



**DA 2x8SH  
Distribution Amplifier  
Manual**



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## Overview

The Radio Systems DA-2x8SH is designed to function as a super low noise, low distortion audio distribution amplifier with input/output connectors that conform to the StudioHub+ RJ45 wiring standard.

Excellent isolation is provided between outputs. Each balanced channel, regardless of level set and load, is unaffected by the other channels. The Radio Systems DA-2x8SH Distribution Amplifier allows audio sources to be routed to multiple locations with various level requirements and impedances while maintaining the integrity of signal quality throughout.

## Mounting

The DA-2x8SH occupies only 1 rack unit (1-3/4 inch) of height in a 19 inch EIA rack. To allow for adequate ventilation, avoid mounting the unit directly above large heat producing equipment such as power amps or power supplies.

When stacking units, it is recommended that one rack space (1-3/4 inch) remain open between every three units.

## Operation

Apply an input level of approximately 0dB to the input RJ45. The gain of any stage may be increased by 20dB in 10dB steps by changing the internal gain straps.

To locate and reset these jumpers, refer to the parts layout for the location of JU10 and JU11. The lid of the unit must be removed to access these jumpers. Place a shorting strap across the center and rear pin (pin towards the rear barrier strip) to increase input gain by 10dB. Place a shorting strap across the center and forward pin to increase input gain by 20dB.

Output level is factory set for unity gain. Each output can be individually set via its front panel recessed level pot over a range from -60 to +18dBm. Nominal operating levels are 0dBm input and +10dBm output. Higher operating levels can cut dynamic range by operating too close to the clipping point. Adjust each output to the desired level, keeping clipping in mind.

## Connections

The units are primarily designed for balanced inputs and outputs. If desired, you may jumper select the audio ground reference by installing shorting jumpers on to the 3-pin headers next to each output. Shorting the middle pin to "IN" references the output ground to the INput's ground, while shorting the middle pin to "CH" references the output ground to CHassis ground. For further details, see the section on using active balanced circuitry in this manual.

If using a mono source (where audio appears ONLY on the left or the right, not dual mono), you may install shorting jumpers on JU1 (adjacent to the input RJ45 connector) in positions 4 & 5, and 6 & 7. Pin 7 is closest to the input RJ45 connector.

There are two parallel inputs, allowing a passive “loop-thru” input for a mission critical source, such as a transmitter or processor input. This way, if the distribution amplifier fails, audio can still pass through uninterrupted.

Although the outputs are short circuit protected, operating into less than a 600 ohm load is not recommended. The input is bridging (high impedance) and will not load down any source.

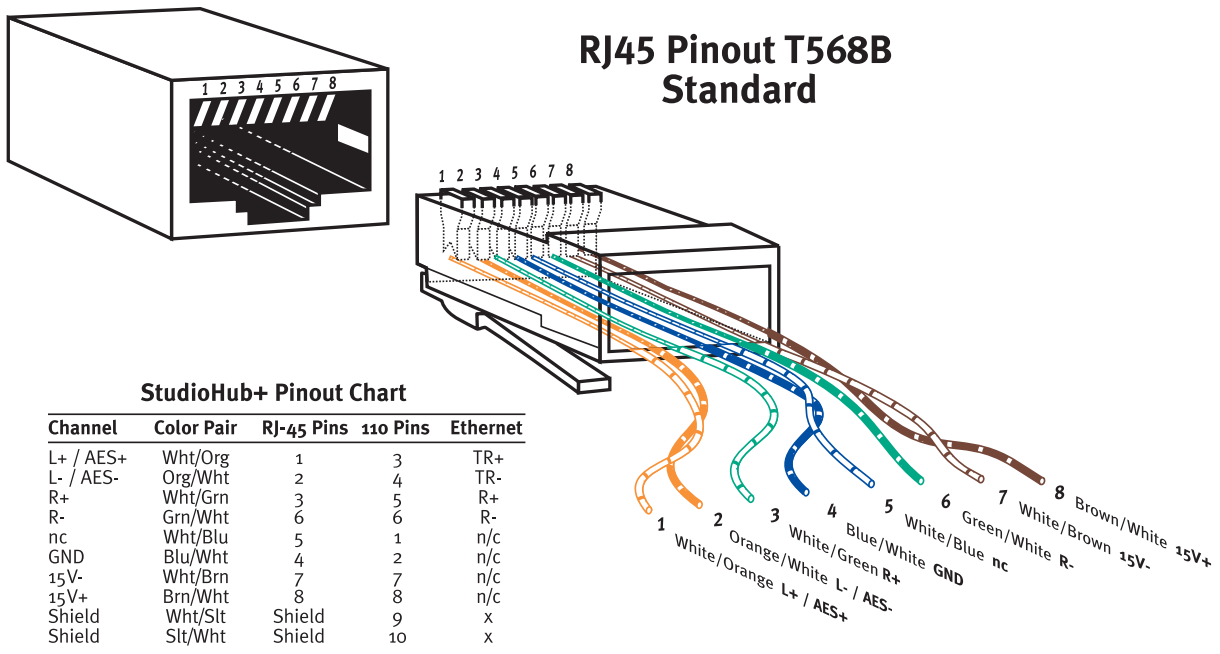
AC line voltage is user selectable from the lid of the cabinet by inserting a thin shafted screw driver through the vent holes to move the red line voltage selector switch to the left for 230V operation, and to the right for 110V operation (factory default).

## StudioHub+ Pinouts

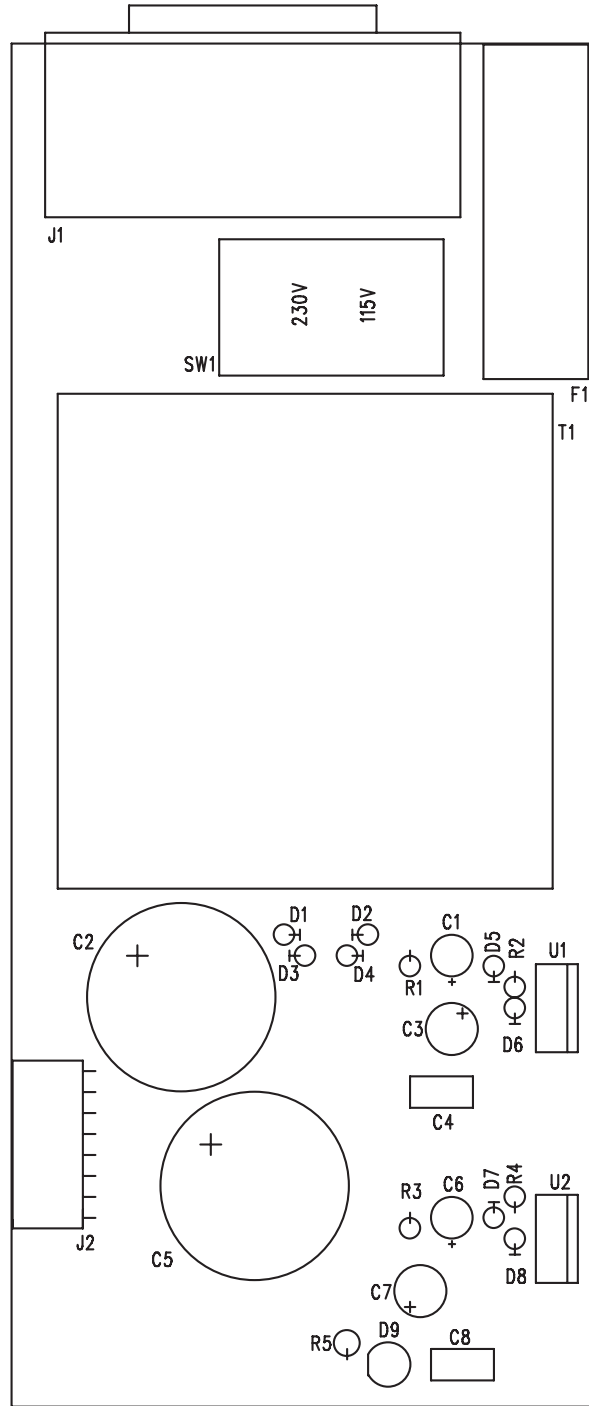
Pinouts on the RJ-45 input and output connectors follow the StudioHub+ wiring standard as shown below. Standard CAT-5 568B (straight through) shielded RJ-45 cables can be utilized.

Hundreds of additional cables and adapters conforming to this standard are available to interconnect your StudioHub+ 2x8 distribution amplifier.

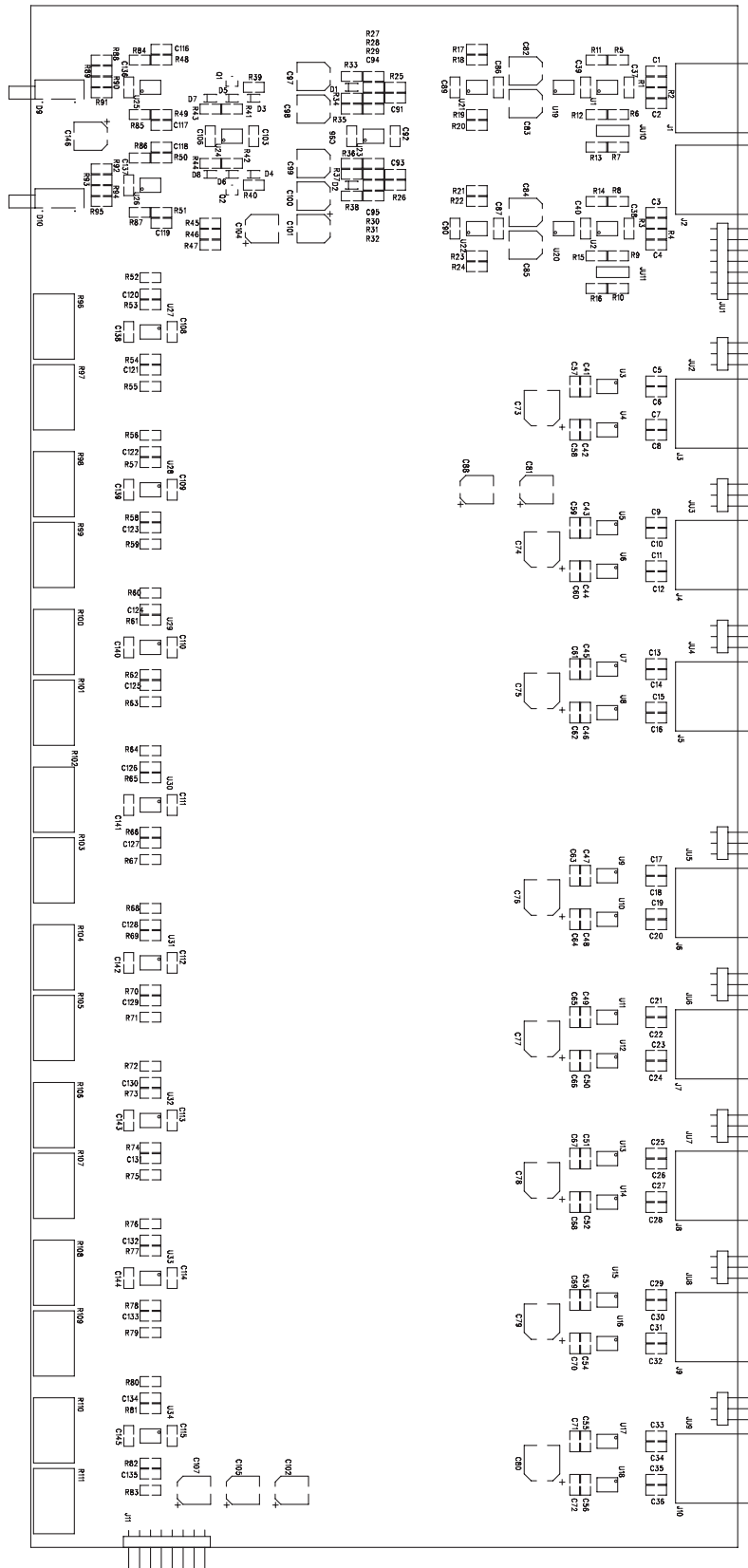
See [www.studiohub.com](http://www.studiohub.com) for more information.



# Parts Layout Power Supply



# Parts Layout Amplifier



## Parts List Power Supply

Part #	Qty.	Description	Reference Designation
16298	1	DA 4X4B POWER SUPPLY DETAIL	
1026	2	CAP 15UF 35V	C1;C6
10597	2	CAP 4700UF 35V	C2;C5
5744	2	CAP 100UF 25V RAD +/-20%	C3;C7
5743	2	CAP .1UF FILM	C4;C8
7012	8	DIODE 1N4005	D1;D2;D3;D4;D5;D6;D7;D8
10489	1	FUSE HOLDER	F1
10847	1	FUSE 0.3 AMP	F1
10491	1	IEC POWER CONNECTOR	J1
10490	1	SAMTEC 8 PIN FRT HEADER	J2
2831	1	RES 1K 1/2W 5%	R5
9585	2	RES 237 OHM 1/4W 1%	R2;R4
9582	2	RES 2.61K 1/4W 1%	R1;R3
10492	1	SWITCH POWER DPDT 110/220V	SW1
10788	1	TRANSFORMER DA TOROID	T1
1076	1	VR LM337T	U2
1077	1	VR LM317T	U1
10683	1	LED 3MM GREEN HIGH CURRENT	D9



## Parts List Amplifier

Part #	Qty.	Description	Reference Designation
12986	1	SH+ STEREO 1X8 DA DETAIL	
16019	26	RES SMT 1.0K 1/8W 1%	R1-R4;R11;R12;R14;R15;R35;R36;R52;R55;R56;R59 R;60;R63;R64;R67;R68;R71;R72;R75;R76;R79;R80;R83 R41;R42
16021	2	RES SMT 100K 1/8W 1%	R48-R51; R86-R87
16040	6	RES SMT 1.00M OHM 1/8W 1%	R33; R38-R40; R45; R88-R95
14424	13	RES SMT 2.2K	R5;R6;R8;R9
16074	4	RES SMT 20.0K OHM 1/8W 1%	R13;R16
16022	2	RES SMT 221 OHM 1/8W 1%	R34;R37;R43;R44
16352	4	RES SMT 3.32K OHM 1/8W 1%	R17-R32; R46;R47
16351	18	RES SMT 5.11K OHM 1/8W 1%	R53;R54;R57;R58;R61;R62;R65;R66;R69;R70;R73;R74; R77;R78;R81;R82
16419	16	RES SMT 7.32K OHM 1/8W 1%	R7;R10
16353	2	RES SMT 931 OHM 1/8W 1%	C91;C93
16347	2	CAP SMT .0022PF 50V CERM	C1-C4; C94;C95
16151	6	CAP SMT 330PF 50V CERM	C5-C36; C120-C135
16374	48	CAP SMT 68PF	C82-C85; C97-C100
14750	8	CAP SMT 22UF 16V ELECT	C81;C88;C101;C102;C104;C105;C107;C146
14753	8	CAP SMT 100UF	C73-C80
16153	8	CAP SMT 100UF 50V ELECT	D1-D8
16512	8	DIODE SMT MMSD4148T1G	D9B;D10B
16356	2	LED SMT RED	D9A;D10A
16357	2	LED SMT GREEN	D9;D10
16348	2	LIGHT PIPE 3MM DUAL TOWER	Q1;Q2
16012	2	TRANSISTOR SMT MMBT4401	U3-U18
16383	16	IC SMT DIFFER. LINE DRIVER	U19;U20
16164	2	IC SMT DIFFER. LINE RECEIVER	U25;U26
16349	2	IC SMT LM358	U1;U2; U21-U24; U27-U34
16063	14	IC SMT NE5532D	R96-R111
10659	16	POT PIHER	J1-J10
11353	10	RJ45 RIGHT ANGLE SHIELDED	J11
10484	1	HEADER 8 PIN RIGHT ANGLE	JU10;JU11
7770	2	HEADER 3 PIN SINGLE ROW .1	JU2-JU9
16417	8	HEADER 3 PIN SAMTEC RT	JU1
16418	1	HEADER 7 PIN SAMTEC RT	JU1-JU11
5758	11	JUMPER PLUG .1	C37-C72; C86;C87;C89;C90;C92;C96;C103;C106; C108-C119;C136-C145
16005	66	CAP SMT .1UF 50V CERM	R84;R85
16514	2	RES SMT 10.0M OHM 1/8W 1%	

## Specifications

Frequency Response	+0, -.1dB 20Hz – 20kHz
Distortion THD + N	.002% over 20Hz – 20kHz, any output level from +4dBm to +24dBm (with 600 ohm load)
Distortion IMD SMPTE	.003% any output level from +4dBm to +24dBm (with 600 ohm load)
Distortion DIM	.002% any output level from +4dBm to +24dBm (with 600 ohm load)
Crosstalk	-105dB over 20Hz – 20kHz
Noise	102dB below +4dBm output level unity gain measurement bandwidth 20 Hz - 20kHz with 600 ohm input and output termination
Maximum input	+28dBm
Maximum output	+25dBm (with 600 ohm load)
Headroom	21dB above +4dBm output (with 600 ohm load)
Dynamic Range	123dB
Maximum Gain	jumper selectable for: 16dB, 26dB, or 36dB
CMRR	-50dB over 20Hz – 20kHz
Input Impedance	40k ohms
Output Impedance	60 ohms
LED Audio Input Indicators	-24dBm input level audio present trip point +24dBm input level audio overload trip point

## Using Active Balanced Circuitry

Balanced lines have been used for many years and are in continuing use today because of their immunity to stray pickup. Induced signals appear on both sides of the balanced line. The receiving end of the balanced line responds only to the difference voltage between the lines which is the desired signal. Induced signals are common to both and are balanced out.

Transformers have been the mainstay of balanced circuitry for decades. Unfortunately, transformers cause distortion and ringing, and are susceptible to magnetic flux pickup. Further, good quality audio transformers are very expensive.

The use of op-amp balanced circuitry has the advantage of transformers without the disadvantages. The only caveat is that careful wiring practices are more important with active balanced than with transformers.

Active balanced outputs and inputs use three wires: +, -, and ground. The + and - terminals are both driven and neither should ever be connected to ground. For best performance, a three-conductor shielded wire should be used. The third wire completes the ground circuit. The shield should be connected to the ground at one end of the wire only. If a two-wire shielded cable is used, it is important that a ground connection be made between the sending and receiving units. A ground circuit through equipment chassis or through three-prong AC cord ground is also acceptable.

Single-ended audio interconnections lack the interference immunity of balanced hook-ups. For the reason, keep unbalanced connections short, direct, and well separated from AC power wires. To drive a single-ended load from an active balanced source, use coaxial wire: + to center conductor and ground to shield, leaving the - output unconnected. To feed an active balanced input from a single-ended source, use coaxial wire, connecting the hot center conductor to +. Connect the shield to ground and put a jumper from ground to -.

When driving an active balanced input from a transformer balanced floating source, use two conductor shielded wire. Ground the shield at the source end. Establish good ground between the chassis either directly or through AC plug ground prongs. At the load, connect the + lead to the + input and the - lead to the - input. Put two 300 ohm resistors in series between the + input and the - input and connect their mid-point to the load ground. This correctly terminates the source output transformer for optimum frequency and transient response (freedom from ringing) and provides a low impedance return path for leakage and induced hum. If more than one active balanced load is to be placed across a floating balanced transformer source, install this resistive termination once only. From that location to the active balanced loads, run three-conductor shielded wire, shield continued from the sources chassis, + from +, - from -, and ground from the mid-point of the terminating resistors.

To drive a balanced floating transformer load from an active balanced source, use shielded wire. Connect the shield to source ground and leave the shield open at the load end. Connect + to + and - to -, and establish a good source ground to load chassis connection, either through a third wire in the interconnect cable or through chassis contact or AC cord third wire ground.

Interconnections between pieces of stereo equipment require doubling the

connections described above without duplicating the ground connection. Between pieces of active balanced stereo equipment, then, 5 shielded conductors should be run.

When testing active balanced equipment with single ended test equipment, do not connect the - to test equipment ground. Most modern test equipment provides balanced inputs. In many dual-trace oscilloscopes, balanced signals may be displayed by running the two inputs in the "add" mode with one input switched to invert. To perform a test with single-ended equipment, + and - outputs must be tested independently and their results added. Testing only a single output results in a 6 db loss in output level.

The active balanced equipment interconnection format makes possible state of the art fidelity. Careful attention to detail and conservative practice will be rewarded with outstanding flat frequency response, low distortion, and wide dynamic range.

## Warranty

Radio Systems warrants this equipment to be free from defects in materials and workmanship for a period of one (1) year.

This warranty extends to first users of the product and future owners who purchase the product within the warranty period.

The terms of this warranty are null and void if this product is stored or operated in an environment not conducive to electronic equipment, or shows signs of misuse or modifications which affect the proper functioning of the product. This warranty does not apply to damage caused by fire, smoke, flood, lightning, or acts of nature and physical abuse.

Radio Systems, and its associated companies, authorized distributors, and personnel are not liable for loss of revenues or other damages or effects to the broadcast signal quality or coverage which may result from the improper functioning of this product.

## Repair Policy

Technical assistance is available at any time, at no charge, by phone or correspondence.

During the warranty period, there will be no charge for parts or service made to units which show no sign of misuse by customer or lightning caused damage. The customer is responsible for the cost of shipping their unit back to Radio Systems for repair.

During the warranty period, shipment of small parts and assemblies may also be made at a charge to the user. Emergency shipments of replacement parts and circuits will be made at the user's request for an extra shipping and service charge. Chargeable services will be made COD or on Net-30 day terms to users with established accounts.

During the warranty period, full credit or return of COD charges (less any service and expedited shipping charges) will be made to users who return the defective parts or circuits within 30 days, if the damage is covered under the terms of the warranty.

## Return Instructions

Contact Radio Systems at 856-467-8000 for a return authorization number.

Pack all items carefully and ship pre-paid, via UPS insured, to:

Radio Systems  
601 Heron Drive  
Logan Township, NJ 08085

Attn: R.A.# \_\_\_\_\_

Enclose a note which includes your name, company, phone number, the serial number, return address (no box numbers), and a complete description of the problem.





For Assy:  
Part# DA-2x8SH  
11/07



601 Heron Drive  
Logan Township, NJ 08085  
Phone: 856-467-8000 Fax: 856-467-3044  
<http://www.radiosystems.com>