

SERVICE MANUAL

Subwoofer Amplifier Model:
RSW-15

CAUTION!

**Lethal voltages are present and exposed
when cover is off of amplifier.**

Only qualified service technicians
should attempt to repair this product.



SPECIFICATIONS 3
Model: RSW-15 3

THEORY OF OPERATION 4
INPUTS..... 4
SIGNAL CONDITIONING 4
OUTPUT..... 4
POWER SUPPLY..... 4
OTHER FEATURES 5

PARTS LISTS 6

SCHEMATIC DIAGRAMS..... 13

SPECIFICATIONS

Model: RSW-15

Rated Power Output	650 Watts Continuous into 6 Ω
Maximum Power Output	2400 Watts(peak) into 6 Ω
Frequency Band-width	35 - 110Hz
THD	< 1.0% @ 1 Watt < 0.5% @ Rated Power <10.0% @ Maximum Power
Signal to Noise	90dB or better
60 Hz Hum	<800 μ V
Input Sensitivity for Rated Output	Line Input = 200mVrms @ 40Hz
Input Impedance	Line Input = 10K Ω
Auto-on Sensitivity	Line Input = 10mVrms (20Hz - 2kHz)
Auto-On Delay	1-2 Seconds
Auto-Off Delay	> 15 minutes
Low Pass	Variable 40 - 120Hz with 24dB/Octave Slope

THEORY OF OPERATION

RSW-15 Amplifier

INPUTS

This amplifier utilizes two RCA connectors(L & R) for LINE LEVEL signal input. A second set of RCA connectors are connected directly to the inputs to provide a non-filtered LINE output. This is for passing a full range signal to a second subwoofer, power amplifier, etc.

SIGNAL CONDITIONING

All pre-amplification, filtering, and signal conditioning is accomplished using dual op-amp device U2 and quad op-amp devices U1, and U3. Op-amp U1A, and U3C are gain stages that performs the necessary buffering and isolation of the input signals. The input signal/s from Line In are fed to summing amp U1A. From there the signal passes through the fixed Low Pass filter U1B, the variable Low Pass filter U1C, and Notch filter U2A. In this amplifier U2A is not actively used as a notch filter and is operated as a unity gain buffer amp stage. The LFE Mode switch S1 selects either the filtered signal or a signal that has bypassed the LowPass and Notch filters. From there the signal passes through U3A which is the Level Control stage. Following U3A the signal goes to High Pass filter U3B which has a slope of approximately 12dB/octave below 20Hz. Stage U3C is a buffer/driver stage which also acts as a selectable phase inverter via the Polarity switch S3. From here the signal is sent to the power output section of the amplifier.

OUTPUT

The Power Amplifier(PA) section of this amplifier is a balanced bridge design. Signal splitter stages U301B and U301C feed pre-amps U301A and U301D which in turn feed the signal to driver stages Q303, Q304, and Q308, Q309. The signal is then applies to the power output MOSFET's Q306, Q307, Q308, and Q310, Q311, Q312. The maximum output capability of the amplifier is determined primarily by the output transistor type, and the DC rail voltage/current supplied by the power supply. The value of feedback resistors R314 and R330 determine the sensitivity of the PA section. Trimmer pots RP301 and RP302 establish the DC offsets.

POWER SUPPLY

The RSW-12 utilizes a high current switching power supply with **proprietary** output controller circuitry. This controller circuitry tracks the input signal and continually adjusts the rail voltages to what is needed at the time. This creates a high efficiency amplifier since very little current is flowing when not needed. The power supply also supplies a highly regulated +/- 10Vdc for the op-amps.

LIMITERS

This amplifier contains several limiting circuits for the purpose of controlling the signal so as not to drive the speakers beyond their physical limits. Op-amp stage U5A along with components C107 and R78 form an overall limiter which limits the output to the speakers to the rated power level. U5B and U5C form a Tracking Limiter which monitors the power supply capacity. the tracking limiter does a hard limit of the signal when it detects that the demands on the power supply are exceeding its capability. The Frequency Dependent Limiter consists of low-pass filters U3D & U4B, and inverter stage U4C. This circuit limits the power output only below a specific frequency. In the RSW-12 this frequency is approximately 23Hz. The Clip Detect circuit U5D is not used.

OTHER FEATURES

AUTO ON/OFF

This amplifier features an automatic on/off circuit that allows the user to set up once and forget it. With the power switch in the "AUTO" position, a switching circuit consisting of U1D, U4A, & U4D, senses an input signal. From this switching circuit, JFET Q301 on the power amp board is biased OFF which removes the grounding of the signal. For the protection of the speaker when the amplifier is first plugged in, there is a short delay before JFET Q1 is biased OFF. The sensing circuit will bias Q301 ON after the input signal is absent for approximately 15 minutes or more which shorts the signal path to ground. With the power switch in the "ON" position the signal sensing circuit is bypassed and Q301 is always turned OFF. A bi-color LED indicates the status of the amplifier at any given time. The LED will be GREEN when the control circuit is activated and RED when in sleep mode.

RSW-15 Parts List (Features Board)

<u>PART</u>	<u>VALUE/PART NUMBER</u>		<u>KLIPSCH PART #</u>
RESISTORS, FIXED			
R207	150Ω	1/4 W Metal Film 1%	
R14	200Ω	"	
R117	499Ω	"	
R29,30	1.00KΩ	"	
R28	1.15KΩ	"	
R115,118	2.00KΩ	"	
R209	2.21KΩ	"	
R12	2.80KΩ	"	
R204	3.32KΩ	"	
R13	5.11KΩ	"	
R102,106	5.49KΩ	"	
R17	6.49KΩ	"	
R1,2,21,22,23,103,107,108,109,110,111,112,113,208,210	10.0KΩ	"	
R200	15.0KΩ	"	
R201	16.9KΩ	"	
R26	17.4KΩ	"	
R24,27	20.5KΩ	"	
R25	26.1KΩ	"	
R4,5,8,9	30.1KΩ	"	
R3	46.4KΩ	"	
R114,116	100KΩ	"	
C102,103,R16,100,101	130KΩ	"	
R202	150KΩ	"	
R15,203	475KΩ	"	
R6,10,18	0 Ω	¼ W Carbon Film 5%	
R205	470Ω	"	
R79	2.20KΩ	"	
R78	330KΩ	"	
R206	9.1MΩ	"	
R211	200Ω	½ W Carbon Film 5%	
RESISTORS, VARIABLE			
R1	LOWPASS CONTROL	Dual 50K Linear Taper Pot.	
CAPACITORS			
C1,7,105,106	100pF	Ceramic 10%	
C200	470pF	" 5%	
C202,204	1000pF	" 10%	
C201	.1μF	" 20%	
C3,5	.027μF	Film 5%	
C100,R104	.047μF	"	
C4,6	.068μF	"	
C11	.10μF	"	
C101,R105	.12μF	"	
C10	.18μF	"	
C8,9	.22μF	"	

RSW-15 Parts List**(Features Board)**

<u>PART</u>	<u>VALUE/PART NUMBER</u>	<u>KLIPSCH PART #</u>
ELECTROLYTIC CAPS		
C2	4.7 μ F/35V NP	
C14,15	4.7 μ F/50V	
C203	47 μ F/50V	
C107	100 μ F/35V	
C104	470 μ F/50V	
DIODES		
D100,101,102,103,104,105,106,107,110,200	1N4148	
Z100	ZENER, 500MW 8.2V 1N5237B	
Z101	ZENER, 500MW 14V 1N5244B	
DZ0011	ZENER, 500MW 3.3V 1N5225B	
ICs		
U1,3	TL074/084 Quad Op-Amp	
U4,5	LM324N Quad Op-Amp	
U2	TL082 Dual Op-Amp	
TRANSISTORS		
Q1	J111 N-CH JFET Selected TR only	
SWITCHES		
S1,2,3	SPDT TOGGLE	
SP	Power ON/OFF	DPST ROCKER SWITCH
CONNECTORS		
J1	Line In/Out	Quad RCA Jack
F1		Fuse Holder
VOLUME CONTROL BOARD		
R2	10K Ω AUDIO TAPER POT.	

RSW-15 Parts List**(Power Amp Board)**

<u>PART</u>	<u>VALUE/PART NUMBER</u>	<u>KLIPSCH PART #</u>
RESISTORS, FIXED		
R396,397	10Ω	.6W MF1% FlameProof
R385	47Ω	"
R386	100Ω	"
R373	200Ω	1/4 W Metal Film 1%
R351	210Ω	"
R390,391	274Ω	"
R389,392	332Ω	"
R324,342	392Ω	"
R3112,3113	750Ω	"
R344,370,371,372,3101	1.00KΩ	"
R368	1.21KΩ	"
R345	1.50KΩ	"
R3100	2.05KΩ	"
R315,317,331,333	2.21KΩ	"
R382	2.43KΩ	"
R320,321,336,337,369	3.32KΩ	"
R306	4.12KΩ	"
R316,318,332,334	4.53KΩ	"
R3108	4.75KΩ	"
R311,328,355,356,359,379	4.99KΩ	"
R304	5.11KΩ	"
R319,322,335,338,384	6.81KΩ	"
R305	7.87KΩ	"
R377,380	10.0KΩ	"
R312,329	15.0KΩ	"
R308,309,375,381	20.0KΩ	"
R357,361	22.1KΩ	"
R302,307	23.7KΩ	"
R358,362	30.1KΩ	"
R360	38.3KΩ	"
R363	47.5KΩ	"
R367	51.1KΩ	"
R352,353,354,364,3104,3105	100KΩ	"
R314,330	267KΩ	"
R365	294KΩ	"
R313,395,3114	0.0 Ω	1/4 WATT
R323,326,327,339,340,341	339Ω	1/4 W Carbon Film 5%
R350	4.70KΩ	"
R310,349	10.0KΩ	"
R3106	30.0KΩ	"
R376	33.0KΩ	"
R303	100KΩ	"
R3107	330KΩ	"
R399	1.00MΩ	"
R388	10.0KΩ	1/2 W Carbon Film 5%
R3103	200KΩ	"
R3102	4.7Ω	2W Metal Oxide 5%
R348	3.90KΩ	"
R346,347,393,394	0.10Ω	"
R325,343	4.70KΩ	1W Metal Oxide 5%

RSW-15 Parts List
(Power Amp Board)
VALUE/PART NUMBER

PART**KLIPSCH PART #****RESISTORS, VARIABLE**

RP301,302 5K Ω TRIMMER POT

CAPACITORS

C307,317	22pF	Ceramic 50V	
C343,350,351,370,371	.1 μ F	"	
C344	.22 μ F	"	
C341	100pF	Ceramic 100V	
C340	330pF	"	
C335,366,345,347	470pF	"	
C337,367	2200pF	"	
C313,324,331	4700pF	"	
C322,338	.01 μ F	"	
C304,311,312,322,323	0.1 μ F	"	
C360	470pF	Ceramic 1KV	
C358	2200pF	Ceramic 500V	
C342	2200pF	Film	
C306,316	.022 μ F	"	
C303	.047 μ F	"	
C302	0.1 μ F	"	
C361	6.8 μ F	"	

ELECTROLYTIC CAPS

C301,309,310,319,320	22 μ F /50V
C305,315,326	22 μ F/35V
C348	100 μ F/35V
C329,330	100 μ F/25V
C355,56	470 μ F/200V

TRANSISTORS

Q302,304,309,313,316,324	2N5401 PNP	
Q303,308,322,323	2N5551 NPN	118729
Q305,310,320,321	IRF640 MOSFET TO220	118731
Q306,307,311,312	IRF9640 MOSFET TO220AB	118773
Q301	J113 N-CH JFET TO92	
Q314,315,317	2N4401 NPN	
Q319	TIP47 NPN	

THERMISTOR

TH302,303	100K @ 25C NTC
TH301	PTH9L04BD222TS2F510

ICs

U301	TL074/084 QUAD OPAMP	118769
U306	LM324 QUAD OPAMP	
U304	MOC3012 FOTO	
U307	UC3842N PWM	

RSW-15 Parts List**(Power Amp Board)**

<u>PART</u>	<u>VALUE/PART NUMBER</u>	<u>KLIPSCH PART #</u>
DIODES		
D301,302,303,304,305,306,307,308,309,310, 311,312,313,314,315,316,317,318,319,320, 321,323,325,330	1N4148T	
D324	IR HEXFRED HFA08TB60	
Z303	1N5242B 12V 500mW ZENER	
Z301,302	1N5245B 15V 500mW ZENER	
Z304	1N5240B 10V 500mW ZENER	
U305	TL431CLP 2.5-37V SHUNT ZENER	

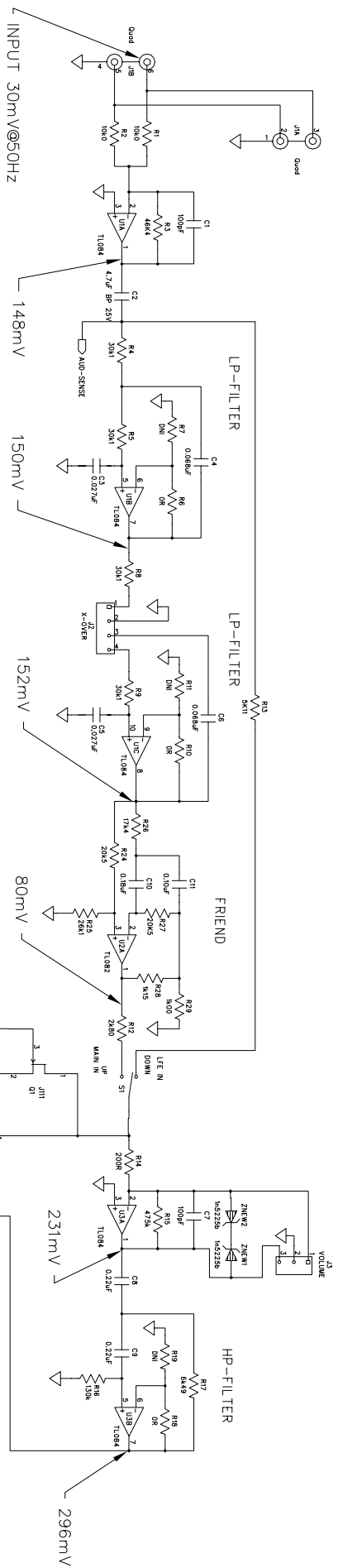
**RSW-15 Parts List
(EMI Filter Board)**

<u>PART</u>	<u>VALUE/PART NUMBER</u>	<u>KLIPSCH PART #</u>
RESISTORS		
R23	1.0M Ω Carbon Film 5%	
Z4	275V 100J .6W Varistor	
CAPACITORS		
C3	4700PF 250V 20% CY1	
C4,5	0.10 μ F 250V 10%	
C2	0.22 μ F 250V 10% FX	
DIODES		
D5	8A 400V Bridge Rectifier	
INDUCTORS		
L1	CHOKE CM YT7271	

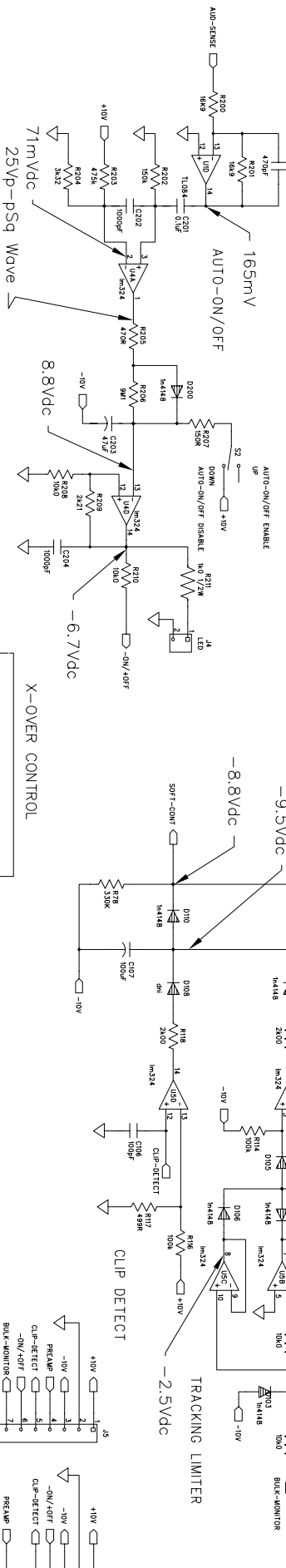
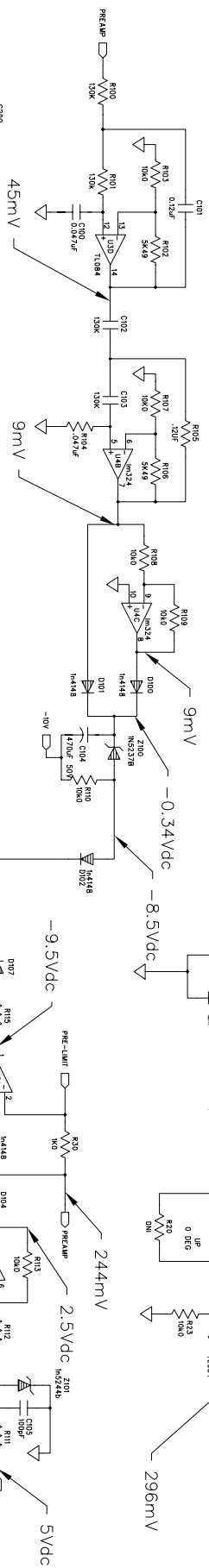
RSW-15 Parts List

(Power Supply Board)

<u>PART</u>	<u>VALUE/PART NUMBER</u>	<u>KLIPSCH PART #</u>
RESISTORS, FIXED		
R407,410,414,417,419,420,425,426	22Ω 0.6W M F 1% Flame Proof	
R408,411,415,418	392Ω 1/4W Metal Film 1%	
R436	3.32KΩ "	
R439,440	10Ω 1W Metal Oxide 5%	
R406,409,413,416	390Ω "	
R402	47.0KΩ "	
R429	33.0KΩ 2w Metal Oxide 5%	
R403	22.0KΩ 1/4W Carbon Film 5%	
R421	100KΩ 1/2W Carbon Film 5%	
R433,434	0.0 Ω 1/4W	
CAPACITORS		
C421,444,446,447	.01μF Ceramic 100V 20%	
C406,408,412,414	4700pF Film 5%	
C409	0.01μF "	
C430,435,436,437,438,439,440,449,450	0.1μF "	
C415,416,418	47μF/50V Electrolytic 20%	
C422,424	560μF/200V "	
C431,434	680μF/200V "	
C432,433	820μF/200V "	
C441,448	4700pF/250V CY1	
DIODES		
D403,404,406	1N4934 1A 100V Fast Recovery	
D410	1N4936 1A 400V Fast Recovery	
D402	DIAC 1A2 60V	
D411,412	1N4148T	
D407,408	ULTRAFast MUR1660CT 8A 600V	
Z401,403,405,407	1N5242B 500mW 12V 5%	
Z402,404,406,408	1N5245B 500mW 15V 5%	
Z409	1N5231B 500mW 5.1V 5%	
TRANSISTORS		
Q401	ZTX558 PNP TO92	
Q403,404,406,407	IRF740 MOSFET TO220AB (IR ONLY)	
SURGISTOR		
TH401	SL154R008 4R 8A 70J	



FREQUENCY-DEPENDENT LIMITER



CLIP DETECT

