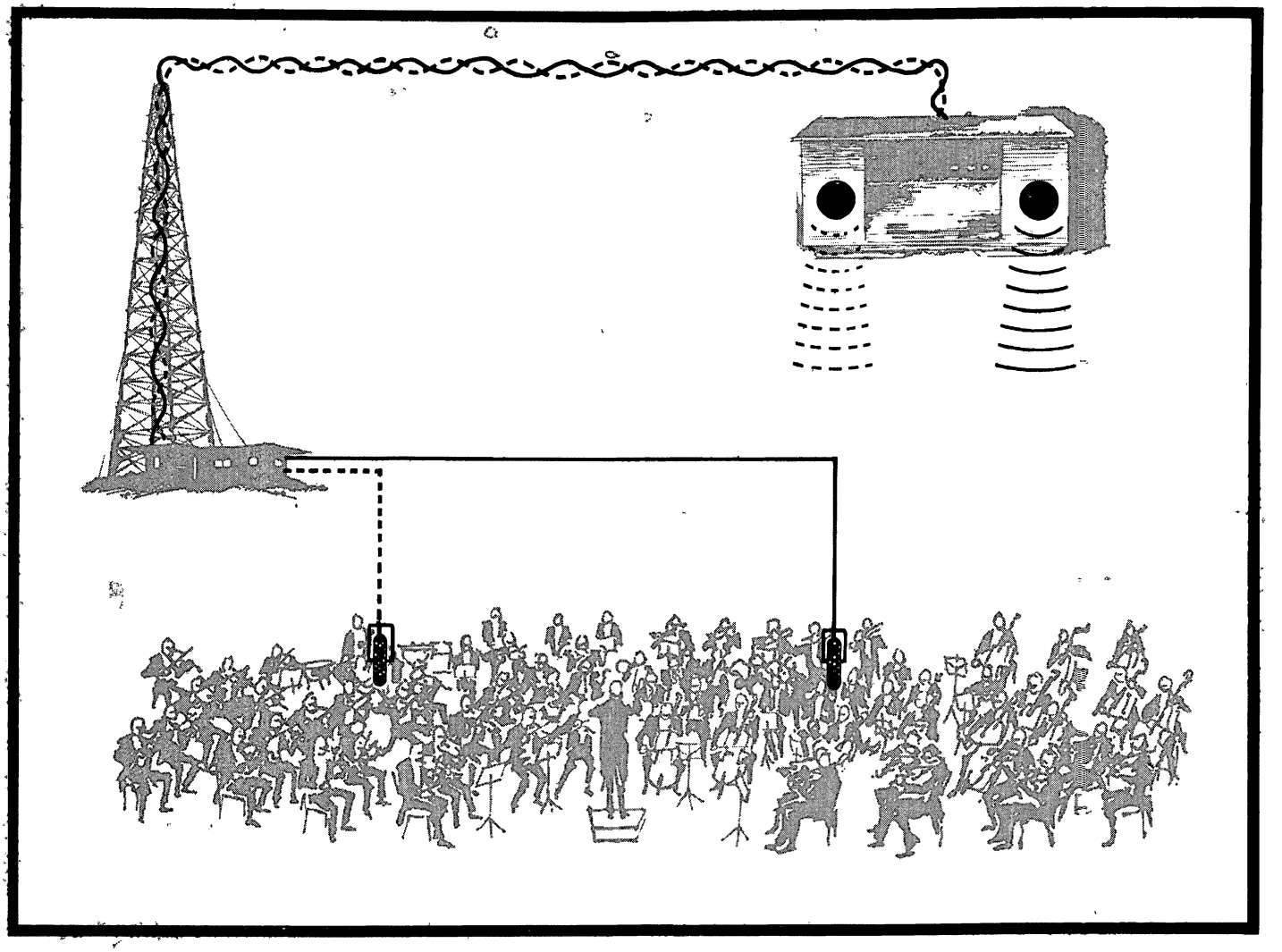
ZENITH®

SERVICE MANUAL



HIGH FIDELITY
AND STEREO FM MODELS

ZENITH RADIO CORPORATION

1900 N. AUSTIN AVENUE CHICAGO, ILLINOIS 60639

PRICE $1.50 HF 18 SUPPLEMENT #2 PART NO. 923-592

INDEX

ALL CHASSIS COVERED IN SERVICE MANUAL HF-18 (923-558) EXCEPT
*CHASSIS COVERED IN SERVICE MANUAL HF-18S (923-576)
**CHASSIS COVERED IN THIS SERVICE MANUAL HF-18S2 (923-592)

CHASSIS	SCHEMATIC PAGE	CHASSIS LAYOUT PAGE	PARTS LIST PAGE
1Y20Z	98	–	58
2ZT21	100, 101	99	58
2ZT22	100,101	99	58
2YT23	102	102	58, 59
2ZT24	103	103	59
2AT30	105	104	59
*3AT20	20, 21	22	12
**3AT20	19, 20, 21	22	12
6ZT20	106	107	59, 60
6AT24	108	149	60, 61
8ZT20	110, 111	109	61
9AT27	113	112	61, 62
**10AT26	23	23	12, 13
**10YT26	23	23	12, 13
10ZT30	116, 117, 118	119	63, 64, 65
10ZT31	120, 121	122	65
10ZT33	124, 125	123	65, 66
10AT37	126, 127	128	66, 67
10ZT38	130, 131	129	67, 68
11ZT27	133	132	68, 69
11AT30	134, 135	136	69, 70, 71
20AT21	138, 139	137	71, 72, 73
20AT21Z	138, 139	137	71, 72, 73
20AT30	140, 141	142	73, 74, 75, 76
20AT30Z	140, 141	142	73, 74, 75, 76
20AT31Z	144, 145	143	76, 77, 78
**21BT30	24, 25	26	13, 14, 15
25AT20 (EARLY)	146, 147	148	78, 79, 80, 81
*25AT20 (LATE	23, 24, 25	26	12, 13, 14, 15
29AT24	150, 151	149	81, 82, 83, 84, 85, 86
A550W	96, 97	–	86
S-9017W	94	–	87
S-9017W-1	94	–	87
*S-82931	19	–	16, 17
S-83179	95	–	86, 87
Speaker Wiring	88, 89, 90	–	–
Schematics	91, 92, 93	–	–
*	18	–	–
**	18	–	–

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

CABINET			CHASSIS			SPEAKER		
MODEL	STYLE	COLOR	MODEL	TYPE	EIA POWER OUTPUT	PART NUMBER	VOICE COIL IMPE-DANCE (IN OHMS)	SIZE INCHES
A507F	Table (w/handle) (lift lid)	Green	3AT20	3 Transistor Phono Only	–	49-1184	32	1-2x6
A507L	Table (w/handle) (lift lid)	Beige	3AT20	3 Transistor Phono Only	–	49-1184	32	1-2x6
A507V	Table (w/handle) (lift lid)	Coral	3AT20	3 Transistor Phono Only	–	49-1184	32	1-2x6
Z565W1	Table (lift lid) (Circle of Sound Speakers)	Walnut	10AT26	10 Transistor Phono Only	2x20	49-1116	6.4	2-6
B906W Note 5	Console (lift lid)	Walnut	20AT30Z	20 Transistor FM/AM/ Phono	2x8	49-1153 49-1094	16 45	2-6x9 2-3½
B907M	Console (lift lid)	Maple	21BT30	20 Transistor FM/AM/ Phono	2x10	49-1153 49-1094	16 45	2-6x9 2-3½
B908DE	Console (lift lid)	Dark Oak	21BT30	20 Transistor FM/AM/ Phono	2x10	49-1153 49-1094	16 45	2-6x9 4-3½
B908P	Console (lift lid)	Pecan	21BT30	20 Transistor FM/AM/ Phono	2x10	49-1153 49-1094	16 45	2-6x9 4-3½
B910W	Console (lift lid)	Walnut	21BT30	20 Transistor FM/AM/ Phono	2x10	49-1153 49-1094	16 45	2-6x9 4-3½
A929DE Note 5	Console (lift lid)	Dark Oak	20AT30Z	20 Transistor FM/AM/ Phono	2x8	49-1169 49-1094 49-1166	16 45 8	2-8x12 2-3½ 2-Horn
A929P Note 5	Console (lift lid)	Pecan	20AT30Z	20 Transistor FM/AM/ Phono	2x8	49-1169 49-1094 49-1166	16 45 8	2-8x12 2-3½ 2-Horn
A931W Note 5	Console (lift lid)	Walnut	20AT21Z	20 Transistor FM/AM/ Phono	2x15	49-1175 49-1094 49-1151	10 45 8	2-10 2-3½ 2-Horn

NOTES

1. Stylus, S = Manufactured Sapphire, D = Diamond.
2. Tape Input and Output - May be used with the following models:
   A634 - Cassette Tape Player.
   A635 - Cartridge Tape Player.
   A636 - Cassette Tape Player/Recorder.
3. Remote speaker adapter kit No. S-74539 available.
4. Headphone jack.
5. Model listed for reference only, See Service Manual HF-18 (923-558) for Chassis information.

FEATURES OF HIGH FIDELITY & STEREO FM MODELS

RECORD CHANGER					OTHER FEATURES			
NUMBER	MOUNTING	CARTRIDGE	STYLUS NOTE 1	45 RPM ADAPTOR	INDICATOR LIGHT	TAPE	RECORD STORAGE	REMOTE SPEAKER PROVISION
169-374	Shelf	142-170	D-S 56-567	S-72648 or S-84995	–	–	–	–
169-373	Shelf	142-170	D-S 56-567	S-72648 or S-84995	–	–	–	–
169-375	Shelf	-142-170	D-S 56-567	S-72648 or S-84995	–	–	–	–
169-372	Shelf	142-168	D-S S-68567	S-82964	–	Note 2	–	Note 4
169-361	Shelf	142-164	D-S 56-560	S-82965	–	Note 2	Yes	Yes Note 3
169-361	Shelf	142-164	D-S 56-560	S-82965	–	Note 2	Yes	Yes Note 3
169-362	Shelf	142-168	D-S S-68567	S-82965	–	Note 2	Yes	Yes Note 3
169-362	Shelf	142-168	D-S S-68567	S-82965	–	Note 2	Yes	Yes Note 3
169-362	Shelf	142-168	D-S S-68567	S-82965	–	Note 2	Yes	Yes Note 3
169-362	Shelf	142-168	D-S S-68567	S-82965	–	Note 2	Yes	Yes Note 3
169-362	Shelf	142-168	D-S S-68567	S-82965	–	Note 2	Yes	Yes Note 3
169-363	Shelf	142-168	D-S S-68567	S-82965	–	Note 2	Yes	Yes Note 3

RECORD CHANGER FEATURES

PART NO.	MFG.	BASE PLATE	TURNTABLE
169-361	VM	Tree Bark Brown	Light Beige
169-362	VM	Tree Bark Brown	Light Beige
169-363	VM	Tree Bark Brown	Light Beige
169-372	VM	White	Grey Chrome
169-373	BSR	Off White	Yellow
169-374	BSR	Off White	Dark Green
169-375	BSR	Off White	Grey

GENERAL INFORMATION

THEORY

For theory and operation, of circuits covered in this manual, refer to Service Manual HF 18 (Zenith Part No. 923-558).

MULTIPLEX ALIGNMENT

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

MUTING CONTROL

A muting control, 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.

ANTENNAS FOR STEREO FM

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

EXTERNAL FM ANTENNA

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

FM CABINET ANTENNA

All models contain an FM antenna built into the cabinet. This antenna is a folded dipole cut to the desired frequency, and is attached to the internal periphery of the cabinet.

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 21BT30 - Test Point "C", Located between Transistors Q101 (A.M. Converter) and Q201 (1st I.F.).

Chassis 21BT30

Micro Volts Input	AGC Voltage At 1st I.F.
0	1.34
25	1.23
100	0.91
200	0.82
500	0.73
1K	*0.70
5K	0.58
50K	0.10
100K	0.06

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 3AT20, 10AT26, 10YT26 and 21BT30 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.

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.

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

CIRCUIT BOARD COMPONENT IDENTIFICATION

As a special feature to aid the Service Technician, Zenith has identified the location of components which are mounted on certain circuit boards. This information is printed on the circuit boards and also appears on the schematic. 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. Metal pick (soldering aid).
5. Pencil type soldering iron with a small tip (25 watts or less).
6. Tin leads on component before soldering.
7. Use only solder with an extremely low melting point, (60% Tin, 40% Lead).

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

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 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 megacycle markers in obtaining IF curve symmetry.

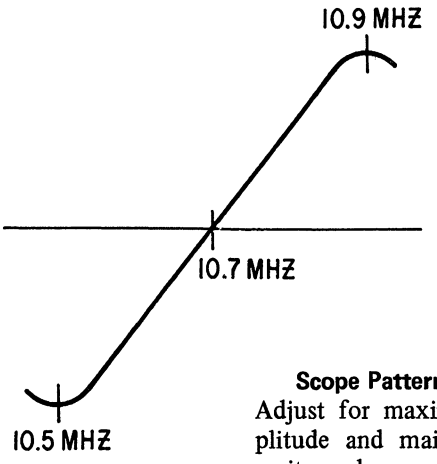
The condenser mentioned further on in the alignment procedure should be as small as possible and the ground lead of the generator must be connected to the chassis at the base of the socket, where the signal is being injected. Should the signal be injected at some point other than a socket, then the ground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

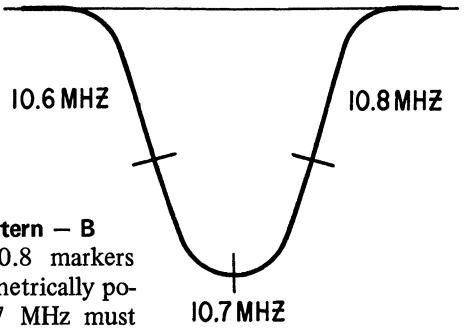
In the following alignment procedure charts there is a letter appearing in the operation column in addition to the number. This letter indicates the test point to which the hot lead of the scope is to be connected as follows:

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

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

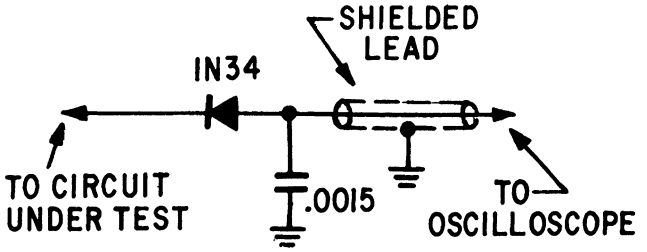


Scope Pattern – A
Adjust for maximum amplitude and maintain linearity and symmetry. 10.7 MHz must be on curve at base line.



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.

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.



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 535 KHz with the tuning gang closed. Adjust the RF and Mixer Transformers at 600 KHz. 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.

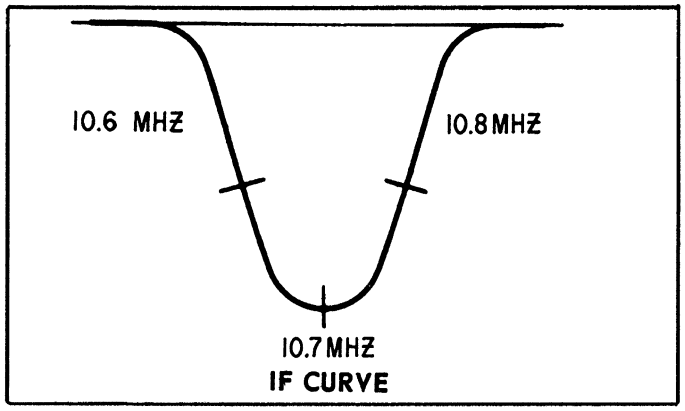
RF AND IF ALIGNMENT PROCEDURE FOR CHASSIS 21BT30

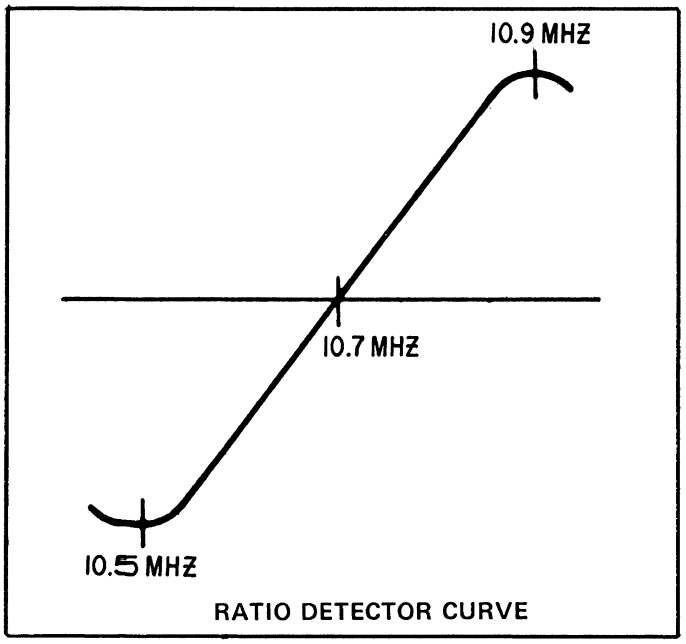
OPERATION *	CONNECT GENERATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJUST	PURPOSE
NOTE: For AM Alignment Use A Signal With 400 Hertz Modulation							
1 C	One turn loosely coupled to wavemagnet		455 KHz	BC	600 KHz	L203, L204, L207, L210	Align IF channel for maximum output
2 C			1600 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			1400 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 b efore 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.





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 200 KHz with a sweep rate of 60 Hertz, as well as an oscilloscope. During the IF and ratio detector alignment it is not only necessary to obtain maximum gain, but also extremely important to maintain symmetry.

To help achieve 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 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 cable.

This multiplex generator provides a composite mulitplex 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 possibily 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 froms and their magnitude may vary slightly from chassis to chassis, however, they are quire 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 67 KHz 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 Traccing

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 18 for more information.

ITEM NO.	PART NO.	DESCRIPTION
		CHASSIS 3AT20
NOTE:	Unless otherwise stated all resistors are 10%, ½ watt, carbon.	
C401	22-5201	.0022 MFD Disc 25V
C402	22-3034	.05 MFD Disc 25V
C404	22-3255	330 PF Disc 25V
C403	22-3652	.1 MFD Disc 10V
C405	22-4568	100 MFD Electrolytic 15V
C406	22-4570	100 MFD Electrolytic 35V
C501	22-3767	500 MFD Electrolytic 35V
R401	63-8321	5 MED Ohm Volume Control
R402	63-1901	560K
R403	63-1820	6800
R404	63-1911	1.0 MEG
R405	63-1901	560K
R406	63-1785	1K
R407	63-1785	1K
R408	63-1747	120
R409	63-4529	4.7
R410	63-4529	4.7
CR401	103-145	Biasing Diode
CR501	212-71	Rectifier Diode
LS401	49-1184	Speaker
	*12-5331	Chassis Support Bracket
	22-2	220 PF Disc Capacitor - 500V.
	22-3414	4700 PF Disc Capacitor - 25V.
	63-1701	10 Ohm Resistor - ½W 10%
	63-1883	220K Ohm Resistor - ½W 10%
	63-1890	330K Ohm Resistor - ½W 10%
	63-1915	1.2 Megohm Resistor - ½W 10%
	64-1033	Rip Eyelet (7 Req.)
	86-329	Connector Terminal (2 Req.)
	*121-764	Transistor - Driver
	800-305	Output Transistor Assem. - Matched Pair (PNP) (NPN)
		CHASSIS 10YT26 AND 10AT26
NOTE:	Unless otherwise stated all resistors are 10%, ½ watt, carbon.	
C1	22-3034	.05 MFD Disc 25V
C2	22-5018	.47 MFD 50V
C3	22-5018	.47 MFD 50V
C4	22-13	.0033 MFD Disc 500V
C5	22-3710	.22 MFD 50V
C6	22-3595	.33 MFD 50V
C7	22-5361	1.5 MFD Electrolytic N.P. 10V
C8	22-3595	.33 MFD 50V
C9	22-3678	.047 MFD 100V
C10	22-2884	5 MFD Electrolytic 12V
C12	22-3595	.33 MFD 50V
C13	22-2703	220 PF Disc 500V
C14	22-3599	.015 MFD 500V
C15	22-3034	.05 MFD Disc 25V
C16	22-5018	.47 MFD 50V
C17	22-5018	.47 MFD 50V
C18	22-3710	.22 MFD 50V
C19	22-13	.0033 MFD Disc 500V
C20	22-3595	.33 MFD 50V
C22	22-5361	1.5 MFD Electrolytic N.P. 10V
C23	22-3595	.33 MFD 50V
C24	22-3678	.047 MFD 100V
C25	22-3595	.33 MFD 50V
C26	22-2884	5 MFD Electrolytic 12V
C27	22-2703	220 PF Disc 500V
C28	22-3599	.015 MFD 500V
C29	22-3678	.047 MFD 100V
C30	22-5175	200 MFD 25V
C33	22-5316	500 MFD Electrolytic 50V
C34	22-5175	200 MFD 25V
C36	22-5316	500 MFD Electrolytic 500V

ITEM NO.	PART NO.	DESCRIPTION
C37	22-3678	.047 MFD 100V
C38	22-5362	1000 MFD Electrolytic 50V
C39	22-5316	500 MFD Electrolytic 50V
C40	22-5167	1000 MFD Electrolytic 30V
C41	22-4577	50 MFD Electrolytic 25V
C42	22-4666	.001 MFD Disc 1400V
C43	22-4601	.01 MFD 1000V
C44	22-4601	.01 MFD 1000V
R1A } R1B }	63-6939	Dual Loudness Control
R2A } R2B }	63-7123	Dual Bass Control
R3A } R3B }	63-6938	Dual Treble Control
R4	63-6042	220 Ohms Resistor 10% 1W
R5	63-5305	.51 Ohms Resistor 5% 5W
R6	63-6049	330 Ohms Resistor 10% 1W
R7	63-5305	.51 Ohms Resistor 5% 5W
R8	63-6049	330 Ohms Resistor 10% 1W
R9	63-5305	.51 Ohms Resistor 5% 5W
R10	63-6042	220 Ohms Resistor 10% 1W
R11	63-5305	.51 Ohms Resistor 5% 5W
R12	63-6031	120 Ohms Resistor 10% 1W
R13	63-6003	27 Ohms Resistor 10% 1W
R14	63-4519	2.7 Ohm Resistor 10% ½W
R15	63-4519	2.7 Ohm Resistor 10% ½W
R16	63-4519	2.7 Ohm Resistor 10% ½W
R17	63-4519	2.7 Ohm Resistor 10% ½W
R18	63-6027	100 Ohm Resistor 20% 1W
R19	63-6027	100 Ohm Resistor 20% 1W
T1	95-2475	Driver Transformer
T2	95-2475	Driver Transformer
T3	95-2476	Power Transformer
M1	S-75015	Housing, Wire & Terminal Assembly
M2	S-75020	Housing, Wire & Terminal Assembly
M3	S-75023	Housing, Wire & Terminal Assembly
M4	S-79077	Housing, Wire & Terminal Assembly
M5	S-79111	Housing, Wire & Terminal Assembly
SE1	212-61	Silicon Rectifier
SE2	212-61	Silicon Rectifier
PL1	100-249	Pilot Light Bulb
PL2	100-249	Pilot Light Bulb
S1	85-1022	Phono-Tape & A.C. Switch
F1	136-24	2A Fuse
SPK1	49-1116	6" PM Speaker
SPK2	49-1116	6" PM Speaker
J1	44-78	Head Phone Jack (10AT26 Only)
		10YT26 AND 10AT26 AMPLIFIER CHASSIS
	11-87	A.C. Line Cord
	19-535	Retaining Clip (1 Used On Ea. 126-1106)
	19-546	Retaining Clip (Used On 22-5362)
	19-561	Retaining Clip (1 Used On Ea. 22-5167 & 22-5316)
	22-14	.0047 MFD Disc Capacitor - 500V. (4 Req.)
	22-3973	100 MFD Electrolytic Capacitor - 25V. (2 Req.)
	43-519	Socket Contact Housing - Male
	43-573	6 Contact Housing - Female
	43-574	9 Contact Housing - Female
	44-48	Connector Jack (2 Part Of S-83558)
	52-1339	Three Conductor Cable - Phono (Approx. 26")
	52-1442	Four Conductor Cable - Speaker (Approx. 8")
	54-140	Hex Palnut (Used On 44-78)
	57-6328	Heat Sink Plate (2 Req.)
	63-1768	390 Ohm Resistor - ½W. 10% (2 Req.)
	63-1827	10K Ohm Resistor - ½W. 10% (2 Req.)
	63-1848	33K Ohm Resistor - ½W. 10%
	78-1765	Dial Light Socket & Wire

*Denotes parts not previously used.

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 18 for more information.

ITEM NO.	PART NO.	DESCRIPTION
		10YT26 AND 10AT26 AMPLIFIER CHASSIS (Cont'd)
	78-1812	2 Contact Transistor Socket (4 Req.)
	83-5277	Insulating Strip (4 Part Of 800-196)
	83-5328	11 Lug Terminal Strip
	83-5975	Transistor Terminal Strip
	83-6015	17 Lug Terminal Strip
	83-6208	Single Lug Terminal Strip
	86-334	Terminal (3 Used On 43-519)
	86-389	Terminal - Female (10 Req.)
	102-5383	Fuse Label (2 Amp. 250V.)
	112-1608	8-18 x 5/16 x 1/4 Phillips Pan Hd. Self-Tap. Screw - Black Oxide (4 Mt. 95-2476)
	114-801	8-18 x 5/16 x 1/4 Hex Hd. Self-Tap. Screw-Stat. Bronze (1 Used On Ea. 95-2475)
	114-1001	6-32 x 1/2 Hex Washer Hd. Self-Tap. Screw-Special (4 Used On Ea. 800-196)
	121-544	Transistor - Driver (2 Req.)
	125-140	Strain Relief Grommet
	126-1106	Heat Dissipator (1 Used On Ea. 121-544)
	136-24	2 Amp. Fuse
	205-51	Dow Corning Heat Conductive Grease (Part Of 800-196)
	800-196	Power Output Transistor - Matched Pair (2 Req.)
	S-83558	Speaker Jack Mtg. Bracket & Connector Terminal
		10YT26 AND 10AT26 CONTROL PANEL PRE-AMP. COMPONENTS
	12-4903	Control Panel Bracket
	19-480	Clip (2 Req.)
	43-570	6 Contact Housing - Male
	43-571	Socket Contact Housing
	44-77	Tape Jack
	52-1444	Four Conductor Cable (Approx. 23 1/2")
	52-1473	Two Conductor Shielded Lead (Phono)
	52-1474	Two Conductor Shielded Lead (Tape)
	54-139	3/8-32 Palnut (4 Req.)
	58-214	Single Prong Plug (2 Req.)
	63-1743	100 Ohm Resistor - ½W. 10% (2 Req.)
	63-1764	330 Ohm Resistor - ½W. 10% (2 Req.)
	63-1785	1000 Ohm Resistor - ½W. 10% (2 Req.)
	63-1799	2200 Ohm Resistor - ½W. 10% (2 Req.)
	63-1806	3300 Ohm Resistor - ½W. 10% (2 Req.)
	63-1810	3900 Ohm Resistor - ½W. 10% (2 Req.)
	63-1813	4700 Ohm Resistor - ½W. 10% (4 Req.)
	63-1834	15K Ohm Resistor - ½W. 10%
	63-1859	56K Ohm Resistor - ½W. 10% (2 Req.)
	63-1862	68K Ohm Resistor - ½W. 10% (2 Req.)
	63-1876	150K Ohm Resistor - ½W. 10% (2 Req.)
	63-1883	220K Ohm Resistor - ½W. 10% (2 Req.)
	63-1897	470K Ohm Resistor - ½W. 10% (4 Req.)
	63-1901	560K Ohm Resistor - ½W. 10% (2 Req.)
	63-1911	1 MEG Ohm Resistor - ½W. 10% (2 Req.)
	63-1943	5.6 MEG Ohm Resistor - ½W. 10% (2 Req.)
	79-174-12	No. 18 Sleeving - Yellow - 1 1/2" (4 Req.)
	83-1475	Armite Strip
	83-5288	13 Lug Terminal Strip (2 Req.)
	83-5975	Transistor Terminal Strip (2 Req.)
	86-390	Terminal (10 Req.)
	121-433	Transistor - Pre-Amp. (2 Req.)
	121-543	Transistor - Pre-Driver (2 Req.)
	126-1346	Shield
	198-12	Dial Scale Reflector
		CHASSIS 21BT30
NOTE: Unless otherwise stated all resistors are 10%, ½ watt, carbon.		
C1A		F.M. Detector Trimmer
C1B		F.M. Detector Tuning
C1C		F.M. Oscillator Tuning
C1D	*22-6051	A.M. Antenna Trimmer
C1E		A.M. Antenna Tuning
C1F		A.M. Oscillator Tuning
C1G		A.M. Oscillator Trimmer

*Denotes parts not previously used.

ITEM NO.	PART NO.	DESCRIPTION
C2	22-2513	7 PF Disc 500V
C3	22-2729	.001 MFD Disc 25V
C4	22-3792	17 PF Disc 5% 500V
C5	22-3675	10 PF Disc 5% 500V
C6	22-3393	.01 MFD Disc 25V
C7	22-3541	3.3 PF Gimmick 5% 500V
C8	22-3558	16 PF Disc 5% 500V
C9	*22-5879	3.3 PF Disc ± .25% 25V
C10	22-2729	.001 MFD Disc 25V
C11	*22-5878	5.5 PF Disc ± .5 PF 25V
C12	22-3034	.05 MFD Disc 25V
C13	22-4855	1.7 TO 10 PF 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	390 PF Mica 5% 100V
C201	22-3310	2.7 PF 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	42 PF Disc 5% 500V
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 + .25 P.F. 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	22-2729	.001 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	22-6246	3.3 MFD N.P. 15V
C304	22-5782	2200 PF Polystyrene 5% 500V
C305	22-2884	5 MFD Electrolytic 12V
C307	22-5782	2200 PF Polystyrene 5% 500V
C308	22-3415	.0068 MFD Disc 25V
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
C362	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

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 18 for more information.

CHASSIS 21BT30 (Cont'd)

ITEM NO.	PART NO.	DESCRIPTION
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	22-4601	.01 MFD Disc Cap 1K.V.
R1	63-1768	390 Ohm
R2	63-4213	4.7K Ohm ¼W
R3	63-1772	470 Ohm 20%
R4	63-1796	1.8K Ohm
R5	63-4196	1.8K Ohm ¼W
R6	63-1831	12K Ohm
R7	63-1898	470K Ohm 20%
R8	63-4122	33 Ohm ¼W
R9	63-1898	470K Ohm 20%
R10	63-1898	470K Ohm 20%
R11	63-1785	1K Ohm
R101	63-1831	12K Ohm
R102	63-1803	2.7K Ohm
R103	63-1831	12K Ohm
R104	63-1771	470 Ohm
R105	63-1803	2.7K Ohm
R201	63-1778	680 Ohm
R202	63-1761	270 Ohm
R203	63-1772	470 Ohm 20%
R204	63-1806	3.3K Ohm
R205	63-1827	10K Ohm
R206	63-1771	470 Ohm
R207	63-1785	1K Ohm
R208	63-1799	2.2K Ohm
R209	63-1772	470 Ohm 20%
R210	63-4185	1K Ohm ¼W
R211	63-1775	560 Ohm
R212	63-1772	470 Ohm 20%
R213	63-1778	680 Ohm
R214	63-1778	680 Ohm
R215	63-1813	4700 Ohm
R216	63-1813	4700 Ohm
R217	63-1799	2.2K Ohm
R218	63-1869	100K Ohm
R219	63-1841	22K Ohm
R220	63-1785	1K Ohm
R221	63-1834	15K Ohm
R222	63-1824	8.2K
R223	63-1904	680K Ohm
R224	63-1898	470K Ohm 20%
R225	63-1799	2.2K Ohm
R301	63-1855	47K Ohm
R302	63-1817	5.6K Ohm
R303	63-1764	330 Ohm
R305	63-1813	4.7K Ohm
R306	63-1771	470 Ohm
R307	63-1806	3.3K Ohm
R308	63-6495	100K Mute Control
R309	63-1785	1K Ohm
R310	63-1782	820 Ohm
R312	63-1824	8.2K Ohm
R313	63-1775	560 Ohm
R314	63-1764	330 Ohm
R315	63-1771	470 Ohm
R316	63-1778	680 Ohm 1W
R318	63-1782	820 Ohm
R319	63-1825	9.1K Ohm 5%
R320	63-1799	2.2K Ohm
R321	63-1826	10K Ohm 5%
R322	63-1778	680 Ohm
R401	63-1880	180K Ohm
R403	63-1876	150K Ohm
R404	63-1883	220K Ohm
R405	63-1845	27K Ohm
R406	63-1848	33K Ohm
R407	63-1810	3.9K Ohm
R408	63-7683	50K Dual Loudness Control
R409	63-1827	10K Ohm
R410	*63-7682	100K Dual Bass Control
R411	63-1820	6.8K Ohm
R412	*63-7681	50K Dual Treble Control
R413	63-1897	470K Ohm
R414	63-1789	1200 Ohm
R415	63-1740	82 Ohm
R416	63-1853	43K Ohm 5%
R417	63-1799	2200 Ohm
R418	63-1827	10K Ohm
R419	63-1769	430 Ohm 5%
R420	63-1769	430 Ohm 5%
R421	63-1708	15 Ohm
R422	63-4501	1 Ohm
R424	63-1835	15K Ohm 20%
R425	*63-7684	250K Balance Control & Switch
R451	63-1880	180K Ohm
R453	63-1876	150K Ohm
R454	63-1883	220K Ohm
R455	63-1845	27K Ohm
R456	63-1848	33K Ohm
R457	63-1810	3.9K Ohm
R459	63-1827	10K Ohm
R461	63-1820	6.8K Ohm
R463	63-1897	470K Ohm
R464	63-1789	1200 Ohm
R465	63-1740	82 Ohm
R466	63-1853	43K Ohm 5%
R467	63-1799	2200 Ohm
R468	63-1827	10K Ohm
R469	63-1769	430 Ohm 5%
R470	63-1769	430 Ohm 5%
R471	63-1708	15 Ohm
R472	63-4501	1 Ohm
R501	63-5659	560 Ohm 2W
R502	63-1701	10 Ohm
R503	63-1799	2.2K Ohm
R506	63-1933	3.3 MEG Ohm 20%
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 T201	1st IF Transformer 10.7 MHz Pri.
L202	IN T201	1st IF Transformer 10.7 MHz Sec.
L203	IN T202	1st IF AM 455 KHz Pri.
L204	IN T202	1st IF AM 455 KHz Sec.
L205	IN T203	2nd IF Transformer 10.7 MHz Pri.
L206	IN T203	2nd IF Transformer 10.7 MHz Sec.
L207	IN T204	2nd IF AM 455 KHz
L208	IN T205	3rd IF Transfromer 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.

*Denotes parts not previously used.

NOTE: Certain circuit boards included in this parts list have component locations identified by item number o n the circuit board. These item numbers are also shown on the schematic and in the following parts list – See HF 18 for more info rmation.

CHASSIS 21BT30 (Cont'd)

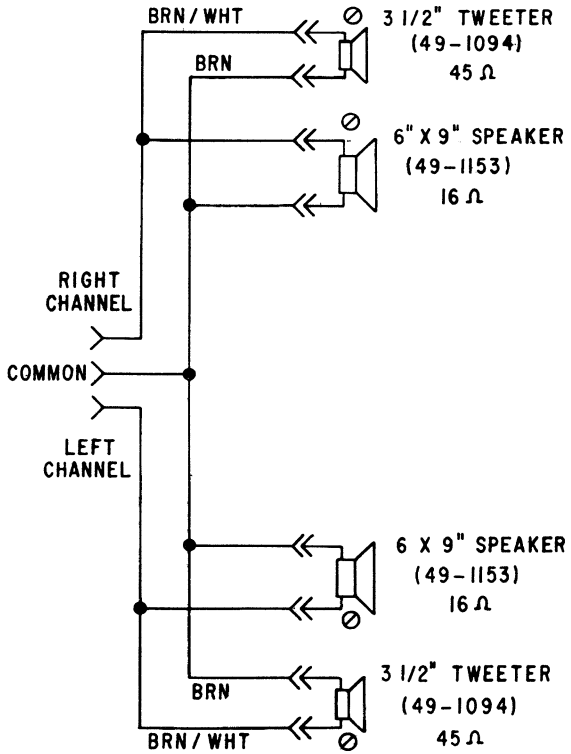
ITEM NO.	PART NO.	DESCRIPTION
L213	IN T207	Ratio Detector Trans. 10.7 MHz Tertiary
L214	IN T207	Ratio Detector Trans. 10.7 MHz Sec.
L301	S-79435	67 KHz Trap Coil
T101	95-2625	AM Oscillator Transformer
T201	95-2546	FM 1st IF Transformer 10.7 MHz
T202	95-2541	AM 1st IF AM 455 KHz
T203	95-2547	FM 2nd IF Tranformer 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-84181	Detector Coil 38 KHz
T501	95-2790	Power Transformer
SW1	*85-1058	Band Switch
CR1	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
CR301	103-23	Germanium Diodes
CR302	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	*105-107	Integnet
Z351	*105-107	Integnet
DS1	100-249	Pilot Light No. 1847
DS301	100-507	Stereo Indicator Light
	*12-5420	Background Bracket
	17-130	Cable Clamp (Used On 52-1590)
	17-156	Cable Clamp (Used On 52-1590)
	19-480	Retaining Clip (2 Req.)
	19-485	Speed Clip (Part Of S-82528)
	19-614	Clip (Part Of S-85104)
	22-3424	270 PF Capacitor - 100V.
	22-3613	1000 PF Mica Capacitor (2 Req.)
	22-3635	2200 PF Mica Capacitor (2 Req.)
	22-4909	1 MF Electrolytic Capacitor - 25V.
	22-5687	.0022 MF Disc Capacitor (2 Req.)
	*22-6048	.22 MFD. Capacitor - 75V. (2 Req.)
	43-571	Nine Contact Housing
	44-48	Connector Jack (4 Part Of S-79667)
	52-1062	Two Conductor Cable (Approx. 20")
	52-1425	Two Conductor Shielded Cable (Used On 58-214)
	52-1443	Four Conductor Cable (Approx. 6")
	52-1530	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 Cable
	54-139	3/8-32 x 9/16 Palnut (1 Used On Ea. 63-7681, 63-7682, 63-7683 & 63-7684) (5 Req.)
	54-334	Tinnerman Speed Nut (1 Used On Ea. 114-591) (4 Req.)
	54-828	1/2"-20 Palnut
	*54-851	Palnut (17 Join Chassis Frame & Chassis BD.)
	*57-7850	Side Plate
	*57-8147	Side Plate (Gang)
	58-214	Single Prong Plug (2 Req.)
	*59-1081	Pointer (Dial)
	61-222	Idler Pulley (7 Req.)
	64-288	Shoulder Rivet (1 Part Of S-85564 & 2 Part Of Ea. S-85563 & S-85565) (5 Req.)
	*76-1987	Tuning Shaft
	*78-1937	Dial Light Socket & Wire
	80-2069	Tension Spring
	*82-152	Oscillator Coil Grounding Strap
	*82-154	3rd I.F. Grounding Strap
	82-165	Grounding Strap (Part Of S-85104)
	83-1961	Antenna Terminal Strip
	83-3404	Three Lug Terminal Strip
	*83-7196	Two Lug Terminal Strip
	*83-7197	Two Lug Terminal Strip (Part Of S-85559)
	*83-7233	Antenna Mtg. Strip
	*83-7417	Antenna Protective Strip
	86-357	Connector Termin al (2 Req.)
	86-390	Connector Termin al (9 Req.)
	86-449	Connector Termin al (Used On 52-1062)
	-OR-	
	86-357	Connector Termin al (Used On 52-1062)
	86-450	Connector Termin al (Used On 52-1062)
	-OR-	
	86-344	Connector Termin al (Used On 52-1062)
	86-500	Terminal (15 Req.)
	86-565	Connector Termin al (3 Req.)
	93-1833	Transistor Insulating Washer (2 Req.)
	*93-1906	No. 4 Flat Washer (Output Transistors)
	94-1532	Nylon Shaft Bushing
	*94-1545	Nylon Insulating Bushing (Used Only When 800-312 Is Used)
	114-342	6-20 x 3/16 x 1/4 Hex Hd. Self-Tap. Screw-Stat. Bronze (Used On 83-7196)
	114-591	4-24 x 3/8 x 3/16 Slotted Hex Hd. Self-Tap. Screw - Cadmium (2 Used On Ea. 800-289 or 800- 312) (4 Req.)
	114-689	8-18 x 1/2 Hex Hd. Special Washer (Spin-lock) Self-Tap. Screw-Stat. Bronze (2 Mt. S-82104)
	114-801	8-18 x 5/16 Hex Hd. Self-Tap. Screw-Stat. Bronze (1 Mts. Ea. S-85563 & S-85564, 2 Mts. Ea. 12-54-20, 57-7850 & S-85565 & 5 Mt. S-85559) (16 Req.)
	114-802	8-18 x 5/16 Hex Washer Hd. Self-Tap. Screw-Stat. Bronze (1 Mts. Ea. 17-130 & 17-156) (2 Req.)
	121-430	Transistor - Driver (2 Req.)
	121-433	Transistor - Pre-Amp. (2 Req.)
	121-546	Transistor - 2nd. & 3rd. I.F. (2 Req.)
	121-612	Transistor - R.F. (FM)
	121-613	Transistor - Autodyne Converter - FM
	121-614	Transistor - 1st. I.F. Amp.
	121-639	Transistor - Comp-osite Amp. (3 Req.)
	121-706	Transistor - Audio Driver (2 Req.)
	121-714	Transistor - FM - AM I.F.
	121-737	Transistor - Stereo Ind. Switch
	121-762	Transistor - Detector
	126-1336	Coil Shield
	188-140	Retaining Ring
	188-155	Clamping Ring (Part Of S-85569)
	*800-312	Output Transistor Assem. - Matched Pair Consists of one 121-803 and one 121-804.
	-OR-	
	800-289	Output Transistor Assem. - Matched Pair Consists of one 121-709 and one 121-710.
	S-79667	Antenna Tape & Lnput Bracket Assem.
	S-82528	Antenna Cable & Terminal Assem.
	S-85104	I.F. Grounding Strap, Braid & Clip Assem.
	*S-85559	Control Mtg. Bracket Assem.
	*S-85562	Drive Cord & Eyelet Assem.
	*S-85563	Pulley Mtg. Bracket Assem. (2 Req.)
	*S-85564	Pulley Mtg. Bracket Assem.
	*S-85565	Pointer Guide Bracket Assem.
	*S-85569	Drive Pulley Assem.
	*S-85865	Power Supply
	S-75023	Cable, Terminal and Housing Assem.
	S-82471	Wire, Terminal and Housing Assem.
	11-150	Line Cord.
	12-5165	Mounting Bracket
	17-143	Cable Clamp (2 Req.)
	64-974	Nylon Rivet (4 Req.)
	83-5284	Five Lug Terminal Strip (2 Req.)
	83-5291	Insulating Strip (2 Req.)
	114-802	8-18 x 5/16 Hex Washer Head - Self-Tap Screw-Type B - Stat. Bronze.
	*S-86475	Pulley Mtg. Bracket Assem.

*Denotes parts not previously used.

NOTES

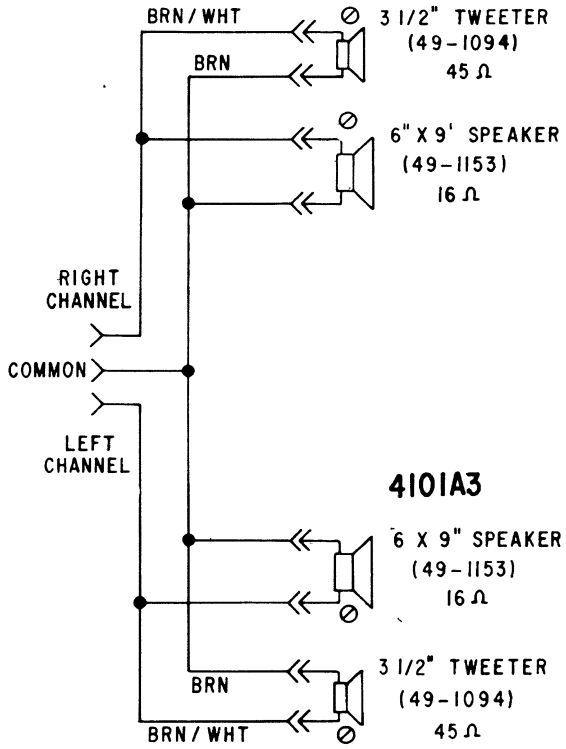
NOTES

B906



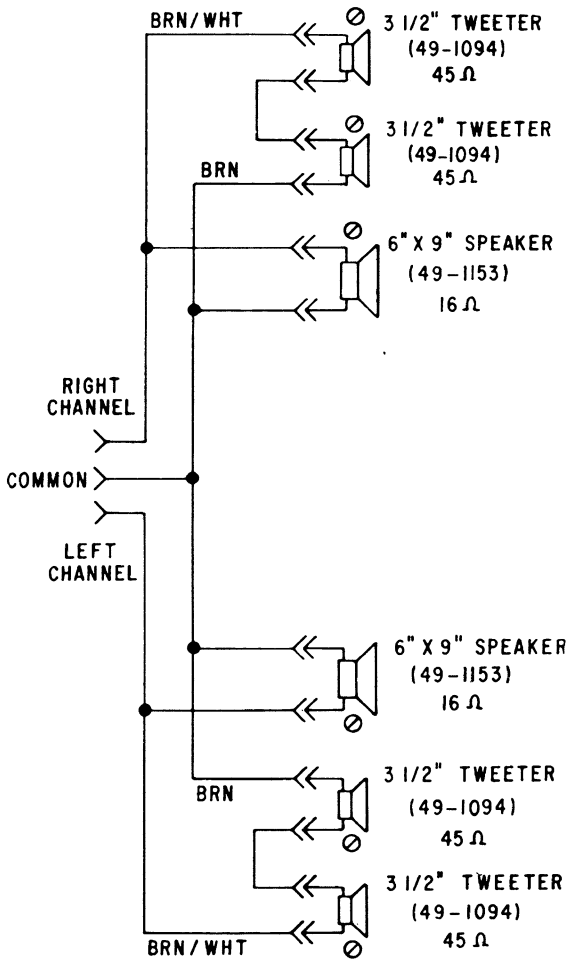
3927D3

B907, B908



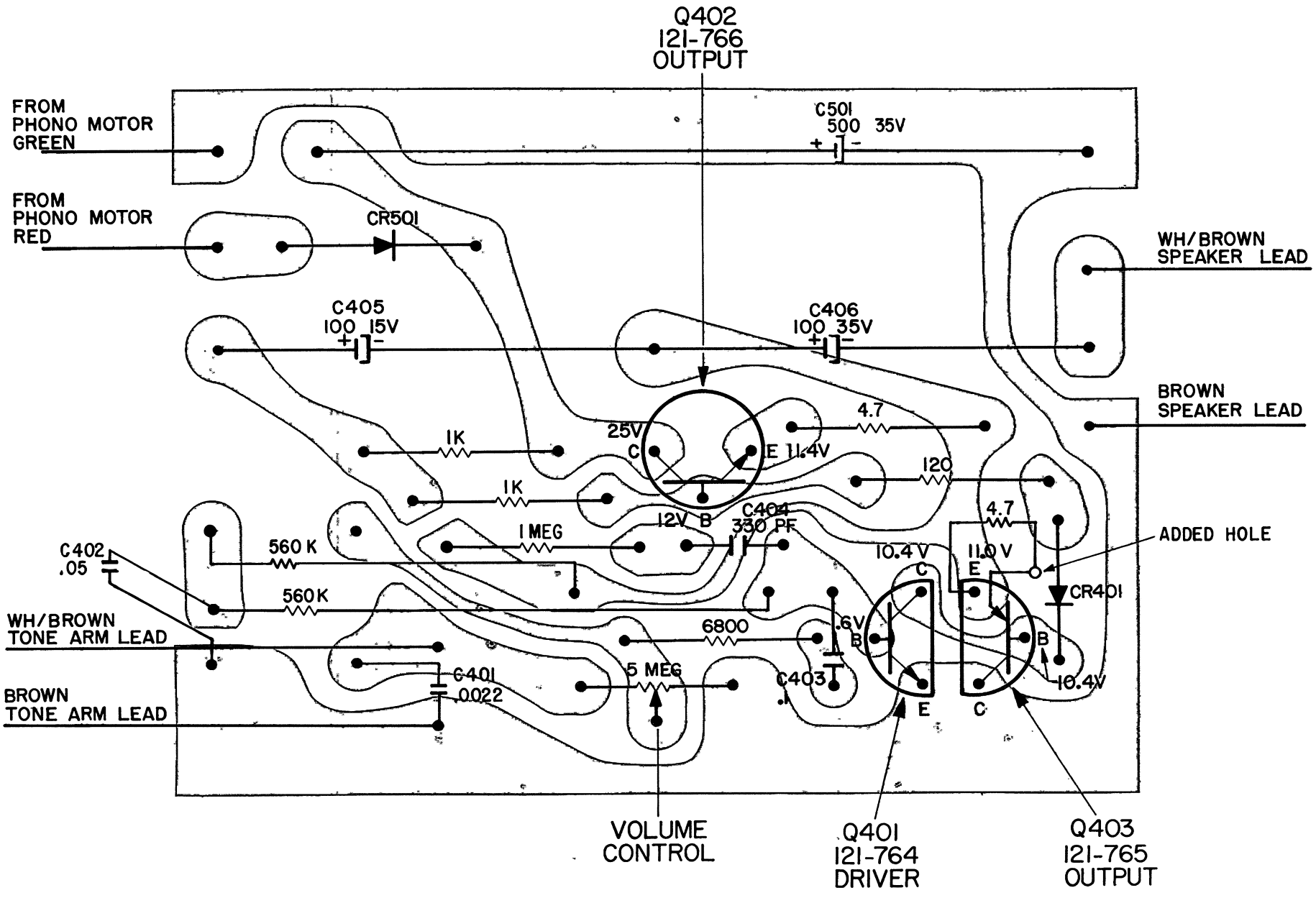
4101A3

B910

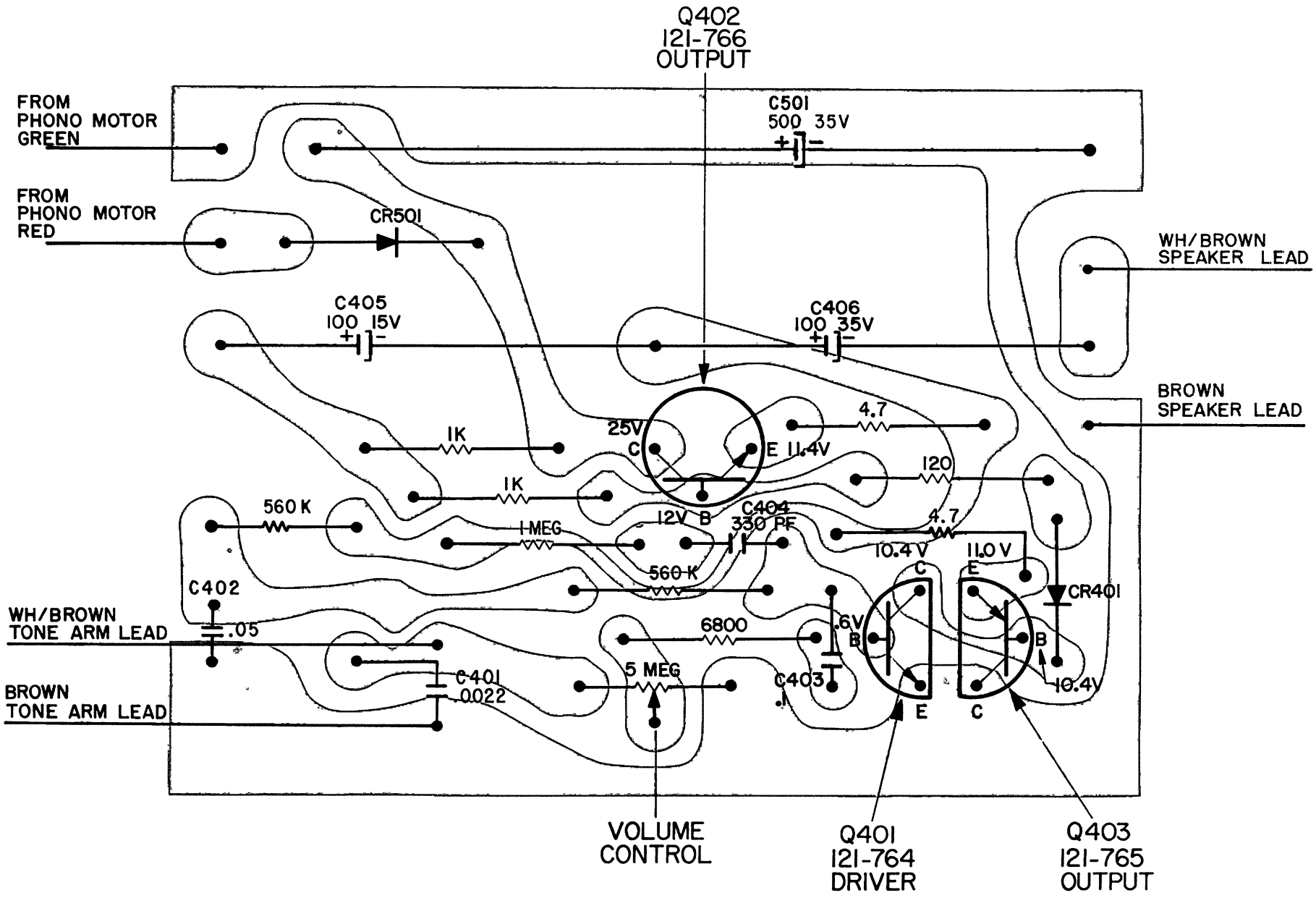


NOTE:
⊘ INDICATES WHITE OR YELLOW VOICE COIL POLARITY IDENTIFICATION DOT ON SPEAKER

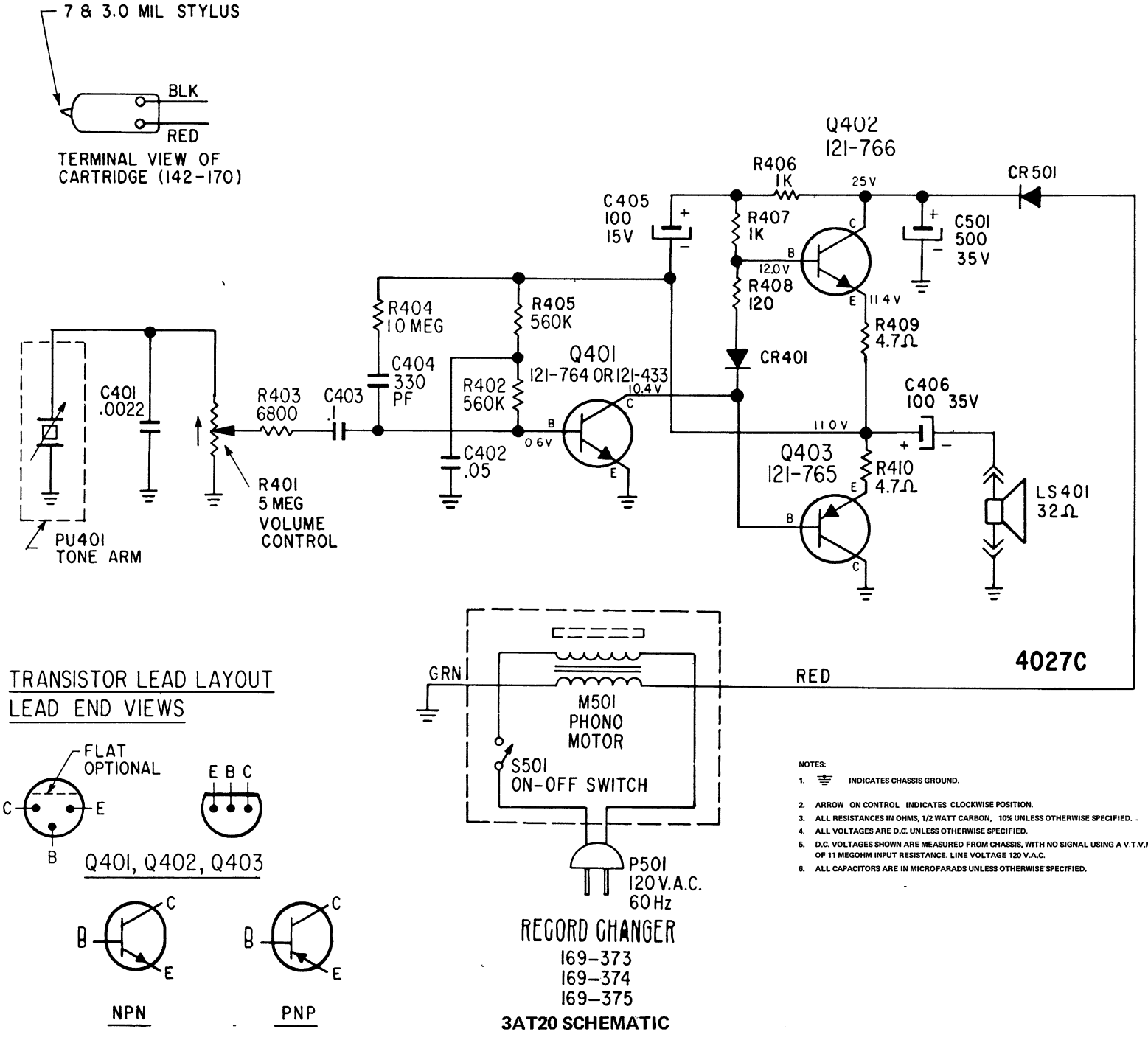
SPEAKER WIRING SCHEMATICS



3AT20 - CHASSIS WIRING AND COMPONENTS AS VIEWED FROM FOIL SIDE
EARLY PRODUCTION

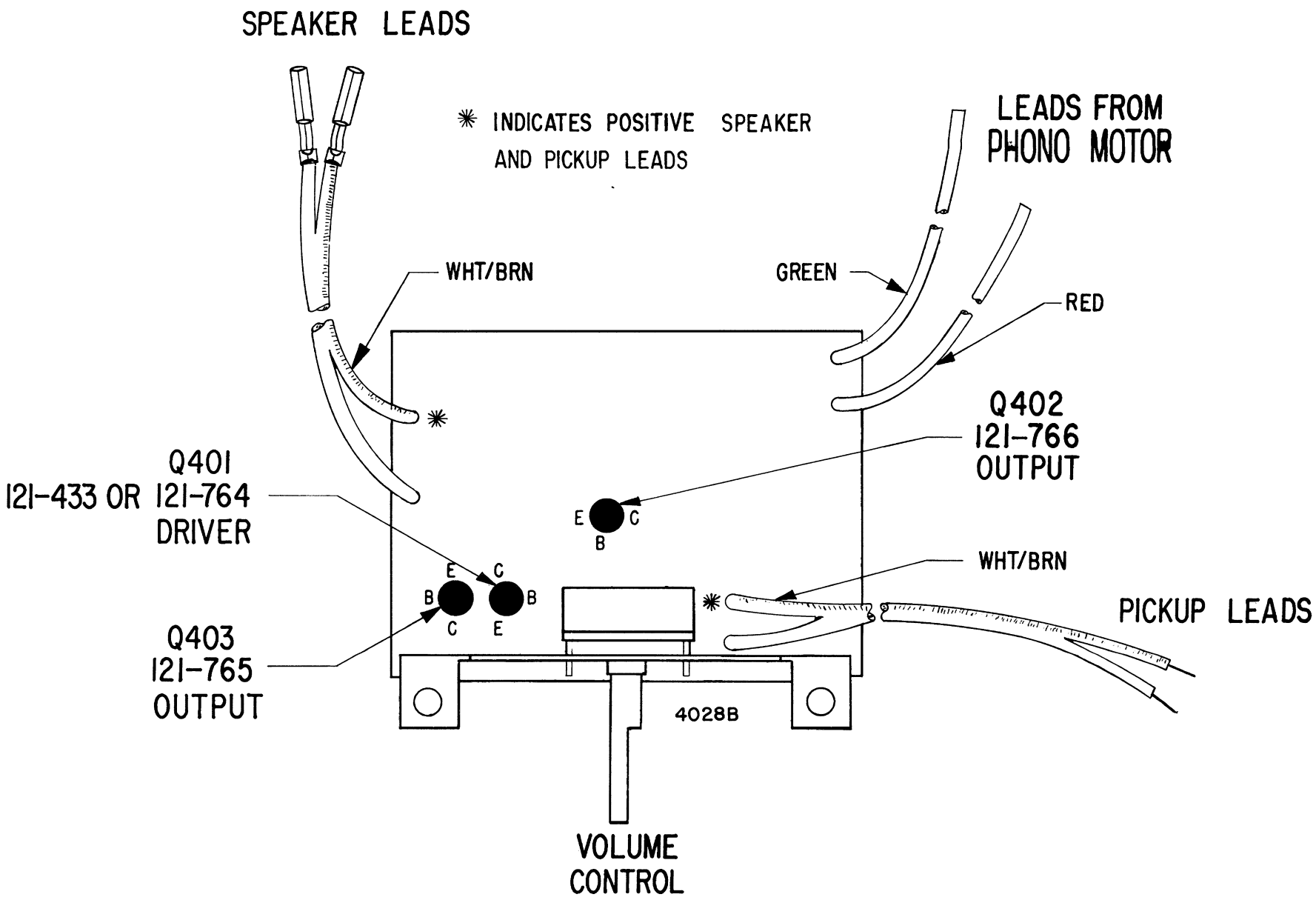


3AT20 CHASSIS WIRING AND COMPONENTS AS VIEWED FROM FOIL SIDE – LATER PRODUCTION



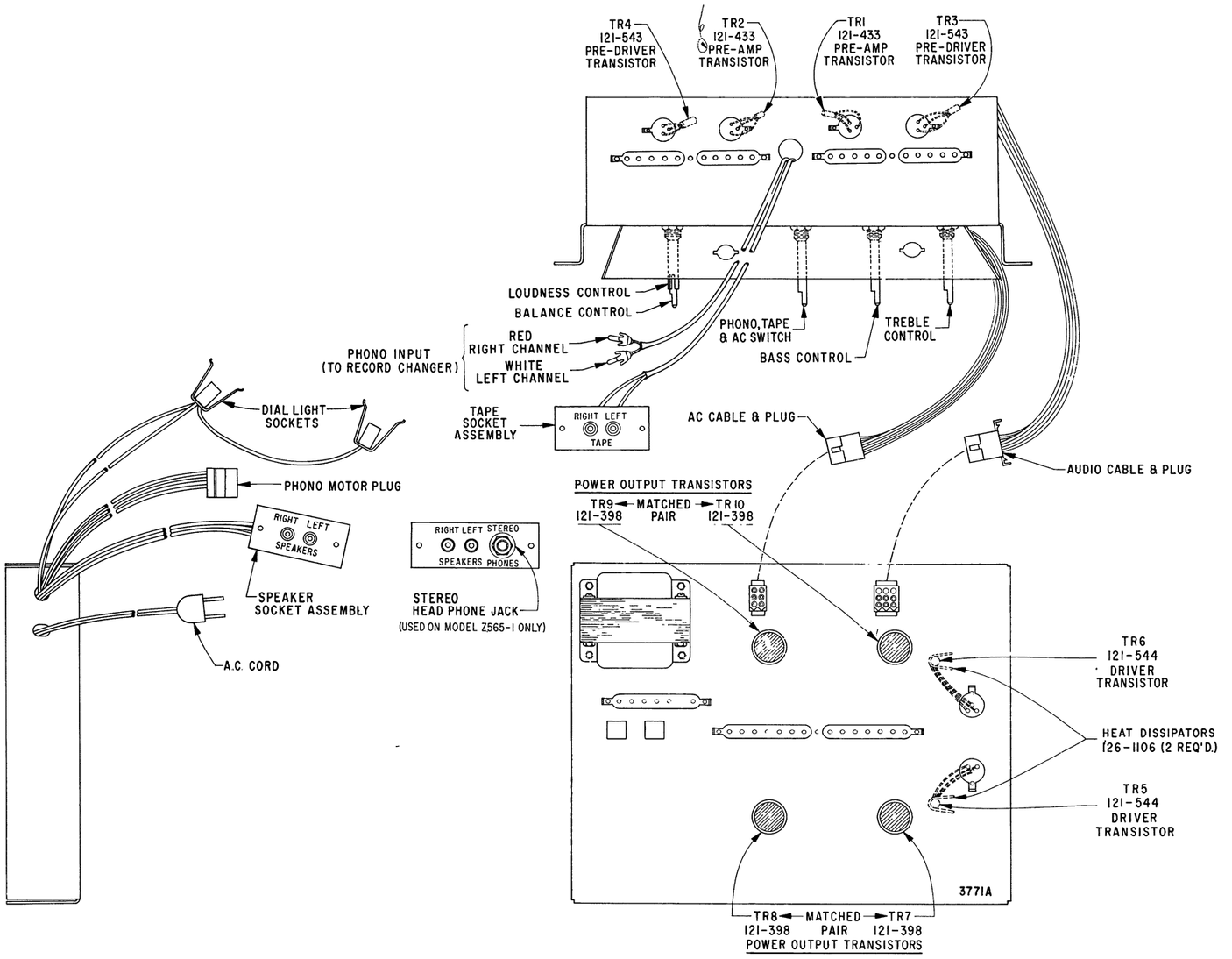
NOTES:

1. ⏚ INDICATES CHASSIS GROUND.
2. ARROW ON CONTROL INDICATES 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.

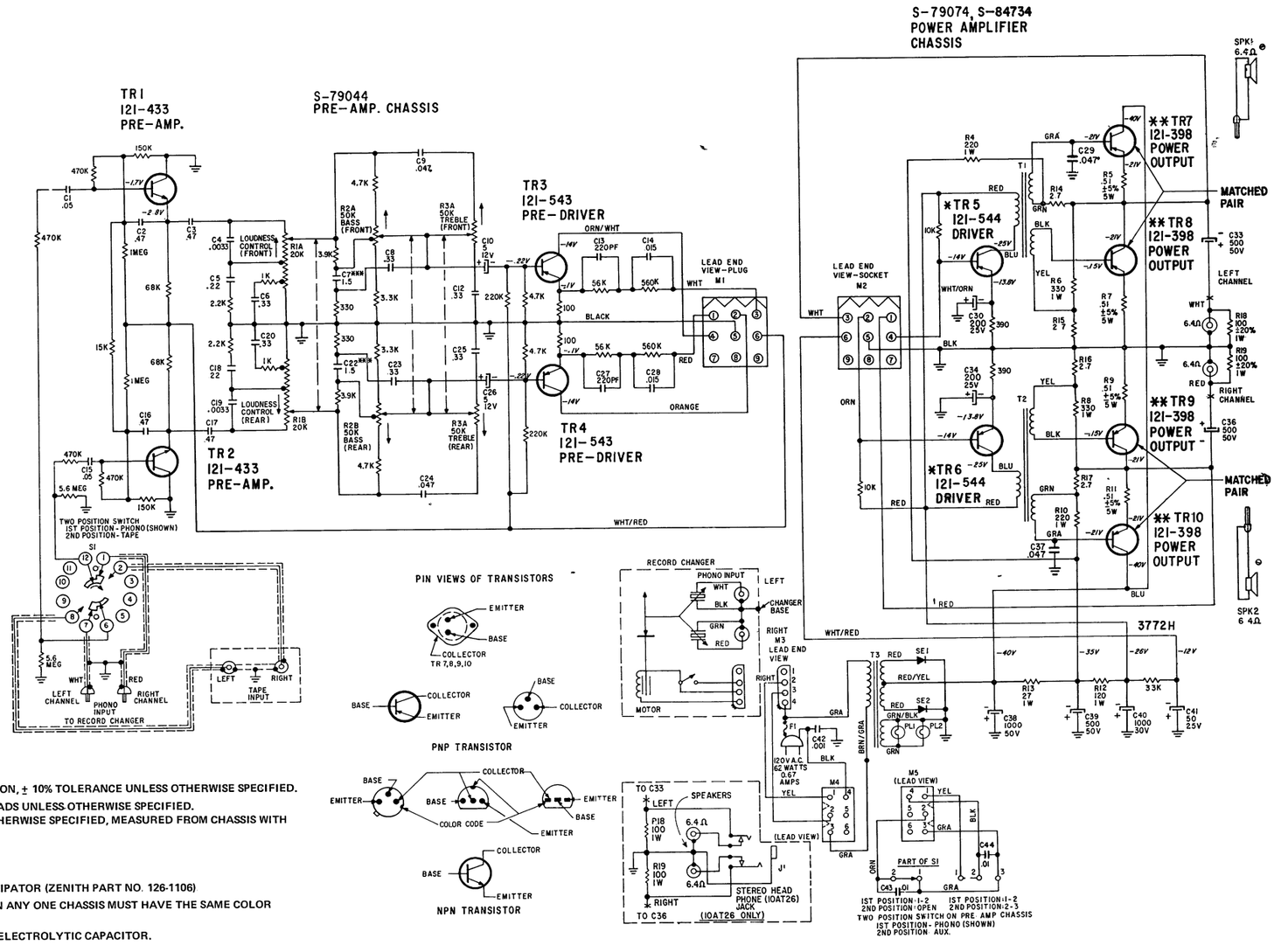


3AT20 CHASSIS LAYOUT

10AT26 AND 10YT26 - CHASSIS LAYOUT



10AT26 AND 10YT26 - SCHEMATIC



NOTES:

ALL RESISTORS ARE 1/2 WATT, CARBON, ± 10% TOLERANCE UNLESS OTHERWISE SPECIFIED.

ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

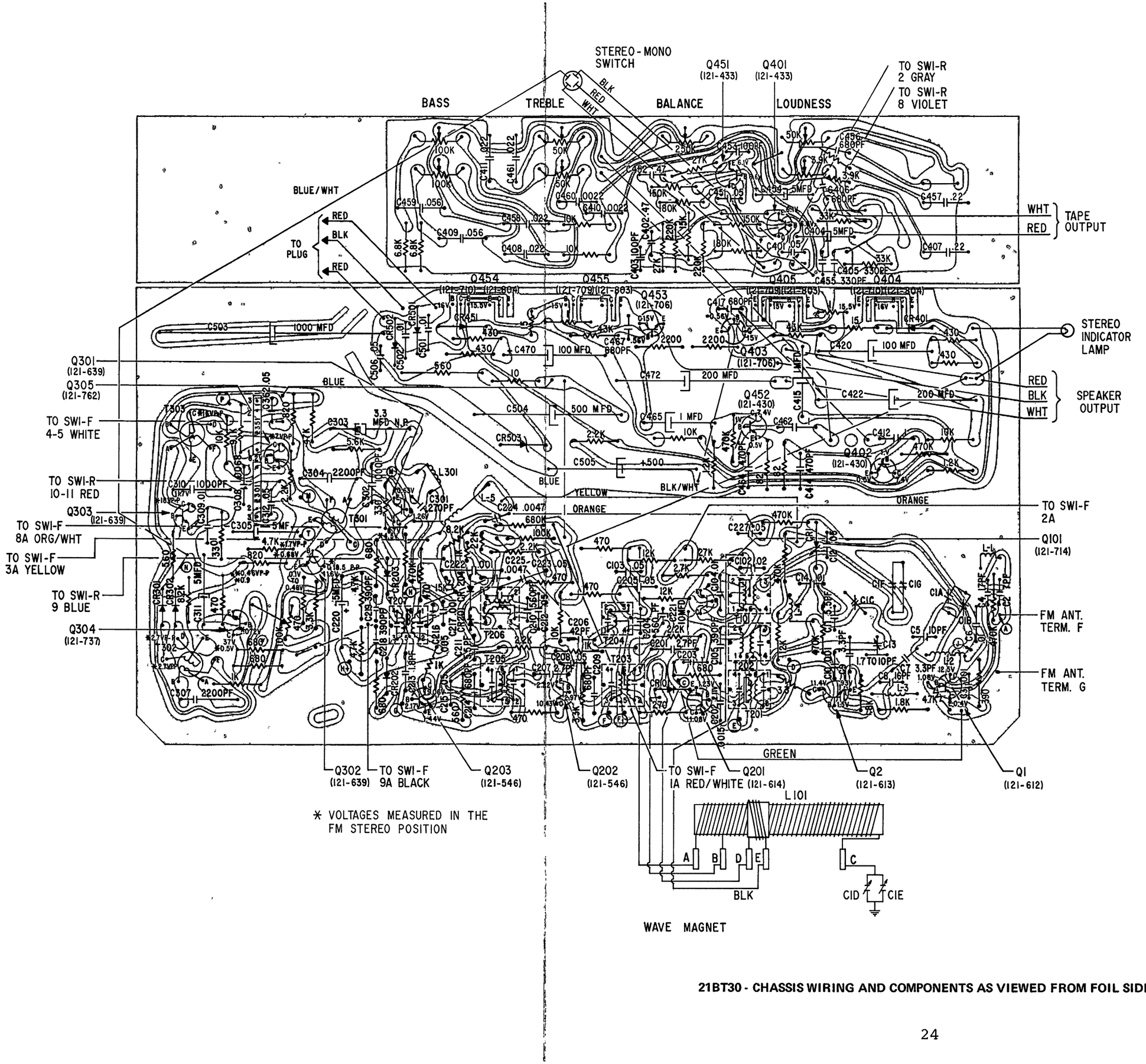
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED, MEASURED FROM CHASSIS WITH NO SIGNAL USING A VTVM.

⏚ DENOTES CHASSIS

* TR5 & 6 MUST USE HEAT DISSIPATOR (ZENITH PART NO. 126-1106)

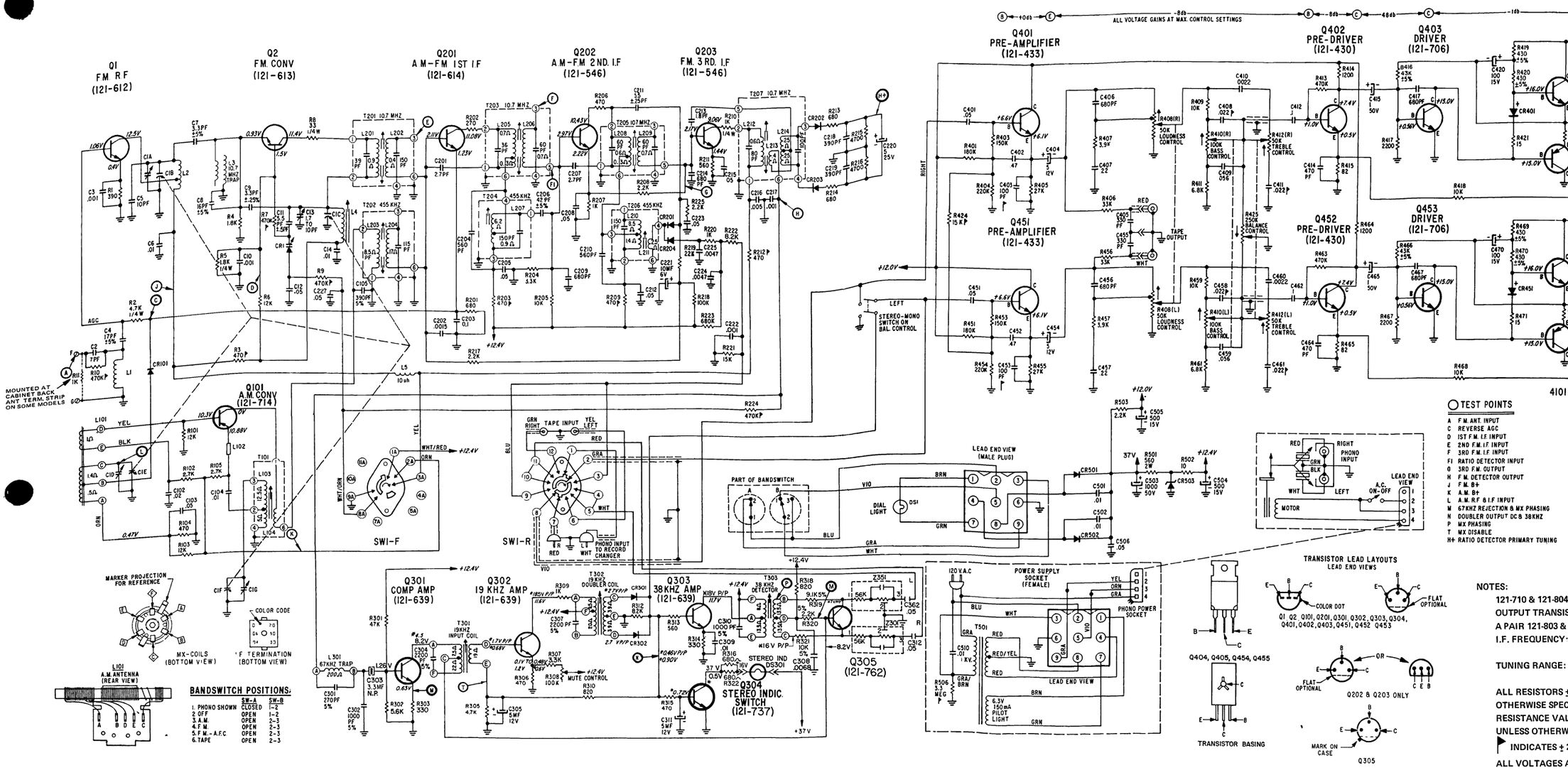
* * ALL 121-398 TRANSISTORS IN ANY ONE CHASSIS MUST HAVE THE SAME COLOR CODE.

* * * INDICATES NON-POLARIZED ELECTROLYTIC CAPACITOR.



* VOLTAGES MEASURED IN THE FM STEREO POSITION

21BT30 - CHASSIS WIRING AND COMPONENTS AS VIEWED FROM FOIL SIDE



TEST POINTS

- A F.M. ANT. INPUT
- C REVERSE AGC
- D 1ST 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 DETECTOR PRIMARY TUNING

NOTES:

121-710 & 121-804 ARE INSULATED FROM CHASSIS.
OUTPUT TRANSISTORS IN EACH CHANNEL SHALL BE A PAIR 121-803 & 121-804 OR 121-709 & 121-710.

I.F. FREQUENCY· A. M. 455 KHZ
F. M. 10.7 MHZ

TUNING RANGE: A. M. 540-1600 KHZ
F. M. 88-108 MHZ

ALL RESISTORS ± 10% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED.

RESISTANCE VALUES IN OHMS, CAPACITANCE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

▶ INDICATES ± 20%.

ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED, AND ARE MEASURED WITHOUT SIGNAL INPUT USING A VACUUM TUBE VOLTMETER.

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

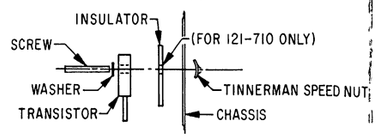
⏚ DENOTES CHASSIS.

21BT30 - SCHEMATIC

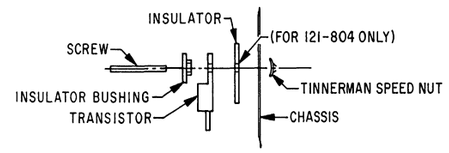
TRANSISTORS			
No.	PART No.	DESCRIPTION	
Q1	121-612	FM - R.F	
Q2	121-613	FM CONVERTER	
Q101	121-714	A M. CONVERTER	
Q201	121-614	A.M.-F.M. 1st I.F.	
Q202	121-546	A.M.-F.M. 2nd I.F.	
Q203	121-546	F.M. 3rd I.F.	
Q301	121-639	COMP. AMPLIFIER	
Q302	121-639	19 KHZ AMPLIFIER	
Q303	121-639	38 KHZ	
Q304	121-737	STEREO IND. SWITCH	
Q305	121-762	BI-PLEX DET	
Q401	121-433	PRE-AMPLIFIER	
Q451	121-433	PRE-AMPLIFIER	
Q402	121-430	PRE-DRIVER	
Q452	121-430	PRE-DRIVER	
Q403	121-706	DRIVER	
Q453	121-706	DRIVER	
* Q404	121-710	OUTPUT	A
	121-804	OUTPUT	B
* Q405	121-709	OUTPUT	C
	121-803	OUTPUT	D
* Q454	121-710	OUTPUT	A
	121-804	OUTPUT	B
* Q455	121-709	OUTPUT	C
	121-803	OUTPUT	D

* OUTPUT TRANSISTORS MAY BE ONE OF TWO GROUPS, EITHER (2) 121-709 PLUS (2) 121-710 OR (2) 121-803 PLUS (2) 121-804.

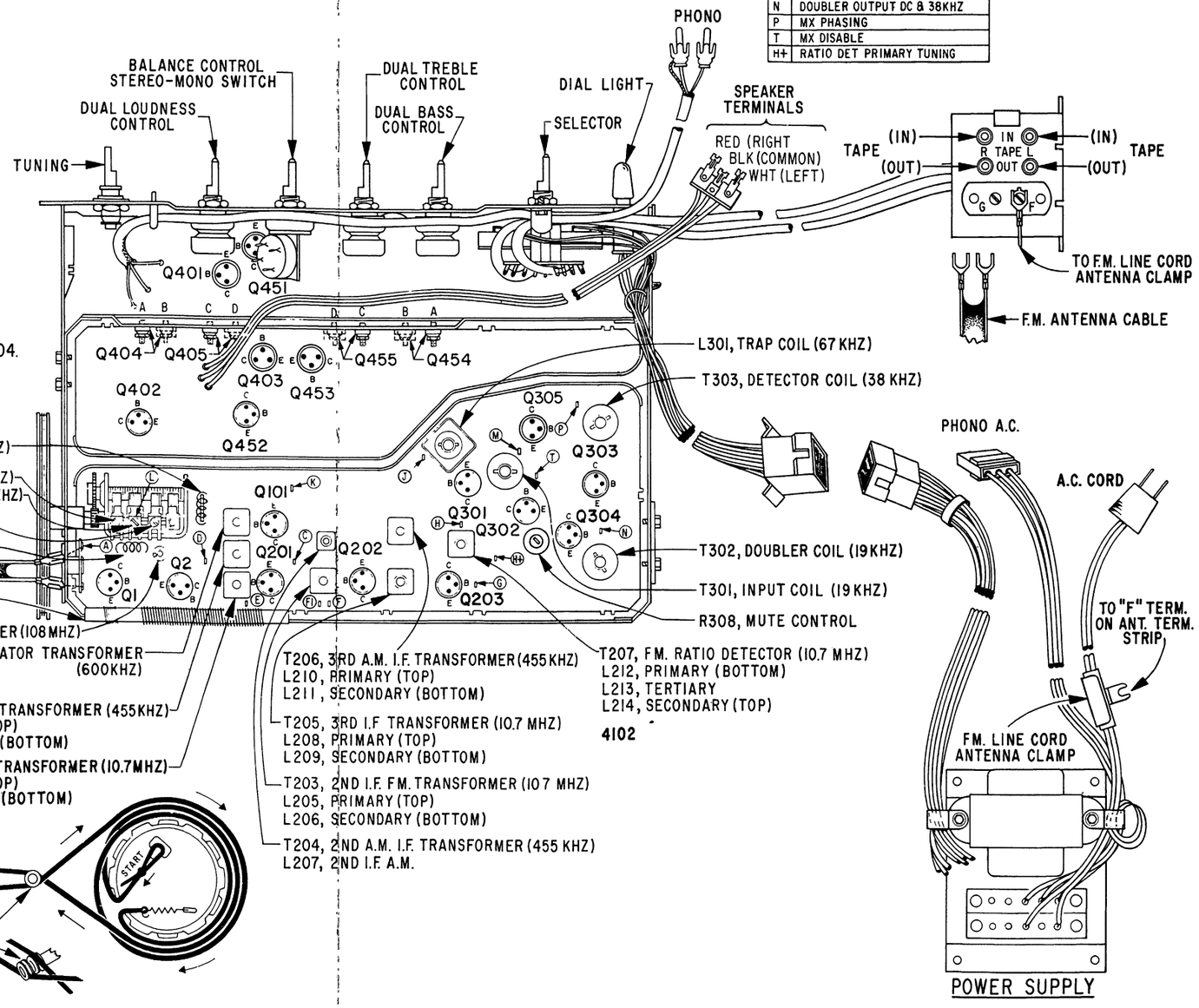
"GROUP A"
(121-709 & 121-710)

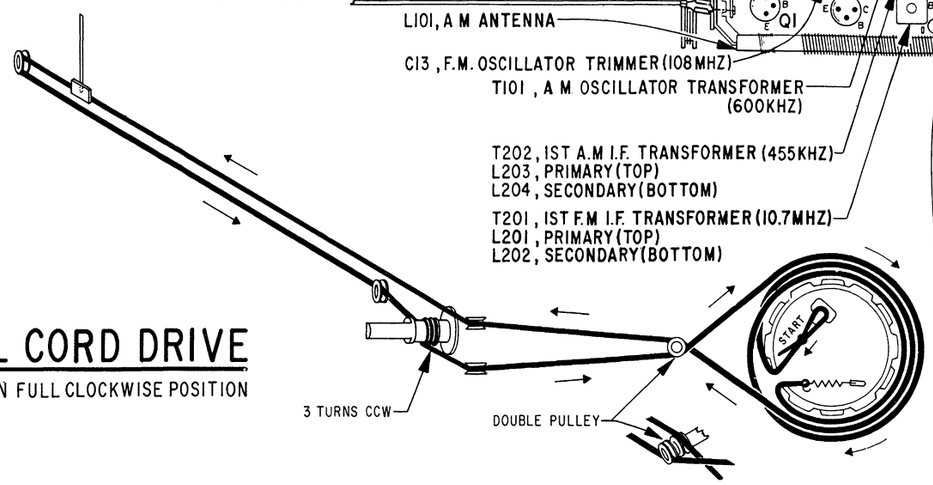


"GROUP B"
(121-803 & 121-804)



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



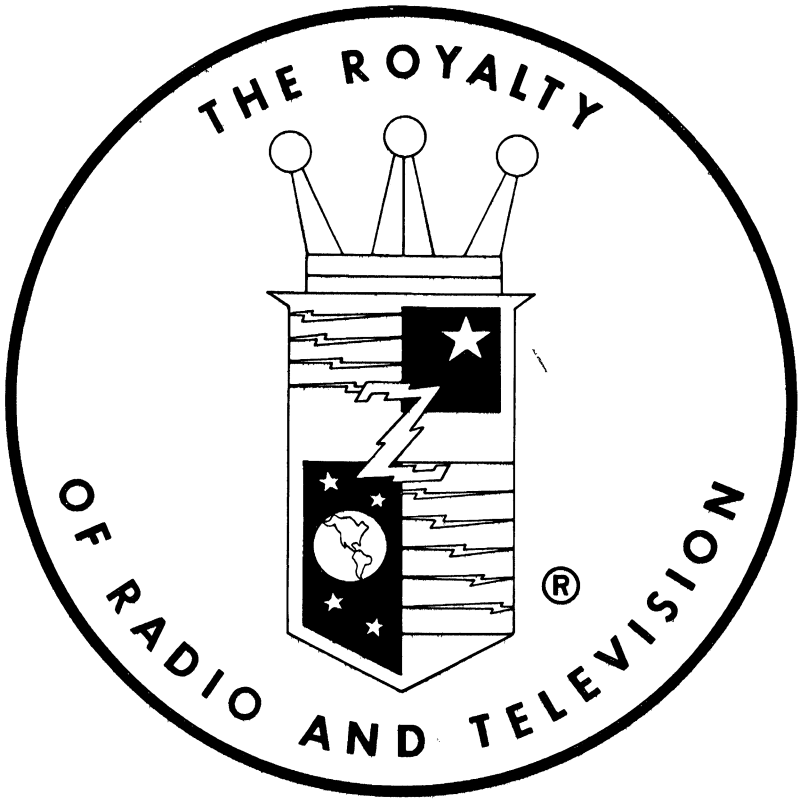


DIAL CORD DRIVE

SHOWN IN FULL CLOCKWISE POSITION

POWER SUPPLY

21BT30 - CHASSIS LAYOUT



ZENITH RADIO CORPORATION

1900 N. AUSTIN AVENUE CHICAGO, ILLINOIS 60639

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

923-592 HF 1852 RR 3/70 30M PRINTED IN U.S.A.