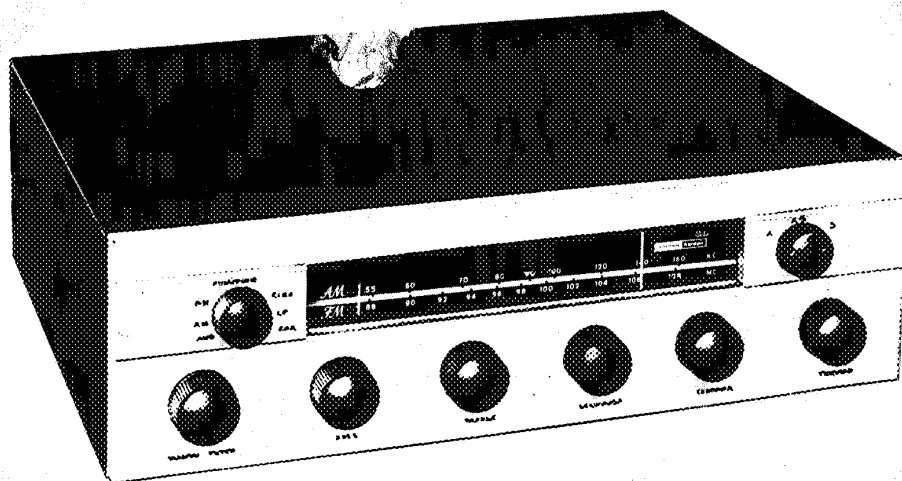


**harman kardon**



## The Solo II

Model TA-12

HIGH FIDELITY TUNER-AMPLIFIER

## OPERATION AND SERVICE INSTRUCTIONS

### IMPORTANT

It is essential you read this instruction book carefully before setting up your Harman-Kardon high fidelity system. You have invested in a fine instrument into which many excellent engineering developments have been incorporated. Each is important for the proper operation of your system. This book has been written in simple nontechnical language and if you will take the time to read it first before doing anything else you will find it simple to obtain optimum performance from your new Solo II.

We especially call your attention to the paragraph describing the proper adjustment of the Hum Bucking Control. This control should be adjusted prior to permanent installation of the instrument.

### UNPACKING

After unpacking the Solo II, inspect it carefully for signs of damage in transit. Your unit was subjected to many inspections and tests prior to packing. If damage is visible, notify your dealer immediately. If the unit was shipped to you, notify the transportation company at once.

Check the contents of the carton carefully. Inspect

the folds of the packing material before discarding it. Your package should contain:

- 1 Solo II, Model TA-12.
- 1 Instruction Booklet.
- 1 Antenna Wire. (FM)
- 1 Warranty Card.
- 1 Template and Cabinet Installation Instructions.

It is strongly urged that the warranty card be completed and mailed without delay, to protect your rights under the warranty. If you should require repair service or information on the use of the Solo II, we will be able to identify your unit immediately, and respond quickly. NOTE: To expedite service, when necessary, please contact Harman-Kardon first. We will suggest a warranty station in your area and give you the proper procedure and authorization for shipping.

### INSTALLATION

Your Solo II receiver may be installed on an open shelf, table, bookcase or high fidelity equipment cabinet. For cabinet mounting, refer to the template supplied with this instruction book.

#### Ventilation:

All electrical equipment generates heat which must be allowed to escape. Although the Solo II is well

ventilated in itself, sufficient space should be allowed around it to permit free air flow. If it is placed in a bookcase, it should be located well toward the front, to provide as much clearance as possible at the rear. DO NOT place books or other objects on top of the Solo II. Covering the perforated metal cage will prevent proper air flow and will result in sharply reduced component and tube life.

## POWER REQUIREMENTS

Plug the AC power cord into any outlet furnishing 117 volts, 50 or 60 cycles house current. The exact voltage is relatively unimportant and may vary 105 and 125 volts. Be sure, however, that you have a 50 or 60 cycle AC power source. The Solo II has a convenience outlet on the rear of the chassis. The proper use of this outlet is described in the section under Electrical Connections.

## ELECTRICAL CONNECTIONS

### AM Antenna:

The Harman-Kardon ferrite loopstick built into the Solo II comprises all the antenna required for the finest in noise-free local AM reception.

In locations more removed from metropolitan areas, an outdoor antenna may be required. This should consist of a single wire, as long as is reasonably practical. It should be kept away from large metal objects, power lines or electrical machinery.

Connect one end of the outdoor antenna to the terminal marked "AM" on the Antenna Terminal Strip located on the rear of the chassis.

### FM Antenna:

Due to the extremely high FM sensitivity of the Solo II, the 48" piece of wire furnished with the set will be sufficient antenna for all but the most difficult locations. One end of this wire should be fastened to the "FM" terminal of the Antenna Terminal Strip, the other end left free and extended as may be convenient. It may be tacked or stapled to the rear of the bookcase or equipment cabinet if necessary.

If, for some reason, it is necessary to utilize other FM antenna types, we have listed for your convenience the following suggestions:

1. Special outdoor FM antennas may be used. These come in various types. For extremely difficult locations an in-line Yagi cut for the FM band or equivalent may be necessary. For reception of FM stations scattered in many directions, a non-directional antenna may be used. This non-directional type is known as a double dipole and consists of two folded dipoles placed at right angles to each other.

2. Your present TV antenna may be used to obtain a maximum FM signal. A special antenna coupler or

knife switch should be used when joining the FM line to the television antenna.

### Phonograph Connections:

Any type of record player will operate with the Solo II. To derive maximum enjoyment it is suggested that a high quality pickup and a rumble-free turntable be used. Two classes of phonograph pickups are in use today: Magnetic (GE, Audak, ESL, Fairchild, Pickering and Recoton) and Crystal (including the newly developed ceramics).

All magnetic cartridges should be connected to the jack on the rear of the chassis marked "PHONO." Connect crystal or ceramic cartridges to the jack marked "AUX" also located on the rear of the chassis.

A word of advice: The purchase of a diamond needle is a worthwhile investment. It has extremely long life and will not only protect your records, but will insure maximum tone quality.

It is sometimes advisable to ground the phonograph chassis to the receiver in order to reduce hum and other unwanted noise. Attach a wire to the metal framework of the changer and connect the other end to the "G" terminal of the Speaker Terminal Strip.

The power cord of the record changer or turntable may be plugged into the AC convenience outlet located on the rear of the Solo II.

### Auxiliary Inputs:

The Solo II incorporates an "AUX" input located at the rear of the unit. Plug all high level equipment, such as a tape recorder or television tuner, into this jack. If you are using a ceramic or crystal phono cartridge make certain to connect your phonograph to the "AUX" jack. This position is controlled by the Function Selector Switch on the front panel.

### Tape Output:

A receptacle marked "TAPE OUT" is located on the rear of the Solo II chassis. This will provide either AM, FM or phonograph program material to a tape recorder or other auxiliary equipment. In other words, any program material appearing at the speaker terminals also appears at the "TAPE OUT" jack, but unmodified by the volume or tone controls. This makes it possible to record a program with the proper recording equalization as determined by your tape recorder, while simultaneously monitoring the program with the proper tone control, contour and loudness (volume) setting.

### Convenience Outlets:

The Solo II incorporates an AC convenience outlet located at the rear of the unit. Auxiliary high fidelity equipment (tape recorder, television tuner or phonograph) may be connected to this outlet and will then be controlled by the on/off switch on the Solo II. Never load this AC convenience outlet with more than a total of 2 amps.

### **Speaker Connections:**

A unique method of connecting one or two loudspeakers is incorporated in the Solo II in order that you may derive maximum enjoyment from this superlative instrument with any of today's fine speaker systems.

#### **Connecting one loudspeaker:**

Connect one of the two speaker leads to terminal "G" and the other lead to "A" on the three screw terminal strip at the rear of the chassis marked "SPEAKER." For speakers with an impedance of 12 to 24 ohms place the Impedance Selector Jumper located at the rear of the chassis so that the center terminal is connected to the terminal marked 16. For speakers with an impedance of 4 to 12 ohms place the Impedance Selector Jumper so that the center terminal is connected to the terminal marked 8. The front panel Speaker Selector Switch should then be placed in the "A" position.

#### **CAUTION:**

A jumper is connected between "A" and "B" terminals on the Speaker Terminal Strip on the rear of this instrument. When only one loudspeaker is used, this jumper must be connected at all times. It should be removed only when two separate speakers are connected. This precaution will prevent the set from appearing to be inoperative when only one speaker is connected, and the Speaker Selector Switch is improperly set.

#### **Connecting two loudspeakers:**

If you wish to operate two loudspeakers with the Solo II and use either one or both together, connect the second speaker to terminals "G" and "B" on the Speaker Terminal Strip. For best operation, both speakers should have the same impedance, although a slight mismatch will not disturb the overall response.

To select speaker A, place the front panel Speaker Selector Switch in the "A" position. To select speaker B, place the switch in position "B". To activate both speakers simultaneously, place the front panel Speaker Selector Switch in position marked "AB".

### **OPERATION**

In general, every control on a well designed, honestly considered high fidelity instrument has a specific useful function, related to each of the other controls. Although this cannot be a treatise on the subject, an explanatory note on the relationship of the various front panel controls will doubtless prove useful in organizing and clarifying them for the user.

Your Solo II incorporates the following operating controls located on the front panel. Viewing the instrument from the front and reading from left to right you will note the Scratch Filter Control, Bass Control, Treble Control, Loudness (volume) Control (on/off switch is incorporated into this control), Dynamic Con-

tour Control and Tuning Control. In the upper left hand corner you will find the Function Selector Switch and in the upper right corner the Speaker Selector Control.

To operate, turn the Function Selector Switch to the AM position. Set the Bass and Treble tone controls so that the white lines on the knobs point straight up. This will assure a "flat" uncompensated response. Turn the set on by rotating the Loudness Control in a clockwise position; now set this Loudness Control at 1/3 volume. The Contour Control should remain on zero at this time. Tune for an AM station.

Once the desired program is located and tuned in, adjust the volume so that the music is played at a comfortable level. Now adjust the Bass and Treble tone controls to correct for the electro-acoustic characteristics of the loudspeaker you are using and the acoustic characteristics of the room in which you are listening. Modify each control until settings are chosen which in your total system create the proper sense of aural balance and evenness.

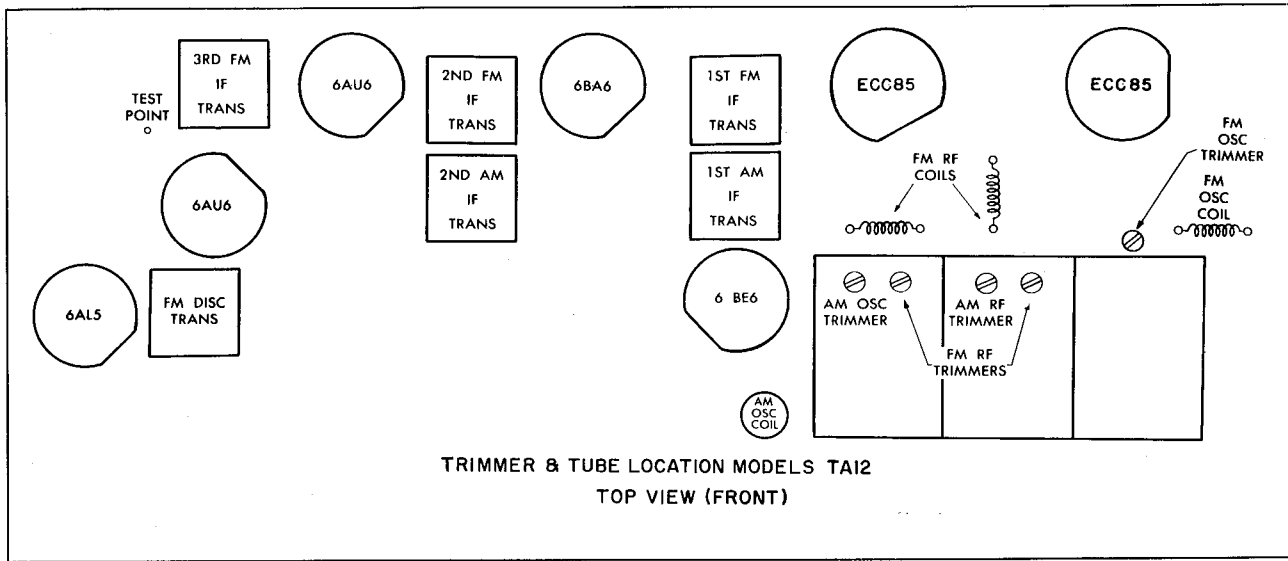
Now reduce the Loudness (Volume) control setting somewhat lower than normal listening level in your room. You will note that the full bodied lifelike quality you experienced at high listening level has disappeared (this because of the Fletcher-Munson effect described in the paragraph on the H/K Dynamic Loudness Contour). With all other controls unchanged, select the best contour setting for you. Do this by switching quickly through the several positions until you find the one which most nearly duplicates the full bodied sound you enjoyed at high level. Now turn the Loudness control up to the level at which you wish to listen (perhaps the maximum level you can permit in your home). You'll find that there is automatic compensation of contour wherever you set the Loudness control thereafter. In fact, under normal circumstances you should not find it necessary to readjust the tone controls or the contour selector once having chosen the correct settings for you, your room and your system.

### **TECHNICAL EXPLANATION OF THE CONTROLS**

The Function Selector Switch has 8 positions: AUX, AM, FM, FM-AFC, RIAA-Rumble, RIAA, LP and EUR. Its use is to select the desired type of program. Listed below is the explanation of the various functions.

#### **Automatic Frequency Control: (AFC)**

FM broadcasting, by its very nature, eliminates almost all natural and man-made static. However, the characteristics of FM which makes this possible also causes problems in tuning. The Solo II incorporates a special electronic circuit known as Automatic Frequency Control that overcomes these problems and insures proper tuning even if the manual tuning is not accurately



FUNCTION SWITCH SETTING	SIGNAL GENERATOR		SIGNAL INPUT POINT	OUTPUT INDICATOR	CONNECT INDICATOR TO:	DIAL SETTING	ADJUST	OUTPUT INDICATION
	FREQ.	MOD.						
AM	455 KC	30% AM	AM RF GANG	AC-VTVM OR SCOPE	TUNER OUTPUT	1600 KC	2 AM IF TRANS.	MAXIMUM OUTPUT
AM	1500 KC	30% AM	AM ANT. TERM.	AC-VTVM OR SCOPE	TUNER OUTPUT	1500 KC	OSC & ANT TRIMMERS	MAXIMUM OUTPUT
AM	600 KC	30% AM	AM ANT. TERM.	AC-VTVM OR SCOPE	TUNER OUTPUT	600 KC	OSC COIL & LOOPSTICK	MAXIMUM OUTPUT
AM	1500 KC	REPEAT STEP 2						

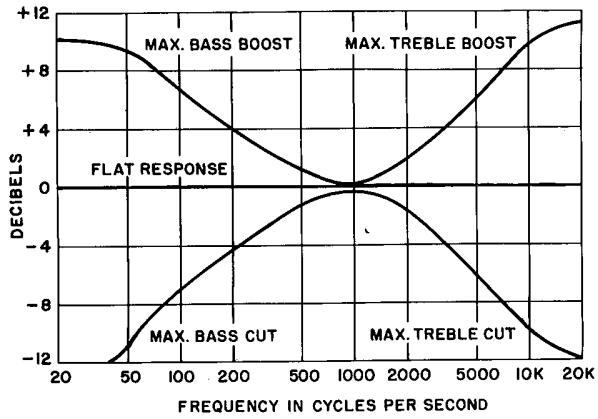
**AM ALIGNMENT PROCEDURE**

FUNCTION SWITCH SETTING	SIGNAL GENERATOR		SIGNAL INPUT POINT	OUTPUT INDICATOR	CONNECT INDICATOR TO:	DIAL SETTING	ADJUST	OUTPUT INDICATION
	FREQ.	MOD.						
FM	10.7 MC	300KC FM 60 CPS	FM MIXER GANG	AC-VTVM OR SCOPE	TEST POINT	—	3 FM IF TRANS.	MAX GAIN & SYMMETRY
FM	10.7 MC	300KC FM 60 CPS	FM MIXER GANG	AC-VTVM OR SCOPE	TUNER OUTPUT	—	DISCR. TRANS.	S PATTERN OF MAX GAIN & SYMM.
FM	106 MC	300KC FM 60 CPS	FM ANT. TERMINAL	AC-VTVM OR SCOPE	TEST POINT	106 MC	106 MC OSC RF, MIXER TRIMMERS	MAXIMUM OUTPUT
FM	90 MC	300KC FM 60 CPS	FM ANT. TERMINAL	AC-VTVM OR SCOPE	TEST POINT	90 MC	OSC, RF, MIXER COILS	MAXIMUM OUTPUT

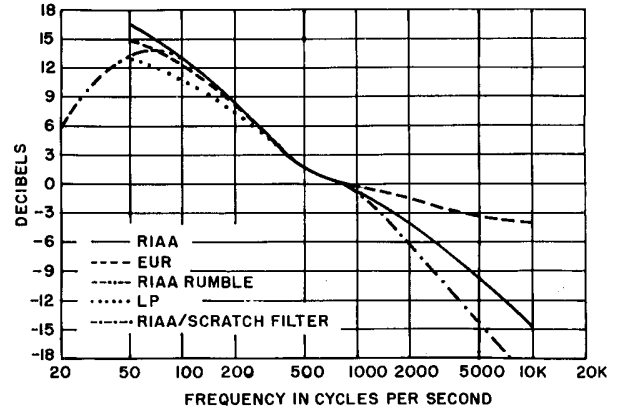
**FM ALIGNMENT PROCEDURE**

**HARMAN - KARDON, INC.**

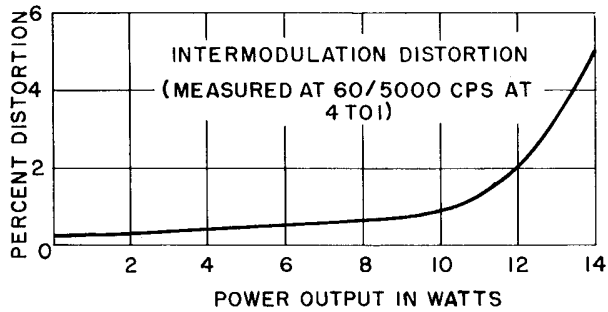
## AMPLIFIER CHARACTERISTICS



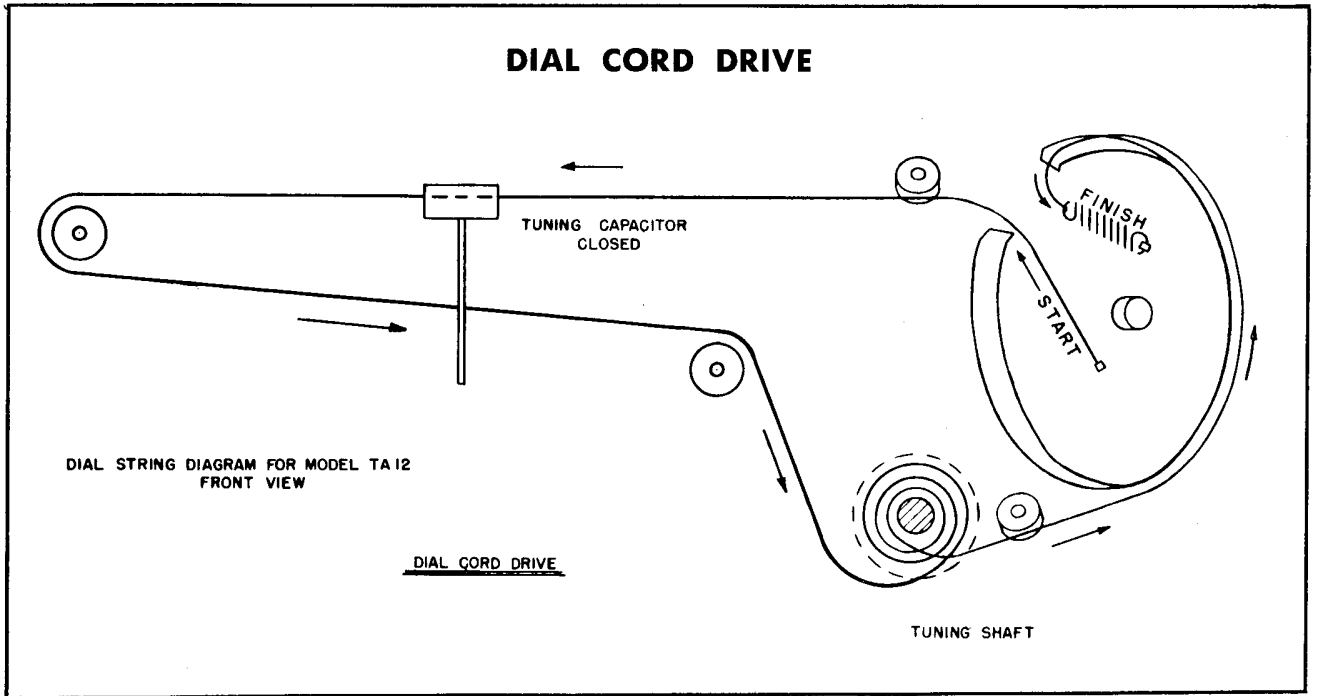
TONE CONTROL AND FREQUENCY RESPONSE CHARACTERISTICS



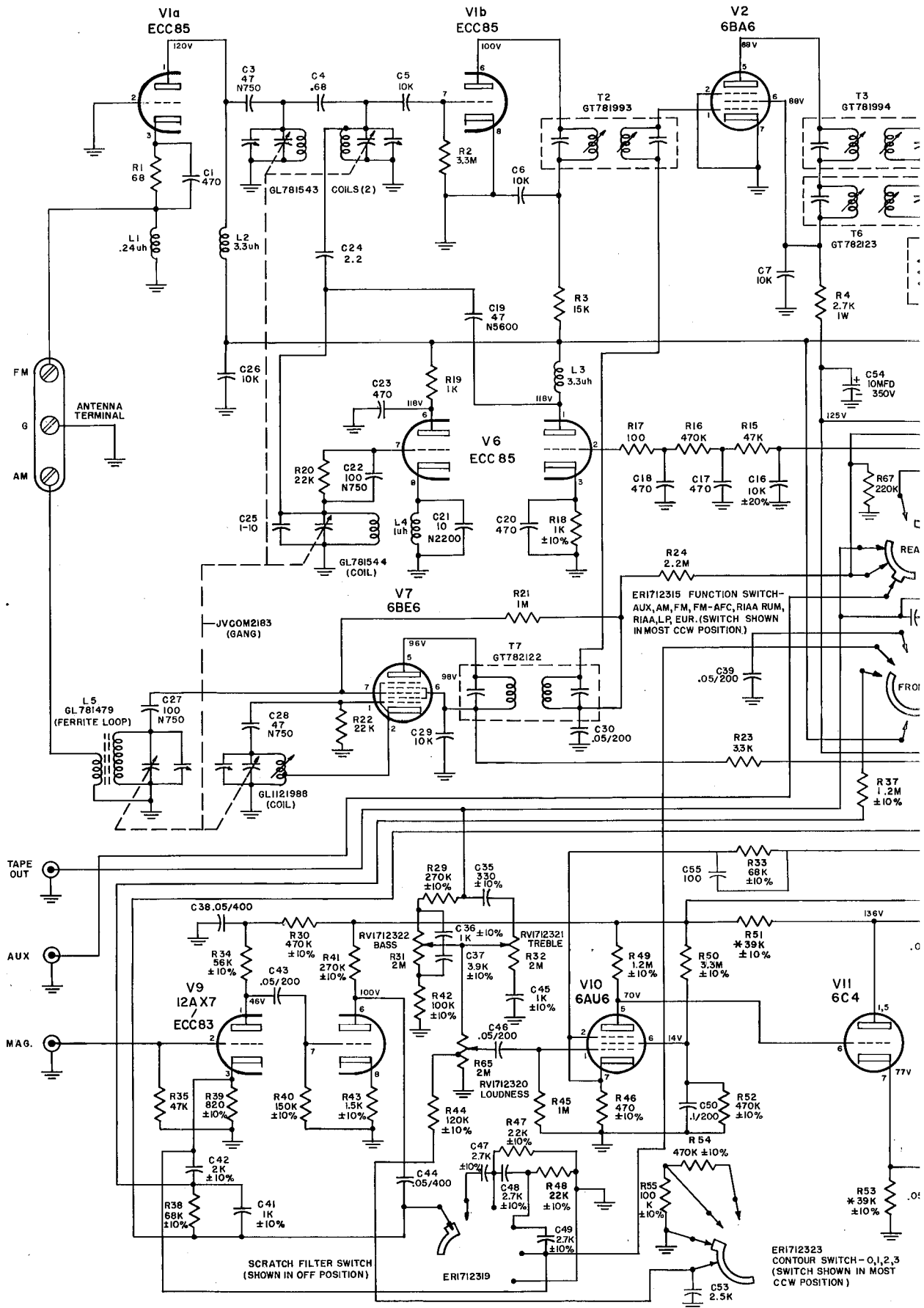
PHONOGRAPH EQUALIZATION CHARACTERISTICS - MODEL TA 12



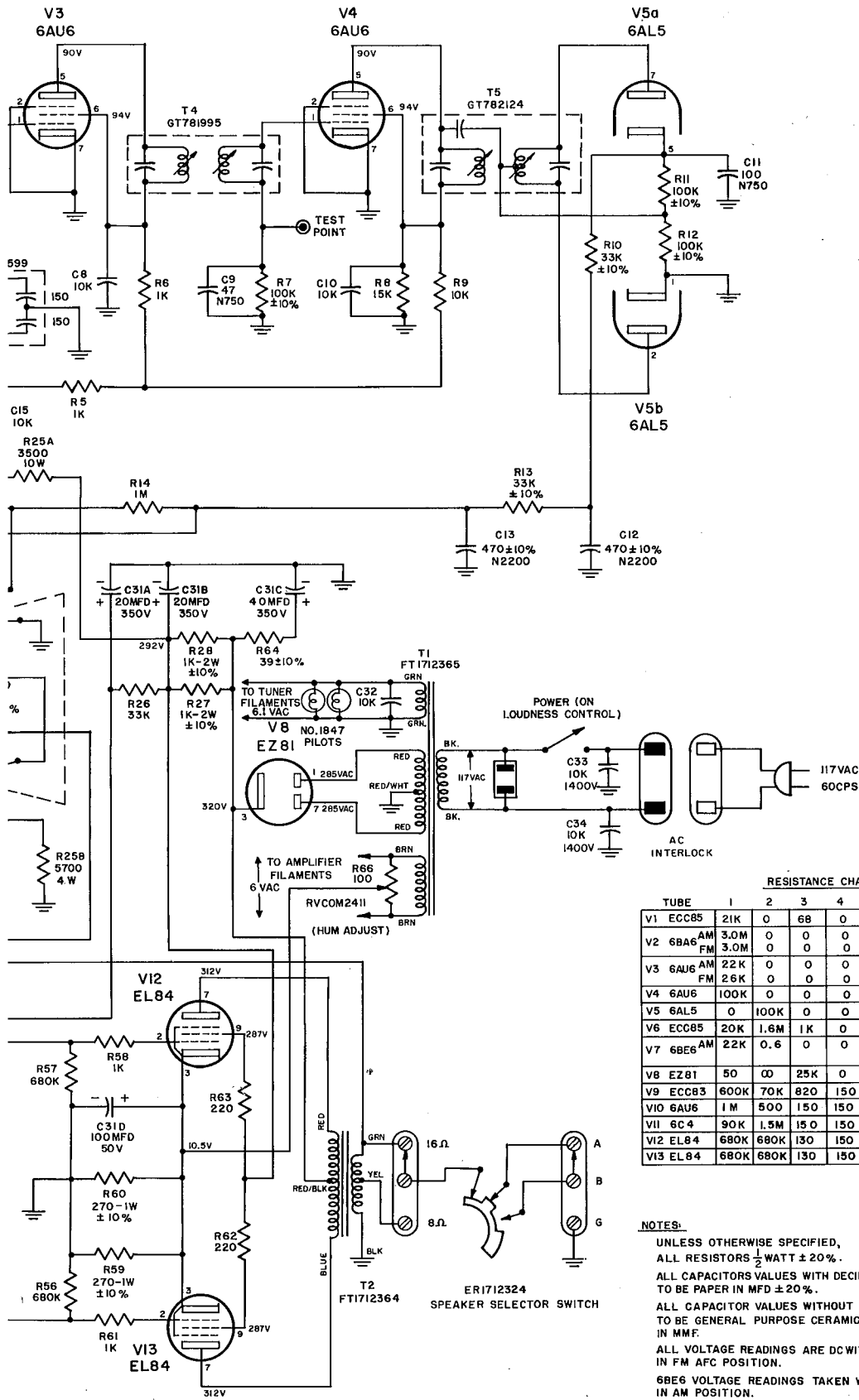
INTERMODULATION DISTORTION CHARACTERISTICS



"THE BEST SEAT IN THE CONCERT HALL"



**SCHEMATIC**

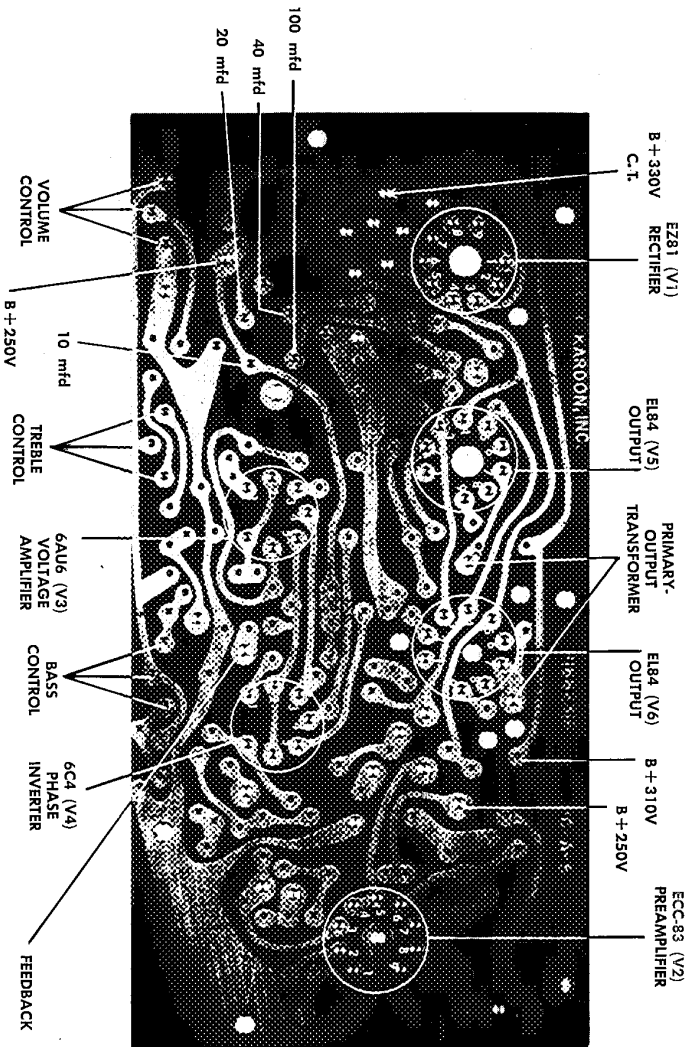


RESISTANCE CHART

TUBE	1	2	3	4	5	6	7	8	9
V1 ECC85	21K	0	68	0	0	35K	3.3M	0	0
V2 6BA6 AM	3.0M	0	0	0	8.5K	8.5K	0	—	—
V2 6BA6 FM	3.0M	0	0	0	2.5K	2.5K	0	—	—
V3 6AU6 AM	22K	0	0	0	2.2K	2.2K	0	—	—
V3 6AU6 FM	26K	0	0	0	2.2K	2.2K	0	—	—
V4 6AU6	100K	0	0	0	12K	12K	0	—	—
V5 6AL5	0	100K	0	0	190K	0	100K	—	—
V6 ECC85	20K	1.6M	1K	0	0	21K	2.2K	0.6	0
V7 6BE6 AM	22K	0.6	0	0	9K	9K	3.5M	—	—
V8 EZ81	50	00	25K	0	0	00	48	00	00
V9 ECC83	600K	70K	820	150	150	280K	160K	1.5K	150
V10 6AU6	1M	500	150	150	1.5M	470K	500	—	—
V11 6C4	90K	1.5M	150	150	90K	1.5M	40K	—	—
V12 EL84	680K	680K	130	150	150	00	26K	00	26K
V13 EL84	680K	680K	130	150	150	00	26K	00	26K

NOTES:  
 UNLESS OTHERWISE SPECIFIED,  
 ALL RESISTORS 1/2 WATT ± 20%.  
 ALL CAPACITORS VALUES WITH DECIMAL POINT  
 TO BE PAPER IN MFD ± 20%.  
 ALL CAPACITOR VALUES WITHOUT DECIMAL POINT  
 TO BE GENERAL PURPOSE CERAMIGS 500 WVDC,  
 IN MMF.  
 ALL VOLTAGE READINGS ARE DC WITH FUNCTION SWITCH  
 IN FM AFC POSITION.  
 6BE6 VOLTAGE READINGS TAKEN WITH FUNCTION SWITCH  
 IN AM POSITION.  
 ALL RESISTANCE READINGS TAKEN WITH FUNCTION  
 SWITCH FM AFC POSITION.  
 \*DENOTES MATCHED RESISTORS.  
 S171  
 S1712436A



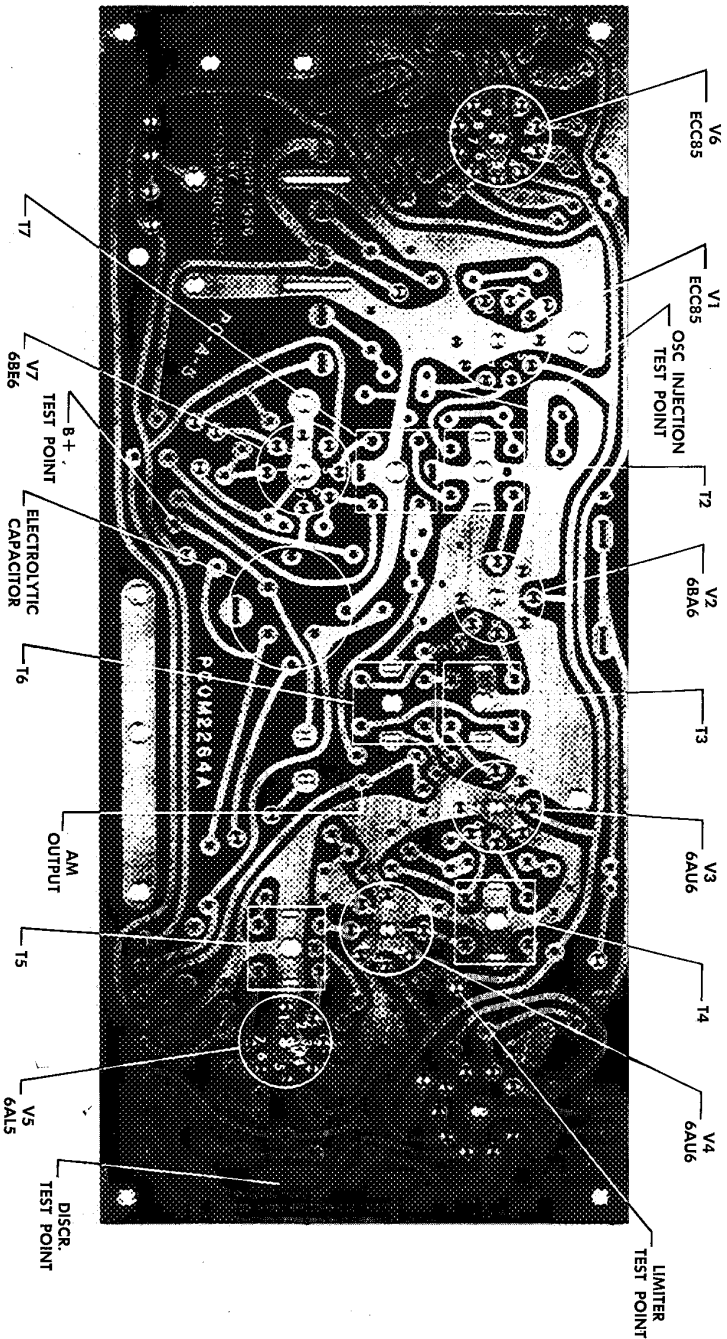


These photographs show the printed circuit boards used in the Harman-Kardon Solo II and indicate to some degree the complexity of design and painstaking care required in the planning of such a unit.

FM frequencies, by their very nature, require careful placement of parts and leads. In conventional point to point wiring, misplacement of a wire, even a slight amount from its correct position will adversely affect operation.

The amplifier has been designed to use printed circuits in those areas where each component and each connecting lead must be carefully positioned in order to afford best possible operation.

This design form results, we feel, in providing the best possible characteristics and reflects the highest state of the art in the construction of fine high fidelity equipment.





#### **Avoid Overheating:**

When using the soldering iron (35 watts or less), do not overheat the component terminals or the copper foil. Excessive heat (applying soldering iron longer than necessary, using a higher wattage soldering iron than recommended, or using a solder gun) may cause the bond between the board and foil to break. This will necessitate replacement or repair of the foil connection.

#### **Tools and Materials Required:**

- (1) Low wattage soldering iron with a small point or wedge (rating should not exceed 35 watts).
- (2) Small wire brush.
- (3) 60% tin, 40% lead, low temperature rosin core solder.
- (4) Thin bladed knife.
- (5) Small wire pick, or soldering aid.

#### **REPLACING COMPONENTS**

##### **Soldering Replacement Component to Old Leads:**

Cut the leads where they enter the defective component. Clean off the ends of the leads, leaving as much of the leads as possible. Make a small loop in each lead of the replacement component and slide the loops over the remaining leads of the old component. Caution should be taken not to overheat the connection since the copper foil may peel or the original component lead may fall out of the board. This is possible due to heat transfer through the leads. The lead length of the replacement part should be kept reasonably short to provide some mechanical rigidity.

##### **Unsoldering and Resoldering Components:**

To test a component or if the component is mounted

in such a manner that the above method can not be used (such as vertically mounted capacitors, etc.) the component can be replaced by unsoldering it. This procedure should be used whenever it is necessary to unsolder any connections to replace defective components.

(a) Heat the connection on the wiring side of the board with a small soldering iron. When the solder melts, brush away the solder. Do not overheat the connection. In the process of removing the solder, caution must be taken to prevent excessive heating. Therefore, do not leave the iron on the connection while brushing away the solder. Melt the solder, remove the iron and quickly brush away the solder. It may require more than one heating and brushing process to completely remove the solder.

(b) Insert a knife blade between the wiring foil and the "bent-over" component lead and bend the lead perpendicular to the board. (It may be necessary to apply the soldering iron to the connection while performing this step as it is sometimes difficult to completely break the connection by brushing.) Do not overheat the connection.

(c) While applying the soldering iron to the connections, "wiggle" the component until it is removed.

(d) Remove any small particles of solder using a clean cloth dipped in solvent.

(e) A thin film of solder may remain over the hole through the board after removing the component. Pierce the film with the lead from the new component after heating the solder film with the soldering iron.

(f) Insert the leads of the new component through the holes provided. Cut to desired length and bend over the ends against the copper foil. Resolder the connection with 60/40 low temperature solder.

**Harman-Kardon high fidelity instruments incorporate advanced production techniques as well as advanced circuit features. They reflect the highest state of the art of fine audio equipment. We hope your unit provides you with many hours of listening enjoyment.**

**Our Customer Service Department is maintained to answer your correspondence about High Fidelity and to make recommendation of appropriate companion accessories. Please feel free to write without obligation.**

**harman kardon**

520 MAIN STREET  
WESTBURY, L. I., N. Y.

## SPECIFICATIONS

### RF SECTION

Circuits: FM: Armstrong circuit with Limiter & Foster-Seeley Discriminator, Automatic Frequency Control—Low Noise Front End consisting of Tuned Triode Grounded Grid Amplifier and Triode Mixer.

AM: Superheterodyne with A.V.C. and Ferrite Antenna.

Sensitivity: FM: 5 microvolts for 30 db quieting: 3 microvolts for 20 db quieting.

AM: Loop sensitivity 80 microvolts/meter; Terminal sensitivity 20 microvolts.

Selectivity: FM: 200 KC bandwidth: 6 db down.

AM: 8 KC bandwidth: 6 db down.

FM Discriminator peak to peak separation 375 KC

Frequency Range: FM: 88-108 MC AM: 530-1650 KC  
FM Drift:  $\pm 5$  KC max.

Image Rejection: FM: 40 db AM: 30 db.

IF Rejection: FM: 70 db AM: 30 db.

Antenna Input: FM: 300 ohms. AM: Built-in low noise ferrite loopstick plus high impedance terminal for external antenna.

Distortion: Less than 1% harmonic on FM. Less than 1% harmonic for up to 80% mod. on AM.

Frequency Response: FM:  $\pm 1/2$  db 20 to 20,000 c.p.s. including standard 75 micro-second deemphasis.

AM: 3 db 20 to 5,000 c.p.s.

Hum Level: 60 db below 100% modulation.

Radiation: Within FCC Requirements.

### AUDIO SECTION

Circuits: 2—EL84 Pentode Connected.

Output Level: 12 Watts at less than 1% harmonic distortion—2% IM (60 c.p.s. & 7K c.p.s. at 4:1 ratio) Peak 22 watts.

Output Impedance: 8 and 16 ohms.

Frequency Response:  $\pm .5$  db 15-30,000 c.p.s. at 3 watt level.  $\pm 1$  db 20-25,000 c.p.s. at 12 watts.

Damping Factor: 5

Hum: Min. Volume Hum: 80 db below 12 watts.

AUX and Tuner Hum: 70 db below 12 watts.

Phono Hum: 60 db below 12 watts.

Tone Control Range: Base:  $\pm 12$  db at 50 c.p.s.

Treble:  $\pm 12$  db. at 10,000 c.p.s.

Input Levels: AUX.: 0.5 volts. Phono: 3 millivolts. (Will not overload with input level below 180 mv.)

Dynamic Loudness Contour: 4 Positions.

Equalization: RIAA with Rumble Filter, RIAA, LP, EUR.

Scratch Filter, 2 Positions: Position 1: Uncompensated.

Position 2: 7 db Roll off at 7K c.p.s.

### OVERALL SPECIFICATIONS

Controls: (Front Total 8) Function, AUX., AM, FM, FM-AFC, RIAA-RUMBLE, RIAA, LP & EUR. Loudness with On/Off Power Switch.

Treble, Bass, Tuning, Contour, Speaker Selector and Scratch Filter.

Convenience Outlet: 1—AC Receptacle on Chassis Rear and controlled by Power Switch.

Tube Complement: (Total 13) 2—ECC85, 3—6AU6, 1—6BE6, 1—6C4, 1—6BA6, 1—6AL5, 1—12AX7, 1—EZ81, 2—EL84.

Power Consumption: 90 Watts.

Finish: Control Panel: Copper. Cage and knobs: Matte Black.

Shipping Weight: 20 pounds.

Special Notes: Tape Output Flat, unaffected by Tone Controls.

Safety Interlock Power Cord disconnects power when cage is removed.

Printed Wiring used throughout, employs dip-soldered, copper-clad laminated phenolic plastic board.

Simple Mechanical Disassembly makes board easily available for service.

Dimensions: 13-1/2 in. deep, including front knobs and loopstick, by 14-5/8 in. long, by 4-1/2 in. high.

### LIST OF REPLACEABLE PARTS MODEL TA-12

Description	H-K Part No.	List Price
Antenna Loopstick	GL1712407	\$ 2.30
Loopstick Tuning Ring	P481329	.25
Function Switch	ER1712315	1.90
Contour Switch	ER1712323	1.25
Scratch Filter Switch	ER1712319	1.10
Speaker Selector Switch	ER1712324	1.05
Loudness Control	RV1712320	1.40
Bass Control	RV1712322	1.00
Treble Control	RV1712321	1.00
Hum Adj. Control	RVCOM2411	.65
Glass Dial Ass'y.	P1712384	1.00
Pointer	P1712390	.60
Power Transformer	PT1712365	16.25
Output Transformer	PT1712364	10.75
Variable Capacitor	JVCOM2183	7.00
Capacitor, Elect.		
40-20-10/350, 100/50	JE21281	3.25
Trans. 1st FM IF	GT781993	1.55
Trans. 2nd FM IF	GT781994	1.55
Trans. 3rd FM IF	GT781995	1.55
Trans. FM Disc	GT782124	2.00
Trans. 1st AM IF	GT782122	1.35
Trans. 2nd AM IF	GT782123	1.35
Coil AM Osc.	GL1121988	.90
Coil FM RF	GL781543	.50
Coil FM Osc.	GL781544	.50
Osc. Trimmer	JV20688	.15
Cage	P1712311	11.50
Escutcheon	P1712304	8.00
Knob, W/White Line (Small)	P22783	.15
Knob, W/White Line	P20778	.15
Knob, Tuning	P20778	.15
Instruction Pamphlet	L1712392	1.00
Mounting Template	L1712393	.75
Schematic		.50

When ordering parts always list the model number, serial number and complete part number. We reserve the right to change list prices without notice.