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Quick Start Guide

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Pre-Installation

This section describes safety conventions used within this document and provides essential information about the **Model LVC 5050** amplifier. Review this material before installing or operating the amplifier.

AE TECHRON is committed to continuous product improvement. Technical progress may result in minor variations between this manual and a particular unit. Any significant changes or customizations will be reflected in revisions of this manual. Customers are encouraged to promptly add any additional information, about their particular unit, to this manual.

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Safety Conventions

The **LVC 5050** amplifier is a highly sophisticated instrument. Special hazard alert instructions appear throughout this guide. Note the following examples:



DANGER

DANGER represents the most severe hazard alert. Extreme bodily harm or death will occur if these guidelines are not followed. Note the explanation of the hazard and instructions for avoiding it.



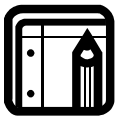
WARNING

WARNING alerts you to hazards which could result in severe injury or death. Note the explanation of the hazard and the instructions for avoiding it.



CAUTION

CAUTION indicates hazards which could result in potential personal injury or equipment or property damage. Once again, note the explanation of the hazard and the instructions for avoiding it.



NOTE: A Note represents information, which needs special emphasis but does not represent a hazard.

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General Description

The ***AE TECHRON*** **Model LVC 5050** is a dual channel power supply amplifier designed for use in high power systems. It can deliver up to 2,500 watts per channel into 2-ohm loads or 5,000 watts bridged into a single 4-ohm load. It accomplishes this with extremely low harmonic and intermodulation distortion and low noise.

All this power is concentrated into a 5-inch rack mount package. From the front panel, you can control and monitor the input signals.

- A push button power switch activates an **AMBER "ON"** indicator.
- Dual brightness indicator—dim indicates signal presence, bright indicates amplifier is in OVERLOAD.
- Dual color (**RED** and **GREEN**) LED indicators show current limit and load current.

On the back panel:

- Input is connected using bare wires.
- Loads connect to a unique output block, which combines heavy duty binding bolts and dual banana connectors.
- A detachable cover on the output block protects against accidental short circuits and dangerous electrical shock.

Other features include the ability to:.

- Switch from Dual mode to Bridge Mono or Parallel Mono mode with a 3-position slide switch.
- Select three different gain values for either channel with two more 3-position slide switches.

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Specifications

Specifications are for units in Dual Mode driving both channels into 8-ohm loads, (26 dB = 20 times voltage gain) and operating from 120 VAC, unless otherwise specified.

“Standard 1 kHz Power" refers to maximum average power in watts at 1 kHz with 0.1% THD.

“Full Bandwidth Power" refers to maximum average power in watts from 20 Hz to 20 kHz with 0.1% THD.

Performance

Frequency Response: ± 0.1 dB from 20 Hz to 20 kHz at 1 watt.

Phase Response: ±10° from 10 Hz to 20 kHz at 1 watt.

Signal to Noise Ratio: At 26-dB gain, better than 105 dB (A-weighted) below full output.

Total Harmonic Distortion (THD): <0.05% from 20 Hz to 1 kHz, increasing linearly to 0.1% at 20 kHz at full output.

I. M. Distortion: <0.05% from 410 milliwatts to full output at 26-dB gain, with an 8-ohm load.

Slew Rate: >30 V per microsecond.

Load Impedance: Rated for 16, 8, 4, 2-ohm use. Safe with all types of loads, even reactive ones.

Required AC Mains: 60 Hz, 120VAC with 30A service. Convertible to 100/ 200/208/230/240VAC at 50/60 Hz.

Maximum Load: 250 Volts RMS, no load conditions.

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Controls

Front Panel: A push "On/Off" power switch; also, a signal level control for each channel. The level controls are wired to the PIP card and may be enabled or disabled.

Back Panel: A 3-position switch selects Dual, Bridge-Mono, or Parallel- Mono mode. A 3-position switch selects 20, 70, or 140 voltage gain for each channel.

Internal: Switches behind the front grill allow selection of normal VZ operation, lock to low voltage only, lock to high voltage only, and lock to low voltage under ODEP conditions.

Indicators

Amber Enable Indicator shows on/off status of low-voltage power supply.

A Green OVERLOAD indicator for each channel flashes dim green to show a signal is present at the input, and flashes brightly in the rare event distortion of any kind exceeds 0.05%, including input overload.

A bi-color (Green/Red) I_{LOAD}/I_{LIMIT} indicator for each channel flashes green with the output signal (when under a current load) and flashes red in the event of current limiting.

Input/Output

Input Impedance: Greater than 10 K ohms, balanced, and 5 K ohms, unbalanced.

Output Impedance: Less than 10 milliohms is series with less than 2 microhenries.

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Connectors

Inputs: Euro-style screw terminals will accept up to 16 gauge bare wire.

Outputs: Unique output bus with dual banana jacks on 3/4 inch centers, and high current ring or spade lug barrier connectors.

AC Line: "TT" style, 3 wire, 30A grounded connector (for 120 VAC units).

Construction

Black splatter-coat steel chassis with specially designed flow-through front to rear ventilation system with computer-controlled forced air-cooling.

Dimensions: 19 inch (48.3 cm) wide, 5.25 inch (13.3 cm) high, 16 inch (40.3 cm) deep behind front mounting surface, and 2.875 inches (7.3 cm) in front of the mounting surface.



NOTE: Allow 4 inches in back for adequate airflow.

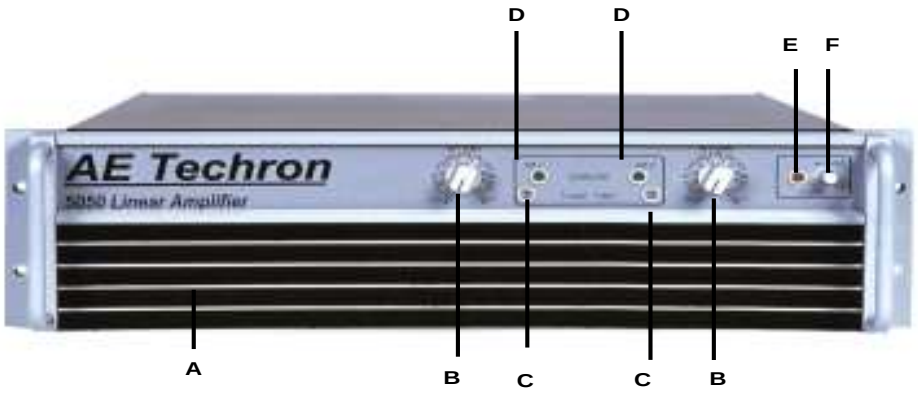
Weight: 77 lbs. (35.2 kg) net, 88 lbs. (40.2 kg) shipping weight.

Mounting: Standard BIA 310 front-panel rack mount with supports for supplemental rear corner mounting.

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Front Panel Functions

The following illustration, with captioned call-outs, provides a visual location of the **LVC 5050** front panel functions.



A. Dust Filters

The dust filters remove large particles from the air drawn in by the cooling fans. Check the filters regularly to prevent clogging. The filter elements can be easily removed for cleaning by gently pulling them away from the front panel.

B. Level Control

The output level for each channel is set with these controls. Each control has 31 detents for precise adjustment.

C. I_{Load}/I_{Limit} Indicators

The flow of current to the load and the maximum current limit of the amplifier are monitored by these two-color indicators. The **I** $_{Load}$/**I** $_{Limit}$ indicators glow green to show that load current is flowing and turn off when there is no significant load current. The **I** $_{Load}$/**I** $_{Limit}$ indicators turn red if the amplifier has reached its maximum output current capacity.

D. Overload Indicators

When a large input signal causes an input overload or output clipping, these green indicators flash *brightly* with a 0.1 second hold, otherwise, they indicate the presence of a distortion-free signal.

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E. Power Indicator

This amber indicator lights when the amplifier is connected to AC power and turned “ON”.

F. Power Switch

This push button is used to turn the amplifier “ON” and “OFF”. When turned on, the output is muted for about four seconds to protect your system from start-up transients.

Back Panel

The following illustration, with captioned call-outs, provides a visual location of the **LVC 5050** back panel functions.



G. Power Cord

Units set up for 100 to 120 VAC have a 10 AWG, 30 amp line cord, while units set up for 200 to 240 VAC have a 12 AWG, 20 amp line cord. North American units set up for 120 VAC, 60 Hz power are shipped with a grounded 125 volt, 30 amp NEMA TT30P plug; units shipped outside North America are provided without a plug.

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H. Output Connectors

This high-current output block is provided for output connection. Its connectors accept banana plugs, spade lugs or bare wire. There is a detachable output cover (not shown) used to protect against accidental short circuits and dangerous electrical shock.

I. Parallel Mono/ Stereo/ Bridge Mono

This switch is used to select one of three- output modes; Parallel Mono, Stereo or Bridge Mono.



WARNING

The amplifier should be "Off" for at least 10 seconds before changing this switch

J. Gain Switches

These three-position switches are used to select a voltage gain of 20,70 or 140 times for each channel.

K. Input Plug-in Module

The versatility of plug-in modules make it easy to customize the input, and other functions of the amplifier, to your needs.



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Details of the Plug In Module

Pin	Function
1,2,	Available for additional features
3,4	Standby, When Pins 3 and 4 are shorted output section of amplifier forced into standby.
5	Ground pin for use with pins 6, 7, and 8
6	Voltage monitor, will have 1/20th of voltage at output of Channel 2. Pin 6 is inactive when amplifier is used in either mono mode.
7	Current monitor, will have 1 volt for every 4 amps of current at output of Channel 2, pin is inactive when amplifier is used in either mono mode.
9-11	Balanced input for Channel 2. Pins 9 or 11 can be connected to Pin 10 if an unbalanced input is desired. Pins 9 and 11 are not active when amplifier is used in either mono mode.
12	Ground pin for use with pins 13, 14, and 15.
13	Voltage monitor, will have 1/20th of voltage at output of Channel 1, when operated in 2 channel or Parallel Mono mode and 1/40th of the voltage when operated in Bridged Mono mode. Pin 13 is active in all modes of operation.
14	Current monitor, will have 1 volt for every 4 amps of current at output of Channel 1, when operated in 2 channel or Bridge Mono mode. When operated in Parallel Mono mode 1 volt for every 6 amps of output current. Pin 14 is active in all modes of operation.
16-18	Balanced input for Channel 1. Pins 16 or 18 can be connected to Pin 17 if an unbalanced input is desired. Pins 16 and 18 are active in all modes of operation.

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The CCPIP Input Card

Channel One Controls

VR8 Adjusts common mode rejection for balanced input on Channel 1.

VR1 Adjusts DC offset of Channel 1 of input card (measured at Pin 7 of U4)

VR3 Adjusts the Channel 1 soft clip circuit:

- ~ 15V (CW) No Clip
- ~8V (Center) Minimum Clip
- 0V (CCW) Max. Clip

VR10 Adjusts DC offset of Channel 1 of amplifier (measured at output of amplifier). Should be adjusted if gain of amplifier is changed.

JMPCC1

CV - Puts Channel 1 in Constant Voltage Mode
CC - Puts Channel 1 in Constant Current Mode
(CC or CV must be jumped for channel to operate)

CC1 - Constant Current compensation 1 for Channel 1 connects C 23 and R55

CC2 - Constant Current compensation 2 for Channel 1 connects C27 and R59

NOTE: C18 (Ch.1) C19 (Ch.2) - In parallel with compensation, controls stability and bandwidth when in Constant Current Mode

Channel 2 Controls:

VR9 Adjusts common mode rejection for balanced input on Channel 2

VR2 Adjusts DC offset of Channel 2 of input card (measured at Pin 7 of U3)

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VR4 Adjusts the Channel 1 soft clip circuit:

- ~ 15V (CW) No Clip
- ~8V (Center) Minimum Clip
- 0V (CCW) Max. Clip

VR6 Adjusts DC offset of Channel 2 of amplifier (measured at output of amplifier). Should be adjusted if gain of amplifier is changed.

JMPCC2

CV - Puts Channel 2 in Constant Voltage Mode
CC - Puts Channel 2 in Constant Current Mode
(CC or CV must be jumped for channel to operate)

CC1 - Constant Current compensation 1 for Channel 2 connects C24 and R53

CC2 - Constant Current compensation 2 for Channel 2 connects C26 and R61



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Installation

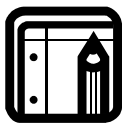
This section describes general guidelines for installing the **Model LVC 5050** amplifier with special emphasis on system installations.

Unpacking

Every ***AE TECHRON*** **Model LVC 5050** is carefully inspected and tested prior to leaving the factory. Carefully unpack and inspect the unit for damage in shipment. Besides the amplifier, you should find this manual and mounting hardware in the package.

1) Inspect the crating for **ANY** signs of damage.
   a. Make written notes of any damage for future reference.
   b. If damage is found notify the transportation company immediately
   c. Save the shipping carton and packing materials as evidence of damage for the shipper's inspection.
   d. If severe damage is apparent, **DO NOT** proceed until a representative of the shipping company is present.
2) Uncrate/unpack the amplifier
3) Save the packing materials for later use in transporting **or** shipping the unit.

AE TECHRON will cooperate fully in the case of any shipping damage investigation. In any event, replacement-packing materials are available from ***AE TECHRON***.



NOTE: Never ship this unit without proper packaging.

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Mounting

The **LVC 5050** is designed for standard 19-inch (48.3 cm) rack mounting and "stack" mounting without a cabinet. For optimum cooling and rack support, multiple units should be stacked directly on top of each other.



WARNING

To reduce the risk of *ELECTRIC SHOCK* or FIRE HAZARD, DO NOT expose the LVC5050 to rain or moisture.



CAUTION

Always support the back of the unit. Provide extra support if the unit will be transported.



Mounting Dimensions

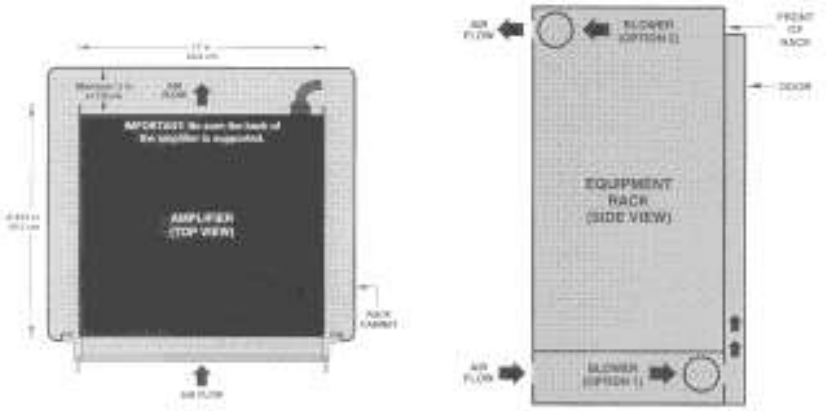
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Cooling

NEVER block the air vents in the front or back of the amplifier. These amplifiers **DO NOT** need to be mounted with space between them. If you must leave open spaces in a rack for any reason, close them with blank panels or poor airflow will result. Allow for airflow of at least 75 cubic feet (2.1 cubic meters) per minute per unit. Additional airflow may be required when driving low-impedance loads at consistently high output levels.

NOTE: Refer to Section 3 Applications for detailed information on thermal dissipation.

When mounting the amplifier in a rack cabinet, the back wall of the rack should be at least 3 inches (7.6 cm) away from the back of the amplifier chassis as shown below.



Rack Cabinet Cooling

If your rack has a door, provide adequate airflow by installing a grille in the door or by pressurizing the air behind the door. Wire grilles are recommended over perforated panels. A good choice for pressurizing the air behind the rack cabinet door is to mount a "squirrel cage" blower inside the rack (Option 1 above). Mount the blower so it blows outside air into the space between the door and front of the amplifiers, pressurizing the “chimney" behind the door. This blower should not blow air into or take air out of the space behind the amplifiers.

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Making Connections

Before beginning the installation of your amplifier, check the following:

- ✓ Remove all power from the unit. Do not have the AC cord plugged in.
- ✓ Turn input level control down (fully counter clockwise).

The input and output jacks are located on the back panel. Use care in making connections, selecting signal sources, and matching loads. During hookup take the following precautions:

1. **Use only shielded cable on inputs.** The higher the density of the shield (the outer conductor), the better the cable. Spiral wrapped shield is not recommended.

2. **The output wire and connectors should be heavy enough** to carry the intended current to the load.

3. **Use good quality connectors** with proper strain relief.

- Do not use connectors that have any tendency to short circuit.
- Do not use connectors that can be plugged into AC power receptacles.

4. **Keep unbalanced input cables as short as possible.** Avoid lengths greater than 10 feet.

5. **Do not run signal** (input) **cables together with high level wiring** such as load (output) wires or AC cords (lowers most hum and noise).

6. **Do not short the ground lead of an output cable to the input signal ground.** Oscillations may result.

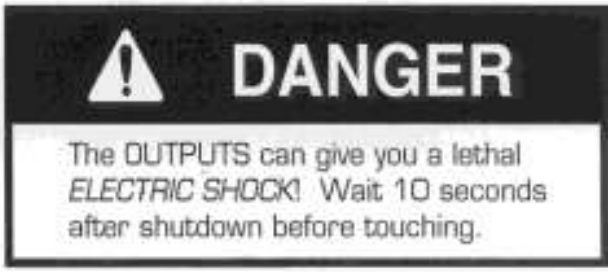
7. **Operate the amplifier from proper AC current.** Supply voltage must be 50 to 60 Hz and no more than 10% above or below the selected line voltage. Failure to comply with these frequency limits may damage the unit and result in unreliable operation.

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8. **Never connect the output to a power supply output, battery, or power main.** These connections will cause serious damage to the amplifier.

9. **Do not permit unqualified personnel to tamper with circuitry.** Do not make unauthorized circuit modifications. Serious damage to the amplifier and/or safety hazards may result.





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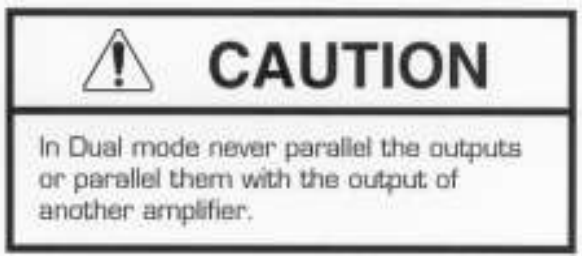
Dual Channel Hookup

In Dual Mode, installation is very intuitive: input Channel 1 feeds output Channel 1, and input Channel 2 feeds output Channel 2. To activate Dual mode:

1. **Turn off the amplifier**
2. **Wait 10 seconds for the power supply to discharge**
3. **Slide the Dual/Mono switch to the center position**
4. **Connect the output wiring as shown below.**

The high-current output block has three sets of output connectors per channel so multiple loads can be easily connected. Two sets accept banana plugs, while the third set accepts spade lugs or bare wire. Observe correct load polarity and be very careful not to short the two outputs.





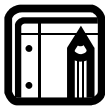
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Bridge-Mono Hookup

Bridge-Mono mode is intended for driving loads with a total impedance of 4 ohms or more (see Section 2.4.3 if the load is less than 4 ohms). Installing the amplifier in Bridge-Mono mode is very different from the other modes and requires special attention.

To activate Bridge-Mono mode:

1. **Turn the amplifier off**
2. **Wait at least 10 seconds**
3. **Slide the Dual/Mono switch to the right (as you face the back of the amplifier).**



NOTE: Both outputs receive the signal from the channel 1 input with the output of channel 2 inverted so it can be bridged with the channel 1 output.

AND



NOTE: The channel 2 input and level control are disconnected in Bridge Mono mode. A signal-feeding channel 2 will have no effect on the output.

1. **Connect the load across the channel 1 and 2 positive (+) terminals**
2. **Attach the positive lead from the load to channel 1.**
3. **Attach the negative lead from the load to channel 2. (This cannot be connected to ground, chassis or amplifier, or it will damage the amplifier.**

The negative (-) terminals are not used and should not be shorted. This cannot be connected to ground, chassis or amplifier, it will damage the amplifier.

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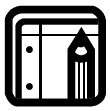
Parallel-Mono Hookup

Parallel-Mono mode is intended for driving loads with a total impedance of less than 4 ohms (see Section 2.4.2 if the load is 4 ohms or greater). Installing the amplifier in Parallel-Mono mode is very different from the other modes and requires special attention.

To activate Parallel-Mono mode:

1. **Turn off the amplifier**
2. **Wait at least 10 seconds**
3. **Slide the Dual/Mono switch to the left (as you face the back panel).**
4. **Connect the input signal to channel 1, and do not use the channel 2 input**

Both outputs will now receive the signal from the channel 1 input.

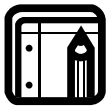


NOTE: The channel 2 input and level control are disconnected in Parallel-Mono mode. A signal-feeding channel 2 will have no effect on the output.

To complete connections:

1. **Install a jumper wire between the positive (+) outputs of channel 1 and 2 that is at least 14 gauge in size.**
2. **Connect the load to the output of channel 1 as shown below.**
3. **Connect positive (+) lead from the load to the positive (+) channel 1 terminal**
4. **Connect the negative (-) lead from the load to the negative (-) channel 1 terminal.**

Channel 2's Green LED will be bright—this is normal.



NOTE: Remember to remove the jumper between the positive output terminals before changing to Bridge-Mono or Dual modes—Amplifier damage may result.

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Connecting Power

The **LVC 5050** uses a 3-wire (grounded) AC line system. At times, the third wire ground may introduce a ground loop into the system. Each **LVC 5050** is supplied from the factory with an appropriate AC cord.

- Units set up for 100 to 120 VAC operation is shipped with 10 AWG, 30 amp line cords.
- Units set up for 200 to 240 VAC operation is shipped with 12 AWG, 20 amp line cords.
- North American units set up for 120 VAC, 60 Hz operation are provided with a 125 volt, 30 amp NEMA TT30P plug.
- Units destined for other parts of the world are provided without a plug.

Whenever possible, connect the power cord to an isolated power circuit with adequate current . Excessive line voltages of more than 11% above the amplifier's rated line voltage will activate the overvoltage protection circuitry.

All specifications in this manual were measured using 120 VAC, 60 Hz power mains unless otherwise noted. Specifications are derived using a peak main voltage equal to the true peak of a 120 V RMS sine wave with all available channels fully loaded.

Although this amplifier is rated for operation at 100 and 120 VAC, it is more efficient at 200, 208, 230 or 240 VAC. At these higher voltages, less power is converted to thermal energy in the AC cord and slightly more power is available at low frequencies.





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