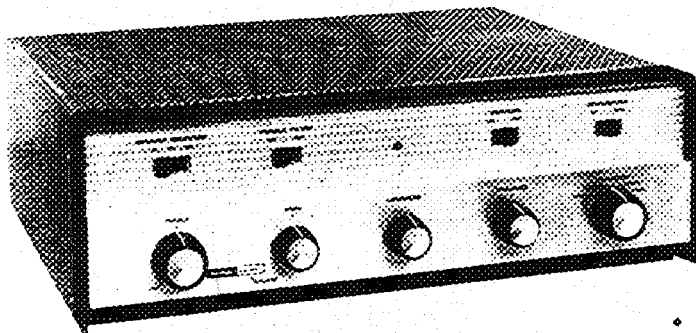


harman**kardon**

The Nocturne

MODEL AX20

STEREOPHONIC CONVERSION AMPLIFIER

INSTRUCTION MANUAL

It is essential you read this instruction booklet carefully before installing your high fidelity system. You have invested in an extremely fine electronic instrument into which many excellent engineering developments have been incorporated, and each is important for the proper operation of your system. This booklet has been written in simple non-technical language and if you will take time to read it first before doing anything else, you will find it simple to obtain optimum performance from your Harman-Kardon Model AX20 Stereophonic Conversion Amplifier. Be sure to keep this booklet available at all times. It contains indispensable technical and service information.



This is the Harman-Kardon Stereo Symbol. It is your assurance of superb stereo performance.

GENERAL DESCRIPTION

The AX20 stereophonic conversion amplifier—dual preamplifier is an extremely versatile instrument and may be used in the following ways.

- 1—As a stereophonic converter utilizing your present high fidelity amplifier or combination receiver for the second channel.
- 2—As a monaural 20 watt amplifier with an additional preamplifier for extreme flexibility.

UNPACKING

After unpacking the Nocturne inspect it carefully for signs of transit damage. The unit was subjected to many inspections and tests prior to final packing, and it therefore should be in perfect condition. If damage is visible, notify your dealer at once. If the unit was shipped to you, notify the transportation company without delay.

Check the contents of the carton thoroughly and inspect the folds of the packing material before discarding it. Your package should contain the following items:

- 1 Model AX20 Stereophonic Conversion Amplifier-Dual Preamplifier.
- 1 Instruction Manual
- 1 Warranty Card
- 1 Mounting Template.

WARRANTY POLICY

We urge you to completely fill in your warranty card and mail it to the factory without delay to protect your rights under warranty. The warranty cards are carefully filed for reference and should you require information on the use of this high fidelity unit, or repair service, we will be able to immediately identify your set and reply quickly.

NOTE: It is necessary to receive factory authorization before returning a set for warranty repair either to the factory or to an authorized station. Repairs are to be returned on an Express Prepaid basis. A letter describing the exact difficulty must be enclosed with the unit.

WARRANTY

We warrant each Nocturne Model AX20 to be free from defects in material and workmanship under normal use and service, and in accordance with the conditions herein below set forth, for a period of 1 year from date of delivery to the original purchaser, and agree to replace or repair any part or parts, with the exception of tubes which are under the manufacturer's 90 day warranty, returned to us within said 1 year, with transportation prepaid and which our examination shall disclose to our satisfaction to have been thus defective. This warranty does not include free labor, nor is it applicable to any instrument which shall have been repaired or altered in any way so as in our judgment to affect its stability or reliability nor which has been subject to neglect, misuse, abuse, negligence or accident nor which has had the serial number altered, effaced, or removed. Neither shall this warranty apply to any instrument which has been connected otherwise than in accordance with instructions furnished by us.

This warranty is expressly in lieu of all other warranties, express or implied, and of all other obligations or liability on our part, and we neither assume nor authorize any representative or other person to assume for us any other liability in connection with the sale of this instrument.

USING THE NOCTURNE MODEL AX20 AS A STEREOPHONIC CONVERTER

If you now own a basic amplifier, or an amplifier—preamplifier, you may utilize the Model AX20 for the second channel and control your entire stereo system with the AX20 controls. For this method of operation the AX20 is connected in the manner described below.

INSTALLATION PROCEDURE

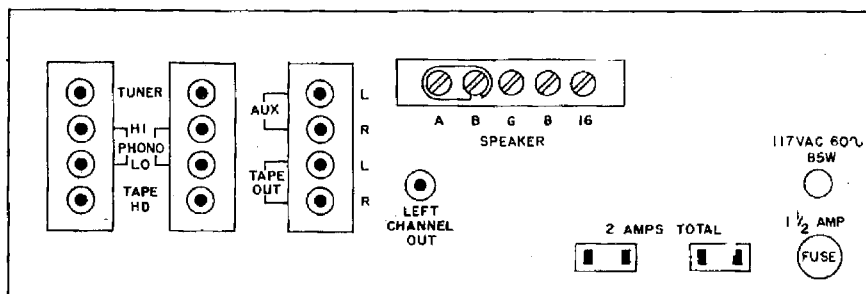
Ventilation:

The unit is well ventilated in itself, but sufficient space must be allowed around it to permit proper air flow. Install the amplifier in a manner to allow for unrestricted circulation. Do not place books or other objects on the cage or in the immediate vicinity of the instrument. Reducing the air flow will result in sharply reduced component and tube life.

Power Requirements:

Plug the AC cord into any outlet furnishing 117 volts 50 or 60 cycle AC current. The voltage may vary between 105 and 125 volts. Two AC convenience outlets are located on the rear of the instrument. Auxiliary equipment (tape deck, record player, additional amplifier) may be plugged into these outlets and will be controlled by the on/off switch located on the AX20.

REAR PANEL CONNECTIONS



REAR PANEL MODEL AX20

Figure A

Connecting Your Speakers:

Your two speakers should be matched, if possible, to obtain optimum results and should be placed 8 to 15 feet apart against one wall of your listening room. Facing the speakers straight out or slanting them slightly, will depend on your room size, acoustic effect and where you will be seated for listening. It may be necessary to experiment with speaker placement until best results are obtained.

Use any type wire to connect your speakers. Lamp cord is excellent and may be easily dressed around the molding for an inconspicuous and neat installation.

Speaker Connection For Stereo Conversion Arrangement

Connect one speaker to the G and 8 or 16 ohm terminal on the rear SPEAKER OUTPUT strip of the AX20. (Refer to Figure B) Selection of the 8 or 16 ohm terminal will depend on the impedance of the speaker you are using. Allow terminals A & B to remain strapped together for this method of operation. Connect your other speaker to the appropriate ground and 8 or 16 ohm impedance terminal on your other monaural amplifier.

Connecting Your Stereo Record Player:

A stereo cartridge is essentially two cartridges in one and uses two output connecting plugs. If you are using a low level magnetic cartridge, plug one output lead into the LEFT LO PHONO input jack located on the rear of the chassis and the other cartridge output lead into the RIGHT LO PHONO input jack.

Stereo crystal or ceramic cartridges may also be used with this amplifier. They must be plugged into the LEFT and RIGHT HI PHONO input jacks.

Plug the AC line cord of your record player into one of the AC convenience outlets located on the rear panel of the Model AX20.

Connecting Your Stereo Tape Player:

A stereo tape deck utilizes two playback heads. Each head has its own output plug. Connect one plug to the LEFT TAPE HD input jack and the other plug to the RIGHT TAPE HD jack. These jacks are located on the lower left portion of the rear panel.

Connecting Your Stereo Tape Recorder:

Since most stereo tape recorders have their own preamplifiers, it is not desirable to plug the output of the recorder into the TAPE HD input jacks. This might cause overloading of the input stage. Connect one of the output plugs of your recorder into the LEFT AUX jack and the other output plug into the RIGHT AUX jack located on the rear panel of this instrument.

Connecting Your Tape Recorder to Make a Recording:

Provision is made on your Model AX20 to permit the recording of any program material. Connect the left input of your stereo tape recorder to the receptacle marked LEFT TAPE OUT on the rear panel and the right input of your stereo tape recorder to the receptacle marked RIGHT TAPE OUT. To connect a monaural tape recorder, connect its input to either LEFT or RIGHT TAPE OUT receptacle. If the program source you desire to record is plugged into the left preamplifier channel, use the LEFT TAPE OUT jack, and if it is plugged into the right preamplifier channel, use the RIGHT TAPE OUT jack. This will enable you to make a recording with the proper recording equalization as determined by your recorder, while simultaneously monitoring the program with the proper tone control, contour and loudness setting.

OPERATING THE MODEL AX20 AS A STEREOPHONIC CONVERTER

Every control on a well designed and honestly considered high fidelity instrument has a specific useful function related to each of the other controls. A brief explanatory note on the relationship of the various front panel controls will doubtless prove useful in organizing and clarifying them for you.

The Model AX20 incorporates the following front panel controls. Viewing the instrument from left to right you will note a TREBLE control (on/off switch is incorporated in this control), BASS control, LOUDNESS control, BALANCE control, MODE switch and FUNCTION switch. On the upper section you will note the SPEAKER SELECTOR switch RUMBLE FILTER switch, CONTOUR SWITCH, and EQUALIZATION switch.

The SPEAKER SELECTOR SWITCH located on the front panel of your AX20 is inoperative for this application and may remain in any position.

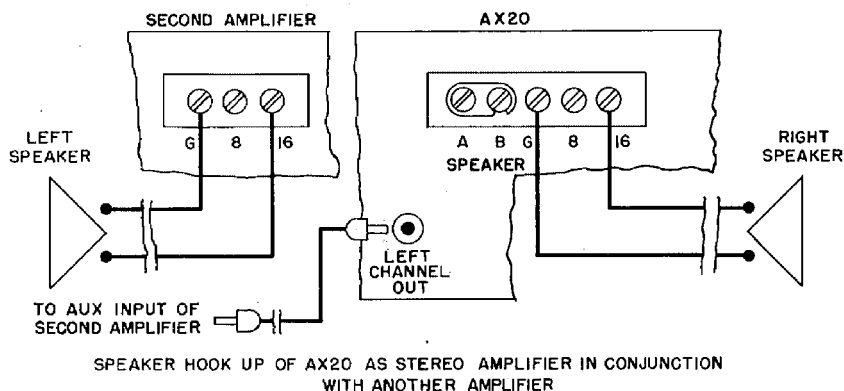


Figure B

Connecting Both Amplifiers For Stereo Operation:

Connect a shielded lead of any length up to 20 feet between the LEFT CHANNEL OUT jack on the rear of the AX20 and the AUX or TUNER input on your other amplifier.

NOTE: If the amplifier used for the second stereo channel is a combination AM-FM tuner, amplifier and preamplifier such as the Harman-Kardon Festival, this connection will not interfere with normal Monaural AM or FM reception through the speaker connected to the combination unit. If you wish to use both amplifiers and speakers for monaural program material, a simple change in the internal wiring of the receiver can easily be made.

The change (which is best done by a technician) consists of removing the wire from the Function Selector switch arm (refer to your original instruction book) and extending it out from the chassis. This wire is connected to the AX20 LEFT CHANNEL OUT Receptacle. A new shielded wire is connected between the Function Selector switch arm and the TUNER Receptacle of the AX20.

IMPORTANT: Connect the AC power cord from your monaural amplifier to the AC convenience outlet on the rear of the Model AX20. The on/off switch on the AX20 will now control the power for both amplifiers.

Connecting Your Stereo Tuner:

The FM output of your Harman-Kardon stereo tuner should be connected to the LEFT TUNER input jack located on the rear panel. The AM output should be connected to the RIGHT TUNER input jack. The same method of installation applies if you are using separate FM and AM tuners. Plug the AC line cord of your tuner into one of the AC convenience outlets located on the rear panel of the Model AX20.

Connecting Your Tuner:

The output of your monaural tuner should be connected to either the left or right TUNER jacks located on the rear panel. Plug the AC power cord of your tuner into one of the AC convenience outlets located on the rear panel of the Model AX20.

Connecting Your Record Player:

Any type of record player may be used with this amplifier. If your player uses a low level magnetic cartridge plug it into either the LEFT or RIGHT LO PHONO input. If you are using a monaural ceramic or crystal cartridge plug it into either the LEFT or RIGHT HI PHONO input.

Connecting Your Tape Player:

Connect your monaural tape deck to one of the TAPE HD input jacks on the rear panel.

Connecting Your Tape Recorder:

Since most monaural tape recorders have their own preamplifier, it is not desirable to plug the output of the recorder into the TAPE HD jack. This might cause overloading of the input stage. Connect the recorder output plug to either LEFT or RIGHT AUX jack on the rear panel.

Connecting Your Tape Recorder To Make A Recording:

Provision is made on your Model AX20 to permit the recording of any program material. Connect the input of your monaural tape recorder to either the LEFT or RIGHT TAPE OUT receptacle located on the rear panel. If the program source you desire to record is plugged into the left preamplifier channel, use the LEFT TAPE OUT jack and if it is plugged into the right preamplifier channel, use the RIGHT TAPE OUT jack. This will enable you to make a recording with the proper recording equalization as determined by your recorder, while simultaneously monitoring the program with the proper tone control, contour and loudness setting.

Connecting Auxiliary Monaural Equipment:

A TV tuner or other similar device with a high output level may be connected to either the LEFT or RIGHT AUX jack on the rear panel.

OPERATING THE MODEL AX20 AS A MONAURAL AMPLIFIER

The Model AX20 incorporates the following front panel controls. Viewing the instrument from left to right you will note a TREBLE control (on/off switch is incorporated in this control), BASS control, LOUDNESS control, BALANCE control, MODE switch and FUNCTION switch. On the upper section you will note a SPEAKER SELECTOR switch, RUMBLE FILTER switch, CONTOUR switch and EQUALIZATION switch.

How To Play A Monaural LP Record:

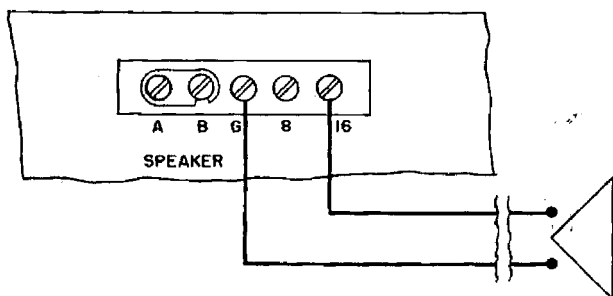
If you have been playing stereo records, merely remove the stereo record and put on a monaural record. It's as simple as that! All stereo record players and phonographs are completely compatible with monaural LP records. LP's and stereos may be intermixed on any good stereo record changer.

USING THE MODEL AX20 AS A MONAURAL AMPLIFIER

INSTALLATION PROCEDURE

Connecting Your Speaker:

Connect one lead from your speaker to the G terminal on the SPEAKER TERMINAL strip, and the other lead to the 8 or 16 ohm terminal depending on the impedance of the speaker you are using. (See Figure C) A and B terminals must remain strapped. The SPEAKER SELECTOR switch located on the front panel is inoperative for this method of operation.



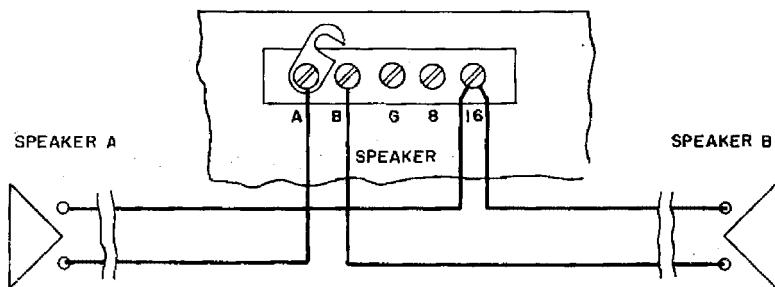
SPEAKER HOOK UP OF AX20 AS MONAURAL AMPLIFIER

Figure C

Connecting Two Monaural Speakers:

The Model AX20 allows you to operate two independent speaker systems if you prefer. You may then select one speaker or the other, or operate both simultaneously.

Remove the strap between the A and B terminals. Attach one speaker to the A and 16 ohm terminal on the SPEAKER OUTPUT strip and the other speaker to the B and 16 ohm terminal on the same strip. If your speakers are 8 ohms, connect one speaker to A and 8 ohms and the other to B and 8 ohms. (See Figure D) The SPEAKER SELECTOR switch located on the front panel is operative for this method of operation.



SPEAKER HOOK UP OF AX20 AS MONAURAL AMPLIFIER
USING TWO SEPARATE SPEAKERS

Figure D

TECHNICAL EXPLANATIONS OF THE CONTROLS

Since a stereo preamplifier is actually two preamplifiers in one, the number of operating controls would normally be doubled. This would make operation unnecessarily cumbersome. For convenience the duplicate controls are mechanically tied together, or ganged, to be operated by one knob.

Bass and Treble:

The BASS and TREBLE controls on the Model AX20 provide the full range of tonal adjustment necessary for high fidelity listening. These controls can either boost or cut the bass and treble tones of the stereo system. The controls should be set in accordance with your hearing preference, speaker characteristics and room acoustics.

Loudness Control:

This control adjusts the volume level of any program material fed into your stereo system. Its effect can be modified by the CONTOUR switch.

Contour Switch:

One of the limitations of human hearing is its tendency to lose sensitivity to the very low pitched sounds, as the program sound level is reduced. It is this characteristic (known as the Fletcher-Munson effect) which causes one to play music programs at high listening level in order to experience the full rich tone available from fine modern recordings. The Harman-Kardon CONTOUR switch compensates for the Fletcher-Munson effect thus eliminating high listening levels as a requisite for full enjoyment of reproduced music.

For low level listening throw the CONTOUR switch located on the front panel to the "ON" position. You will note how the low frequencies become more apparent while the volume level remains unchanged.

Balance Control:

The nature of stereo reproduction is such that it requires two identical channels to attain the highest degree of faithfulness and spatial distribution. Any variation in the efficiency of one channel as compared to the other will disturb this relationship. Since there may be slight differences between the two speakers, tape heads, etc., the AX20 includes a control to balance one channel against the other. Sufficient range is covered by this control to permit rebalancing of the overall system even in cases where major unbalance exists. It is entirely to be expected that this control will be set anywhere within its range to attain system balance.

When the BALANCE control is properly set, the apparent sound source will lie in a broad area between the two speakers. When the BALANCE control is rotated to the right the sound will move to the right and when the control is rotated to the left, the sound will move to the left.

Mode Switch:

The MODE switch selects between stereo operation, where a stereo program source is available, and monaural operation utilizing the full power of both channels and both speakers when the program source is monaural only.

TECHNICAL EXPLANATION OF THE CONTROLS

Bass and Treble:

These controls provide the full range of tonal adjustment necessary for high fidelity listening. These controls can either boost or cut the bass and treble tones of your monaural system. The controls should be set in accordance with your hearing preference, speaker characteristics and room acoustics.

Loudness Control:

This control adjusts the volume level of any program material fed into your high fidelity system. Its effect can be modified by the CONTOUR Switch.

Contour Switch:

One of the limitations of human hearing is its tendency to lose sensitivity to the very low pitched sounds, as the program sound level is reduced. It is this characteristic (known as the Fletcher-Munson effect) which causes one to play music programs at high listening level in order to experience the full rich tone available from fine modern recordings. The Harman-Kardon CONTOUR Switch compensates for the Fletcher-Munson effect, thus eliminating high listening levels as a requisite for full enjoyment of reproduced music.

For low level listening throw the CONTOUR Switch located on the front panel to the "ON" position. You will note how the low frequencies become more apparent while the volume level remains unchanged.

Balance Control:

This control has no function in monaural listening and should be left in the center position. If rotated to either extreme position, it would completely shut off the preamplifier on that side.

Mode Switch:

The only application for this switch in monaural operation is to select between the two preamplifiers. This allows for double the usual number of input jacks found on ordinary monaural amplifiers. The STEREO NORMAL and MONAURAL RIGHT positions are identically connected and will activate the Right preamplifier, therefore switching on all program material connected to this preamplifier. STEREO REVERSE and MONAURAL LEFT are identically connected and will activate the Left preamplifier.

For simplicity, it is suggested to use only the MONAURAL RIGHT and MONAURAL LEFT positions on the MODE Switch for monaural operation. Switch to MONAURAL RIGHT or MONAURAL LEFT as a function of the preamplifier you wish to use.

Function Switch:

The FUNCTION switch selects the desired type of program source and has four positions. TAPE HD selects your tape deck plugged into either the LEFT or RIGHT TAPE HD jack located on the rear panel. PHONO selects either your

monaural low level magnetic cartridge or high level ceramic cartridge. The TUNER position selects your monaural tuner for operation and the AUX position selects your monaural tape recorder or other auxiliary monaural equipment.

Speaker Selector Switch:

In a monaural installation where more than one set of speakers are installed (for example: one speaker in the living room and another in the den) selection between the two speakers is made by operating the SPEAKER SELECTOR switch on the front panel.

To operate Speaker A (located in your living room) set the LEFT SPEAKER SELECTOR switch located on the front panel to "A". To select Speaker B (located in another room) set the SPEAKER SELECTOR switch to "B". To operate both speakers simultaneously set the SPEAKER SELECTOR switch to "AB".

Rumble Filter:

At times, record changers, records and even some turntables produce an objectionable low frequency signal that is strong enough to be introduced into the sensitive playback system. Known as "Rumble", this undesirable signal can be eliminated by the special RUMBLE FILTER switch incorporated in the Model AX20. Whenever rumble is encountered, set the switch to "ON".

Equalization Switch:

Records and tapes are recorded with special emphasis and deemphasis of certain frequencies in order to achieve maximum dynamic range. To play back your records and tapes faithfully, it is necessary to "equalize" their frequency response.

When playing your monaural records set the EQUALIZATION switch to the RIAA or EUR position depending on the recommendation of the record company. If you are in doubt as to the proper equalization setting, set the switch for best listening quality.

When you are using your monaural tape deck through the TAPE HD jack, set the equalization switch to either 3% or 7½ depending on the tape speed used. Proper playback equalization is then automatically selected.

ADJUSTMENTS

Output Balance:

This control is located between the output transformer and the EL84 output tubes. It balances the two EL84's for lowest power hum and distortion. Adjustment is quite simple: allow the amplifier to remain in operation for at least 15 minutes. Turn the Loudness control to minimum. Now while listening to the speaker connected to the AX20, adjust this control for minimum hum. Due to the extremely low hum level of the AX20, this is best done at a time when the room is very quiet. The setting for minimum hum is attained only when the two power tubes have been exactly balanced, and this is the condition for absolute minimum distortion.

This switch has four positions. STEREO NORMAL enables the speakers to operate in the manner in which they are normally connected. STEREO REVERSE interchanges the channels so that the program source appearing at the left speaker now appears at the right and the program source appearing at the right speaker reverses to the left. MONAURAL RIGHT and MONAURAL LEFT can be utilized when the amplifier is used in stereo connection, but with a monaural program source such as an FM broadcast. Setting the MODE switch to RIGHT allows any program material being fed into the right stereo input to be reproduced by both speakers simultaneously. Setting the MODE switch to LEFT allows all program material being fed into the left stereo input to be reproduced by both speakers simultaneously. Under each of these conditions the combined power of both channels is available.

Function Switch:

The FUNCTION switch selects the desired type of program source and has four positions. TAPE IID selects your tape deck plugged into the TAPE HD jacks located on the rear panel. PHONO selects the low level stereo phono cartridge plugged into the LOW LEVEL PHONO jacks or the high level ceramic or crystal stereo cartridge plugged into the HIGH LEVEL phono jacks located on the rear panel. The TUNER position selects your stereo tuner for operation and the AUX position selects your stereo tape recorder or other auxiliary stereo equipment.

Speaker Selector Switch:

For stereo operation, this switch is inoperative.

Equalization Switch:

Records and tapes are recorded with special emphasis and deemphasis of certain frequencies in order to achieve maximum dynamic range. To play back your records and tapes faithfully, it is necessary to "equalize" their frequency response.

When playing your stereophonic records set the EQUALIZATION switch to the RIAA position. It is not necessary to use the EUR position since all stereophonic recordings are recorded only with the RIAA equalization curve.

When you are using your tape deck through the TAPE HD input jacks, set the EQUALIZATION switch to either 3 $\frac{1}{2}$ or 7 $\frac{1}{2}$ depending on the tape speed used. Proper playback equalization is then automatically selected.

ADDITIONAL INFORMATION

Speaker Phasing:

When more than one speaker is used in any music reproducing system they must be connected in such a way as to aid, rather than to work against each other. Since two speakers must be used for stereo reproduction, this caution applies. Checking for phase, and correcting if necessary, is quite simple, and is done at the time of installation of the system.

Play a record with readily apparent bass tones. Listen carefully to the strength and clarity of the bass. Now reverse the connections on *one* of the speakers. If the bass notes are now louder and clearer, the speakers are now correctly phased. If the bass seems weaker, the original connection was correct.

Hum Adjustment:

One HUM ADJUST-HIGH LEVEL control and one HUM ADJUST-LOW LEVEL control are located on the right side of the chassis in front of the electrolytic. Each operates simultaneously to adjust both left and right channels. To adjust for minimum hum, set the FUNCTION switch to TUNER, turn the tuner off (if connected) and turn the LOUDNESS control full on. Adjust the HIGH LEVEL hum control for minimum hum. Now set the FUNCTION switch to the TAPE-I.O position, and set the LOW LEVEL hum control for minimum hum.

System Hum or Noise:

In any high fidelity installation, hum may be caused by the interconnection of a record changer, tuner and amplifier, as a result of the cables and different grounds. A good way to eliminate this problem is to first disconnect everything but the speakers from the amplifier, and listen for hum. If the hum persists, make the hum and balance adjustments described above. Try reversing the amplifier power plug. Now plug in the record player. If hum appears, try reversing the record player power plug, and try connecting a wire from the record player chassis to the amplifier chassis. In this way, connect the tuner, tape deck and other devices in turn.

Note that hum may be picked up by defective interconnecting cables, and by interconnecting cables running too close to power cables.

MAINTENANCE AND REPAIRS

Fuse:

In the event of a potentially damaging failure of tubes or components, the Model AX20 is protected by a 1½ ampere, type 3AG fuse, located on the rear of the unit. If this fuse is blown, it should be replaced only with one of the same rating. Replacing with a fuse of higher rating will not protect the amplifier, and may result in severe damage, which will not be covered by the factory warranty.

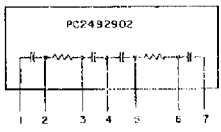
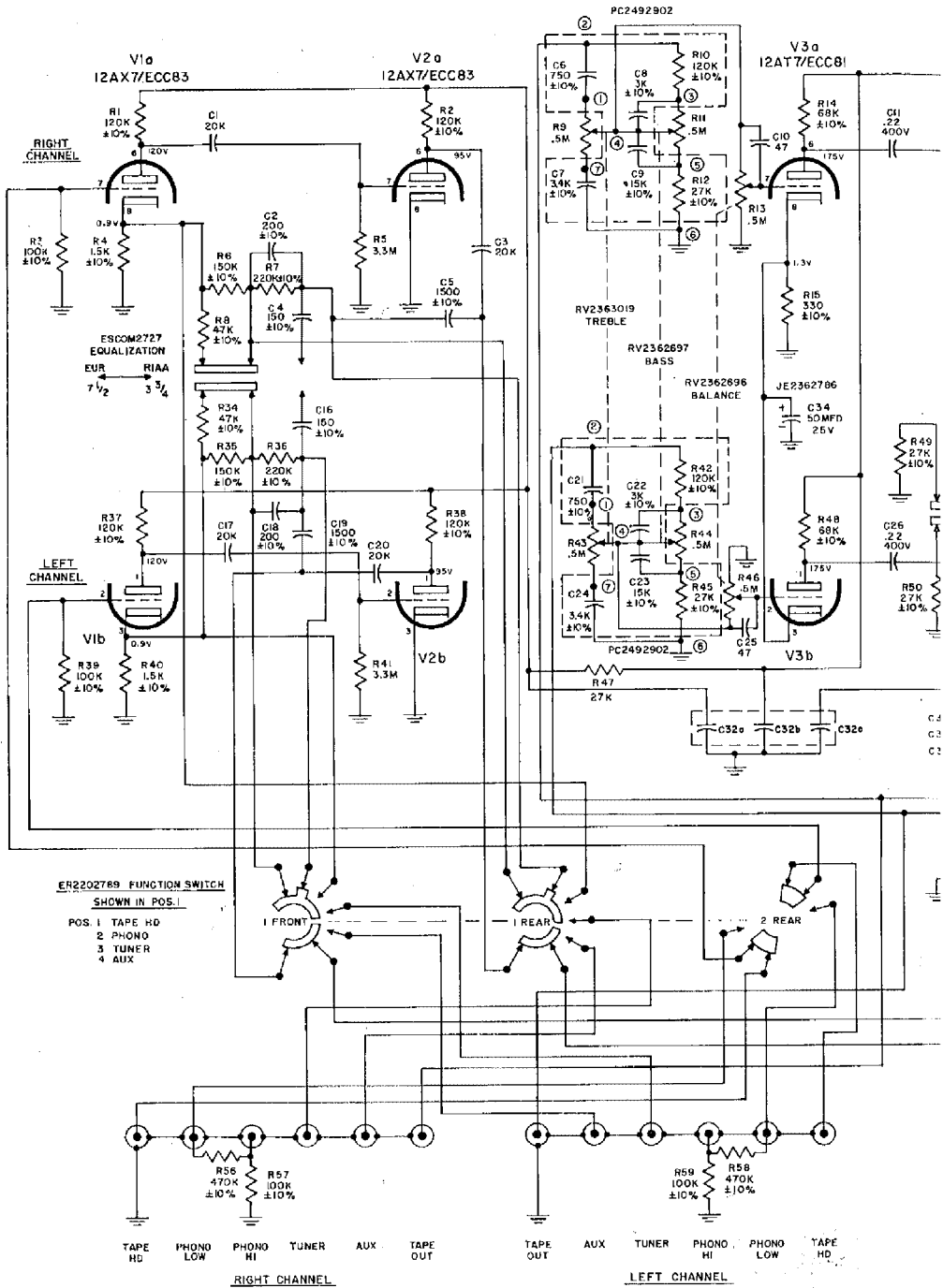
Routine Maintenance

Due to the conservative design and high quality components of the Model AX20, no routine maintenance other than yearly tube checking is advised. Occasional resetting of the hum and output balance adjustments, following the procedure described above, will keep the unit operating at peak efficiency. These adjustments should certainly be made after any tube replacement.

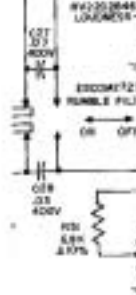
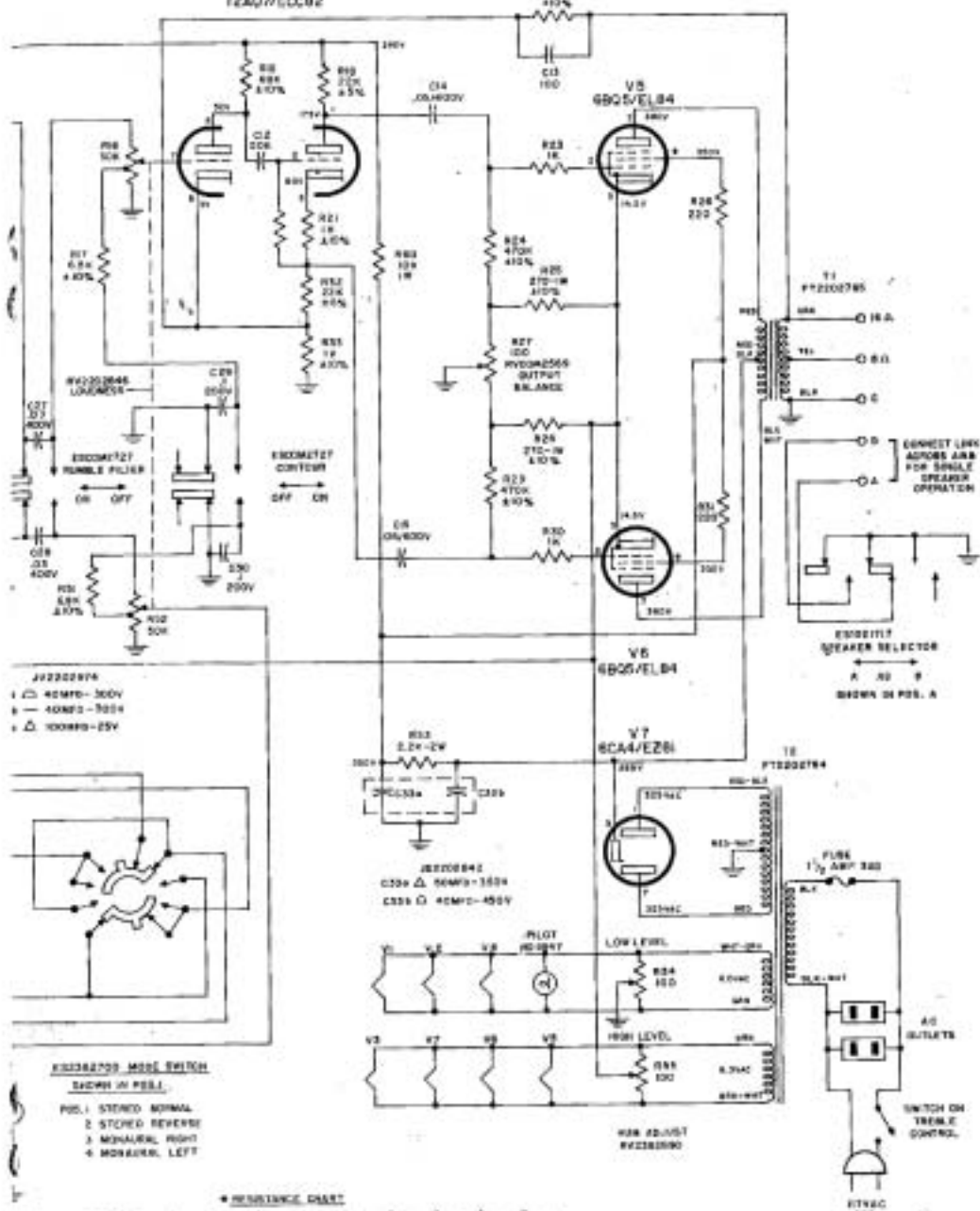
Repair:

Only the most qualified service technician should be employed, as special equipment and training is required to properly service a high fidelity amplifier. This manual contains information of great value to the repairman, and should be kept available.

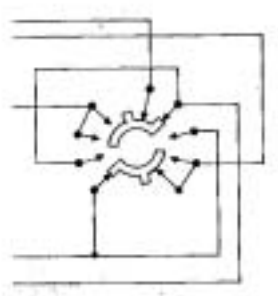
Factory Warranty Stations are maintained in most major cities. For the address of the nearest one, or for any other information relating to your Harman-Kardon products, write to the attention of the Customer Service Department, Harman-Kardon, Inc., 520 Main St., Westbury, N. Y. Be sure to include the model and serial number of the set in question. A short description of your complete installation is often of help in answering your questions.



V4
12AU7/ECC82



- J2202874
 1 Δ 40MFD-300V
 2 - 40MFD-300V
 3 Δ 100MFD-25V



- 40226709 MODE SWITCH
 SHOWN IN POS. 1
- POS. 1 STEREO NORMAL
 2 STEREO REVERSE
 3 MONAURAL RIGHT
 4 MONAURAL LEFT

* RESISTANCE CHART

TUBE	1	2	3	4	5	6	7	8	9
V1 ECC82	—	100K	1.5K	25	25	—	100K	1.5K	25
V2 ECC82	—	3.3M	0	25	25	—	3.3M	0	25
V3 ECC82	—	1M	—	100	100	—	1M	—	100
V4 ECC82	—	1.5M	3.2K	25	25	100K	20K	2.5K	25
V5 EL84	—	470K	80K	100	100	—	—	—	—
V6 EL84	—	470K	100	100	100	—	—	—	—
V7 6CA4	—	—	—	100	100	—	—	—	—

* COMMON SWITCH IS PUSH.
 MODE SWITCH IN STEREO NORMAL.
 BALANCE CONTROL CENTERED.
 LOUDEST CONTROL MAX GAIN.
 TONE CONTROLS FLAT.
 CONTOR & RABBLE SWITCHES OFF.

UNLESS OTHERWISE SHOWN
 ALL RESISTORS 1/2 WATT 5%
 ALL CAPACITOR VALUES WITHOUT SPECIAL TO BE GENERAL PURPOSE CERAMIC DISC WVC 10%
 ALL VOLTAGES ARE DC
 ALL RESISTANCES ARE IN OHMS

AX20 LIST OF REPLACEABLE PARTS

Description	H-K Part No.	List Price
DPDT SLIDE SWITCH	ESCOM2727	.40
DPDT SLIDE SWITCH	ES1021717	.60
POWER TRANSFORMER	FT2202784	14.75
OUTPUT TRANSFORMER	FT2202785	15.00
ELECTROLYTIC COND. 40MFD/450V 50MFD/350V	JE2202842	3.00
ELECTROLYTIC COND. 40MFD/200V 50MFD/25V 100MFD/25V	JE2202843	2.25
TWIN POT	RV2362690	1.30
BALANCE POT	RVCOM2569	.60
TREBLE CONTROL WITH A.C. SWITCH	RV2362730	3.50
BASS CONTROL	RV2362697	3.25
LOUDNESS CONTROL	RV2202846	2.25
BALANCE CONTROL	RV2362696	2.00
FUNCTION SWITCH	ER2202789	2.65
MODE SWITCH	ER2362700	1.60
KNOB W/WHITE LINE	PCOM2865	.25

SPECIFICATIONS

Circuits:	2-EL84's self biased, pentode connected in push-pull. Two separate self contained preamplifiers feeding through ganged tone and volume controls. One preamplifier feeds the power amplifier directly and the other terminates in an output jack for use with an external amplifier for a full stereophonic system.
Output Level:	20 watts at less than 1% harmonic distortion. 17 watts at less than 0.5% harmonic distortion. 5 watts at less than 0.2% harmonic distortion. 17 watts at less than 2% intermodulation distortion. Harmonic distortion readings at 1000 c.p.s.; Intermodulation distortion readings at 60/6000 c.p.s.: 4:1; All at 16 ohm load-120 volts.
Peak Power Output:	40 watts.
Output Impedance:	8 and 16 ohms.
Frequency Response:	± 0.5 db 15-30,000 c.p.s. at 1 watt. ± 1.0 db 20-20,000 c.p.s. at 15 watts.
Damping Factor:	5
Hum:	Minimum Volume: 90 db below 15 watts. Tuner & Aux.: 80 db below 15 watts (0.5 volt input reference) Phono (RIAA Position): 70 db below 15 watts (6 mv input reference) Tape Input: 60 db below 15 watts (1 mv 250 c.p.s. input reference)
Stereo Preamplifier Separation:	Better than 50 db.
Tone Control Range:	± 12 db at 50 c.p.s. ± 12 db at 10,000 c.p.s.
Rumble Filter:	12 db per octave below 50 c.p.s.
Input Levels:	Aux. and Tuner: 300 millivolts, flat response. Phono-Lo (Mag): 3 mv at 1 KC Phono-Hi (Crystal or Ceramic): 20 mv @ 1 KC Will not overload with input level below 350 MV. Tape: 1 mv. at 250 c.p.s.
Tape Output Level:	1 volt from each channel, unmodified by volume and tone controls.
Second Preamplifier Output Level:	0.5 volts, low impedance modified by all controls.
Record Equalization:	RIAA and EUR.
Tape Equalization:	NARTB 7½ and 3%