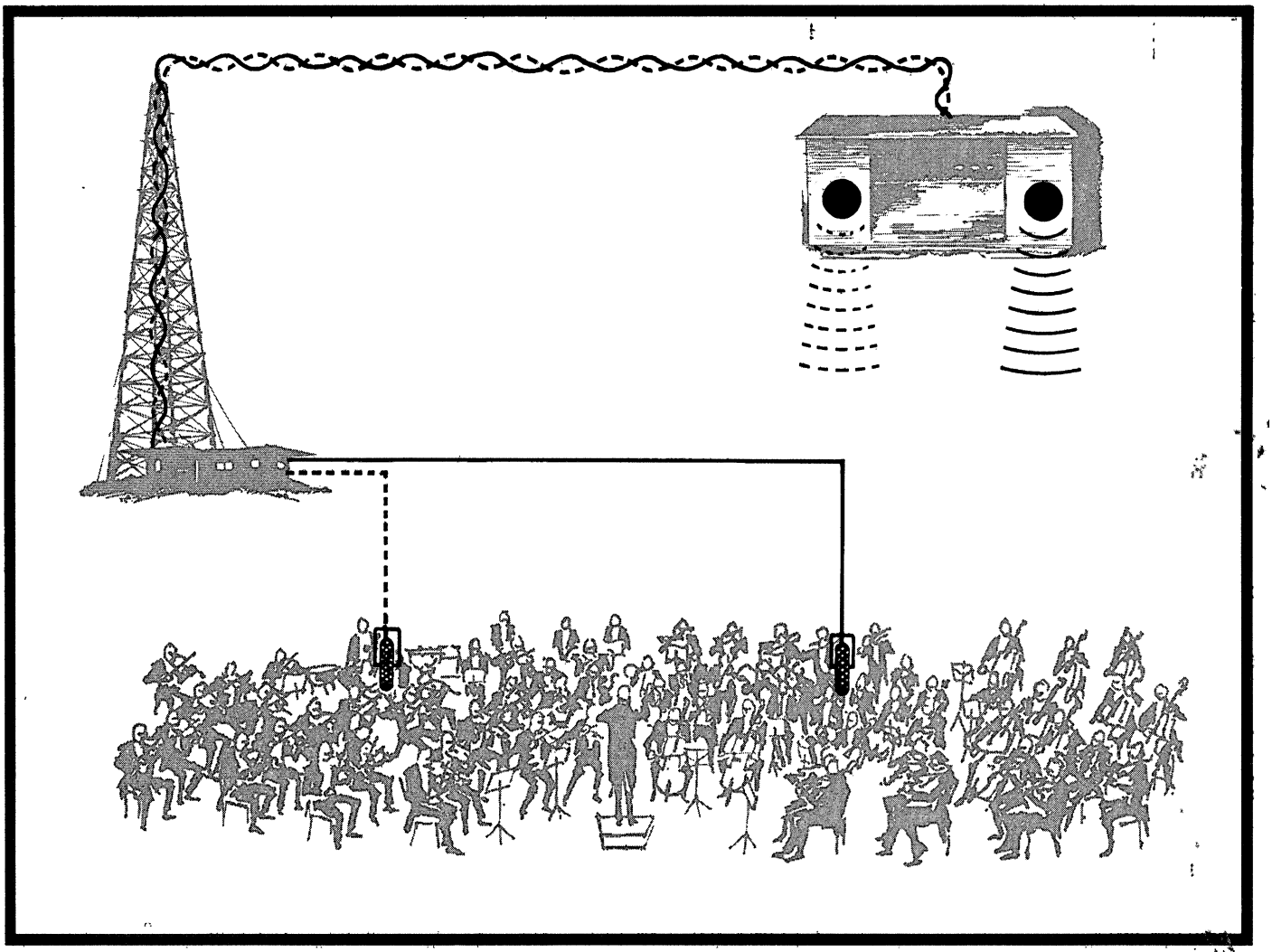
ZENITH®

SERVICE MANUAL



HIGH FIDELITY
AND STEREO FM MODELS

ZENITH RADIO CORPORATION

1900 N. AUSTIN AVENUE CHICAGO, ILLINOIS 60639

PRICE $1.50 HF 17 SUPPLEMENT #2 PART NO. 923-555

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NOTE: **CHASSIS COVERED IN THIS SERVICE MANUAL
*CHASSIS COVERED IN SERVICE MANUAL HF-17S (923-529)
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FEATURES OF HIGH FIDELITY & STEREO FM MODELS

CABINET					CHASSIS			SPEAKER		
MODEL	STYLE	MATERIAL	FINISH	COLOR	MODEL	TYPE	EIA POWER OUTPUT	PART NUMBER	VOICE COIL IMPEDANCE (IN OHMS)	SIZE (INCHES)
A555J	Table (W/handle)	Metal	Vinyl	Brown & Light Beige	10ZT38	Phono Only	10 W	49-1167 49-979	16 45	2–6 x 9 2–3½
A906W	Console (Lift Lid)	Wood W/Veneers	Wood	Walnut	20AT30Z	FM–AM Phono	16 W	49-1153 49-1094	16 45	2–6 x 9 2–3½
A907M	Console (Lift Lid)	Wood W/Veneers	Wood	Maple	20AT30Z	FM–AM Phono	16 W	49-1153 49-1094	16 45	2–6 x 9 2–3½
A908DE	Console (Lift Lid)	Wood W/Veneers	Wood	Dark Oak	20AT30Z	FM–AM Phono	16 W	49-1153 49-1094	16 45	2–6 x 9 2–3½
A908P	Console (Lift Lid)	Wood W/Veneers	Wood	Pecan	20AT30Z	FM–AM Phono	16 W	49-1153 49-1094	16 45	2–6 x 9 2–3½
A910W	Console (Lift Lid)	Wood W/Veneers	Wood	Walnut	20AT30Z	FM–AM Phono	16 W	49-1153 49-1094	16 45	2–6 x 9 4–3½

NOTES:

1. D–Diamond, S–Sapphire
2. Tape Input and Output may use Model Z634 Tape Cassette Player or Model Z635 Tape Cassette Player
3. Optional Remote Speaker Adapter Kit #S-74539 is available to permit use of Remote Speakers.

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

RECORD CHANGER				OTHER FEATURES			
TYPE	MOUNTING	CARTRIDGE	STYLUS NOTE 1	INDICATOR LIGHT	TAPE	RECORD STORAGE	REMOTE SPEAKER
169-365	Hinged Panel	142-166	D–S S-68567	NONE	NONE	NONE	NONE
169-361	Shelf	142-164	D–S 56-560	NONE	YES NOTE 2	YES	NOTE 3
169-361	Shelf	142-164	D–S 56-560	NONE	YES NOTE 2	YES	NOTE 3
169-361	Shelf	142-164	D–S 56-560	NONE	YES NOTE 2	YES	NOTE 3
169-361	Shelf	142-164	D–S 56-560	NONE	YES NOTE 2	YES	NOTE 3
169-367	Shelf	142-166	D–S S-68567	NONE	YES NOTE 2	YES	NOTE 3

RECORD CHANGER FEATURES

PART NO.	MFG.	BASE PLATE	TURN TABLE
169-361	(VM)	TREE BARK BROWN	LIGHT BEIGE
169-365	(VM)	GOLD	BLACK
169-367	(VM)	TREE BARK BROWN	LIGHT BEIGE

GENERAL INFORMATION

THEORY

For all theory and circuit operation of circuits covered in this manual, refer to Service Manual HF 17, (Zenith Part No. 923-521) and Service Manual HF 17, Supplement No. 1, (Zenith Part No. 923-529).

MULTIPLEX ALIGNMENT

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

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

More precise adjustment of the mute control can be made by using the SPTE-1 multiplex generator. This procedure is described in the multiplex alignment procedure included in this manual.

Zenith has designed and manufactured an SPTE-1 Multiplex Generator that can be used to properly align the multiplex portion of these receivers. The multiplex alignment procedure is included in later pages of this manual. The SPTE-1 Multiplex Generator is available at your Zenith Distributor.

ANTENNAS FOR STEREO FM

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

EXTERNAL FM ANTENNA

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

SIGNAL STRENGTH CHART

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

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

Chassis 20AT30Z - Test Point "C". Located between Transistors Q101 (A.M. Converter) and Q201 (1ST. I.F.).

Chassis 20AT30Z

Micro Volts Input	Reverse AGC Voltage at Test Point "C"
0	1.34
25	1.20
100	0.92
200	0.82
500	0.75
1K	* 0.71
5K	0.62
50K	0.13
100K	0.08

AUTOMATIC FREQUENCY CONTROL-AFC

These receivers feature an automatic frequency control which automatically keeps your receiver on the exact station frequency when you are tuned to an FM station. To utilize this feature tune the receiver as instructed and then turn the band switch to AFC position.

When the desired FM station is a weak station, adjacent in frequency to a strong station, the AFC may pull the tuning into the stronger station. Under these conditions, place the bandswitch in FM position and tune the receiver as instructed.

Tuning the receivers on the frequency modulation band will require more care than on the broadcast band. A hissing sound may be noted when tuning between Frequency Modulation stations. This is normal, and will disappear as the station is tuned in. After a station is located, the pointer should be moved back and forth over it until the point of quietest reception and best tone quality is found. Correct tuning is indicated by the disappearance of background noise.

SPEAKER PHASING

It is most important that coded speaker leads be connected to coded terminals on speakers for proper polarity within each speaker group. It is also then most important that the speaker groups be in phase with each other. One excellent method is to play a monaural record with the volume of each speaker group equal.

Under these conditions the sound should appear to come from a point midway between the two speaker groups. If the sound comes from any other point than midpoint, then one speaker group is out of phase with the other and you should check polarity. One of the easiest methods of checking polarity within the speaker group is to momentarily place a 4½ volt battery across the speaker feed terminals. All the speaker cones should simultaneously move in the same direction.

POWER AMPLIFIERS

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

1. Each channel of the 8ZT20, 10ZT38 and 20AT30Z 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.)

2. When a power transistor is replaced the insulator (when used) between the transistor and the heat sink should also be replaced. On chassis 8ZT20 apply Dow Corning No. 340 heat conductive grease all around the transistor, between the transistor and clamp on the chassis.

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.

CIRCUIT BOARD COMPONENT IDENTIFICATION

As a special feature to aid the Service Technician, Zenith has identified the location of components which are mounted on certain circuit boards. This information is printed on the circuit boards and also appears on the schematic. Zenith has also prepared a two-color drawing of the foil side of the circuit board showing the relationship between the components and the foil. This will aid the Technician in quickly tracing circuits, as not only are the components shown, but also the voltages at various check points. Components are identified by a letter/number combination. A letter prefix to indicate the type of component: C=Capacitor, L=Coil, R=Resistor, CR=Diode, etc. The numbers are assigned in blocks to identify the circuit, in which it is used, as follows.

Block	Stage	Example
1 - 99	FM Tuner	R1, C1, L1.
101 - 199	AM Tuner	R101, C101, L101.
201 - 299	IF	R201, C201, L201.
301 - 399	Multiplex	R301, C301, L301.
401 - 449	Audio, Right Channel	R401, C401, L401.
451 - 499	Audio, Left Channel	R451, C451, L451.
501 - 599	Power Supply	R501, C501, L501.

CIRCUIT BOARD SERVICING

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

1. Good pair of long-nose pliers.
2. Sharp wire cutters.
3. Small stiff glue brush (for solder removal).
4. Pencil type soldering iron with a small tip (25 watts or less).

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

5. Tin leads on component before soldering.
6. Use only solder with an extremely low melting point, (60% Tin, 40% Lead).
7. Metal pick (soldering aid).

COMPONENT REPLACEMENT

Resistors and capacitors should be replaced by clipping out the defective part and neatly soldering in the new part. If a unit, such as the oscillator coil or I.F. transformer is to be removed, heat the mounting lugs with a pencil type soldering iron and move them away from the soldered connection with a long-nose pliers or metal pick. Continue heating the lugs and brush away the molten solder with a small stiff glue brush. Remove the defective unit before lifting it off the chassis. Before inserting the new unit, be certain that the lug holes are open and free from solder. Forcing a lug against a solder filled lug hole may break the bond between the chassis base and the wiring foil. It is, therefore, necessary to exercise care when replacing units.

An open or damaged section of circuit board wiring foil can be repaired by soldering a short jumper wire across the points to be connected. When soldering the low voltage electrolytics, transistors and diodes, the wire should be held with a pair of long nose pliers. The long nose pliers will act as a heat sink.

SIGNAL TRACING

A technique used in radio commonly known as "Screw driver testing" in which the B plus at the plate of the tube or collector of a transistor is shorted to ground to check for "clicks" in the speaker, is definitely not recommended. This practice would be comparable to shorting the collector of a transistor to ground which could damage the transistor. Standard point to point signal checking with the proper RF, IF and audio signals, should only be used.

RESISTANCE MEASUREMENTS

When making resistance measurements in the circuit, it is most important to remove any transistors in the circuit under test for accuracy in readings. Incorrect or inaccurate resistance measurements are the result of a transistor acting as a diode and conducting.

When making measurements across an electrolytic capacitor, be certain the ohm meter leads are correctly polarized. Also, be certain the battery voltage of the meter does not exceed the working voltage of the capacitor; the capacitor may otherwise be damaged.

FM, RF, AND IF ALIGNMENT

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

Because of the wide band pass required in the multiplex FM tuner, it is desirable to use an FM signal generator having a deviation of 400 KHz with a sweep rate of 60 hertz as well as an oscilloscope when aligning both the IF and RF FM portions of this receiver. It is not only necessary to obtain maximum amplitude in the IF amplifier stages, but also necessary to maintain symmetry. To help achieve this symmetry, it is desirable to have 10.6, 10.7 and 10.8 megahertz markers in obtaining IF curve symmetry.

The condenser mentioned further on in the alignment procedure should be as small as possible and the ground lead of the generator must be connected to the chassis at the base of the socket, where the signal is being injected. Should the signal, be injected at some point other than a socket, then the ground lead should be connected to ground as closely as possible to this point.

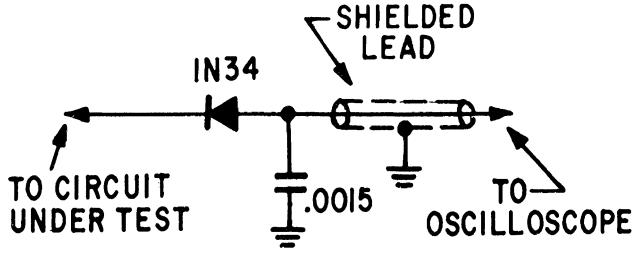
In all alignment procedures, the signal generator output should be kept just high enough to obtain an indication. This is most necessary, since on some chassis we have a zero time constant limiter which will clip the signals if their magnitude is too great, resulting in erroneous waveforms.

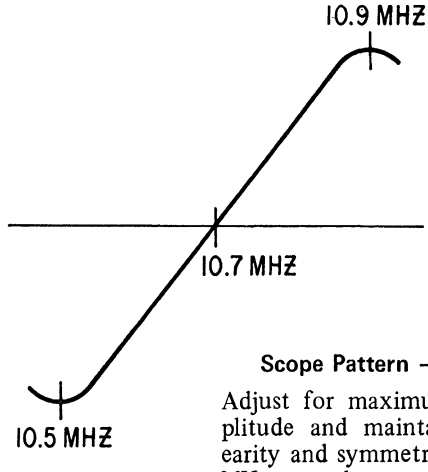
In the following alignment procedure chart there are letters appearing in the operation column in addition to the number. These letters indicate the test point to which the hot lead of the scope is to be connected as follows:

A. Connect to Ratio Detector Test Point "H".

B. Connect to the last FM IF Test Point "G".

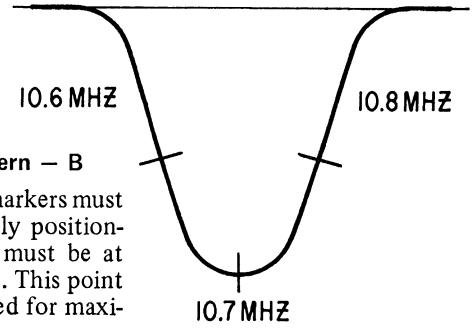
A detector probe is required. If your oscilloscope is not equipped with this probe, it can easily be constructed. For best results, this probe should be shielded.





Scope Pattern — A

Adjust for maximum amplitude and maintain linearity and symmetry. 10.7 MHz must be on curve at base line.



Scope Pattern — B

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

AM ALIGNMENT

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

Normally the Oscillator, RF and Mixer Coils and Transformers will not require adjustment unless they have been replaced or misaligned. If alignment becomes necessary the Oscillator Coil should be adjusted at 535KHz with the tuning gang closed. Adjust the RF and Mixer Transformers at 600KHz. These adjustments should be made after the corresponding trimmer adjustment shown in the alignment charts. Repeat the corresponding coil and trimmer adjustments for best results.

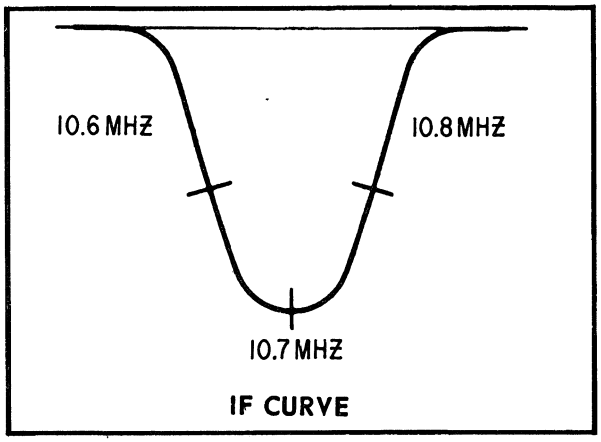
RF AND IF ALIGNMENT PROCEDURE FOR CHASSIS 20AT30Z

OPERATION	CONNECT GENERATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJUST	PURPOSE
NOTE: For AM Alignment Use A Signal With 400 Hertz Modulation							
1 C	One turn loosely coupled to wavemagnet		455 KHz	BC	600 KHz	L203, L204, L207, L210	Align IF channel for maximum output
2 C			1600 KHz	BC	1600 KHz	C1G	Set oscillator to dial scale
3 C			600 KHz	BC	600 KHz	L103	
4 C			Repeat Operations No. 2 & 3				
5 C			1500 KHz	BC	1400 KHz	C1D	Align antenna stage
NOTE: For FM Alignment Use A Signal With 400 KHz Deviation							
6 A	Term. No. 5 of T205 3rd IF Trans. Test Point "G"	47 ohm in shunt with gen. output. Then from hot lead a 27 ohm in series with a .001 MFD capacitor.	10.7 MHz	FM	Gang Closed	L212	Adjust Primary and Secondary of ratio detector for maximum amplitude and symmetry, as shown in Scope Pattern "A"
7 A			10.7 MHz	FM	Gang Closed	L214	
8 B	Term. No. 3 of T203 2nd IF Trans. Test Point "F"		10.7 MHz	FM	Gang Closed	L208 & L209	Align I.F. transformers for maximum output and symmetry. This pattern is not necessarily identical to the overall Scope Pattern "B"
9B	Term. No. 3 of T201 1st IF Trans. Test Point "E"		10.7 MHz	FM	Gang Closed	L205 & L206	
10B	Connect to Test Point "D"		10.7 MHz	FM	Gang Closed	L201 & L202	
11B			10.7 MHz	FM	Gang Closed	Readjust L201, L202, L205, L206, L208 & L209	Align I.F. transformers for maximum output and symmetry as indicated in Scope Pattern "B"
NOTE: In Steps 10B and 11B Generator ground Must Be Connected On Braid As Close To Gang As Possible							
12 B	FM Antenna Post (Remove Antenna) Test Point "A"	300 ohm	106 MHz	FM	106 MHz	C13	Set oscillator to dial scale
13 B			90 MHz	FM	90 MHz	L4	
14 B			Repeat Operations 12 B and 13 B				
15 B			106 MHz	FM	106 MHz	C1A	Align FM Detector stage for maximum
16 B			90 MHz	FM	90 MHz	L2 if necessary	
17 B			Repeat Operations 15 B and 16 B				

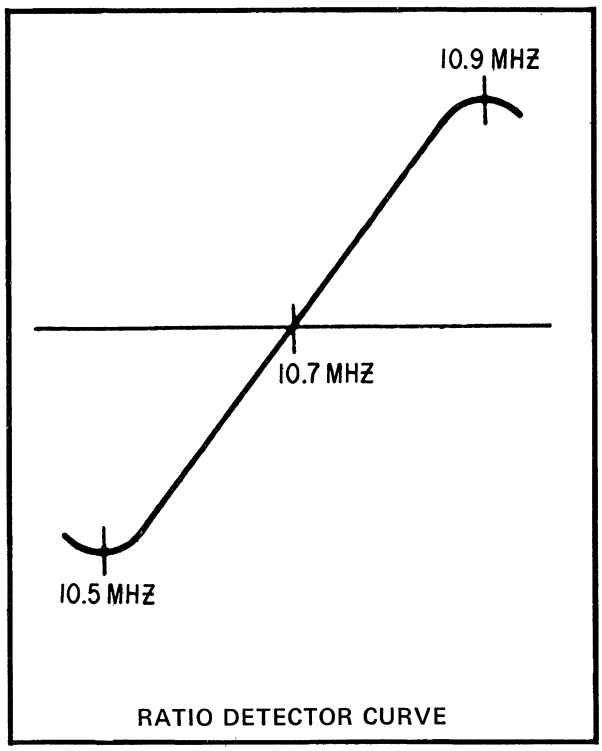
For A, B, C, See Page 8.

MULTIPLEX ALIGNMENT PROCEDURE

Using the Zenith FM multiplex signal generator, the multiplex portion of Zenith or any FM multiplex receiver can be aligned, but first before any attempt is made to do this it is necessary that the technician be certain that the RF, IF, and ratio detector alignment is correct, and that the receiver operates normally on monaural signals.



IF CURVE



RATIO DETECTOR CURVE

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

To help achieve this IF curve symmetry, 10.6 and 10.8 megahertz markers must be symmetrically positioned and the 10.7 megahertz marker must be at the center of the curve. When aligning the ratio detector 10.5 and 10.9 megahertz markers are desirable to achieve S curve symmetry. The pattern, illustrating marker use to obtain S curve symmetry, indicates it is most necessary to adjust for maximum gain and at the same time maintain linearity and symmetry. 10.7 megahertz must be on the curve at the reference line. 10.5 megahertz and 10.9 megahertz must be at the lower and upper turn of the S curve respectively. Only when the I.F. and ratio detector circuitry have been aligned in accordance with these specifications should the technician proceed to align the multiplex portion of the receiver.

Preliminary Procedures

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

The following procedure is only necessary when the generator has been received from the factory, or has been subjected to a great deal of handling or transportation vibration. Although the 19KHz pilot generator oscillator is extremely stable, there is always the possibility that it could shift from its precisely assigned frequency. As a result, we have a very simple method to check the 19KHz pilot frequency using an FM multiplex receiver and an FM multiplex station as a frequency standard. Proceed as follows:

1. Tune your FM multiplex receiver to an FM multiplex station and when the pilot indicator lights up, this indicates the 19KHz pilot amplifier is functioning. Since the 19KHz sine wave is from the transmitter it must be on frequency and can be used as a reference standard. With a cable connect the collector output of the 19KHz amplifier to the vertical input of a good oscilloscope.

2. On the multiplex generator set the pilot carrier amplitude control to 10%. Place L-R, L+R and 67KHz switches in OFF position and connect the composite output terminal directly to the horizontal input of the oscilloscope. On the oscilloscope you will see an oval Lissajous figure which should be motionless when the 19KHz output of the generator is synchronized with the 19KHz signal from the transmitter. Should the Lissajous figure rotate it will only be necessary to adjust the pilot carrier frequency trimmer on the multiplex generator with an IF alignment wrench until the Lissajous figure ceases to rotate. After the generator has been adjusted to zero beat, disconnect all cables.

The multiplex generator provides a composite multiplex signal as well as an RF signal, FM modulated by the composite multiplex signal.

The composite signal is very useful since it is an excellent tool that can be used in signal tracing the multiplex portion of the receiver. We do not recommend that multiplex alignment be made using only the composite signal injected at the output terminal of the ratio detector tertiary winding, since there is always some phase shift

occurring in the RF, IF or ratio detector circuits. As a result, multiplex alignment made by a signal injected at the ratio detector would not be correct. For proper multiplex alignment the composite signal must FM modulate the RF carrier and then be fed into the FM antenna terminals. With the signal injected in this manner the multiplex alignment would then be the best that could possibly be obtained and separation would be the maximum for this receiver.

The RF carrier in this generator is variable from 88 to 108MHz. The RF signal should be injected at a point in the FM band where no other signal is present. If at all possible this should be at a frequency near the middle of the FM band. Tune the FM receiver to this point and adjust the RF frequency adjusting slug on the generator to this same frequency. The AGC voltage developed in the receiver should be maximum. AGC voltage substantially less than this will indicate the RF frequency adjusting slug is tuned to an image.

19KHz Sub Carrier Amplifier, Doubler and Mute Adjustments

1. Turn generator 19KHz pilot carrier amplitude control to 10% position.
2. Connect the V.T.V.M. (DC scale) and/or scope to the junction of the two frequency doubling diodes and chassis (Test Point "N").
3. Place the stereo-monaural switch in stereo position and short Test Point "T" to ground.
4. Adjust the 19KHz amplifier transformer and the doubler transformer for maximum output. Simultaneously adjust the mute control so the voltage at the junction of the two frequency doubling diodes never exceeds -.2 volt during this operation. This voltage must be kept at a minimum for proper alignment. The three controls in this paragraph have an effect on each other. Should the stereo indicator light up, readjust the mute control to extinguish the lamp and continue adjustment of the transformers for maximum.
5. Remove ground from Test Point "T".
6. Turn generator pilot carrier amplitude control to 5% position.
7. Slowly rotate the mute control to a point where the stereo indicator lights up.

Separation Adjustments

1. Place stereo monaural switch in Stereo position.
2. Turn generator pilot carrier amplitude control to 10% position.
3. Move L-R and L+R generator switches from OFF position to L-R and L+R positions.
4. Connect a V.T.V.M. (AC scale) and/or scope to the L audio output, after the 38KHz filter.
5. Adjust the 38KHz detector transformer for maximum voltage at L output. The magnitude of this signal should be much greater than that at the R output. The voltage at the L output should be approximately 10 times or greater than at the R output.

TROUBLE-SHOOTING

Should a problem arise in aligning the FM multiplex portion of the receiver and the technician does not know whether the difficulty lies in the RF, IF, limiter and ratio detector portions of the receiver, or whether the difficulty lies in the multiplex portion, the multiplex generator can be used as an excellent signal tracing device to determine if the multiplex section of the receiver is functioning properly. The composite output of the multiplex generator can be injected at the output of the ratio detector.

To reduce possible extraneous signals coming through the ratio detector, short the ratio detector primary with a jumper lead. The wave forms and their magnitude may vary slightly from chassis to chassis, however, they are quite indictive of what will be seen when signal tracing the multiplex circuitry.

67KHz Signal Tracing

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

19KHz Signal Tracing

1. Move the 67KHz generator switch to OFF.
2. Rotate the generator 19KHz pilot carrier amplitude control to 10% position.
3. Sequentially connect your scope to the base of composite amplifier, base of 19KHz amplifier and collector of 19KHz amplifier. The amplitude of the 19KHz signal should greatly increase as you proceed along the 19KHz chain.

Doubler and Subcarrier Signal Tracing

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

Multiplex Detector Signal Tracing

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

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

PARTS LIST

NOTE: Certain circuit boards included in this parts list have component locations identified by item number on the circuit board. These item numbers are also shown on the schematic and in the following parts list – See HF 17 for more information.

CHASSIS 8ZT20

ITEM NO.	PART NO.	DESCRIPTION
C401	22-5507	22 PF 500 V 20% Disc
C402	22-3414	.0047 MF 25V 20% Disc
C403	22-3448	10 MF 15V Electrolytic
C404	22-5511	100 MF 20V Electrolytic
C405	22-3598	.022 MF 50V 20%
C406	22-5509	.22 MF 3V 20%
C407	22-5512	250 MF 15V Electrolytic
C451	22-5507	22PF 500V 20% Disc
C452	22-3414	.0047 MF 25V 20% Disc
C453	22-3448	10 MF 15V Electrolytic
C454	22-5511	100 MF 20V Electrolytic
C455	22-3598	.022 MF 50V 20%
C456	22-5509	.22MF 3V 20% Disc
C457	22-5512	250 MF 15V Electrolytic
C501	22-5511	100 MF 20V Electrolytic
C502	22-5511	100 MF 20V Electrolytic
C503	22-5475	500 MF 25V Electrolytic
R402A, R402B	*63-7638	Dual Tone Control
R407	*63-7637	Volume Control
R457	*63-7637	Volume Control
T501	95-2573	Output Power Transformer
CR-501	212-71	Silicon Rectifier
SP1	49-1138	Speaker (Z541)
SP2	49-1138	Speaker (Z541)
SP1	49-1147	Speaker (Z538)
SP2	49-1147	Speaker (Z538)
Q401	121-633	Transistor, Pre-Driver
Q402	121-632	Transistor, Driver
Q403, Q404	800-219	Transistors, Output - Matched Pair (Consists of one 121-640 and one 121-641)
Q451	121-633	Transistor, Pre-Driver
Q452	121-632	Transistor, Driver
Q403, Q404	800-219	Transistors, Output - Matched Pair (Consists of one 121-640 and one 121-641)
	11-183	A.C. Line Cord
	12-4901	Control Bracket (3 Required)
	17-135	Line Cord Clamp
	19-552	Clip - Heat Sink (2 Used on S-78037 & 4 Used On S-81069)
	23-23	Wire Connector
	43-519	Socket Contact Housing
	58-214	Connector Plug (2 Part of S-79177)
	63-1722	33 Ohm Resistor - ½W. 10% (2 Req'd.)
	63-1750	150 Ohm Resistor - ½W. 10% (3 Req'd.)
	63-1758	220 Ohm Resistor - ½W. 20% (2 Req'd.)
	63-1768	390 Ohm Resistor - ½W. 10% (2 Req'd.)
	63-1778	680 Ohm Resistor - ½W. 10% (2 Req'd.)
	63-1785	1000 Ohm Resistor - ½W. 10%
	63-1792	1500 Ohm Resistor - ½W. 10% (2 Req'd.)
	63-1813	4700 Ohm Resistor - ½W. 10% (2 Req'd.)
	63-1880	180K Ohm Resistor - ½W. 10% (2 Req'd.)
	63-1908	820K Ohm Resistor - ½W. 10% (2 Req'd.)
	63-1911	1 Meg Ohm Resistor - ½W. 10%
	63-1915	1.2 Meg Ohm Resistor - ½W. 10% (2 Req'd.)
	63-4529	4.7 Ohm Resistor - ½W. 10% (4 Required)
	79-174-12	No. 18 Sleeving - Yellow - 1½"
	86-334	Connector Terminal (3 Required)
	94-1527	Snap Bushing (Used on 11-183)
	114-802	8-18 x 5/16 x 1/4 Hex Washer Hd. Self-Tap Screw-Stat. Bronze (2 Used on S-81070)
	205-51	Dow Corning Heat Conductive Grease (Part of 800-219)
	S-78037	Chassis Control Panel Assem.
	S-79177	Phono Cable & Plug Assem.
	*S-81069	Chassis Bracket Assem.
	*S-81070	Bracket & Jack Assem.

CHASSIS 10ZT38

ITEM NO.	PART NO.	DESCRIPTION
C401	22-3034	.05 MFD Disc 25V
C403	22-5	100 PF Disc 500V
C404	22-3687	1 MFD Electrolytic 50V
C407	22-5634	.1 MFD Filmatic 200V
C409	22-5473	.056 MFD Filmatic 200V
C410	22-5637	.0047 MFD Filmatic 200V
C411	22-5632	.022 MFD Filmatic 200V
C412	22-3652	.1 MFD Disc 10V
C414	22-16	470 PF Disc 500V
C415	22-3687	1 MFD Electrolytic 50V
C417	22-2939	680 PF Disc 500V
C420	22-4568	100 MFD Electrolytic 15V
C422	22-3721	200 MFD Electrolytic 35V
C451	22-3034	.05 MFD Disc 25V
C453	22-5	100 PF Disc 500V
C454	22-3687	1 MFD Electrolytic 50V
C457	22-5634	.1 MFD Filmatic 200V
C459	22-5473	.056 MFD Filmatic 200V
C460	22-5637	.0047 MFD Filmatic 200V
C461	22-5632	.022 MFD Filmatic 200V
C462	22-3652	.1 MFD Disc 10V
C464	22-16	470 PF Disc 500V
C465	22-3687	1 MFD Electrolytic 50V
C467	22-2939	680 PF Disc 500V
C470	22-4568	100 MFD Electrolytic 15V
C472	22-3721	200 MFD Electrolytic 35V
C503	22-5362	1000 MFD Electrolytic 50V
C504	22-5475	500 MFD Electrolytic 25V
R402	63-1950	8.2 Megohm ½W. 10%
R405	63-1845	27K Ohm ½W. 10%
R407	63-1810	3900 Ohm ½W. 10%
R408(R), R408(L)	*63-8168	50K Dual Loudness Control
R409	63-1827	10K Ohm ½W. 10%
R411	63-1813	4700 Ohm ½W. 10%
R412(R), R412(L)	*63-7587	50K Dual Tone Control
R413	63-1897	470K Ohm ½W. 10%
R414	63-1789	1200 OHM ½W. 10%
R415	63-1740	82 OHM ½W. 10%
R416	63-1848	33K Ohm ½W. 10%
R417	63-1799	2200 Ohm ½W. 10%
R418	63-1827	10K Ohm ½W. 10%
R419	63-1761	270 Ohm ½W. 10%
R420	63-1768	390 Ohm ½W. 10%
R421	63-1708	15 Ohm ½W. 10%
R422	63-4505	1.2 Ohm ½W. 10%
R423	63-1932	3.3 Megohm ½W. 10%
R425	*63-7586	250 K Balance Control
R452	63-1950	8.2 Megohm ½W. 10%
R455	63-1845	27K Ohm ½W. 10%
R457	63-1810	3900 Ohm ½W. 10%
R459	53-1827	10K Ohm ½W. 10%
R461	63-1813	4700 Ohm ½W. 10%
R463	63-1897	470K Ohm ½W. 10%
R464	63-1789	1200 Ohm ½W. 10%
R465	63-1740	82 Ohm ½W. 10%
R466	63-1848	33K Ohm ½W. 10%
R467	63-1799	2200 Ohm ½W. 10%
R468	63-1827	10K Ohm ½W. 10%
R469	63-1761	270 Ohm ½W. 10%
R470	63-1768	390 Ohm ½W. 10%
R471	63-1708	15 Ohm ½W. 10%
R472	63-4505	1.2 Ohm ½W. 10%
R501	63-1796	1.8K Ohm ½W. 10%
CR401	103-145	Diode
CR451	103-145	Diode
CR501	212-71	Rectifier Diode
CR502	212-71	Rectifier Diode
A501	S-79577	A.C. Power Sub-Assy.
SP1	49-1167	Speaker 6 x 9

* DENOTES PARTS NOT PREVIOUSLY USED

ITEM NO.	PART NO.	DESCRIPTION
SP2	49-1167	Speaker 6 x 9
SP3	49-979	Speaker 3½
SP4	49-979	Speaker 3½
Q401	121-433	Transistor, Pre-Amplifier
Q402	121-430	Transistor, Pre-Driver
Q403	121-706	Transistor, Driver
Q404 Q405	800-270	Transistors, Output - Matched Pair (Consists of one 121-707 and one 121-708)
Q451	121-433	Transistor, Pre-Amplifier
Q452	121-430	Transistor, Pre-Driver
Q453	121-706	Transistor, Driver
Q454 Q455	800-270	Transistors, Output - Matched Pair (Consists of one 121-707 and one 121-708)
	12-4938	Chassis Bracket
	19-480	Cable Retaining Clip
	43-877	Three Contact Housing (Male)
	52-1481	Three Conductor Cable (Approx. 10")
	52-1483	Three Conductor Cable (Approx. 12")
	*52-1508	Two Conductor Shielded Lead (Part of S-80215)
	54-334	Tinnerman Speed Nut (1 Used on Ea. 114-1080)
	58-315	Connector Plug (2 Part of S-80215)
	83-6769	Chassis Control Panel Strip
	*83-6805	4 Lug Terminal Strip
	86-483	Terminal - Male (3 Required)
	*93-1833	Transistor Insulating Washer (2 Required)
	93-1834	Aluminum Washer (2 Required)
	*101-1288	Speaker Connection Label
	103-45	Diode (2 Required)
	114-801	8-18 x 5/16 x ¼ Hex Hd. Self-Tap. Screw-Stat. Bronze (2 Used on 83-6769 & 1 Used On 83-6805)
	114-1080	4-24 x 7/16 x 3/16 Hex Hd. Self-Tap. Screw-Stat. Bronze (1 Used on Ea. 800-270) (4 Required)
	212-71	Silicon Rectifier (2 Required)
	S-79559	Power Cable & Terminal Assem.
	*S-80215	Shielded Lead & Plug Assem.

CHASSIS 20AT30Z

CIA	22-5812	F.M. Detector Trimmer
CIB		F.M. Detector Tuning
CIC		F.M. Oscillator Tuning
CID		A.M. Antenna Trimmer
CIE		A.M. Antenna Tuning
CIF		A.M. Oscillator Tuning
CIG		A.M. Oscillator Trimmer
C2	22-2513	7PF Disc 500V
C3	22-2729	.001 MFD Disc 25V
C4	22-3792	17PF Disc 5% 500V
C5	22-3675	10PF Disc 5% 500V
C6	22-3393	.01 MFD Disc 25V
C7	22-3541	3.3PF Gimmick 5% 500V
C8	22-3558	16PF Disc 5% 500V
C9	*22-5879	3.3PF Disc ± .25PF 50V
C10	22-2729	.001 MFD Disc 25V
C11	*22-5878	5.5PF Disc ± .5PF 25V
C12	22-3034	.05 MFD Disc. 25V
C13	22-4855	1.7 to 10PF Ceramic Trimmer
C14	22-3393	.01 MFD Disc 25V
C102	22-3033	.02 MFD Disc 25V
C103	22-3034	.05 MFD Disc 25V
C104	22-3393	.01 MFD Disc 25V
C105	22-5480	390PF Mica 5% 100V
C201	22-3310	2.7PF Gimmick 500V
C202	22-5483	.0015 MFD Disc 500V
C203	22-3652	.1 MFD Disc 10V
C204	22-5481	560 PF Disc 500V
C205	22-3034	.05 MFD Disc 25V
C206	22-3791	42PF Disc 5% 500V

ITEM NO.	PART NO.	DESCRIPTION
C207	22-3310	2.7 PF Gimmick 500V
C208	22-3034	.05 MFD Disc 25V
C209	22-5482	680 PF Disc 500V
C210	22-5481	560 PF Disc 500V
C211	*22-3770	5.5 PF Disc 500V
C212	22-3034	.05 MFD Disc 25V
C213	22-2428	1.8 PF Gimmick 500V
C214	22-5482	680 PF Disc 500V
C215	22-3034	.05 MFD Disc 25V
C216	22-3080	.005 MFD Disc 25V
C217	22-2729	.001 MFD Disc 25V
C218	22-3177	390 PF Disc 500V
C219	22-3177	390 PF Disc 500V
C220	22-3896	5 MFD Electrolytic 25V
C221	22-5486	10 MFD Electrolytic 6V
C222	22-3415	.0068 MFD 25V
C223	22-3034	.05 MFD Disc 25V
C224	22-14	.0047 MFD 500V
C225	22-14	.0047 MFD 500V
C227	22-3034	.05 MFD Disc 25V
C301	*22-5780	270 PF Polystyrene 5% 500V
C302	*22-5781	1000 PF Polystyrene 5% 500V
C303	*22-5638	.47 MFD 100V
C304	22-5782	2200 PF Polystyrene 5% 500V
C305	22-2884	5 MFD Electrolytic 12V
C306	22-3393	.01 MFD Disc 25V
C307	22-5782	2200 PF Polystyrene 5% 500V
C308	*22-5781	1000 PF Polystyrene 5% 500V
C309	22-3393	.01 MFD Disc 25V
C310	*22-5781	1000 PF Polystyrene 5% 500V
C311	22-2884	5 MFD Electrolytic 12V
C312	22-3034	.05 MFD Disc 25V
C351	22-3034	.05 MFD Disc 25V
C401	22-3034	.05 MFD Disc 25V
C402	22-5487	.47 MFD Disc 3V
C403	22-5	100 PF Disc 500V
C404	22-2884	5 MFD Electrolytic 12V
C405	22-3255	330 PF Disc 500V
C406	22-2939	680 PF Disc 500V
C407	22-5639	.22 MFD 10% 100V
C408	*22-5814	.022 MFD 20% 100V
C409	*22-5815	.056 MFD 10% 100V
C410	22-18	.0022 MFD Disc 500V
C411	*22-5814	.022 MFD 20% 100V
C412	22-3652	.1 MFD Disc 10V
C414	22-16	470 PF Disc 500V
C415	22-3687	1 MFD Electrolytic 50V
C417	22-2939	680 PF 500V
C420	22-4568	100 MFD Electrolytic 15V
C422	22-3721	200 MFD Electrolytic 35V
C451	22-3034	.05 MFD Disc 25V
C452	22-5487	.47 MFD Disc 3V
C453	22-5	100 PF Disc 20% 500V
C454	22-2884	5 MFD Electrolytic 12V
C455	22-3255	330 PF Disc 500V
C456	22-2939	680 PF Disc 500V
C457	22-5639	.22 MFD 10% 100V
C458	*22-5814	.022 MFD 20% 100V
C459	*22-5815	.056 MFD 10% 100V
C460	22-18	.0022 MFD Disc 500V
C461	*22-5814	.022 MFD 20% 100V
C462	22-3652	.1 MFD Disc 10V
C464	22-16	470 PF Disc 500V
C465	22-3687	1 MFD Electrolytic 50V
C467	22-2939	680 PF Disc 500V
C470	22-4568	100 MFD Electrolytic 15V
C472	22-3721	200 MFD Electrolytic 35V
C501	22-4617	.01 MFD Disc 500V
C502	22-4617	.01 MFD Disc 500V
C503	22-5362	1000 MFD Electrolytic 50V
C504	22-4572	500 MFD Electrolytic 15V
C505	22-4572	500 MFD Electrolytic 15V
C506	22-3661	.05 MFD 100V
C510	22-2655	.01 MFD Disc Cap 1.4 K.V.

* DENOTES PARTS NOT PREVIOUSLY USED

ITEM NO.	PART NO.	DESCRIPTION
R1	63-1768	390 Ohm 10% ½W.
R2	63-4213	4.7K Ohm 10% ¼ W.
R3	63-1772	470 Ohm 20% ½W.
R4	63-1796	1.8K Ohm 10% ½W.
R5	63-4196	1.8K Ohm 10% ¼W.
R6	63-1831	12K Ohm 10% ½W.
R7	63-1898	470K Ohm 20% ½W.
R8	63-4122	33 Ohm 10% ¼W.
R9	63-1898	470K Ohm 20% ½W.
R10	63-1898	470K Ohm 20% ½W.
R101	63-1831	12K Ohm 10% ½W.
R102	63-1803	2.7K Ohm 10% ½W.
R103	63-1831	12K Ohm 10% ½W.
R104	63-1771	470 Ohm 10% ½W.
R105	63-1799	2.2K Ohm 10% ½W.
R201	63-1778	680 Ohm 10% ½W.
R202	63-1761	270 Ohm 10% ½W.
R203	63-1772	470 Ohm 20% ½W.
R204	63-1806	3.3K Ohm 10% ½W.
R205	63-1827	10K Ohm 10% ½W.
R206	63-1771	470 Ohm 10% ½W.
R207	63-1785	1K Ohm 10% ½W.
R208	63-1799	2.2K Ohm 10% ½W.
R209	63-1772	470 Ohm 20% ½W.
R210	63-4185	1K Ohm 10% ¼W.
R211	63-1775	560 Ohm 10% ½W.
R212	63-1772	470 Ohm 20% ½W.
R213	63-1778	680 Ohm 10% ½W.
R214	63-1778	680 Ohm 10% ½W.
R215	63-1813	4700 Ohm 10% ½W.
R216	63-1813	4700 Ohm 10% ½W.
R217	63-1799	2.2K Ohm 10% ½W.
R218	63-1869	100K Ohm 10% ½W.
R219	63-1841	22K Ohm 10% ½W.
R220	63-1785	1K Ohm 10% ½W.
R221	63-1834	15K Ohm 10% ½W.
R222	63-1785	1K Ohm 10% ½W.
R223	63-1904	680K Ohm 10% ½W.
R224	63-1898	470K Ohm 20% ½W.
R225	63-1799	2.2K Ohm 10% ½W.
R301	63-1855	47K OHM 10% ½W.
R302	63-1817	5.6K Ohm 10% ½W.
R303	63-1768	390 Ohm 10% ½W.
R304	63-1803	2.7K Ohm 10% ½W.
R305	63-1813	4.7K Ohm 10% ½W.
R306	63-1771	470 Ohm 10% ½W.
R307	63-1813	4.7K Ohm 10% ½W.
R308	63-6495	100K Mute Control
R309	63-1785	1K Ohm 10% ½W.
R310	63-1782	820 Ohm 10% ½W.
R311	63-1848	33K Ohm 10% ½W.
R312	63-1824	8.2K Ohm 10% ½W.
R313	63-1775	560 Ohm 10% ½W.
R314	63-1813	4.7K Ohm 10% ½W.
R315	63-1771	470 Ohm 10% ½W.
R317	63-6066	820 Ohm 10% 1W
R318	63-6045	270 Ohm 10% 1W
R401	63-1880	180K Ohm 10% ½W.
R403	63-1876	150K Ohm 10% ½W.
R404	63-1883	220K Ohm 10% ½W.
R405	63-1845	27K Ohm 10% ½W.
R406	63-1848	33K Ohm 10% ½W.
R407	63-1810	3.9K Ohm 10% ½W.
R408(R) R408(L)	63-7683	50K Dual Loudness Control
R409	63-1827	10K Ohm 10% ½W.
R410(R) R410(L)	*63-7682	100K Dual Bass Control
R411	63-1820	6.8K Ohm 10% ½W.
R412(R) R412(L)	*63-7681	Dual Treble Control
R413	63-1897	470K Ohm 10% ½W.
R414	63-1789	1200 Ohm 10% ½W.
R415	63-1740	82 Ohm 10% ½W.

ITEM NO.	PART NO.	DESCRIPTION
R416	63-1853	43K Ohm 5% ½W.
R417	63-1799	2200 Ohm 10% ½W.
R418	63-1827	10K Ohm 10% ½W.
R419	63-1768	390 Ohm 10% ½W.
R420	63-1768	390 Ohm 10% ½W.
R421	63-1708	15 Ohm 10% ½W.
R422	63-4501	1 Ohm 10% ½W.
R424	63-1835	15K Ohm 20% ½W.
R425	*63-7684	250K Balance Control & Switch
R451	63-1880	180K Ohm 10% ½W.
R453	63-1876	150K Ohm 10% ½W.
R454	63-1883	220K Ohm 10% ½W.
R455	63-1845	27K Ohm 10% ½W.
R456	63-1848	33K Ohm 10% ½W.
R457	63-1810	3.9K Ohm 10% ½W.
R459	63-1827	10K Ohm 10% ½W.
R461	63-1820	6.8K Ohm 10% ½W.
R463	63-1897	470K Ohm 10% ½W.
R464	63-1789	1200 Ohm 10% ½W.
R465	63-1740	82 Ohm 10% ½W.
R466	63-1853	43K Ohm 5% ½W.
R467	63-1799	2200 Ohm 10% ½W.
R468	63-1827	10K Ohm 10% ½W.
R469	63-1768	390 Ohm 10% ½W.
R470	63-1768	390 Ohm 10% ½W.
R471	63-1708	15 Ohm 10% ½W.
R472	63-4501	1 Ohm 10% ½W.
R501	63-5659	560 Ohm 10% 2W.
R502	63-1701	10 Ohm 10% ½W.
R503	63-1799	2.2K Ohm 10% ½W.
R506	63-1933	3.3 Megohm 20% ½W.
L1	*20-1744	FM Antenna Coil
L2	*20-1648	FM RF Coil
L3	20-1256	Trap Coil 10.7 MHZ
L4	*20-1649	FM Oscillator Coil
L5	20-2033	Peaking Coil
L101	*S-82104	AM Antenna Assembly
L102	149-311	Ferrite Core Sleeve
L103	IN T101	AM Oscillator Trans. Pri.
L104	IN T101	AM Oscillator Trans. Sec.
L201	IN T 201	1st IF Transformer 10.7 MHZ Pri.
L202	IN T201	1st IF Transformer 10.7 MHZ Sec.
L203	IN T202	1st IF AM 455 KHZ Pri.
L204	IN T202	1st IF AM 455 KHZ Sec.
L205	IN T203	2nd IF Transformer 10. 7 MHZ Pri.
L206	IN T203	2nd IF Transformer 10.7 MHZ Sec.
L207	IN T204	2nd IF AM 455 KHZ
L208	IN T205	3rd IF Transformer 10.7 MHZ Pri.
L209	IN T205	3rd IF Transformer 10.7 MHZ Sec.
L210	IN T206	3rd IF AM 455 KHZ Pri.
L211	IN T206	3rd IF AM 455 KHZ Sec.
L212	IN T207	Ratio Detector Trans. 10.7 MHZ Pri.
L213	IN T207	Ratio Detector Trans. 10.7 MHZ Tertiary
L214	IN T207	Ratio Detector Trans. 10.7 MHZ Sec.
L301	S-79435	67 KHZ Trap Coil
T101	95-2544	AM Oscillator Transformer
T201	95-2546	FM 1st IF Transformer 10.7 MHZ
T202	95-2541	AM 1st IF AM 455 KHZ
T203	95-2547	FM 2nd IF Transformer 10.7 MHZ
T204	95-2542	AM 2nd IF AM 455 KHZ
T205	95-2548	FM 3rd IF Transformer 10.7 MHZ
T206	95-2543	AM 3rd IF AM 455 KHZ
T207	95-2545	FM Ratio Detector 10.7 MHZ
T301	S-79438	Input Coil 19 KHZ
T302	S-79436	Doubler Coil 19 KHZ
T303	S-79437	Detector Coil 38 KHZ
T501	95-2698	Power Transformer
SWI	*85-1058	Band Switch
CRI	103-47	AFC Diode
CR101	103-74	Germanium Diode
CR201	103-23	Germanium Diode
CR202	103-90	Germanium Diodes (Matched Pair)
CR203	103-90	
CR204	103-23	Germanium Diode

* DENOTES PARTS NOT PREVIOUSLY USED

ITEM NO.	PART NO.	DESCRIPTION
CR301	103-23	Germanium Diodes
CR302	103-23	
CR303	103-23	Germanium Diodes
CR351	103-23	
CR401	103-145	Diode
CR451	103-145	Diode
CR501	212-71	Silicon Rectifier
CR502	212-71	Silicon Rectifier
CR503	103-96	Diode
Z301	*105-106	Integnet
PL1	100-249	Pilot Light No. 1847
PL2	100-249	Pilot Light No. 1847
PL3	*100-474	Stereo Indicator Light
Q1	121-612	Transistor, FM R.F.
Q2	121-613	Transistor, FM Conv.
Q101	121-714	Transistor, AM Conv.
Q201	121-614	Transistor, FM-AM 1st I.F.
Q202	121-546	Transistor, FM-AM 2nd I.F.
Q203	121-546	Transistor, FM 3rd I.F.
Q301	121-639	Transistor, Comp. Amp.
Q302	121-639	Transistor, 19KHZ Amp.
Q303	121-639	Transistor, 38 KHZ Amp.
Q304	121-639	Transistor, Stereo Indicator Switch
Q401	121-433	Transistor, Pre-Amplifier
Q402	121-430	Transistor, Pre-Driver
Q403	121-706	Transistor, Driver
Q404	121-710	Transistor, Output - NPN
Q405	121-709	Transistor, Output - PNP
Q451	121-433	Transistor, Pre-Amplifier
Q452	121-430	Transistor, Pre-Driver
Q453	121-706	Transistor, Driver
Q454	121-710	Transistor, Output - NPN
Q455	121-709	Transistor, Output - PNP
	*12-5166	Dial Background Mtg. Bracket
	*12-5169	Bandswitch & Tuning Bracket
	*12-5170	Control Mtg. Bracket
	17-143	Nylon Clamp (2 Required)
	19-448	Ground Clip (2 Required)
	*26-1575	Dial Scale
	43-571	Nine Contact Housing
	*46-7260	Bandswitch Knob
	*46-7261	Tuning Knob
	*46-7262	Control Knob - Loudness - Bass - Treble - Balance (4 Required)
	52-1425	Two Conductor Shielded Cable
	52-1443	Four Conductor Cable (Approx. 6")
	52-1529	Three Conductor Cable (Approx. 28")
	*52-1588	Two Conductor Shielded Lead
	*52-1589	Two Conductor Shielded Lead
	*52-1590	Two Conductor Shielded Lead
	*52-1591	Two Conductor Shielded Lead
	54-139	3/8-32 x 9/16 Palnut (5 Required)
	54-334	Tinnerman Speed Nut (1 Used on Ea. 114-591 (4 Required)
	54-522	Tinnerman Speed Nut
	54-804	Zip Twist Palnut (6 Used on S-82432)
	54-828	1/2" - 20 Palnut
	54-835	Tinnerman Nut (21 Required)
	58-214	Single Prong Plug (2 Required)
	*59-1016	Dial Pointer - FM
	*59-1017	Dial Pointer - AM
	64-288	Shoulder Rivet (1 Part of Ea. S-82399, & S-82401, 2 Part of S-82400) (4 Req'd.)
	*76-1902	Tuning Shaft
	*78-1866	Dial Light Socket & Wire
	*78-1867	Dial Light Socket & Wire
	*78-1868	Dial Light Socket & Wire
	80-1964	Tension Spring
	80-2066	Tension Spring
	*82-152	Oscillator Coil Grounding Strap
	*82-153	2nd I.F. Grounding Strap
	*82-154	3rd I.F. Grounding Strap
	83-3404	Three Lug Terminal Strip
	83-6636	Trim Strip (Part of S-82432)
	*83-6637	Trim Strip (Part of S-82432)
	*83-7196	Two Lug Terminal Strip
	*83-7197	Two Lug Terminal Strip
	*83-7233	Antenna Mtg. Strip
	86-357	Connector Terminal (2 Required)
	86-388	Connector Terminal (3 Required)
	86-390	Connector Terminal (9 Required)
	86-391	Connector Terminal (2 Required)
	86-398	Connector Terminal (19 Required)
	86-500	Terminal (20 Required)
	93-1833	Transistor Insulating Washer (2 Req'd.)
	94-1532	Nylon Shaft Bushing
	114-390	8-18 x 7/16 x 1/4 Hex Hd. Self-Tap. Screw-Stat. Bronze (6 Used on S-82432)
	114-591	4-24 x 3/8 x 3/16 Slotted Hex Hd. Self-Tap. Screw - Cadmium (1 Used on Ea. 121-709 & 121-710) (4 Required)
	114-801	8-18 x 5/16 Hex Hd. Self-Tap. Screw-Stat. Bronze (1 Mts. Ea. S-82399, 17-143 & 2 MT. Ea. S-82104, S-82400 & 12-5166, & 4 MTS. S-82401 & 2 Joins Ea. S-82401 & S-82399 & S-82401 & S-82400) (21 Req'd.)
	114-803	6-20 x 1/4 Hex Washer Hd. Self-Tap. Screw-Stat. Bronze (1 MTS. 83-7196)
	126-1336	Coil Shield
	*171-66	Stereo Indicator Lens
	188-140	Retaining Ring
	188-155	Clamping Ring (Part of S-82433)
	188-441	Knob Clamping Ring (Part of 46-7260, 46-7261 & 46-7262)
	192-420	Dial Crystal (2 Required)
	199-265	Shielded Paper Sleeve
	199-436	Shielded Paper Sleeve
	*S-82400	Bracket & Pulley Assem. (Right)
	S-82401	Bandswitch Bracket Assem.
	*S-82402	Dial Light Shield Assem.
	*S-82431	Stereo Indicator Light & Terminal Assem.
	*S-82432	Escutcheon Assem.
	*S-82433	Drive Pulley Assem.
	*S-82434	Drive Cord & Eyelet Assem.
	*S-82435	Drive Cord & Eyelet Assem. (Pointer)

MODEL Z538C & P

USING CHASSIS 8ZT20

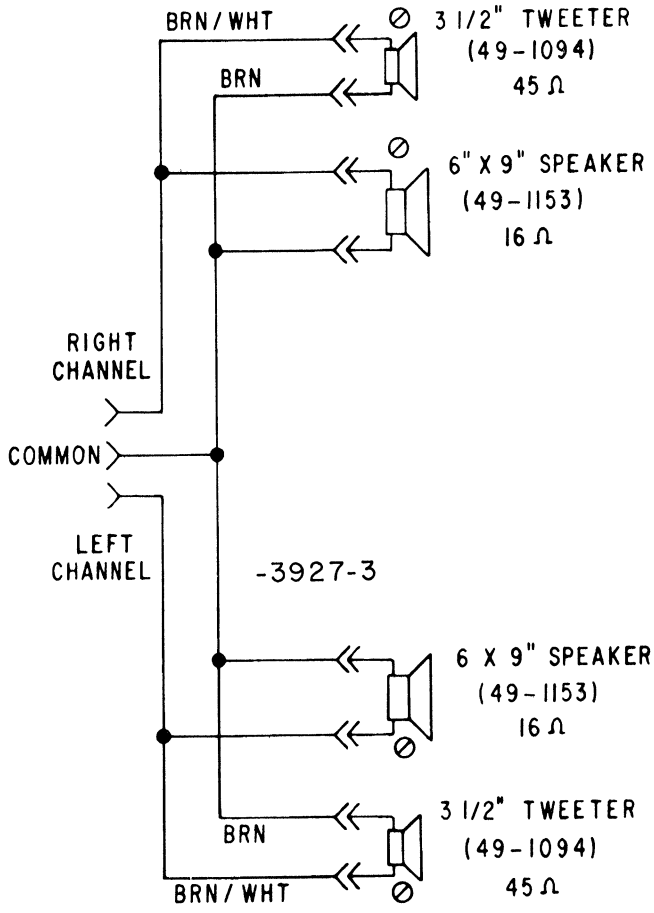
14-9002	Speaker Cabinet - Left - Model Z538C
14-9003	Speaker Cabinet - Left - Model Z538P
*14-9014	Cabinet Base - Model Z538C
*14-9015	Cabinet Base - Model Z538P
*14-9302	Speaker Cabinet Base - Model Z538C
*14-9303	Speaker Cabinet Base - Model Z538P
*14-9306	Speaker Cabinet - Right - Model Z538C
*14-9307	Speaker Cabinet - Right - Model Z538P
*16-3683	Packing Carton
*19-588	Screen Retaining Clip (4 Required)
*36-577	Cabinet Handle - Model Z538C
*36-578	Cabinet Handle - Model Z538P
*46-6115	Cord Retainer (2 Req'd.) - Model Z538C
*46-6872	Cord Retainer (2 Req'd.) - Model Z538P
*46-6878	Control Knob (3 Req'd.) - Model Z538C
46-6879	Control Knob (3 Req'd.) - Model Z538P
49-1147	4" PM Speaker (2 Required)
54-653	Tinnerman Nut (4 Used on 1 69-358 or 169-360)
56-528	Needle - .7 Mil. & 3 Mil. MFD. Sapphire (Part of 142-148)
*57-7006	Name Plate - Model Z538C
*57-7007	Name Plate - Model Z538P
57-7425	Speaker Housing Insert (Part of 14-9008) - Model Z538C
57-7426	Speaker Housing Insert (Part of 14-9009) - Model Z538P
*74-235	Ventilating Screen (2 Required)
*80-2007	Catch Spring (4 Required)
*83-7011	Escutcheon Trim Strip (Model Z538C)
*83-7012	Escutcheon Trim Strip (Model Z538P)

* DENOTES PARTS NOT PREVIOUSLY USED

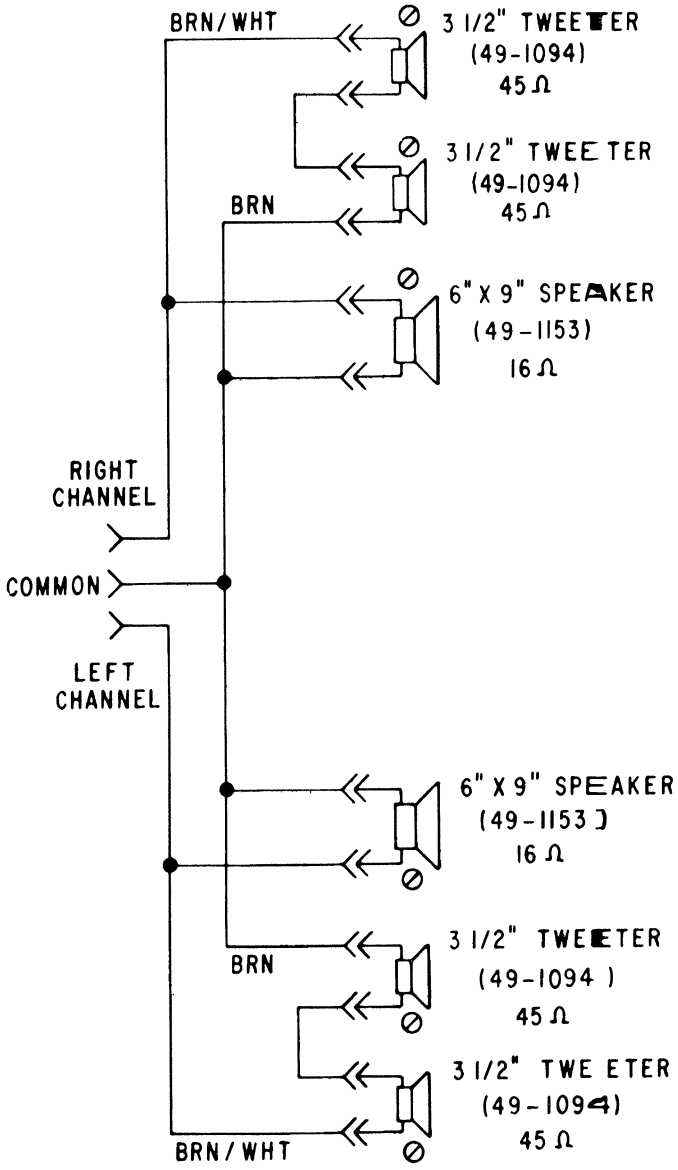
ITEM NO.	PART NO.	DESCRIPTION
	*83-7029	Polyurethane Strip (6 Required)
	86-329	Terminal (2 Used on Ea. S-81198)
	94-1497	Spacer Bushing (4 Required)
	*101-1853	Transistor Layout & Patent Label
	112-1291	6-20 x 3/8 Phillips Pan Hd. Self-Tap. Screw-N.P. (4 Used on Ea. 138-984 & 138-988 or 138-985 & 138-989)
	112-1869	4-24 x 1/2 Phillips Truss Hd. Self-Tap. Screw - Cadmium (1 Used on Ea. 156-107 or 156-108)
	112-2018	8-15 x 1 5/8 Phillips Special Hd. Self-Tap. Screw - Bright - N.P. (4 Used on 169-358 or 169-360)
	112-2081	8-18 x 9/16 Phillips Pan Hd. Self-Tap. Screw - N.P. (6 Join 14-8996 & 14-9014 or 14-8997 & 14-9015)
	*112-2082	10-16 x 7/8 Phillips Truss Hd. Self-Tap. Screw - N.P. (2 Used on 36-577 or 36-578)
	114-351	6-20 x 1/2 Hex Hd. Self-Tap. Screw-Stat. Bronze (4 MT. 8ZT20)
	114-523	8-18 x 7/16 Hex Hd. Self-Tap. Screw-Stat. Bronze - Flat Washer Att. (1 Used on Ea. 46-6115 or 46-6872)
	114-811	6-20 x 1/4 Hex Hd. Self-Tap. Screw-Stat. Bronze (2 Used on Ea. 49-1147 & 2 Used on Ea. 156-106 or 156-107)
	125-62	Rubber Grommet (Used on 169-358 or 169-360)
	125-148	Rubber Grommet (4 Used on 169-358 or 169-360)
	*138-984	Speaker Grille (Left) - Model Z538C
	*138-985	Speaker Grille (Left) - Model Z538P
	*138-988	Speaker Grille (Right) - Model Z538C
	*138-989	Speaker Grille (Right) - Model Z538P
	142-148	Dual Cartridge - .7 Mil. & 3 Mil. MFD. Sapphire (Part of 169-358 or 169-360)
	*156-107	Catch (4 Required) Model Z538P
	*156-108	Catch (4 Required) Model Z538C
	*159-187	Catch Button (4 Required) - Model Z538P
	*159-188	Catch Button (4 Required) - Model Z538C
	*166-183	Rubber Bumper (4 Required)
	*166-184	Cabinet Runner (2 Part of 14-9306) Model Z538C
	*166-185	Cabinet Runner (2 Part of 14-9307) Model Z538P
	*169-358	4 Speed Record Changer (See Changer Parts List For Components) - Model Z538P
	OR	
	169-360	4 Speed Record Changer (See Changer Parts List For Components) - Model Z538C
	188-155	Knob Clamping Ring (Part of 46-6878 or 46-6879)
	*202-3168	Instruction Book
	*220-175	Packing Cushioning Material
	S-72649	45 RPM Record Adapter
	*S-81198	Speaker Lead Assem. (2 Required)
		MODEL Z541P & W
		USING CHASSIS 8ZT20
	*14-8998	Speaker Cabinet Base - Model Z541W
	*14-8999	Speaker Cabinet Base - Model Z541P
	*14-9004	Speaker Cabinet (Left) Model Z541W
	*14-9005	Speaker Cabinet (Left) Model Z541P
	*14-9010	Speaker Cabinet (Right) Model Z541W
	*14-9011	Speaker Cabinet (Right) Model Z541P
	*14-9016	Cabinet Base - Model Z541W
	*14-9017	Cabinet Base - Model Z541P
	*16-3683	Packing Carton
	*19-588	Screen Retaining Clip (4 Required)
	*36-601	Cabinet Handle - Model Z541W
	*36-602	Cabinet Handle - Model Z541P
	*46-6873	Cord Retainer (2 Req'd.) Model Z541W
	*46-6874	Cord Retainer (2 Req'd.) Model Z541P
	*46-6880	Control Knob (3 Req'd.) Model Z541W
	*46-6881	Control Knob (3 Req'd.) Model Z541P
	49-1138	4 x 6" PM Speaker (2 Required)
	54-653	Tinnerman Nut (4 Used on 169-359 or or 169-360)
	56-528	Needle - .7 Mil. & 3 Mil. MFD. Sapphire (Part of 142-148)
	57-7006	Name Plate (Model Z541P)
	*57-7007	Name Plate - Model Z541W
	*74-235	Ventilating Screen (2 Required)
	*80-2077	Catch Spring (4 Required)
	*83-7015	Escutcheon Trim Strip - Model Z541W
	*83-7016	Escutcheon Trim Strip - Model Z541P
	83-7029	Polyurethane Strip (6 Required)
	86-329	Terminal (2 Used on Ea. S-81198)
	*101-1853	Transistor Layout & Patent Label
	*112-1291	6-20 x 3/8 Phillips Pan Hd. Self-Tap. Screw - N.P. (2 Used on Ea. 138-976 & 138-980 or 138-977 & 138-981)
	112-1869	4-24 x 1/2 Phillips Truss Hd. Self-Hd. Self-Tap. Screw-Cadmium (1 Used on Ea. 156-108 or 156-109)
	112-2018	8-15 x 1 5/8 Phillips Special Hd. Self-Tap. Screw-Bright N.P. (4 Used on 169-359 or 169-360)
	*112-2079	6-20 x 9/16 Phillips Pan Hd. Self-Tap. Screw-N.P. (4 Used on Ea. 138-976 & 138-980 or 138-977 & 138-981)
	112-2081	8-18 x 9/16 Phillips Pan Hd. Self-Tap. Screw-N.P. (6 Join 14-8998 & 14-9016 or 14-8999 & 14-9017)
	*112-2082	10-16 x 7/8 Phillips Truss Hd. Self-Tap. Screw-N.P. (2 Used on 36-601 or 36-602)
	114-351	6-20 x 1/2 Hex Hd. Self-Tap. Screw-Stat. Bronze (4 MT. 8ZT20)
	114-523	8-18 x 7/16 Hex Hd. Self-Tap. Screw-Stat. Bronze - Flat Washer Att. (1 Used on Ea. 46-6873 or 46-6874)
	114-811	6-20 x 1/4 Hex Hd. Self-Tap. Screw-Stat. Bronze (2 Used on Ea. 49-1138 & 2 Used on Ea. 156-108 or 156-109) (12 Required)
	125-62	Rubber Grommet (1 Used on 169-359 or 169-360)
	125-148	Rubber Grommet (4 Used on 169-359 or 169-360)
	*138-976	Speaker Grille (Right) Model Z541W
	*138-977	Speaker Grille (Right) Model Z541P
	*138-980	Speaker Grille (Left) Model Z541W
	*138-981	Speaker Grille (Left) Model Z541P
	*139-233	Speaker Baffle (Left) Model Z541W
	*139-234	Speaker Baffle (Left) Model Z541P
	*139-237	Speaker Baffle (Right) Model Z541W
	*139-238	Speaker Baffle (Right) Model Z541P
	142-148	Dual Cartridge - .7 Mil & 3 Mil. MFD. Sapphire (Part of 169-359 or 169-360)
	*156-108	Cabinet Catch (4 Req'd.) Model Z541W
	*156-109	Cabinet Catch (4 Req'd.) Model Z541P
	*159-188	Catch Button (4 Req'd.) Model Z541W
	*159-189	Catch Button (4 Req'd.) Model Z541P
	*166-183	Rubber Bumper (4 Required)
	*166-186	Cabinet Runner (4 Req'd.) Model Z541W
	*166-187	Cabinet Runner (4 Req'd.) Model Z541P
	*169-359	4 Speed Record Changer (See Changer Parts List For Components) Model Z541P
	*169-360	4 Speed Record Changer (See Changer Parts List For Components) Model Z541W
	188-155	Knob Clamping Ring (Part of 46-6880 or 46-6881)
	*202-3168	Instruction Book
	*220-175	Packing Cushioning Material
	S-72649	45 RPM Record Adapter
	*S-81198	Speaker Lead Assem. (2 Required)

* DENOTES PARTS NOT PREVIOUSLY USED

A906, A907, A908

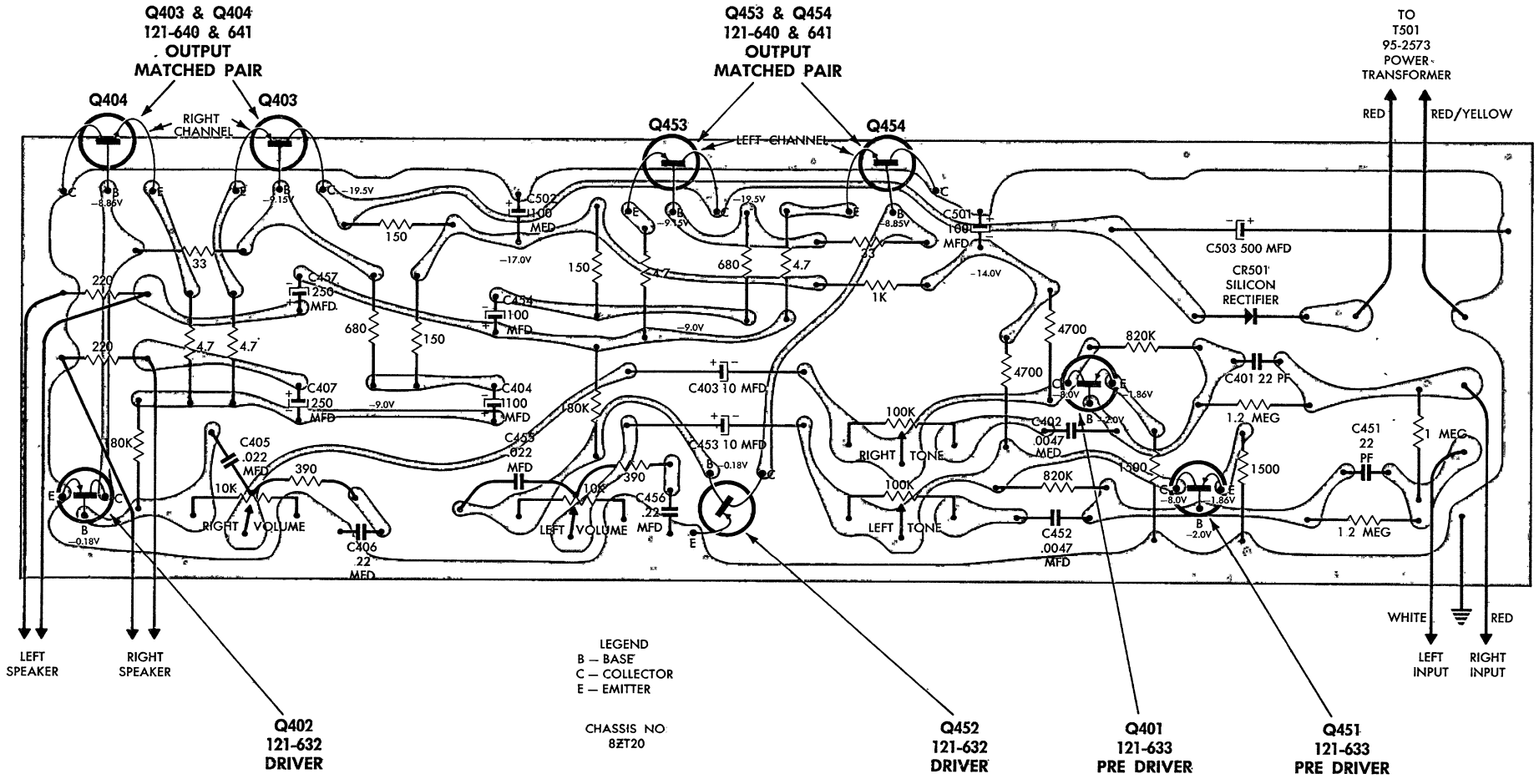


A910

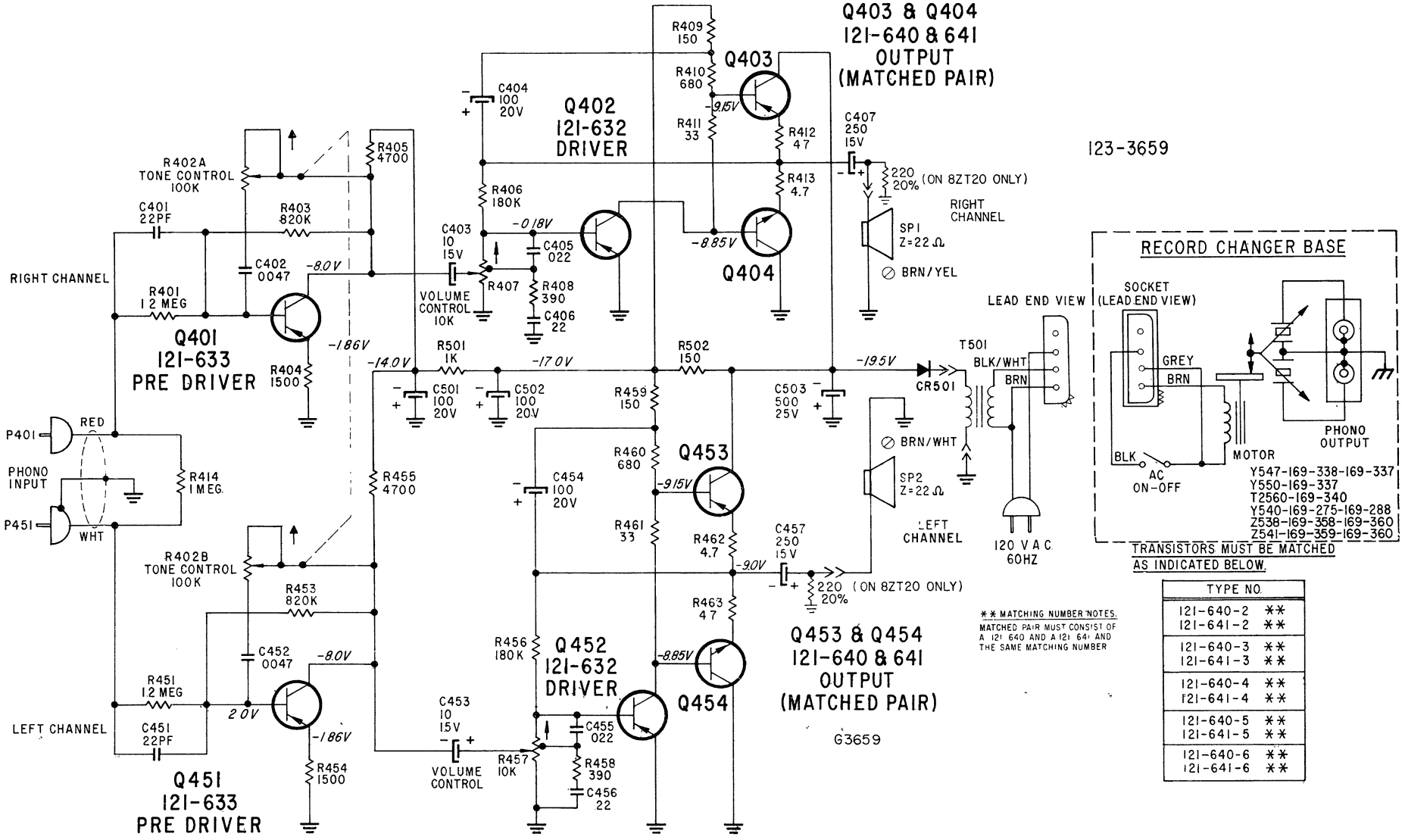


NOTE:
⊘ INDICATES WHITE OR YELLOW VOICE COIL POLARITY IDENTIFICATION DOT ON SPEAKER

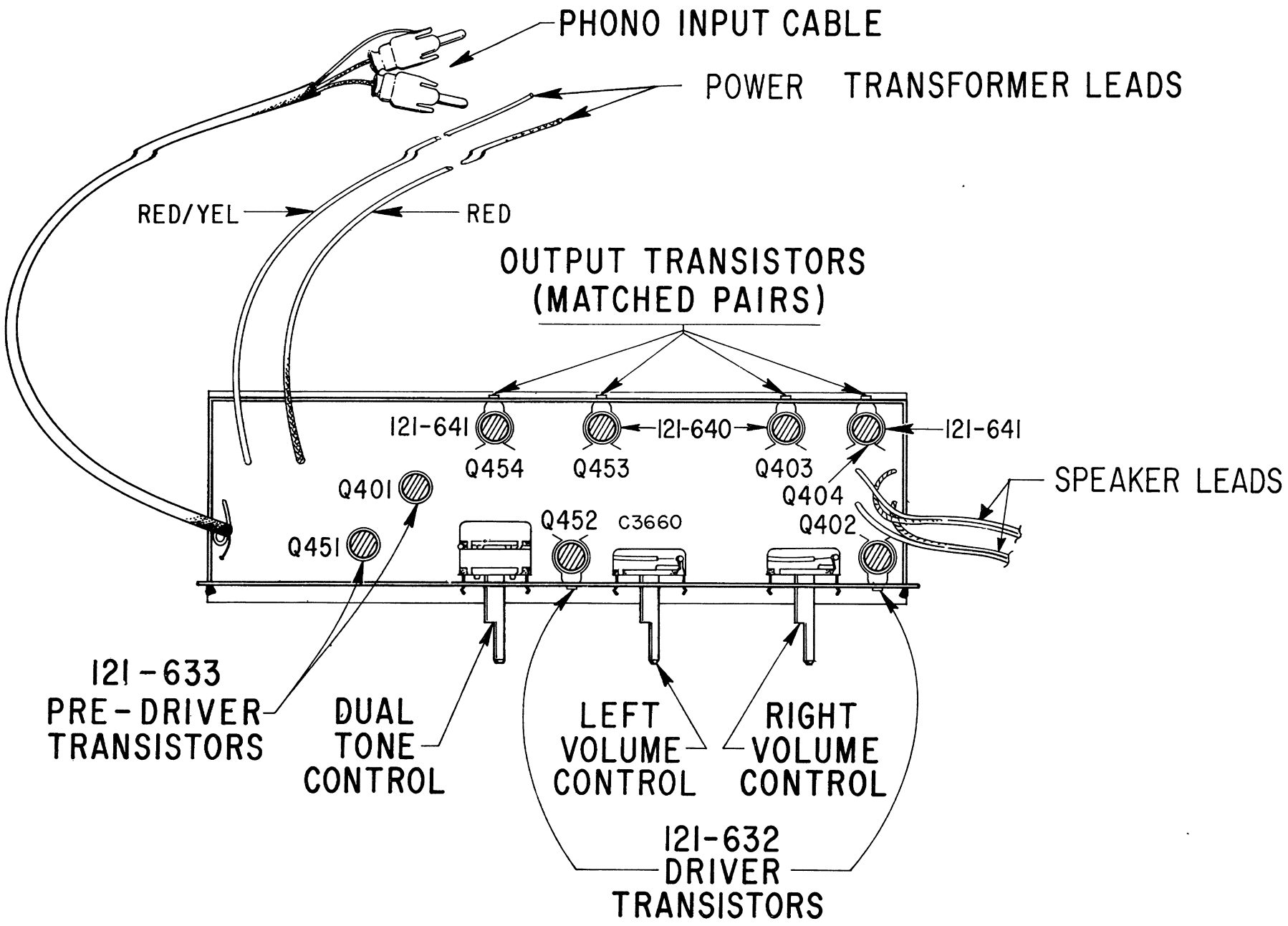
SPEAKER WIRING SCHEMATIC



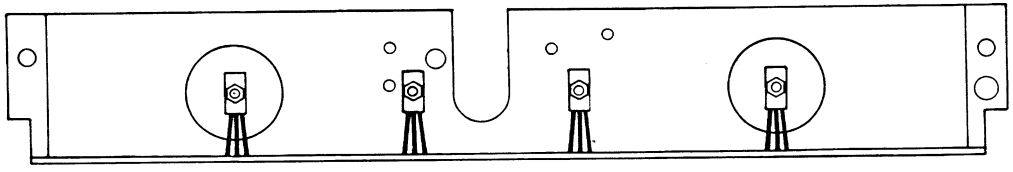
8ZT20 — CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE



8ZT20 — SCHEMATIC

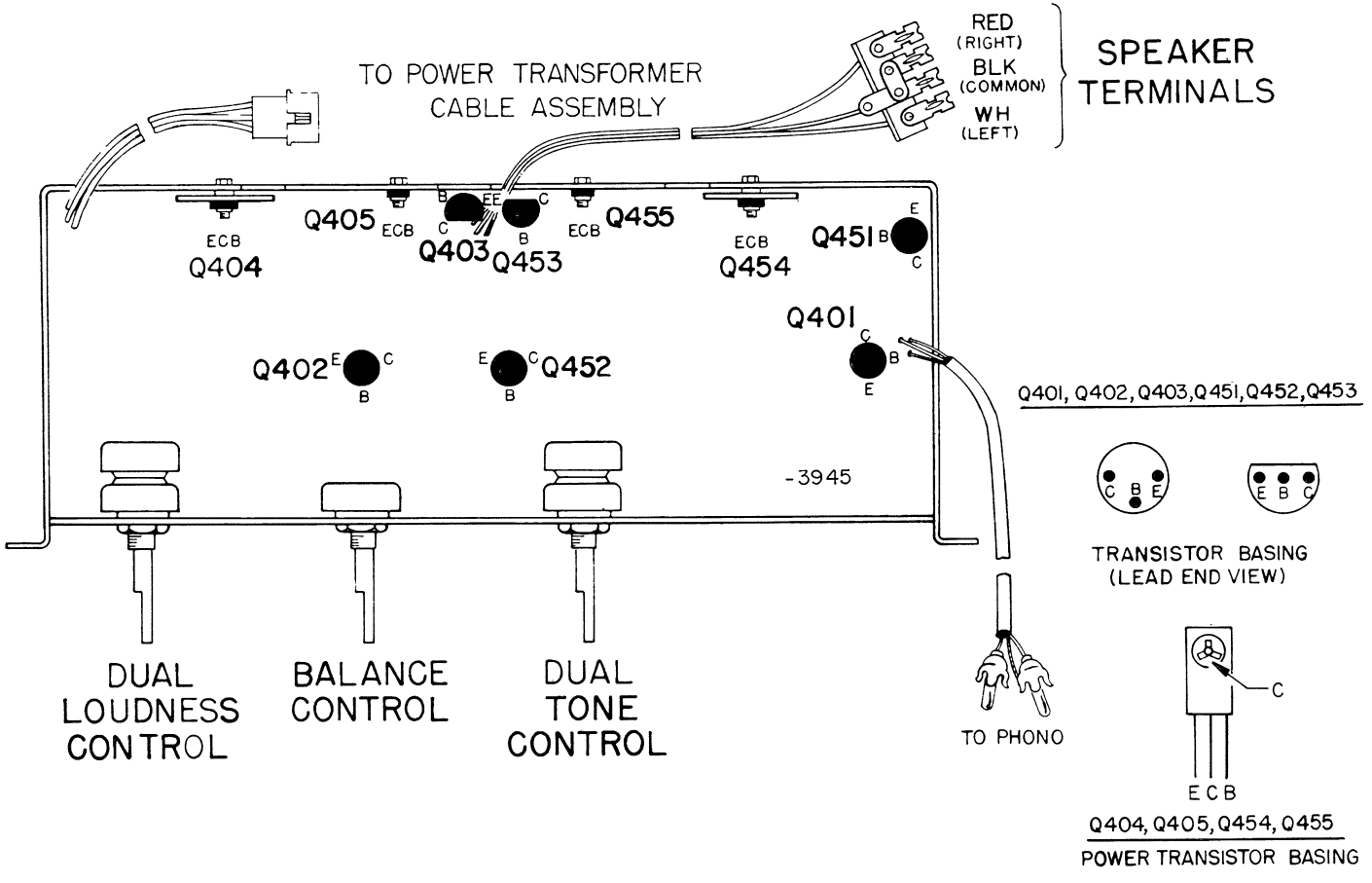


8ZT20 – CHASSIS LAYOUT

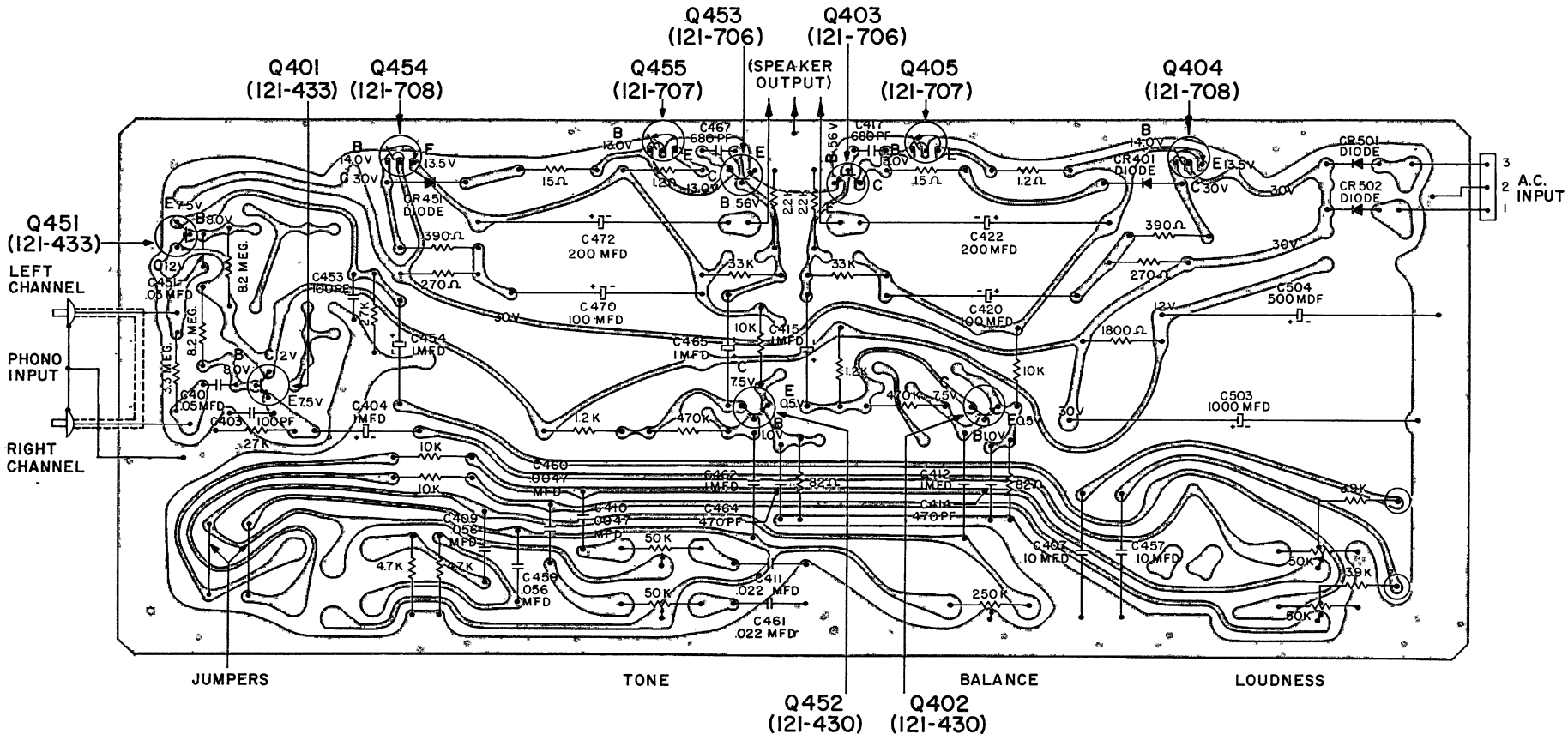


FRONT VIEW, FRONT PANEL REMOVED
(SHOWING POWER TRANSISTORS AND HEAT SINKS ONLY)

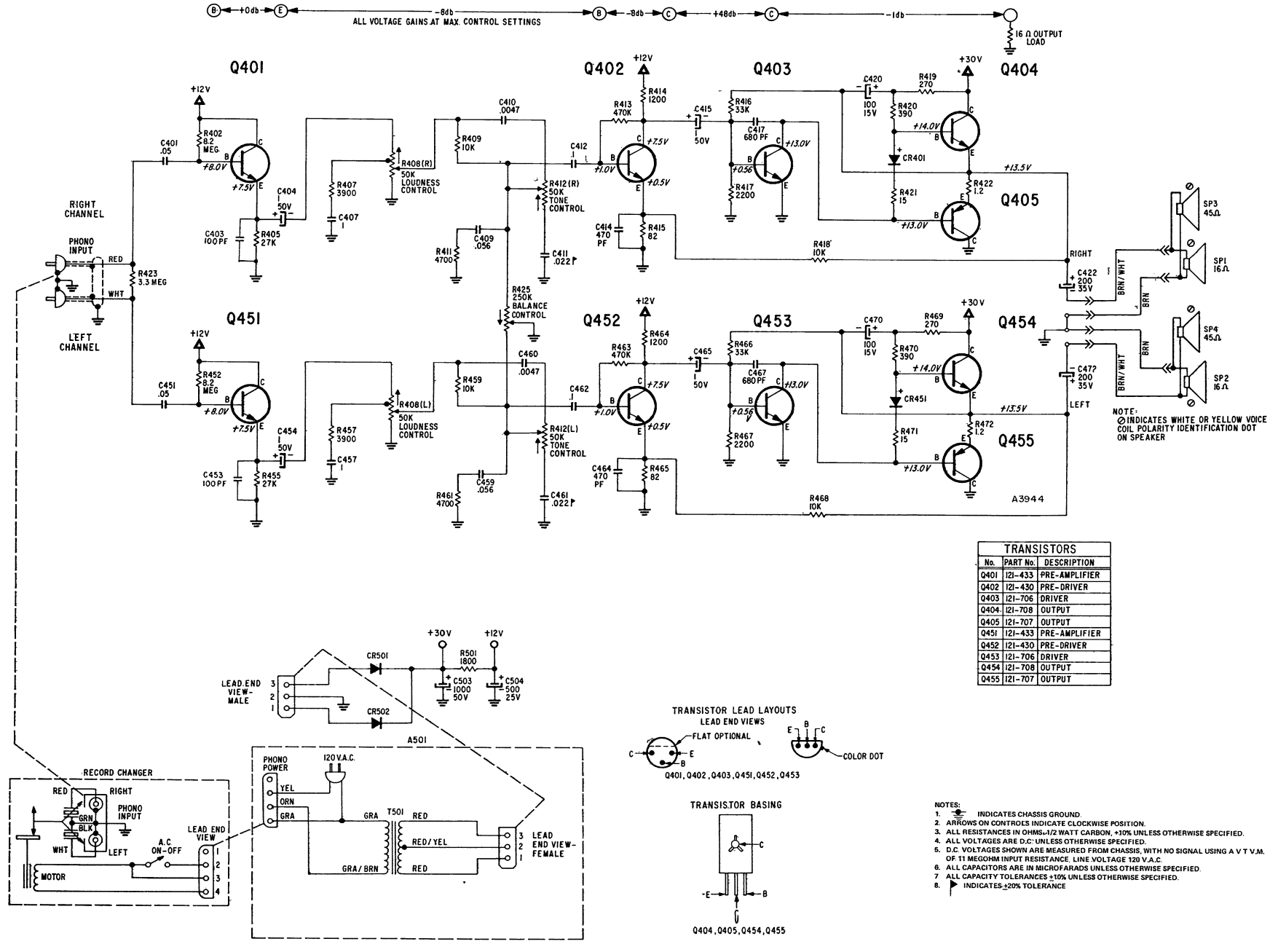
TRANSISTORS			
NO.	PART NO.	DESCRIPTION	REQ.
Q401 Q451	121-433	PRE-AMPLIFIER	2
Q402 Q452	121-430	PRE-DRIVER	2
Q403 Q453	121-706	DRIVER	2
Q404 Q454	121-708	OUTPUT	2
Q405 Q455	121-707	OUTPUT	2



10ZT38 – CHASSIS LAYOUT



10ZT38 – CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE



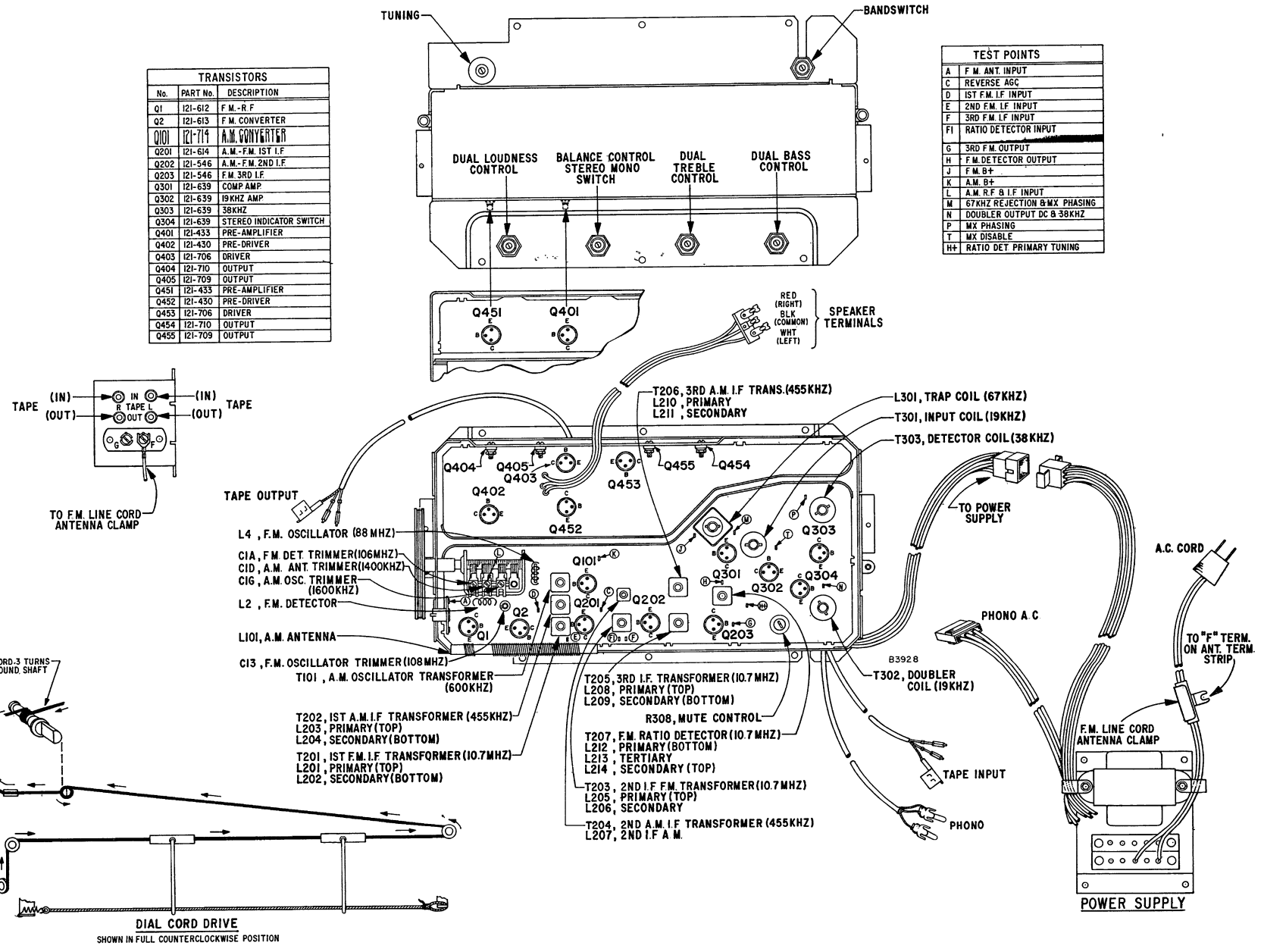
TRANSISTORS		
No.	PART No.	DESCRIPTION
Q401	121-433	PRE-AMPLIFIER
Q402	121-430	PRE-DRIVER
Q403	121-706	DRIVER
Q404	121-708	OUTPUT
Q405	121-707	OUTPUT
Q451	121-433	PRE-AMPLIFIER
Q452	121-430	PRE-DRIVER
Q453	121-706	DRIVER
Q454	121-708	OUTPUT
Q455	121-707	OUTPUT

NOTES:
1. ⏚ INDICATES CHASSIS GROUND.
2. ARROWS ON CONTROLS INDICATE CLOCKWISE POSITION.
3. ALL RESISTANCES IN OHMS, 1/2 WATT CARBON, ±10% UNLESS OTHERWISE SPECIFIED.
4. ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
5. D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS, WITH NO SIGNAL USING A V T V.M. OF 11 MEGOHM INPUT RESISTANCE. LINE VOLTAGE 120 V.A.C.
6. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
7. ALL CAPACITY TOLERANCES ±10% UNLESS OTHERWISE SPECIFIED.
8. ▶ INDICATES ±20% TOLERANCE

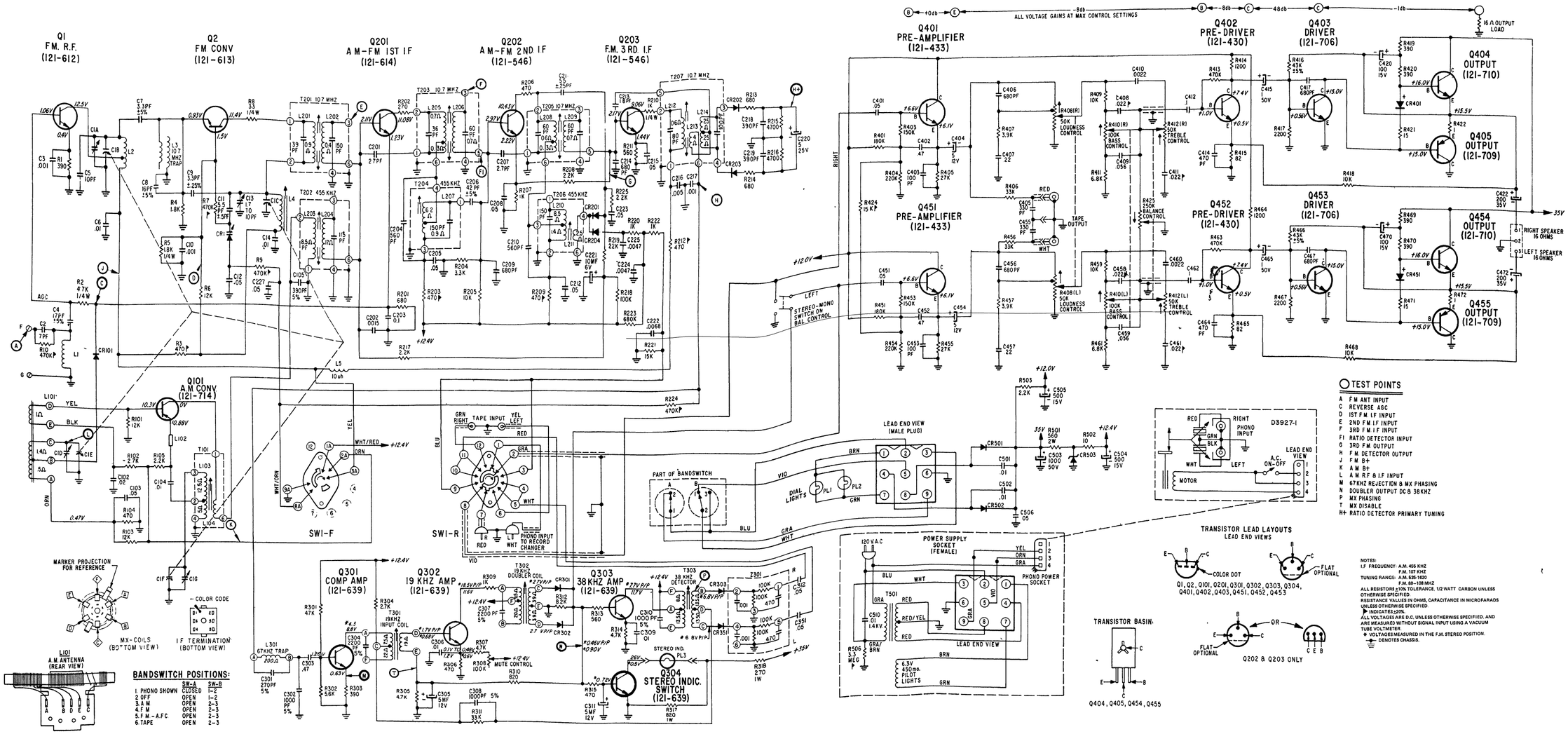
10ZT38 – SCHEMATIC

TRANSISTORS		
No.	PART No.	DESCRIPTION
Q1	121-612	F.M.-R.F.
Q2	121-613	F.M. CONVERTER
Q101	121-714	A.M. CONVERTER
Q201	121-614	A.M.-F.M. IST I.F.
Q202	121-546	A.M.-F.M. 2ND I.F.
Q203	121-546	F.M. 3RD I.F.
Q301	121-639	COMP AMP.
Q302	121-639	19KHZ AMP.
Q303	121-639	38KHZ
Q304	121-639	STEREO INDICATOR SWITCH
Q401	121-433	PRE-AMPLIFIER
Q402	121-430	PRE-DRIVER
Q403	121-706	DRIVER
Q404	121-710	OUTPUT
Q405	121-709	OUTPUT
Q451	121-433	PRE-AMPLIFIER
Q452	121-430	PRE-DRIVER
Q453	121-706	DRIVER
Q454	121-710	OUTPUT
Q455	121-709	OUTPUT

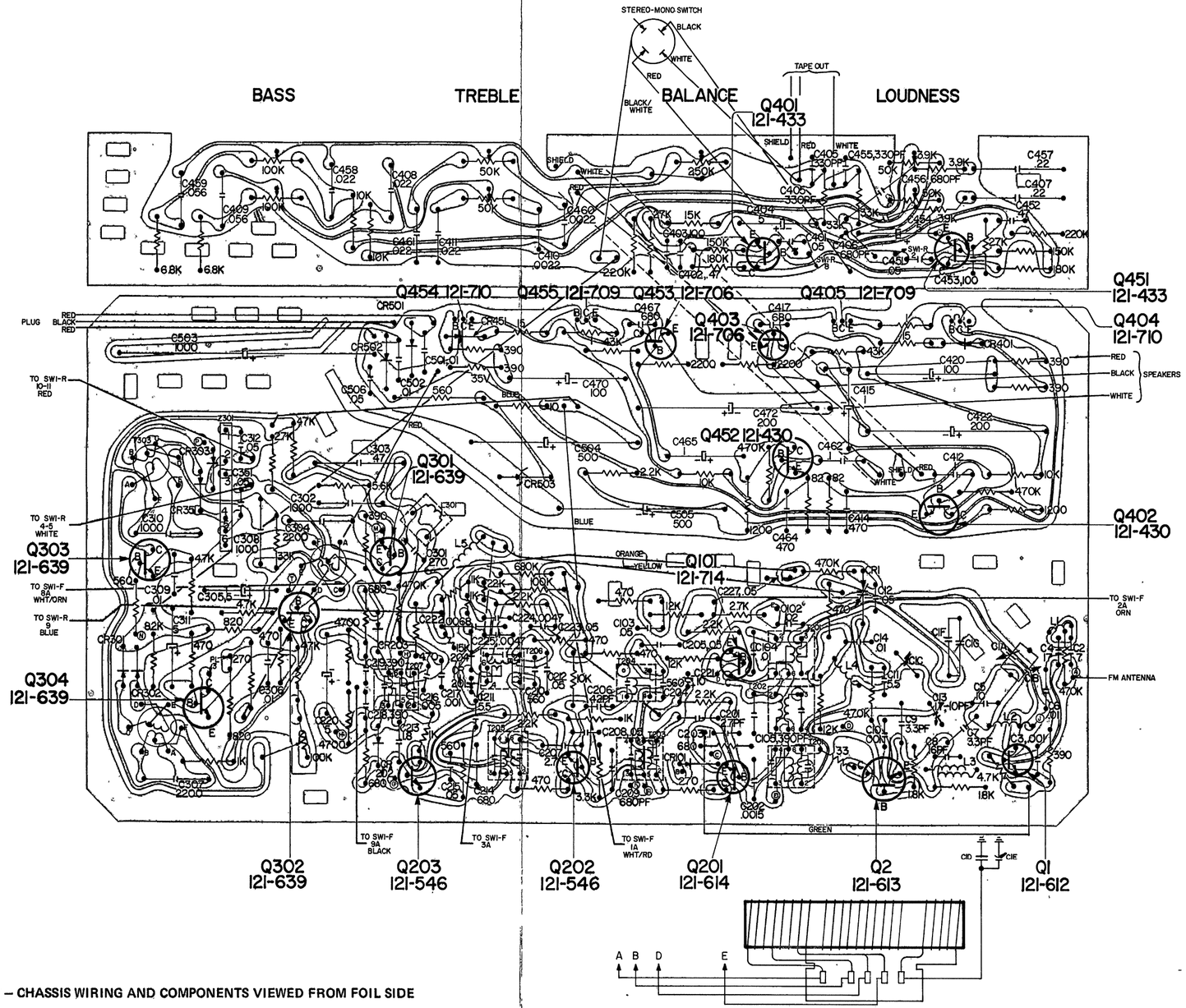
TEST POINTS	
A	F.M. ANT. INPUT
C	REVERSE AGC
D	IST F.M. I.F. INPUT
E	2ND F.M. I.F. INPUT
F	3RD F.M. I.F. INPUT
FI	RATIO DETECTOR INPUT
G	3RD F.M. OUTPUT
H	F.M. DETECTOR OUTPUT
J	F.M. B+
K	A.M. B+
L	A.M. R.F. & I.F. INPUT
M	67KHZ REJECTION & MX PHASING
N	DOUBLER OUTPUT DC & 38KHZ
P	MX PHASING
T	MX DISABLE
H+	RATIO DET. PRIMARY TUNING



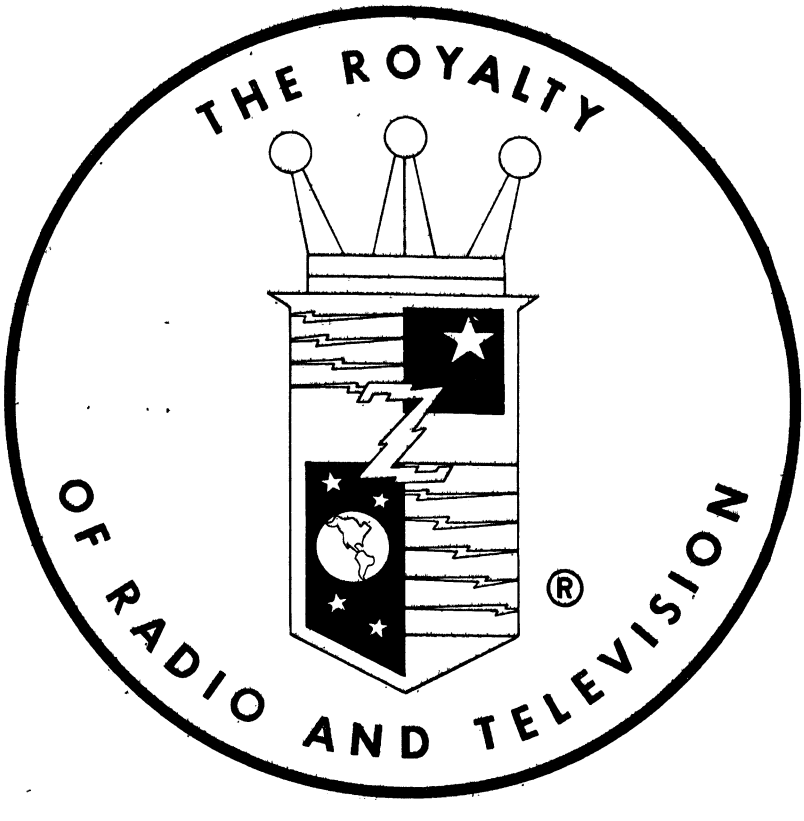
20AT30Z – CHASSIS LAYOUT



20AT30Z – SCHEMATIC



20AT30Z – CHASSIS WIRING AND COMPONENTS VIEWED FROM FOIL SIDE



ZENITH RADIO CORPORATION

1900 N. AUSTIN AVENUE CHICAGO, ILLINOIS 60639

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

923-555 HF17S2 RR 2/69 30M

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