

harman/kardon

HKTS 10

Home Cinema Speaker System

SERVICE MANUAL



harman/kardon, Inc.
250 Crossways Park Dr.
Woodbury, New York 11797

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SPECIFICATIONS

HKTS 10 System Frequency Response 35Hz – 20kHz (–6dB)

SAT-TS10 Satellites

Recommended Power
10 – 110 watts

Impedance
8 ohms nominal

Sensitivity
86dB @ 1 watt/1 meter

Tweeter
One 1" dome, video-shielded

Midrange
One 4" driver, video-shielded

Dimensions (H x W x D)
10-1/8" x 5-1/4" x 5-3/8"
257mm x 133mm x 137mm

Weight
6.6 lb/3.0kg

CEN-TS10 Center

Recommended Power
10 – 110 watts

Impedance
8 ohms nominal

Sensitivity
86dB @ 1 watt/1 meter

Tweeter
One 1" dome, video-shielded

Midrange
Dual 4" drivers, video-shielded

Dimensions (H x W x D)
5-1/16" x 16-1/2" x 5-3/16"
128mm x 418mm x 131mm

Weight
10 lb/4.5kg

SUB-TS10 Subwoofer

Amplifier
150 watts RMS

Bass Driver
12" woofer, bass-reflex enclosure

Dimensions (H x W x D)
20-5/16" x 16-3/8" x 15-1/16"
515mm x 416mm x 382mm

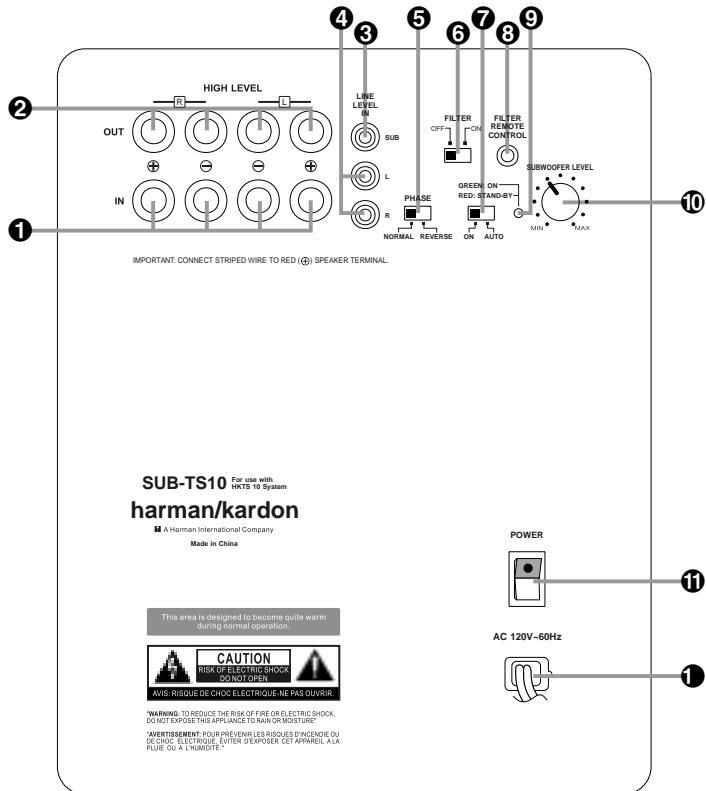
Weight
40 lb/18.0kg

Occasional refinements may be made to existing products without notice but will always meet or exceed original specifications unless otherwise stated.

SUB-TS10 150W Powered Amplifier

LINE VOLTAGE	Yes/No	Hi/Lo Line	Unit	Notes	
US 120vac/60Hz	Yes	108-132	Vrms	Normal Operation	
Parameter	Specification	Unit	QA Test Limits	Conditions	Notes
Amp Section					
Type (Class AB, D, other)	D	D	n/a		
Load Impedance (speaker)	4	Ohms	n/a	Nominal	
Rated Output Power	150	Watts	150	1 input driven	
THD@ Rated Power	0.08	%	1	22k filter	
THD @ 1 Watt	0.15	%	0.5	22k filter	
DC Offset	5	mV-DC	30	@ Speaker Outputs	
Damping factor	>100	DF	30		Measured at speaker terminals, Output power 140 Watts THD 0.1 %
Input Sensitivity					
Input Frequency	50	Hz	NA	Nominal Freq.	1 input driven
Line Input (L&R)	220	mVrms	±2dB	To Rated Power	1 input driven
LFE Input	220	mVrms	±2dB	To Rated Power	LFE input driven only
Speaker/Hi Level Input	2.2	Vrms	±2dB	To Rated Power	(-20 dB below Line In)...1 input driven
Signal to Noise					
SNR-A-Weighted	100	dBA	85	rel. to rated power	A-Weighting filter
SNR-unweighted	90	dBr	80	rel. to rated power	22k filter
SNR @ 1W-unweighted	65	dBr	60	rel. to 1W Output	22k filter
Residual Noise Floor	1.2	mVrms	3.0	Volume @max, using RMS reading DMM/VOM (or A/P)	
Residual Noise Floor	0.8	mVrms(max)	2.0	Volume @max, w/ A/P Swept Bandpass Measurement (Line freq. + harmonics)	
Input Impedance					
Line input L&R , LFE	10	K ohms	n/a	Nominal	
Speaker/Hi Level Input	4.7	K ohms	n/a	Nominal	
Filters					
Left & Right Low Pass fixed	130	Hz	--	±2dB @ -3dB ref. 100Hz	
LFE Low Pass fixed	220	Hz	--	±2dB @ -3dB ref. 100Hz	
Subsonic filter (HPF)	22	Hz	--	±2dB @ -3dB ref. 100Hz	
Limiter	YES	--	n/a		
Features					
LFE Input	YES		functional		BW Limited to 220 Hz
Volume pot Taper (lin/log)	log	--	functional		
ATO	YES		functional		
Signal Sensing (ATO)					
ATO test Frequency	50	Hz	n/a		
ATO Line Level	4.0	mV	2.0 - 8.0	2mV@50Hz into Line Input w/ 1 ch. driven	
ATO Speaker level input	40	mV	20 - 80	20mV@50Hz into Line Input w/ 1 ch. driven	
ATO Turn-on time	5	ms	functional	Amp connected and AC on, then input signal applied	
Auto Mute/ Turn-OFF Time	15	minutes	10 - 25	T before muting, after signal is removed	
Power on Delay time	3	sec.	functional	AC Power Applied	
Transients/Pops					
ATO Transient	5	mV-peak	10	@ Speaker Outputs	
Turn-on Transient	50	mV-peak	100	@ Speaker Outputs	AC Line cycled from OFF to ON
Turn-off Transient	50	mV-peak	100	@ Speaker Outputs	AC Line cycled from ON to OFF
Efficiency					
Stand-by Input Power	10	Watts	12	@ nom. line voltage	Maximum allowable input power under nominal Input voltage and frequency, HOT or COLD operation.
Power Cons.@rated power	230	Watts	250	@ nom. line voltage	150 Watts @ 4 Ohms nominal line voltage
Protection					
Short Circuit Protection	YES	--	functional	Direct short at output	
Thermal Protection	65	deg. C	--	functional @1/8 max unclipped Power	Temperature rise should not exceed 35K rise
DC Offset Protection	YES	--	functional	DC present at Speaker Out leads	Relay or crowbar (for driver/fire protection)
Line Fuse Rating					
US Version	3.15	Amps		Type-T or Slo Blo	External fuse with UL/SEMKO rated holder

SUB-TS10 SUBWOOFER AMPLIFIER PANEL CONTROLS AND CONNECTIONS



- ① Speaker-Level Inputs
- ② Speaker-Level Outputs
- ③ Line-Level Subwoofer (SUB) Input
- ④ Line-Level Full-Range Inputs
- ⑤ Phase Switch
- ⑥ High-Cut (Low-Pass) Filter Switch
- ⑦ Music-Sense On/Off Switch
- ⑧ Filter Remote Control Input
- ⑨ LED Indicator
- ⑩ Subwoofer-Level Control
- ⑪ Master Power Switch
- ⑫ AC Power Cord

① Speaker-Level Inputs: Connect these binding post terminals to the main left and right speaker terminals of your receiver or amplifier, if your receiver or amplifier does not have a line-level subwoofer output. Remember to maintain polarity by connecting the (+) terminal on the receiver/amplifier to the (+) terminal on the SUB-TS10 subwoofer, and the (-) terminal on the receiver/amplifier to the (-) terminal on the SUB-TS10 subwoofer.

② Speaker-Level Outputs: If you are using the **Speaker-Level Inputs** ① on the SUB-TS10, you should connect these binding post terminals to your front left and right speakers, remembering to maintain polarity by connecting the (+) terminal on

the SUB-TS10 subwoofer to the (+) terminal on the speaker, and the (-) terminal on the SUB-TS10 subwoofer to the (-) terminal on the speaker. If you are not using the **Speaker-Level Inputs** ①, then connect your front left and right speakers directly to your receiver or amplifier. See pages 6 and 7 for further information.

③ Line-Level Subwoofer (SUB) Input: Connect the subwoofer output of a receiver with digital surround sound decoding, such as Dolby® Digital or DTS™, to this input. This input bypasses the SUB-TS10's internal crossover circuitry, and should only be used with a filtered signal. If your receiver does not have digital decoding, you should use the

Line-Level Full-Range Inputs ④ instead.

④ Line-Level Full-Range Inputs: Connect the line-level subwoofer output or preamp output(s) of your receiver or amplifier to these inputs. If your receiver does not have a separate subwoofer output, use a Y-adaptor (not supplied) to bridge the receiver's preamp output to the main amp input for that channel, and connect the long end of the adaptor to the corresponding line-level input on the SUB-TS10. If your receiver has only a single subwoofer output, you may connect it to either the left or right line-level input on the SUB-TS10, and no Y-adaptor is needed.

⑤ Phase Switch: This switch determines whether the SUB-TS10 subwoofer's piston-

SUB-TS10 SUBWOOFER AMPLIFIER PANEL CONTROLS AND CONNECTIONS

like action moves in and out in phase with the main speakers. If the speakers were to play out of phase, the sound waves produced by the subwoofer would be cancelled out, reducing bass response. This phenomenon depends in part on the relative placement of the speakers in the room. In most cases, the **Phase Switch 5** should be left in the **NORMAL** position. However, it does no harm to experiment with the **Phase Switch 5**, and you may leave it in the position that maximizes bass response.

6 High-Cut (Low-Pass) Filter Switch: Placing this switch in the **ON** position activates circuitry that cuts out all audio input signals above 120Hz. This allows the SUB-TS10 to focus its power on reproducing the low-frequency portion of the signal, avoiding inefficiency and distortion. Engage this filter when using the **Speaker-Level Inputs 1**, or when using the **Line-Level Full-Range Inputs 4**, unless your receiver or processor processes its line-level output using a low-pass filter. The filter has no effect when the **SUB Input 3** is used.

7 Music-Sense On/Off Switch: When placed in the **AUTO** position, and when the **Master Power Switch 11** is turned on, the SUB-TS10 will automatically turn itself on or place itself in the Standby mode, depending on whether it is receiving an audio signal. When this switch is placed in the **ON** position, the SUB-TS10 will remain on, whether or not it is receiving an audio signal.

8 Filter Remote Control Input: This input accepts a remote control signal from a compatible Harman Kardon A/V receiver that enables you to override the **High-Cut**

(Low-Pass) Filter Switch 6, by signaling the SUB-TS10 to engage the filter even when the switch is in the **OFF** position.

9 LED Indicator: This LED indicates whether the SUB-TS10 is in the **ON** or **STANDBY** state when used with the **Music-Sense On/Off Switch 7** in the **AUTO** position. The LED is lit Green to indicate that the SUB-TS10 is receiving an audio signal and is turned on, and the LED is lit Red to indicate that no signal is being received and the SUB-TS10 is in Standby mode.

When the **Music-Sense On/Off Switch 7** is in the **ON** position, the LED will be lit Green, whether or not an audio signal is present.

When the **Master Power Switch 11** is turned off, the LED goes dark, no matter which position the **Music-Sense On/Off Switch 7** is in.

10 Subwoofer-Level Control: Volume can be adjusted using the **Subwoofer-Level Control**. Turn the control clockwise to increase the SUB-TS10's volume, or counterclockwise to decrease it.

11 Master Power Switch: Place this switch in the “•” position to power-on the SUB-TS10 subwoofer. The SUB-TS10 will then be either in the Standby mode or completely on, depending on the position of the **Music-Sense On/Off Switch 7**.

12 AC Power Cord: Make sure to plug this cord into an active, unswitched electrical outlet for proper operation of the SUB-TS10. The cord should not be plugged into the accessory outlets found on some audio components.

SPEAKER CONNECTIONS (continued)

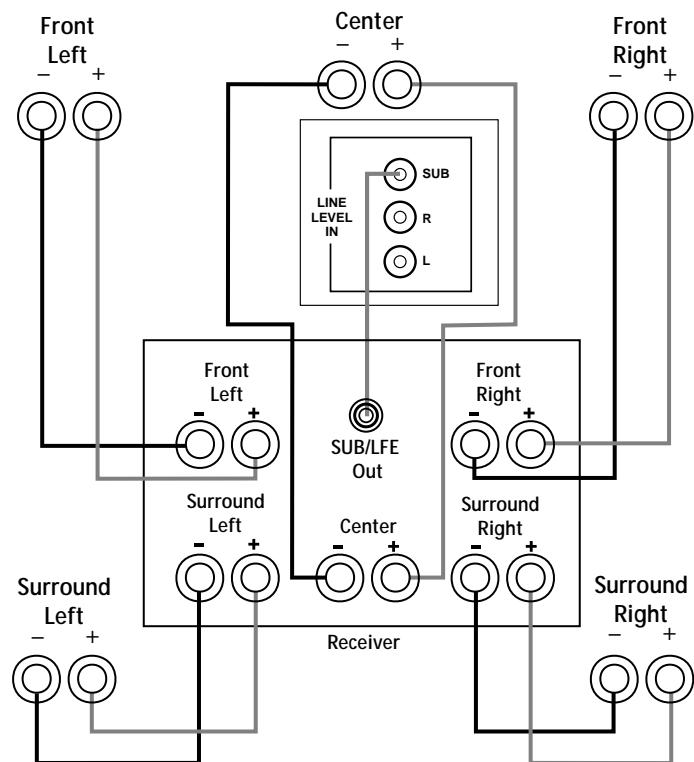
Dolby Digital or DTS (or other Digital Surround Mode) Connection

USE THIS INSTALLATION METHOD FOR DOLBY DIGITAL, DTS OR OTHER DIGITAL SURROUND PROCESSORS:

Use the line-level input jack marked **SUB** ③ for the Low-Frequency Effects channel. Connect this jack to the subwoofer output or LFE output on your receiver or amplifier. Connect each speaker to the corresponding speaker terminals on your receiver or amplifier.

Make sure that you have configured your surround sound processor for "Subwoofer On." The front left, front right, center and rear surround speakers should all be set to "Small."

When all connections have been made, plug the AC power cord on the subwoofer into an AC outlet.



SPEAKER CONNECTIONS (continued)

Dolby Pro Logic (Non-Digital) – Line Level

USE THIS INSTALLATION METHOD FOR DOLBY PRO LOGIC APPLICATIONS (NOT DOLBY DIGITAL, DTS OR OTHER DIGITAL PROCESSING), WHERE THE RECEIVER/PROCESSOR IS EQUIPPED WITH A SUB-WOOFER OUTPUT, OR A VOLUME-CONTROLLED PREAMP (LINE-) LEVEL OUTPUT:

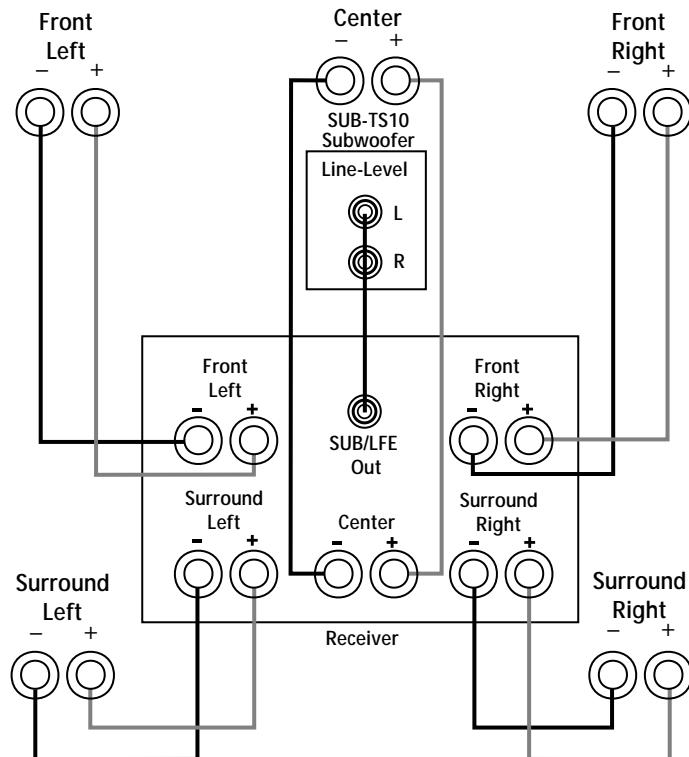
Use the supplied RCA-type patch cord to connect the line-level subwoofer output on your receiver or amplifier to either the left or right **Line-Level Full-Range Input 4** on the SUB-TS10 subwoofer. Use both the left and right inputs on the subwoofer if your receiver or processor has both left and right line-level outputs.

If your receiver is equipped with line-level outputs but does not have a separate sub-woofer output, use a Y-adaptor (not supplied) to bridge the receiver's preamp output to the main amp input for that channel, and connect the long end of the adaptor to the corresponding line-level input on the SUB-TS10.

IMPORTANT: Do not use the **SUB Input** **③** on the subwoofer with Dolby Pro Logic processors. Make sure that you have configured your surround sound processor for "Subwoofer On." The front left, front right, center and rear surround speakers should all be set to "Small."

When all connections have been made, plug the AC power cord on the subwoofer into an AC outlet.

Connect each speaker to the corresponding speaker terminals on your receiver or amplifier.



SPEAKER CONNECTIONS (continued)

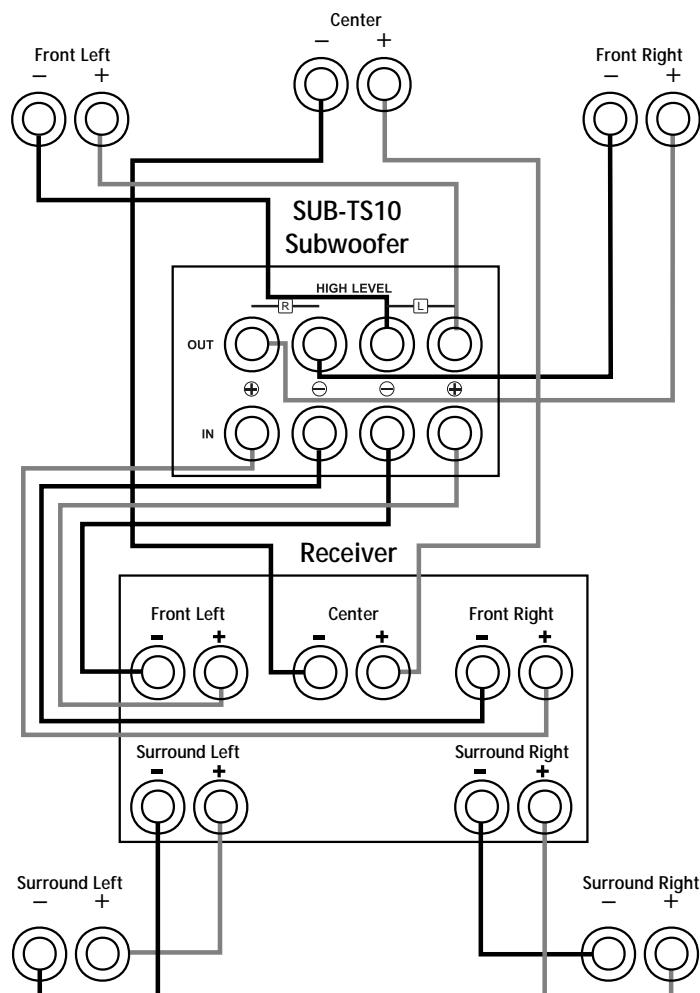
Dolby Pro Logic*
(Non-Digital) – Speaker Level

USE THIS INSTALLATION METHOD FOR DOLBY PRO LOGIC APPLICATIONS (NOT DOLBY DIGITAL, DTS OR OTHER DIGITAL PROCESSING), WHERE THE RECEIVER/PROCESSOR DOES NOT HAVE A SUBWOOFER OUTPUT, OR A VOLUME-CONTROLLED PREAMP (LINE-) LEVEL OUTPUT:

Connect your receiver or amplifier's front left and right speaker terminals to the left and right **Speaker-Level Input ①** terminals on the SUB-TS10 subwoofer that are marked "High Level In." Connect the left and right **Speaker-Level Output ②** terminals on the SUB-TS10 subwoofer that are marked "High Level Out" to the corresponding terminals on the back of your front left and right speakers.

Connect your receiver or amplifier's center, and surround left and right speaker terminals to the corresponding terminals on the back of your center, and surround left and right speakers.

When all connections have been made, plug the AC power cord on the subwoofer into an AC outlet.



OPERATION

Move the **Master Power Switch** ⑪ (marked **Power**) to the “•” (On) position. The SUB-TS10 subwoofer will automatically turn itself on or go into Standby mode, depending on whether or not a signal is being sent to it by your receiver or surround processor, and provided that the **Music-Sense On/Off Switch** ⑦ is moved to the right so that it is in the **AUTO** position.

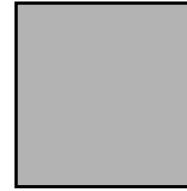
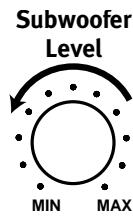
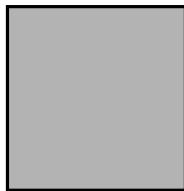
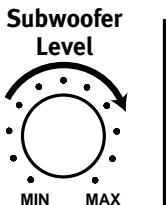
When your receiver or amplifier is off, or is not sending program material to the subwoofer, the subwoofer will be in Standby mode and the **LED Indicator** ⑨ on the amp panel will turn red. When the subwoofer senses an audio signal, it will automatically turn itself on and the **LED Indicator** ⑨ will turn green. If the subwoofer does not sense a signal after approximately twenty minutes, it will automatically go into Standby mode.

When the **Music-Sense On/Off Switch** ⑦ is switched to the **ON** position, the subwoofer will remain on, whether or not program material is playing.

If you will be away from home for an extended period of time, or if the subwoofer will not be used, switch the **Master Power Switch** ⑪ to the **OFF** position.

Volume

Volume can be adjusted using the **Subwoofer-Level Control** ⑩, as shown below.



Additional Bass Adjustments

In addition to the volume adjustments described above, the SUB-TS10 subwoofer includes a **Phase Switch** ⑤ and a **Filter Switch** ⑥ that can be used to adjust the bass response to suit your listening environment or taste.

In most situations, the **Phase Switch** ⑤ should be left in the **NORMAL** position. If you suspect that the subwoofer is playing out of phase with the other speakers, which would tend to diminish bass response, try placing this switch in the **REVERSE** position. There is no harm in experimenting, and you may return the switch to the **NORMAL** position at any time. If you rearrange your room and reposition the speakers, it would be a good idea to check whether they are in phase by flipping this switch.

The **High-Cut (Low-Pass) Filter Switch** ⑥ limits the frequencies of the audio signal inputted to the subwoofer to the low frequencies that the subwoofer reproduces best. This allows the subwoofer to perform more efficiently, and with superior bass reproduction, minimizing distortion that might occur if the subwoofer attempted to reproduce higher frequencies. This switch should be left in the **ON** position, **except**:

1. When the **SUB Input** ③ is being used, in which case it has no effect, or
2. When the **Speaker-Level Inputs** ② or the **Line-Level Full-Range Inputs** ④ are being used with a crossover or filter on board the receiver or processor. In these two circumstances, place the switch in the **OFF** position.

TROUBLESHOOTING

If there is no sound from any of the speakers:

- Check that receiver/amplifier is on and a source is playing.
- Check that the powered subwoofer is plugged in and its **Master Power Switch** **11** is switched on to the "•" position.
- Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.
- Review proper operation of your receiver/amplifier.

If there is no sound coming from one speaker:

- Check the "Balance" control on your receiver/amplifier.
- Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured, and that no wires are touching each other.
- In Dolby Digital or DTS mode, make sure that the receiver/processor is configured so that the speaker in question is enabled.
- Turn off all electronics and switch the speaker in question with one of the other speakers that is working correctly. Turn everything back on, and determine whether the problem is in the same place: i.e., the speaker that was working previously now has no sound and the speaker that was not working now sounds fine; or whether it has moved: i.e., the speaker that was not working still has no sound and the speaker that was working is still fine. If the problem is in the same place, the source of the problem is most likely with your receiver or amplifier, and you should consult the owner's manual for that product for further information. If the problem has followed the speaker, consult your dealer for further assistance or, if that is not possible, visit our Web site at www.harmankardon.com for further information.

If there is no sound from the center speaker:

- Check all wires and connections between receiver/amplifier and speaker. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.
- If your receiver/processor is set in Dolby Pro Logic mode, make sure the center speaker is not in phantom mode.
- If your receiver/processor is set in Dolby Digital or DTS mode, make sure the receiver/processor is configured so that the center speaker is enabled.

If the system plays at low volumes but shuts off as volume is increased:

- Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.
- If more than one pair of main speakers is being used, check the minimum impedance requirements of your receiver/amplifier.

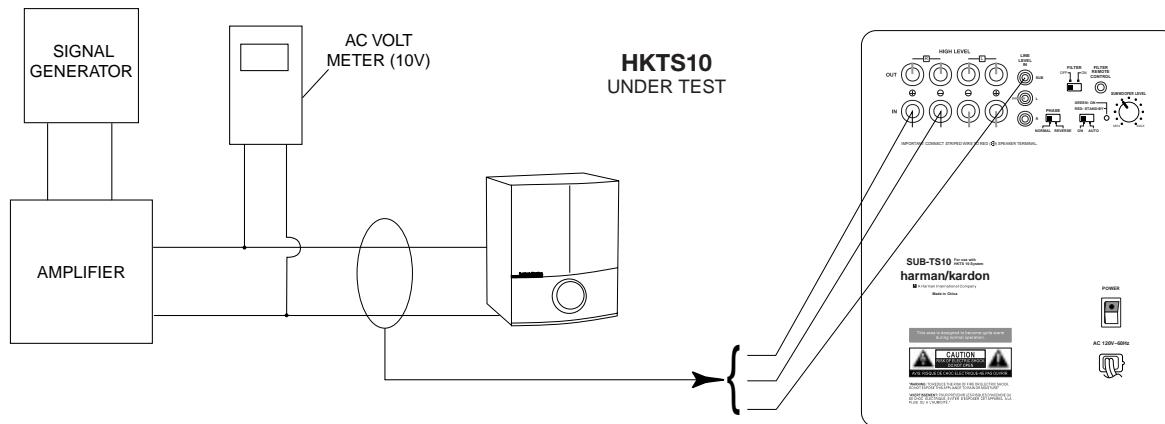
If there is low (or no) bass output:

- Make sure the SUB or line-level inputs of the SUB-TS10 subwoofer and SUB or LFE output of your receiver or amplifier are properly connected by the RCA-type patch cord.
- If you are using the SUB-TS10's speaker-level inputs, check your speaker cables to make sure they are all connected; that none of the wires are frayed, cut or punctured; and that you have maintained the correct polarity by connecting positive terminals to positive terminals, and negative terminals to negative terminals.
- Make sure the subwoofer is plugged into an active electrical outlet and its **Master Power Switch** **11** is switched on to the "•" position.
- Check the speaker setup (bass management) settings in your AVR receiver or processor to make certain that the front, center and surround speakers are configured for "Small," and that the subwoofer is set for "Yes" or "On."

If there is no sound from the surround speakers:

- Check all wires and connections between receiver/amplifier and speakers. Make sure all wires are connected. Make sure none of the speaker wires are frayed, cut or punctured.
- Review proper operation of your receiver/processor and its surround sound features.
- Make sure the movie or TV show you are watching is recorded in a surround sound mode. If it is not, check to see whether your receiver/processor has other surround modes you may use.
- In Dolby Digital or DTS mode, make sure your receiver/processor is configured so that the surround speakers are enabled.
- Review the operation of your DVD player and the jacket of your DVD to make sure that the DVD features the desired Dolby Digital or DTS mode, and that you have properly selected that mode using both the DVD player's menu and the DVD disc's menu.

Test Set Up and Procedure



Equipment needed:

- Function/signal generator/sweep generator
- Integrated Amplifier
- Multimeter
- Speaker cables

General Unit Function (UUT = Unit Under Test)

- 1) From the signal generator, connect one line level (RCA) cable to the single Sub input on the UUT.
- 2) On the front of the unit, turn the LEVEL control full counterclockwise. FILTER control should be OFF.
- 3) Turn on generator, adjust to 75mV, 50 Hz.
- 4) Plug in UUT; turn the power switch ON. LED should be Red. Turn LEVEL control full clockwise (MAX)
- 5) LED should now be Green; immediate bass response should be heard and felt from port tube opening.
- 6) Turn off generator, turn VOLUME control fully counterclockwise, disconnect RCA cable.
- 7) Connect one pair of speaker cables to Speaker Level input terminal (IN) on Right channel only. Cables should be connected to an integrated amplifier fed by the signal generator.
- 8) Turn on generator and adjust so that speaker level input at the amplifier is 1.6V, 50 Hz. Turn LEVEL control full clockwise.
- 9) Green LED should light, immediate bass response should be heard and felt from the port tube opening.

Sweep Function

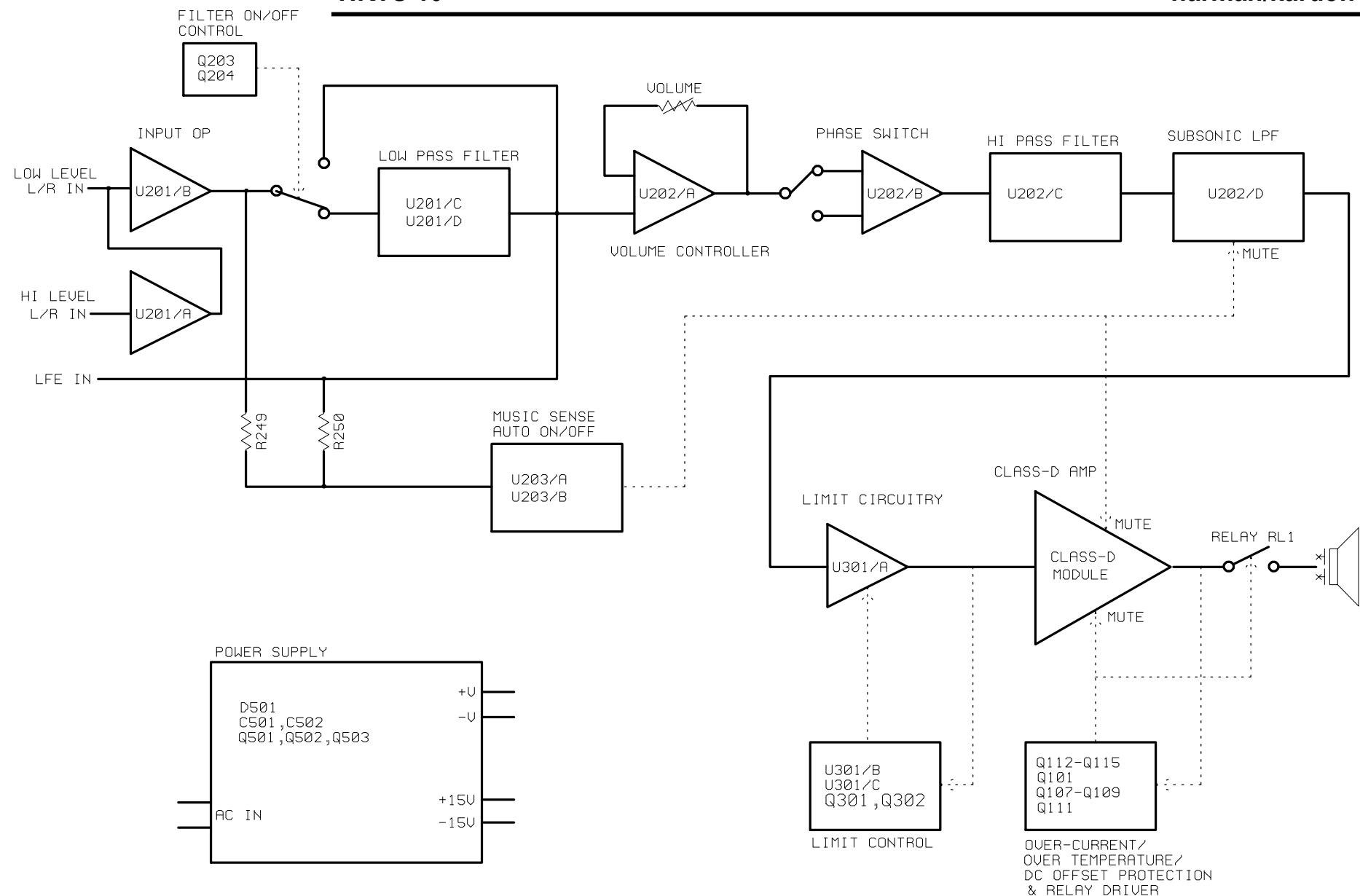
- 1) Follow steps 7-9 above, using a sweep generator as a signal source.
- 2) Sweep generator from 20Hz to 300Hz. Listen to the cabinet and drivers for any rattles, clicks, buzzes or any other noises. If any unusual noises are heard, remove woofers and test.

Driver Function

- 1) Remove woofer from cabinet; detach + and - wire clips.
- 2) Check DC resistance of woofer; it should be **3.5 ohms $\pm 10\%$**
- 3) Connect a pair of speaker cables to driver terminals. Cables should be connected to an integrated amplifier fed by a signal generator. Turn on generator and adjust so that speaker level output is **5.0V**.
- 4) Sweep generator from 20Hz to 1kHz. Listen to driver for any rubbing, buzzing, or other unusual noises.

HKTS 10

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HKTS 10 BLOCK DIAGRAM

HKTS 10 Subwoofer/Satellite/Center		Mechanical/Packing Parts List
Part Number		Description
Subwoofer SUB TS10		
30PF14FM-DW02		12" Woofer (DCR = 3.5 ohms +/-10%)
xc125006-b		Front Baffle
xc125007		Grille
wi5334-1		Foot (4)
06-T5305004		Screw for front baffle & Feet (8)
Satellites SAT-TS10		
10PR70BZK-HW02		4" woofer
35DM13NG-PT02		13 mm tweeter
XR5176-1		Crossover Network
xc045016-b		Baffle
xc045017-1		Grille
xd045016-b		Enclosure
Center Channel CEN-TS10		
10PR70BZK-MW02		Woofer 4"
35DM13NG-HT02		13mm tweeter
xr5177-1		Crossover Network
xc045014-b		Baffle
xd045014-b		Enclosure
xc045015-1		Grille
Packing/Accessories		
wg5320		Master carton
ai5170		Owner's manual
at5108		Warranty card
sal5009		Wire set 40' (surround)
sal063-1		Wire set 20' (center)
sal5020		Wire set 15' (front satellites)
sal5044		15' RCA cable
wi5688		Center Channel Bracket/Support
wi5689		Foot
wi5691		Wall Bracket for Satellite

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SUB-TS10 EXPLODED VIEW

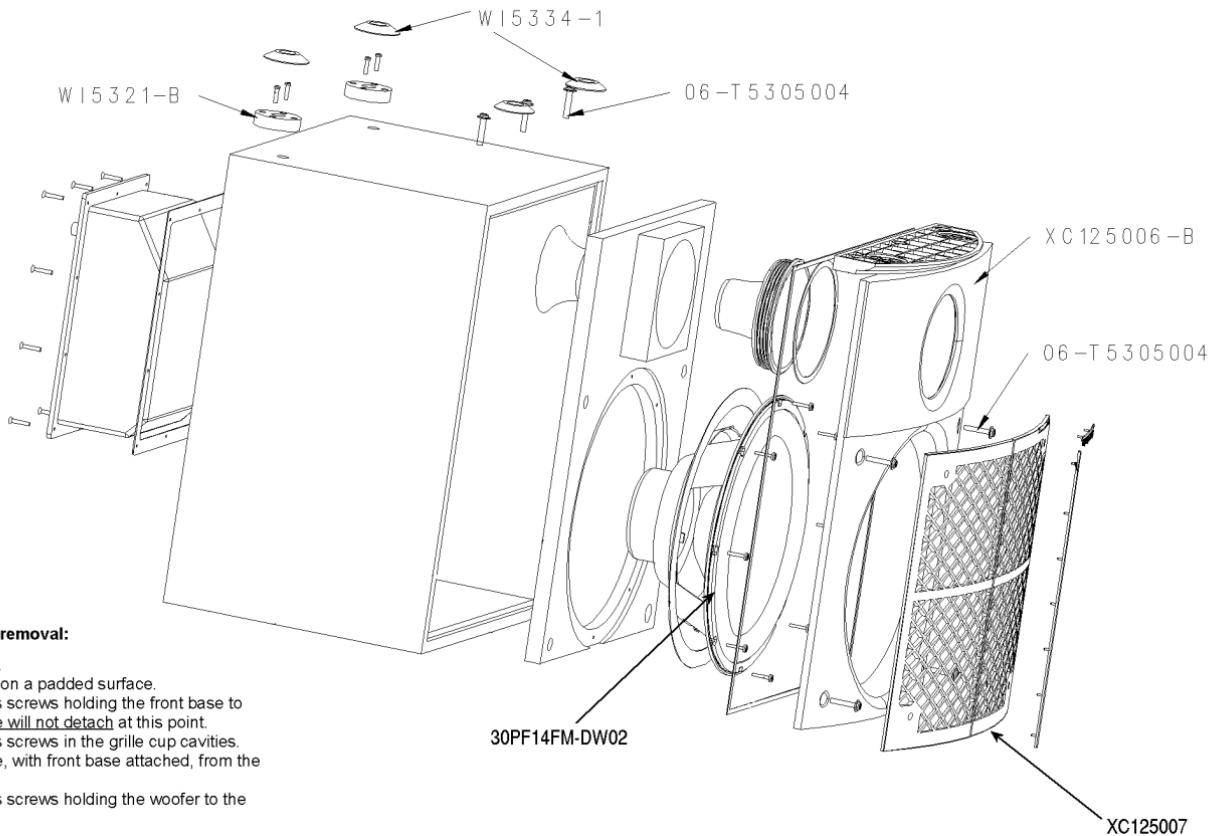
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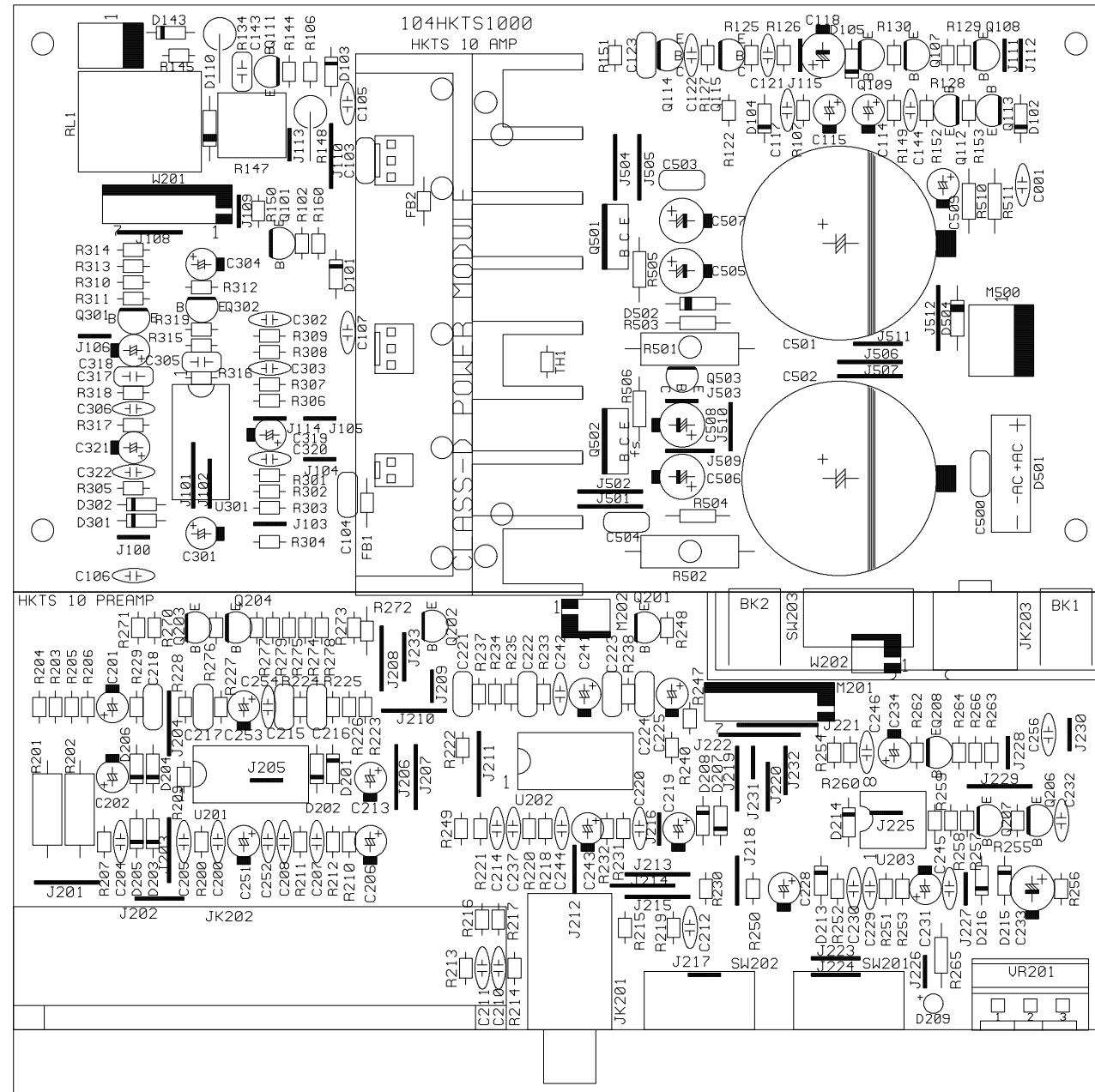
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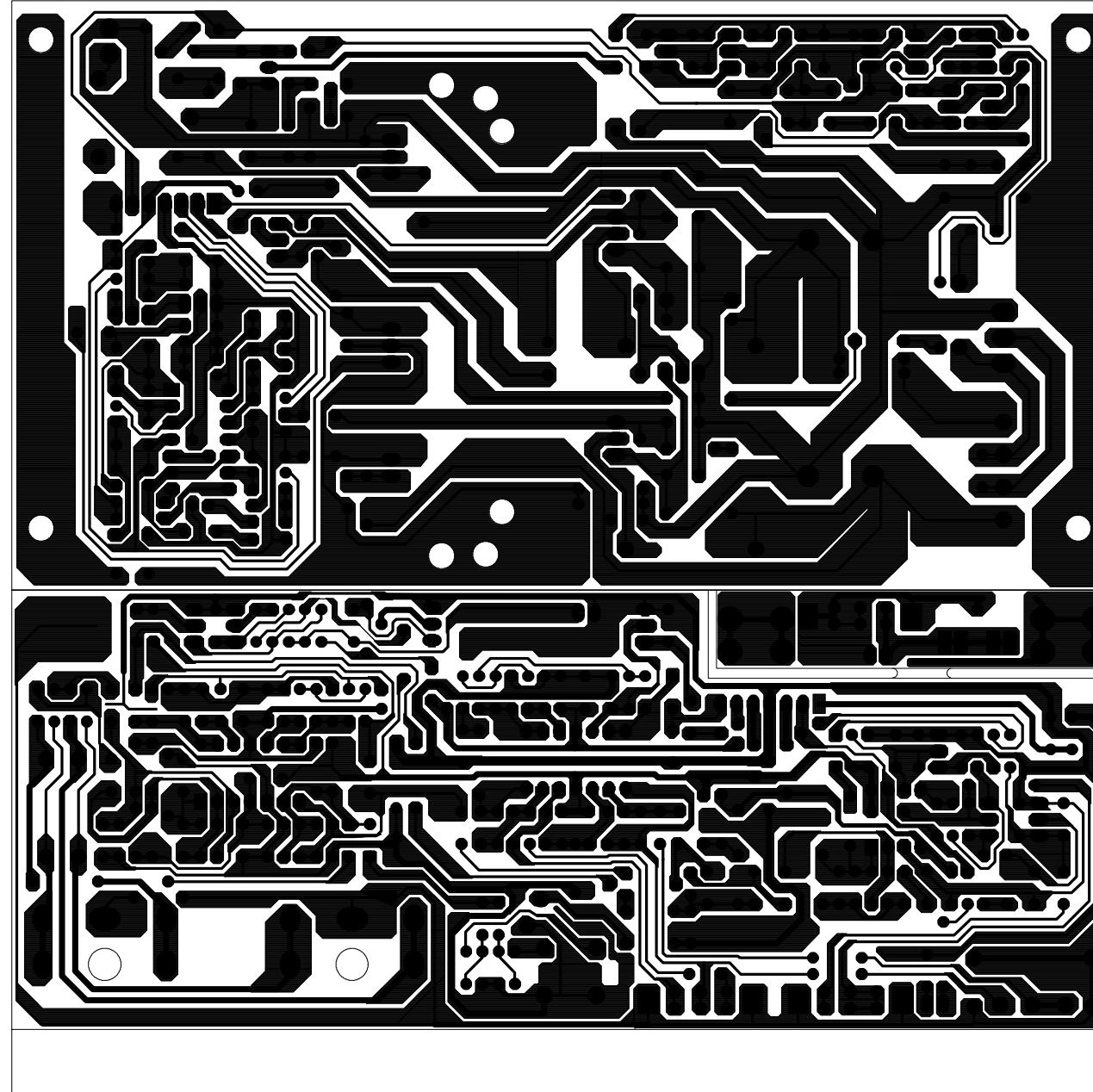
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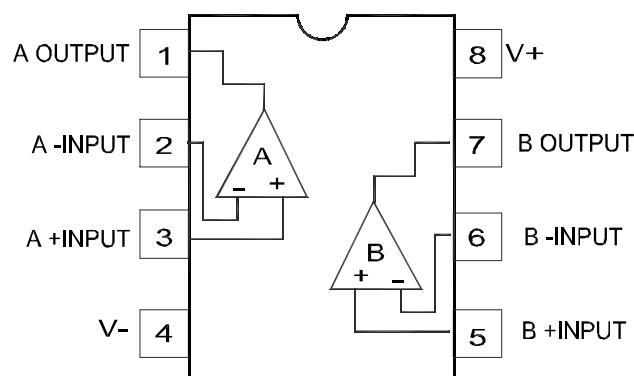




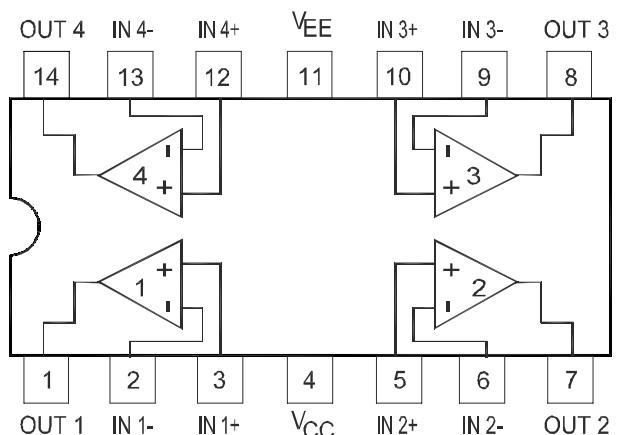


Integrated Circuit Diagrams

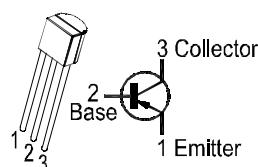
4558 DUAL OP AMP,
U203



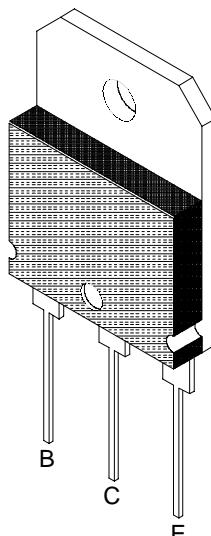
OPAMP, QUAD 14P DIL TL074
U201, 202, 301



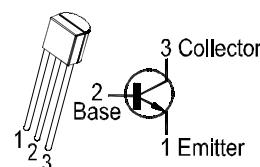
TRANS, PNP, 2N5401 TAP,
TO-92,
Q503



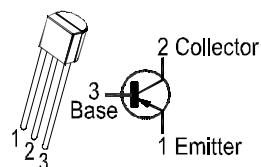
TIP31C NPN,
TIP32C PNP,
Q501, 502



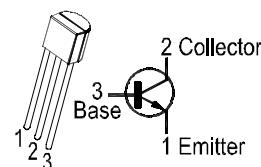
TRANS, NPN, 2N5551 TAP,
Q114,115



TRANS, PNP, TAP,
2SA1015GR
Q101,107,112



TRANS, NPN, 2SC1815GR TAP,
2SC2235 Q108,109,111,113,
Q201-204,206-208,301,302



00340-1

SUBTS-10 Electrical Parts List

Input/Power Amp PCB

Part #	Description	QTY	Reference Designator
<i>Resistors</i>			
11014103j26	Resistor 10K 1/4W ±5% CF	3	R503,504,510
11014222j26	Resistor 2.2K 1/4W ±5% CF	1	R511
11014432j26	Resistor 4.3K 1/4W ±5% CF	1	R506
11014472j26	Resistor 4.7K 1/4W ±5% CF	1	R505
11016102j26	Resistor 1K 1/6W ±5% CF	5	R153,213,214,215,254
11016103j26	Resistor 10K 1/6W ±5% CF	36	R128,130,149,150,209,212,216,217,218,220,221,222,225~229,230,232,234,235,240,248,260,273~277,279,305,306,308,311,314,319
11016104j26	Resistor 100K 1/6W ±5% CF	6	R122,126,231,263,266,307
11016105j26	Resistor 1M 1/6W ±5% CF	1	R259
11016122j26	Resistor 1.2K 1/6W ±5% CF	1	R265
11016124j26	Resistor 120K 1/6W ±5% CF	1	R233
11016151j26	Resistor 150 ohms 1/6W ±5% CF	1	R253
11016153j26	Resistor 15K 1/6W ±5% CF	1	R107
11016154j26	Resistor 150K 1/6W ±5% CF	1	R252
11016182j26	Resistor 1.8K 1/6W ±5% CF	2	R145,271
11016183j26	Resistor 18K 1/6W ±5% CF	1	R262
11016203j26	Resistor 20K 1/6W ±5% CF	1	R309
11016205j26	Resistor 2.0M 1/6W ±5% CF	1	R257
11016221j26	Resistor 220 ohms 1/6W ±5% CF	1	R144
11016222j26	Resistor 2.2K 1/6W ±5% CF	1	R102
11016223j26	Resistor 22K 1/6W ±5% CF	5	R238,247,255,256,316
11016224j26	Resistor 220K 1/6W ±5% CF	2	R272,278
11016273j26	Resistor 27K 1/6W ±5% CF	2	R223,237
11016333j26	Resistor 33K 1/6W ±5% CF	1	R310
11016393j26	Resistor 39K 1/6W ±5% CF	1	R151
11016472j26	Resistor 4.7K 1/6W ±5% CF	3	R200,207,258
11016473j26	Resistor 47K 1/6W ±5% CF	7	R106,129,219,249,250,251,264
11016474j26	Resistor 470K 1/6W ±5% CF	2	R127,312
11016512j26	Resistor 5.1K 1/6W ±5% CF	2	R210,211
11016513j26	Resistor 51K 1/6W ±5% CF	1	R224
11016562j26	Resistor 5.6K 1/6W ±5% CF	1	R152
11016621j26	Resistor 620 ohms 1/6W ±5% CF	1	R160
11016751j26	Resistor 750 ohms 1/6W ±5% CF	1	R315
11016755j26	Resistor 7.5M 1/6W ±5% CF	1	R313
11016822j26	Resistor 8.2K 1/6W ±5% CF	1	R270
11016913j26	Resistor 91K 1/6W ±5% CF	4	R203-206
116161002f26	Resistor 10K 1/6W ±1% MF	2	R301,303
116161102f26	Resistor 11.0K 1/6W ±1% MF	1	R302
116162200f26	Resistor 220 ohms 1/6W ±1% MF	1	R317
116162202f26	Resistor 22.0K 1/6W ±1% MF	1	R318
11012472j00	Resistor 4.7K 1/2W ±5%	2	R201,202
11020332jk3	Resistor 3.3K 2W ±5%	1	R134
11120102jk3	Metal Film Resistor 1K 2W ±5%	1	R148
11130471jk2	Metal Film Resistor 470 ohms 3W ±5%	2	R501,502
11350s68j00	Cement Resistor 0.068 ohms 5W	1	R147
115h503a102	Variable Resistor 50K	1	VR201 Level Pot
<i>Capacitors</i>			
129a154j633	Metallize Cap. 0.15U 63V ±5% MSC	2	C221,222
1302b101k503	Metallize Cap. 100P 50V ±10%	3	C302,303,306
1302b221k503	Disc Capacitor 220P 50V ±10%	12	C200,204,205,207,208,210,211,212,214,220,230,237
1302b470k503	Disc Capacitor 47P 50V ±10%	1	C229

Part #	Description	QTY	Reference Designator
1302f104z503	Disc Capacitor 0.1U 50V +80/-20%	14	C107,117,122,144,232,242,244,245,246,252,254,256,320,322
132103j503	Mylar Capacitor 0.01U 50V ±5%	2	C305,317
132103ja03	Mylar Capacitor 0.01U 100V ±5%	2	C103,104
132104ja03	Mylar Capacitor 0.1UF 100V ±5%	4	C123,218,503,504
132183j503	Mylar Capacitor 0.018U 50V ±5%	2	C223,224
132223ja03	Mylar Capacitor 0.022uF 100V ±5%	1	C215
132273ja03	Mylar Capacitor 0.027U 100V ±5%	1	C143
132473ja03	Mylar Capacitor 0.047uF 100V ±5%	2	C216,217
1353105m50	Electrolytic Cap. 1U 50V ±20%	1	C228
1353106m50	Electrolytic Cap. 10U 50V ±20%	12	C201,202,206,213,219,231,241,243,251,253,319,321
1353107m10	Electrolytic Cap. 100U 10V ±20%	2	C114,115
1353107m16	Electrolytic Cap. 100uF 16V ±20%	1	C234
1353107m35	Electrolytic Cap. 100U 35V ±20%	2	C507,508
1353225m50	Electrolytic Cap. 2.2U 50V ±20%	1	C509
1353216	Electrolytic Cap. 22U 16V ±20%	1	C304
1353250	Electrolytic Cap. 22U 50V ±20%	3	C225,505,506
1353227m16	Electrolytic Cap. 220U 16V ±20%	2	C118,233
1353476m16	Electrolytic Cap. 47U 16V ±20%	1	C318
132103kb00	Mylar Cap. 0.01U 200V ±10%	1	C500
1385478m63	Electrolytic Cap. 4700U 63V ±20%	1	C501
1385478m63	Electrolytic Cap. 4700U 63V ±20%	1	C502
<i>Semiconductors</i>			
192027c1815gr	Transistor 2SC1815GR	12	Q108,109,113,201-204,206,207,208,301,302
192027c2235y	Transistor 2SC2235Y	1	Q111
192028a1015gr	Transistor 2SA1015GR	3	Q101,107,112
1921672n5551	Transistor 2N5551	2	Q114,115
1921682n5401	Transistor 2N5401	1	Q503
197131n4148	1N4148	18	D102,103,104,105,143,201,202~208,214,215,216,310,312
19915000335	Zener Diode 3.3V 1/2W 52mm	1	D213
19915000625	Zener Diode 6.2V 1/2W 52mm	1	D101
19915001605	Zener Diode 16V 1/2W 52mm	1	D502
192161tip31c	Transistor TIP31C SGS	1	Q501
192162tip32c	Transistor TIP32C SGS	1	Q502
19510204hgw	LED 204HGW Indicator	1	D209
19700kbu606g	Diode 6A 800V KBU606G	1	D501
197101n4004	1N4004	2	D110,504
19006m4558d	I.C. OPA 4558D Dual Op-amp	1	U203
19016tl074cn	I.C. TL074CN ST Quad Op-amp	3	U201,202,301
<i>Miscellaneous</i>			
1091ttc802j0	Thermister TTC-802(JS) NTC	1	TH1
1201000003	Inductor 10W	2	FB1,2
171urwh124d	Relay RWH-SH-124D (1600 ohm)	1	RL1
1740rca326p	JACK RCA-326 PURPLE/WHT/RED	1	JK201 (Set of three)
1741jy35421	PHONE JACK 3.5mm JY-3542-01-030	1	JK203
17420810360g	SPK JK.BP 8PIN SH0810360G	1	JK202 (Set of eight)
180tms7210v	SWITCH SLIDE 6PIN MS7210V	3	Filter/Phase/Auto-on-off
150r4055900a	Power Transformer I/P:120V/60Hz	1	T501
152u602015	Line Cord SVT FT-2 6FT	1	
154k31505t0	Fuse 3.15A 250V 30mm UL/CSA	1	F501
15563032i	Fuse Holder HTB-32I 30mm UL/CSA	1	F501
180pbr12c11s	PUSH SW BR12C11S	1	SW501 POWER

Power Amp Module PW150D

Part#	Ref. Designator	Description	Qty
<i>Resistors</i>			
11812061001j	R2,11,29,30	RES, 1.00K 1206 5%	4
11812061002j	R7,9,25	RES, 10.0K 1206 5%	3
118120610r0j	R22,23	RES, 10.0 ohms 1206 5%	2
11812061201j	R31-46	RES, 1.20K 1206 5%	16
11812062002j	R26	RES, 20.0K 1206 5%	1
11812062201j	R6,13,16	RES, 2.20K 1206 5%	3
11812062701j	R10	RES, 2.70K 1206 5%	1
11812063000j	R24	RES, 300.0 ohms 1206 5%	1
11812063301j	R14,15,27,28	RES, 3.30K 1206 5%	4
11812063902j	R3	RES, 39.0K 1206 5%	1
11812064700j	R8	RES, 470 ohms 1206 5%	1
11812064701j	R1,5,12	RES, 4.70K 1206 5%	3
11812064702j	R17	RES, 47.0K 1206 5%	1
11812064704j	R4	RES, 4.70M 1206 5%	1
118120647r0j	R20,21	RES, 47.0 ohms 1206 5%	2
<i>Capacitors</i>			
141c0101k50	C4	CAP,CA 100pF 50V 10% 1206 NP0	1
141c0220k50	C5	CAP,CA 22pF 50V 10% 1206 SMT NPO	1
141c0561k50	C6	CAP,CA 560pF 50V 10% 1206 NPO	1
141c6104m50	C2,3,7,8,9,10,11,15	CAP,CA 0.1uF 50V 20% 1206 Z5U	8
141c7223k50	C13	CAP,CA 0.022uF 50V 10% 1206 X7R	1
141d7104ka0	C1	CAP,NP 0.1uF 100V 10% 1210 X7	1
128e106ma01	C16,17	CAP,E NP 10uF 100V 20%	2
141d7104kb0		CAP,NP 0.1uF 200V 10% 1210 X7	1
<i>Semiconductors</i>			
19016tl072dts	IC1	SMD I.C. TL072CDT SGS Dual Op-Amp	1
19209124126qs	Q1,4,5	TRANS, NPN 50V 0.15A 2SC2412K	3
19209139066rs	Q2,8	TRANS, NPN 120V 0.05A 2SC3906K	2
19209210376qs	Q7,9	TRANS, PNP 50V 0.15A 2SA1037K	2
19209215146rs	Q3,6	TRANS, PNP 120V 0.05A 2SA1514K	2
19703rls4148s	D1,2,3,4,5,6	Diode RLS4148	6
19915000563s	Z1,2	ZENER 5.6V 5% PHILIPS BZX84-C5 V6	2
19915001203s	Z5,6	ZENER 12V 5% PHILIPS BZX84-C12	2
19915001503s	Z3,4	ZENER 15V 5% PHILIPS BZX84-C15	2
192232irf9640	Q10	FET IRF9640 IR P-CH TO220	1
192233irf640	Q11	FET IRF640 IR N-CH TO-220	1
<i>Miscellaneous</i>			
1759f40hr2		Wafer 40PIN PITCH=2.54mm HR2*40	
12214121m4191		L1 Ferrite core LS-A6206-ST EFD-30 1	
12214350j4180		L2 Inductor 35uH 1	
06-t3085020		PCB TO H/S-2,PCB TO PCB/H-4 SCREW 3*8 6	
06-t31207		TO HSQLC1004/ID150-1 SCREW M3*12 1	

