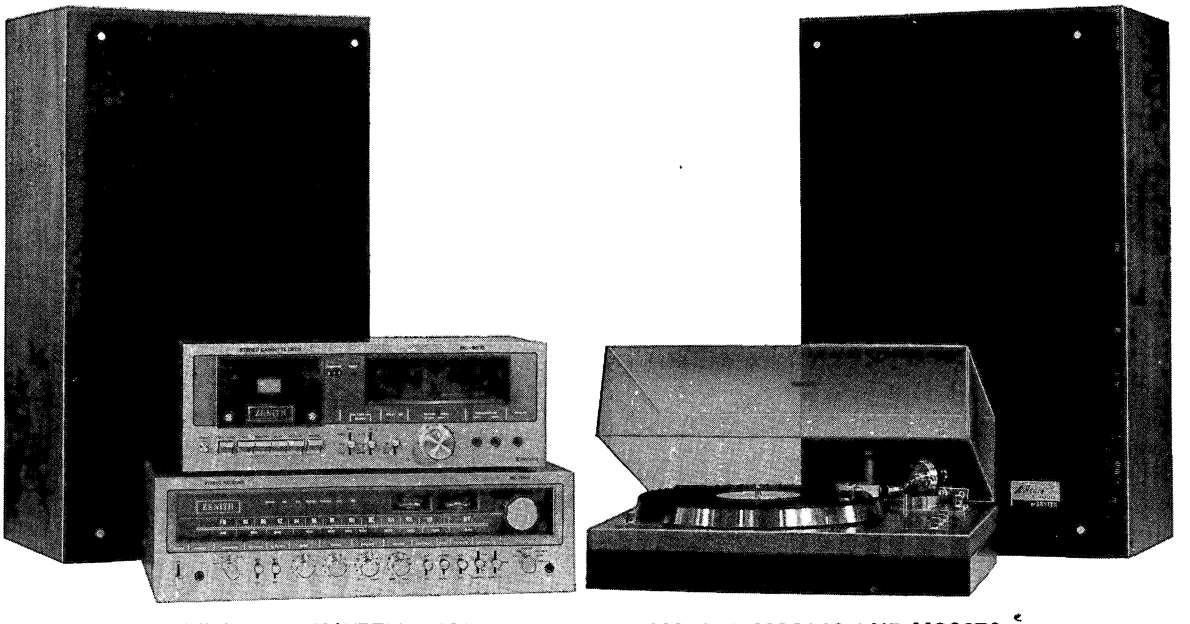
During 1979, Zenith's 60th Anniversary year, a totally new concept in Audio Products is being introduced to the consumer. In addition to the customary console models (such as those illustrated on the facing page and for which service information appears in this manual) there are the following categories:

Integrated Stereo Systems
(contains AM/FM/Phono/Tape)
Integrated Stereo Receivers
(contains AM/FM/Tape)
Component Stereo Receivers
(contains AM/FM only)
Component Accessory Record Changers
(some including such features as belt drive and automatic players)
Component Accessory Tape Recorder

Detailed product feature charts for these categories appear on the following pages. Service information for the Integrated Stereo Systems, Integrated Stereo Receivers and Component Stereo Receivers (including tape sections when part of model) will appear in a series of service manuals starting with HF35. Record Players/ Changers (either accessory or part of a model) will appear in RC28 and subsequent RC series service manuals. Component Tape Recorder Service information will appear in a TR series manual. Two typical groups of models are illustrated below.



INTEGRATED STEREO SYSTEM – MODELS IS4080 AND MC3000



COMPONENT SYSTEM – MODELS MC4000, MC7050, MC9040 AND MC9070

TABLE A — TUNER/AMPLIFER SECTION FEATURES

1979 AUDIO PRODUCT LINE FEATURES — INTEGRATED STEREO AND MODULAR COMPONENTS

X OR LETTER DENOTES FEATURE INCLUDED AND NUMBER DENOTES QUANTITY: D = ROTARY DETENT ACTION (CENTER DETENT ON BALANCE CONTROL), F = ROTARY FLYWHEEL, K = KEYBOARD TYPE, P = PUSH BUTTON TYPE, R = ROTARY TYPE, S = SLIDE TYPE, T = TOGGLE TYPE

FEATURES	MODEL NUMBER	IS4020	IS4030	IS4040	IS4060	IS4070	IS4080	MC6010	MC6060	MC7030	MC7040	MC7050
	PRODUCT TYPE	AM/FM/PHONO/TAPE			AM/FM/PHONO/TAPE			AM/FM/TAPE		AM/FM	AM/FM	AM/FM
POWER OUTPUT (Min. R.M.S. per channel)		5W			10W			5W	10W	15W	25W	40W
T.H.D. NO MORE THAN		1%			1%			2%	1%	0.4%	0.3%	0.2%
BANDWIDTH OF		100 Hz to 15 kHz			60 Hz to 20 kHz			100 Hz —	60 Hz —	20 Hz —	20 Hz —	20 Hz —
INTO AN 8 OHM LOAD								15 kHz	20 kHz	20 kHz	20 kHz	20 kHz
TUNER/AMPLIFIER CONTROLS												
VOLUME		R	R	R	D	D	D	D	D	D	D	D
BALANCE		R	R	R	D	D	D	D	D	D	D	D
TREBLE		R	R	R	D	D	D	D	D	D	D	D
BASS		R	R	R	D	D	D	D	D	D	D	D
TUNING		R	R	R	F	F	F	F	F	F	F	F
TUNER/AMPLIFIER SWITCHES												
POWER		P	P	P	T	T	T	P	P	T	T	T
LOUDNESS		P	P	P	T	T	T	P	P	P	T	T
HI FILTER		P	P	P	T	T	T	P	P	P	T	T
LO FILTER		—	—	—	T	T	T	P	P	P	T	T
SPEAKER	A	—	—	—	T	T	T	P	P	—	—	—
	B	—	—	—	T	T	T	P	P	—	—	—
	A, B or A+B	T	T	T	—	—	—	—	—	—	—	—
	OFF, A, B or A+B	—	—	—	—	—	—	—	—	R	R	R
MONO/STEREO		—	—	—	T	T	T	P	P	P	T	T
FM MUTE		—	—	—	T	T	T	—	P	P	T	T
FM AFC		AUTOMATIC			AUTOMATIC			P	P	P	T	—
FM DE-EMPHASIS (on back)		—	—	—	—	—	—	—	—	S	S	S
TAPE MONITOR		—	—	—	—	—	—	—	—	P	T	T
TAPE DUBBING		—	—	—	—	—	—	—	—	—	—	T
BANDSWITCH — POSITIONS		5	5	6	6	6	6	5	5	4	4	6
	AM	R	R	R	R	R	R	R	P	R	R	R
	FM	R	R	R	R	R	R	R	P	R	R	R
	PHONO	R	R	R	R	R	R	R	P	R	R	2R
	EIGHT TRACK TAPE	R	—	R	R	—	R	R	—	—	—	—
	CASSETTE TAPE	—	R	R	—	R	R	—	P	—	—	—
	AUXILIARY INPUT	R	R	R	2R	2R	R	R	P	R	R	R
	MICROPHONE	—	—	—	—	—	—	—	—	—	—	R

TABLE B — TUNER/AMPLIFIER SECTION FEATURES

1979 AUDIO PRODUCT LINE FEATURES — INTEGRATED STEREO AND MODULAR COMPONENTS

X OR LETTER DENOTES FEATURE INCLUDED AND NUMBER DENOTES QUANTITY: D = ROTARY DETENT ACTION (CENTER DETENT ON BALANCE CONTROL), F = ROTARY FLYWHEEL, K = KEYBOARD TYPE, P = PUSH BUTTON TYPE, R = ROTARY TYPE, S = SLIDE TYPE, T = TOGGLE TYPE

FEATURES	MODEL NUMBER	IS4020	IS4030	IS4040	IS4060	IS4070	IS4080	MC6010	MC6060	MC7030	MC7040	MC7050
	PRODUCT TYPE	AM/FM/PHONO/TAPE			AM/FM/PHONO/TAPE			AM/FM/TAPE		AM/FM	AM/FM	AM/FM
TUNER/AMPLIFIER CONNECTORS												
TAPE INPUT		–	–	–	–	–	–	–	–	X	X	2
TAPE OUTPUT		X	X	X	X	X	X	X	X	X	X	2
PHONO IN — CERAMIC		INTERNAL			–	–	–	X	X	X	X	–
PHONO IN — MAGNETIC		–	–	–	INTERNAL			X	X	X	X	2
AUXILIARY INPUT		X	X	X	2	2	X	X	X	X	X	X
SPEAKER OUTPUT — RCA TYPE (Pair)		2	2	2	2	2	2	2	2	–	–	–
PUSH TYPE (Pair)		–	–	–	–	–	–	–	–	2	2	2
HEADPHONE (STEREO)		X	X	X	X	X	X	X	X	X	X	X
EXTERNAL ANTENNA												
FM — 300 OHM UNBALANCED		X	X	X	–	–	–	–	–	–	–	–
FM — 300 OHM BALANCED		–	–	–	X	X	X	X	X	X	X	X
FM — 75 OHM UNBALANCED		–	–	–	–	–	–	X	X	X	X	X
AM		–	–	–	–	–	–	X	X	X	X	X
AC OUTLETS — UNSWITCHED		X	X	X	X	X	X	X	X	X	X	X
SWITCHED		–	–	–	–	–	–	–	–	–	–	X
PHONO GROUND TERMINAL		–	–	–	–	–	–	X	X	X	X	X
MICROPHONE INPUT		–	–	–	–	–	–	–	–	–	–	X
TUNER/AMPLIFIER FEATURES												
FM STEREO INDICATOR LIGHT		X	X	X	X	X	X	X	X	X	X	X
FUNCTION INDICATOR LIGHTS		–	–	–	X	X	X	–	–	X	X	X
TUNING METER (ILLUMINATED)												
CENTER READING FM/PEAK AM		X	X	X	X	X	X	X	X	–	–	–
CENTER READING FM		–	–	–	–	–	–	–	–	X	X	X
SIGNAL STRENGTH METER												
FM/AM (ILLUMINATED)		–	–	–	–	–	–	–	–	X	X	X
SPEAKER PROTECTION FUSES		–	–	–	–	–	–	–	–	X	X	–
SPEAKER PROTECTION CIRCUIT		–	–	–	–	–	–	–	–	–	–	X

TABLE C — EIGHT TRACK RECORDER FEATURES

1979 AUDIO PRODUCT LINE FEATURES — INTEGRATED STEREO AND MODULAR COMPONENTS

X OR LETTER DENOTES FEATURE INCLUDED AND NUMBER DENOTES QUANTITY: D = ROTARY DETENT ACTION (CENTER DETENT ON BALANCE CONTROL), F = ROTARY FLYWHEEL, K = KEYBOARD TYPE, P = PUSH BUTTON TYPE, R = ROTARY TYPE, S = SLIDE TYPE, T = TOGGLE TYPE

FEATURES	MODEL NUMBER	IS4020	IS4030	IS4040	IS4060	IS4070	IS4080	MC6010	MC6060			
	PRODUCT TYPE	AM/FM/PHONO/TAPE			AM/FM/PHONO/TAPE			AM/FM/TAPE				
EIGHT TRACK CONTROLS												
PROGRAM		P	—	P	P	—	P	P	—			
PAUSE		PP	—	PP	PP	—	PP	PP	—			
FAST FORWARD		PP	—	PP	PP	—	PP	PP	—			
RECORD		P	—	P	P	—	P	P	—			
AUTO STOP		—	—	—	—	—	—	PP	—			
REPEAT		—	—	—	X	—	X	—	—			
RECORD LEVEL		—	—	—	X	—	R*	R	—			
EIGHT TRACK CONNECTORS												
MICROPHONE		X	—	*	X	—	*	X	—			
EIGHT TRACK FEATURES												
RECORD/PLAY		X	—	X	X	—	X	X	—			
ALC		X	—	X	—	—	—	—	—			
RECORD INDICATOR LIGHT		X	—	*	X	—	*	X	—			
AUTO-STOP AFTER PROGRAM 4 (RECORD AND F.F.)		X	—	X	X	—	X	X	—			
AUTO-STOP INDICATOR LIGHT		—	—	—	—	—	—	X	—			
PROGRAM INDICATOR LIGHTS		X	—	X	X	—	X	X	—			
LEVEL METERS (TWO ILLUMINATED AND OPERATING IN RECORD AND PLAY)		—	—	—	X	—	*	X	—			
DC MOTOR		X	—	X	X	—	X	X	—			
TAPE STORAGE		—	—	—	X	—	*	—	—			

*Common to Eight Track and Cassette Recorders

TABLE D — CASSETTE RECORDER FEATURES

1979 AUDIO PRODUCT LINE FEATURES — INTEGRATED STEREO AND MODULAR COMPONENTS

X OR LETTER DENOTES FEATURE INCLUDED AND NUMBER DENOTES QUANTITY: D = ROTARY DETENT ACTION (CENTER DETENT ON BALANCE CONTROL), F = ROTARY FLYWHEEL, K = KEYBOARD TYPE, P = PUSH BUTTON TYPE, R = ROTARY TYPE, S = SLIDE TYPE, T = TOGGLE TYPE

FEATURES	MODEL NUMBER	IS4020	IS4030	IS4040	IS4060	IS4070	IS4080	MC6010	MC6060	MC9070		
	PRODUCT TYPE	AM/FM/PHONO/TAPE			AM/FM/PHONO/TAPE			AM/FM/TAPE		TAPE		
CASSETTE CONTROLS												
PAUSE		—	KK	KK	—	KK	KK	—	KK	KK		
RECORD, REWIND, F. FWD., PLAY, STOP/EJECT		—	—	—	—	K	K	—	K	—		
RECORD, REVIEW/REWIND, CUE/F. FWD., PLAY, STOP/EJECT		—	K	K	—	—	—	—	—	K		
RECORD LEVEL		—	—	—	—	R	R*	—	R	R		
CHROMIUM DIOXIDE (CrO_2)		—	—	—	—	P	P	—	P	T		
FERRIC OXIDE, FERRI CHROME		—	—	—	—	—	—	—	—	T		
DOLBY NOISE REDUCTION**		—	—	—	—	—	—	—	—	T		
POWER SWITCH		—	—	—	—	—	—	—	—	T		
CASSETTE CONNECTORS												
MICROPHONE INPUT		—	X	*	—	X	*	—	X	X		
LINE INPUT		—	—	—	—	—	—	—	—	X		
LINE OUTPUT		—	—	—	—	—	—	—	—	X		
HEADPHONE (STEREO)		—	—	—	—	—	—	—	—	X		
CASSETTE FEATURES												
RECORD/PLAY		—	X	X	—	X	X	—	X	X		
ALC		—	X	X	—	—	—	—	—	—		
RECORD INDICATOR LIGHT		—	X	*	—	X	*	—	X	X		
LEVEL METERS (ILLUMINATED AND OPERATING IN RECORD AND PLAY)		—	—	—	—	X	*	—	X	X		
COUNTER		—	X	X	—	X	X	—	—	X		
COUNTER (ILLUMINATED)		—	—	—	—	—	—	—	X	—		
TAPE RUN LIGHT		—	—	—	—	—	—	—	X	—		
AUTO-STOP (PLAY AND RECORD)		—	X	X	—	X	X	—	X	—		
TAPE STORAGE		—	—	—	—	X	*	—	—	X		
DC MOTOR		—	X	X	—	X	X	—	X	X		
DOLBY NOISE REDUCTION**		—	—	—	—	—	—	—	—	X		
PEAK INDICATOR LIGHT		—	—	—	—	—	—	—	—	X		

* Common to Eight Track and Cassette Recorders.

**Dolby is a trademark of Dolby Laboratories.

TABLE E – RECORD CHANGER FEATURES

1979 AUDIO PRODUCT LINE FEATURES – INTEGRATED STEREO AND MODULAR COMPONENTS

RECORD CHANGER FEATURES	MODEL NUMBERS	IS4020 IS4030 IS4040	IS4060 IS4070 IS4080	MC9020	MC9030	MC9040
	PRODUCT TYPE	AM/FM/PHONO/TAPE		PHONO	PHONO	PHONO
RECORD CHANGER PART NUMBER		169-573	169-574-01	169-574	169-575	169-576
MANUFACTURE		BSR	GARRARD	GARRARD	GARRARD	GARRARD
MANUFACTURES BASIC P/N		C197	630S	630S	GT-4	GT-25
CARTRIDGE PART NUMBER		142-197	142-189	142-194	142-195	142-196
TYPE		CERAMIC	MAGNETIC	MAGNETIC	MAGNETIC	MAGNETIC
MANUFACTURE		TETRAD	SHURE	SHURE	SHURE	SHURE
MANUFACTURE BASIC P/N		TC11MO/T3MD	M81CS	M75CS	M75ECS	M75EJ
STYLUS PART NUMBER		56-639	56-641	56-641	56-641-02	56-641-03
STYLUS TYPE (Dia./Mfg. Saph.)		D-S	D	D	D	D
STYLUS PRESSURE (Grams)		3.5 – 5.0	3.0 – 5.0	2.5 – 5.0	2.5 – 5.0	1.5 – 3.0
CABLES						
AC LINE CORD		BUILT-IN		YES	YES	YES
AUDIO CABLE (RCA Connector)		BUILT-IN		3 FEET	3 FEET	3 FEET
GROUND LEAD		BUILT-IN		3 FEET	3 FEET	3 FEET
CONTROLS						
SPEED SELECTOR – RPM		33, 45, 78	12" 33,	12" 33,	33, 45	33, 45
		SLIDE (3)	7" 33, 7" 45,	7" 33, 7" 45,	SLIDE (2)	ROTARY (2)
SIZE SELECTOR – INCHES		7, 10, 12	10" 78,	10" 78,	–	7, 12
		SLIDE (3)	SLIDE (4)	SLIDE (4)	–	ROTARY (2)
FUNCTION		OFF, ON,	OFF, MANUAL,	OFF, MANUAL,	OFF, MANUAL,	OFF, MANUAL,
		AUTO	AUTO	AUTO	AUTO	AUTOMATIC,
		SLIDE (3)	SLIDE (3)	SLIDE (3)	REPEAT	REPEAT
					SLIDE (4)	ROTARY (4)
START/REJECT		–	–	–	SLIDE (2)	ROTARY (2)
TOUCH REJECT		–	–	–	YES	–
CUE CONTROL LEVER		YES	–	–	–	–
VISCOUS CUE CONTROL LEVER		–	YES	YES	YES	YES
ANTI-SKATE		ROTARY	SLIDE	SLIDE	ROTARY	ROTARY
FEATURES						
DUST COVER		YES	YES	YES	YES	YES
CABINET ISOLATOR FEET		–	–	–	YES	YES
SPINDLES		STANDARD	MULTIPLE PLAY A-7545		MULTIPLE PLAY 76-2133	
			SINGLE PLAY 76-2132		SINGLE PLAY 27-627	
45 RPM ADAPTER		S-72648	YES	YES	CUP	CUP
TWO POINT PUSH OFF SUPPORT		–	–	–	YES	YES
RECORD STACK (Unwarped)		5	5	5	5	5
TURNTABLE – SIZE		11"	10-1/2"	11"	11-1/4"	12-1/8"
AND MATERIAL		METAL	METAL	METAL	DIE CAST ALUMINUM	
TONE ARM						
LOW MASS "S" SHAPE		–	YES	YES	YES	YES
FACTORY ADJ. COUNTER BALANCE		–	YES	YES	–	–
CALIBRATED COUNTER BALANCE		–	–	–	–	YES
JEWELED BEARINGS		–	–	–	–	YES
REMOVEABLE HEAD SHELL		–	–	–	–	YES
GIMBEL MOUNTING		–	–	–	–	X
BELT DRIVE		–	–	–	X	X
FOUR POLE MOTOR		–	X	X	X	X

TECHNICAL APPLICATIONS

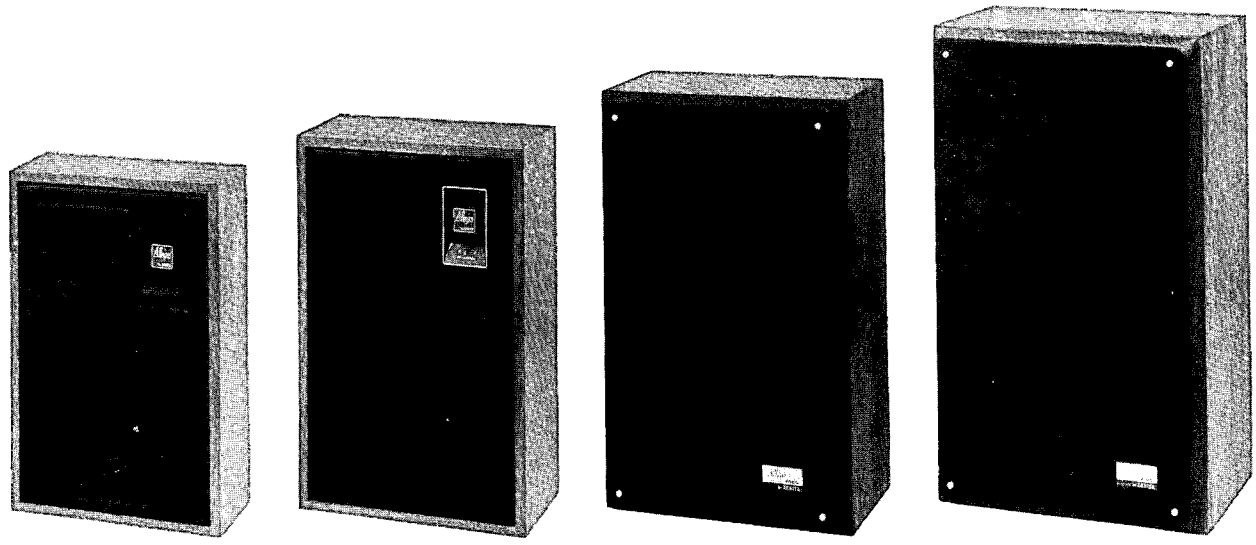


FIGURE 1 – MODELS MC1000, MC2000, MC3000 AND MC4000

ALLEGRO SPEAKER SYSTEMS

Figure 1 illustrates the four 1979 Allegro Speaker Systems. Models MC1000 and MC2000 are comparable to their "J Line" counterparts J1000W and J2000W. Service procedures for Models MC1000 and MC2000 appear in this Service Manual. A complete discussion of the basic Allegro Speaker System concept appeared in Service Manual HF32 and will not be repeated in this manual.

Models MC3000 and MC4000 present new styling and several new features:

1. Removable grilles.
2. Front mounted speakers.
3. Variable crossover networks (Treble control on Model MC3000 and both Treble and Midrange controls on Model MC4000).
4. Model MC3000 has a frequency response which has been improved over the "J Line".
5. Model MC4000 provides a wider frequency response and higher power handling capability than prior models.

Grilles on Models MC3000 and MC4000 may be removed by use of four knobs mounted near each corner of the grille. Grasp the two upper knobs and slowly pull grille away from the enclosure until grille unsnaps from enclosure. Repeat the same procedure with the bottom two knobs until the grille has been removed from enclosure.

Once the grille has been removed, speakers and crossover control panel are visible (See Figure 2). Model MC3000 has a Treble control while Model MC4000 has both a Treble and Midrange control. On the control panel is a frequency response plot typical for each series of models when these crossover controls are set at their mid rotation point (See Figure 3). While these controls would normally be set at midpoint, they may be adjusted to accommodate room acoustics.

FIGURE 2 – MODEL MC4000

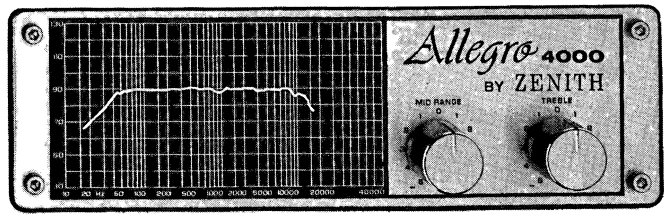


FIGURE 3 – CROSSOVER CONTROLS

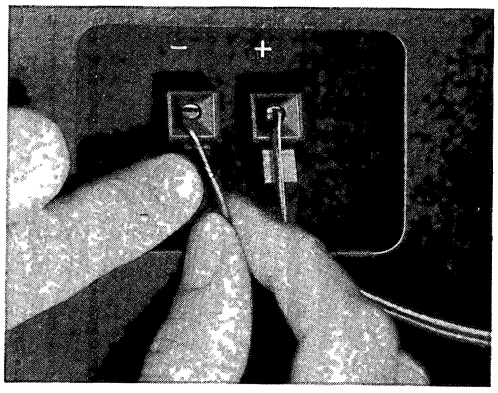


FIGURE 4 – PUSH TYPE CONNECTOR

Should it be desired to replace a speaker, it will be necessary to first remove grille and then trim rings (held by four screws) which cover the speaker mountings (not used on tweeter). Speaker mounting screws are visible after these trim rings have been removed.

Models MC3000 and Model MC4000 use push type wire connectors for connecting speaker leads (See Figure 4). A two conductor cable has a RCA type plug on one end, while the other end has stripped leads. One of the two conductors is normally marked with a colored stripe, or as a rib molded as part of the insulation. This marked lead is the positive lead and should be connected to the red connector on the cabinet back while the unmarked lead is connected to the black connector. To make connections to either of these terminals, depress the top of the connector, insert bared end of lead into hole in connector (note marking on leads) and release pressure on connector. Repeat same procedure for other lead.

NOTE – It is most important that only speakers of proper power handling capability be connected to any audio amplifier. Never connect a speaker of low power handling capability to a unit which has a higher power output. To do so can result in damage to a speaker system.

A schematic of Model MC4000 is illustrated in Figure 5.

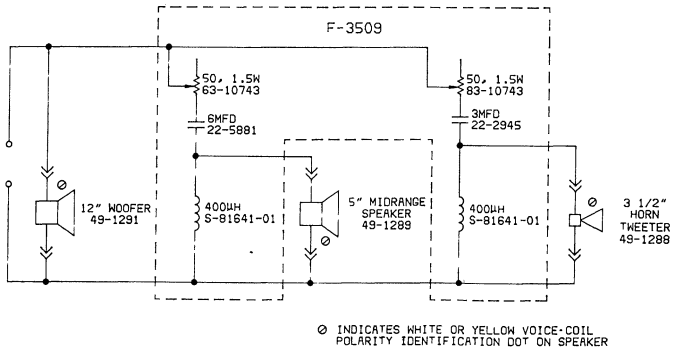


FIGURE 5 – MODEL MC4000 SCHEMATIC

TABLE A – ALLEGRO SPEAKER SYSTEM MODELS		
IMPEDANCE / SERIES	8 OHM	16 OHM
Allegro 1000	E9012W, E9012W1, G1000W, G9012W1, H1000W, H1000W1, H1000W2, H1000W3, J1000W1, J1000W2, MC1000	–
Allegro 2000	G2000W, G2000W11, G9014W, H2000W, H2000W3, J2000W1, J2000W2, MC2000	E9014W, E9014W1, E9014X, E9014X1
Allegro 3000	G3000W, G3000W11, G9018W, H3000W, H3000W3, J3000W1, MC3000	E9018W, E9018W1, E9018X1
Allegro 4000	MC4000	–
Allegro	G9019W	–

SERVICE PROCEDURES FOR "CAPTIVATED BACK" ALLEGRO SPEAKER SYSTEMS (MODELS H1000W2, H1000W3, H2000W3, H3000W3, J1000W1, J1000W2, J2000W1, J2000W, J3000W1, MC1000, MC2000)

Models listed above have "captivated backs" and require a service technique that is different from that used with prior speaker enclosures having removable backs. To gain access to the inside of these "captivated back" enclosures it is necessary to cut-out a portion of the existing back, make the required repairs (replace a speaker, etc.) and then install a replacement back.

Proceed as follows:

1. Place speaker enclosure on a firm work surface protected by felt or similar non-abrasive material. It may be desirable to construct a padded framework to hold the speaker enclosure during the following steps.
   CAUTION: To protect the cabinet and grille from damage position the enclosure so the grille and Allegro port (which protrude in front of the cabinet) will not touch any surface in the work area.
   CAUTION: Do not permit enclosure to slide while performing these steps, as this may scratch or otherwise mar the cabinet's finish.

2. Draw four (4) straight lines on existing cabinet back as illustrated (by dash lines) in Figure 6. The lines must be approximately 3" from, and parallel with, the outer edges of side, top and bottom panels.

3. Referring to Figure 7, cut along the four (4) lines marked in step 2, using a sabre saw or router.
   CAUTION: All holes required to start cut, and the cut itself, must be made to side of line nearest the center of cabinet back, so as to avoid possible damage to portion of cabinet back that remains in cabinet. Control depth of cut to avoid cutting either speaker wire or acoustic pads inside enclosure (back is approximately 3/8" thick).

TABLE B – SPEAKER ENCLOSURE SIZE				
MODEL LINE / ALLEGRO SERIES	"G"	"H"	"J"	"K"
1000	16-1/2" h, 10-1/2" w, 7-1/2" d	18" h, 10-1/2" w, 7-1/2" d	20-1/2" h, 13-1/2" w, 7-1/4" d	20-1/2" h, 13-1/2" w, 7-1/4" d
2000	18-5/8" h, 12-3/8" w, 7-7/8" d	20-5/8" h, 13" w, 7-7/8" d	22-1/2" h, 14-1/2" w, 8-5/8" d	22-1/2" h, 14-1/2" w, 8-5/8" d
3000	22-3/4" h, 14-1/4" w, 8-7/8" d	24-3/4" h, 15-5/8" w, 10" d	24-3/4" h, 15-5/8" w, 10" d	24-3/4" h, 15-5/8" w, 10" d
4000	–	–	–	27-7/8" h, 16-3/8" w, 12" d

4. Remove and discard cut-out portion of back.

5. Acoustic material might be stapled to inside of some enclosures. If this material must be removed, first remove staples (if used) being certain loose staples do not lodge inside enclosure. Acoustic material must be replaced in same location after completing repairs (a "U" shape with bottom edge near inside bottom of cabinet).

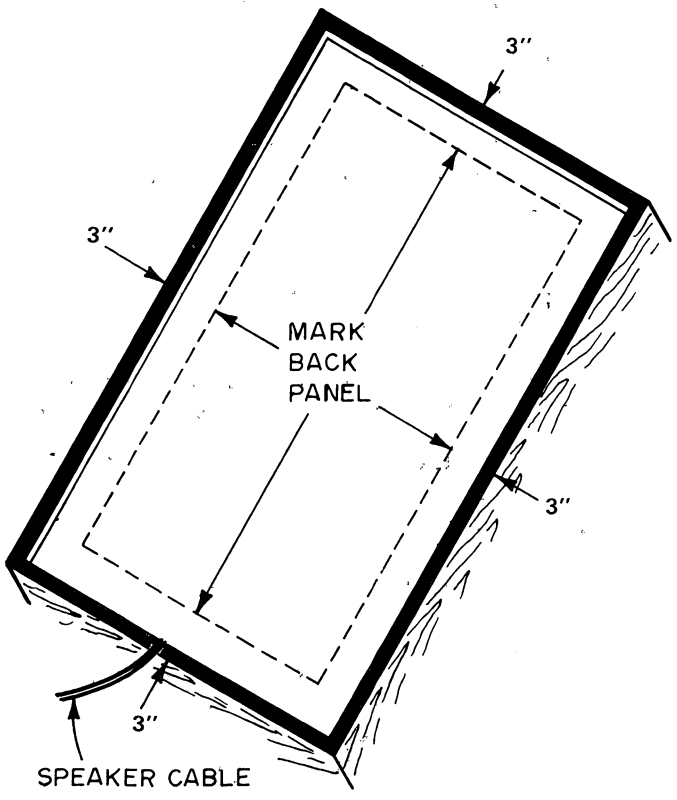


FIGURE 6 – MARKING BACK PANEL

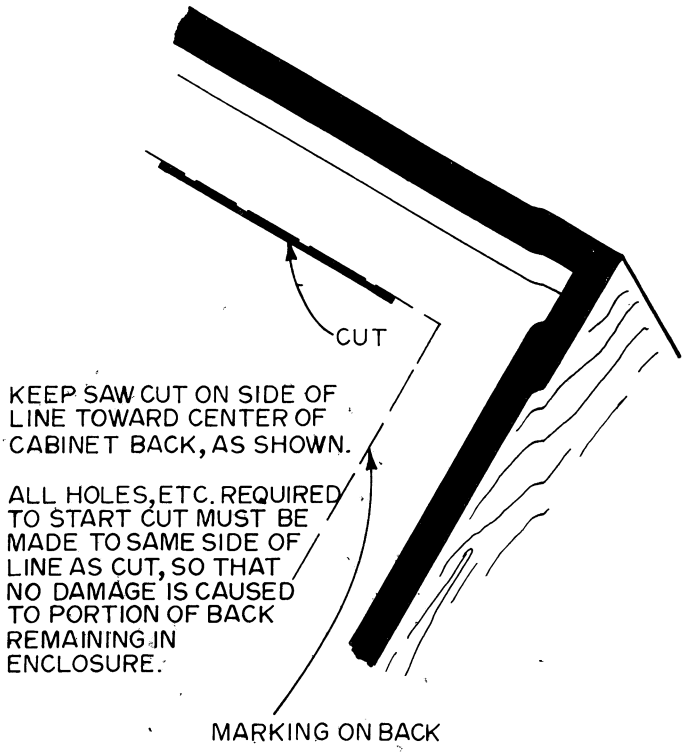


FIGURE 7 – AREA OF CUT

6. Repair (replace speakers, etc.) as needed.

7. Position replacement back panel on that portion of back still remaining (See Figure 8).
   NOTE: Be certain speaker cable is fed out through slot provided at bottom edge of replacement back.

8. Replacement back has predrilled holes.

9. Using replacement back as a template, drill holes in portion of remaining back using 3/32" bit. These will be pilot holes for screws that hold replacement back.

10. Remove back and clean all chips, shavings, dust or other foreign material from enclosure.

11. Apply a strip of tape provided, to the surface of the back, remaining in the enclosure, against which the replacement back will rest (See shaded area in Figure 9). This tape *must* be used to prevent air leaks.

12. Position replacement back on portion of back remaining in enclosure.
    CAUTION: Be certain speaker cable is fed out through slot provided at bottom edge of replacement back.

13. Insert screws provided through the pre-drilled holes in the replacement back. Tighten the screws so the back is firmly secured to the portion of the back remaining in the enclosure (See Figure 10).

14. Test completed unit.

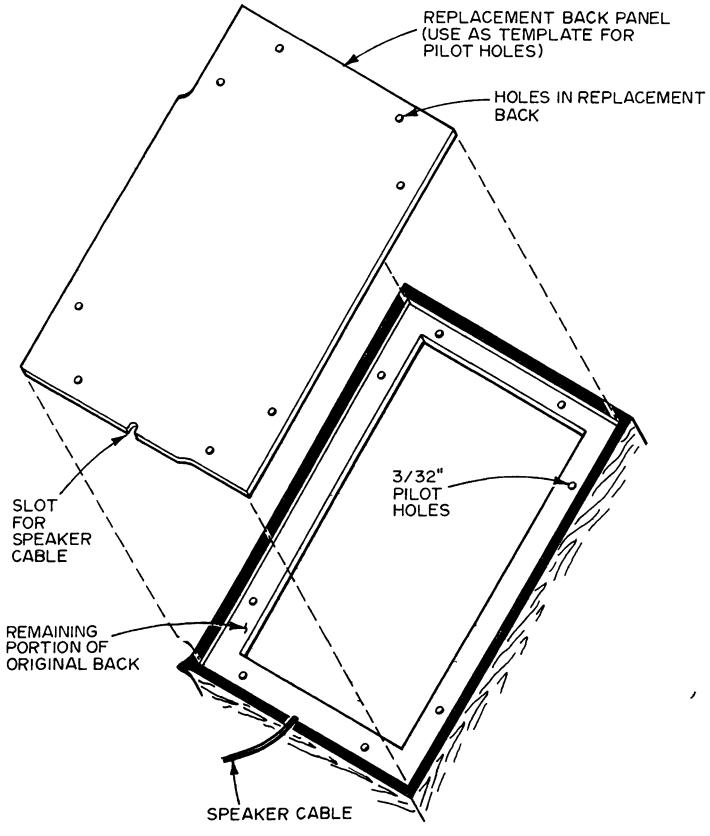


FIGURE 8 – PILOT HOLES

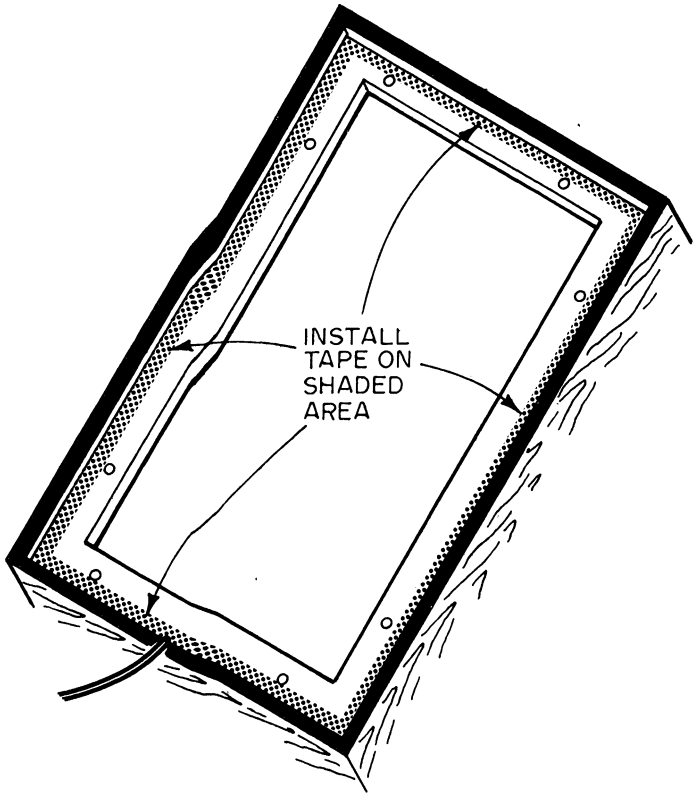
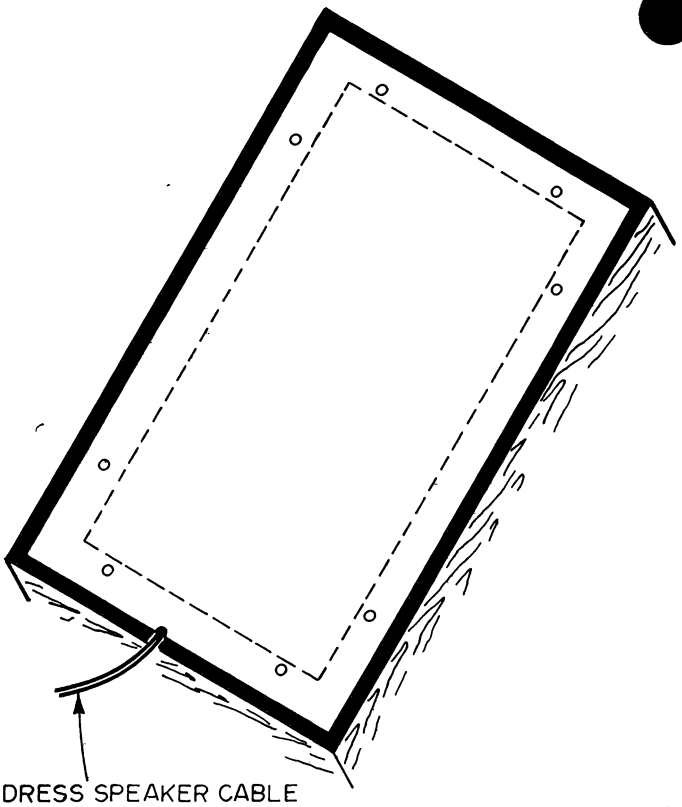


FIGURE 9 – INSTALLING TAPE

CABINET REPAIR TIPS

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

POSITION REPLACEMENT BACK PANEL ON REMAINING PORTION OF THE ORIGINAL BACK AND SECURE WITH 7/8" PHILLIPS FLAT HEAD SCREWS THROUGH EACH PREDRILLED HOLES IN REPLACEMENT BACK PANEL



DRESS SPEAKER CABLE THROUGH SLOT IN REPLACEMENT BACK

FIGURE 10 – SECURING NEW PANEL

A. When removing the back, handle the acoustical pads carefully (they may tear easily).

B. Speakers (and other components) must be securely fastened to prevent air leaks, and loose components can result in rattles. Air leaks and rattles can result in a deterioration of performance.

C. When replacing the back, be certain that the acoustic pads don't obstruct the port.

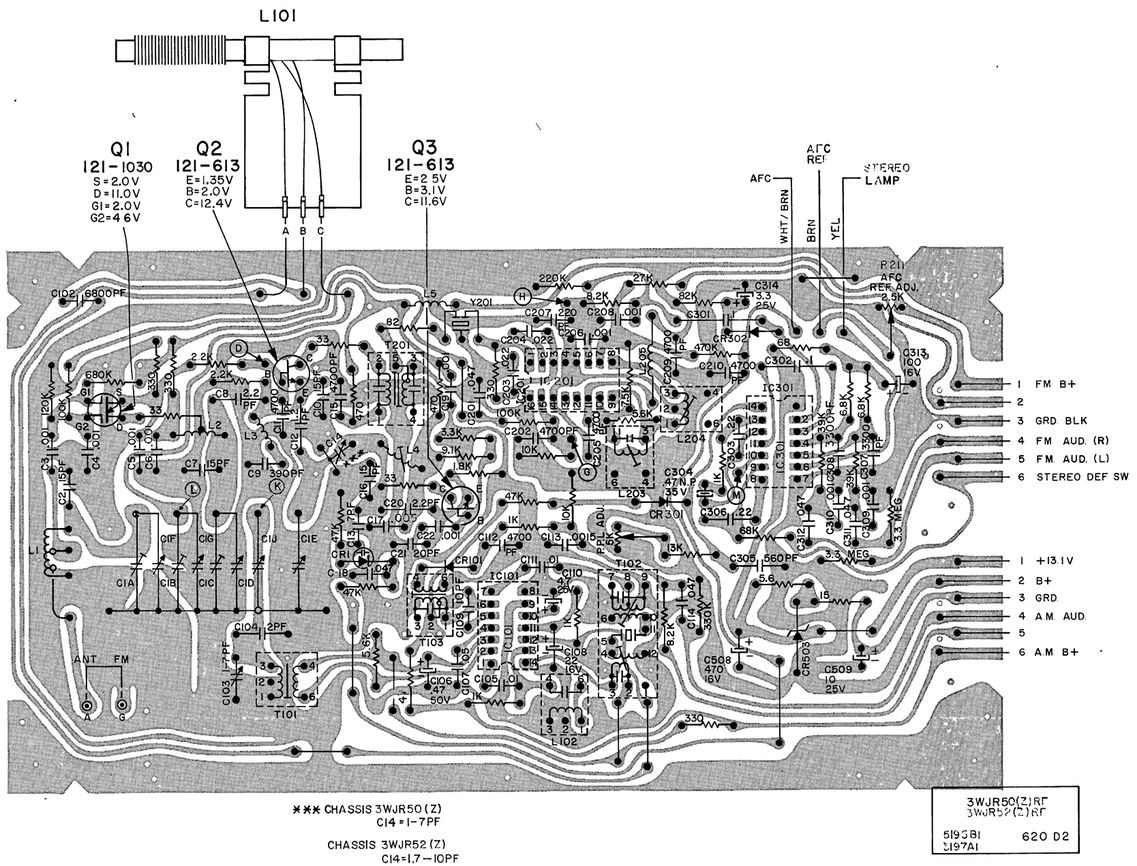
D. All screws holding the back must be secured, by using a sufficient amount of torque, in order to prevent air leaks.

CABINET BACK REPAIR KITS

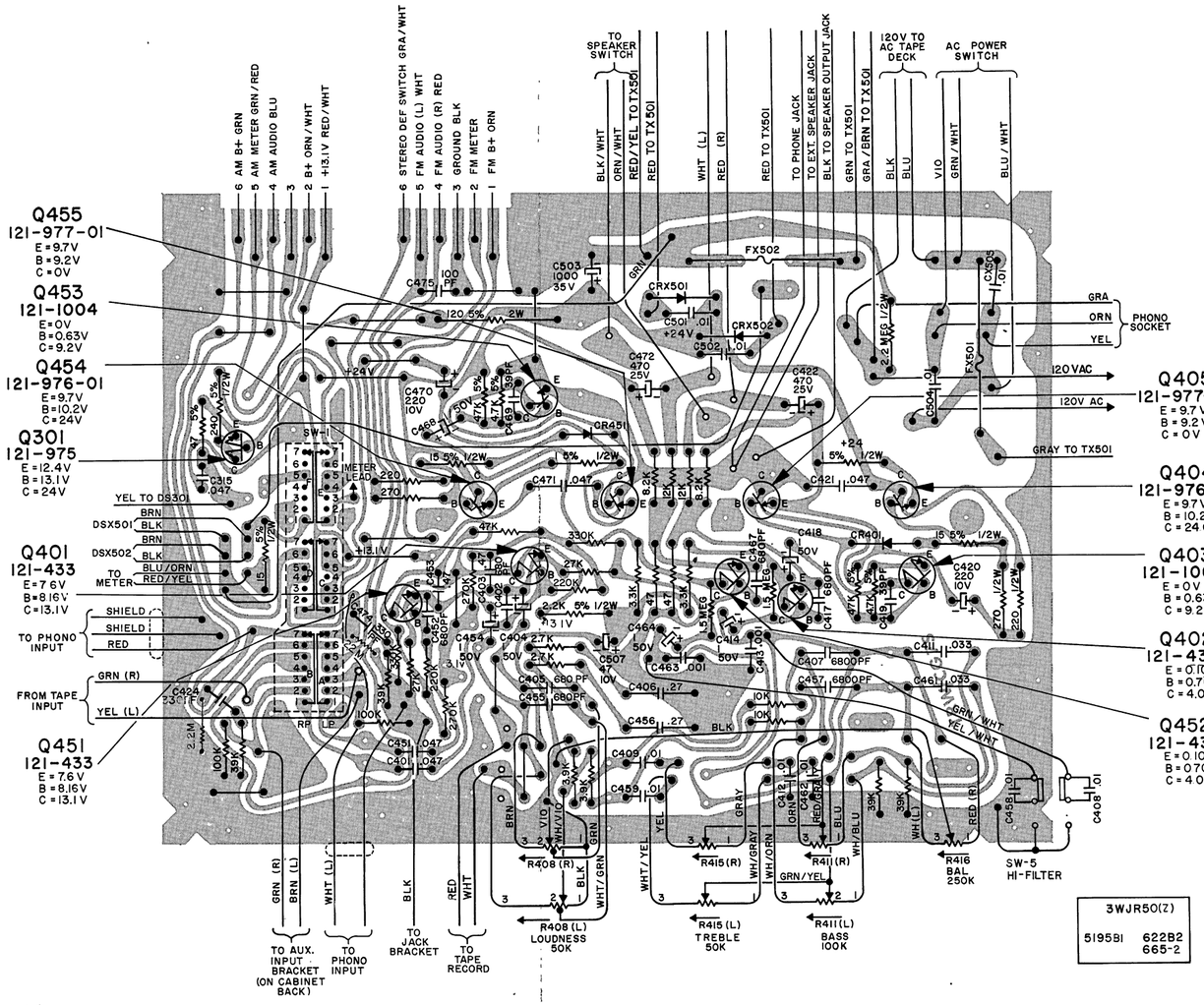
Repair kits for "H", "J" and "K" Line Allegro models using "captivated" backs are listed in Table C.
NOTE: "H" Line kits are not interchangeable with "J" and "K" Line kits.

TABLE C – ALLEGRO BACK REPAIR KITS

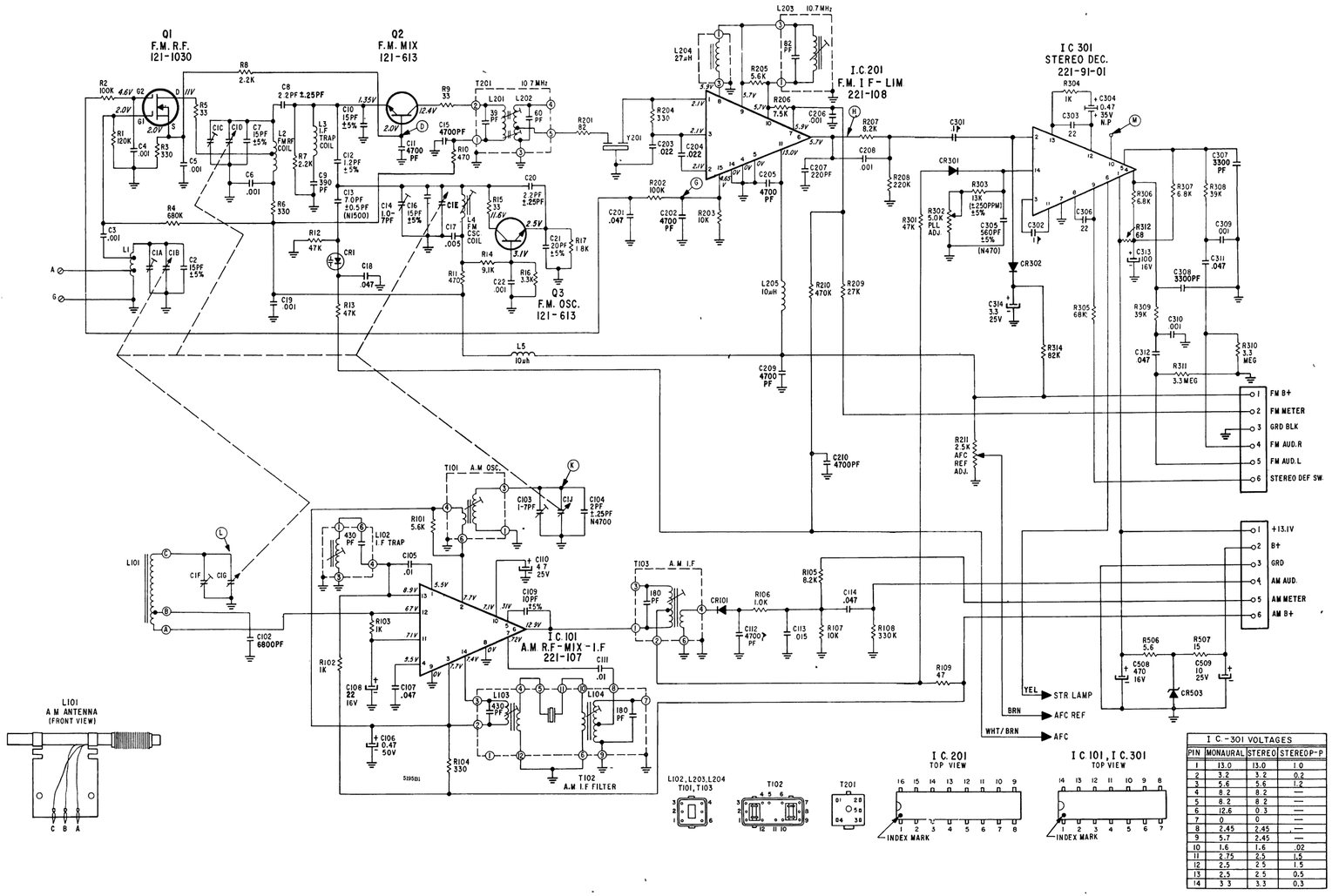
KIT PART NO.	ALLEGRO MODEL NO.
802-31	H1000W2, H1000W3
802-32	H2000W3
802-33	H3000W3
802-34	J1000W1, J1000W2, MC1000
802-35	J2000W1, MC2000
802-36	J3000W1



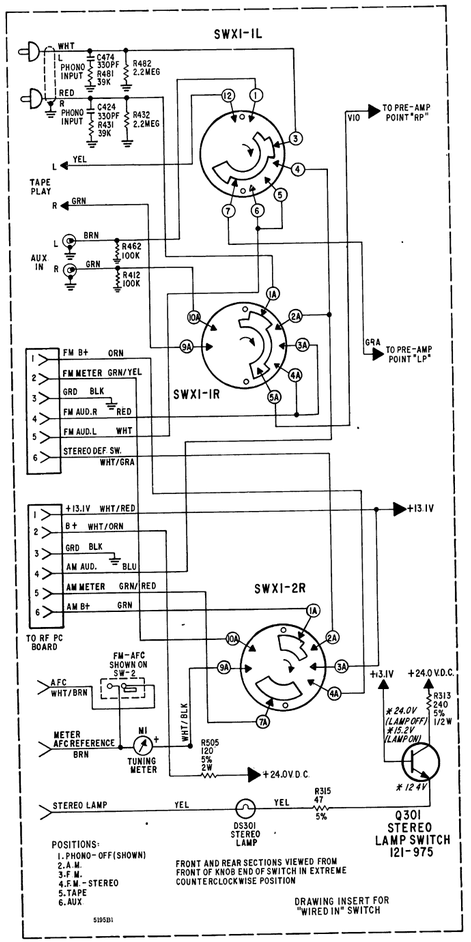
CHASSIS 3WJR50, 50Z – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – AUDIO AND POWER SUPPLY

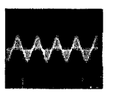


CHASSIS 3WJR50, 50Z – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – RF/IF/MPX

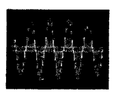


I C - 301 VOLTAGES			
PIN	MONAURAL	STEREO	STEREO P-P
1	13.0	13.0	1.0
2	3.2	3.2	0.2
3	5.6	5.6	1.2
4	8.2	8.2	—
5	8.2	8.2	—
6	12.6	0.3	—
7	0	0	—
8	2.45	2.45	—
9	5.7	2.45	—
10	1.6	1.6	.02
11	2.75	2.5	1.5
12	2.5	2.5	1.5
13	2.5	2.5	0.5
14	3.3	3.3	0.3

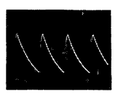




PIN 2-COMPOSITE INPUT
L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10%
0.5V P/P (0.5 MILLISEC.)

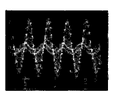


PINS 3 AND 11-COMPOSITE AMPLIFIED
L+R, L–R (1 KHZ LEFT ONLY), 19 KHZ PILOT 10%
1.4V P/P (0.5 MILLISEC.)

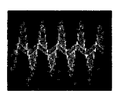


PIN 14-VOLTAGE CONTROLLED OSCILLATOR ADJUSTMENT
3.5V P/P (5.0 MICROSEC.)

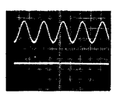
PIN 10-19 KHZ TEST POINT
2.7V P/P (10.0 MICROSEC.)



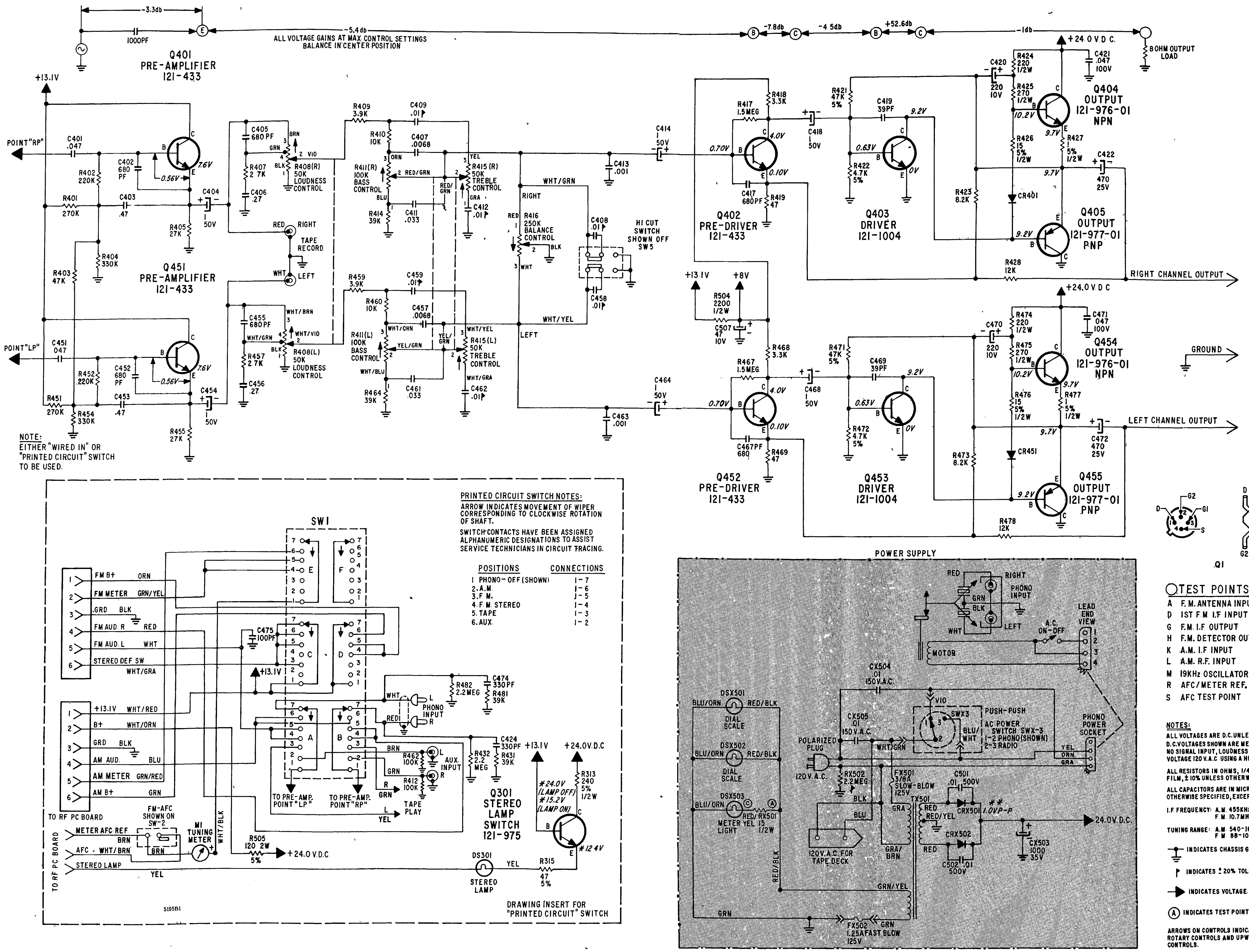
PINS 12 AND 13-FILTER-PHASE DETECTOR
0.14V P/P (0.5 MILLISEC.)



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



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



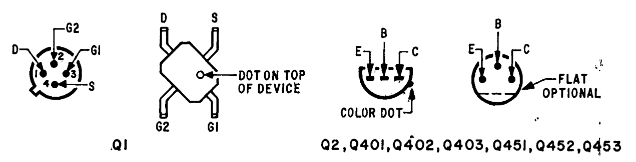
IMPORTANT SAFETY NOTICE

WHEN SERVICING THIS CHASSIS, UNDER NO CIRCUMSTANCES SHOULD THE ORIGINAL DESIGN BE MODIFIED OR ALTERED WITHOUT PERMISSION FROM THE ZENITH RADIO CORPORATION. ALL COMPONENTS SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL CIRCUIT. SPECIAL COMPONENTS ARE USED TO PREVENT SHOCK AND FIRE HAZARD. THESE CRITICAL COMPONENTS ARE SHADED ON THE SCHEMATIC AND PARTS LIST FOR EASY IDENTIFICATION.

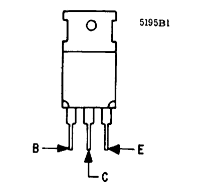
THIS CIRCUIT DIAGRAM MAY OCCASIONALLY DIFFER FROM THE ACTUAL CIRCUIT USED. THIS WAY, IMPLEMENTATION OF THE LATEST SAFETY AND PERFORMANCE IMPROVEMENT CHANGES INTO THE SET IS NOT DELAYED UNTIL THE NEW SERVICE LITERATURE IS PRINTED.

TRANSISTOR LEAD LAYOUTS

LEAD END VIEWS



TRANSISTOR BASING



TEST POINTS

- A F.M. ANTENNA INPUT
- D IST F.M. I.F INPUT
- G F.M. I.F OUTPUT
- H F.M. DETECTOR OUTPUT
- K A.M. I.F INPUT
- L A.M. R.F. INPUT
- M 19KHz OSCILLATOR OUTPUT
- R AFC/METER REF.
- S AFC TEST POINT

NOTES:

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.

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

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

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

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

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

INDICATES CHASSIS GROUND.

INDICATES ±20% TOLERANCE.

INDICATES VOLTAGE.

(A) INDICATES TEST POINTS.

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

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

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

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

CHASSIS 3WJR50, 50Z

ITEM NO.	PART NO.	DESCRIPTION
C1A	22-7545 (3WJR50) 22-7578 (3WJR50Z)	FM ANTENNA TRIMMER
C1B		FM ANTENNA TUNING
C1C		FM RF TRIMMER
C1D		FM RF TUNING
C1E		FM OSCILLATOR TUNING
C1F		AM ANTENNA TRIMMER
C1G		AM ANTENNA TUNING
C1J		AM OSCILLATOR TUNING
C2	22-2642	15 PF DISC ±5% 500V
C3	22-2729	.001 MFD DISC 25V
C4	22-2729	.001 MFD DISC 25V
C5	22-2729	.001 MFD DISC 25V
C6	22-2729	.001 MFD DISC 25V
C7	22-2642	15 PF DISC ±5% 500V
C8	22-6225-26	2.2 PF DISC ±.25 PF 500V
C9	22-3177	390 PF DISC 500V
C10	22-2642	15 PF DISC ±5% 500V
C11	22-7615-04	4700 PF DISC 50V
C12	22-5164	1.2 PF GIMMICK ±5% 500V
C13	22-6344	7 PF DISC ±.5 PF N1500 500V
C14	22-7460	1.0 PF TO 7 PF CERAMIC TRIMMER
C15	22-7615-04	4700 PF DISC 50V
C16	22-2642	15 PF DISC ±5% N33 500V
C17	22-3080	.005 MFD DISC 25V
C18	22-7615-10	.047 MFD DISC 50V
C19	22-2729	.001 MFD DISC 25V
C20	22-6225-26	2.2 PF DISC ±.25 PF 500V
C21	22-7621-17	20 PF DISC ±5% 50V
C22	22-2729	.001 MFD DISC 25V
C102	22-7613-22	6800 PF DISC 50V
C103	22-7460	1 PF TO 7 PF AM OSCILLATOR TRIMMER
C104	22-4819	2 PF ±0.25 PF N4700 TUB 500V
C105	22-7615-06	.01 MFD DISC 50V
C106	22-7153-25	.47 MFD ELECTROLYTIC 50V
C107	22-7615-10	.047 MFD DISC 50V
C108	22-7151-05	22 MFD ELECTROLYTIC 16V
C109	22-3675	10 PF DISC ±5% 500V
C110	22-7152-03	4.7 MFD ELECTROLYTIC 25V
C111	22-7615-06	.01 MFD DISC 50V
C112	22-7613-20	4700 PF DISC 50V
C113	22-7614-26	.015 MFD DISC 50V
C114	22-7615-10	.047 MFD DISC 50V
C201	22-7615-10	.047 MFD DISC 50V
C202	22-7615-04	4700 PF DISC 50V
C203	22-7615-08	.022 MFD DISC 50V
C204	22-7615-08	.022 MFD DISC 50V
C205	22-7615-04	4700 PF DISC 50V
C206	22-2729	.001 MFD DISC 25V
C207	22-2703	220 PF DISC 500V
C208	22-3748	.001 MFD DISC 1000V
C209	22-7615-04	4700 PF DISC 50V
C210	22-7615-04	4700 PF DISC 50V
C301	22-5907	1 MFD MYLAR 20% 50V
C302	22-5907	1 MFD MYLAR 20% 50V
C303	22-3527	.22 MFD DISC 12V
C304	22-7406	.47 MFD NP ELECTROLYTIC 35V
C305	22-7493	560 PF ±5% N470 DISC 500V
C306	22-3527	.22 MFD DISC 12V
C307	22-7613-18	3300 PF DISC 50V
C308	22-7613-18	3300 PF DISC 50V
C309	22-2729	.001 MFD DISC 25V
C310	22-2729	.001 MFD DISC 25V
C311	22-7615-10	.047 MFD DISC 50V
C312	22-7615-10	.047 MFD DISC 50V
C313	22-7151-08	100 MFD ELECTROLYTIC 16V
C314	22-7152-02	3.3 MFD ELECTROLYTIC 25V
C401	22-7615-10	.047 MFD DISC 50V
C402	22-2939	680 PF DISC 500V
C403	22-5487	.47 MFD 3V
C404	22-7153	1 MFD ELECTROLYTIC 50V
C405	22-2939	680 PF DISC 500V
C406	22-5964	.27 MFD MYLAR 50V
C407	22-3415	.0068 MFD DISC 25V
C408	22-7614-24	.01 MFD DISC 20% 50V
C409	22-7614-24	.01 MFD DISC 20% 50V
C411	22-5883	.033 MFD MYLAR 100V
C412	22-7614-24	.01 MFD DISC 20% 50V
C413	22-5688	.001 MFD DISC ±20% 500V
C414	22-7153	1 MFD ELECTROLYTIC 50V
C417	22-2939	680 PF DISC 500V
C418	22-7153	1 MFD ELECTROLYTIC 50V
C419	22-3381	39 PF DISC ±5% 500V
C420	22-7150-09	220 MFD ELECTROLYTIC 10V
C421	22-6447-01	.047 MFD 100V
C422	22-7152-11	470 MFD ELECTROLYTIC 25V
C424	22-5665	330 PF DISC 500V
C451	22-7615-10	.047 MFD DISC 50V
C452	22-2939	680 PF DISC 500V
C453	22-5487	.47 MFD DISC 3V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C455	22-2939	680 PF DISC 500V
C456	22-5964	.27 MFD MYLAR 50V
C457	22-3415	.0068 MFD DISC 25V
C458	22-7614-24	.01 MFD DISC 20% 50V
C459	22-7614-24	.01 MFD DISC 20% 50V
C461	22-5883	.033 MFD MYLAR 100V
C462	22-7614-24	.01 MFD DISC 20% 50V
C463	22-5688	.001 MFD DISC ±20% 500V
C464	22-7153	1 MFD ELECTROLYTIC 50V
C467	22-2939	680 PF DISC 500V
C468	22-7153	1 MFD ELECTROLYTIC 50V
C469	22-3381	39 PF DISC ±5% 500V
C470	22-7150-09	220 MFD ELECTROLYTIC 10V
C471	22-6447-01	.047 MFD MYLAR 100V
C472	22-7152-11	470 MFD ELECTROLYTIC 25V
C474	22-5665	330 PF DISC 1000V
C475	22-3383	100 PF DISC 500V
C501	22-4617	.01 MFD DISC 500V
C502	22-4617	.01 MFD DISC 500V

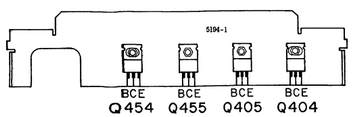
ITEM NO.	PART NO.	DESCRIPTION
CX503■	22-7154-12	1000 MFD ELECTROLYTIC 35V
CX504■	22-7431-07	.01 MFD 150VAC
CX505■	22-7431-07	.01 MFD 150VAC
C507	22-7150-07	47 MFD ELECTROLYTIC 10V
C508	22-7151-11	470 MFD ELECTROLYTIC 16V
C509	22-7152-04	10 MFD ELECTROLYTIC 25V
R1	63-9922-22	120K OHM 5% 1/4W
R2	63-9922-20	100K OHM 5% 1/4W
R3	63-9921-60	330 OHM 5% 1/4W
R4	63-9922-40	680K OHM 5% 1/4W
R5	63-4122	33 OHM 10% 1/4W
R6	63-9921-60	330 OHM 5% 1/4W
R7	63-9921-80	2.2K OHM 5% 1/4W
R8	63-9921-80	2.2K OHM 5% 1/4W
R9	63-9921-36	33 OHM 5% 1/4W
R10	63-9921-64	470 OHM 5% 1/4W
R11	63-4171	470 OHM 10% 1/4W
R12	63-9922-12	47K OHM 5% 1/4W
R13	63-9922-12	47K OHM 5% 1/4W
R14	63-9921-95	9.1K OHM 5% 1/4W
R15	63-4122	33 OHM 10% 1/4W
R16	63-9921-84	3.3K OHM 5% 1/4W
R17	63-9921-78	1.8K OHM 5% 1/4W
R101	63-9921-90	5.6K OHM 5% 1/4W
R102	63-9921-72	1K OHM 5% 1/4W
R103	63-9921-72	1K OHM 5% 1/4W
R104	63-9921-60	330 OHM 5% 1/4W
R105	63-9921-94	8.2K OHM 5% 1/4W
R106	63-9921-72	1K OHM 5% 1/4W
R107	63-9921-96	10K OHM 5% 1/4W
R108	63-9922-32	330K OHM 5% 1/4W
R109	63-9921-40	47 OHM 5% 1/4W
R201	63-9921-46	82 OHM 5% 1/4W
R202	63-9922-20	100K OHM 5% 1/4W
R203	63-9921-96	10K OHM 5% 1/4W
R204	63-9921-60	330 OHM 5% 1/4W
R205	63-9921-90	5.6K OHM 5% 1/4W
R206	63-9921-93	7.5K OHM 5% 1/4W
R207	63-9921-94	8.2K OHM 5% 1/4W
R208	63-9922-28	220K OHM 5% 1/4W
R209	63-9922-06	27K OHM 5% 1/4W
R210	63-9922-36	470K OHM 5% 1/4W
R211	63-10651-02	2.5K OHM AFC REF ADJUST
R301	63-9922-12	47K OHM 5% 1/4W
R302	63-10651-03	5K OHM P.L.L ADJUST
R303	63-10311-99	13K OHM 5% 1/4W
R304	63-9921-72	1K OHM 5% 1/4W
R305	63-9922-16	68K OHM 5% 1/4W
R306	63-9921-92	6.8K OHM 5% 1/4W
R307	63-9921-92	6.8K OHM 5% 1/4W
R308	63-9922-10	39K OHM 5% 1/4W
R309	63-9922-10	39K OHM 5% 1/4W
R310	63-9924-56	3.3 MEG OHM 10% 1/4W
R311	63-9924-56	3.3 MEG OHM 10% 1/4W
R312	63-9921-44	68 OHM 5% 1/4W
R313	63-9946-57	240 OHM 5% 1/2W
R314	63-9922-18	82K OHM 5% 1/4W
R315	63-9921-40	47 OHM 5% 1/4W
R401	63-9922-30	270K OHM 5% 1/4W
R402	63-9922-28	220K OHM 5% 1/4W
R403	63-9922-12	47K OHM 5% 1/4W
R404	63-9922-32	330K OHM 5% 1/4W
R405	63-9922-06	27K OHM 5% 1/4W
R407	63-9921-82	2.7K OHM 5% 1/4W
R408R R408L	63-10189-02	50K OHM LOUDNESS CONTROL DUAL
R409	63-9921-86	3.9K OHM 5% 1/4W
R410	63-9921-96	10K OHM 5% 1/4W
R411R R411L	63-8982-02	100K OHM BASS CONTROL DUAL
R412	63-9922-20	100K OHM 5% 1/4W
R414	63-9922-10	39K OHM 5% 1/4W
R415R R415L	63-8983-02	50K OHM TREBLE CONTROL DUAL
R416	63-8981-02	250K BALANCE CONTROL
R417	63-9924-48	1.5 MEG OHM 10% 1/4W
R418	63-9921-84	3.3K OHM 5% 1/4W
R419	63-9921-40	47 OHM 5% 1/4W
R421	63-9922-12	47K OHM 5% 1/4W
R422	63-9921-88	4.7K OHM 5% 1/4W
R423	63-9921-94	8.2K OHM 5% 1/4W
R424	63-9946-56	220 OHM 5% 1/2W
R425	63-9946-58	270 OHM 5% 1/2W
R426	63-9946-28	15 OHM 5% 1/2W
R427	63-10565	1.0 OHM 5% 1/2W
R428	63-9921-98	12K OHM 5% 1/4W
R430	63-1757	220 OHM 10% 1/2W (SEE HEADPHONE JACK ASS'Y.)
R431	63-9922-10	39K OHM 5% 1/4W
R432	63-9922-52	2.2 MEG OHM 5% 1/4W
R451	63-9922-30	270K OHM 5% 1/4W
R452	63-9922-28	220K OHM 5% 1/4W
R454	63-4289	330K OHM 5% 1/4W
R455	63-9922-06	27K OHM 5% 1/4W
R457	63-9921-82	2.7K OHM 5% 1/4W
R459	63-9921-86	3.9K OHM 5% 1/4W
R460	63-8921-96	10K OHM 5% 1/4W
R462	63-9922-20	100K OHM 5% 1/4W
R464	63-9922-10	39K OHM 5% 1/4W
R467	63-9924-48	1.5 MEG OHM 10% 1/4W
R468	63-9921-84	3.3K OHM 5% 1/4W
R469	63-9921-40	47 OHM 5% 1/4W
R471	63-9922-12	47K OHM 5% 1/4W
R472	63-9921-88	4.7K OHM 5% 1/4W
R473	63-9921-94	8.2K OHM 5% 1/4W
R474	63-9946-56	220 OHM 5% 1/2W
R475	63-9946-53	270 OHM 5% 1/2W
R476	63-9946-28	15 OHM 5% 1/2W
R477	63-10565	1.0 OHM 5% 1/2W
R478	63-9921-98	12K OHM 5% 1/4W

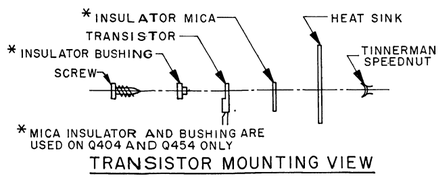
ITEM NO.	PART NO.	DESCRIPTION
R480	63-1757	220 OHM 10% 1/2W (SEE HEADPHONE JACK ASS'Y.)
R481	63-9922-10	39K OHM 5% 1/4W
R482	63-10356-52	2.2 MEG OHM 10% 1/4W
RX501■	63-9946-28	15 OHM 5% 1/2W
RX502■	63-10526-01	2.2 MEG OHM 20% 1/2W
R504	63-9946-80	2.2K OHM 5% 1/2W
R505	63-10371-50	120 OHM 5% 2W
R506	63-9921-18	5.6 OHM 5% 1/4W
R507	63-9921-28	15 OHM 1/4W
CR1	103-47-01	AFC DIODE
CR101	103-23-01	GERMANIUM DIODE
CR301	103-142-01	SILICON DIODE
CR302	103-142-01	SILICON DIODE
CR401	103-222-01	SILICON DIODE
CR451	103-222-01	SILICON DIODE
CRX501■	212-76-02	SILICON RECTIFIER
CRX502■	212-76-02	SILICON RECTIFIER
CR503	103-96-01	ZENER DIODE
L1	20-3771	FM ANTENNA COIL
L2	20-3773	FM RF COIL
L3	20-1631	TRAP COIL 10.7 MHz
L4	20-3772	FM OSCILLATOR COIL
L5	20-2033	10 MICROHENRY COIL RF CHOKE
L101	A-4781	AM ANTENNA ASSEMBLY
L102	20-3776	TRAP COIL 455 KHz
L103	IN T102	AM FILTER PRIMARY
L104	IN T102	AM FILTER SECONDARY
L201	IN T201	10.7 MHz IF PRIMARY
L202	IN T201	10.7 MHz IF SECONDARY
L203	20-3774	FM QUADRATURE DETECTOR
L204	20-3775	FM 27 M.H COIL
L205	20-2033	10 MICROHENRY COIL RF CHOKE
T101	95-3268	AM OSCILLATOR TRANSFORMER
T102	A-4782	AM IF FILTER
T103	95-3266	AM DETECTOR COIL
T201	95-3269	10.7 MHz IF
TX501■	95-3289-01	POWER TRANSFORMER
FX501■	136-117-12	3/8 SLO BLOW FUSE 125V
FX502■	136-113-16	1.25 A FAST BLOW 125V
IC101	221-107	AM IC
IC201	221-108	FM IC
IC301	221-91-01 OR	STEREO DECODER PHASE LOCK LOOP (PREFERRED)
	221-91	STEREO DECODER PHASE LOCK LOOP (ALTERNATE)
DS301	100-658-01	STEREO INDICATOR LIGHT
DSX501■	100-661	DIAL SCALE
DSX502■	100-661	DIAL SCALE
DSX503■	100-658	PILOT LIGHT
J1	78-2252	HEADPHONE JACK (SEE HEADPHONE JACK ASS'Y.)
PC	204-620	CIRCUIT BOARD RF
PC	204-622	CIRCUIT BOARD AUDIO AND POWER SUPPLY
SW-1	85-1489	BAND SWITCH
SW2	85-1506-01	FM AFC SWITCH
SWX-3■	A-5902	POWER SWITCH
SW4	85-1508-01	SPEAKER SWITCH (SEE SPEAKER SWITCH ASS'Y.)
SW5	85-1507-01	HI CUT SWITCH
Y201	224-2 OR	CERAMIC FILTER, 10.64 MHz (BLACK)
	224-2-01 OR	CERAMIC FILTER, 10.67 MHz (BLUE)
	224-2-02 OR	CERAMIC FILTER, 10.70 MHz (RED)
	224-2-03 OR	CERAMIC FILTER, 10.73 MHz (ORANGE)
	224-2-04	CERAMIC FILTER, 10.76 MHz (WHITE)
Q1	121-1030	FM RF FIELD EFFECT TRANSISTOR
Q2	121-613	MIXER TRANSISTOR
Q3	121-613	FM OSCILLATOR TRANSISTOR
Q301	121-975	STEREO LAMP SWITCH
Q401	121-433	PRE-AMPLIFIER TRANSISTOR
Q402	121-433	PRE-DRIVER TRANSISTOR
Q403	121-1004	DRIVER TRANSISTOR
Q404	121-976-01	NPN OUTPUT TRANSISTOR
Q405	121-977-01	PNP OUTPUT TRANSISTOR
Q451	121-433	PRE-AMPLIFIER TRANSISTOR
Q452	121-433	PRE-DRIVER TRANSISTOR
Q453	121-1004	DRIVER TRANSISTOR
Q454	121-976-01	NPN OUTPUT TRANSISTOR
Q455	121-977-01	PNP OUTPUT TRANSISTOR
MI	122-68-04	METER
		■CRITICAL CIRCUIT COMPONENT

5195B2

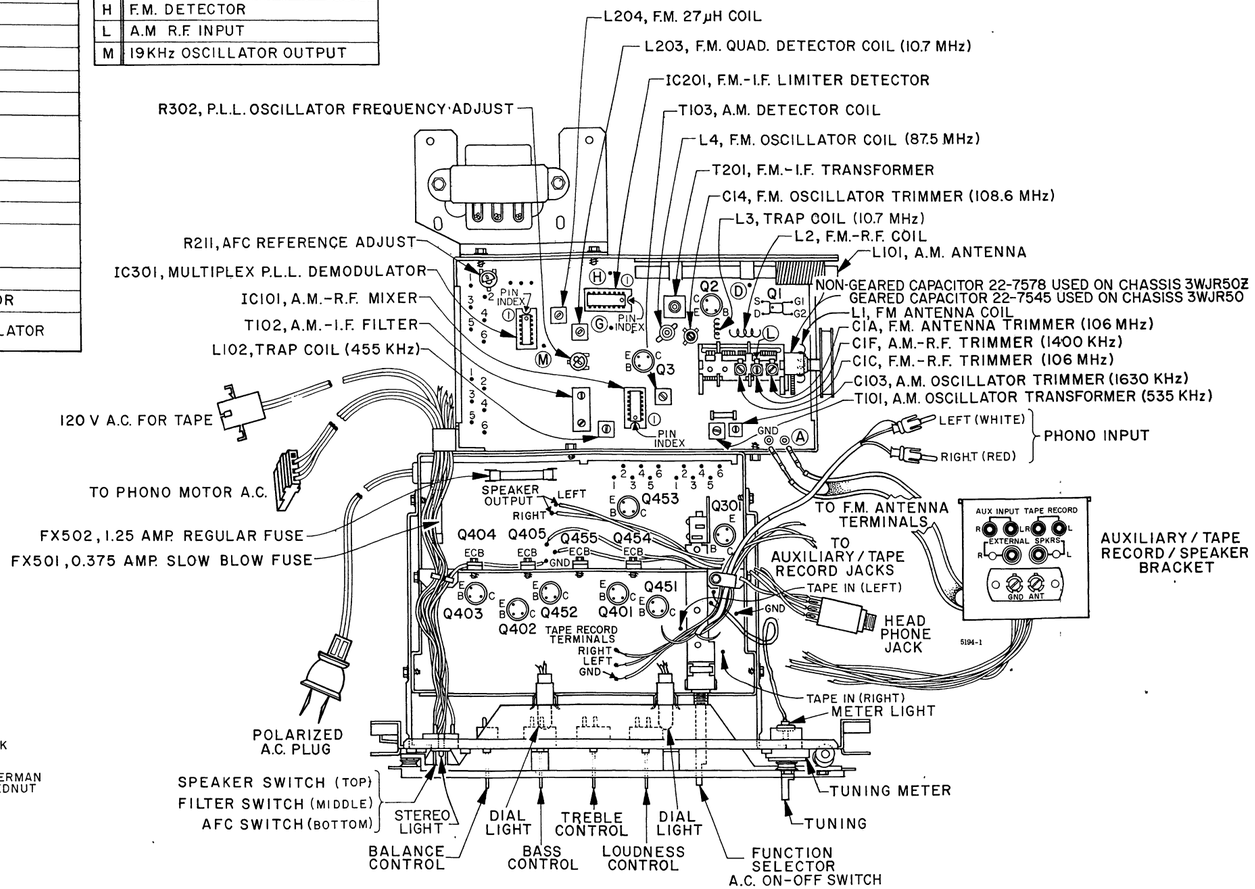
TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-1030	F.M.-R.F.
Q2	121-613	F.M. MIXER
Q3		F.M. OSCILLATOR
Q301	121-975	STEREO LAMP SWITCH
Q401	121-433	PRE-AMPLIFIER
Q402		PRE-DRIVER
Q403	121-1004	DRIVER
Q404	121-976-01	OUTPUT
Q405	121-977-01	
Q451	121-433	PRE-AMPLIFIER
Q452		PRE-DRIVER
Q453	121-1004	DRIVER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

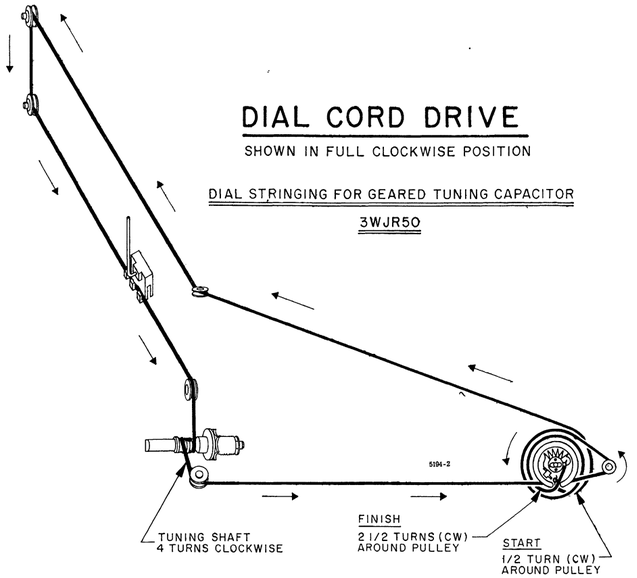
○	TEST POINTS
A	F.M ANTENNA INPUT
D	F.M. I.F. INPUT
G	F.M I.F. OUTPUT
H	F.M. DETECTOR
L	A.M R.F. INPUT
M	19KHz OSCILLATOR OUTPUT

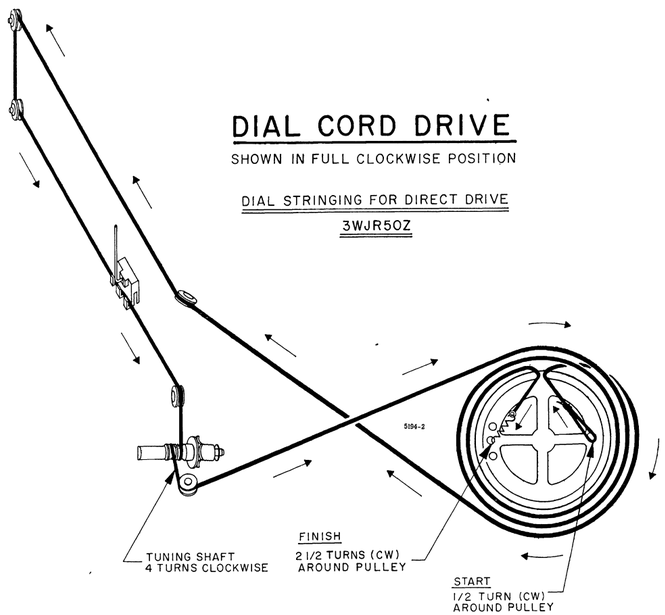




TRANSISTOR MOUNTING VIEW



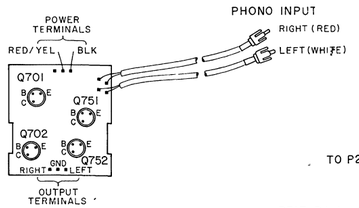




CHASSIS 3WJR50, 50Z-CHASSIS LAYOUT

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

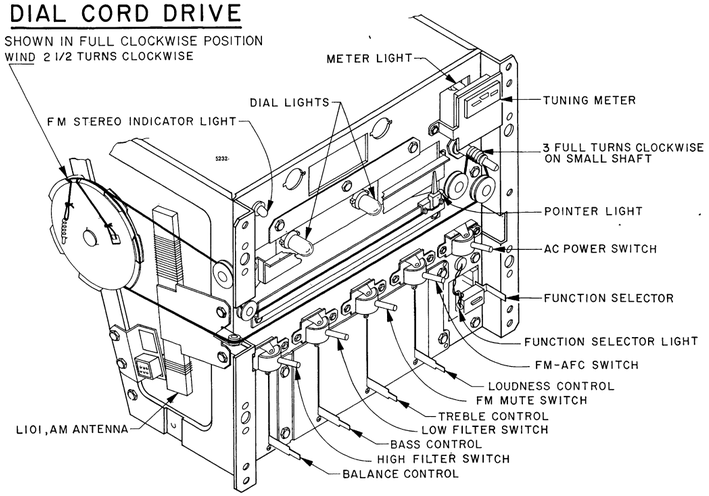
	TEST POINTS
A	FM ANTENNA INPUT
D	FM IF INPUT
G	FM IF OUTPUT
H	FM DETECTOR OUTPUT
L	AM RF INPUT
M	19 kHz OSCILLATOR OUTPUT
AB	AUDIO BIAS
AC	
AD	
AE	

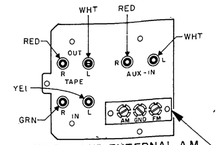


MAGNETIC PHONO PRE-AMPLIFIER
PART OF RF TUNER

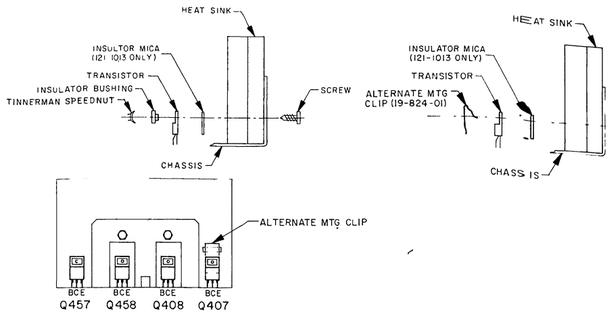
DIAL CORD DRIVE

SHOWN IN FULL CLOCKWISE POSITION
WIND 2 1/2 TURNS CLOCKWISE

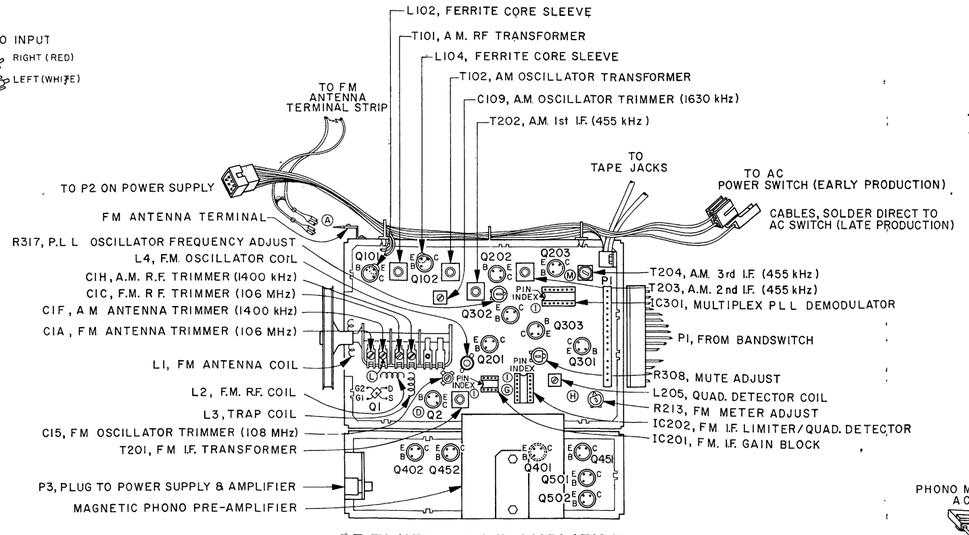




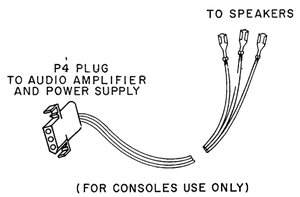
TO FM AND EXTERNAL AM ANTENNA TERMINAL STRIP



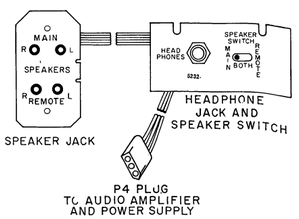
TRANSISTOR MOUNTING VIEW

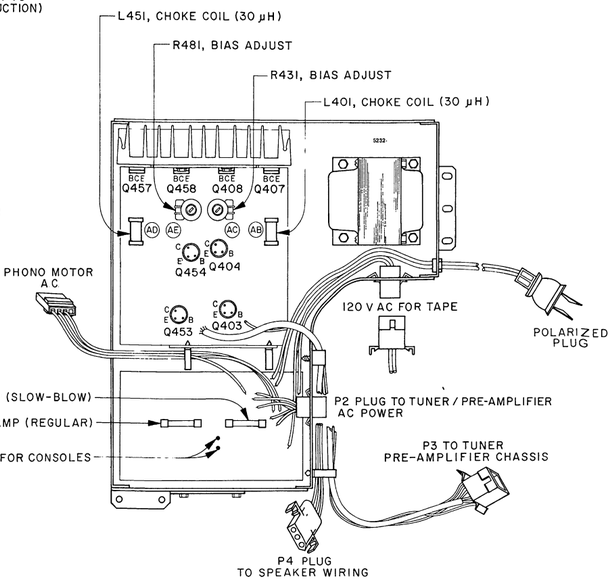


RF TUNER & PRE-AMPLIFIER



(FOR CONSOLES USE ONLY)





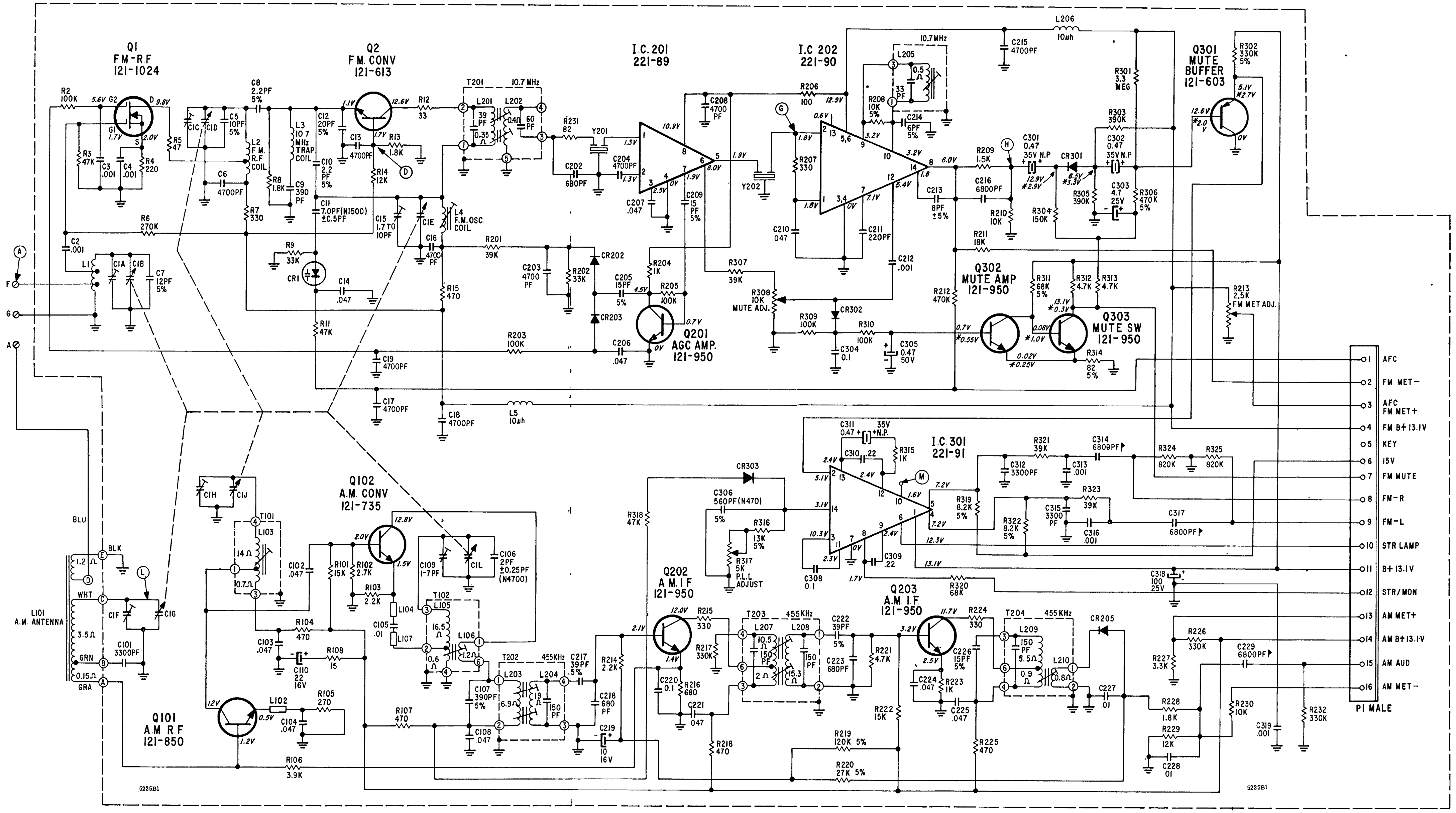
AUDIO AMPLIFIER & POWER SUPPLY

CHASSIS 15WJR29

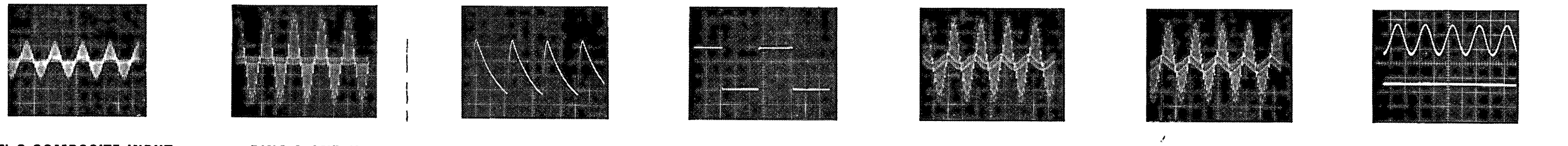
ITEM NO.	PART NO.	DESCRIPTION
C1A		F.M. ANTENNA TRIMMER
C1B		F.M. ANTENNA TUNING
C1C		F.M. RF TRIMMER
C1D		F.M. RF TUNING
C1E	22-6245-01	F.M. OSCILLATOR TUNING
C1F		A.M. ANTENNA TRIMMER
C1G		A.M. ANTENNA TUNING
C1H		A.M. RF TRIMMER
C1J		A.M. RF TUNING
C1L		A.M. OSCILLATOR TUNING
C2	22-2729	.001 MFD DISC 25V
C3	22-2729	.001 MFD DISC 25V
C4	22-2729	.001 MFD DISC 25V
C5	22-3675	10 PF DISC ±5% 500V
C6	22-7615-04	4700 PF DISC 50V
C7	22-3035	12 PF DISC ±5% 500V
C8	22-2468	2.2 PF GIMMICK ±5%
C9	22-3177	390 PF DISC 500V
C10	22-2468	2.2 PF GIMMICK ±5% 500V
C11	22-6344	7 PF DISC ± .5 PF N1500 500V
C12	22-7621-17	20 PF DISC ±5% 50V
C13	22-7615-04	4700 PF DISC 50V
C14	22-7615-10	.047 MFD DISC 50V
C15	22-4855	1 7 TO 10 PF CERAMIC TRIMMER
C16	22-7615-04	4700 PF DISC 50V
C17	22-7615-04	4700 PF DISC 50V
C18	22-7615-04	4700 PF DISC 50V
C19	22-7615-04	4700 PF DISC 50V
C101	22-7613-18	3300 PF DISC 500V
C102	22-7615-10	.047 MFD DISC 50V
C103	22-7615-10	.047 MFD DISC 50V
C104	22-7615-10	.047 MFD DISC 50V
C105	22-7615-06	.01 MFD DISC 50V
C106	22-4819	2 PF ±0.25 PF N4700 TUB. 500V
C107	22-5972	390 PF ±5% POLYSTYRENE TUB. 125V
C108	22-7615-10	.047 MFD DISC 50V
C109	22-7460	1 PF TO 7 PF AM OSC. TRIMMER
C110	22-7161-05	22 MFD ELECTROLYTIC 16V
C202	22-5482	680 PF DISC 500V
C203	22-7615-04	4700 PF DISC 50V
C204	22-7615-04	4700 PF DISC 50V
C205	22-2642	15 PF DISC ±5% 500V
C206	22-6447-01	.047 MFD MYLAR 100V
C207	22-7615-10	.047 MFD DISC 50V
C208	22-7615-04	4700 PF DISC 50V
C209	22-2642	15 PF DISC ±5% 500V
C210	22-7615-10	.047 MFD DISC 50V
C211	22-2703	220 PF ±10% DISC 500V
C212	22-2729	.001 MFD DISC 25V
C213	22-5805	8 PF ±5% DISC 500V
C214	22-2381	6 PF ±5% DISC 500V
C215	22-7615-04	4700 PF DISC 50V
C216	22-7613-22	6800 PF DISC 50V
C217	22-7641-22	39 PF DISC ±5% 50V
C218	22-2939	680 PF DISC 500V
C219	22-7151-04	10 MFD ELECTORLYTIC 16V
C220	22-3652	1 MFD DISC 10V
C221	22-7615-10	.047 MFD DISC 50V
C222	22-7641-22	39 PF ±5% DISC 50V
C223	22-2939	680 PF DISC 500V
C224	22-7615-10	.047 MFD DISC 50V
C225	22-7615-10	.047 MFD DISC 50V
C226	22-2642	15 PF DISC ±5% 500V
C227	22-7615-06	.01 MFD DISC 50V
C228	22-7615-06	.01 MFD DISC 50V
C229	22-7614-22	6800 PF DISC 20% 50V
C301	22-7406	.47 MFD NP ELECTROLYTIC 35V
C302	22-7406	.47 MFD NP ELECTROLYTIC 35V
C303	22-7152-03	4.7 MFD ELECTROLYTIC 25V
C304	22-3652	1 MFD DISC 10V
C305	22-7153-25	.47 MFD ELECTROLYTIC 50V
C306	22-7493	560 PF ±5% N470 DISC 500V
C308	22-5907	1 MFD MYLAR 50V
C309	22-3527	.22 MFD DISC 12V
C310	22-3527	.22 MFD DISC 12V
C311	22-7406	.47 MFD N.P ELECTROLYTIC 35V
C312	22-7613-18	3300 PF DISC 50V
C313	22-2729	.001 MFD DISC 25V
C314	22-7614-22	6800 PF DISC 20% 50V
C315	22-7613-18	3300 PF DISC 50V
C316	22-2729	.001 MFD DISC 25V
C317	22-7614-22	6800 PF DISC 20% 50V
C318	22-7152-08	100 MFD ELECTROLYTIC 25V
C319	22-2729	.001 MFD DISC 25V
C401	22-7615-10	.047 MFD DISC 50V
C402	22-2939	680 PF DISC 500V
C403	22-7390-06	.82 MFD ELECTROLYTIC 50V
C404	22-7153	1 MFD ELECTROLYTIC 50V
C405	22-3362	560 PF DISC 500V
C407	22-5964	.27 MFD MYLAR 50V
C408	22-5722	.068 MFD MYLAR 100V
C410	22-2939	680 PF DISC 500V
C411	22-7153	1 MFD ELECTROLYTIC 50V
C412	22-7613-18	3300 PF DISC 50V
C413	22-5632	.022 MFD MYLAR 200V (ALT. 22-7179)
C414	22-5722	.068 MFD MYLAR 100V
C415	22-7613-26	.015 MFD DISC 50V
C416	22-7613-17	2700 PF DISC 50V
C417	22-3383	100 PF DISC 500V
C418	22-6048	.22 MFD MYLAR 50V
C419	22-16	470 PF DISC 500V
C420	22-7154-07	47 MFD ELECTROLYTIC 35V
C421	22-2939	680 PF DISC 500V
C422	22-7154-07	47 MFD ELECTROLYTIC 35V
C423	22-7154-08	100 MFD ELECTROLYTIC 35V
C424	22-3751	20 PF DISC ±5% 500V
C425	22-7496	.47 MFD MYLAR 100V
C426	22-3255	330 PF DISC 500V
C427	22-5639	.22 MFD MYLAR 100V
C428	22-7113	1500 MFD ELECTROLYTIC 65V
C431	22-7601	.033 MFD POLYESTER 50V
C451	22-7615-10	.047 MFD DISC 50V
C452	22-2939	680 PF DISC 500V
C453	22-7390-06	.82 MFD ELECTROLYTIC 50V
C454	22-7153	1 MFD ELECTROLYTIC 50V
C455	22-3362	560 PF DISC 500V
C457	22-5964	.27 MFD MYLAR 50V
C458	22-5722	.068 MFD MYLAR 100V
C460	22-2939	680 PF DISC 500V
C461	22-7153	1 MFD ELECTROLYTIC 50V
C462	22-7613-18	3300 PF DISC 50V
C463	22-5632	.022 MFD MYLAR 200V (ALT. 22-7179)
C464	22-5722	.068 MFD MYLAR 100V
C465	22-7613-26	.015 MFD DISC 50V
C466	22-7613-17	2700 PF DISC 50V
C468	22-6048	.22 MFD MYLAR 50V
C469	22-16	470 PF DISC 500V
C471	22-2939	680 PF DISC 500V
C472	22-7154-07	47 MFD ELECTROLYTIC 35V
C473	22-7154-08	100 MFD ELECTROLYTIC 35V
C474	22-3751	20 PF DISC ±5% 500V
C475	22-7496	.47 MFD MYLAR 100V
C476	22-3255	330 PF DISC 500V
C477	22-5639	.22 MFD MYLAR 100V
C478	22-7113	1500 MFD ELECTROLYTIC 65V
C481	22-7601	.033 MFD POLYESTER 50V
C501■	22-4350	.056 MFD MYLAR 200V
C502■	22-4350	.056 MFD MYLAR 200V
CX504■	22-7113	1500 MFD ELECTROLYTIC 65V
CX505■	22-7431-07	.01 MFD DISC 150VAC
CX506■	22-7431-07	.01 MFD DISC 150VAC
C507	22-7151-11	470 MFD ELECTROLYTIC 16V
C508	22-7152-09	220 MFD ELECTROLYTIC 25V
C509	22-7152-09	220 MFD ELECTROLYTIC 25V
C510	22-7152-04	10 MFD ELECTROLYTIC 25V
CX511■	22-7113	1500 MFD ELECTROLYTIC 65V
C512	22-7149-07	47 MFD ELECTROLYTIC 6.3V
C701	22-7153	1 MFD ELECTROLYTIC 50V
C702	22-2593	20 PF DISC 500V
C703	22-2939	680 PF DISC 500V
C704	22-6905	1 MFD MYLAR 50V
C705	22-3383	100 PF DISC 500V
C706	22-7602	1800 PF ±5% POLYESTER 50V
C707	22-5761	470 PF DISC 1000V
C708	22-3412	820 PF DISC 500V
C709	22-7154-09	220 MFD ELECTROLYTIC 35V
C710	22-7154-09	220 MFD ELECTROLYTIC 35V
C751	22-7153	1 MFD ELECTROLYTIC 50V
C752	22-2593	20 PF DISC 500V
C753	22-2939	680 PF DISC 500V
C754	22-6905	1 MFD MYLAR 50V
C755	22-3383	100 PF DISC 500V
C756	22-7602	1800 PF ±5% POLYESTER 50V
C757	22-5761	470 PF DISC 1000V
C758	22-3412	820 PF DISC 500V
R2	63-9922-20	100K OHM 5% 1/2W (ALT 63-10184-20±10% 1/4W)
R3	63-9922-12	47K OHM ±5% 1/4W (ALT 63-10184-12±10% 1/4W)
R4	63-9921-56	220 OHM ±5% 1/4W (ALT 63-10183-56±10% 1/4W)
R5	63-4129	47 OHM 10% 1/4W
R6	63-9922-30	270K OHM ±5% 1/4W (ALT 63-10184-30±10% 1/4W)
R7	63-9921-60	330 OHM ±5% 1/4W (ALT 63-10183-60 ±10% 1/4W)
R8	63-9921-78	1.8K OHM ±5% 1/4W (ALT 63-10183-78±10% 1/4W)
R9	63-9922-08	33K OHM ±5% 1/4W (ALT 63-10184-08±10% 1/4W)
R11	63-4255	47K OHM ±10% 1/4W
R12	63-9921-36	33 OHM ±5% 1/4W (ALT 63-10183-36±10% 1/4W)
R13	63-9921-78	1.8K OHM ±5% 1/4W (ALT 63-10183-78±10% 1/4W)
R14	63-9921-98	12K OHM ±5% 1/4W (ALT 63-10183-98±10% 1/4W)
R15	63-9921-64	470 OHM ±5% 1/4W (ALT 63-10183-64±10% 1/4W)
R101	63-9922	15K OHM ±5% 1/4W (ALT 63-10184 ±10% 1/4W)
R102	63-9921-82	2.7K OHM ±5% 1/4W (ALT 63-10183-82±10% 1/4W)
R103	63-9921-80	2.2K OHM ±5% 1/4W (ALT 63-10183-80±10% 1/4W)
R104	63-9921-64	470 OHM ±5% 1/4W (ALT 63-10183-64±10% 1/4W)
R105	63-9921-58	270 OHM ±5% 1/4W (ALT 63-10183-58±10% 1/4W)
R106	63-9921-86	3.9K OHM ±5% 1/4W (ALT 63-10183-86±10% 1/4W)
R107	63-9921-64	470 OHM ±5% 1/4W (ALT 63-10183-64±10% 1/4W)
R108	63-9921-28	15 OHM ±5% 1/4W (ALT 63-10183-28±10% 1/4W)
R201	63-9922-10	39K OHM ±5% 1/4W (ALT 63-10184-10±10% 1/4W)
R202	63-9922-08	33K OHM ±5% 1/4W (ALT 63-10184-08 ±10% 1/4W)
R203	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-10184-20±10% 1/4W)
R204	63-9921-72	1K OHM ±5% 1/4W (ALT 63-10183-72±10% 1/4W)
R205	63-9922-20	100K OHM ±5% 1/4W (ALT 63-10184-20±10% 1/4W)
R206	63-9921-48	100 OHM ±5% 1/4W (ALT 63-10183-48±10% 1/4W)
R207	63-9921-60	330 OHM ±5% 1/4W (ALT 63-10183-60±10% 1/4W)
R208	63-9921-96	10K OHM ±5% 1/4W (ALT 63-10181-96±5% 1/4W)
R209	63-9921-76	1.5K OHM ± 5% 1/4W (ALT 63-10183-76 ± 10% 1/4W)
R210	63-9921-96	10K OHM ±5% 1/4W (ALT 63-10183-96±10% 1/4W)
R211	63-9922-02	18K OHM ±5% 1/4W (ALT 63-10184-02±10% 1/4W)
R212	63-9922-36	470K OHM ±5% 1/4W (ALT 63-10184-36±10% 1/4W)
R213	63-10651-02	2.5K OHM FM METER ADJUST
R214	63-9921-80	2.2K OHM ±5% 1/4W (ALT 63-10183-80±10% 1/4W)
R215	63-9921-60	330 OHM ±5% 1/4W (ALT 63-10183-60±10% 1/4W)
R216	63-9921-68	680 OHM ±5% 1/4W (ALT 63-10183-68±10% 1/4W)
R217	63-9922-32	330K OHM ±5% 1/4W (ALT 63-10184-32±10% 1/4W)
R218	63-9921-64	470 OHM ±5% 1/4W (ALT 63-10183-64±10% 1/4W)
R219	63-9922-22	120K OHM ±5% 1/4W (ALT 63-10182-22±5% 1/4W)
R220	63-9922-06	27K OHM ±5% 1/4W (ALT 63-10182-06±5% 1/4W)
R221	63-9921-88	4.7K OHM ±5% 1/4W (ALT 63-10183-88±10% 1/4W)
R222	63-9922	15K OHM ±5% 1/4W (ALT 62-10184±10% 1/4W)
R223	63-9921-72	1K OHM ±5% 1/4W (ALT 63-10183-72±10% 1/4W)
R224	63-9921-60	330 OHM ±5% 1/4W (ALT 63-10183-60±10% 1/4W)
R225	63-4171	470 OHM ±10% 1/4W
R226	63-9922-32	330K OHM ±5% 1/4W (ALT 63-10184-32±10% 1/4W)
R227	63-9921-84	3.3K OHM ±5% 1/4W (ALT 63-10183-84±10% 1/4W)
R228	63-9921-78	1.8K OHM ±5% 1/4W (ALT 63-10183-78±10% 1/4W)
R229	63-9921-98	12K OHM ±5% 1/4W (ALT 63-10183-98±10% 1/4W)
R230	63-9921-96	10K OHM ±5% 1/4W (ALT 63-10183-96±10% 1/4W)
R231	63-9921-46	82 OHM ±5% 1/4W (ALT 63-10183-46±10% 1/4W)
R232	63-4290	330K OHM ±10% 1/4W
R301	63-9924-56	3.3 MEG OHM ±10% 1/4W (ALT 63-10184-56 ±10% 1/4W)
R302	63-9922-32	330K OHM ±5% 1/4W (ALT. 63-10182-32±5% 1/4W)
R303	63-9922-34	390K OHM ±5% 1/4W (ALT 63-10184-34±10% 1/4W)
R304	63-9922-24	150K OHM ±5% 1/4W (ALT 63-10184-24±10% 1/4W)
R305	63-9922-34	390K OHM ±5% 1/4W (ALT 63-10184-34±10% 1/4W)
R306	63-9922-36	470K OHM ±5% 1/4W (ALT 63-10182-36±5% 1/4W)
R307	63-9922-10	39K OHM ±5% 1/4W (ALT 63-10184-10±10% 1/4W)
R308	63-10651-04	10K OHM MUTE ADJUST
R309	63-9922-20	100K OHM ±5% 1/4W (ALT 63-10184-20±10% 1/4W)
R310	63-9922-20	100K OHM ±5% 1/4W (ALT 63-10184-20±10% 1/4W)
R311	63-9922-16	68K OHM ±5% 1/4W (ALT 63-10182-16±5% 1/4W)
R312	63-9921-88	4.7K OHM ±5% 1/4W (ALT 63-10183-88±10% 1/4W)
R313	63-9921-88	4.7K OHM ±5% 1/4W (ALT 63-10183-88±10% 1/4W)
R314	63-9921-46	82 OHM ±5% 1/4W (ALT 63-1018146±5% 1/4W)
R315	63-9921-72	1K OHM ±5% 1/4W (ALT 63-10183-72±10% 1/4W)
R316	63-10311-99	13K OHM ±5% 1/4W
R317	63-10651-03	5K PHASE LOCKED LOOP ADJUST
R318	63-9922-12	47K OHM ±5% 1/4W (ALT 63-10184-12±10% 1/4W)
R319	63-9921-94	8.2K OHM ±5% 1/4W (ALT 63-10181-94±5% 1/4W)
R320	63-9922-16	68K OHM ±5% 1/4W (ALT 63-10184-16±10% 1/4W)
R321	63-9922-10	39K OHM ±5% 1/4W (ALT 63-10184-10±10% 1/4W)
R322	63-9921-94	8.2K OHM ±5% 1/4W (ALT 63-10181-94±5% 1/4W)
R323	63-9922-10	39K OHM ±5% 1/4W (ALT 63-10184-10±10% 1/4W)
R324	63-4308	820K OHM ±10% 1/4W
R325	63-4308	820K OHM ±10% 1/4W
R401	63-9922-30	270K OHM ±5% 1/4W (ALT 63-7887±10% 1/2W)
R403	63-9922-26	180K OHM ±5% 1/4W (ALT 63-7880±10% 1/2W)
R404	63-9922-32	330K OHM ±5% 1/4W (ALT 63-7890±10% 1/2W)
R405	63-9922-06	27K OHM ±5% 1/4W (ALT 63-7845±10% 1/2W)
R407	63-9921-78	1800 OHM ±5% 1/4W (ALT 63-7796±10% 1/2W)
R408	63-9922-08	33K OHM ±5% 1/4W (ALT 63-7848±10% 1/2W)
R410R, R410L	63-10189-02	50K OHM DUAL LOUDNESS CONTROL (ALT 63-10189)
R411	63-9922-44	1 MEG OHM ±5% 1/4W (ALT 63-7911±10% 1/2W)
R412	63-9921-88	4.7K OHM ±5% 1/4W (ALT 63-7813±10% 1/2W)
R413	63-9921-68	680 OHM ±5% 1/4W (ALT 63-7778±10% 1/2W)
R414	63-9922-02	18K OHM ±5% 1/4W (ALT 63-7838±10% 1/2W)
R415R, R415L	63-8982-02	100K OHM DUAL BASS CONTROL (ALT 63-8982)
R416	63-9921-90	5.6K OHM ±5% 1/4W (ALT. 63-7817±10% 1/2W)
R417R, R417L	63-8983-02	50K OHM DUAL TREBLE CONTROL (ALT 63-8983)
R418	63-9922-04	22K OHM ±5% 1/4W (ALT. 63-7841±10% 1/2W)
R420	63-8981-02	250K OHM BALANCE CONTROL (ALT. 63-8981)
R421	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-7869±10% 1/2W)
R422	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-7868±5% 1/2W)
R423	63-9922-24	150K OHM ±5% 1/4W (ALT 63-7875±5% 1/2W)
R424	63-9921-50	120 OHM ±5% 1/4W (ALT. 63-7747±10% 1/2W)
R425	63-9921-92	6800 OHM ±5% 1/4W (ALT. 63-7820±10% 1/2W)
R426	63-9921-82	2700 OHM ±5% 1/4W (ALT. 63-7803±10% 1/2W)
RX427■	63-9921-86	3900 OHM ±5% 1/4W (ALT. 63-7809±5% 1/2W)
R429	63-9921-88	4700 OHM ±5% 1/4W (ALT. 63-7812±5% 1/2W)
R430	63-9921-70	820 OHM ±5% 1/4W (ALT 63-7782±10% 1/2W)
R431	63-8328	300 OHM BIAS ADJUST
RX437■	63-10444-22	.82 OHM ±10% 5W
RX438■	63-4511	1.8 OHM ±5% 1/2W
RX439■	63-10565-24	10 OHM ±5% 1/2W
R440	63-9946-76	1500 OHM ± 1/2W (ALT 63-7792±10% 1/2W)
R443	63-1757	220 OHM ±10% 1/2W
R451	63-9922-30	270K OHM ±5% 1/4W (ALT 63-7887±10% 1/2W)
R453	63-9922-26	180K OHM ±5% 1/4W (ALT. 63-7880±10% 1/2W)
R454	63-9922-32	330K OHM ±5% 1/4W (ALT 63-7890±10% 1/2W)
R455	63-9922-06	27K OHM ±5% 1/4W (ALT 63-7845±10% 1/2W)
R457	63-9921-78	1800 OHM ±5% 1/4W (ALT 63-7796±10% 1/2W)
R458	63-9922-08	33K OHM ±5% 1/4W (ALT 63-7848±10% 1/2W)
R461	63-9922-44	1 MEG OHM ±5% 1/4W (ALT. 63-7911±10% 1/2W)
R462	63-9921-88	4.7K OHM ±5% 1/4W (ALT 63-7813±10% 1/2W)
R463	63-9921-68	680 OHM ±5% 1/4W (ALT 63-7778±10% 1/2W)
R464	63-9922-02	18K OHM ±5% 1/4W (ALT 63-7838±10% 1/2W)
R466	63-9921-90	5.6K OHM ±5% 1/4W (ALT. 63-7817±10% 1/2W)
R468	63-9922-04	22K OHM ±5% 1/4W (ALT 63-7841±10% 1/2W)
R471	63-9922-20	100K OHM ±5% 1/4W (ALT. 63-7869±10% 1/2W)
R474	63-9921-50	120 OHM ±5% 1/4W (ALT 63-7747±10% 1/2W)
R475	63-9921-92	6800 OHM ±5% 1/4W (ALT. 63-7820±10% 1/2W)
R476	63-9921-82	2700 OHM ±5% 1/4W (ALT. 63-7803±10% 1/2W)
RX477■	63-9921-86	3900 OHM ±5% 1/4W (ALT. 63-7809±5% 1/2W)
R479	63-9921-88	4700 OHM ±5% 1/4W (ALT. 63-7812±5% 1/2W)
R480	63-9921-70	820 OHM ±5% 1/4W (ALT 63-7782±10% 1/2W)
R481	63-8328	300 OHM BIAS ADJUST
RX487■	63-10444-22	.82 OHM ±10% 5W
RX488■	63-4511	1.8 OHM ±5% 1/2W
RX489■	63-10565-24	10 OHM ±5% 1/2W
R490	63-9946-76	1500 OHM ±5% 1/2W (ALT 63-7792±10% 1/2W)
R493	63-1757	220 OHM ±10% 1/2W
RX501■	63-1701	10 OHM ±10% 1/2W
RX502■	63-4536	6.8 OHM ±10% 1/2W
RX503■	63-1701	10 OHM ±10% 1/2W
RX504■	63-10526-01	2.2 MEG OHM ±20% 1/2W
RX505■	63-10449-86	390 OHM ±5% 7W
RX506■	63-10451-84	330 OHM ±10% 7W
R507	63-10428-75	130 OHM ±5% 3W
R508	63-9921-36	33 OHM ±5% 1/4W (ALT 63-7722±10% 1/2W)
R509	63-9921-36	33 OHM ±5% 1/4W (ALT 63-7722±10% 1/2W)
R510	63-9946-28	15 OHM ±5% 1/2W (ALT 63-7708±10% 1/2W)
R512	63-9921-78	1800 OHM ±5% 1/4W (ALT. 63-7796±10% 1/2W)
R513	63-9922-18	82K OHM ±5% 1/4W (ALT 63-7866±10% 1/2W)
R514	63-9922-04	22K OHM ±5% 1/4W (ALT 63-7841±10% 1/2W)
R701	63-9922-20	100K OHM ±5% 1/4W
R702	63-9921-72	1K OHM ±5% 1/4W
R703	63-7949	8.2 MEG OHM ±5% 1/2W
R704	63-9922-26	180K OHM ±5% 1/4W
R705	63-9921-90	5.6K OHM ±5% 1/4W
R706	63-9922-08	33K OHM ±5% 1/4W
R707	63-7952	10 MEG OHM ±5% 1/2W
R708	63-9922-54	2.7 MEG OHM ±5% 1/4W
R709	63-9922-24	150K OHM ±5% 1/4W
R710	63-9921-72	1K OHM ±5% 1/4W
R711	63-9921-88	4.7K OHM ±5% 1/4W
R712	63-9922-04	22K OHM ±5% 1/4W
R713	63-9921-90	5.6K OHM ±5% 1/4W
R751	63-9922-20	100K OHM ±5% 1/4W
R752	63-9921-72	1K OHM ±5% 1/4W
R753	63-7949	8.2 MEG OHM ±5% 1/2W
R754	63-9922-26	180K OHM ±5% 1/4W
R755	63-9921-90	5.6K OHM ±5% 1/4W
R756	63-9922-08	33K OHM ±5% 1/2W
R757	63-7952	10 MEG OHM ±5% 1/2W
R758	63-9922-54	2.7 MEG OHM ±5% 1/4W
R759	63-9922-24	150K OHM ±5% 1/4W
R760	63-9921-72	1K OHM ±5% 1/4W
CR1	103-47-01	AFC DIODE
CR202	103-23-01	GERMANIUM DIODE
CR203	103-23-01	GERMANIUM DIODE
CR205	103-23-01	GERMANIUM DIODE
CR301	103-142	SILICON DIODE
CR302	103-23-01	GERMANIUM DIODE
CR303	103-142-01	SILICON DIODE
CR401	103-145-01	SILICON DIODE
CR402	103-145-01	SILICON DIODE
CR403	103-145-01	SILICON DIODE
CR404	212-76	SILICON DIODE
CR451	103-145-01	SILICON DIODE
CR452	103-145-01	SILICON DIODE
CR453	103-145-01	SILICON DIODE
CR454	212-76	SILICON DIODE
CRX501■	212-76	SILICON RECTIFIER
CRX502■	212-76	SILICON RECTIFIER
CR505	103-256	ZENER DIODE
CR506	103-142-01	SILICON DIODE
CR507	103-142-01	SILICON DIODE
L1	20-3595	FM ANTENNA COIL
L2	20-3594	FM RF COIL
L3	20-1631	10.7 MHz TRAP COIL
L4	20-3545	FM OSCILLATOR COIL
L5	20-2033	10 MICROHENRY COIL
L101	A-6872	AM ANTENNA COIL ASSEMBLY
L102	149-311	FERRITE CORE SLEEVE
L103	IN T101	BC-RF TRANSFORMER
L104	149-311	FERRITE CORE SLEEVE
L105	IN T102	AM OSCILLATOR TRANSFORMER PRI.
L106	IN T102	AM OSCILLATOR TRANSFORMER SEC.
L107	149-311	FERRITE CORE SLEEVE
L201	IN T201	1ST IF TRANSFORMER 10.7 MHz PRI.
L202	IN T201	1ST IF TRANSFORMER 10.7 MHz SEC.
L203	IN T202	1ST IF AM 455KHz PRI.
L204	IN T202	1ST IF AM 455KHz SEC.
L205	20-3702	10.7 MHz QUAD DETECTOR COIL
L206	20-2033	10 MICROHENRY COIL
L207	IN T203	2ND IF AM 455 KHz PRI.
L208	IN T203	2ND IF AM 455 KHz SEC.
L209	IN T204	3RD IF AM 455 KHz PRI.
L210	IN T204	3RD IF AM 455 KHz SEC.
L401	20-3824	CHOKE COIL 20 MICROHENRY
L451	20-3824	CHOKE COIL 20 MICROHENRY
L501	20-2033	10 MICROHENRY COIL
T101	95-2750	BC RF TRANSFORMER
T102	95-2544	AM OSCILLATOR TRANSFORMER
T201	95-2753	FM IF TRANSFORMER 10.7 MHz
T202	95-2751	AM 1ST IF 455 KHz
T203	95-2752	AM 2ND IF 455 KHz
T204	95-2689	AM 3RD IF 455 KHz
TX501■	95-3198-02	POWER TRANSFORMER
TX502■	95-3393	CHOKE (SK2599P ONLY)
FX501■	136-117-21	1.25 SLO-BLO FUSE
FX502■	136-114-20	2 AMP REGULAR BLOW FUSE
IC201	221-89	F.M. IF GAIN BLOCK
IC202	221-90	F.M. IF LIMITER-QUAD DETECTOR
IC301	221-91	MULTIPLEX P L L DEMODULATOR
DS301	100-611	STEREO INDICATOR LIGHT
DSX501■	100-625	POINTER LIGHT
DSX502■	100-610	METER LIGHT
DSX503■	100-368-04	DIAL LIGHT
DSX504■	100-368-04	DIAL LIGHT
DSX505■	100-633	PILOT LIGHT
DSX506■	100-249	CABINET LIGHT
DSX507■	100-249	CABINET LIGHT
M1	122-72	TUNING METER
J1	78-2137-03	HEADPHONE JACK
PC	204-585	CIRCUIT BOARD, RF
PC	204-583	CIRCUIT BOARD, AUDIO
PC	204-586	CIRCUIT BOARD, POWER AMPLIFIER
PC	204-640	CIRCUIT BOARD, POWER SUPPLY
SW1	85-1474	BAND SWITCH
SWX2■	85-1458-01	POWER SWITCH
SW3	85-1446-01	FM MUTE SWITCH
SW4	85-1446-01	FM MUTE SWITCH
SW5	85-1447-01	LOW FILTER SWITCH
SW6	85-1447-01	HIGH FILTER SWITCH
SW7	85-1496	SPEAKER SWITCH
	224-1	CERAMIC FILTER, 10.64 MHz (BLACK)
	OR	
	224-1-01	CERAMIC FILTER, 10.67 MHz (BLUE)
	OR	
Y201	224-1-02	CERAMIC FILTER, 10.70 MHz (RED)
Y202	OR	
	224-1-03	CERAMIC FILTER, 10.73 MHz (ORANGE)
	OR	
	224-1-04	CERAMIC FILTER, 10.76 MHz (WHITE)
Q1	121-1024	FM-RF
Q2	121-613	FM CONVERTER
Q101	121-850	AM-RF
Q102	121-735	AM CONVERTER
Q201	121-950	AGC AMPLIFIER
Q202	121-950	AM 1ST IF
Q203	121-950	AM 2ND IF
Q301	121-603	MUTE BUFFER
Q302	121-950	MUTE AMPLIFIER
Q303	121-950	MUTE SWITCH
Q401	121-433	PRE-AMPLIFIER
Q402	121-433	AUDIO AMPLIFIER
Q403	121-1005	PRE-DRIVER
Q404	121-877	DRIVER
Q407	121-1013	OUTPUT DARLINGTON
Q408	121-1012	OUTPUT DARLINGTON
Q451	121-433	PRE-AMPLIFIER
Q452	121-433	AUDIO AMPLIFIER
Q453	121-1005	PRE-DRIVER
Q454	121-877	DRIVER
Q457	121-1013	OUTPUT DARLINGTON
Q458	121-1012	OUTPUT DARLINGTON
Q501	121-774	FM POWER SWITCH
Q502	121-768	FM POWER SWITCH
Q701	121-433	PRE-AMPLIFIER
Q702	121-433	PRE-AMPLIFIER
Q751	121-433	PRE-AMPLIFIER
Q752	121-433	PRE-AMPLIFIER
IC201	221-89	FM IF GAIN BLOCK
IC202	221-90	FM IF LIMITER QUAD. DETECTOR
IC301	221-91	MULTIPLEX P.L.L. DEMODULATOR
		■CRITICAL CIRCUIT COMPONENT

5225A2

MAGNETIC PREAMP CIRCUIT BOARD DRAWING APPEARS ON PAGE 33



AM/FM, RF, IF & FM MPX



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

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

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

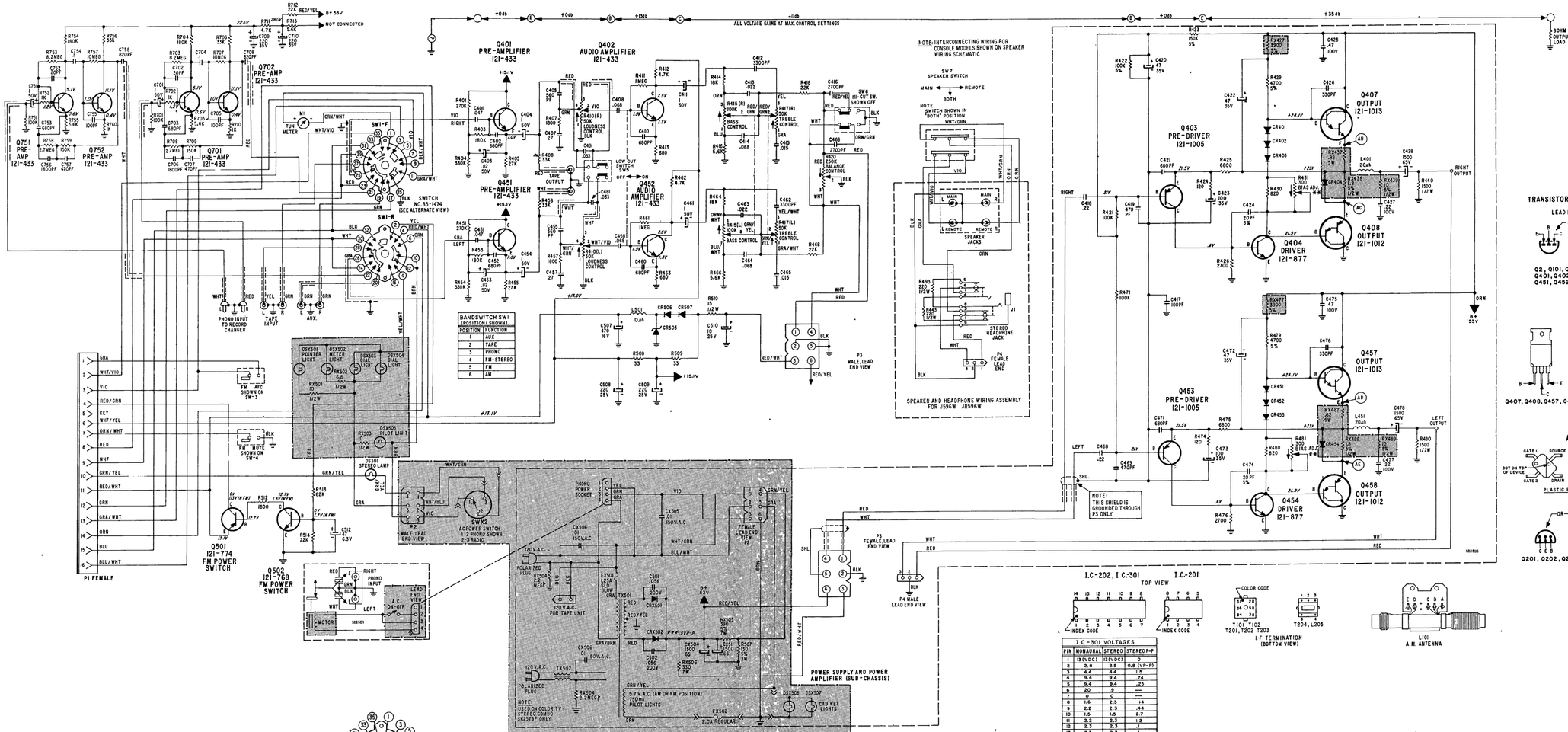
PIN 10-19 KHZ TEST POINT 2.7V P/P (10.0 MICROSEC.)

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

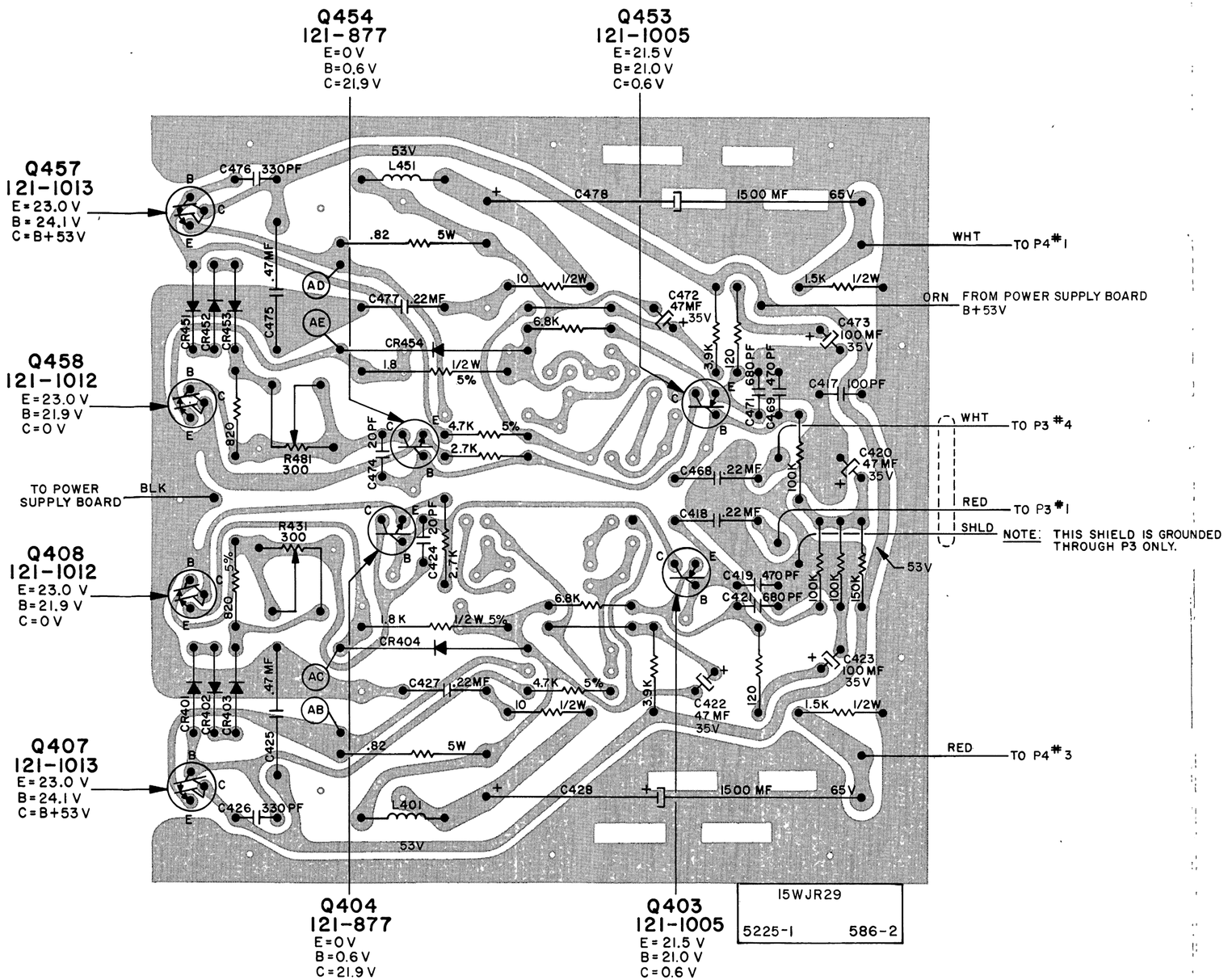
PINS 8 AND 9-FILTER-AMPLITUDE DETECTOR 0.47V P/P (0.5 MILLISEC.)

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

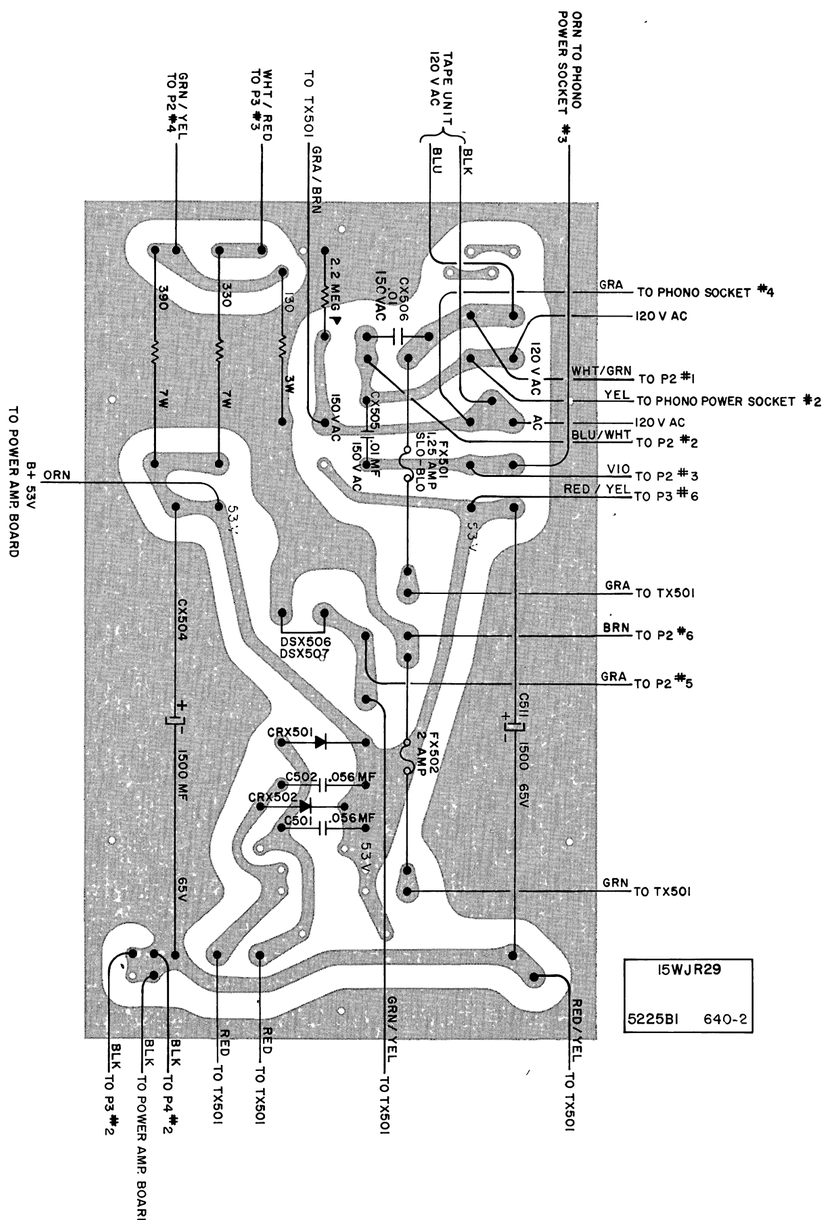
CHASSIS 15WJR29 – SCHEMATIC



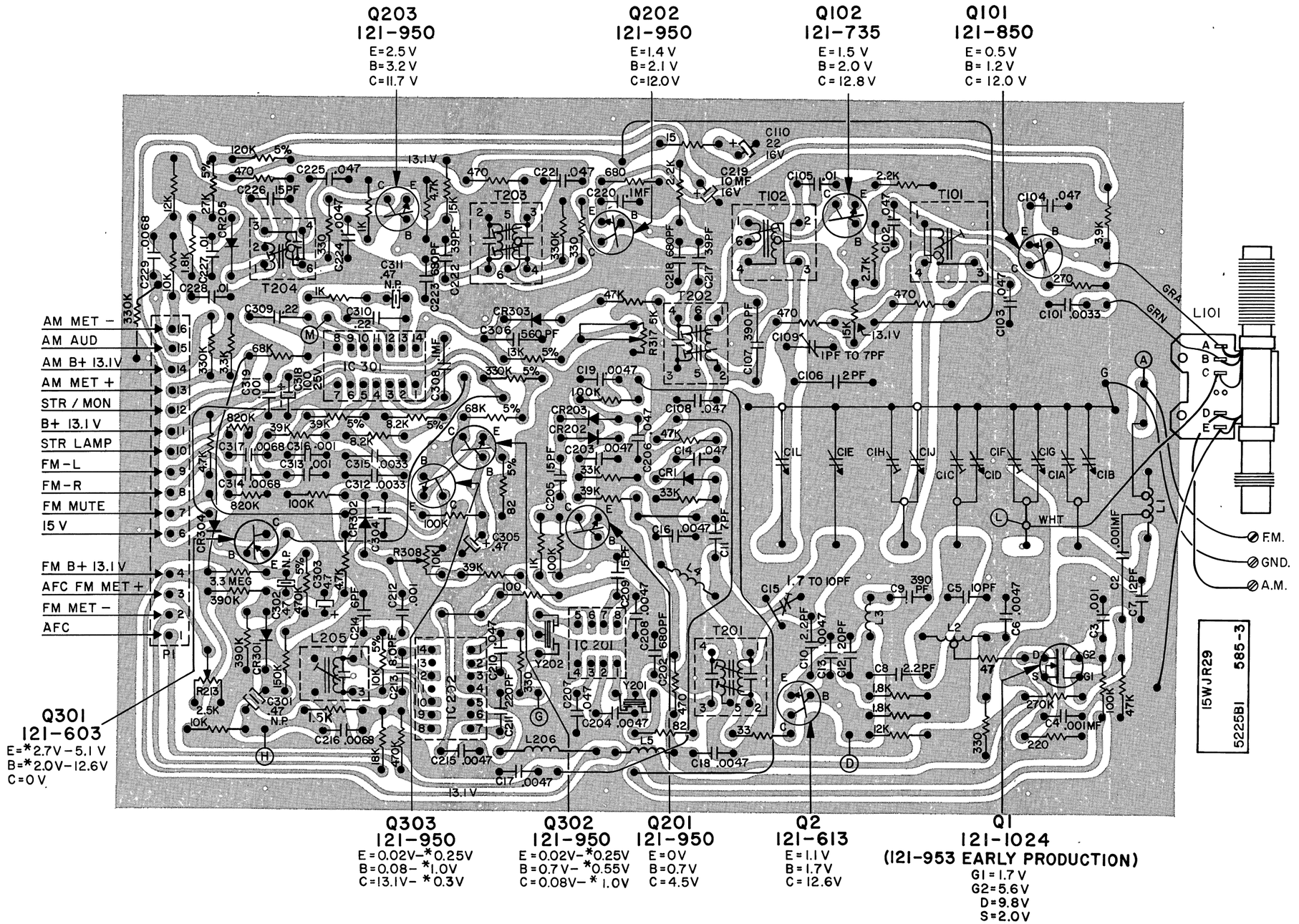
CHASSIS 15WJR29 – SCHEMATIC



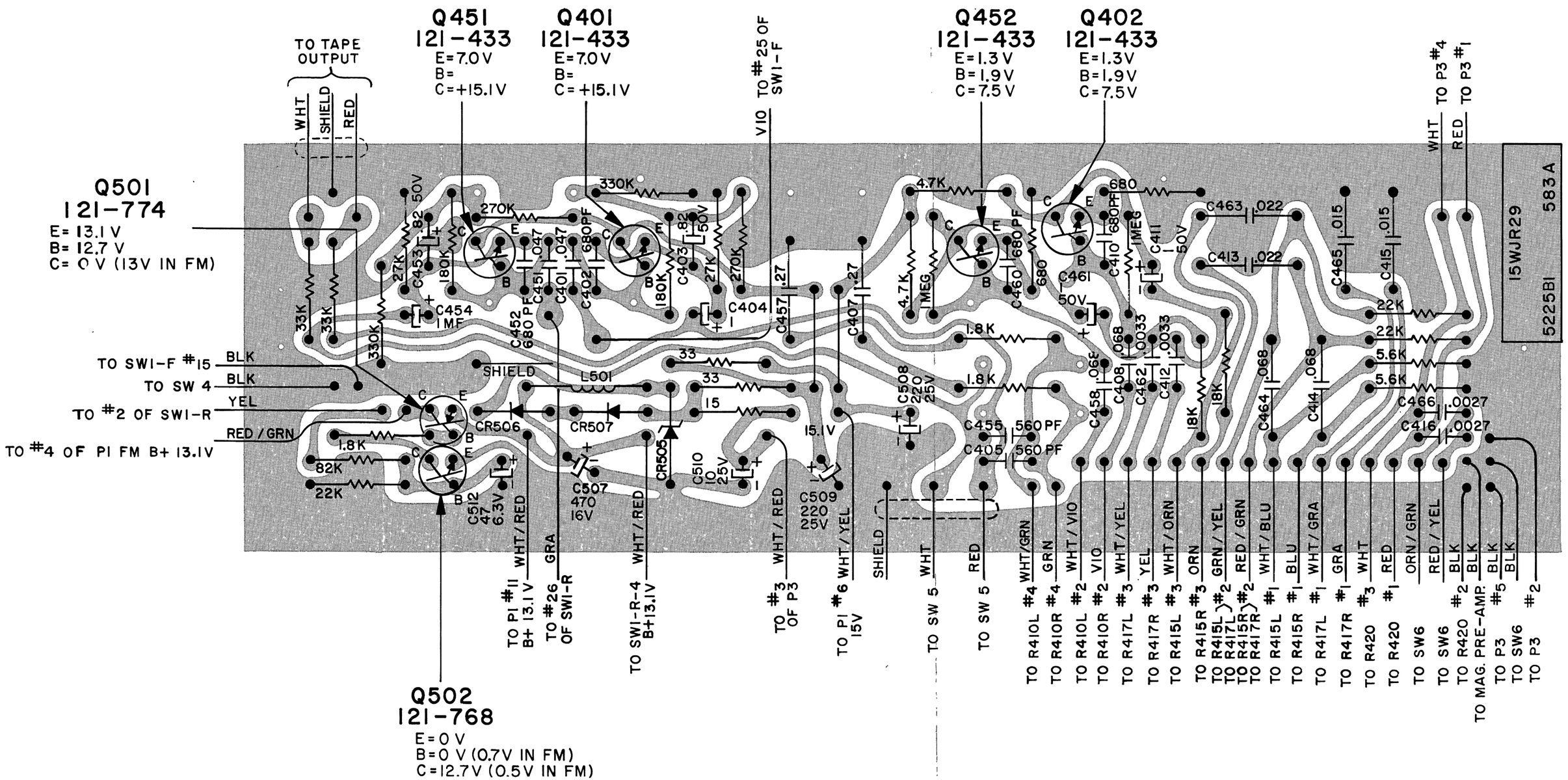
CHASSIS 15WJR29 – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – POWER AMPLIFIER



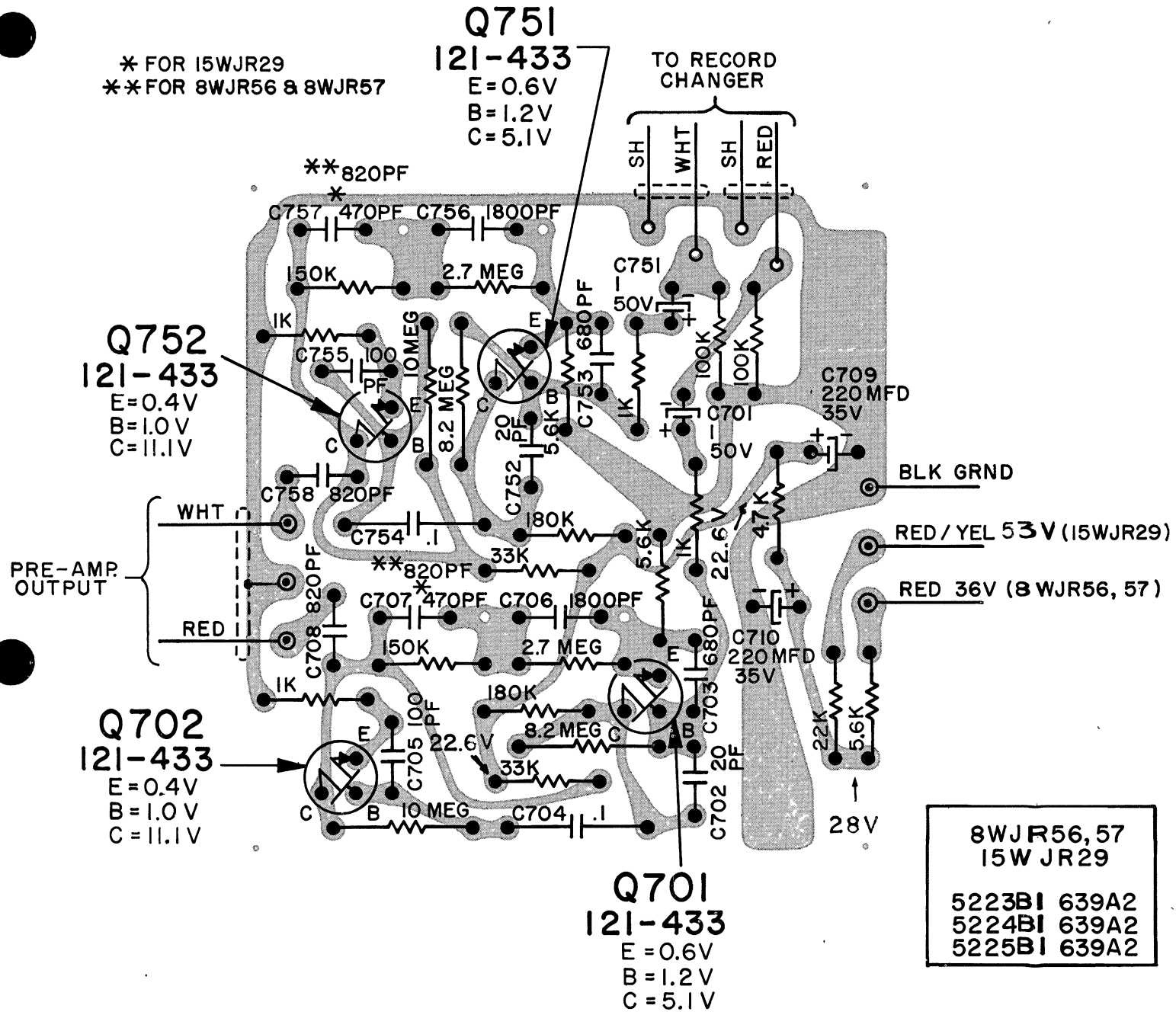
CHASSIS 15WJR29 – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – POWER SUPPLY



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



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



CHASSIS 15WJR29 – CHASSIS WIRING AND COMPONENTS
VIEWED FROM FOIL SIDE – MAGNETIC PHONO PREAMP