

C A R V E R R E S E A R C H



L I G H T S T A R

LIGHTSTAR REFERENCE

Dual-Monaural Power Amplifier
Owner's Manual

For Free Distribution
NOT FOR RESALE

1. Safety Instructions

1. Read Instructions — All the safety and operation instructions should be read before the Carver Component is operated.

2. Retain Instructions — The safety and operating instructions should be kept for future reference.

3. Heed Warnings — All warnings on the Component and in these operating instructions should be followed.

4. Follow Instructions — All operating and other instructions should be followed.

5. Water and Moisture — The Component should not be used near water - for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.

6. Ventilation — The Component should be situated so that its location or position does not interfere with its proper ventilation. For example, the Component should not be situated on a bed, sofa, rug, or similar surface that may block any ventilation openings; or placed in a built-in installation such as a bookcase or cabinet that may impede the flow of air through ventilation openings.

7. Heat — The Component should be situated away from heat sources such as radiators, or other devices which produce heat.

8. Power Sources — The Component should be connected to a power supply only of the type described in these operation instructions or as marked on the Component.

9. Power Cord Protection — Power-supply cords should be routed so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit the Component.

10. Cleaning — The Component should be cleaned only as recommended in this manual.

11. Non-use Periods— The power cord of the Component should be unplugged from the outlet when unused for a long period of time.

12. Object and Liquid Entry — Care should be taken so that objects do not fall into and liquids are not spilled into the inside of the Component.

13. Damage Requiring Service — The Component should be serviced only by qualified service personnel when:

- A. The power-supply cord or the plug has been damaged; or
- B. Objects have fallen, or liquid has spilled into the Component; or
- C. The Component has been exposed to rain; or
- D. The Component does not appear to operate normally or exhibits a marked change in performance; or
- E. The Component has been dropped, or its cabinet damaged.

14. Servicing — The user should not attempt to service the Component beyond those means described in this operating manual. All other servicing should be referred to qualified service personnel.



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK
DO NOT REMOVE COVER (OR BACK)
NO USER-SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to 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 appliance.

PORTABLE CART WARNING


Carts and stands - The Component should be used only with a cart or stand that is recommended by the manufacturer. A Component and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the Component and cart combination to overturn.

15. To prevent electric shock, do not use this polarized plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Pour prévenir les chocs électriques ne pas utiliser cette fiche polarisée avec un prolongateur, un prise de courant ou une autre sortie de courant, sauf si les lames peuvent être insérées à fond sans laisser aucune partie à découvert.

16. Grounding or Polarization — Precautions should be taken so that the grounding or polarization means of the Component is not defeated.

17. Internal/External Voltage Selectors — Internal or external line voltage selector switches, if any, should only be reset and re-equipped with a proper plug for alternate voltage by a qualified service technician. See an Authorized Carver Dealer for more information.

18. Attachment Plugs for Alternate Line Voltage (Dual voltage models only) — See your Authorized Carver Dealer for information on the attachment plug for alternate voltage use. This pertains to dual-voltage units only.

This apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

ATTENTION — Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de class A/de class B (selon le cas) prescrites dans le règlement sur le brouillage radio-électrique édicté par le ministère des communications du Canada.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING – TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION: TO PREVENT ELECTRIC SHOCK, MATCH WIDE BLADE OF PLUG TO WIDE SLOT, FULLY INSERT.

ATTENTION: POUR ÉVITER LES CHOCS ÉLECTRIQUES, INTRODUIRE LA LAME LA PLUS LARGE DE LA FICHE DANS LA BORNE CORRESPONDANTE DE LA PRISE ET POUSSER JUSQU'AU FOND.

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2. Introduction

You are about to embark on a journey that will take you into the future of audio technology. And Carver Research will take you there, beginning with Lightstar™.

The Lightstar Reference Power Amplifier utilizes a radical new concept in power amplifier design that conveys a level of transparency unattainable with conventional amplifier designs.

The key difference between Lightstar and conventional amplifier designs is its ability to cleanly amplify the audio signal regardless of the reactive characteristics of the speakers it is driving. The amplifier's effect on the signal is so neutral that it provides nothing but pure gain to the signal presented to its inputs. Virtually no distortion, no coloration, just effortless and undisturbed music as the artists intended it to be heard.

The power supply in conventional amplifiers is passive, simply providing a (hopefully) steady DC supply to the amplifier stage so that it can do its job. This makes it susceptible to AC power line variations and spikes, which can reduce its ability to deliver power by up to 50%.

The power supply in Lightstar is an active system, using digital technology (Digital Transformer™ patent pending) to optimize the DC voltages so the amplifier stage always has precisely the energy it needs to deliver to the loudspeaker at all times. No more. No less. This is the key to its effortless and transparent sound.

Lightstar's Digital Transformer regulates out all AC power line imperfections and compensates for low line voltage to allow delivery of full rated power at all times.

The Lightstar power supply stores energy at very high voltages, allowing it to deliver full rated power all the way down to below 10Hz. This high-energy power supply combined with the Digital Transformer provides exceptional linearity and superior current gain. This allows the power to double as the load impedance is halved. In addition, it allows the amplifier to deliver an enormous amount of peak current to effortlessly reproduce difficult transients.

Other features specific to the Lightstar Reference amplifier include a balanced input and a single-ended RCA input for each channel. A switch is provided to increase the gain for CD direct operation or for use with a passive preamplifier. Two pairs of speaker binding posts per channel are provided for ease of connecting and biwire capability. A lighted analog power meter for each channel appears on the front panel along with a touchplate controlled by a unique and sophisticated circuit that places the amplifier into standby mode.

Your power amplifier was designed and manufactured in Lynnwood, Washington by people with a lifetime commitment to providing the world's finest components for music reproduction and home entertainment. Thanks for placing your confidence in Carver Research. We know your new power amplifier will provide many years of listening enjoyment.

3. Features and Specifications

Lightstar Reference Special Features

- 300 watts per channel into 8 ohms
600 watts per channel into 4 ohms
1200 watts per channel into 2 ohms
- Low impedance operation, to less than 1 ohm
- Independent Left/Right speaker relays to eliminate the possibility of transient noise when turned on or off.
- Internal muting circuit for:
Over Temperature
Short Circuit
- Dual analog lighted meters
- Gold-plated RCA input jacks and balanced input jacks with gold-plated contacts for low resistance connections
- 2 pairs of heavy duty multi-way binding post speaker outputs per channel
- Dual mono construction includes two AC linecords and two power switches
- Elegant touchplate for silent switching to standby power
- Solid 3/8" thick long-grain black anodized aluminum chassis
- Digital Transformer™ provides built-in line conditioning
- Switchable high-gain inputs for CD direct operation or use with a passive preamplifier

Specifications

Power Output:

Continuous Average Output Power, both channels driven:

300 watts per channel into 8 Ω from 10 Hz to 20 kHz, with no more than 0.2% THD

600 watts per channel into 4 Ω

1200 watts per channel into 2 Ω

Frequency Response: 20 Hz to 20 kHz
(\pm 0.5 dB)

Full Power Bandwidth: 10 Hz to 20 kHz

Crosstalk: > 60 dB @ 1kHz

Damping Factor: > 200

Output Impedance: < .04 ohms

Sensitivity:

Low Gain 1.74V rms for rated power into 8 ohms at 1 kHz

High Gain 0.43V rms for rated power into 8 ohms at 1 kHz

Gain:

Low Gain 29.0 dB (\pm 0.5 dB)

High Gain 41.0 dB (\pm 0.5 dB)

Input Impedance: 50 kilohms

THD: <0.2%

Signal-to-Noise Ratio:

Low Gain 107 dB

High Gain 98 dB

A-weighted, referenced to rated power

Low Gain 82 dBW

High Gain 73 dBW

A-weighted, referenced to 1W

Slew Rate: >50V/uS

Power Consumption (per side):

60W at idle

250W with musical program

1440W nominal continuous

Power Requirements:

120VAC/60Hz (USA and Canada)

Other voltages as required for export

Display:

2 Analog Meters;

0dB = 300 watts into 8 Ω

Size (H x W x D):

6.9" x 19" x 17.8"

175mm x 483mm x 452mm

with handles

Net Weight: 72 lbs. (32.7 kgs)

Shipping Weight: 82 lbs. (37.2 kgs)

Features and specifications are subject to change without notice.



4. Unpacking

Due to Lightstar's weight, you may want to have someone assist you with unpacking and lifting the amplifier. Please observe proper lifting techniques to avoid back injury.

Carefully unpack your Lightstar Reference and keep the original inner and outer cartons and packing materials for future moving, shipment or long-term storage.

After removing the amplifier from its packing boxes, please check for any visible signs of damage that were not apparent from the outside of the boxes. If you do encounter what appears to be concealed damage, please consult your Carver Research Dealer before proceeding to further unpack or install the unit.

Finally, take a moment to fill out and return the Customer Registration Card packed with the amplifier and return it to Carver. This allows us to keep you informed of new products and technologies as they become available.

Important Paperwork

Make sure to save your sales receipt. Your receipt is extremely important to establish the duration of your Limited Warranty, and for insurance purposes. Next, make a note of the serial number which is located on the back of the amplifier. Record it in the space provided below for convenient reference.

Model:	Lightstar Reference
Serial Number:	_____
Purchased at:	_____
Date:	_____

5. Front and Rear Panel Descriptions

The Lightstar Reference's chassis is constructed of solid 3/8" thick, long-grain black anodized aluminum. The solid construction and detailed metalwork give it an elegant look as well as lending functionality by providing a massive heatsink to easily dissipate the heat generated by internal circuits.

Front Panel Features

1. Power Meters

The Lightstar Reference amplifier features lighted, ballistically-weighted power meters that are calibrated in decibels. The main dB scale has a top value of +3 dB, with 0 dB equal to the maximum rated continuous power (into 8 ohms) of 300 watts per channel.

2. Standby Touchplate

This is a touch sensitive switch that places the amplifier into standby mode. In standby mode the inputs are muted and the amplifier goes into an idle state. Simply touch the plate again to reactivate normal operation.

Use this feature instead of turning the amplifier on and off every time you use it. However, if you know that you will not be using the amplifier for an extended period of time, you should switch it off with the power switches on the rear panel.

When the amplifier is first switched on, it immediately goes into Standby Mode. You **MUST** touch the Standby Touchplate to activate the amplifier stage so that the Lightstar Reference can begin reproducing sound. Here is the sequence of events:

- 1) Turn on one or both power switches (on the rear panel).
- 2) Touch the Standby Touchplate to put the amplifier into Active Mode.
- 3) About 5 seconds after the Touchplate is activated, the speaker output relays will engage. You will hear a soft click from within the amplifier.
- 4) After another 5 seconds, the input muting circuit will disengage and the amplifier is ready to do its job, producing clean, transparent sound.

Note #1: If only one channel is being used, and the other channel is switched on, it will come up in Active Mode as long as the first channel is in Active Mode. It is unnecessary to touch the Standby Touchplate in this instance.

Note #2: If desired, the Standby Touchplate can be bypassed, allowing the amplifier to enter the Active Mode as soon as it is turned on. Of course, this means that you will be unable to use the Standby Touchplate at all. The amplifier must be returned to your Dealer or to a Carver Service Center to have this simple procedure performed. Contact Carver Customer Service for more information (see page 18).

Rear Panel Connections and Controls

3. Power Switches/Circuit Breakers

Each channel has its own separate power switch/circuit breaker. The dual-monaural construction allows each channel to be switched on and operated independently, as if each side were a separate monophonic power amplifier.

When the amplifier is first turned on, it enters the Standby Mode. Touch the Standby Touchplate to put the amplifier into Active Mode.

It is best to turn on the amplifier AFTER you have turned on your signal source equipment (preamplifier, CD player, tuner, etc.). Conversely, turn the amplifier off FIRST (or touch the Standby Touchplate), before you turn off any other equipment.

4. AC Connectors

Push each linecord securely into the AC connectors on the rear of the amplifier. Connect each linecord to a properly configured outlet providing the line voltage specified for your model. See *AC Power Considerations* on page 9 for more information.

5. LEFT and RIGHT INPUT Connectors

There are two types of input connectors provided for each channel:

RCA Input Connectors -

These line level input jacks connect to the audio output jacks of your preamplifier. They provide a single-ended (unbalanced) signal path between your preamplifier and your power amplifier. They are gold-plated to provide the best possible low-resistance connection.

Balanced Input Connectors -

These line level input jacks are used if your preamplifier or CD player has balanced outputs. The contacts in the balanced input jacks are gold-plated to provide the best possible low-resistance connection.

6. Gain Switch

Leave the gain switch set to the "STANDARD GAIN" position when a preamplifier is connected to the input jacks on the Lightstar Reference.

The "HIGH GAIN" position is provided for connecting a CD player, passive preamplifier or other signal source directly to the inputs of the Lightstar Reference.

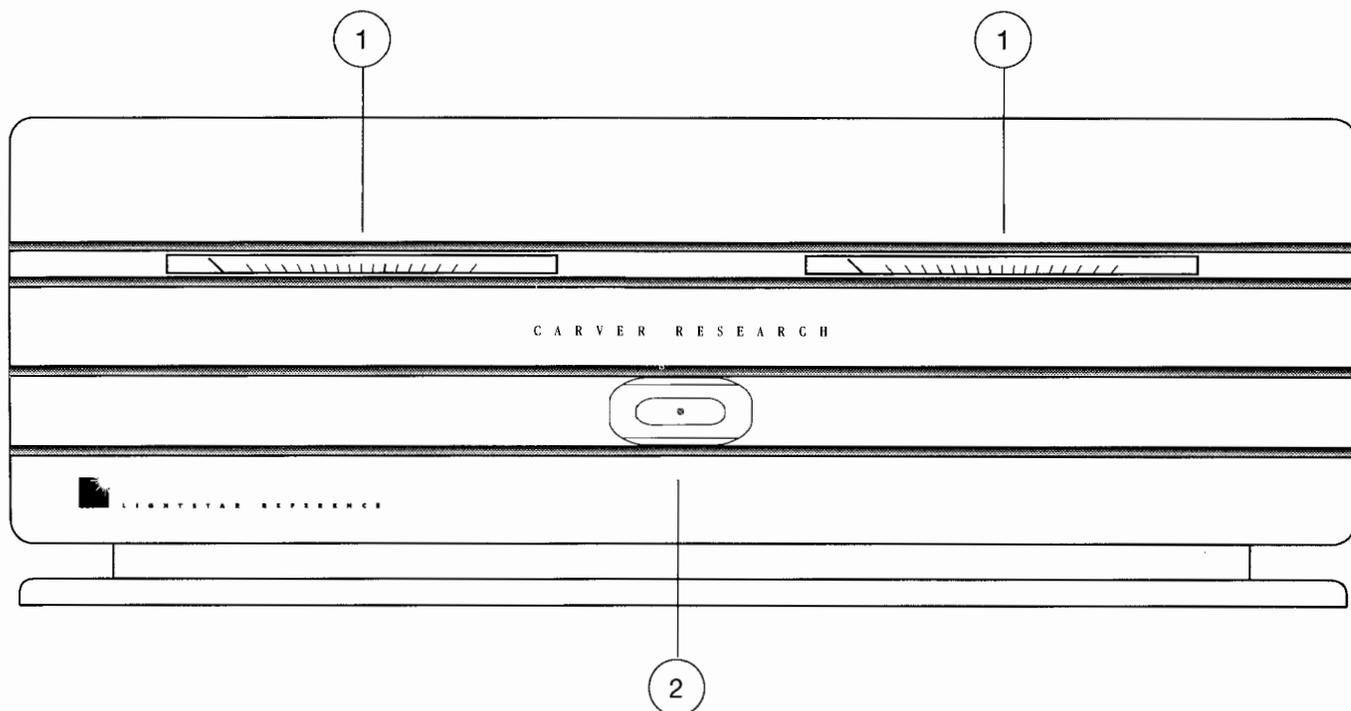


Figure 1. Lightstar Reference Front Panel View



If connecting a signal source directly, it is recommended that a means of attenuating the signal be provided either with the signal source, or via a passive attenuator placed between the signal source and the amplifier.

Note: The Gain Switch affects both the RCA input and the balanced input.

7. LEFT and RIGHT SPEAKER Outputs

Two pairs of gold-plated multi-way binding posts are provided for each channel. They are designed to accept banana plugs, spade lugs or direct wire connections. Please check the Speaker Connection instructions on page 13 for information on cable selection and connections to your loudspeakers.

Caution: The output of the Lightstar Reference can develop hazardous voltages. Care should be taken in connecting the speakers to prevent electric shock or damage to the amplifier. Turn the Lightstar Reference OFF before making any change to speaker wiring or when connecting the unit to another component.

6. Installation and Operation

Location and General Precautions

Observe the following precautions when choosing a location for the Lightstar Reference:

- Do not expose the unit to rain or moisture.
- Protect from prolonged exposure to direct sunlight.
- Avoid excessive exposure to extreme cold or dust.
- Do not place magnetic storage media such as audio or video tapes near the amplifier. All power amplifiers contain transformers that are surrounded by a fluctuating magnetic field which can erase magnetic tapes (or floppy disks).
- Protect from heat and allow adequate ventilation. Place away from direct sources of heat, such as heating vents and radiators. All components produce some heat during operation, so make sure that the ventilation slots are not covered and that air is allowed to circulate freely behind, beside and above the unit. Excessive heat is the single greatest source of both short-term and long-term component failure.

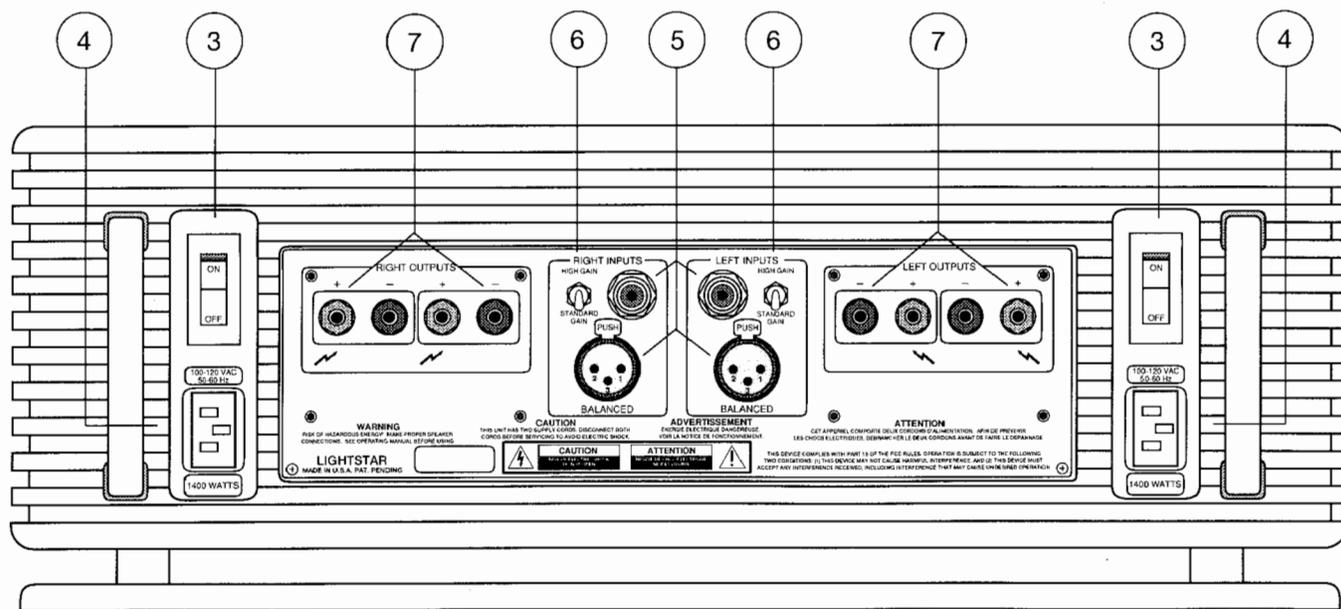


Figure 2. Lightstar Reference Rear Panel View

Note: Because the Lightstar Reference is convection-cooled it requires clearance for air to reach the ventilation slots on the top, bottom and sides of the unit.

Although the amplifier will remain relatively cool during normal operation, under conditions of high-powered use, the top of the amplifier can become quite warm. Therefore, we recommend that you avoid placing any other component directly on top of the Lightstar Reference amplifier.

The Lightstar Reference can be placed in a cabinet or entertainment center which has adequate ventilation (and is capable of supporting 72 pounds). If your shelves do not have open backs, make sure there are vent holes in them. The situation you want to avoid is placing your power amplifier in a sealed cubby-hole. That creates a static air space where temperatures can rise quickly.

If a fluid or foreign object should enter the unit, disconnect the power plugs and contact an authorized dealer or service center. Do not pull out the plug by pulling on the cord; grasp the plug firmly.

Be sure to provide access to the rear panel power switches!

AC Power Considerations

Ensure that the Lightstar Reference is plugged into separate outlets capable of supplying the correct voltage specified for your model and enough current to allow full-power operation of all the components plugged into them.

Although the Lightstar Reference can draw momentary current peaks up to 16 amps (per side), with musical programs each channel will typically require an average of 2 amps or less (when powering 8 ohm speakers).

Due to the high-power capacity of this amplifier, we DO NOT recommend the use of extension cords on the linecords. Under high power conditions, some extension cords will impede the flow of current from the AC outlet to the amplifier.

DO NOT replace the linecords with ones other than those supplied by Carver Research.

These linecords are constructed to handle the high currents required of the Lightstar Reference. They are also specially shielded and are an integral part of the AC line conditioning and noise filtering.

System Configurations

The following pages contain drawings of typical connections that you might make in your installation. These drawings demonstrate how the inputs and outputs on the rear panel of the Lightstar Reference are interconnected with other audio components.

A quick note on input/output levels

Input and output levels for audio equipment are usually divided into three categories.

Phono Level: This is a very low level signal that comes from the cartridge of your turntable. Because of its extremely low voltage, it has a special input connection provided on most preamplifiers and receivers. It provides extra gain to increase the signal, as well as reverse RIAA equalization to restore the flat frequency response that was altered by the equalization used in making phonograph records. Only a turntable should be connected to the PHONO input jacks.

Line Level: This is the signal level that comes out of almost all audio components produced today, except for power amplifiers. It ranges from several hundred millivolts to several volts (AC). Your preamplifier produces a line level signal that can be connected to the input of the Lightstar Reference.

Speaker Level: This is the signal level that comes out of the speaker output terminals on a power amplifier or receiver. It can range from several volts to several tens of volts (AC). Some high powered amplifiers can reach voltage levels approaching that present on a household AC outlet! These connections should only be made to a speaker.

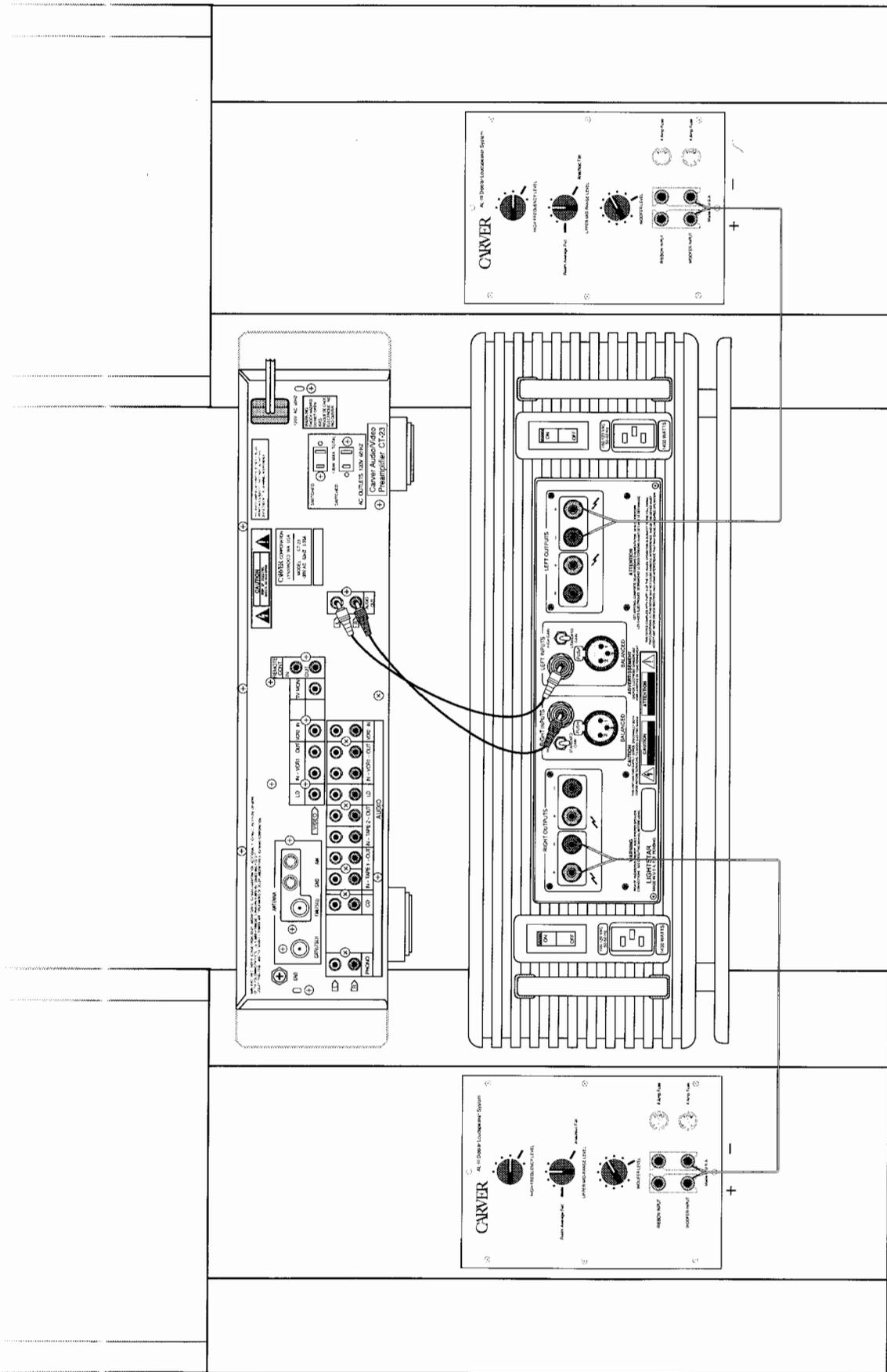
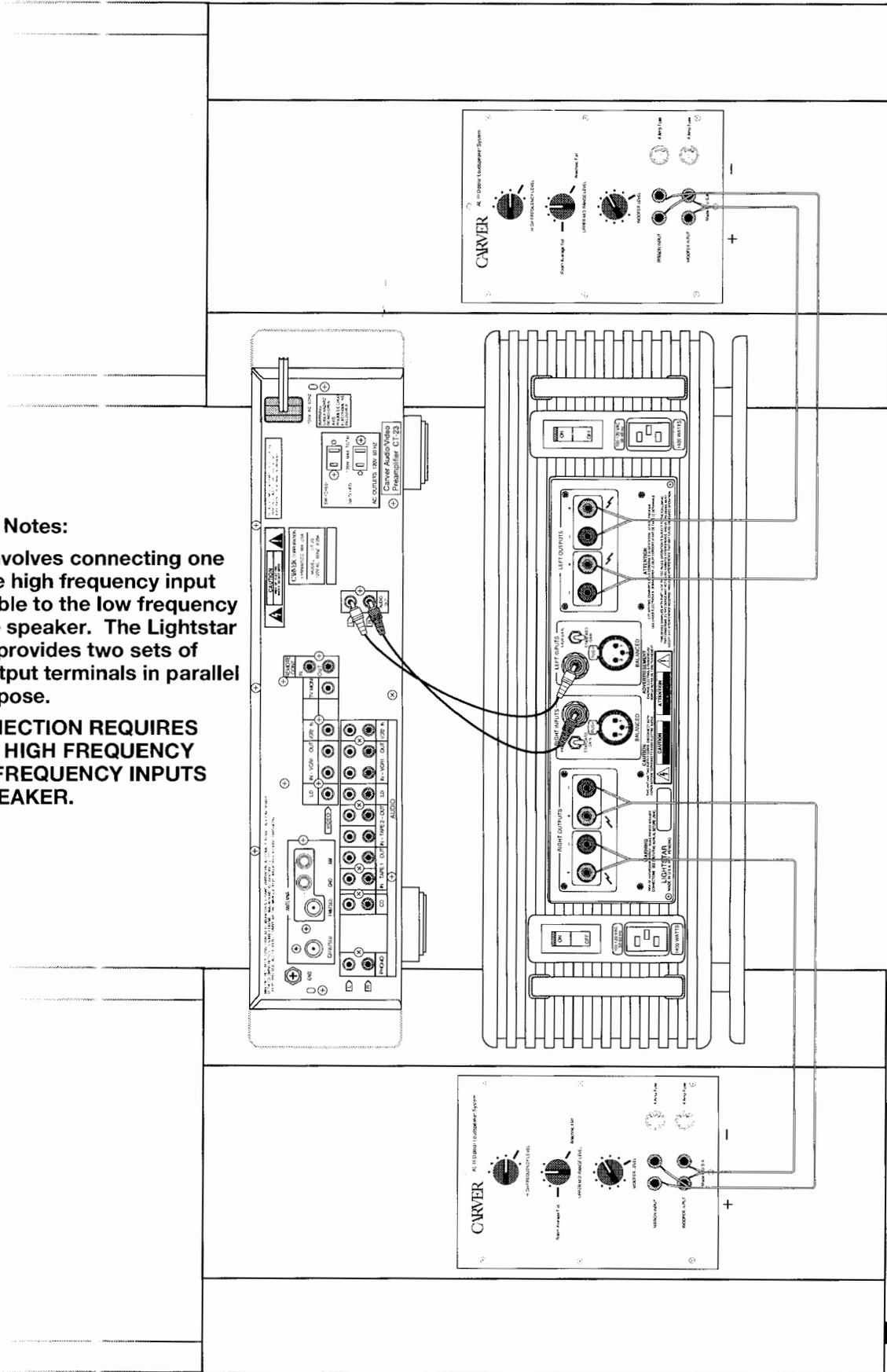


Figure 3. Normal Stereo Connection



Installation Notes:

Bi-wiring involves connecting one cable to the high frequency input and one cable to the low frequency input of the speaker. The Lightstar Reference provides two sets of speaker output terminals in parallel for this purpose.

THIS CONNECTION REQUIRES SEPARATE HIGH FREQUENCY AND LOW FREQUENCY INPUTS TO THE SPEAKER.

Figure 4. Bi-Wired Connection to Speakers with built-in crossover

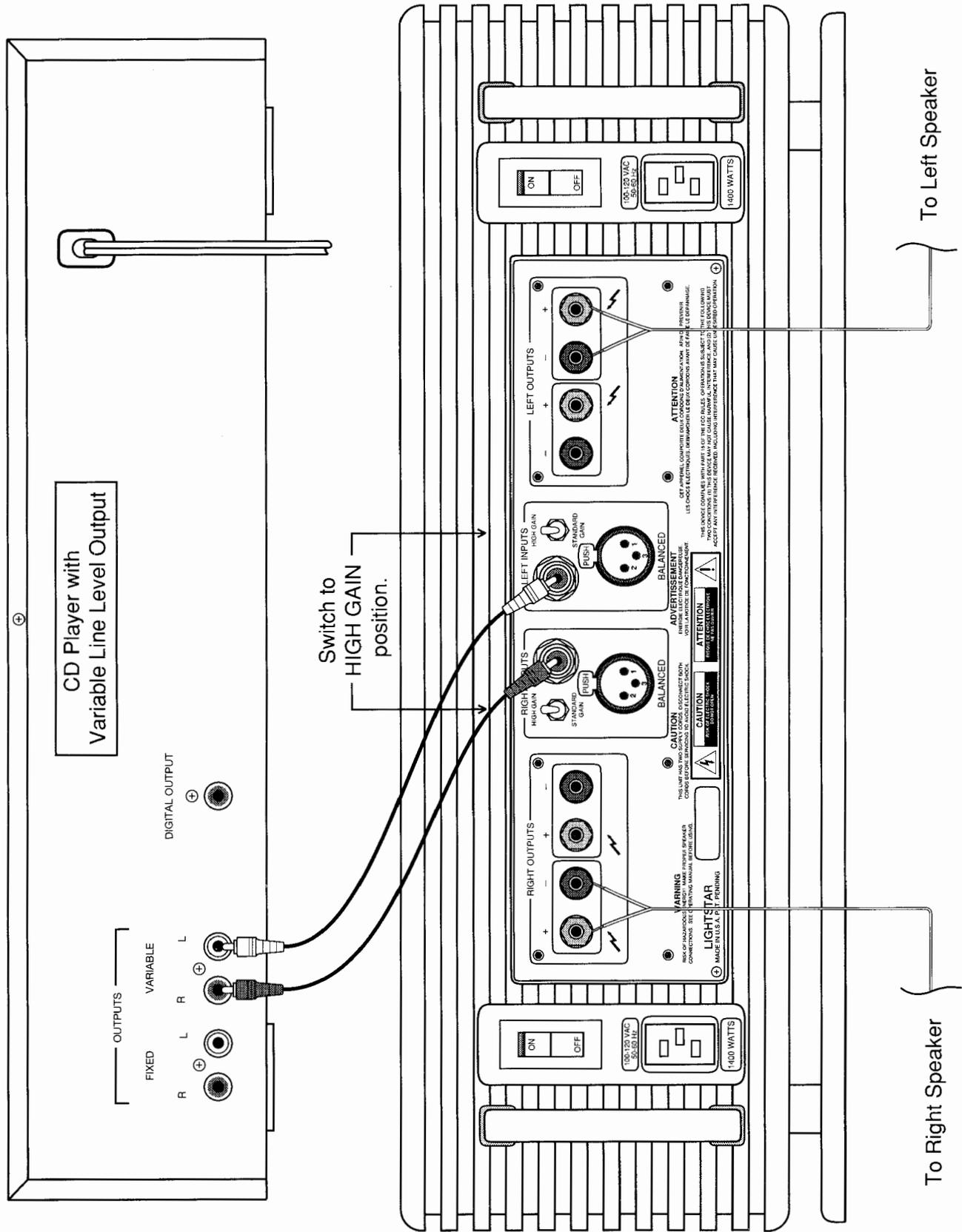


Figure 5. High Gain Connection

Amp-to-Preamp Connections

Lightstar Reference is designed to be compatible with virtually any quality preamplifier, preamplifier/tuner or surround sound processor. If the preamplifier has RCA-type connectors, use standard RCA-type audio cables to connect the RIGHT and LEFT OUTPUTS of the preamplifier to the RIGHT and LEFT INPUTS on the rear panel of the Lightstar Reference (see Figure 6).

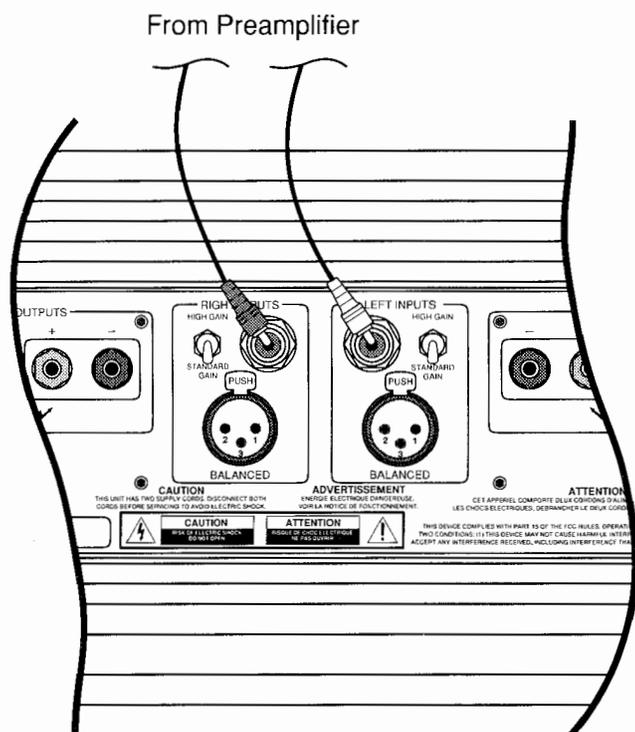


Figure 6. RCA Input Connection

If the preamplifier has balanced output connectors, use balanced cables between the preamplifier and the Lightstar Reference (see Figure 7). Pin 2 is the non-inverting (hot, "+") input, and Pin 3 is the inverting (cold, "-") input. Pin 1 is for the shield. It might help to refer to the owner's manual for your other components at this point. System hook-up variations are shown in the diagrams on pages 10 through 12.

If connecting a signal source directly to the inputs of Lightstar Reference, you may need to move the gain switch to the HIGH GAIN position in order to reach full power (see Figure 5 on page 12).

Amp-to-Speaker Connections

Speaker Connections

One or more sets of speakers can be connected to the Lightstar Reference. Two pairs of high-quality, gold-plated speaker terminals are provided for each channel. Each pair of speaker terminals are connected in parallel, and thus provide the same signal.

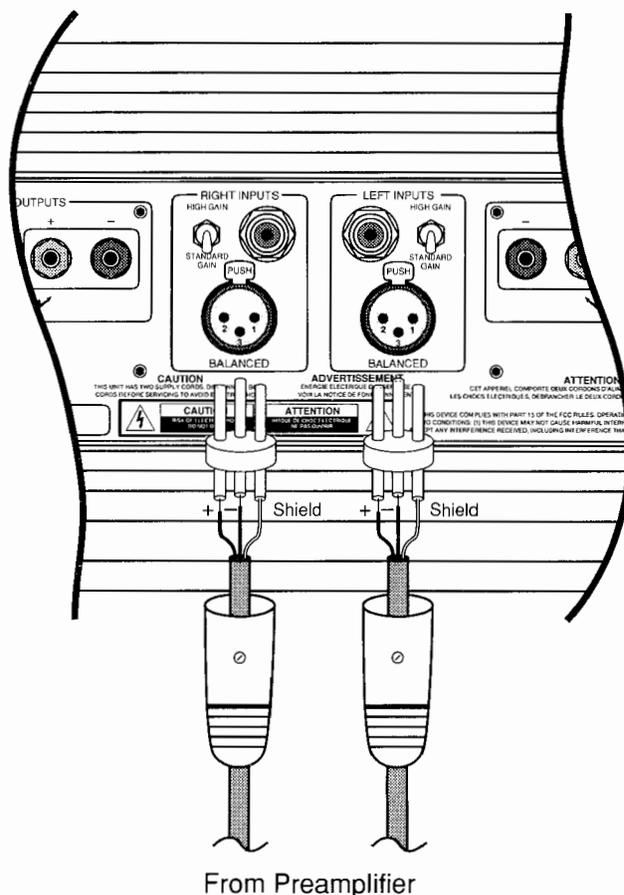


Figure 7. Balanced Input Connection

If you have speakers with separate inputs for bi-wiring, simply connect one pair of speaker terminals to one speaker input, and the other pair of speaker terminals to the other speaker input (see Figure 4 on page 11).

Modern speaker systems most often have nominal impedance ratings of 4, 6, or 8 ohms. This rating can be found in your speaker handbook, and is often printed on the back of the loudspeaker.

Lightstar Reference is capable of driving low impedance loads. If you're using one set of speakers, the amplifier sees the impedance at which the speakers are rated. But if you're connecting two sets of speakers the total impedance of both sets becomes less than either set individually.

To calculate the total impedance (Z_T) for two sets of speakers being operated at the same time, use the following formula:

$$Z_T = \frac{Z_1 \times Z_2}{Z_1 + Z_2}$$

where Z_1 and Z_2 are the individual impedances of the two speaker systems.

We recommend maintaining a total impedance of greater than 1 ohm per channel to experience the maximum benefit from the the Lightstar Reference.

Wiring

Your Carver dealer can recommend a brand of speaker cable that is appropriate for your particular system. Use thick wire for speaker connections. The greater the distance between your amplifier and speakers, the larger the diameter the wire should be (wire thickness specifications or "gauges" get larger as the wire gets thinner; thus 16-gauge wire is thicker than 22-gauge wire).

Use the following chart as a guide:

<u>Wire Length</u>	<u>Gauge of Zip Cord</u>
Up to 15 ft.	18 gauge
Up to 25 ft.	16 gauge
Up to 40 ft.	14 gauge
Up to 60 ft.	12 gauge
Up to 100 ft.	10 gauge
Up to 150 ft.	8 gauge
Up to 250 ft.	6 gauge

Hook-up

The Lightstar Reference speaker terminals are designed to accept bare wire, spade lugs or standard banana plugs.

For bare wire connections:

- 1) Strip 1/2" of insulation off each wire and make sure to carefully twist all the fine strands together. If even one is loose and can touch the opposite terminal, a short circuit may result.

- 2) Unscrew the binding post speaker terminals and insert the wire (see Figure 8). Tighten the connection down on the wire (finger tight – do not use a wrench!).
- 3) Although the speaker terminals are designed to accept up to 10 gauge wire, some speaker cables may use larger gauge wire that will not fit into the speaker terminals. They may require special connections or adapters.

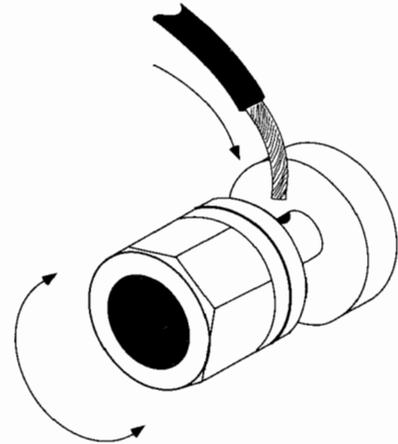


Figure 8. Bare Wire Connection

For spade lug connections

Spade lugs can be attached to the end of the speaker wire. Select a lug that is the correct size for the wire that you are using (specified by wire gauge). The terminal width should be 1/4" diameter to fit over the binding post shaft (see Figure 9).

- 1) Strip 1/2" of insulation off each wire as described above. Slip the bare wire into the barrel of the spade lug and crimp or solder into place.
- 2) Unscrew the binding post speaker terminal and slip the spade lug over the binding post shaft. Tighten the connection down on the lug (finger tight).

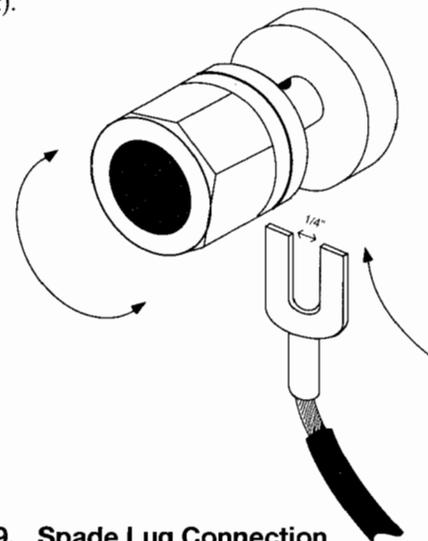


Figure 9. Spade Lug Connection

For banana plug connections:

Banana plugs can be attached to the end of the speaker cable and plugged directly into the Lightstar Reference's binding post sockets (see Figure 10). You can also purchase special speaker cable with banana connectors permanently attached or molded into the wire. This makes connecting and disconnecting speakers simple and quick.

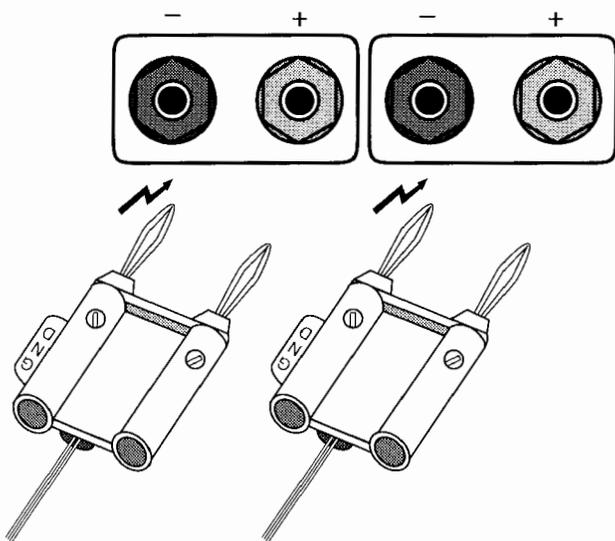


Figure 10. Banana Plug Connection

Polarity

Loudspeakers must be connected with consistent polarity for correct phasing between them. Incorrect phasing will do no physical harm, but bass response will be diminished. The key is to make sure that all speakers connected to the speaker terminals are hooked up the same way.

- 1) Connect "-" at the amplifier speaker outputs to "-" on the back of the speaker, and "+" at the amplifier speaker outputs to "+" on the back of the speaker.
- 2) Connect the Lightstar Reference left speaker outputs to the left speaker inputs, and the right amplifier speaker outputs to the right speaker inputs.

Amplifier Protection

Circuit Breakers

The power switches on the rear panel of the Lightstar Reference are actually resettable magnetic circuit breakers. Magnetic circuit breakers offer higher reliability and longer life than thermal circuit breakers.

If the continuous average current through the breaker should exceed its rating for at least 10 seconds, then the breaker will trip. If this should happen, simply turn the power switch back on. However, it may be necessary to adjust the volume level to avoid tripping the breaker again.

Current Limiting

This protection mechanism safeguards the amplifier against short circuits at the speaker output terminals. If the amplifier is driven hard into an impedance of less than 1/2 ohm, or the speaker wires should accidentally short together, the mute circuit will engage.

After several seconds the mute circuit will turn off and normal operation will resume. If the amplifier senses that the short circuit situation still exists, the mute circuit will engage again. If this cycle persists, check the output connections and wiring to make sure there are no shorts.

Thermal

Each amplifier channel is protected by a thermal switch that activates the mute circuit if the temperature on the heatsink exceeds a predetermined level. The amplifier will remain in "Mute mode" until the heatsink cools to a safe operating level, at which time the muting circuit will turn off and normal operation will resume.

Speaker Protection

If you are using speakers that do not have a power rating high enough to match the maximum power produced by the Lightstar Reference, we recommend that you install in-line speaker fuses between the amplifier and your speakers. Use the fuse value recommended by the speaker manufacturer.

If you can't find this information, the following formula provides a good rule-of-thumb to determine the speaker fuse value to use.

$$I = \sqrt{P/4R}$$

where I = current rating of fuse in amperes
 P = maximum recommended peak power handling capability of the loudspeaker in watts
 R = speaker impedance in ohms

Use a fast-acting type fuse, NOT a slo-blo type. Install the in-line fuseholder between the amplifier's (+) speaker terminal and the speaker's (+) terminal.

7. In Case of Difficulty

If you're having trouble or suspect a problem with the Lightstar Reference, try some simple troubleshooting before contacting your Carver Research dealer or an Authorized Carver Service Center. Most likely, the problem lies elsewhere in the system or with a button or control inadvertently left in the wrong position. In a vast majority of situations, the problem can be traced to one of the following:

1. Controls or connections are incorrect.
2. Lightstar Reference is in Standby mode.
3. Lightstar Reference internal protection circuits are activated.
4. Lightstar Reference circuit breakers are tripped.

No Sound, No Power.

This is usually an indication of a power supply problem, either the power line itself or the amplifier's power supply.

1. Lightstar Reference power is switched off.
2. Linecords are disconnected. Check both ends of the linecords.
3. Poor fit between the plug and wall receptacle. Try removing and reinserting the plug.
4. Power off at wall receptacle. You can test the wall receptacle by plugging in a lamp or AC tester.
5. Lightstar Reference is plugged into a switched outlet. Plug the linecords directly into AC wall outlets.
6. Lightstar Reference circuit breaker(s) has tripped. Verify that the power switch/breaker is ON.

Power On, Low Output or No Output

Low or no output problems are usually related to signal-sources, bad cables or partial output shorts. If the items listed below check out, then the problem may be internal to the Lightstar Reference.

1. Make sure the amplifier is in Active mode and not in Standby.
2. Check the input source to make sure it is working correctly. If the source unit has a headphone jack, you might use a set of headphones to check the operation of the source component.
3. Make sure that all preamplifier controls, especially the TAPE MONITOR button, are correctly set. (A TAPE MONITOR button accidentally pushed in is a frequent cause of total silence.)
4. Turn off your stereo system and check preamplifier-to-power amplifier cable connections.
5. Move the input connections to another amplifier that you know is working to verify that it is not a source problem.
6. Turn the Lightstar Reference off. Check the speaker connections. Be sure that there are no small strands of wire touching similar strands coming from the other wire in the cable. If you use banana plugs, be sure that the setscrews in the plug are securely tightened.
7. If speaker fuses are installed in the loudspeakers or the speaker cables, verify that they are not blown.
8. Make sure the speakers are functioning correctly.

Amplifier runs at first, then no sound.

1. Heatsink thermal switch senses high temperature. Improve ventilation. Make sure that the ventilation slots are not blocked.
2. Circuit breaker(s) are tripped.

Sound cuts off when volume control is turned up.

1. Check speaker wires for a short (bare wire from one connector touching another).
2. Check speakers for damage that may have caused an internal short.

No sound in one channel or one channel has distorted sound.

1. Check the preamplifier's BALANCE control and make sure that it is in the center position.
2. Turn the Lightstar Reference off. Then check speaker wire connections by momentarily switching LEFT and RIGHT speaker cables at the amplifier's speaker output terminals. After turning the unit back on, see if the same loudspeaker is dead or distorted. If it is, the fault lies with the speaker cable or the loudspeaker.
3. If speaker fuses are installed in the loudspeakers or the speaker cable, verify that they are not blown.
4. If, after following step 2, the dead channel DOES switch sides, the problem may be in the Lightstar Reference, the preamplifier, signal source or connecting cables. You can check for a possible cable problem by substituting a good set of cables.

Playback is mixed with hum.

1. Check or replace the connecting cables.
2. Make sure that each connector is securely seated into its socket.
3. Signal cables may have been routed too closely to AC cables, power transformers, motors or other EMI inducing device.
4. Try connecting another source to the power amplifier inputs. If the hum stops, the problem lies with the original source component.
5. If a CATV cable is connected to the system, try disconnecting it. If the hum goes away, call your cable carrier or Carver Customer Service.

Distortion

Distortion is usually caused by an input signal that is too low (where the preamplifier can't produce enough output), overdriving resulting in output clipping, or current limiting caused by excessively low load impedances.

1. Check the setting of the preamplifier's volume control. If it is set too high, it may not have sufficient output to drive the Lightstar Reference.
2. Check the speaker connections and verify that all setscrews are tight and that there are no stray strands of wire to cause short circuits.
3. Verify that the total load impedance presented to the amplifier is within the limits described in this manual for the mode of operation selected (see *Speaker Connections* on page 13).

Room lights dim slightly during loud musical passages

Because of the high current requirements of an audio amplifier at the loudest volume levels, this effect is not unusual and should not cause any harm. If you wish to reduce this dimming effect, try plugging the amplifier into an outlet operating from a different circuit than the one operating the lights.

8. Care and Service Assistance

Care

You'll want to wipe off the Lightstar Reference's front panel and chassis from time-to-time with a soft, dry cloth. If you have something stubborn to remove, use a mild dish soap or detergent sparingly applied to a soft cloth. Don't use alcohol, ammonia, or other strong solvents.

Make every effort to keep your amplifier away from high external temperatures, moisture and airborne substances that can leave greasy deposits and dust.

Never short circuit the output terminals of the amplifier. When connecting the loudspeakers, avoid speaker wires touching at the terminals. Do not drop the amplifier. If you suspect a problem, try system troubleshooting first. Frequently, a problem lies elsewhere in the system or even in the connection cables.

Service Assistance

We suggest that you read the LIMITED WARRANTY completely to fully understand your warranty/service coverage. Please promptly complete and return the CUSTOMER REGISTRATION CARD. Also be sure to save the sales receipt in a safe place. It will be necessary for warranty service.

If your Carver Research product should require service, we suggest you contact the Dealer from whom you purchased your unit. Should the Dealer be unable to take care of your needs, you may contact the Carver Technical Service Department by phoning (206) 775-6245 or by writing to us at the Factory address shown at the right. We will then direct you to the nearest in our national network of Authorized Warranty Service Centers or give you detailed instructions on how to return the product to us for prompt action.

If you should have questions or comments, please write to the Factory address given below. Please include the model and serial number of your Carver product, your complete address and a daytime phone number.

Factory Address

Carver Corporation Service Department
P.O. Box 1237
Lynnwood, WA 98046-1237

(206) 775-6245 *Customer Service and
or Technical Information*
1-800-521-4333

(206) 775-9180 *Customer Service Fax*

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CARVER

CARVER CORPORATION LIMITED WARRANTY

CARVER RESEARCH AUDIO PRODUCTS

Product	Warranty Period
All Audio Products	5 years

YOU MUST RETAIN AND PROVIDE YOUR SALES RECEIPT TO OBTAIN COVERAGE UNDER THIS LIMITED WARRANTY. The Warranty Period begins from the date of first consumer purchase from an Authorized Carver Dealer.

WHAT IS COVERED: THIS WARRANTY COVERS DEFECTS IN MATERIAL AND WORKMANSHIP ONLY. This Limited Warranty DOES NOT extend to: (1) Damage caused by shipment; (2) damage caused by accident, misuse, abuse, failure to perform owner maintenance, or operation contrary to the instructions in the Carver Corporation owner's manual; (3) units on which the serial number has been defaced, modified or removed; and (4) damage resulting from modification or attempted repair by any person other than authorized by Carver Corporation.

WHAT WE WILL PAY FOR: Carver will pay all labor and material expenses for items covered under this Limited Warranty. See the next section concerning shipping charges.

WHAT YOU MUST DO TO OBTAIN WARRANTY SERVICE: In the event your Carver product requires service, write to Carver Corporation (Attention: Customer Service Department), P. O. Box 1237, Lynnwood, Washington 98046-1237 or call the Customer Service Department directly at (206) 775-6245. You will be directed to an Authorized Carver Service Station or receive instructions to ship the unit to the factory. Please save the original shipping carton and packing materials in case shipping is required. Please DO NOT ship Parcel Post. Include a complete description of the problem, the associated components and connections, and a copy of the purchase receipt. Initial shipping costs are not paid by Carver Corporation; return shipping costs will be pre-paid if repairs were covered by the scope of this warranty.

Shipping Address

CARVER CORPORATION
20121 - 48th Avenue West
Lynnwood, WA 98036

LIMITATIONS OF IMPLIED WARRANTIES: ALL IMPLIED WARRANTIES FOR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN DURATION TO THE WARRANTY PERIOD FOR YOUR PRODUCT, UNLESS OTHERWISE PROVIDED BY STATE LAW.

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STATE LAWS MAY DIFFER: SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS AND/OR DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

OTHER IMPORTANT PROVISIONS: Carver Corporation reserves the right to make changes in design and improvements to its products without the responsibility of installing such changes or improvements on products previously sold by Carver.

We suggest that you attach your purchase receipt to this Warranty and keep both documents in a safe place.

Thank you for your choice of a Carver Corporation product.

NOTE: The preceding warranty is exclusive to the United States and its possessions and territories. Please see your Carver dealer or distributor for the correct warranty information in your area or locale.

August 1, 1994



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