

Tactile Motion Amplifier



C-602

OWNER'S GUIDE

Manufactured by:



IMPORTANT SAFETY INSTRUCTIONS



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 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 symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature.

1. **Read Instructions** — All safety and operating instructions should be read before the product is operated.
2. **Retain Instructions** — The safety and operating instructions should be retained for future reference.
3. **Heed Warnings** — All warnings on the product and in the operating instructions should be adhered to.
4. **Follow Instructions** — All operating and use instructions should be followed.
5. **Water and Moisture** — The product should not be used near water — for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, near a swimming pool or the like.
6. **Carts and Stands** — The product should be used only with a cart or stand recommended by the manufacturer.
7. **Wall or Ceiling Mounting** — The product should be mounted to a wall or ceiling only as recommended by the manufacturer.
8. **Ventilation** — The product should be situated so that its location or position does not interfere with its proper ventilation. For example, the product should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or placed in a built-in installation such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
9. **Heat** — The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products that produce heat.
10. **Power Sources** — The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product.
11. **Grounding or Polarization** — This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
12. **Power-Cord Protection** — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point at which they exit from the product.
13. **Cleaning** — The product should be cleaned only as recommended by the manufacturer.
14. **Nonuse Periods** — The power cord of the product should be unplugged from the outlet when left unused for a long period of time.
15. **Object and Liquid Entry** — Care should be taken so that objects do not fall and liquids are not spilled onto the enclosure.
16. **Damage Requiring Service** — The product should be serviced by qualified service personnel when:
 - a. The power-supply cord or plug has been damaged.
 - b. Objects have fallen or liquid has been spilled into the product.
 - c. The product has been exposed to rain.
 - d. The product does not appear to operate normally or exhibits a marked change in performance.
 - e. The product has been dropped or damaged.
17. **Servicing** — The user should not attempt to service the product beyond what is described in the operating instructions. All other servicing should be referred to qualified service personnel.
18. **Lightning** — For added protection for the product during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the wall outlet.
19. **Overloading** — Do not overload wall outlets, extension cords or integral convenience receptacles as this can result in a risk of fire or electric shock.
20. **Attachments** — Only use attachments and accessories specified by the manufacturer.
21. **Voltage** — Insure that the product is only connected to the rated source voltage. Do not connect the 120-volt version to 230-volts or vice-versa. This will result in damage to the product and possible injury to the user.

CAUTION: To prevent electrical shock, match wide blade of plug to wide slot, fully inserted.

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CONGRATULATIONS

Congratulations on your purchase of a Crowson C - 602 amplifier and Actuators. This system represents the state-of-the-art in low frequency reproduction. Read and follow the instructions below to ensure safe and proper system operation.

Warning!

To prevent fire or shock hazard, do not expose this equipment to rain or moisture. To avoid electrical shock, do not open the amplifier enclosure or the chassis cover. Please observe all warnings on the equipment itself. There are no user serviceable parts inside. Please refer all service questions to your authorized Crowson or dealer.

Prior to Installation

Please unpack the system carefully. Please save the carton and all packaging materials for future use. Record the serial number in the space provided on the warranty card and page 15 of this manual for future reference.

PRODUCT FEATURES

C-602 TACTILE MOTION AMPLIFIER

- 400 (x2) watts dynamic/200 (x2) watts RMS high efficiency, Class D
- Twin-amplifier configuration easily drives up to four Crowson Actuators
- DSP-controlled
- Four selectable presets for customized listening mode
- Night-mode setting
- Mute control
- Line-level (RCA) inputs and outputs
- Speaker-level inputs with five way binding post connections
- Signal sensing auto turn on/off (defeatable)
- Variable intensity (volume) control
- Selectable phase control (0, 90, 180 or 270 degrees)
- Built-in adjustable (30-160 Hz) digital low-pass crossover with 24 dB/octave slope
- Blue power indicator LED
- RS-232 Serial Interface
- 12 Volt trigger
- Universal IR repeater mini-jack

INSTALLATION

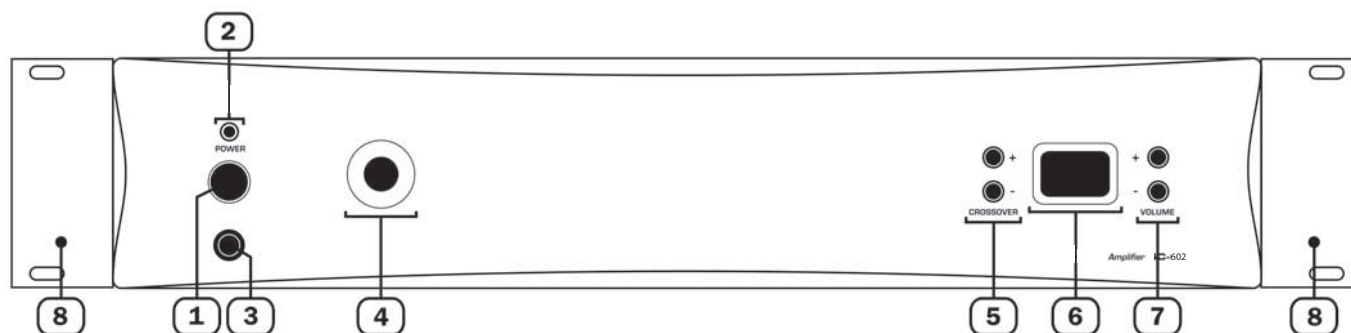


Figure 1: Front Panel Connections of the C-602 amplifier.

FRONT PANEL CONNECTIONS

Following are brief descriptions of the controls described in Figure 1. More detail on these controls can be found in the next section.

(1) Power Switch

This button forces your C-602 amplifier into standby mode. The power LED turns amber, the numeric LED shuts off, and the amplifier puts out no power. The unit will remain in this mode until the POWER button is pressed again. To fully deactivate (i.e. power down) the unit, use the main power switch on the back panel.

(2) Power LED

This LED illuminates when the power is on. Blue indicates normal operation. The LED turns amber when the unit is in standby mode or the remote has been used to deactivate the unit, and dims when the unit is in night mode.

(3) Data Input

This is a factory data input. Do not use.

(4) Remote Eye

This is the eye that receives infrared commands from the supplied remote control.

(5) Crossover

Use these UP and DOWN buttons to select the frequency below which all signals will be routed to the actuators (for example, 80 Hz), rather than to the main speakers. The frequency is briefly indicated on the LED display, then the display reverts to showing the actuators volume level. The slope is fixed at 24 dB/octave.

(6) LED Numeric Indicator

This LED supplies information on intensity (volume), crossover, and other information. The “light” button on the remote deactivates this display. Upon startup, the display shows the volume indicator.

(7) Intensity (volume) Control

These buttons allow you to balance the output from the motion system with the output of the main speakers in your audio system. The intensity should be set to achieve a natural blend between the subwoofer and motion system. The default intensity setting is 30.

Note: Intensity can also be controlled by using the supplied remote.

WARNING: Some manufacturers preset their receivers with the Sub-Out (a.k.a. LFE) channel signal at a minimum level. It is very important to verify that your receiver Sub-Out channel is set to the same output level as your front right and left channels. Refer to your receiver manual for the individual channel level adjustment procedure. If your receiver Sub-Out channel is set too low, the actuators may appear to have a weak output and the Auto On/Off feature may not operate properly.

(8) Optional Rack Mount Ears (Included)

These ears can be attached to the C-602 amp to allow standar 19” rack mounting.

REAR PANEL CONNECTIONS

Following are brief descriptions described in Figure 2. More detail on these controls can be found in the next section.

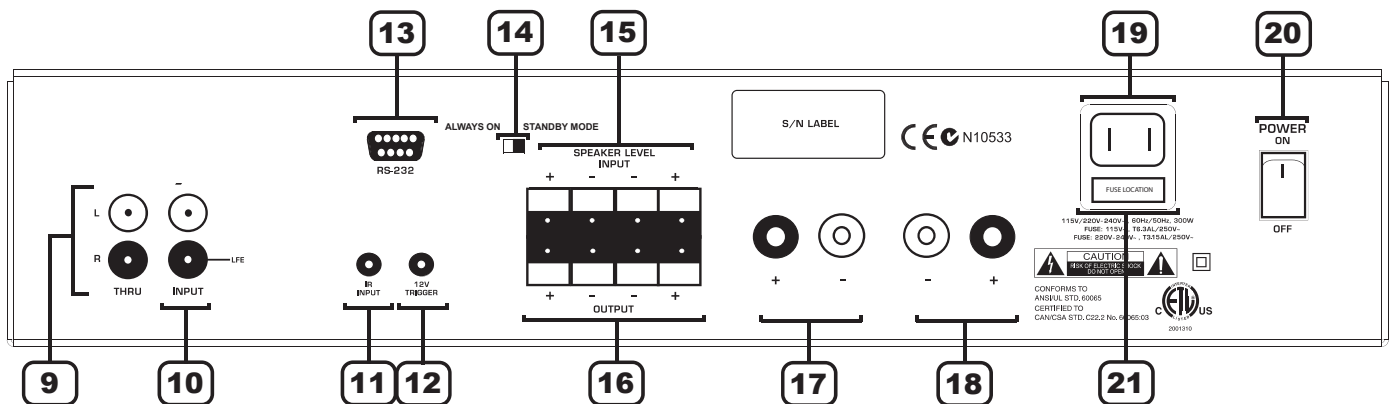


Figure 2: Rear Panel Connections of the C-602 amplifier.

(9) Thru Jacks

These RCA connectors are for passing along the same signal that goes into your motion system to a second “daisy-chained” system. The signal from these RCA connectors is the same as the input signal.

(10) Line Input / LFE Input

Connect these jacks to the LINE OUT preamp output, LFE output, or subwoofer output jacks of your receiver/processor. If using the LFE output from your receiver or processor, plug the single cable into the jack labeled LFE input or, for more signal, use a “Y” connector (optional) and feed the signal into both “R” and “L” inputs. Examples of these types of connections can be found in Figures 2A and 2B.

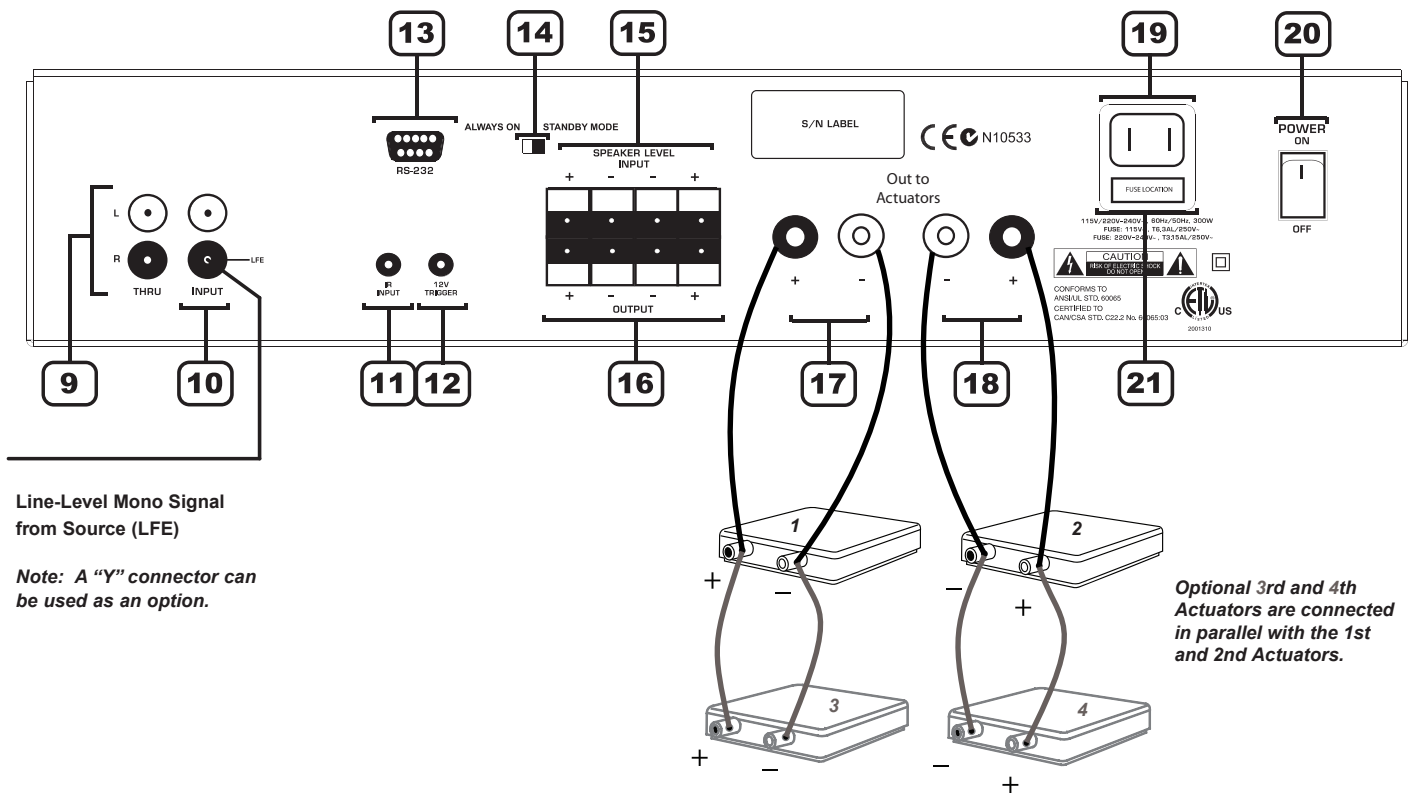


Figure 2A: Mono (LFE) Line-Level Connection.

Stereo Line-Level Output to Another System, e.g. a second C-600 or C-602 amplifier

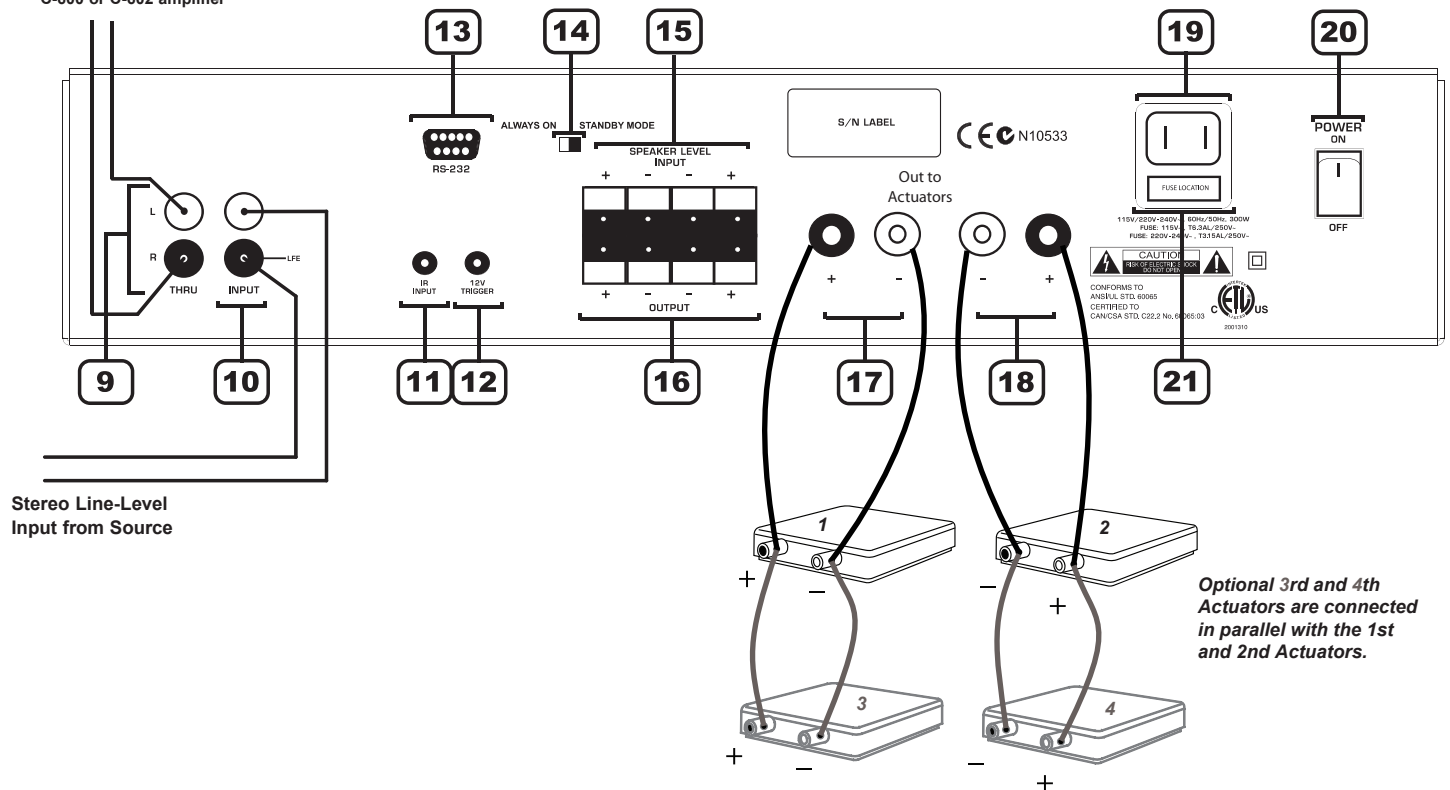


Figure 2B: Stereo Line-Level Connection.

(11) IR Input

An IR repeater can be connected to this mini-jack.

(12) 12V Trigger

When this 2-conductor mini-jack is connected, the amplifier remains in power-off mode until the trigger is applied. The correct trigger is +12V on the tip of the connector relative to the grounded sleeve.

(13) RS-232 In

Use this port to communicate with an RS-232 controlled touch panel system. See Appendix A for an explanation of the use of the serial port, available commands and their formats.

(14) Signal Sensing Auto On/Off Switch

With this switch in the "standby" position, your system can be safely left with the main power switched on continuously. The tactile amplifier will turn itself on automatically when an audio signal is present. If no signal is present for approximately 10 minutes, the unit will switch to standby mode. While in standby mode, your tactile amplifier will draw very minimal power. This function can be disabled by leaving the switch in the "always on" position.

(15) Speaker Level Input Terminals

If you do not connect the C-602 amplifier to your receiver using the line input/LFE input connection (Item 10) connect these input terminals to the speaker output terminals of your amplifier or receiver. If you use this method of connection, make sure to select the "large" speaker option in the receiver's speaker set-up menu. Also, select the option for no subwoofer. This will make sure all bass and LFE information is fed to the speaker outputs and be received by your C-602 amplifier.

Note: Using both speaker terminals and the line level inputs is not recommended, as this may damage the C-602 amplifier or your receiver.

(16) Speaker Level Output Terminals

These connections send a crossed-over speaker-level signal to the front speakers. When connected in this fashion, your satellite speakers will be crossed over at 80 Hz. This removes the task of reproducing frequencies below 80 Hz from your satellites, enabling them to do a better job reproducing high frequencies.

You may also connect your satellites directly to your receiver or amplifier along with the subwoofer if you wish to bypass this crossover.

An example of a speaker-level connection is shown in Figure 3.

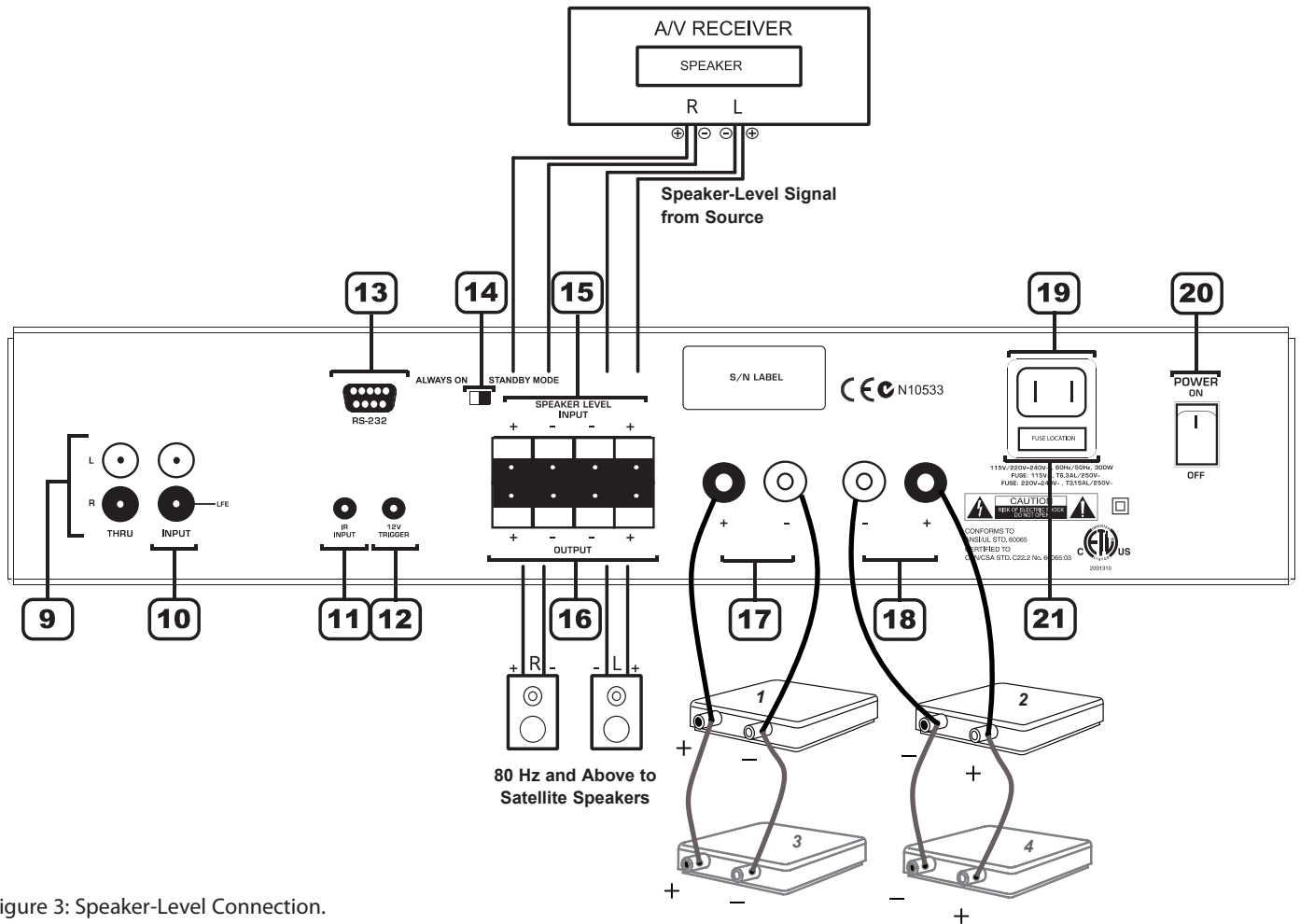


Figure 3: Speaker-Level Connection.

(17) and (18) Actuator Connection 5-way Binding Post Terminals

Connect the output terminals to the Actuators being controlled by the C-602 amplifier. connect a max of two Actuators to each red/black pair of output terminals.

Caution!!! To avoid damage to your C-602 amp and Actuators, be sure to maintain correct polarity when making all speaker connections; red (positive) to red, and black (negative) to black. Be sure that all connections are tight, and that there are no loose strands or frayed wires.

(19) Power Cord Adapter

Connect the detachable power plug to this male interface connection. The detachable cord allows for easy replacement should the original become damaged.

(20) Main Power Switch

Press the POWER switch to the ON position to activate the amplifier. If the unit is to be left unused for an extended period of time, move this switch to the OFF position to prolong the life of the amplifier.

(21) Fuse

If the unit is not functioning, check the fuse. If the fuse is blown, replace with an identically rated fuse. If the fuse blows again, refer the unit for service.

REAR PANEL CONNECTIONS – DETAILED EXPLANATION

The C-602 amplifier is equipped with both speaker-level and line-level inputs. Use the RCA/Phono type "INPUT" jacks when connecting from a pre-amp, signal processor, or line-level crossover. The "SPEAKER LEVEL INPUT" jacks connect directly to the speaker outputs of an integrated amplifier or receiver. Your amplifier section will notice no additional loading effects when you use these inputs because of their high impedance.

Note: Do not use both the RCA/Phono "INPUT" connections and "SPEAKER LEVEL INPUT" connections simultaneously .

ABOUT LOW-PASS FILTER (LPF)

All of the C-602 amplifier inputs sum the left and right channels together and the resulting signal is passed through an adjustable low-pass crossover before being amplified. The crossover control allows you to adjust the upper limit of the Actuator's frequency response from 30 to 160 Hz. The Actuator's response will begin rolling off above the frequency you set this control to. The slope is 24 dB/octave.

You should set the crossover frequency to obtain a smooth and seamless blend with the subwoofer and the main speakers in your system. Adjusting the LPF to the preferred setting will ensure that desirable low-frequency motion is present, while undesirable high-frequency content (such as motion from human voices) is not. Proper adjustment of the LPF will allow your motion experience to most closely resemble a real-world sound experience. Start with the LPF set to 160Hz. Reduce the frequency setting if unwanted high frequency content such as voices is present during testing. Increase the setting if you feel that desirable content is being unnecessarily removed.

Most receivers and processors provide a menu option in which you can characterize main speakers as "large" or "small" speakers. This affects the bass signals passed to the main speakers. We recommend in most cases setting the main speakers to "small," despite their size and frequency response characteristics, allowing all multi-channel bass and LFE signals to be passed to the C-602.

Disabling the Low-Pass Crossover (Subwoofer Direct)

If your receiver/processors provides a crossed-over signal to the subwoofer you may want to bypass the C-602 amp's low-pass crossover. To do this, depress both the Crossover UP and Crossover DOWN buttons simultaneously. The numeric LED will show **—** indicating that the low-pass crossover has been defeated. To reactivate the low-pass crossover, simply push the Crossover UP or Crossover DOWN buttons.

A WORD ABOUT YOUR HOME THEATER RECEIVER'S CROSSOVER AND THE C-602 AMPLIFIER'S CROSSOVER

Your Crowson C-602 amplifier is designed to operate using the full range audio signal for input when using the built-in crossover. Many home theater processors/receivers have a "subwoofer out" jack that performs this same function and are designed to be used with a powered subwoofer.

In these installations, you may want to bypass the crossover in either the processor or the Crowson C-602 amplifier as described above. However, in some cases you may want to use BOTH crossovers. If you choose to do this you should stagger the frequencies, (i.e., 120 Hz subwoofer, 80 Hz processor) for best results.

A WORD ABOUT INTERCONNECT CABLES

When connecting the C-602 amplifier to your subwoofer using the speaker level connections, use a high quality speaker cable. It is recommended that you keep the length of cable as short as possible to avoid any potential external interference problems.

When connecting the C-602 amplifier to your actuators, use quality speaker cable that is at least 18-gauge. Be very careful to avoid any loose or frayed strands that could result in a short, causing a dangerous condition and possible damage to your unit. Cables of extremely large size are typically not required. Extremely large gauge wire may not properly fit in the binding posts, resulting in a poor connection and possible short circuits.

Caution!

This amplifier is an electronic device. Do not place the amplifier next to sources of heat such as furnace registers, radiators, etc. Likewise, do not place the amplifier near sources of excessive moisture such as evaporative coolers, humidifiers, etc. The power cord should be routed in such a way that it will not be walked on, pinched or compressed in any way that could result in damaging the insulation or wire.

USAGE

This section addresses day-to-day usage of your C-602 amplifier.

Remote Control

The features of the C-602 remote control are listed below.

- **POWER** — This button forces your C-602 amplifier unit into standby mode. The power LED turns amber, the numeric LED shuts off, and the amplifier puts out no power. The unit will remain in this mode until the POWER button is pressed again. To fully deactivate (i.e. power down) the unit, use the main power switch on the back panel.

Note: The master power switch on the rear panel must be on in order for the front power button to function.

- **MUTE** — This button mutes the Actuators's output. The LED on the amplifier will show 00 if the unit is muted. To unmute the Actuators, press the MUTE button again and the original volume setting shows on the LED.
- **PHASE** — These buttons allow you to optimize the Actuators performance for the seat location and listening position. Play some bass-heavy music. While listening, push one of the four phase buttons, listen and feel for a few moments, and then press the next phase button. In most installations, one of the four button positions will offer a better blend with the subwoofer and speakers. Selecting the correct phase position is that easy. The LED will show the phase selected by showing "PH" followed by the phase number: 0, 90, 180 or 270.
- **LIGHT** — If you wish, you can deactivate the numeric LED on your C-602 amplifier. To do this, press the LIGHT button on your remote. To reactivate the LED, press the LIGHT button again.
- **NIGHT** — Night mode limits the maximum dynamic output of the motion system for late night listening or to be more considerate of close neighbors. Press the night button to turn the night mode feature on or off. Activation of night mode causes "n" to appear briefly on the display. When night mode is deactivated, the display shows "n off" and then returns to normal function.
- **INTENSITY (VOLUME) CONTROL** — The intensity control adjusts the intensity of the tactile motion effect. Set the intensity to preferred levels. When pressing up or down, the level change is shown on the numeric LED on the front panel.

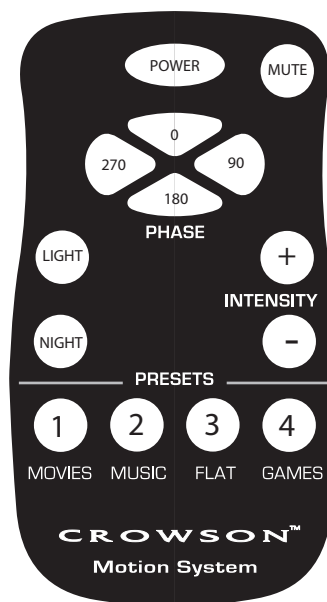


Figure 4: C-602 Remote.

WARNING: Some manufacturers preset their receivers with the Sub-Out channel signal at a minimum level. It is very important to verify that your receiver Sub-Out channel is set to the same output level as your front right and left channels. Refer to your receiver manual for the individual channel level adjustment procedure. If your receiver Sub-Out channel is set too low, the Tactile Motion System may appear to have a weak output, it may sound noisy or distorted, and the Auto On/Off feature may not operate properly.

Note: The intensity (volume) can also be adjusted via the volume buttons on the front panel of the amplifier. These buttons have the same effect as pressing the up and down intensity buttons on your remote.

- **PRESETS** — There are four presets, consisting of Movies, Music, Flat, and Games. As a preset is chosen, the preset is shown on the numeric LED as P1 for preset 1, P2 for preset 2, etc. The presets provide the following characteristics for tactile reproduction:

Movies:	Maximum output and impact for explosions and other action adventure movie content.
Music:	Provides the driving bass found in today's rock music.
Flat:	The tightest and cleanest effect. The flattest frequency response of the four presets.
Games:	Maximum power available for the impact of video games.

Each preset has its own characteristics with respect to volume differential and a single contour equalizer.

CARE OF YOUR AMPLIFIER

Do not use any harsh detergents or chemicals to clean the C-602 chassis. Abrasives, detergents, or cleaning solutions will damage the finish on the C-602 chassis. We recommend using a damp cloth to clean the front, back and sides. Do not allow any liquids to enter the C-602 chassis.

During normal conditions, the amplifier may be left on continuously without any problems. If you plan to leave the unit unused for an extended period of time, we recommend that you turn off the unit by the master power switch on the rear panel.

TROUBLESHOOTING AND SERVICE

Before seeking service for your amplifier or actuators, please re-check all systems. Following is a simple troubleshooting guide to assist you.

1. Verify that the unit is plugged in and power outlet used is active.
2. Is the power switch on?
3. Is the unit receiving an input signal from your receiver or processor?
4. Have all controls on the amplifier (intensity, crossover, phase, etc.) been properly set?
5. If the unit has been running at high levels, one of the protection circuits may be engaged.
Has the amplifier overheated?
6. Has the power button been depressed on the remote?
7. Is the remote non-responsive? We recommend replacing the batteries in the remote.

If the protection circuitry is active, the unit may cycle on and off until operating parameters return to normal. Under more serious conditions, the unit may shut off completely. Normal operation should return upon cooling, but you may be required to turn the power off and then on again to reset the unit.

The following conditions require service by a qualified technician:

1. The power cord has become damaged
2. The unit does not appear to operate normally or exhibits a marked change in performance
3. The unit has been exposed to water
4. Some part of the chassis or circuitry is physically damaged

SPECIFICATIONS

Specifications	C-602
Amplifier: (Class D)	400 (x2) watts Dynamic 200 (x2) watts RMS Power
High Pass Crossover:	80Hz (6 dB/octave)
Low Pass Crossover:	30Hz-160Hz, Defeatable, 24 dB/octave slope
Inputs:	Line and Speaker Level
Outputs:	Line level throughput, speaker level: 80 Hz up, (subwoofer out)
Phase:	0°, 90°, 180°, 270°
Dimensions (H/W/D): (inc. feet)	3.6" x 17" x 13" (9 x 43.2 x 33 cm) **Allow two extra inches in depth for wire connectors and power cable. **Includes feet. Feet can be removed for rack mount use. Unit is approximately "two rack units" high.
Warranty: (North America)	Three years (electronics - parts and labor)
Shipping Weight: (approx.)	25 lbs. (22.7 Kg)

APPENDIX A: RS-232 SERIAL OVERVIEW AND COMMANDS

Introduction

This document outlines the RS-232 protocol specification.

This protocol indicates how the C-602 receives runtime commands from devices such as Creston Universal Remote Controls.

Com Port Setup

Use standard communications settings: Baud Rate: 9600, Data Bits: 8, Parity: None, Stop Bits: 1

IN and OUT Port Pin Configuration

SC serial ports use a standard configuration that allows direct connection to a PC via a FEMALE to MALE serial cable. It uses only three pins (Transmit, Receive, Ground).

The pin configurations are:

IN: Pin 2 = Transmit
 Pin 3 = Receive
 Pin 5 = Ground

OUT: Pin 2 = Receive
 Pin 3 = Transmit
 Pin 5 = Ground

Runtime Command Format

Byte Number	Byte Description	Notes
0	'#'	Header Character
1 to 3 or 4	Command and Parameter Data	3 to 4 ASCII characters see formats below Case sensitive- CAPS ONLY!
4 or 5	'\$'	Termination Character (required or command is ignored)

Activity	Command Format	Acceptable n values	Example(s)	Comments
Volume Control	#VOnn\$, #VO+\$, #VO-\$, #VO?\$	00 – 80	#VO25\$ #VO+\$, #VO-\$, #VO?\$	Sets volume to a value, increments volume up or down, or requests current volume setting
Preset Control	#PSn\$, #PS?\$	1, 2, 3, 4	#PS1\$, #PS2\$ #PS3\$, #PS4\$, #PS?\$	Activates the indicated preset, or requests the current preset
Logo Light Control	#LTn\$, #LT?\$	0: Light Off 1: Light On	#LT0\$ #LT1\$ #LT?\$	Turns the Logo Light on or off, or requests light state
Night Mode Control	#NMn\$, #NM?\$	0: Night Mode Off 1: Night Mode On	#NM0\$ #NM1\$ #NM?\$	Activates/Deactivates Night Mode, or requests light mode state
Mute Control	#MUn\$, #MU?\$ #MU0\$	0: Mute Off 1: Mute On	#MU1\$ #MU?\$	Mutes/Unmutes the woofer, or requests mute state
Power Control	#JUn\$, #JU?\$	0: Power Off 1: Power On	#JU0\$ #JU1\$ #JU?\$	Powers On/Powers Off the woofer, or requests power state

FOR YOUR RECORDS. . .

Date Purchased _____

Dealer _____

Serial # _____

*NOTE: Please complete and return your warranty card within ten (10) days or

Register. . . ON LINE . . . It's faster . . . and easier

www.velodyne.com

LIMITED WARRANTY - U.S. AND CANADA ONLY

VELODYNE ACOUSTICS, Inc. ("VELODYNE") warrants all electronics for a period of three years, drivers for a period of five years, and full range speakers for a period of five years. All VELODYNE products have a warranty from the date of purchase against defects in materials and workmanship subject to the following conditions:

1. VELODYNE is not responsible for defects which result from the use of an amplifier or controller other than the one originally supplied with the unit (subwoofer) or defects which result from modifications or repairs made by any component of the system by anyone other than a VELODYNE factory authorized service representative.
2. This warranty is void if any repairs or service covered by the terms of this warranty are made to any component of the system by anyone other than a VELODYNE factory authorized service representative.
3. VELODYNE is not responsible for damage caused by accidents, abuse, misuse, natural or personal disaster or unauthorized modification. The VELODYNE products are not intended for professional or commercial use and VELODYNE is not responsible for damage resulting from such use.
4. The VELODYNE product warranty is limited to units that are purchased from authorized VELODYNE dealers and finalized within authorized dealer locations.
5. This warranty is nontransferable under any condition.
6. Use of this product outside the U.S. and Canada voids this warranty.

TO OBTAIN SERVICE

Information regarding service may be obtained from the dealer from whom you purchased the unit, or by contacting VELODYNE customer service. Warranty service must be performed by a VELODYNE factory authorized service representative within the warranty period set forth above. If VELODYNE determines the unit is defective, VELODYNE will, at VELODYNE's option, repair or replace the product at no charge if the product is forwarded prepaid to a factory authorized service representative. Products forwarded to the factory authorized service representative should be shipped securely and properly packaged, insured and freight prepaid.

WARRANTY OUTSIDE THE UNITED STATES AND CANADA

The Warranty of this product if it is sold to a consumer outside of the United States or Canada shall comply with applicable law and shall be the sole responsibility of the distributor that supplied this product. To obtain any applicable warranty service, please contact the dealer from which you purchased this product, or the distributor that supplied this product.