

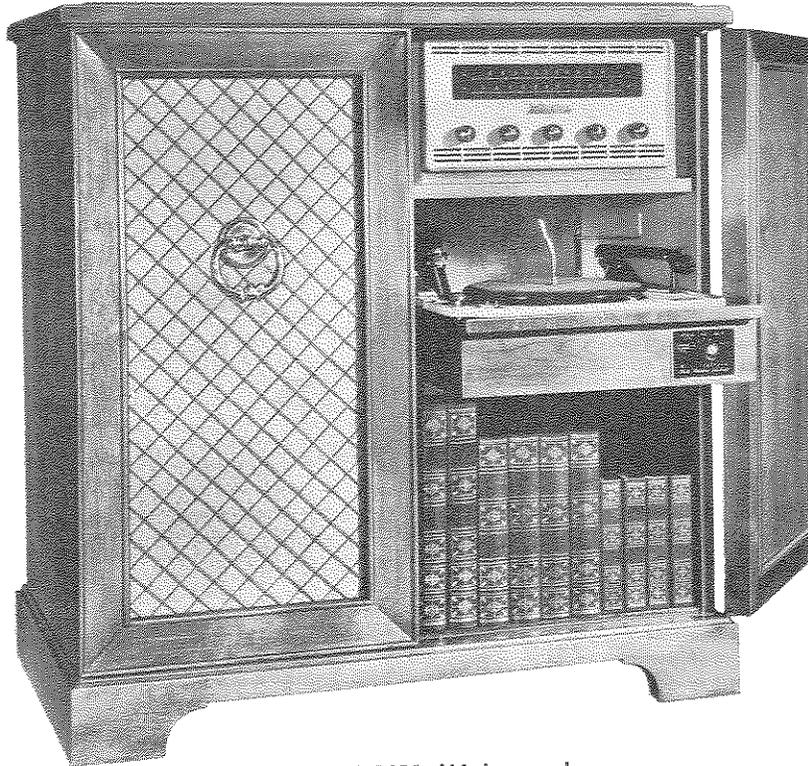


hallicrafters
SUPER-FIDELITY CONSOLE
AM/FM RADIO-PHONOGRAPH
SERVICE INSTRUCTIONS



the hallicrafters co.

MANUFACTURERS OF RADIO, TELEVISION AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.



Model 1621 (Mahogany)
Model 1622 (Maple)

92X2141

GENERAL DESCRIPTION

The Hallicrafters "Super-Fidelity" Console consists basically of a 12-tube AM-FM tuner, a separate 5-tube all-triode amplifier, and a Garrard Model RC-80 record changer (Hallicrafters Part No. 115A147). The "Super-Fidelity" Console is designed to operate on 105 to 125 volt, 60 cycle AC current and has a total power consumption of 241 watts. The bass reflex speaker enclosure of the "Super-Fidelity" Console houses a dual speaker system consisting of a 15-inch "woofer" speaker and a horn type "tweeter" speaker. A special frequency-dividing network divides the reproduced audio spectrum between the two speakers so that the low tones are handled by the "woofer" and the higher frequencies by the "tweeter". Two built-in antennas, a stick-loop for AM and a folded dipole for FM, provide excellent performance and eliminate the need for any external antenna in most locations.

The RC-80 record changer plays up to ten 7", 10" or 12" records (not mixed) at all three speeds - 78, 45 and 33-1/3 r.p.m., and turns of automatically after the last record is played. The pickup arm contains a variable reluctance magnetic cartridge with a replaceable dual-tipped sapphire stylus. The equalized pre-amplifier required for this cartridge is located in the AM-FM tuner. The five-position Hallicrafters Studio Recording Adjustment on the front of the changer provides an adjustable playback response for correcting the recording characteristics on all types of foreign and domestic recordings.

This manual contains service information for the AM-FM tuner, the amplifier, and the Hallicrafters Studio Recording Adjustment unit only. Service information for the RC-80 record changer is given in a separate service manual, Hallicrafters Part No. 94X1259.

AMPLIFIER TECHNICAL SPECIFICATIONS

POWER OUTPUT: 10 watts rated; 20 watts max.

FREQUENCY RESPONSE:

- ± 1 db, 6 to 100,000 cps at 0.5 watt output.
- ± 1 db, 9 to 100,000 cps at 10 watt output.

TOTAL HARMONIC DISTORTION: Less than 0.14% at 10 watt output.

INTERMODULATION DISTORTION: Less than 0.17% at 0.5 watt output; Less than 1.8% at 10 watt output (40 and 12,000 cps; 4:1)

HUM AND NOISE LEVEL: 80 db down at 10 watt output; 83 db down at 20 watt output.

SENSITIVITY: 1.25 volts RMS for 10 watt output.

OUTPUT INTERNAL IMPEDANCE: 0.5 ohm on 16 ohm tap.

OUTPUT LOAD IMPEDANCE: 8 and 16 ohms

DAMPING FACTOR: 32:1

POWER CONSUMPTION: 105-125 volts, 60 cycles AC; 150 watts.

TUBE COMPLEMENT: 12AU7 amp. and inverter, 12AU7 push-pull driver, (2) KT-66 audio output, 5V4G rectifier.

AM-FM TUNER

TECHNICAL SPECIFICATIONS

FREQUENCY RANGE: AM - 535-1750 KC
FM - 88-108 MC

ANTENNA: AM - Built-in stick loop with provision for external antenna. FM - 300 ohm input plus built-in folded dipole.

INPUTS: Phono input for crystal or magnetic pickups. Auxiliary input for TV, tape recorder, etc. Built-in equalized pre-amplifier for magnetic pickups.

AUDIO AMPLIFIER GAIN: Phono input jack to Amplifier output jack; crystal 6 db, magnetic 30 db plus bass compensation below 500 cps.

OUTPUTS: Up to 1.5 volts from cathode follower Amplifier output jack. Cathode follower output from detector also provided.

SENSITIVITY: FM - 7 microvolts for 30 db quieting.
AM - 20 microvolts for 10 db signal-to-noise ratio.

FM DRIFT: ± 25 KC after 1 minute warmup.

TONE COMPENSATION: Treble variable up to 9 db boost or 15 db cut at 15,000 cps. Bass variable up to 13 db boost or 15 db cut at 20 cps.

HUM AND NOISE LEVEL: For 1.5 volt output at Amplifier output jack; AM 52 db, FM 62 db, Phono and Auxiliary 56 db—below rated output.

OSCILLATOR RADIATION: Less than 2 millivolts into 300-ohm antenna. Tuning gang and chassis fully shielded to minimize radiation.

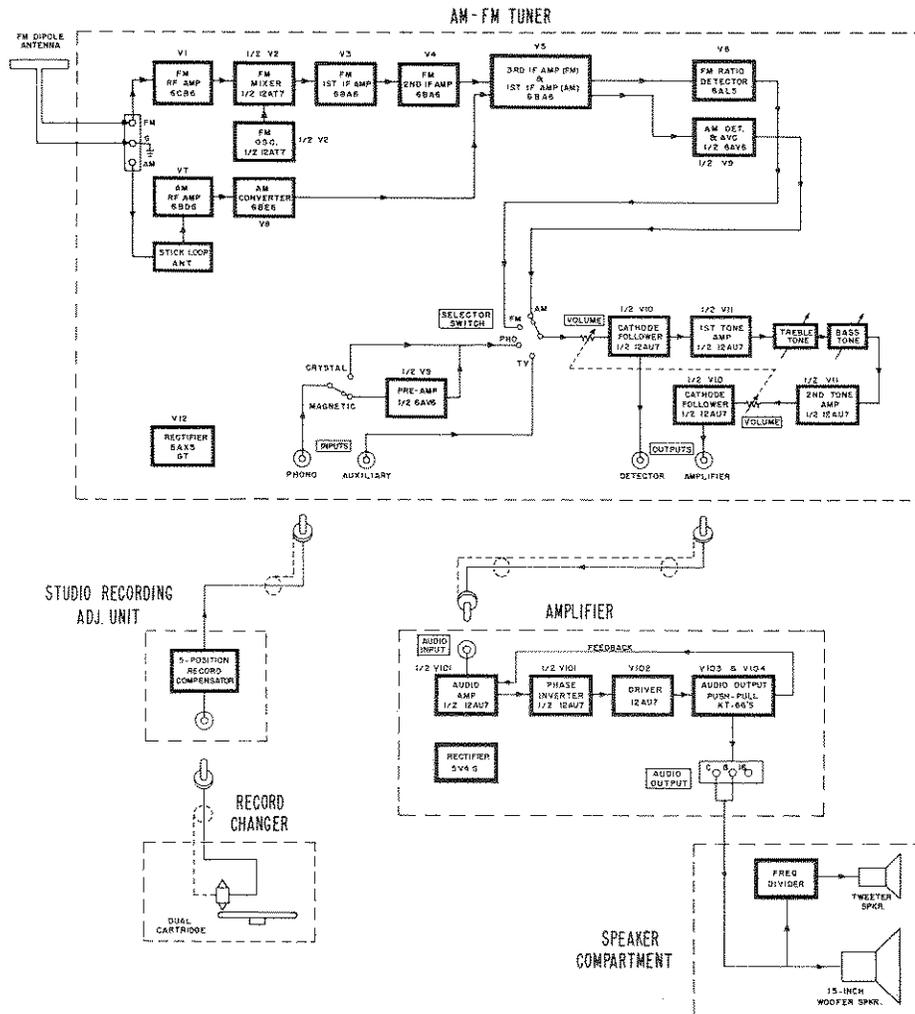
INTERMEDIATE FREQUENCIES: FM - 10.7 MC
AM - 455 KC

BANDWIDTH: FM - 200 KC; AM - 12 KC

AC OUTLETS: Dual at 117 volts, 4 amps total.

POWER CONSUMPTION: 105-125 volts 60 cycles AC; 75 watts.

TUBES: 11 tubes plus rectifier



92D2173

Fig. 1. Block Diagram of "Super-Fidelity" Console

RECORD CHANGER SERVICE DATA

Complete service information for the Garrard RC-80 automatic record changer (Hallicrafters Part No. 115A147) is given in a separate service manual, Hallicrafters Part No. 94X1259.

AMPLIFIER SERVICE DATA

REMOVAL OF AMPLIFIER FROM CABINET - Before removing the amplifier from the cabinet, disconnect the speaker leads and unplug the power and audio input cables. (See Fig. 2.) Remove the right hand rear panel of the cabinet and then remove the four mounting screws located on the underside of the amplifier mounting shelf.

LINE VOLTAGE ADJUSTMENT - The amplifier is designed to operate on 117 volt, 60 cycle AC current. Continuous operation at higher line voltage will shorten the life of the KT-66 audio output tubes. Therefore, in installations where the line voltage is 3 volts or more higher than 117 volts, the jumper lead to the three-terminal strip located on the underside of the chassis should be disconnected from terminal "N" and connected to terminal "H". In installations where the line voltage is 105 volts or lower, connect the jumper lead to terminal "L".

CAUTION - Operation of the amplifier with continuous sine-wave output of 15 watts or more will often seriously reduce the life of one or both of the KT-66 audio output tubes. Never operate the amplifier with only one output tube in place.

BALANCE AND BIAS ADJUSTMENTS - The BALANCE and BIAS adjustments have been carefully adjusted at the factory for correct operation. If either KT-66 audio output tube is replaced, it will be necessary to readjust these controls as outlined below.

- a. Disconnect the jumper on the two-terminal strip located underneath the chassis. Connect a DC voltmeter between the two terminals on this strip. Adjust the BALANCE control (see Fig. 2) for a zero reading on the voltmeter using the lowest voltmeter scale.

NOTE: In some instances, slight differences in operating characteristics of the two KT-66 output tubes may make it impossible to obtain a zero reading. If a reading below 1.0 volt cannot be obtained, it will be necessary to try several tubes until a pair of tubes is found which will give a reading of 1.0 volt or less. Tube substitution is required ONLY if a reading of 1.0 volt or less cannot be obtained.

- b. Replace the jumper on the two-terminal strip. Connect the positive lead of the DC voltmeter to the jumper and the negative lead to the chassis. Adjust the BIAS control (see Fig. 2) until the meter reads + 38 volts.

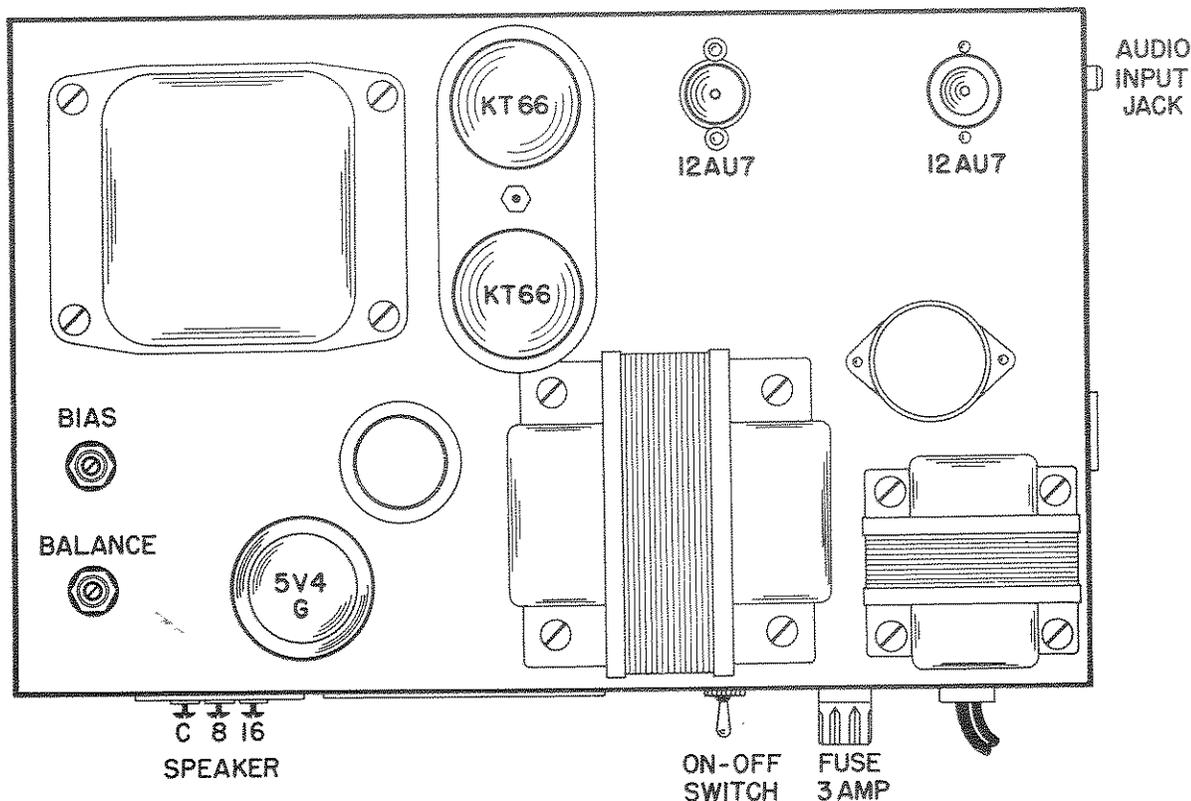
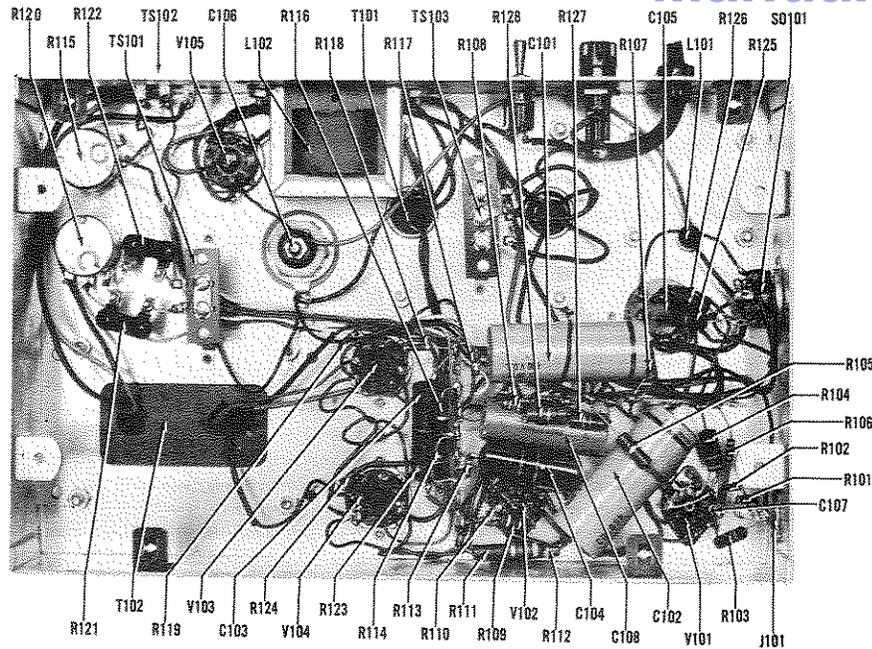


Fig. 2. Amplifier Top View



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Fig. 3. Amplifier Bottom View

AM-FM TUNER SERVICE DATA

REMOVAL OF TUNER FROM CABINET - Before removing the tuner from the cabinet, disconnect all cables attached to the tuner to prevent damage. Remove the four mounting screws on the underside of the mounting shelf and then slide the tuner out through the front of the cabinet.

DIAL LAMP REPLACEMENT - Refer to Fig. 4 for the location of the two dial lamps used in the tuner. To gain access to the lamps, it will be necessary to first remove the tuner from the cabinet as outlined above. Then remove the front panel by removing the front control knobs and the two screws on either side of the front panel. Make replacement with a type 44 (blue bead) pilot lamp.

AUXILIARY INPUT JACK - The Auxiliary input jack (see Fig. 8) may be connected to the output of a tape recorder or the TV sound detector in a television receiver to reproduce tape recordings or TV sound through the "Super-Fidelity" Console. When using this jack, set the Selector control on the front panel at "AUX".

DETECTOR OUTPUT JACK - The Detector output jack (see Fig. 8) may be connected to the input of a tape, disc, or wire recorder to record radio broadcasts. When this jack is used, the entire audio system of the "Super-Fidelity" Console is bypassed, including the amplifier and tone controls. The amount of signal fed into the recorder may be regulated by means of the Volume control on the front panel.

AM-FM TUNER ALIGNMENT INSTRUCTIONS

- Be sure both the tuner and the signal generator are thoroughly warmed up before starting alignment.
- Use an AM signal generator and a VTVM for all steps except Step 8. For Step 8, it will be necessary to connect the amplifier to the tuner and then connect an output meter across the amplifier speaker terminals.
- FM antenna is disconnected during alignment.
- Use a non-metallic alignment tool.
- Set Bass and Treble controls in mid-position and Volume control at maximum.
- AM and FM alignment may be made independent of one another.
- Use lowest output setting of signal generator which gives satisfactory reading on meter.
- Refer to Figs. 4 and 5 for location of all alignment adjustments. Adjustments are also shown on schematic diagram.

AM-FM TUNER ALIGNMENT PROCEDURE

Step	Signal Generator Connections	Generator Frequency	Selector Switch Setting	Receiver Dial Setting	Output Connections	Adjust
FM IF & RATIO DETECTOR ALIGNMENT						
1	Disconnect C-5 at pin #2 of V-2. Connect high side of generator thru .005 mfd. capacitor to pin #2. Low side to pin #3.	10.7 MC	FM	90 MC	VTVM probe to point A (FM AVC). Common lead to chassis.	B (ratio detector pri.), C-D (2nd IF) and E-F (1st IF) for maximum. Keep reducing generator output to keep VTVM reading at approx. 1.0 volt DC.
2	Same as Step 1.	10.7 MC	FM	90 MC	VTVM probe to point G (FM audio). Common lead to chassis.	H (ratio detector sec.) for zero reading on VTVM. The correct zero point is between a positive and negative maximum.
FM RF ALIGNMENT						
3	Reconnect C-5. Connect high side of generator thru 300-ohm resistor to "FM" terminal at rear of chassis. Low side to "G".	90 MC	FM	90 MC	VTVM probe to point A. Common lead to chassis.	FM oscillator coil, FM RF coil, and FM antenna coil for maximum by squeezing or spreading the turns of the coils.
4	Same as Step 3.	105 MC	FM	105 MC	Same as Step 3.	I (oscillator trimmer) and J (antenna trimmer) for maximum. Then adjust K (RF trimmer) for maximum, while rocking gang. Repeat procedure several times to insure maximum sensitivity.
AM IF ALIGNMENT						
5	Disconnect C-37 at pin #7 of V-8. Connect high side of generator thru .01 mfd. capacitor to pin #7. Low side to chassis, close to tube.	455 KC	AM	1000 KC	VTVM probe to point L (AM AVC). Common lead to chassis.	M-N (2nd IF) and O-P (1st IF) for maximum.
AM RF ALIGNMENT						
6	Reconnect C-37. Construct a loop of a few turns of wire and connect it to the generator. Loosely couple this loop to the AM stick loop antenna.	600 KC	AM	600 KC	Same as Step 5.	R (oscillator slug) and S (RF slug) for maximum.
7	Same as Step 6.	1400 KC	AM	1400 KC	Same as Step 5.	T (oscillator trimmer), U (RF trimmer) and V (antenna trimmer) for maximum.
10 KC WHISTLE FILTER ADJUSTMENT						
8	Same as Step 6.	1400 KC (10 KC AM modulated)	AM	1400 KC	Output meter across amplifier speaker terminals.	W (whistle filter trimmer) for null.

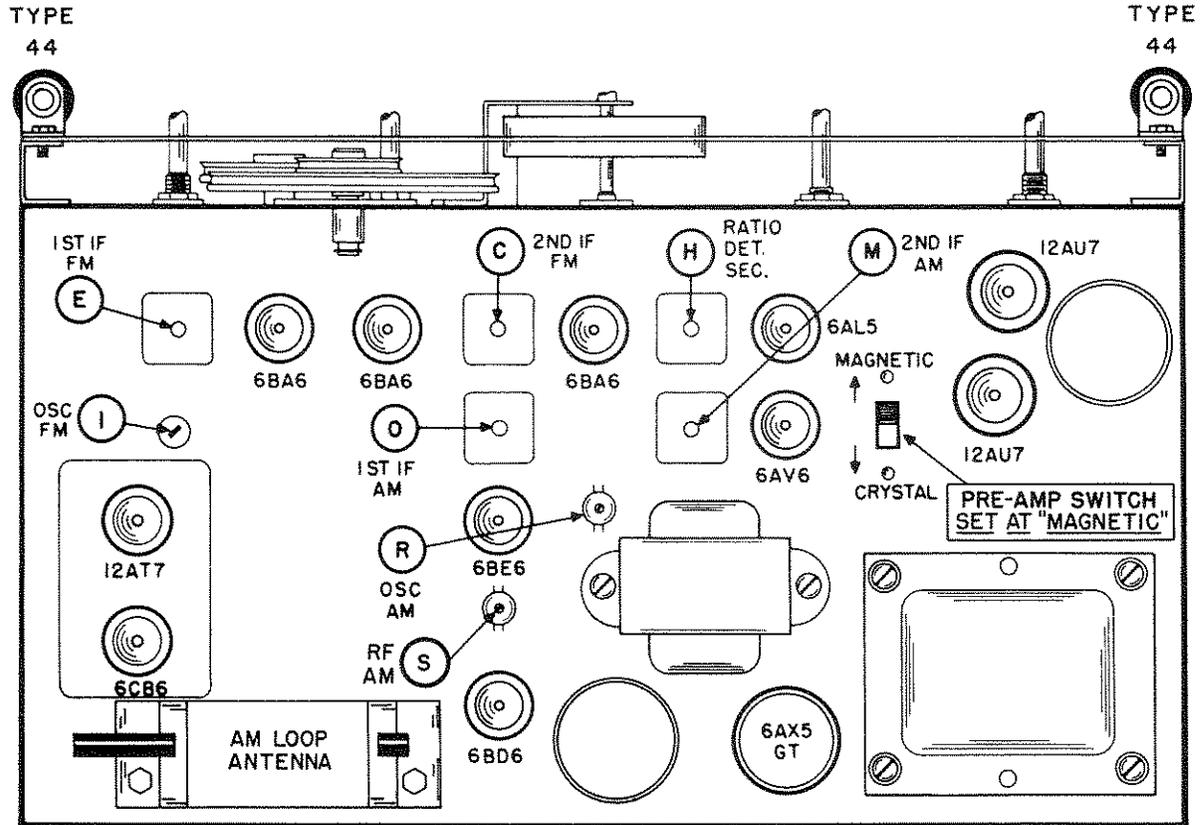


Fig. 4. Top View of Tuner Showing Location of Alignment Adjustments and Tubes

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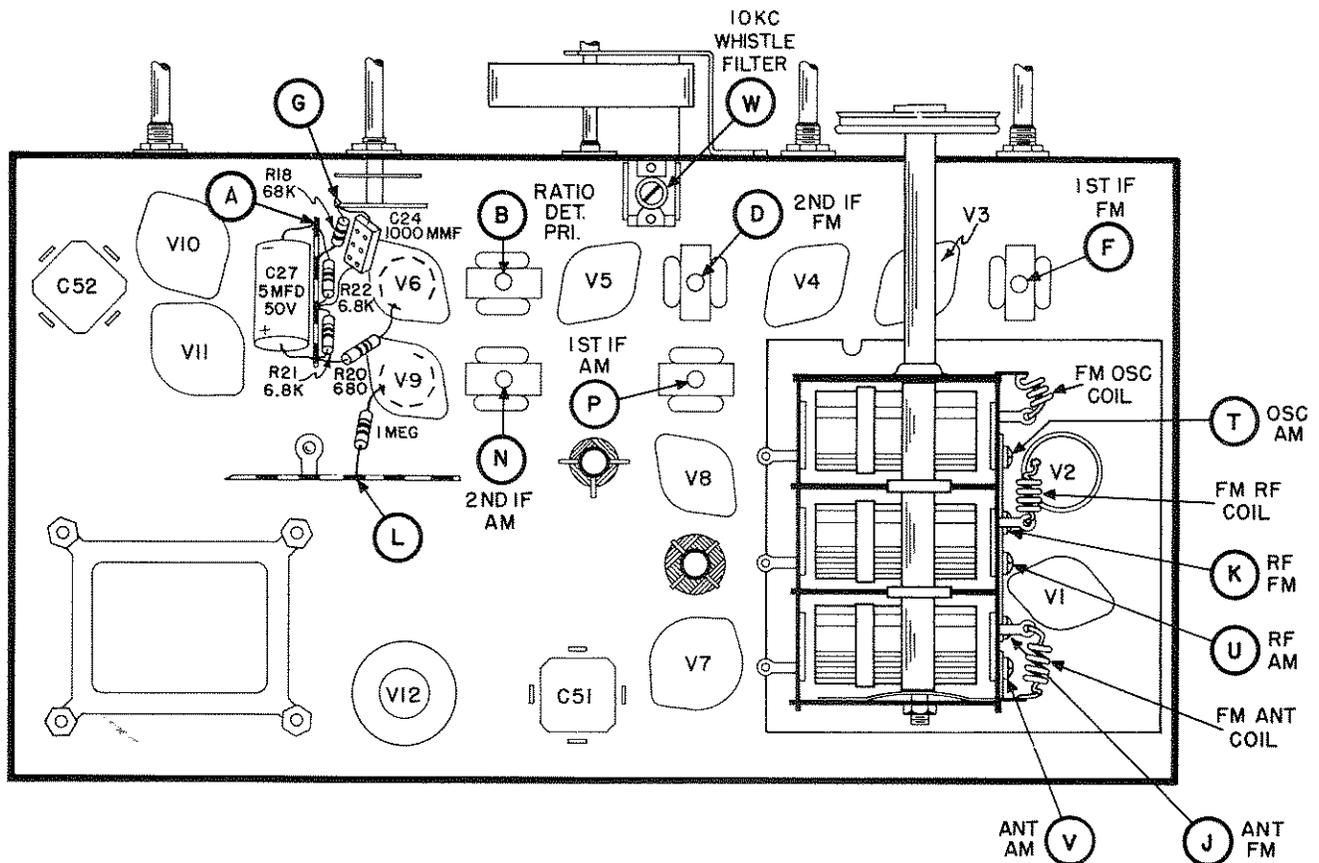


Fig. 5. Bottom View of Tuner Showing Location of Alignment Adjustments

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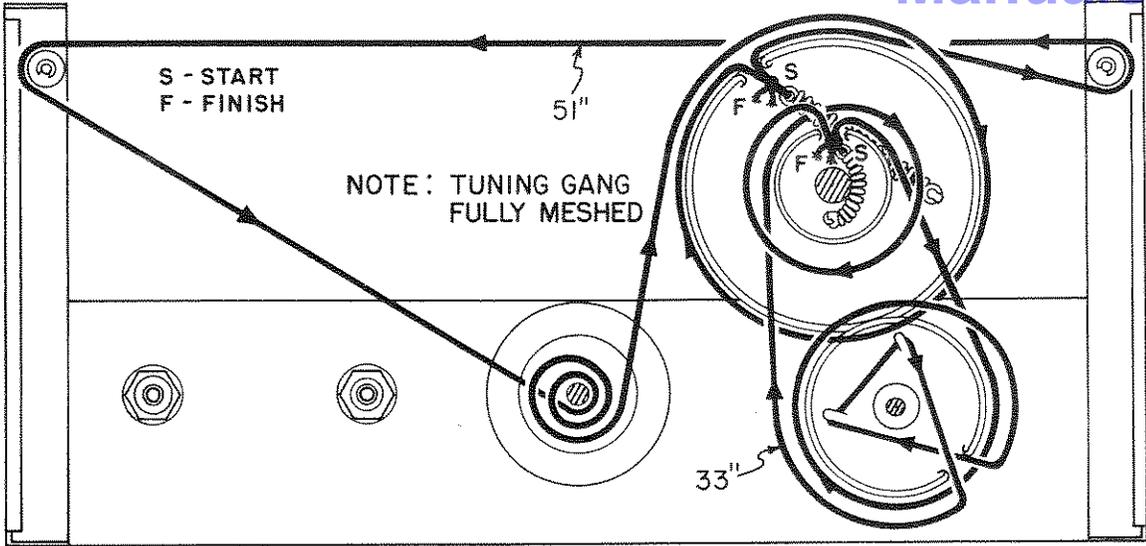
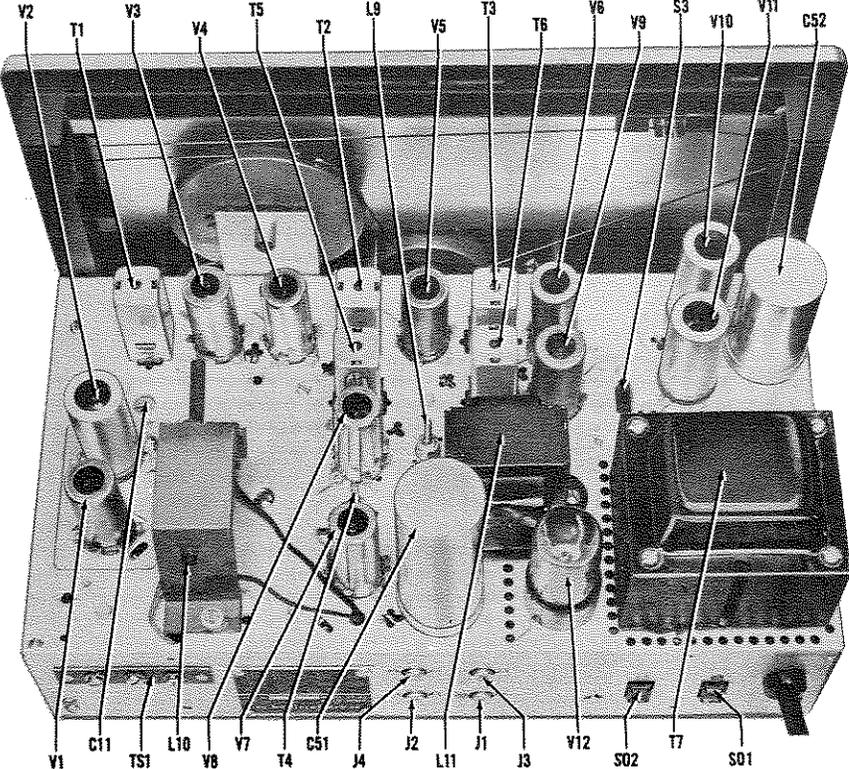


Fig. 6. Tuner Dial Cord Stringing

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Fig. 7. Top View of Tuner Showing Component Location

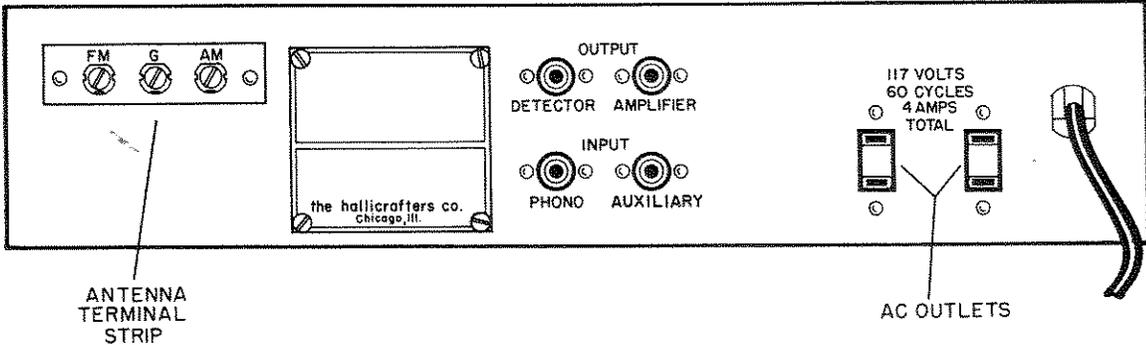


Fig. 8. Tuner Rear View

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HALLICRAFTERS STUDIO RECORDING ADJUSTMENT UNIT

In the cutting of commercial recordings, the bass notes are de-emphasized (made weaker) and the treble notes are emphasized (made stronger) to reduce certain undesirable effects encountered in recording. Curve A in Fig. 10 is a typical recording curve showing the bass de-emphasis and the treble emphasis characteristics. Thus, in order to properly reproduce records, it is necessary for the associated amplifying equipment to provide a "reverse" characteristic incorporating bass emphasis and treble de-emphasis. This "reverse" curve is called the playback curve and is shown in Curve B of Fig. 10. In the "Super-Fidelity" Console, this is accomplished by means of the Hallicrafters Studio Recording Adjustment on the front of the changer, and the built-in equalized pre-amplifier. The bass portion of the playback curve is formed by the pre-amplifier while the treble portion is controlled by the Studio Recording Adjustment. Thus, the overall result when playing a record through the set is a "flat" response as shown in Curve C of Fig. 10, provided the Bass and Treble tone controls are in their center positions.

The recording characteristics and the amount of bass de-emphasis and treble emphasis vary considerably from one record manufacturer to another. To compensate for these variations, the Hallicrafters Studio Recording Adjustment has five positions which provide the correct "playback response" for all of the popular commercial record types. The positions of the Studio Recording Adjustment are listed below along with a detailed description of each. It should be noted that the "playback response" in any of the five positions may be modified or supplemented by the use of the Bass and Treble tone controls.

EUROPEAN AND COLUMBIA LP 33 - The LP 33 (Long Playing) position is intended basically for use with Columbia 33-1/3 RPM records, modern Columbia 78 RPM records, and London and other European records.

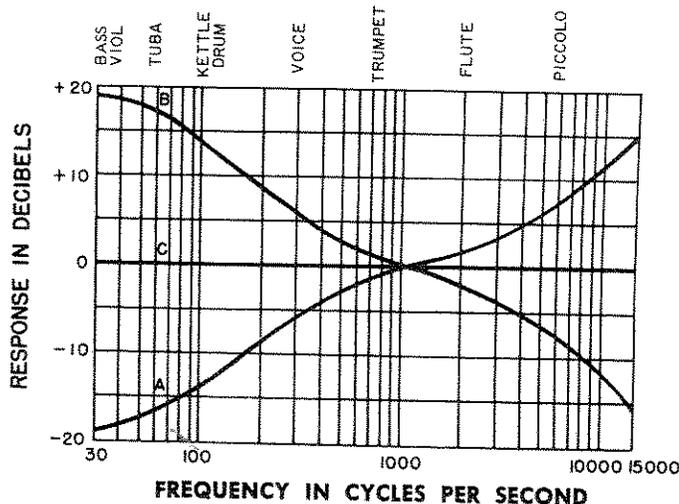


Fig. 10. A. Typical Recording Curve.
B. Playback Curve of Console.
C. Response from Records
thru Console

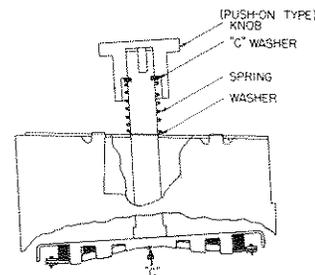
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VICTOR 45 - AES - The AES (Audio Engineering Society) playback response has been proposed as a compromise response for all modern recordings. It has somewhat greater bass and treble response than the LP position above, and may be used in preference to the LP position when such increased response is desired. This position is recommended for most types of records, including the RCA Victor 45, 33-1/3 and 78 RPM.

FLAT - The Flat position has no de-emphasis of the treble response, which results in maximum high-frequency response. Records having low background noise may be reproduced in this position with maximum brilliance.

NEW 78 - This position is intended for 78 RPM records that are in good condition, i.e., where the record scratch and background noise are not excessive.

OLD 78 - This position is intended for early 78 RPM records having a high noise level and a limited high frequency response.



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Fig. 11. Side View of Pickup Cartridge

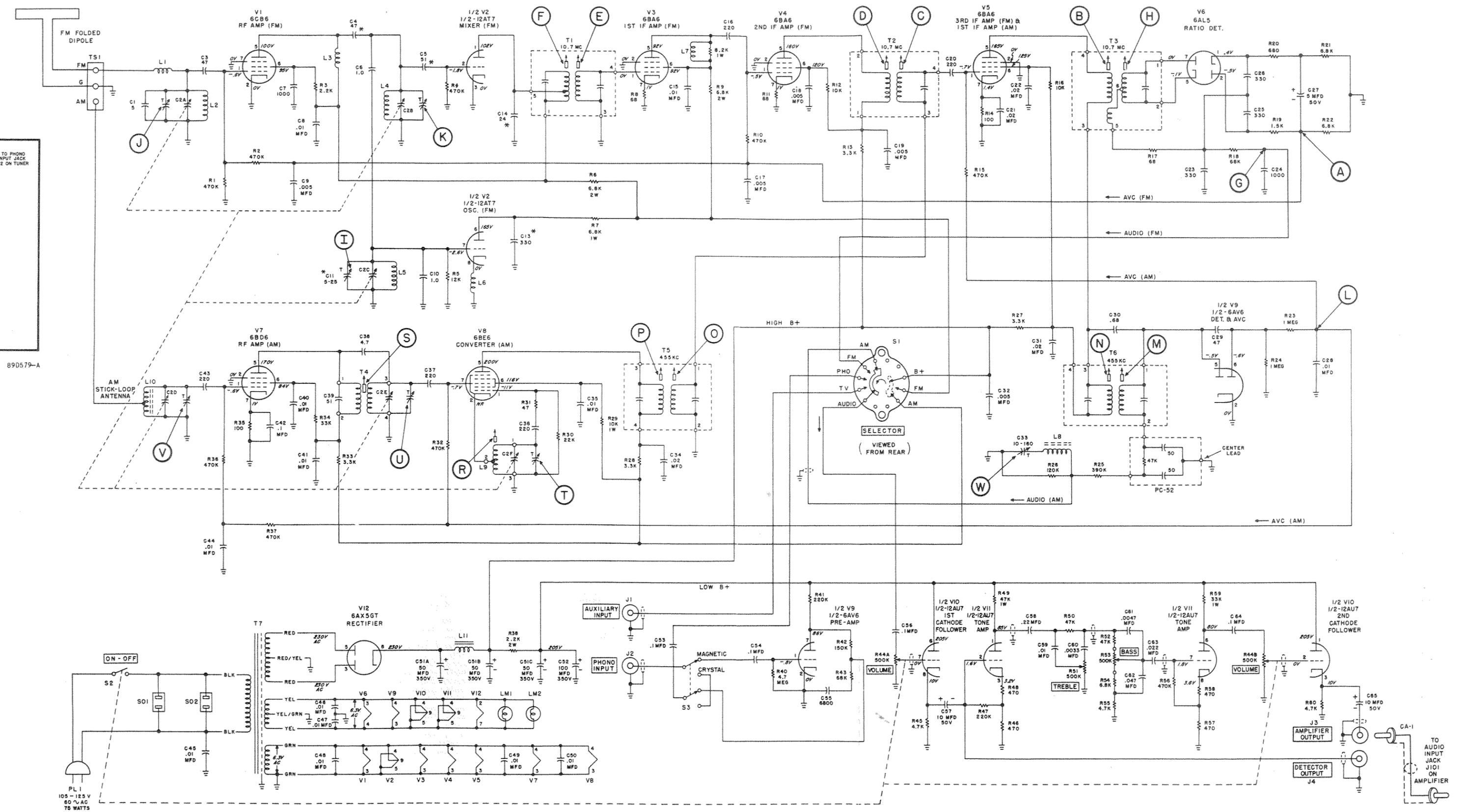
NEEDLE REPLACEMENT

The dual needle assembly is replaceable as a unit, and is easily removable from the pickup cartridge. When making replacement, use Hallicrafters Needle Assembly #121A104. Instructions for removing and installing the needle assembly are given below. Fig. 11 shows the needle assembly installed in the cartridge.

Removal - Pull off the knob and remove the two mounting screws and cartridge from the pickup arm. Compress the spring slightly, remove the "C" washer, pick off the spring and flat washer, and remove the needle assembly from the cartridge.

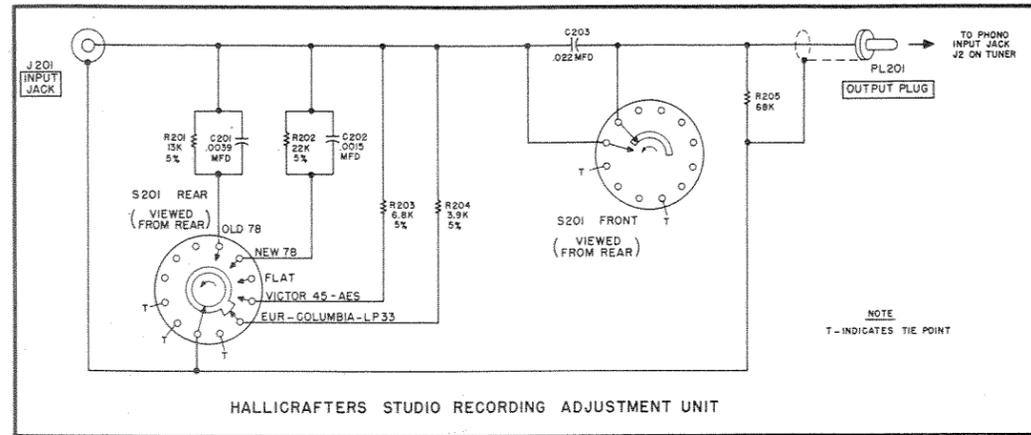
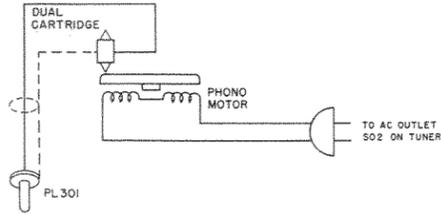
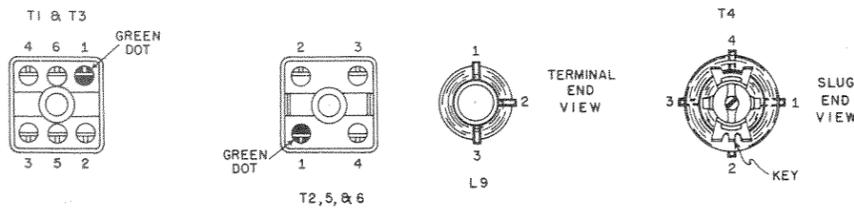
Installation - Insert needle assembly into cartridge with a rotating motion. Place flat washer, then spring, over the needle assembly shaft. Compress spring slightly and insert "C" washer into groove on shaft to hold spring in place. Mount the cartridge into pickup arm and install knob. Note that the knob key and needle assembly shaft are both off-center so that the knob can fit on in only one position. Do not force the knob on. Press knob firmly on shaft making certain first that the alignment is correct. Apply pressure only at point "C" to prevent damage to the needle assembly.

AM-FM TUNER and STUDIO RECORDING ADJUSTMENT UNIT



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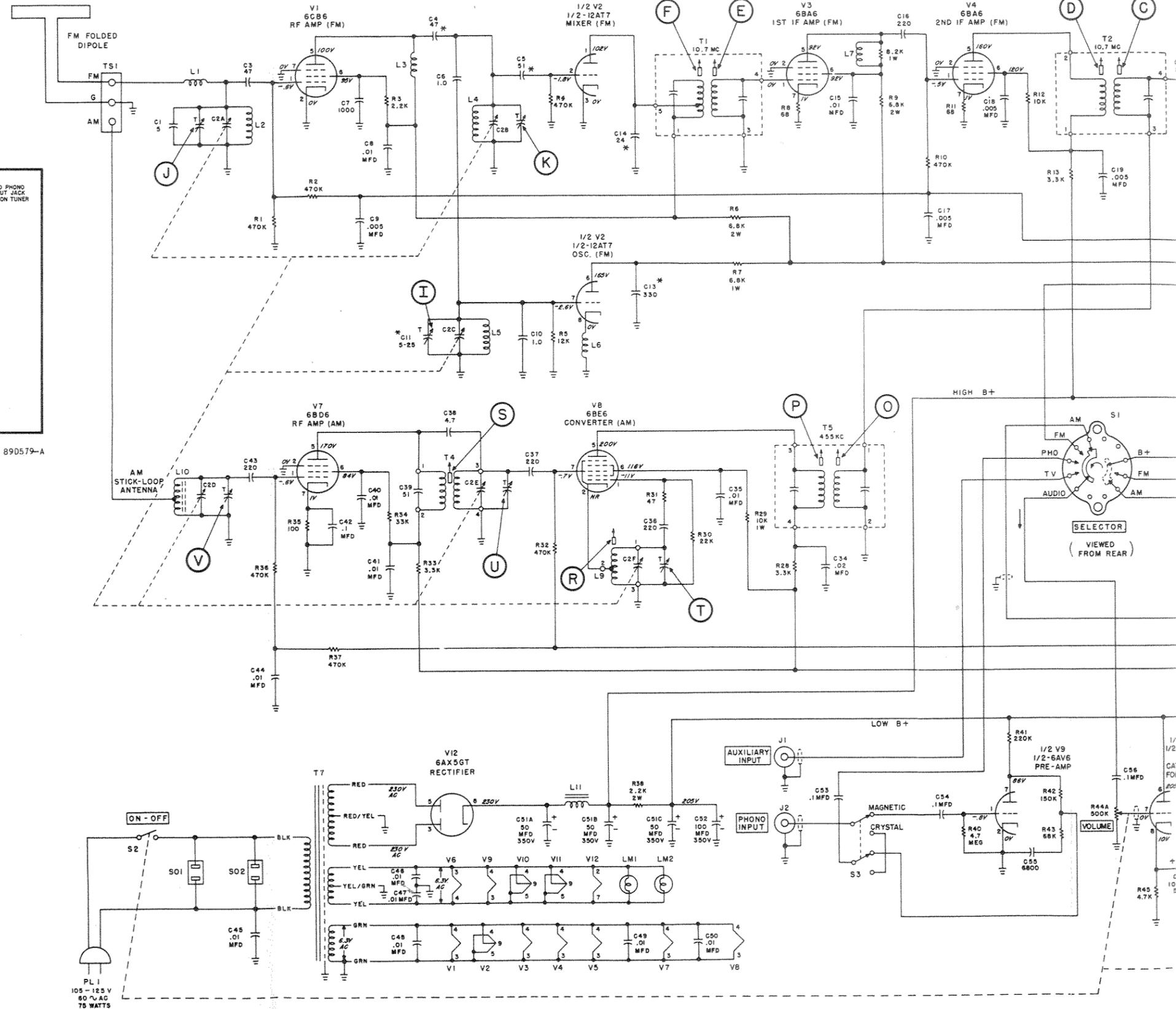
NOTES

1. Resistor values in ohms and capacitor values in MMF unless otherwise specified. K=1000.
 2. Resistors are 1/2 watt and 10% unless otherwise specified.
 3. Selector switch S-; shown in "AM" position (fully counterclockwise).
 4. AM IF—455KC; FM IF—10.7 MC.
- * Use exact replacement part ONLY. See Service Parts List.

VOLTAGES

- Voltage readings taken under following conditions:
1. Line voltage—117 volts, 60 cycles AC.
 2. No signal input, gang fully closed, and Volume control at maximum.
 3. Voltages are DC and positive unless otherwise specified.
 4. DC voltages measured with VTVM between tube socket terminals and chassis unless otherwise specified.
 5. AC voltages measured with 1000 ohms per volt meter.
 6. Voltage readings for V-1, V-2, V-3, V-4, V-5, and V-6 taken with Selector switch set at "FM". Switch set at "AM" for V-7, V-8, and detector section of V-9 and at "PHO" for V-10, V-11, and pre-amp section of V-9.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.



AMPLIFIER PARTS LIST

Schematic Symbol	Description	Hallcrafters Part Number	Schematic Symbol	Description	Hallcrafters Part Number
CAPACITORS					
C-101,102	.47 mfd. 600 V., oil filled; tubular	46B203	L-102	Choke, filter; 25 henries, 40 ma, 800 ohms	56C151
C-103,104	.1 mfd. 600 V., oil filled; molded tubular paper	46C202	T-101	Transformer, power	52D263
C-105	Dual 40 mfd. 500 V., dual 8 mfd. 400 V.; electrolytic	45B222	T-102	Transformer, audio output	55D203
C-106	4 mfd. 600 V., electrolytic	46B206	TUBE COMPLEMENT		
C-107	10 mmf. 10%, 500 V.; ceramic	47CA20100F	V-101,102	12AU7: audio amplifier and phase inverter, driver	90X12AU7
C-108	10 mfd. 50 V., electrolytic	45B211	V-103,104	KT66: audio output	90XKT66
RESISTORS					
R-101,108,110	470,000 ohms 10%, 1/2 watt; carbon	23X20X474K	V-105	5V4G: rectifier	90X5V4G
R-102	10,000 ohms 10%, 1/2 watt; carbon	23X20X103K	CONNECTORS AND SOCKETS		
R-103	470 ohms 10%, 1 watt; carbon	23X30X471K	J-101	Jack, audio input	36A041
R-104	47,000 ohms 10%, 2 watt; carbon	23X40X473K	SO-101	Socket, power	6E296
R-105,107	2% matched resistor pair; 22,000 ohms 1 watt, carbon	23B088		Socket, tube; miniature 9 pin	6A452
R-106	4700 ohms 10%, 1/2 watt; carbon	23X20X472K		Socket, tube; octal	6B296
R-109	390 ohms 10%, 1 watt; carbon	23X30X391K	TS-101	Terminal strip, KT66 cathode	88A880
R-111,112	2% matched resistor pair; 47,000 ohms 2 watt; carbon	23B087	TS-102	Terminal strip, speaker	88A879
R-113,117	2% matched resistor pair; 100,000 ohms 1/2 watt, carbon	23B086	TS-103	Terminal strip, power transformer primary	88A878
R-114,116	100 ohms 10%, 1 watt; carbon	23X30X101K	MISCELLANEOUS PARTS		
R-115,120	100 ohms 2 watt, wirewound variable; BIAS and BALANCE controls	25B1018	F-101	Fuse, 3 amp 250 V.; type 3AG	39A301
R-118,123	1000 ohms 10%, 1/2 watt; carbon	23X20X102K	PL-101	Holder, fuse	6A451
R-119,124	100 ohms 10%, 1/2 watt; carbon	23X20X101K		Line cord and plug	87A481
R-121,122	400 ohms 2%, 5 watt; wirewound	24BF401B		Lock, line cord	76B756
R-125	22,000 ohms 10%, 1 watt; carbon	23X30X223K		Mtg. base, tube shield	76A1018
R-126	33,000 ohms 10%, 1 watt; carbon	23X30X333K		Mtg. plate, capacitor C-105	8A1998
R-127	100,000 ohms 10%, 1 watt; carbon	23X30X104K		Nameplate, tube location and power data	13C1106
R-128	10,000 ohms 10%, 1 watt; carbon	23X30X103K		Retainer, tube; for KT-66's	76A1017
COILS AND TRANSFORMERS					
L-101	Choke, filter; 4 henries, 170 ma, 150 ohms	56C152	S-101	Shield, miniature tube	69A519
				Switch, spst toggle	60A138

STUDIO RECORDING ADJUSTMENT UNIT PARTS LIST

Schematic Symbol	Description	Hallcrafters Part Number	Schematic Symbol	Description	Hallcrafters Part Number
RESISTORS					
R-201	13,000 ohms 5%, 1/2 watt; carbon	23X20X133J	C-202	.0015 mfd. 20%, 600 V.; molded tubular	46BS152L6
R-202	22,000 ohms 5%, 1/2 watt; carbon	23X20X223J	C-203	.022 mfd. 20%, 200V., molded tubular	46BS223L2
R-203	6800 ohms 5%, 1/2 watt; carbon	23X20X682J	MISCELLANEOUS		
R-204	3900 ohms 5%, 1/2 watt; carbon	23X20X392J	J-201	Grommet, rubber	16A002
R-205	68,000 ohms 10%, 1/2 watt; carbon	23X20X683K		Jack, phono	36A029
CAPACITORS					
C-201	.0039 mfd. 10%, 400V.; molded tubular	46BS392E4	PL-201	Knob, Studio Recording Adjustment	15A686
			S-201	Plug, phono	10A221
				Switch, rotary wafer; 5 position	60A581

MISCELLANEOUS PARTS

Schematic Symbol	Description	Hallcrafters Part Number	Schematic Symbol	Description	Hallcrafters Part Number
C-401	Cabinet, mahogany (for model 1621)	78F1068	PL-301	Pickup cartridge (less dual needle assembly)	121A103
	Cabinet, maple (for model 1622)	78F1069		Record changer, Garrard Model RC-80 (less pickup cartridge and dual needle assembly)	115A147
	Capacitor: 4 mfd. 20%, 50 V.; tubular paper	46B227	LS-401	Speaker, tweeter; 8-ohm voice coil	85A155
	Dual needle assembly	121A104	LS-402	Speaker, 15-inch PM; 8-ohm voice coil	85A156
	Nameplate, Hallcrafters Studio Recording Adjustment	13B1142			
	Operating Instruction Book	94K1242			

NOTES



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