

307 Dual Isolation Transformer

307



User's Guide

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307

 **Symetrix**

Congratulations on your purchase of the Symetrix 307 Dual Isolation Transformer. The 307 is a two-channel isolation transformer intended for use in solving interface problems which require galvanic isolation between source and load. The 307 provides two high-quality line isolation transformers in a convenient half-rack enclosure.

Transformers have a bad reputation in modern audio systems. Years ago, *everything* was transformer coupled; mostly because that was the *only* way to couple a tube to a 600-ohm load. Of course, tubes are now an alternative amplification device, and most solid-state units are direct coupled to the load, be it 600-ohms or an open circuit. By doing away with transformers, we've extended the bandwidth and lowered the distortion of our systems. Unfortunately, we've also made our systems more susceptible to circulating ground currents. For ground-isolation problems, especially those that involve circulating currents in the ground system, a transformer is the preferred method of solving the problem.

Another use for a transformer is connecting balanced outputs with unbalanced inputs. Most transformerless outputs emulate a grounded center-tapped transformer. This puts half the output voltage swing on pin 2 and half on pin 3. For unbalanced loads, you generally ignore one of the two signals, which is fine, but it just cost you 6 dB in output level. Going through a patchbay is even more difficult, as you want

both output pins for a balanced load, and you want to be able to float pin 3 for unbalanced loads. In most patch bays, this is difficult or impossible. A transformer between the balanced output and the patchbay solves this neatly. You can ground either side for driving unbalanced loads and everything works as planned. Life is grand.

The 307's inputs and outputs use Euroblock connectors which accept bare wires (screw terminals with a twist). Separate connections are provided for each internal circuit ground as well as the chassis. Each channel also has a ground lift switch that allows easy separation of the input and output ground systems. The 307 operates at +4dBu signal levels.

We recommend that you read this manual from cover to cover. Somewhere between the confines of the two covers you should find the answers to most (98%) of your questions. If you're in a hurry (like most of us) skip ahead to Section 3, "Fast Setup." This section will help you get connected, and send you on your way.

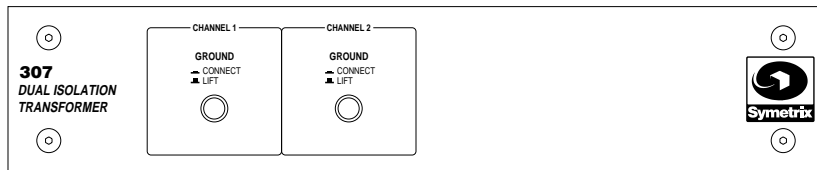
Should you have any comments or questions, please do not hesitate to contact us. Your calls and e-mail are always welcome.

Phone: (425) 787-3222

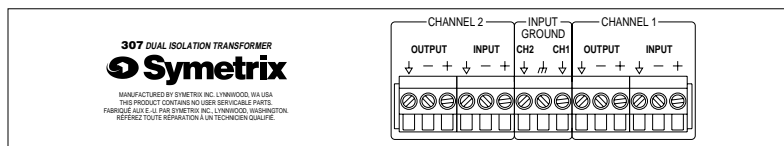
Fax: (425) 787-3211

Email: symetrix@symetrixaudio.com

Website: www.symetrixaudio.com



Front panel



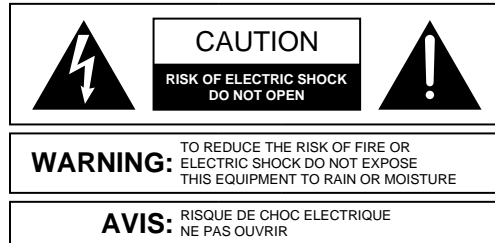
Rear panel



The information in this summary is intended for persons who operate the equipment as well as repair personnel. Specific warnings and cautions are found throughout this manual wherever they may apply.

The notational conventions used in this manual and on the equipment itself are described in the following paragraphs.

Equipment Markings



SEE OWNERS MANUAL. VOIR CAHIER D'INSTRUCTIONS.
 No user serviceable parts inside. Refer servicing to qualified service personnel.
 Il ne se trouve a l'interieur aucune piece pouvant etre reparaee l'usager.
 S'adresser a un reparaateur competent.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user of the presence of uninsulated “dangerous voltage” within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the 307 (i.e. this manual).

Note The 307 is a completely passive device and there is no AC power (or DC power for that matter) inside the enclosure. Consequently there is no shock hazard involved in the equipment itself. If the equipment used with the 307 is not grounded properly or is improperly connected to the AC line, then the possibility of a shock hazard becomes quite real.

Caution *To prevent electric shock, do not use the polarized plug supplied with your pieces of audio equipment with any extension cord, receptacle, or other outlet unless the blades can be fully inserted to prevent blade exposure.*

Operating location - Do not operate this equipment under any of the following conditions: explosive atmospheres, in wet locations, in inclement weather, improper or unknown AC mains voltage, or if improperly fused.

Stay out of the box - To avoid personal injury or injury to others, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

Terms

Several notational conventions are used in this manual. Some paragraphs may use **Note**, **Caution**, or **Warning** as a heading. Certain typefaces and capitalization are used to identify certain words. These are:

Note Identifies information that needs extra emphasis. A **Note** generally supplies extra information to help you to better use the 307.

Caution *Identifies information that, if not heeded, may cause damage to the 307 or other equipment in your system.*

Warning **Identifies information that, if ignored, may be hazardous to your health or that of others.**

CAPITALS Controls, switches or other markings on the 307's chassis.

Boldface Strong emphasis.

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This section discusses a variety of topics, all related to getting signals in and out of the 307 and getting on with using it.

I/O Connections

All input and output connections use screw-type connectors. The connectors are modular and may be detached from the unit for installation or for servicing. These connectors are designed for use with bare wire; tinning is not necessary for stranded conductors.

Connect your sources to the rear-panel input connectors. These connectors may be driven from a balanced or unbalanced, low-impedance source. When using an unbalanced source, you can connect the output minus terminal to ground either at the source or at the 307.

Connect the outputs as required. These connectors deliver a floating balanced output signal. For unbalanced use, connect the output minus terminal to circuit ground at the 307 or at the load. For unbalanced output use, you may want to ignore circuit ground and just use the plus and minus terminals. In this way, the two ground systems are completely isolated.

[See Appendix 1 on page 10.]

Grounding

You have several options:

1. Connect the source and load ground systems together.
2. Separate the source and load ground systems.
3. Connect circuit ground and chassis ground together.
4. Separate circuit ground and chassis ground.

The number one consideration for each of these decisions is whether or not your system hums when the grounds are connected together.

Source Impedance

The Achille's heel of any transformer is high levels at low frequencies. The transformers in the 307 perform best when driven from a low source impedance, preferably 150-ohms or less.

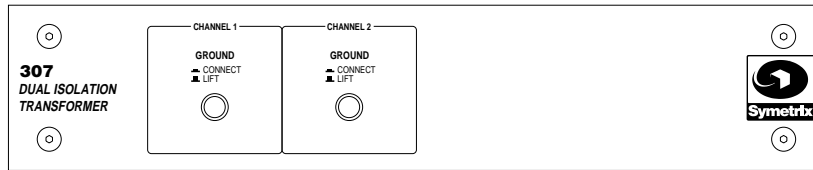
When driven from a 600-ohm source, the 307's performance is still quite acceptable and it improves when the transformer's secondary winding is terminated in 600 ohms.

The difference between 50-ohms source impedance and 600-ohms source impedance is:

50-ohm source, 0 dBu, 20Hz THD+N < .5%.

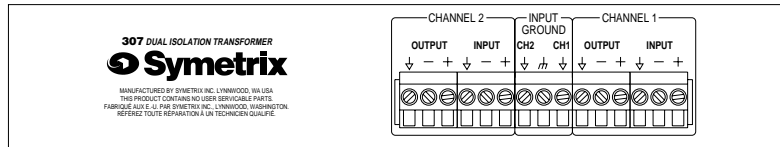
600-ohm source, 0 dBu, 20Hz THD+N < 1%





GROUND switches

Push switches (one per channel) that separate the input and output ground systems from each other.



CHANNEL 1 & 2 connections

Each input and output has three connections: circuit common (shown as a ground symbol), minus and plus audio connections.

All of the circuit common symbols are connected together when the front-panel ground switch is set to the **CONNECT** (in) position. When the ground switch is set to the **LIFT** (out) position, the input and output ground systems are separate.

The input terminals are designed to be driven from a low-impedance source, 600-ohms or less (preferably less). Note that the source impedance is generally much lower than the minimum rated load impedance for an output.

INPUT GROUND

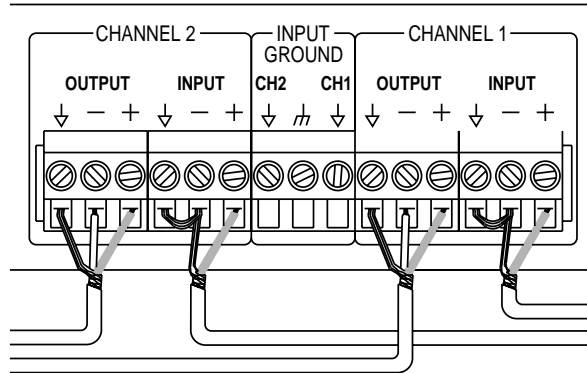
The input ground connections are also available in this block. You can use the extra connections to connect the input ground to the chassis ground.

The chassis ground connection uses a different sort of ground symbol. It connects to the metal enclosure that surrounds the unit.

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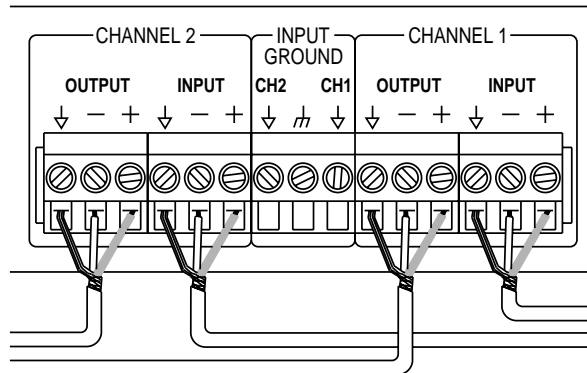
Converting an Unbalanced Source

In this application, the 307 balances the output of an unbalanced source by mirroring the impedance of the load back to the source. For this reason, it is important that the 307 be driven from a low source impedance, preferably less than 600 ohms. This means that the 307 should not be used as a direct box. The Figure to the right shows the connections. Start with the GROUND LIFT switches in the “in” position, and lift the ground only if necessary.



Isolating the Ground Systems

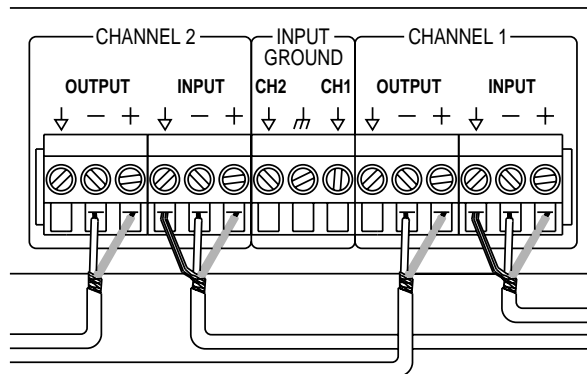
In this application, the ground systems on each side of the 307 are not compatible. This means that when you try to interconnect them, the usual result is hum. In the past, it was fairly commonplace to simply lift the power line ground of one of the pieces of equipment, and this was often sufficient to quiet the system. For safety reasons, this is very poor practice, and an audio isolation transformer such as the 307 is a much better solution. The Figure to the right shows the connections. Ensure that the GROUND LIFT switches are in the LIFT position.



Driving an Unbalanced Load

In this application, the source is electronically balanced and the load is unbalanced, and there is a fair amount of cable between them. For a variety of reasons, it is impractical to float the low side of the source when driving this load. Another reason is that the load is off somewhere in the building, and simply bringing the unbalanced input back to the source is likely to cause hum.

Here we use the 307 to derive a floating output signal that is free of the ground system. You can locate the unit either at the source or at the load. In most cases, locating it at the load is probably better. The Figure above shows the connections. Since we’re ignoring the output ground connections, the setting of the GROUND LIFT switches is immaterial.



Troubleshooting Chart

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>
Hum or buzz in output	Check input and output connector wiring. Ground loop: check related system equipment grounding. Are all system components on the same AC ground? Is the 307 in close proximity to a large hum field (such as a power amp)?
Distortion	Check input signal. Is it too hot, or is it already distorted? Check the output loading. It should be above 600 ohms. Is the input of the device following the 307 clipping? Is the input of the device following the 307 a line-level input (it should be)? Is something else clipping?

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Architects and Engineers Specifications

The transformer isolation box shall be a two channel model that offers hum and noise elimination, and grounding solutions for audio equipment interconnection. The unit shall occupy one-half rack space (1/2 rack).

There shall be one ground lift switch per channel on the front panel that connects or disconnects the input ground to the output ground. The rear panel shall offer all input and output connections on removable euro-block style screw terminal connectors. There shall also be terminals to allow the user to connect circuit ground to chassis ground.

Total Harmonic Distortion shall be no greater than 0.07% (50Hz at 21dBu, low-Z input, high-Z load). The unit shall be a completely passive device and require no power, AC or battery, for operation.

The unit shall be a Symetrix 307 Dual Isolation Transformer.

Specifications

Input/Output	
Maximum Input Level	+22dBu Balanced
CMRR	>80dB @ 60Hz
Performance Data	
Frequency Response	20Hz to 20kHz, +/-0.5dB
THD	<.07%, 50Hz at 21dBu, low-Z input, high-Z load
Insertion Loss	<3dB, 600 Ohm load
Connections	
Input	Euroblock
Output	Euroblock
Physical	
Size (hwd)	½ rack unit
	1.75 x 8.5 x 6.5 in., 4.445 x 21.59 x 15.875 cm.
Shipping Weight	4.5 lbs
Electrical	
No Power Requirements	

In the interest of continuous product improvement, Symetrix, Inc. reserves the right to alter, change, or modify these specifications without prior notice.

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 **Symetrix**

307 Limited Warranty

Symetrix, Inc. expressly warrants that the product will be free from defects in material and workmanship for one (1) year. Symetrix's obligations under this warranty will be limited to repairing or replacing, at Symetrix's option, the part or parts of the product which prove defective in material or workmanship within one (1) year from date of purchase, provided that the Buyer gives Symetrix prompt notice of any defect or failure and satisfactory proof thereof. Products may be returned by Buyer only after a Return Authorization number (RA) has been obtained from Symetrix. Buyer will prepay all freight charges to return the product to the Symetrix factory. Symetrix reserves the right to inspect any products which may be the subject of any warranty claim before repair or replacement is carried out. Symetrix may, at its option, require proof of the original date of purchase (dated copy of original retail dealer's invoice). Final determination of warranty coverage lies solely with Symetrix. Products repaired under warranty will be returned freight prepaid by Symetrix via United Parcel Service (surface), to any location within the Continental United States. At Buyer's request the shipment may be returned via airfreight at Buyer's expense. Outside the Continental United States, products will be returned freight collect.

The foregoing warranties are in lieu of all other warranties, whether oral, written, express, implied or statutory. Symetrix,

Inc. expressly disclaims any IMPLIED warranties, including fitness for a particular purpose or merchantability. Symetrix's warranty obligation and buyer's remedies hereunder are SOLELY and exclusively as stated herein.

This Symetrix product is designed and manufactured for use in professional and studio audio systems and is not intended for other usage. With respect to products purchased by consumers for personal, family, or household use, Symetrix **expressly disclaims all implied warranties, including but not limited to warranties of merchantability and fitness for a particular purpose.**

This limited warranty, with all terms, conditions and disclaimers set forth herein, shall extend to the original purchaser and anyone who purchases the product within the specified warranty period.

Warranty Registration must be completed and mailed to Symetrix within thirty (30) days of the date of purchase.

Symetrix does not authorize any third party, including any dealer or sales representative, to assume any liability or make any additional warranties or representation regarding this product information on behalf of Symetrix.

This limited warranty gives the buyer certain rights. You may have additional rights provided by applicable law.

Limitation of Liability

The total liability of Symetrix on any claim, whether in contract, tort (including negligence) or otherwise arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair, replacement or use of any product will not exceed the price allocable to the product or any part thereof which gives rise to the claim. In no event will Symetrix be liable for any incidental or

consequential damages including but not limited to damage for loss of revenue, cost of capital, claims of customers for service interruptions or failure to supply, and costs and expenses incurred in connection with labor, overhead, transportation, installation or removal of products or substitute facilities or supply houses.

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Servicing the 307

If you have determined that your 307 requires repair services and you live *outside* of the United States, please contact your local Symetrix dealer or distributor for instructions on how to obtain service. If you reside in the U.S. then proceed as follows:

Before sending anything to Symetrix, contact our Customer Service Department for a return authorization (RA) number. The telephone number is (425) 787-3222, Monday through Friday, 8AM (800 hours) though 4:30 PM (1630 hours) Pacific Time.

At the Symetrix factory, Symetrix will perform in-warranty or out-of-warranty service on any product it has manufactured for a period of five years from date of manufacture.

In-warranty Repairs

To get your 307 repaired under the terms of the warranty:

1. Call us for an RA number.
2. Pack the unit in its original packaging materials.
3. Include your name, address, daytime telephone number, and a brief statement of the problem.
4. Write the RA number on the outside of the box.
5. Ship the unit to Symetrix, freight prepaid.

We do *not* accept freight collect shipments.

Repairs made in-warranty will cost you only one-way freight charges. We'll prepay the return (surface) freight.

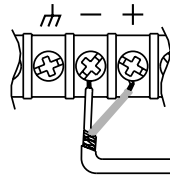
If you send us your product in substandard packaging, we will charge you for factory shipping materials. If you don't have the factory packaging materials, please use an oversized carton, wrap the unit in a plastic bag, and surround it with bubble-wrap. Pack the box full of Styrofoam peanuts. Be sure there is enough clearance in the carton to protect the rack ears (you wouldn't believe how many units are returned with bent ears). We will return the unit in Symetrix packaging. Of course, if the repair is due to operator error, parts and labor will be charged. In any event, if there are charges for the repair costs, you will pay for the return freight. All charges will be COD unless you have made other arrangements (prepaid, Visa or Mastercard).

Out-of-warranty Repairs

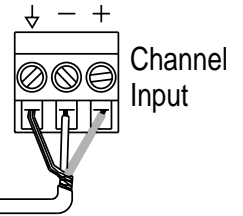
If the warranty period has passed, you'll be billed for all necessary parts, labor, packaging materials, and freight charges. Please remember, you must call for an RA number before sending the unit to Symetrix.

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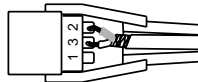
Balanced Terminal Strip
 (When Using CHASSIS Ground)
 (Wire Shield Not Connected)



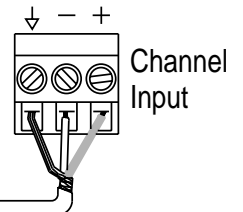
Two Conductor
Shielded Cable



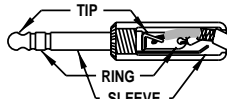
Balanced Female XLR
 (When Using CHASSIS Ground)
 Pin 1=Not Connected
 Pin 2 = High
 Pin 3 = Low
 Shield Tab = Not Connected



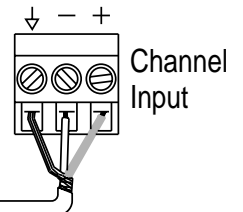
Two Conductor
Shielded Cable



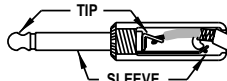
TRS Plug
 (When Using CHASSIS Ground)
 Tip = High
 Ring = Low
 Sleeve = Not Connected
 (Wire Shield Not Connected)



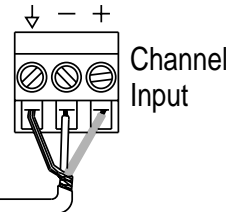
Two Conductor
Shielded Cable



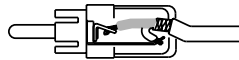
TS Plug
 (When Using CHASSIS Ground)
 Tip = High
 Sleeve = Low
 (Wire Shield Not Connected)



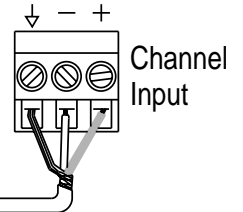
Two Conductor
Shielded Cable



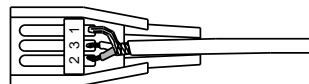
RCA Plug
 (When Using CHASSIS Ground)
 Tip = High
 Sleeve = Low
 (Wire Shield Not Connected)



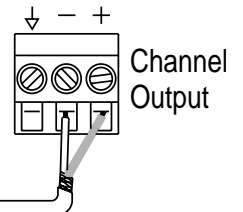
Two Conductor
Shielded Cable



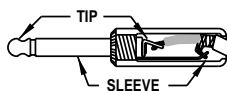
Balanced Male XLR
 (When Using CHASSIS Ground)
 Pin 1= Circuit Ground
 Pin 2 = High
 Pin 3 = Low
 Shield Tab = Not Connected



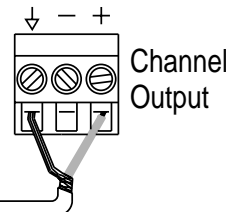
Two Conductor
Shielded Cable



TS Plug
 (When Using CIRCUIT Ground)
 Tip = High
 Sleeve = Shield



One Conductor
Shielded Cable



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Declaration of Conformity

We, **Symetrix Incorporated**,
14926 35th Ave. West, Lynnwood, Washington, USA,
declare under our sole responsibility that the product:

307 Dual Isolation Transformer

to which this declaration relates,
is in conformity with the following standards:

EN 60065

Safety requirements for mains operated electronic and related apparatus for household and similar general use.

EN 50081-1

**Electromagnetic compatibility - Generic emission standard
Part 1: Residential, commercial, and light industry.**

EN 50082-1

**Electromagnetic compatibility - Generic immunity standard
Part 1: Residential, commercial, and light industry.**

The technical construction file is maintained at:

Symetrix, Inc.

14926 35th Ave. West
Lynnwood, WA, 98037-2303
USA

The authorized representative located within the European Community is:

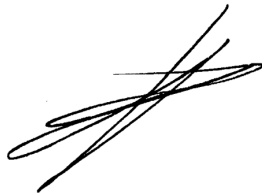
World Marketing Associates

P.O. Box 100
St. Austell, Cornwall, PL26 6YU, U.K.

Date of issue: October 15, 1998

Place of issue: Lynnwood, Washington, USA

Authorized signature:



Dane Butcher, President, **Symetrix Incorporated**.

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 **Symetrix**



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