

**JBL**

# **HTPS-400 THX<sup>®</sup> Subwoofer**

## **SERVICE MANUAL**



JBL Incorporated  
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Woodbury, New York 11797

REV 1 10/2001

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## Specifications

<b>Frequency Response:</b>	28Hz - 200Hz
<b>Input:</b>	THX® and normal line level
<b>Output:</b>	Line level (loop through from input)
<b>Sensitivity:</b>	91dB
<b>Maximum Amplifier Output:</b>	1000 watts
<b>Driver:</b>	12" with aluminum cone and rubber surround, video-shielded
<b>Crossover Frequency:</b>	50Hz - 150Hz (continuously adjustable)
<b>Dimensions (H x W x D):</b>	14-5/8" x 14-5/8" x 14-5/8" (371mm x 371mm x 371mm)
<b>Weight:</b>	62 lb (28kg)



## Detailed Specifications

LINE VOLTAGE	Yes/No	Hi/Lo Line	Nom.	Unit	Notes
US 120vac/60Hz	Yes	108-132	120	Vrms	Normal Operation
EU 230vac/50-60Hz	Yes	207-264	230	Vrms	Normal operation, MOMS required

Parameter	Specification	Unit	QA Test Limits	Conditions	Notes
<b>Amp Section</b>					
Type (Class AB, D, other)	AB	--	--	HC-BASH Power Supply	
Load Impedance (speaker)	8	Ohms	--	Nominal	Z-curve required
Rated Output Power	600	Watts	550	35 Hz	Amplifier must be able to deliver 850 Watts with less than 1 % THD without limiters.
THD @ Rated Power	0.1	%	0.8	22k filter	550W (Cold), amplifier starts limiting
THD @ 1 Watt	0.3	%	1	22k filter	
Polarity	0	deg.	0° ±20	In phase at 50Hz	.250 faston (+).....205 faston (-)
DC Offset	20	mV-DC	50	@ Speaker Outputs	
Damping factor	>50	DF	--		
<b>Input Sensitivity</b>					
Input Frequency	35	Hz	35	Nominal Freq.	
Line Input(Normal Mode)	200	mVrms	±2dB	To Rated Power	Volume level max position, Input mode Normal, crossover control at Max level.
Line Input(THX Mode)	450	mVrms	±2dB	To rated power	Switch Mode in THX.
<b>Signal to Noise</b>					
SNR-A-Weighted	100	dBA	90	relative to rated power	A-Weighting filter
SNR-unweighted	70	dBr	70	relative to rated power	22K filter
SNR rel. 1W-unweighted	60	dBr	55	relative to 1W Output	22K filter
Residual Noise Floor	2	mVrms	3	Volume @max, using RMS A/P A-Weighting	Input terminated using 500 Ohms
Residual Noise Floor + HUM	2	mVrms(max)	2	Volume @max, A/P Swept Bandpass Measurement (Line freq.+ harmonics)	2nd Harmonic must be 12 dBr lower than the Fundamental 3rd Harmonic must be 19 dBr Lower than the Fundamental
<b>Input Impedance</b>					
	20K	ohms	N/A	Nominal	Measured @ 1 KHz, <200 pF at 20 KHz
<b>Active Filters</b>					
Low Pass (fixed or variable)	Variable	--	--		Normal mode only
Low Pass filter (point or range)	50-150	Hz	±2dB		
<b>Line Out (full range)</b>					
<b>Limiters (yes/no)</b>					
	Yes				
THD at Max. Output Power	N/A	N/A	functional	Maximum Output Power	Maximum THD as a result of limiting.
<b>Features</b>					
	--				
Input Select Switch	YES	--	functional	2 Positions	Selects THX or Normal. THX mode sensitivity fixed and crossover bypassed
Polarity switch	YES	--	functional		Normal / Inverted (0 - 180)
Line Output Bufferd Full range	YES	--	±2dB		RCA type connector
Auto Turn ON selector	YES		functional	3 positions	Selects 3 modes (Auto-ON-OFF), It can be accessed without any tools
Volume pot Taper (lin/log)	linear	--	functional		
<b>Input Configuration</b>					
	--	--			
Line In	Mono	--	functional		DC offset protected
Line Output	Mono	--	N/A		Full Range, pass through buffered (Daisy chain) for a second subwoofer
<b>Signal Sensing (ATO)</b>					
	--	--			
Auto-Turn-On (yes/no)	YES	--	functional		Green=ON / Red=Standby Back side Bi-Color LED
ATO Input Frequency	1K	Hz	functional		
ATO Level	2	mV	functional	2mV@50Hz into Line Input	For both input modes (THX or Normal)
ATO Bandwidth	5K	Hz	functional	ATO-LPF for noise immunity	
ATO Turn-on time	5	ms	functional	Amp connected and AC on, then input signal applied	



**Detailed Specifications (Cont.)**

Auto Mute/ Turn-OFF Time	15	minutes	functional	T before muting, after signal is removed	
<b>Power on Delay time</b>	3	sec.	4	AC Power Applied	
<b>Transients/Pops</b>					
ATO Transient	10	mV-peak	20	@ Speaker Outputs	System from stand-by to operational mode
Turn-on Transient	500	mV-peak	1v-pp	@ Speaker Outputs	AC Line cycled from OFF to ON
Turn-off Transient	500	mV-peak	1v-pp	@ Speaker Outputs	AC Line cycled from ON to OFF
<b>Efficiency</b>					
Stand-by Input Power	15	Watts	25	@ nom. line voltage	Ongoing design improvement to reduce it to 15W
AC Power Cons. @ 1W	N/A	Watts	N/A	@ nom. line voltage	Informational
Power Cons. @ rated power	1250	Watts	N/A	@ nom. line voltage	Using speaker load
Efficiency	65%	%	65	@ nom. line voltage	Using resistive load
<b>Protection</b>					
Short Circuit Protection	preferred		functional	Direct short at output	
Thermal Protection	YES			@ 1/8 max unclipped Power	
DC Offset Protection	YES			DC present at Speaker Output leads	Relay or crowbar (for driver/fire protection)
Line Fuse Rating	6A-250VAC	Amps		Type-T or Slo Blo	External fuse with UL/SEMKO rated holder

# Connections

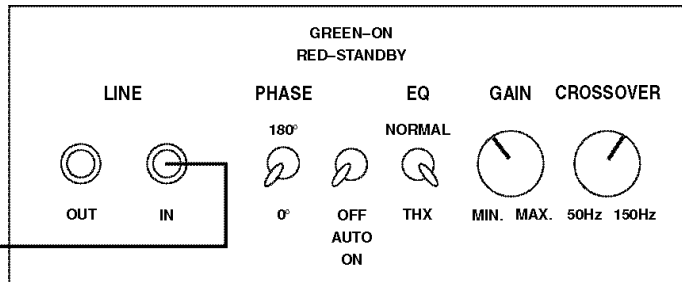
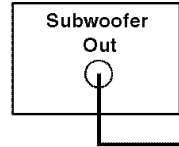
## Line-Level Inputs

### THX Mode:

If your surround processor/receiver is THX-certified:

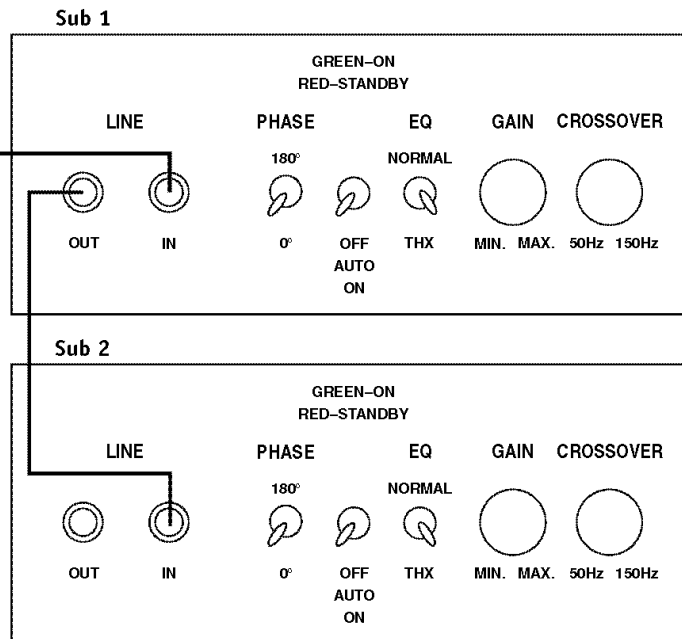
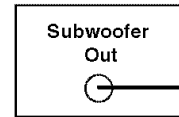
*Note:* When the THX/Normal switch is set to "THX," the subwoofer's internal crossover and output level control are bypassed.

**THX® Certified Receiver/Processor**



To continue enjoying THX-quality bass response in a very large room, two or more HTPS-400 subwoofers may be connected in series. For every 3000 cu. ft. of room volume, it is recommended that you add one HTPS-400.

**THX® Certified Receiver/Processor**



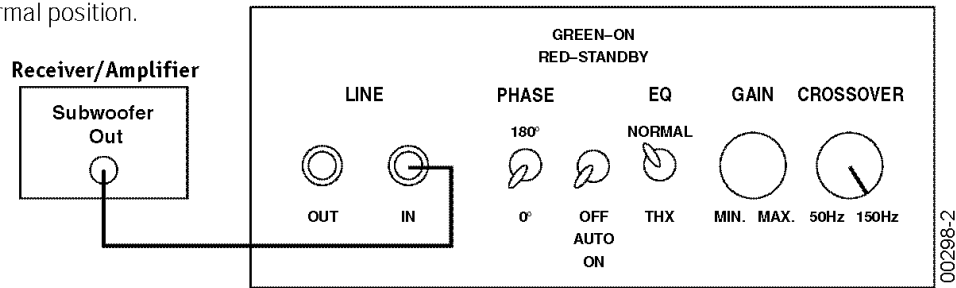
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# Connections (Cont.)

**Normal Mode:**

Use this hookup for all non-THX processors, including Dolby\* Digital, DTS®, Dolby Pro Logic\* or stereo.

*Note:* If using Dolby Digital or DTS, set the crossover frequency knob fully clockwise to the maximum position. Make sure the THX/Normal switch is in the Normal position.



*Note:* Some receivers/processors have stereo subwoofer outputs. In that case, you must use a "Y"-connector (not included) in order to maximize the subwoofer's performance.

## Operation

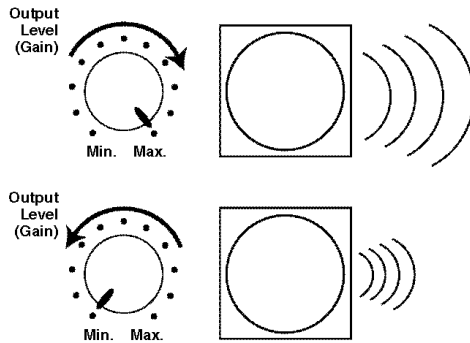
The HTPS-400 contains a signal-sensing auto turn-on/turn-off circuit. This feature will automatically turn the subwoofer on when you turn

your system on with the power switch in the "Auto" position and begin playing any program material. The subwoofer will return to standby mode when

no signal is received for approximately 15 minutes. The power switch's "Off" position is for vacation use only.

Toggle Position	Procedure	LED Color
Off	Power switch off	Red
On	Power switch on and playing program material	Green
Auto	Simply turn off your receiver/processor. The HTPS-400 will turn off after approximately fifteen minutes. The subwoofer will turn on when your receiver/processor begins playing again.	No signal present for more than 15 minutes - <b>Red</b> ; signal present - <b>Green</b>

### Output Level (Gain) - Normal (non-THX) Modes Only



*Note:* When the THX/Normal switch is set to "THX," the output (gain) control is bypassed. Output level is then adjusted at the THX processor.

### Crossover Frequency - Normal (non-THX) Modes Only

The Crossover Frequency adjustment determines the highest frequency the HTPS-400 will reproduce. It allows a seamless transition from the subwoofer to the

satellite speakers. Experiment with this adjustment to find the crossover frequency that sounds best with your speakers.

*Note:* When the THX/Normal switch is set to "THX," the internal crossover is bypassed. Crossover frequency is then adjusted at the THX processor.

### Phase

The Phase switch is used to adjust the relative polarity of the subwoofer to the other speakers. When the speakers are out of phase, the low-frequency sound waves will cancel each other out, reducing bass response. The HTPS-400 provides a convenient phase switch that allows you to remedy this situation without relocating the speakers or changing any speaker connections. In

normal THX operation, the Phase switch should be set to 0 degrees so that the subwoofer is operating in phase with the main speakers. This should produce a smooth frequency response up to 80Hz. In the rare cases when the subwoofer is placed more than 25 feet away from the main speakers, or where the subwoofer is not being used with a THX-certified receiver, or processor, and speakers,

the 180-degree position may provide a smoother frequency response.

Listen to your HTPS-400 subwoofer and main speakers with the switch in the "0°" position, then listen to the same material with the switch set to "180°". Decide which sounds better and leave the switch in this position. Repeat this procedure if you change the location of the subwoofer.

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## Troubleshooting

### **If there is no output from the subwoofer:**

- Make sure the system is on and a source is playing.
- Make sure the HTPS-400 is plugged into an active outlet and the power switch is in either the "Auto" or "On" position.
- If you are using a THX-certified processor/receiver, make sure the THX/Normal switch is set to "THX."
- If you are not using a THX-certified processor/receiver, make sure the THX/Normal switch is set to "Normal."
- Adjust the "Output Level" (Gain) control.
- Review proper operation of your receiver/amplifier.
- Check all wires and make sure they are properly connected. Make sure none of the wires are frayed, cut or punctured.
- If you are not using a THX-certified processor/receiver, make sure that you have configured your processor/receiver so that the subwoofer/LFE output is on.

### **If there is no (or low) bass output:**

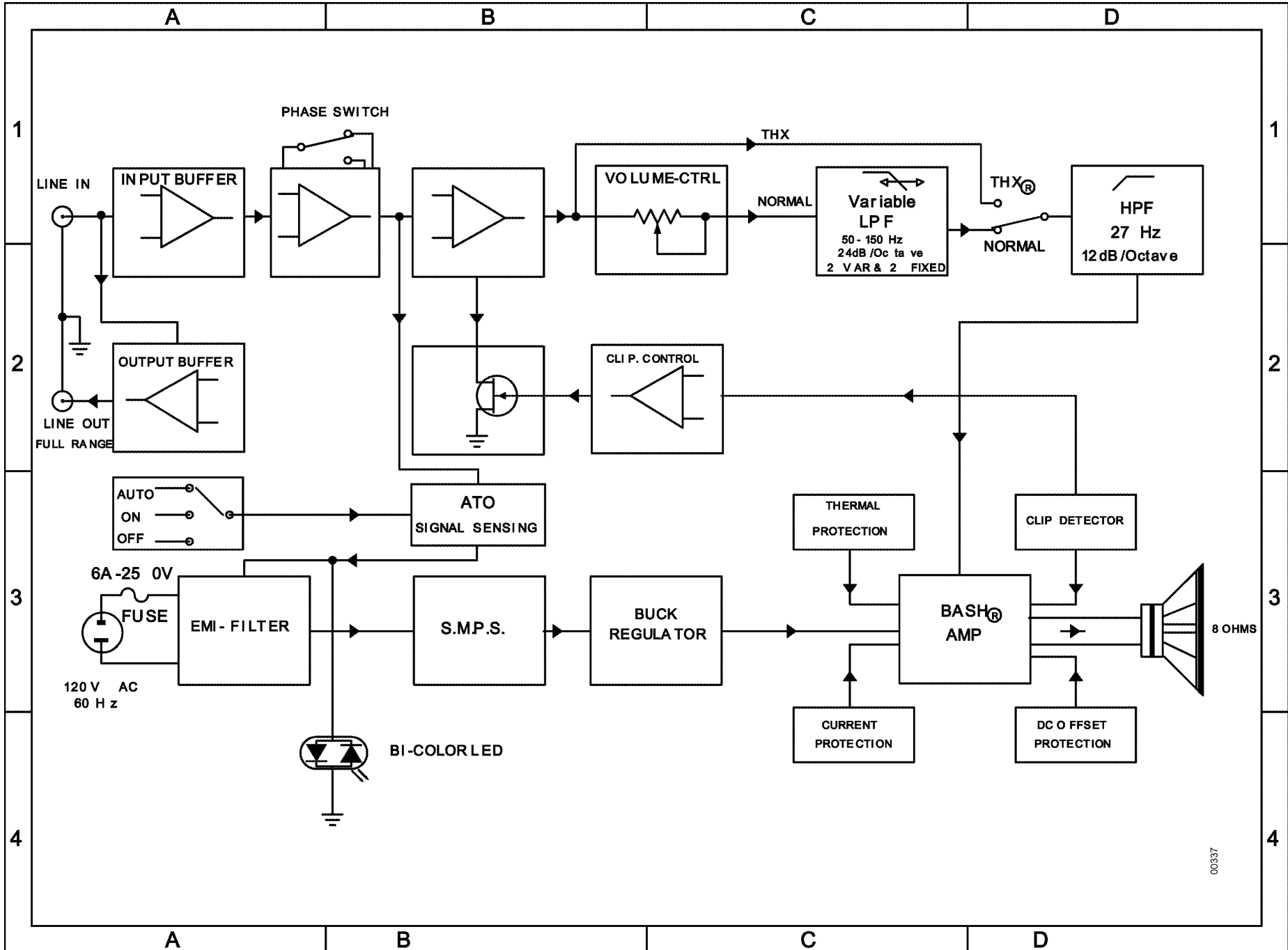
- Make sure that the subwoofer is plugged into a live electrical outlet and the power switch is in either the "Auto" or "On" position.
- Adjust the "Crossover Frequency."
- Adjust the "Output Level" (Gain) control.
- Change the setting on the Phase switch.
- If you are not using a THX-certified processor/receiver, make sure that you have configured your processor/receiver so that the subwoofer/LFE output is on.

### **If you are hearing midrange frequencies (such as vocals) through the subwoofer:**

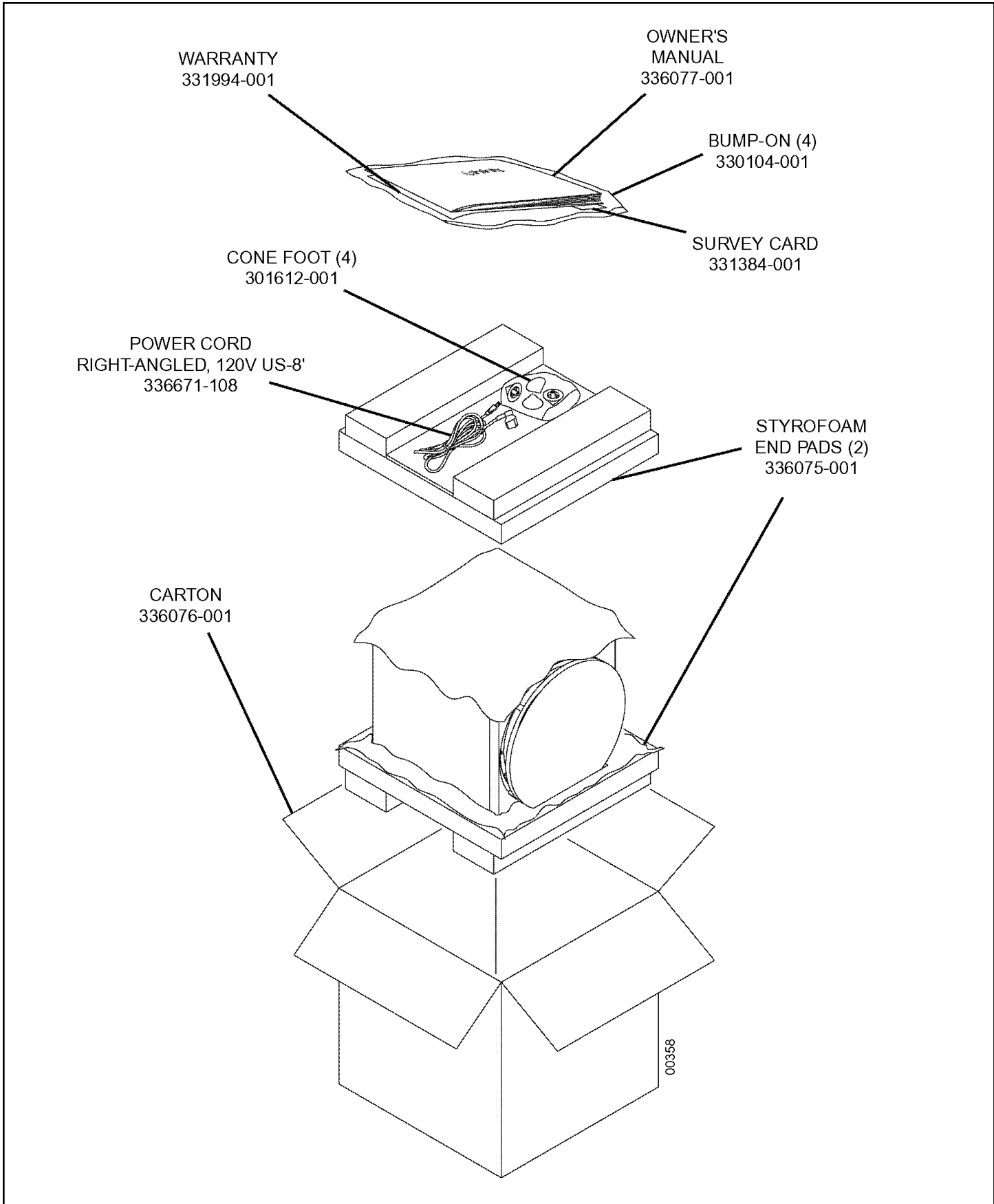
- When using the THX mode, make sure the subwoofer crossover is activated on your processor/receiver.
- When using the Normal Mode, adjust the "Crossover Frequency" to a lower frequency.

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# Amplifier Block Diagram



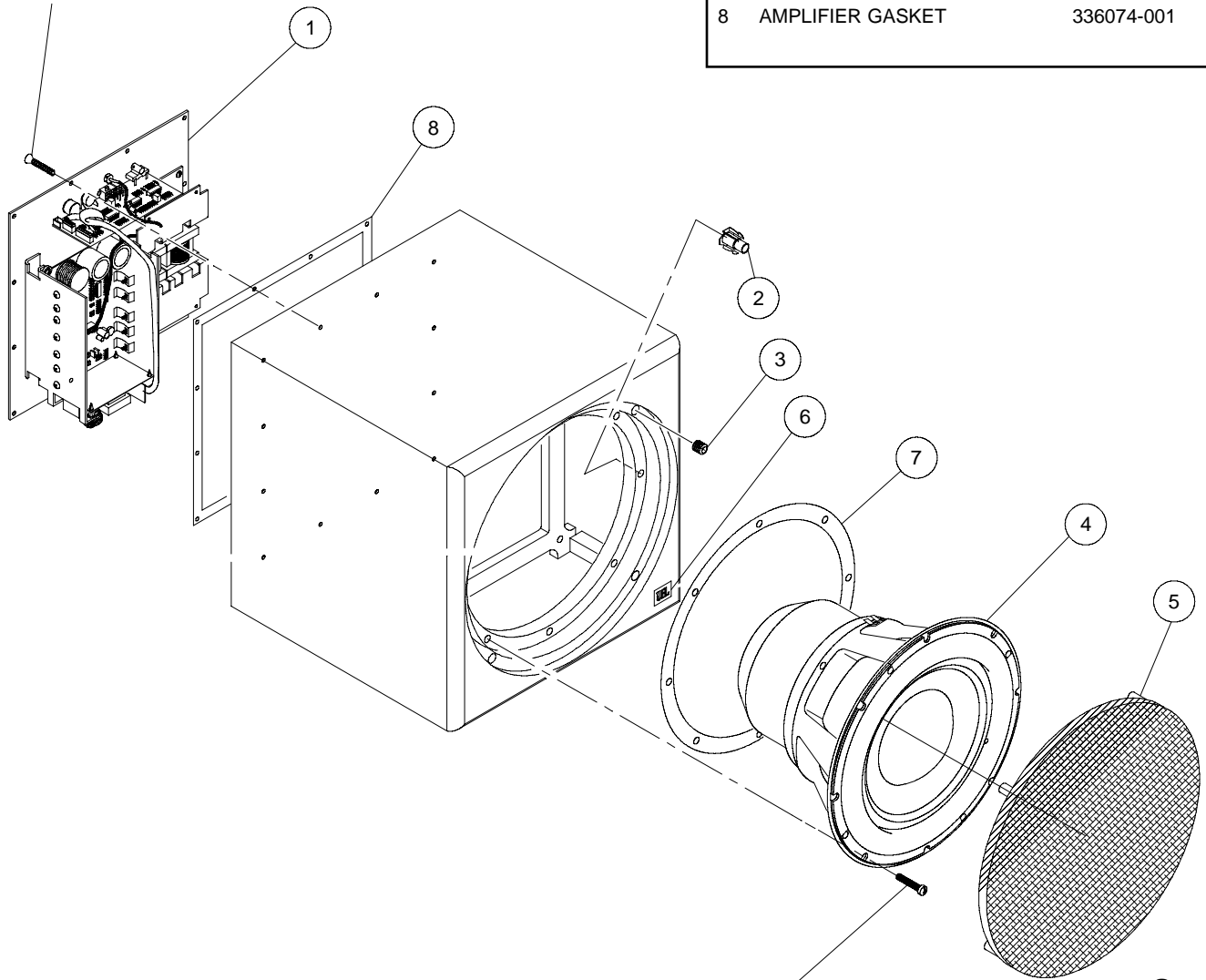
# Packaging



# Exploded View

MECHANICAL PARTS LIST		
1	AMPLIFIER	(Not for Sale)
2	T-NUT (8)	61861
3	GRILLE CUP (4)	333249-001
4	12" WOOFER, SHIELDED, DCR=8.1 ohms ±10%	336063-001
5	GRILLE ASSEMBLY, FRONT	336071-001
6	LOGO, GOLD, JBL	75060-01
7	WOOFER GASKET	335481-001
8	AMPLIFIER GASKET	336074-001

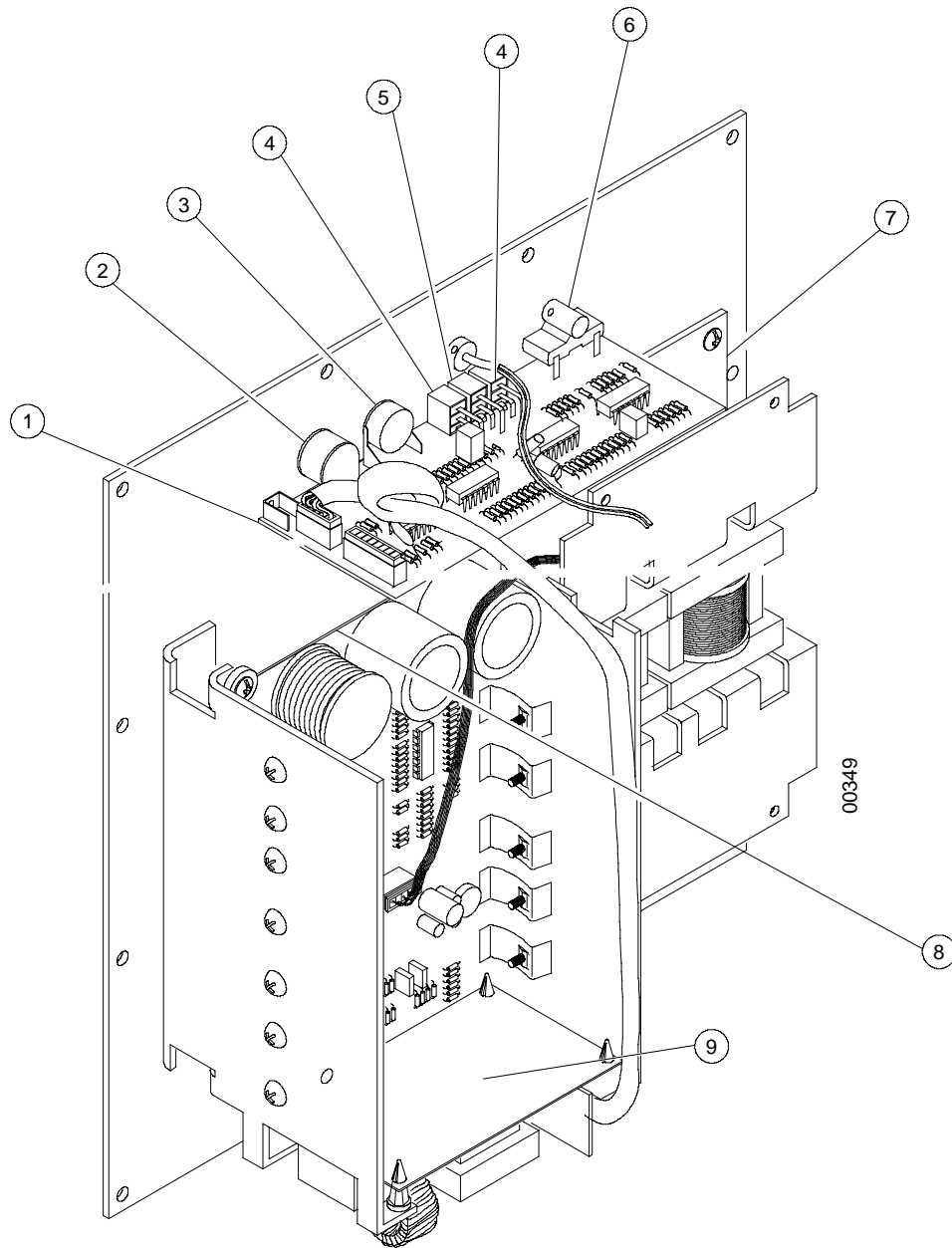
SCREW, (12)  
#8X.75  
PB,FPH  
903601-012



SCREW, (8)  
#10-32X1"  
61861

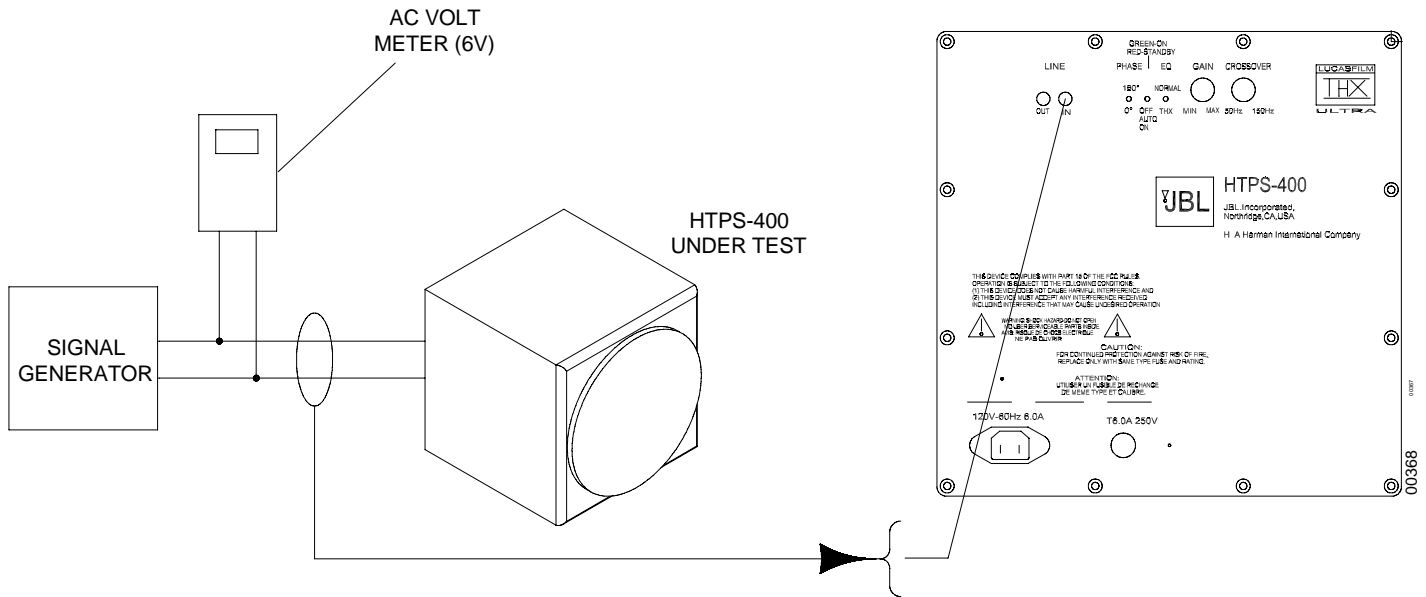
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# HTPS-400 Amplifier



- |   |                                    |        |
|---|------------------------------------|--------|
| 1 | FEATURE BOARD                      |        |
| 2 | POTENTIOMETER, 50K DUAL, CROSSOVER | RP0036 |
| 3 | POTENTIOMETER, 10K SINGLE, GAIN    | RP0063 |
| 4 | SWITCH, SPDT TOGGLE, EQ & PHASE    | SR0007 |
| 5 | SWITCH, 3P TOGGLE, AUTO ON/OFF     | SR0013 |
| 6 | DUAL RCA HORZ MT JACKS             | JC0106 |
| 7 | POWER SUPPLY BOARD                 |        |
| 8 | LINEAR BOARD                       |        |
| 9 | EMI BOARD                          |        |

# Test Set Up and Procedure



## General Function (UUT = Unit Under Test)

1. Connect a single (RCA) cable from the signal generator to the "line in" jack on the UUT.  
 GAIN control should be full counterclockwise.  
 Off/Auto/On switch should be OFF.  
 EQ switch should be on Normal.  
 Turn Crossover knob to full CW (150)  
 Position of phase switch is irrelevant.
2. Turn on generator, adjust to **200mV, 30 Hz**.
3. Plug in UUT; red LED should be ON. Turn GAIN control full clockwise.
4. Bass response should be substantial, and woofer at near maximum excursion.
5. Turn off generator, turn VOLUME control fully counterclockwise, disconnect RCA cable.

## Sweep Function

1. Follow steps 1-4 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 driver and test.

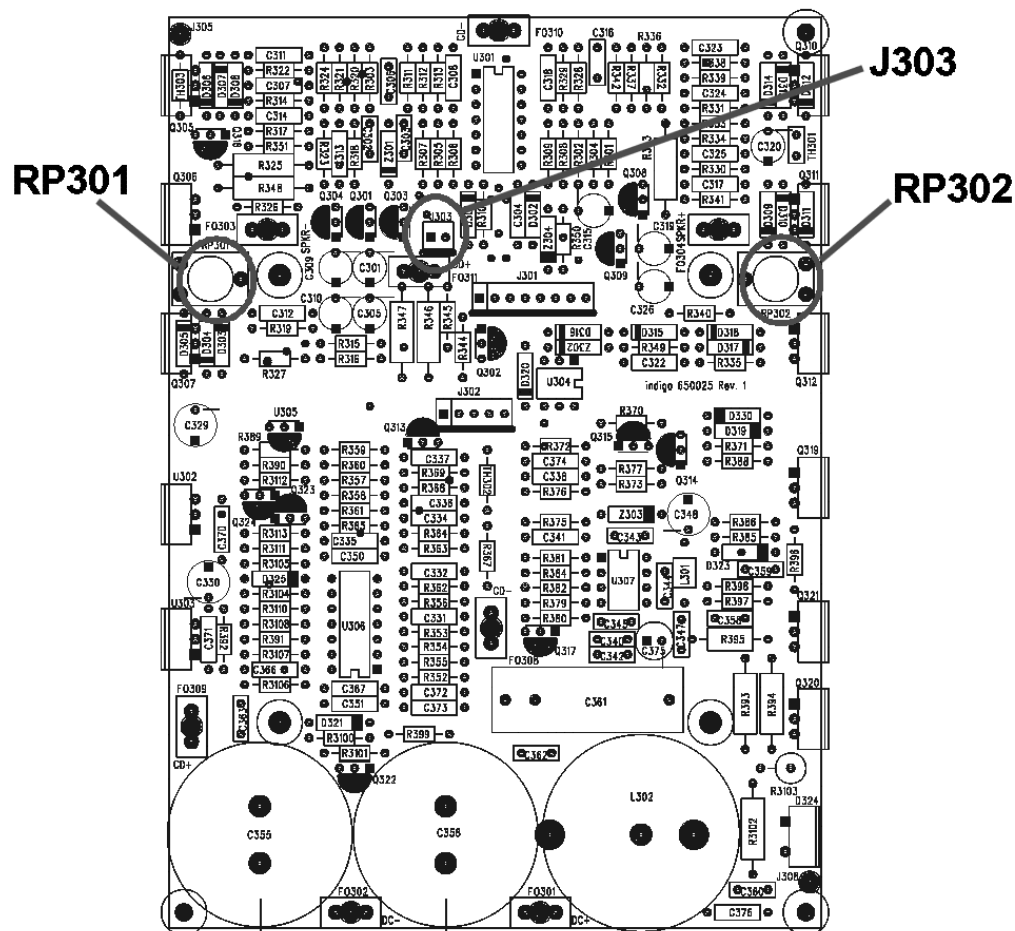
## Driver Function

1. Remove driver from cabinet; detach + and - wire clips.
2. Check DC resistance of driver; it should be **8.1 ohms ±10%**.
3. Connect a pair of speaker cables to driver terminals. Cables should be connected to an integrated amplifier fed by a signal 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.

## HTPS-400 ADJUST BIAS PROCEDURE

(Mandatory when any output MOSFET transistors Q305,310,320,321,306,307,311,312 are replaced)

1. Amplifier should be unplugged and OFF.
2. Remove Amp assembly from cabinet.
3. Identify the Linear board assembly (PCB with the output transistors)
4. Adjust RP301 and RP302 fully Counter Clockwise. See diagram below.
5. Apply 120 VAC power to unit.
6. Verify LED is ON.
7. Connect voltmeter set to DC millivolt range to twin pins on terminal J303, on Linear board.
8. Verify initial voltage is less then 0.1 mV.
9. Adjust RP301 Clockwise until voltmeter reads **0.3 mV** + the initial current from step #8.
10. Adjust RP302 Clockwise until voltmeter now reads **0.6 mV** + the initial current from step #8.
11. Turn amplifier OFF. Disconnect AC power to unit.
12. Remove voltmeter from terminal J303.
13. Replace amp assembly back into cabinet.





## Electrical Parts List

Part No.	Reference Designator	Quantity	Description
<b>PCB, INPUT FEATURE</b>			
Semiconductors			
UA0003	U2,U3,U4	3	OPAMP, QUAD 14PIN DIL LM324N
UA0009	U1	1	OPAMP, QUAD 14P DIL TL074/084
DS0001	D1,D2,D3,D4,D5,D6,D7,D9, D10,D11,D12, D13,D14,D15, D16,D17	16	RECT, 100mA 75V SIGNAL 1N4148T
QB0017	Q2	1	TRANS, NPN 150V 0.6A 2N5551TR
QM0035-S	Q1	1	JFET, J111 SELECTED TR ONLY
Capacitors			
CC0025	C12	1	CAP, CA 1000PF 100V 10%
CC0059	C11,C18	2	CAP, CA .1UF 100V 20%
CC0072	C21,C22	2	CAP, CA 100PF 100V 10%
CC0098	C17	1	CAP, CA .047U 50V 20%
CC0003	C3	1	CAP, C 100PF 100V 5%
CE0098	C19	1	CAP, E 22UF 50V 20% 5X11 5MMLS
CE0103	C13	1	CAP, E 100UF 35V 85DEG 5MMLS
CE0116	C20	1	CAP, E 2.2UF 50V BP 6X11 5MMLS
CF0104	C2,C10	2	CAP, F 1UF 63V 5% 5MMLS
CF0118	C9	1	CAP, F .33UF 63V 10% 5MMLS
CF0119	C4	1	CAP, F .047UF 100V 5% 5MMLS
CF0125	C8	1	CAP, F .068UF 100V 5% 5MMLS
CF0128	C7	1	CAP, F .033UF 100V 5% 5MMLS
CF0144	C5	1	CAP, F .082UF 63DC 5% 5MMLS
Resistors			
RP0036	RP2	1	POT, B50K DUAL 10%
RP0063	RP1	1	POT, A10K SINGLE/BRACKET
RC0136	R31	1	RES, CF 160K 1/4W 5%
RC0273	R7,R14,R22,R25,R40,R42	6	RES, ZERO OHM 1/4W
RC0285	R34	1	RES, CF 2M7 1/4W 5%
RM0001	R33	1	RES, MF 1K00 1/4W 1%
RM0002	R32, R44, R45, R47, R48, R49, R50, R52, R55, R56, R60	11	RES, MF 10K0 1/4W 1%
RM0011	R30,R37,R38,R39,R53	5	RES, MF 100K 1/4W 1%
RM0012	R5	1	RES, MF 100R 1/4W 1%
RM0024	R58	1	RES, MF 2K21 1/4W 1%
RM0031	R28	1	RES, MF 3K32 1/4W 1%
RM0035	R10,R11,R12	3	RES, MF 4K75 1/4W 1%
RM0038	R27	1	RES, MF 56K2 1/4W 1%
RM0039	R2	1	RES, MF 5K11 1/4W 1%
RM0058	R35	1	RES, MF 110R 1/4W 1%
RM0075	R6	1	RES, MF 475R 1/4W 1%
RM0082	R23	1	RES, MF 1K21 1/4W 1%
RM0083	R59	1	RES, MF 1K50 1/4W 1%
RM0085	R26	1	RES, MF 2K00 1/4W 1%
RM0089	R54	1	RES, MF 2K43 1/4W 1%
RM0111	R3	1	RES, MF 17K8 1/4W 1%
RM0113	R8	1	RES, MF 20K0 1/4W 1%
RM0114	R19,R20,R36	3	RES, MF 22K1 1/4W 1%
RM0120	R51	1	RES, MF 30K1 1/4W 1%
RM0147	R17,R18	2	RES, MF 16K2 1/4W 1%
RM0256	R4	1	RES, MF 13K3 1/4W 1%
RM0260	R29,R57	2	RES, MF 1M0 1/4W 1%
RM0304	R9	1	RES, MF 7K87 1/4W 1%





## Electrical Parts List

Part No.	Reference Designator	Quantity	Description
Miscellaneous			
JC0106	J1	1	CNCTR, DUAL RCA HORZ MT BLK/GD
JH0008	J3	1	CNCTR, HEADER 5PIN .100CTR
JH0074	J4	1	CNCTR, HEADER 8PIN LOCKING .1C
MM0025	WB1	1	MISC, PC MT SCREW TERM 6-32
SR0007	SW1,SW2	2	SWITCH, SPDT TOGGLE C/W CAP PC
SR0013	SW3	1	SWITCH, 3P TOGGLE C/W CAP
<b>PCB, LINEAR/BUCK</b>			
Semiconductors			
DS0001	D301, D302, D303, D304, D305, D306, D307, D308, D309, D310, D311, D312, D313, D314, D315, D316, D317, D318, D319, D320, D321, D323, D325, D330	24	RECT, 100mA 75V SIGNAL 1N4148T
DR0085	D324	1	RECT, 8A 400V TO220AC MUR860
QB0002	Q314,Q315,Q317	3	TRANS, NPN 40V .6A TO92 2N4401
QB0017	Q303,Q308,Q322,Q323	4	TRANS, NPN 150V 0.6A 2N5551TR
QB0018	Q302,Q304,Q309,Q313, Q316,Q324	6	TRANS, PNP 150V 0.6A 2N5401TR
QB0033	Q319	1	TRANS, NPN 250V 1A TO220 TIP47
QM0015	Q305,Q310,Q320,Q321	4	MOSFET, IRF640 TO220AB
QM0032	Q306,Q307,Q311,Q312	4	MOSFET, IRF9640 T0220AB
QM0035-S	Q301	1	JFET, J111 SELECTED TR ONLY
UV0007	U303	1	VREG, LINEAR TO220 LM7905CT
UV0013	U302	1	VREG, +5V 100MA TO220 LM7805CT
UA0003	U306	1	OPAMP, QUAD 14PIN DIL LM324N
UA0009	U301	1	OPAMP, QUAD 14P DIL TL074/084
UF0013	U304	1	FOTO, 6PIN MOC3012
UP0004	U307	1	PWM, 8PIN DIL UC3842N
DZ0002	Z303	1	ZENER, 500mW 12V 5% 1N5242B
DZ0021	Z301,Z302	2	ZENER, 500MW 15V 5% 1N5245B
DZ0034	Z304	1	ZENER, 500MW 10V 5% 1N5240B
DZ0018	U305	1	ZENER, 2.5-37V SHUNT TL431CLP
Capacitors			
CC0020	C335,C366	2	CAP, CA 470PF 100V 5%
CC0040	C313,C324,C331	3	CAP, CA 4700PF 100V 10%
CC0059	C311,C312,C322,C323, C372,C373	6	CAP, CA .1UF 100V 20%
CC0065	C337,C367	2	CAP, CA 2200P 100V 10%
CC0072	C341	1	CAP, CA 100PF 100V 10%
CC0082	C350,C351,C370,C371	4	CAP, CA .1UF 50V 20%
CC0087	C332,C338	2	CAP, CA .01UF 100V 20%
CC0108	C307,C317	2	CAP, CA 22PF 50V 10
CC0032	C358	1	CAP, C 2200PF 500V 10% .2LS TR
CC0095	C345,C347	2	CAP, C 470P 100V 5
CE0018	C329,C330	2	CAP, E 100UF 25V 20% 5MMLS
CE0098	C301,C309,C310,C319,C320	5	CAP, E 22UF 50V 20% 5X11 5MMLS
CE0103	C348	1	CAP, E 100UF 35V 85DEG 5MMLS
CE0106	C315	1	CAP, E 22UF 35V BP 8X11 5MMLS
CE0141	C326	1	CAP, E 47UF 35V BP 8X11 5MMLS
CF0008	C342	1	CAP, F 2200PF 100V 5% 5MMLS

## Electrical Parts List

Part No.	Reference Designator	Quantity	Description
CF0035	C306,C316	2	CAP, F .022UF 100V 5% 5MMLS
CF0105	C302,C303	2	CAP, F .15UF 63V 5% 5MMLS
CC0017	C340	1	CAP, C 330PF 100V 10% 5MMLS BU
CC0021	C360,C362,C363	3	CAP, C 470PF 1KV 10% BULK
CC0078	C344	1	CAP, C .22UF 50V 10% .2LS BULK
CC0079	C343	1	CAP, C .1UF 50V 20% .2LS
CE0121	C355,C356	2	CAP, E 470UF 200V 20% 30X25
CF0146	C361	1	CAP, F 6.8UF 250V 10% 27MMLS
CC0059	C304	1	CAP, CA .1UF 100V 20%
CE0106	C305	1	CAP, E 22UF 35V BP 8X11 5MMLS
Resistors			
RC0004	R399	1	RES, CF 1M0 1/4W 5%
RC0006	R349	1	RES, CF 10K 1/4W 5%
RC0061	R350	1	RES, CF 4K7 1/4W 5%
RC0083	R303	1	RES, CF 100K 1/4W 5%
RC0087	R323,R326,R327,R339, R340,R341	6	RES, CF 330R 1/4W 5%
RC0116	R3107	1	RES, CF 330K 1/4W 5%
RC0127	R3106	1	RES, CF 30K 1/4W 5%
RC0128	R376	1	RES, CF 33K 1/4W 5%
RC0273	R313,R395,R3114	3	RES, ZERO OHM 1/4W
RM0001	R344,R370,R371,R372,R3101	5	RES, MF 1K00 1/4W 1%
RM0002	R377,R380	2	RES, MF 10K0 1/4W 1%
RM0003	R312,R329	2	RES, MF 15K0 1/4W 1%
RM0011	R352,R353,R354,R364, R3104,R3105	6	RES, MF 100K 1/4W 1%
RM0024	R315,R317,R331,R333	4	RES, MF 2K21 1/4W 1%
RM0031	R320,R321,R336,R337,R369	5	RES, MF 3K32 1/4W 1%
RM0035	R3108	1	RES, MF 4K75 1/4W 1%
RM0037	R367	1	RES, MF 51K1 1/4W 1%
RM0039	R304	1	RES, MF 5K11 1/4W 1%
RM0043	R319,R322,R335,R338,R384	5	RES, MF 6K81 1/4W 1%
RM0065	R373	1	RES, MF 200R 1/4W 1%
RM0069	R390,R391	2	RES, MF 274R 1/4W 1%
RM0071	R389,R392	2	RES, MF 332R 1/4W 1%
RM0073	R324,R342	2	RES, MF 392R 1/4W 1%
RM0079	R3112,R3113	2	RES, MF 750R 1/4W 1%
RM0082	R368	1	RES, MF 1K21 1/4W 1%
RM0083	R345	1	RES, MF 1K50 1/4W 1%
RM0089	R382	1	RES, MF 2K43 1/4W 1%
RM0093	R306,R316,R318,R332,R334	5	RES, MF 4K53 1/4W 1%
RM0113	R308,R309,R375,R381	4	RES, MF 20K0 1/4W 1%
RM0114	R357,R361	2	RES, MF 22K1 1/4W 1%
RM0118	R351	1	RES, MF 210R 1/4W 1%
RM0120	R358,R362	2	RES, MF 30K1 1/4W 1%
RM0139	R314,R330	2	RES, MF 267K 1/4W 1%
RM0144	R363	1	RES, MF 47K5 1/4W 1%
RM0148	R302,R307	2	RES, MF 6K34 1/4W 1%
RM0180	R311,R328,R355,R356,R359,R379	6	RES, MF 4K99 1/4W 1%
RM0247	R360	1	RES, MF 38K3 1/4W 1%
RM0276	R365	1	RES, MF 294K 1/4W 1
RM0304	R305	1	RES, MF 7K87 1/4W 1%
RM0336	R385	1	RES, MF 47R 0.6W 1% FLAME ROOF
RM0339	R396,R397	2	RES, MF 10R 0.6W 1% FLAMEPROOF
RM0352	R3100	1	RES, MF 2K05 1/4W 1%

## Electrical Parts List

Part No.	Reference Designator	Quantity	Description
RM0365	R386	1	RES, MF 100R 0.6W 1% FLAMEPROOF
RX0072	R3102	1	RES, MO 100R 1W 5%
RX0074	R325,R343	2	RES, MO 4K7 1W 5%
RX0097	R348	1	RES, MO 3K9 2W 5% PR01 SERIES
RC0005	R388	1	RES, CF 10K 1/2W 5%
RC0229	R3103	1	RES, CF 200K 1/2W 5% 1/4W BODY
RP0056	RP301,RP302	2	POT, 5K 8MM HOR TOP ADJ/COVER
RW0022	R346,R347,R393,R394	4	RES, WW 0R1 2W 5%
RC0006	R310	1	RES, CF 10K 1/4W 5%

### Miscellaneous

480015	FO308/FO310	1	SUB, #18B 5 1/4 STRIP BOTH
480020	FO309/FO311	1	SUB, #18R 5 1/4 STRIP BOTH
480084		1	SUB, #18G 4 187X032/#6 RING J308 (CONNECTS TO HEARSINK VIA ONE OF THE FOUR PCB SUPPORTS)
480090	FO301	1	SUB, #18R 9 187X032/1/4STRP
480097	FO302	1	SUB, #18B 9 187X032/1/4STRP
540130	L302	1	IND, CM CHOKE 150UH ELYTONE
BF0007	L301	1	BEAD, FERRITE
JH0008	J302	1	CNCTR, HEADER 5PIN .100CTR
JH0016	J303	1	CNCTR, HEADER 2PIN .100CTR
JH0074	J301	1	CNCTR, HEADER 8PIN LOCKING.1C
KS0017	TH302,TH303	2	THERMISTOR, 100K @ 25C NTC BUL
KS0019	TH301	1	THERMISTOR, PTH9L04BD22TS2F510
MT0003	FO303	1	TERM, FASTON MALE PCMT 250X032
MT0005		2	TERM, KWIKDISC .187 X.032 FEMA USED ON 480097 AND 480090
MT0031	FO304	1	TERM, FASTON MALE PCMT 205X020
TS0019		12	TUBING, #5 CLEAR CUT TO 0.250 FOR USE ON FET

### PCB, PWR SUPPLY ISO 1000W

#### Semiconductors

DR0086	D403,D404,D406	3	RECT, 1A 600V ULTRAFast MUR160
DS0002	D409,D410	2	RECT, 100MA 200V SIGNAL 1N3070
DR0084	D407,D408	2	RECT, 8A 600V ULTRAF MUR1660CT
QB0014	Q401	1	TRANS, PNP TO92 MP5A92TR
DD0003	Q402	1	RECT, 1A2 60V DIAC
QM0055	Q403,Q404,Q406,Q407	4	MOSFET, IRF740 TO220AB IR ONLY
DZ0021	Z401,Z402,Z403,Z404, Z405,Z406,Z407, Z408	8	ZENER, 500MW 15V 5% 1N5245B

#### Capacitors

CC0040	C409	1	CAP, CA 4700PF 100V 10%
CC0087	C421	1	CAP, CA .01UF 100V 20%
CE0013	C415,C416,C418	3	CAP, E 47UF 50V 20% 5MMLS
CF0093	C406,C408,C412,C414	4	CAP, F 4700PF 100V 5% 5MMLS
CE0040	C401,C402,C403,C422,C423,C424	6	CAP, E 680UF 200V 25X35 85DEG
CF0020	C432	1	CAP, FY2 4700PF 250V 20%
CF0050	C426,C427,C430,C431	4	CAP, F .1UF 250V 10% 10MMLS



**Electrical Parts List**

<b>Part No.</b>	<b>Reference Designator</b>	<b>Quantity</b>	<b>Description</b>
<b>Resistors</b>			
RC0082	R403	1	RES, CF 100K 1/2W 5%
RC0138	R422	1	RES, CF 200K 1/4W 5%
RM0001	R401	1	RES, MF 1K00 1/4W 1%
RM0012	R405	1	RES, MF 100R 1/4W 1%
RM0075	R406,R408,R409,R411,R413, R415,R416, R418	8	RES, MF 475R 1/4W 1%
RM0198	R402	1	RES, MF 205K 1/4W 1%
RM0340	R407,R410,R414,R417,R419, R420,R425,R426	8	RES, MF 22R 0.6W 1% FLAMEPROOF
RX0046	R421	1	RES, MO 47K 1W 5%
<b>Miscellaneous</b>			
500113	T403,T404	2	XFMR, POWER 500W ETD44 CLASS F
JH0008	J401	1	CNCTR, HEADER 5PIN .100CTR
KS0021	TH401	1	SURGISTOR, 4R 8A 70J SL154R008
MT0023	FO401,FO402,FO403,FO404	4	TERM, FASTON MALE PCMT 187X032
TS0016		6	TUBING, #5 BLACK CUT TO .3 USED ON D407,D408,Q403,Q404,Q406,Q407
<b>PCB, AC FILTER w AUTO-OFF</b>			
<b>Semiconductors</b>			
DR0038	D502,D503,D504,D505	4	RECT, 1A 400V GENERAL 1N4002
DS0001	D512	1	RECT, 100mA 75V SIGNAL 1N4148T
DB0006	D501	1	RECT, 8A 400V BRIDGE
QB0002	Q501	1	TRANS, NPN 40V .6A TO92 2N4401
UV0007	U502	1	VREG, LINEAR TO220 LM7905CT
UV0013	U501	1	VREG, +5V 100MA TO220 LM7805CT
DZ0029	Z502,Z503	2	ZENER, 500MW 5V1 5% 1N5231B
<b>Resistors</b>			
RC0004	R501	1	RES, CF 1M0 1/4W 5%
RX0051	R502	1	RES, MO 680R 1W6 5%
RX0083	R503	1	RES, MO 150R 3W 5%
<b>Capacitors</b>			
CE0003	C505,C506	2	CAP, E 2.2UF 50V 20% 105C
CE0103	C503,C504	2	CAP, E 100UF 35V 85DEG 5MMLS
CF0057	C501,C502	2	CAP, FX .22UF 250V 10%
<b>Miscellaneous</b>			
480110		2	SUB, #16B 8 187X020/1/4 STRP 1 USED FOR FO502 TO POWER BD PRI DC IN-; 1 USED BETWEEN FO503 AND FUSE HOLDER
480111		1	SUB, #16R 8 187X032/1/4 STRP FO501 TO POWER BD PRI DC IN+;
500103	T501	1	XFMR, POWER 60HZ 24V FT3245
540124	L501	1	IND, CM CHOKE YT7271
JH0008	J502	1	CNCTR, HEADER 5PIN .100CTR
JH0016	D507	1	CNCTR, HEADER 2PIN .100CTR
KV0001	Z501	1	VARISTOR, 275V 100J .6W
MT0005		1	TERM, KWIKDISC .187 X.032 FEMA ON ONE OF THE END OF 480111;

## Electrical Parts List

Part No.	Reference Designator	Quantity	Description
MT0029		2	TERM, KWIKDISC .187/.020 SPL ON ONE OF THE END OF 480110;
SR0038	SW502	1	SWITCH, RELAY SPST TV5 5A 12V
<b>MISCELLANEOUS</b>			
480112		1	SUB, #16B 4 187X020/250X032 FROM IEC TO FUSE HOLDER;
480127		1	SUB, #16B 12 250X032/1/4 STP USED BETWEEN IEC CONNECTOR AND FO504 ON EMI BOARD;
480128		1	SUB, #14B 20 205X020/205X020 CONNECTED TO SPKR- FO304;
480129		1	SUB, #14R 20 250X032/250X032 CONNECTOR TO SPKR+ FO303;
810066		6	MET, HTSNK CLIP HPS SERIES USED ON D407, D408, Q403, Q404, Q406, Q407
810088		1	MET, HTSNK 1X2 BRIDGE USED WITH THE DIODE BRIDGE
810096		1	MET, HTSNK PRIMARY LF SERIES USED ON Q403, Q404, Q406, Q407
810099		1	MET, HTSNK DIODE LF SERIES USED ON D407, D408;
810100		1	MET, HTSNK LEFT BRACKET ASW
810101		1	MET, HTSNK RIGHT BRACKET ASW
FH0012		1	FUSE, HOLDER PANEL MT SEALED
FS0027		1	FUSE, 6A 250V 1.25X.25 GLASS
HN0001		6	NUT, HEX KEP #4-40 ZNP 2PER ON THE IEC CONNECTOR; 4PER ON THE LINEAR/CLASSD BOARD
HN0003		1	NUT, HEX NYLON #6-32 USED ON THE CHOKE
HN0006		9	NUT, HEX KEP #6-32 ZNP 1PC USED W/ BRIDGE HEATSINK; 4PC USED WITH 1.5 STANDOFF
HS0002		1	SCREW, #6-32X1/2 PAN PHIL ZNP USED WITH THE BRIDGE HEATSINK
HS0024		4	SCREW, #6-1/4 TYPE A PP ZNP USED WITH THE STANDOFFS ON EMI BOARD
HS0041		2	SCREW, #4-3/8 TYPE A PP BLK USED ON THE RCA
HS0048		8	SCREW, #4-3/4 TYPE A PP BLK
HS0051		10	SCREW, #4-40X3/8 PAN PHIL BLK
HS0055		6	SCREW, #4-40X1/2 PAN PHIL BLK 2PC USED ON THE IEC CONNECTOR; 4PC USED ON THE LINEAR/CLASSD BOARD
HS0060		16	SCREW, #6-32X3/8 PAN PHIL BLK 4PC USED ON PRIMARY AND DIODE HEATSINK; 12 USED ON THE HEATSINK BRACKETS
HS0062		12	SCREW, #6-1/2 TYPE B PP BLK USED WITH THE FET CLIPS

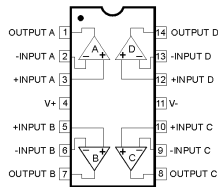


**Electrical Parts List**

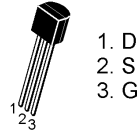
Part No.	Reference Designator	Quantity	Description
HS0065		13	SCREW, #6-32X1/4 PAN PHIL BLK 1PC USED WITH MM0025 ;8PC USED WITH STANDOFF WITH POWER SUPPLY BD; 4PC USED WITH 1.5 STANDOFF;
HS0067		4	SCREW, #6-3/8 TYPE A PP BLK USED ON THE STANDOFF
HS0079		1	SCREW, #6-32X1.25 FL SLOT NYL USED WITH THE CHOKE;
HTPS400 PANEL		1	HTPS400 PANEL COMPLETE
HW0030		4	WASHER, FLAT #8 NYLON FOR LINEAR BOARD MOUNTING
JC0071		1	CNCTR, FEM-FEM HARNESS 8PIN 9 FROM FEATURE BOARD TO LINEAR BOARD
JC0076		1	CNCTR, AC IEC SOCKET .250TAB
JC0088		1	CNCTR, FEM-LED R/G 30 2PIN LED HARNESS
JC0134		1	CNCTR, FEM-FEM HARNESS 5PIN 9 FROM POWER SUPPLY BOARD TO LINEAR BOARD
JC0158		1	CNCTR, FEM-FEM HARN 5P 18 SHI FROM FEATURE BOARD TO EMI BOARD
MC0001		4	CABLE, TIE 4 NATURAL
MC0003		2	CABLE, TIE 40MM W/ METAL RING TIE HARNESS JC0158 TO LINEAR HEAT SINK
MM0030		2	MISC, FOAM .5X.5X.25 HOLE USED WITH THE TOGGLE SWITCHES
MM0040		1	MISC, FOAM GASKET FOR JC0049 USED WITH THE DUAL RCA
MM0061		2	MISC, WIRE CLAMP NYLON TO BIND WIRES;
MS0005		11	SILPAD, .009 .3C/W TO3P
MS0014		1	MISC, CERAMIC PLATE TO-220
MZ0003		4	STANDOFF, 6-32 3/8 ROUND AL USED TO MOUNT POWER SUPPLY TO PANEL
MZ0031		4	STANDOFF, 3/8 NYLON LOCKING 4PC USED ON THE EMI BOARD
MZ0041		4	STANDOFF, #6 1.5 HEX FEM-MALE STANDOFF SHOULD BE POSITIONED SO THAT THE FEMALE END IS IN CONTACT WITH THE PCB AND THE MALE SIDE GOES THROUGH THE HEATSINK;
RC0147		1	RES, CF 6M8 1/4W 5% CONNECTED FROM U4 PIN4 TO NEGATIVE TERMINAL OF C20 WHICH IS LOCATED AT THE LOWER END OF U4;
RP0058		2	POT, KNOB CR00-15MB-16H
TS0018		2	FIBREGLASS, HT210 #2AWG 10 TO SHIELD WIRES

# Integrated Circuit Diagrams

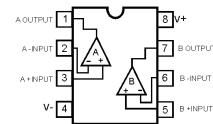
OPAMP, QUAD 14P DIL TL074/084, LM324N  
COMPARATOR U1,2,3,4,301,306



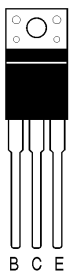
JFET, Q1,301



OPAMP, DUAL 8PIN DIL TL082  
U101

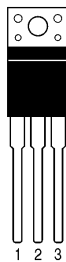


TRANS, NPN 250V 1A  
T0220 TIP47C Q319



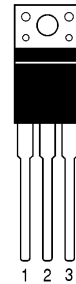
-5V TO220 LM7905CT  
REGULATOR U303,502

- 1. GROUND
- 2. INPUT
- 3. OUTPUT

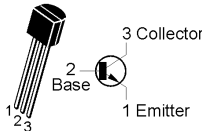


+5V TO220 LM7805CT/7805CT  
REGULATOR U302,501

- 1. INPUT
- 2. GROUND
- 3. OUTPUT

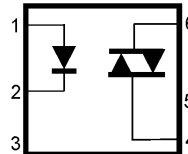


TRANS, NPN 150V 0.6A 2N5551, 2N4401,  
Q2,314,315,317,303,308,322,323,501

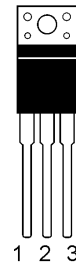


MOSFET, IRF640/9640/740,  
Q305,310,320,321,306,307  
311,312,403,404,406,407

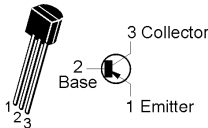
FOTO, 6PIN MOC3012  
U304



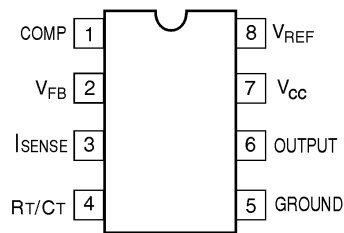
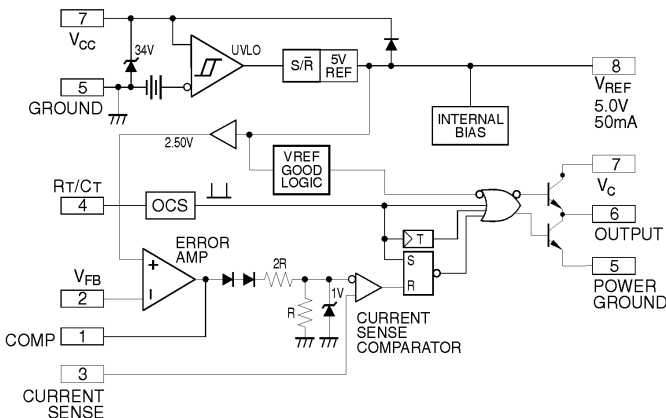
- 1. G
- 2. D
- 3. S



TRANS, PNP 150V 0.6A 2N5401,  
Q302,304,309,313,316,324,401



U307 - UC3842N PWM CONTROLLER



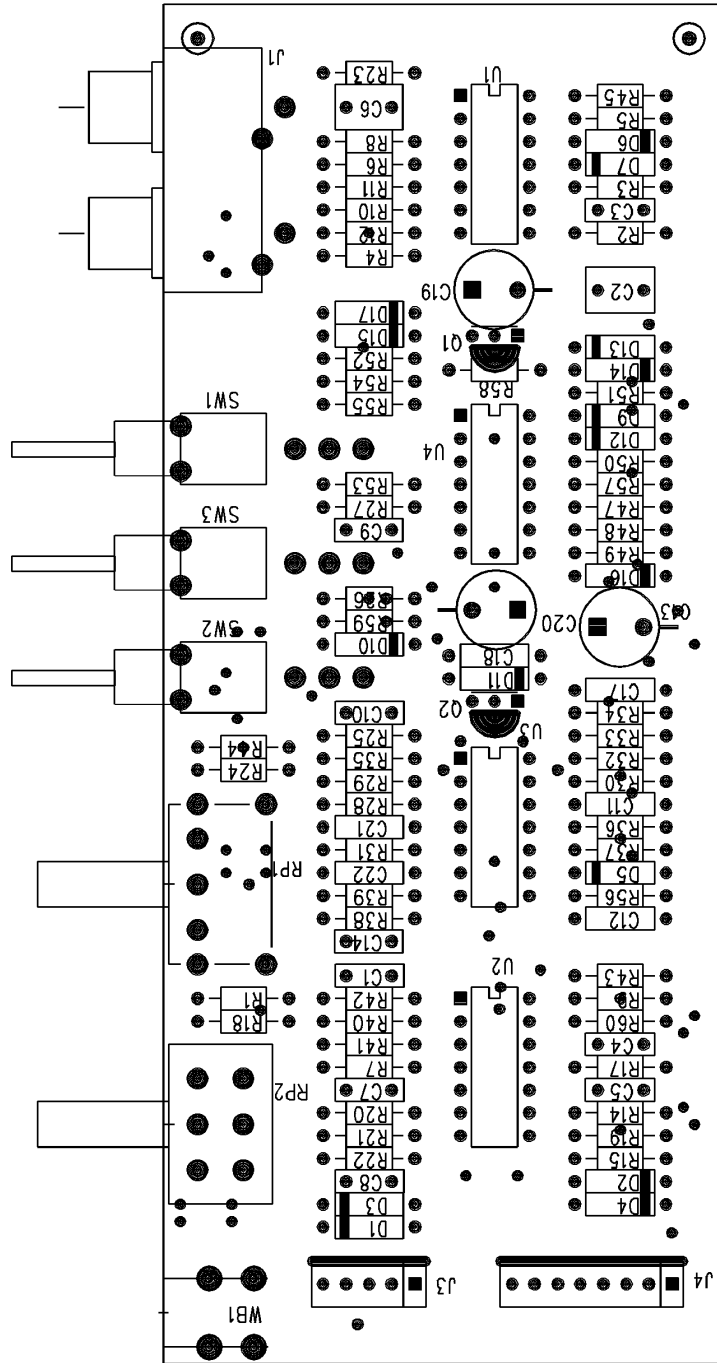
00331

# Feature Board Assembly PCB

## FEATURE BOARD



M3



TH1  
TH2

1-0013:00



M2

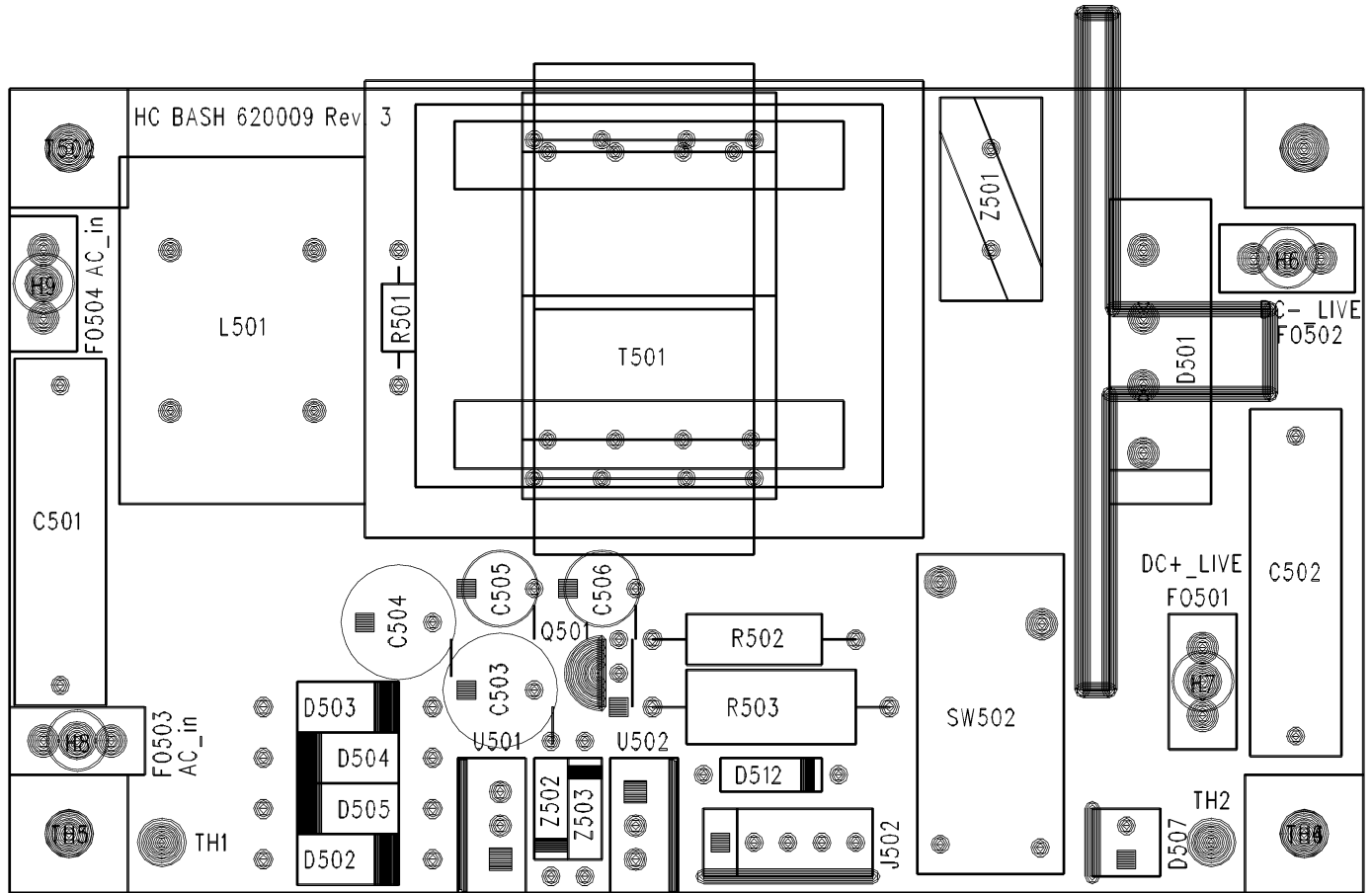


M1



# EMI FILTER Board Assembly PCB

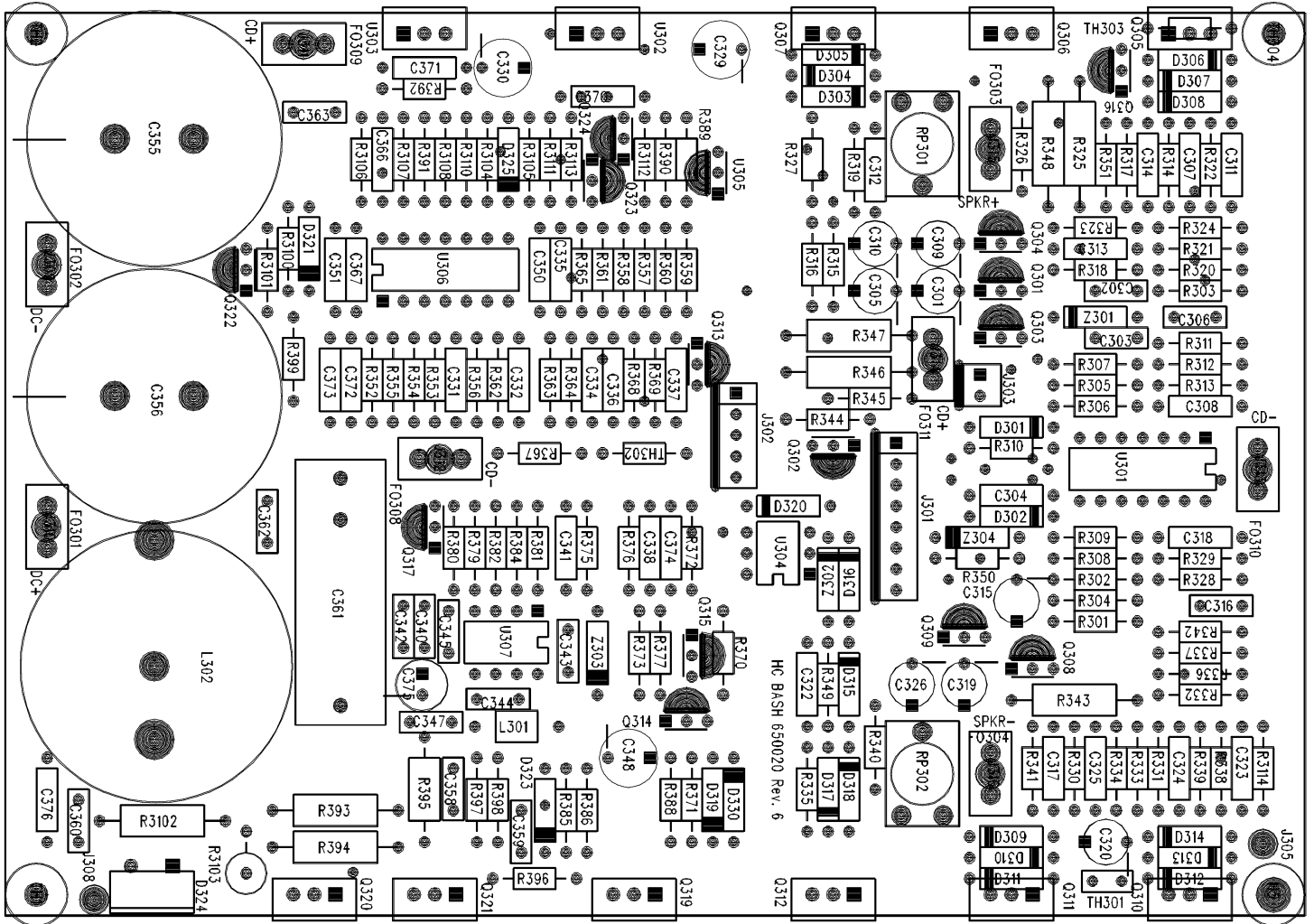
## EMI BOARD



00300-2

# LINEAR Board Assembly PCB

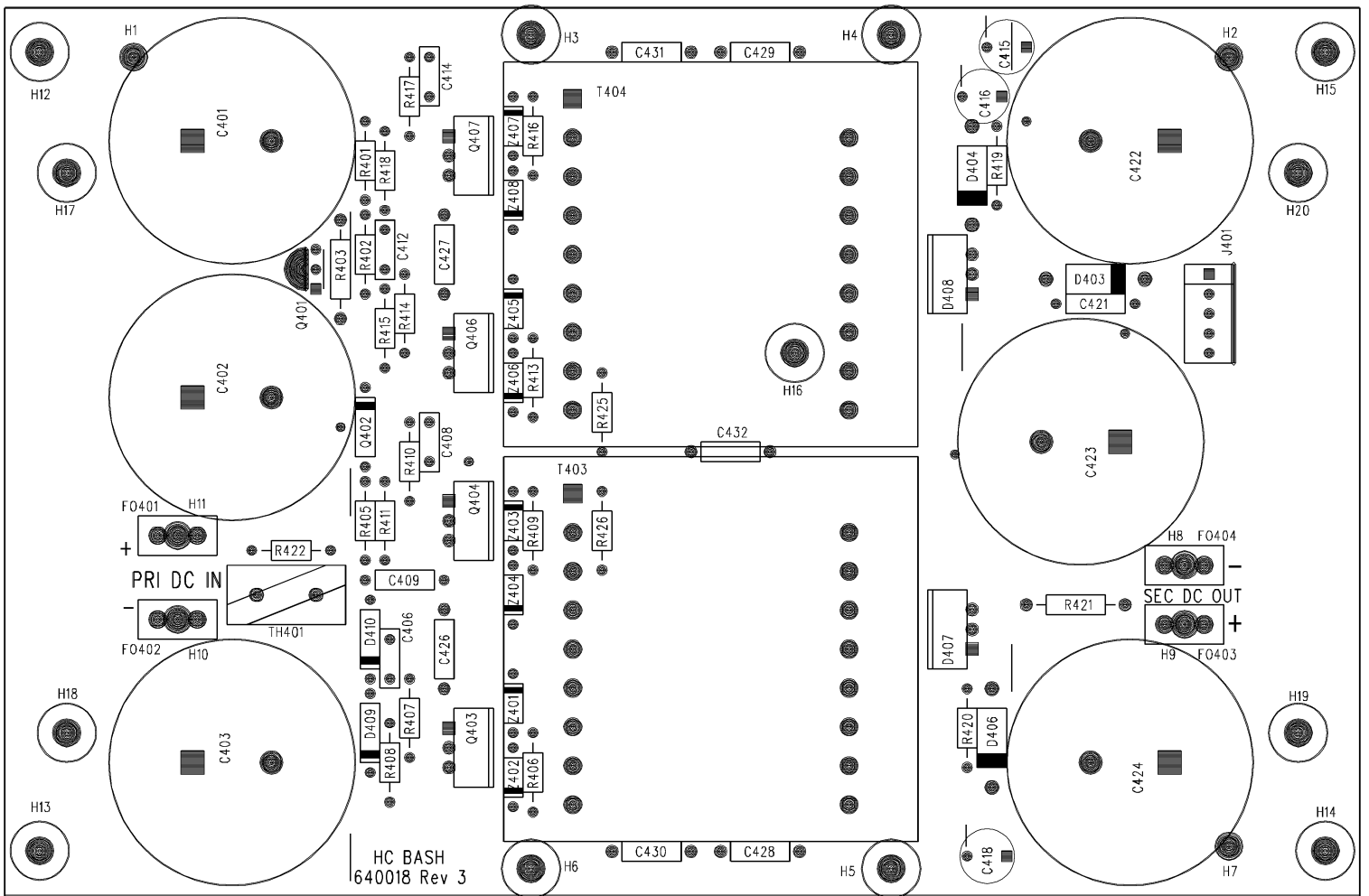
## LINEAR BOARD



3--001E00

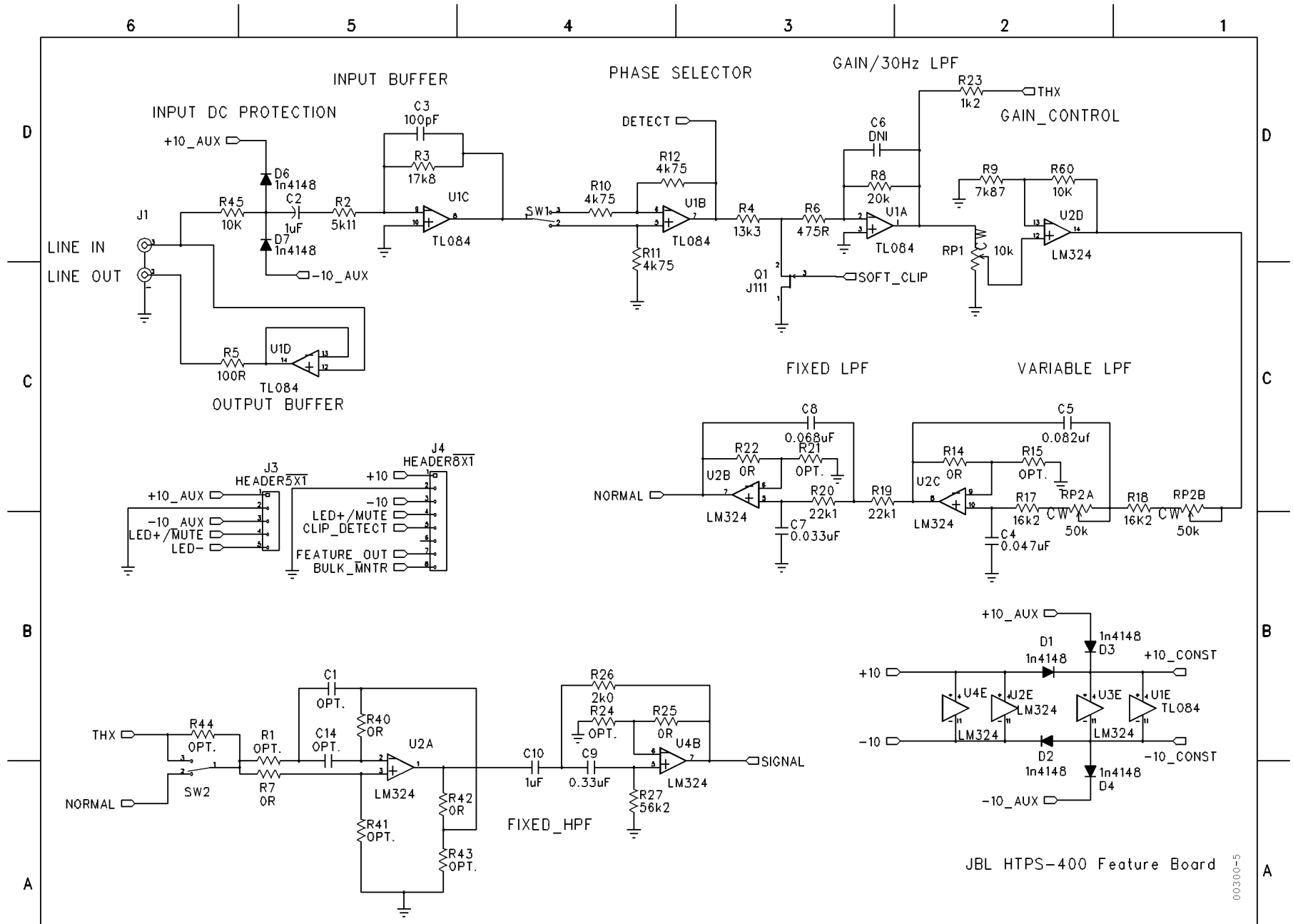
# Power Supply Assembly PCB

1000 WATT POWER SUPPLY



00.300-4

# Feature Board Assembly Schematic

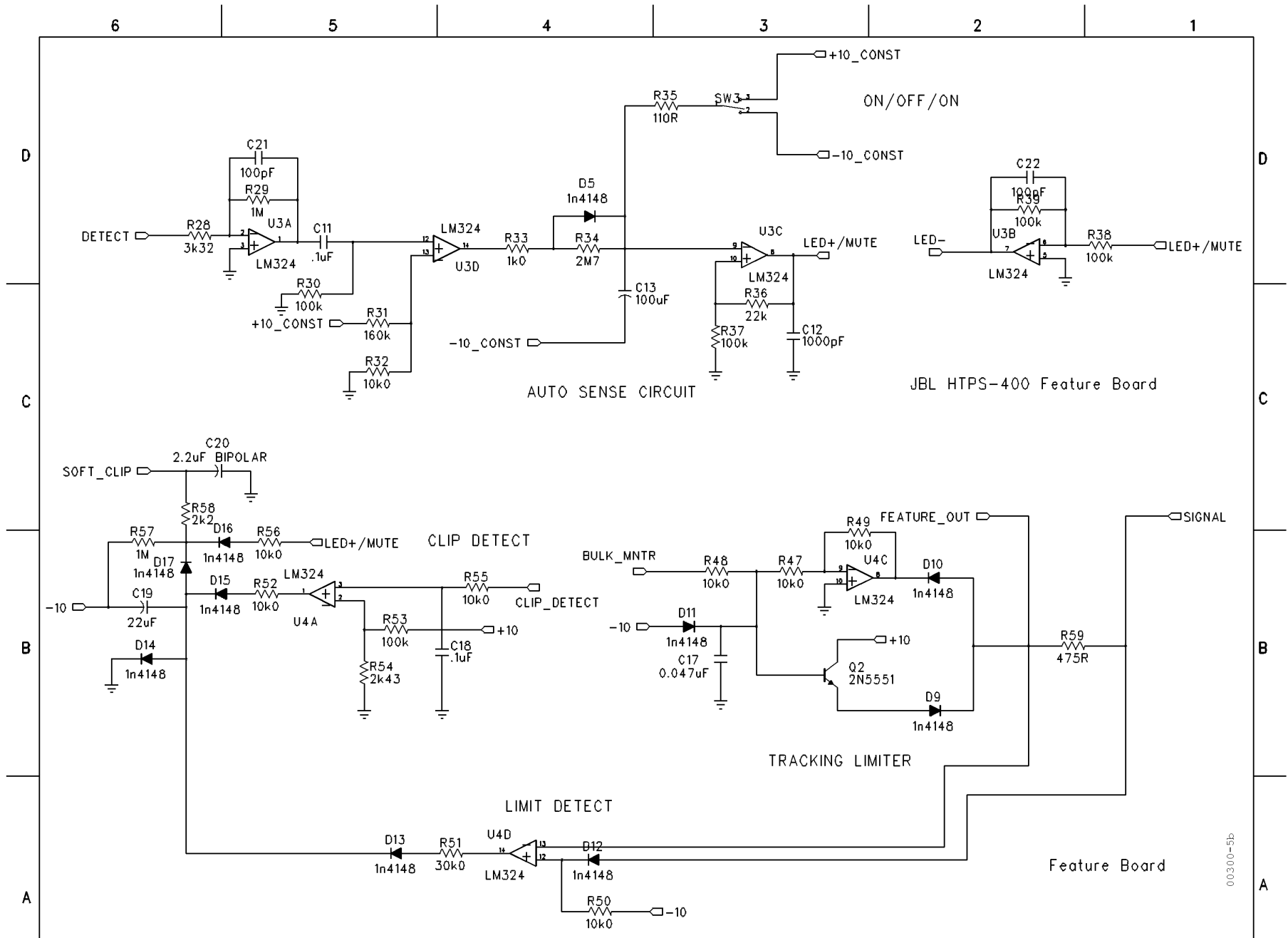


JBL HTPS-400 Feature Board

00300-5

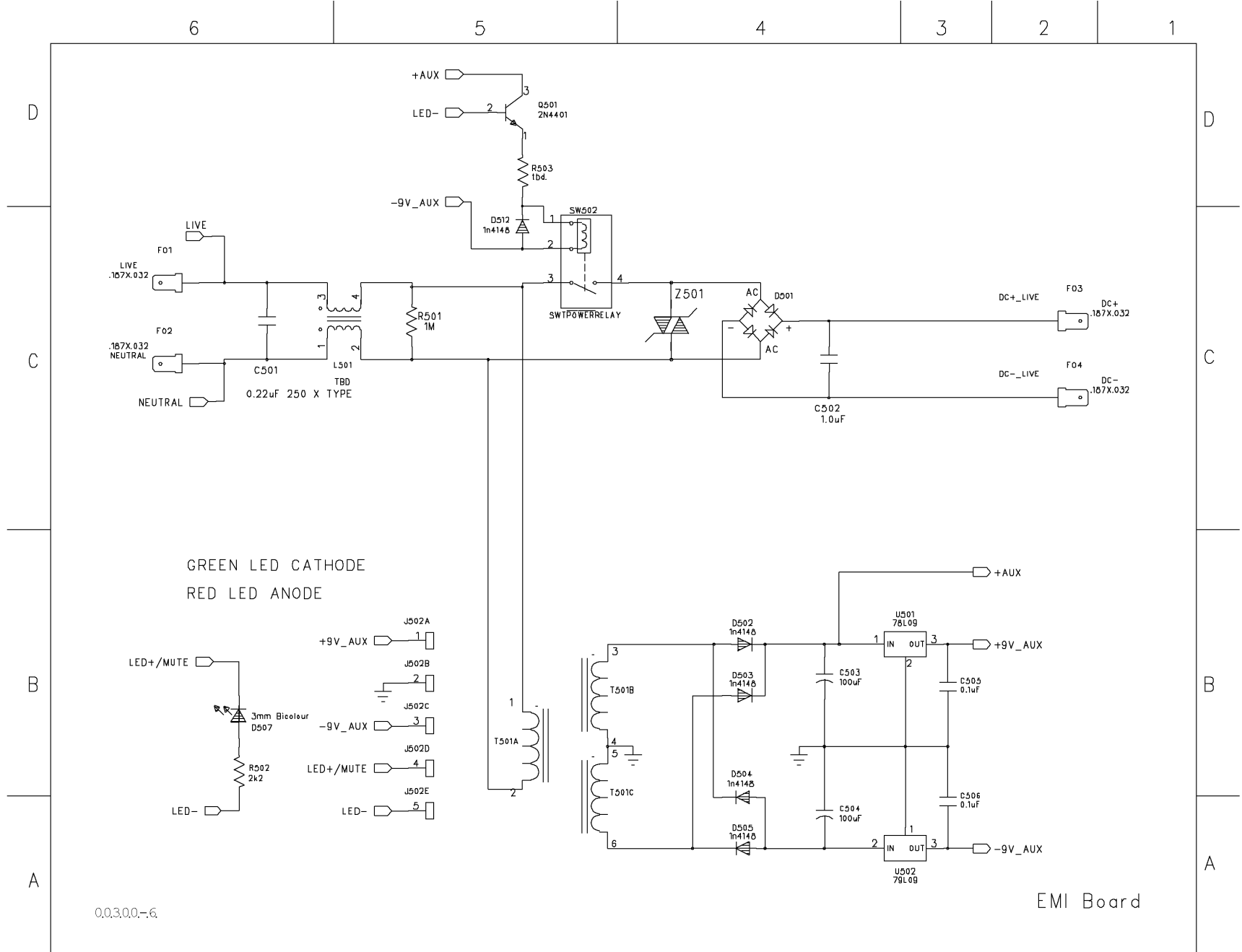


# Feature Board Assembly Schematic (Cont.)



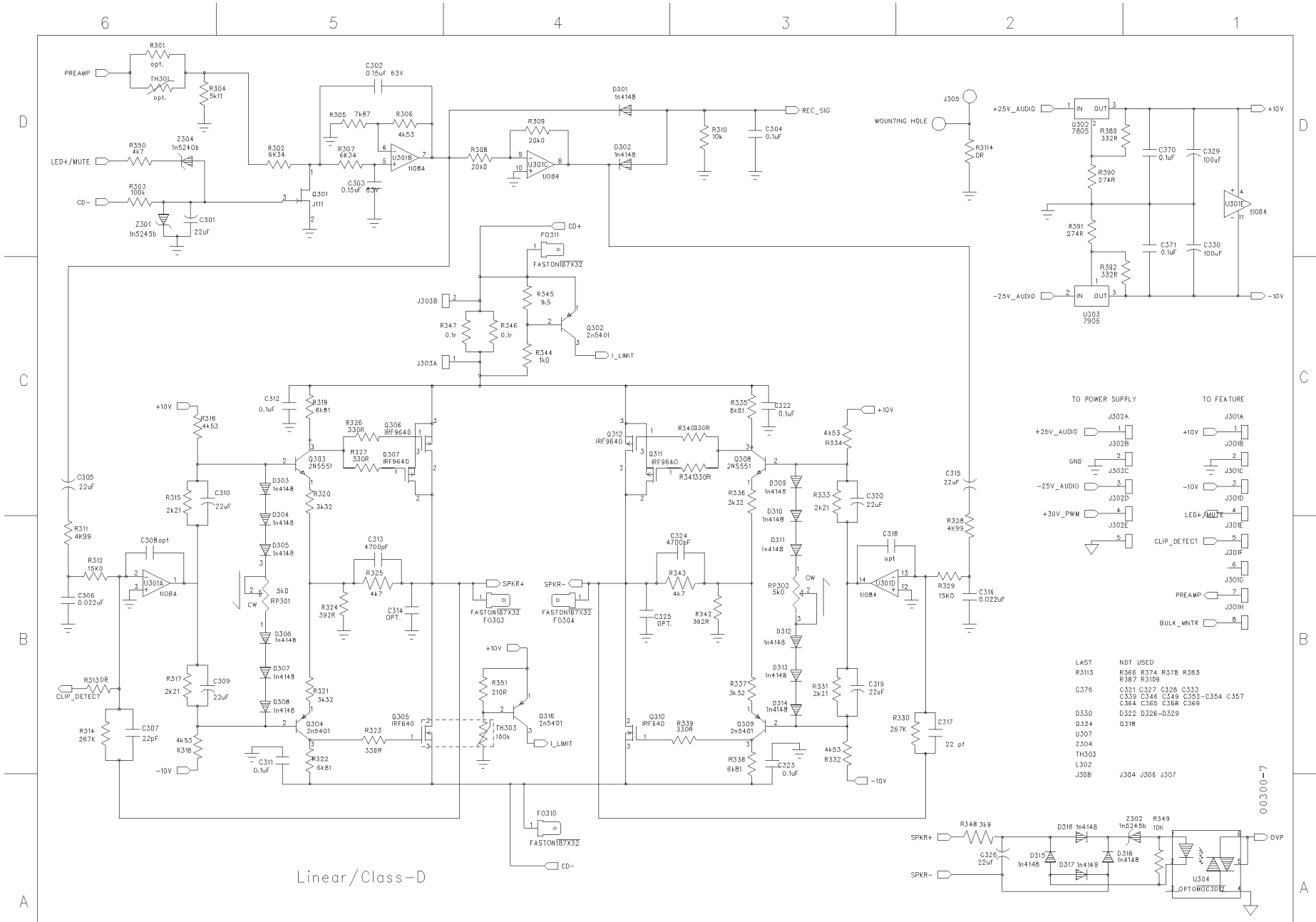
00300-5b

# EMI Filter PCB





Linear/Class B



# Power Supply Assembly

