

Chameleon TV



User Guide

Angry Audio



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Welcome to the world of Angry Audio, home of Audio Chameleon.

Since the beginning of time, man has sought to control the sounds of his environment. The ancient Greeks built amphitheaters to keep the chorus out of the red, medieval town criers begged for a decent limiter, and early settlers of the Great Plains had a deep desire for flat response (get it?).

Ahem. Engineers from the dawn of broadcasting have sought to tame the dynamics of their content with ever-improving technology. The first analog limiting amplifiers gave way to multi-band processing, which in turn was supplanted by DSP. But getting the basics right and sweating the details — those things will never be obsolete.

A good studio is built by including components that make it a convenient and enjoyable place to create the content that dazzles your audience, drives traffic to your advertisers, and lets you keep the summer place in Jackson Hole. Accordingly, every Angry Audio product — including this Chameleon audio processor — is designed to solve common yet critical problems, and is meticulously engineered with performance and longevity in mind to deliver pristine audio and reliable performance for many years.

Our promise and guarantee.

Folks who install Angry Audio products generally think they're the bee's knees, and we hope you'll feel the same. That's why we give you 45 days to get properly acquainted with your Chameleon audio processor. If the two of you can't agree on which armrest is whose, we'll buy it back.

Every Angry Audio product is warrantied to be free from defects in parts and workmanship for two full years after you purchase it. If it fails within this time period, Angry Audio, at its discretion, will repair or replace it so long as you let us know of the failure within the warranty period and can provide proof of purchase in the form of a dated sales receipt. You can call us at +1 615-763-3033, or reach us online at www.angryaudio.com/contact.

Making a good first impression.

When you unbox your CTV, we really hope it makes a good first impression and you take a moment to appreciate the lengths we've gone to in order to create a "built for broadcast" product. All of our products are over-engineered to provide long-term reliability and guaranteed RFI immunity. Some of this is apparent — such as the durable powder-coated steel enclosure — but much of this goodness is invisible, like the premium components within. Even if you can't see it, you'll hear it!

A word or two about safety.

The fact that you've purchased an Angry Audio product proves without doubt that you're an intelligent person — not the sort who would dry a wet smartphone in the microwave, or check a propane tank for leaks with a lighter. Nevertheless, our legal eagles tell us we must provide some boilerplate in order to guard against the unexpected.

Audio gadgets aren't nuclear generating stations or air traffic control consoles, but they are still intended for use by qualified personnel. To avoid electric shock, do not open the unit or attempt to perform any servicing unless you are qualified to do so.



Chameleon audio processors have an internal 120VAC / 240VAC power supply. Hazardous voltages are present whenever the unit is plugged in and may still be present on certain components even when the unit is unplugged. The power cord is the primary disconnect device and so the outlet providing power to the unit should be easily accessible. In other words, make sure you can pull the plug in case of emergency. Use only a properly grounded outlet for power. Do not cut the ground pin or use a ground-lifting adapter, and do not defeat the polarized plug. Do not overload outlets.

Do not expose your Chameleon to rain or moisture. Do not block any ventilation openings, as lack of airflow could damage the unit or create a fire hazard. Any electronic device can fail without warning; do not use this product in applications where a life threatening condition could result due to failure.

Exercise caution with headphone volume. Permanent hearing damage may result from excessive volume.

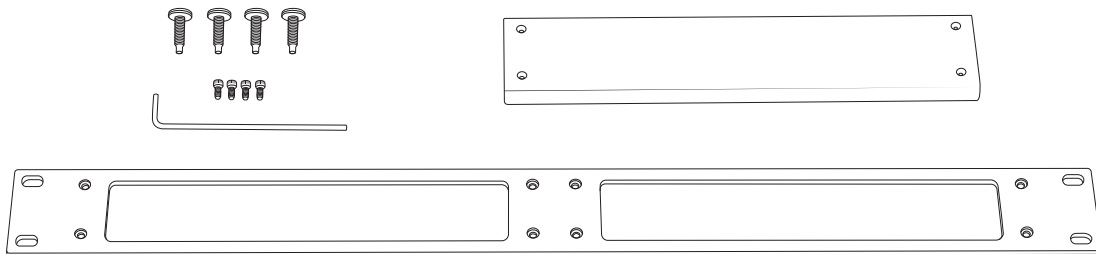
Do not challenge a goose to a staring contest; the goose has nothing to lose and knows it. And for heaven's sake, donate that acid-washed denim jacket from 1987. The eighties called. They don't want it back either.

Mounting your Chameleon in a rack.

Your Chameleon audio processor sits on four rubber feet that ensure it stays put when the master control chair takes the corner a little hot.

If you prefer to rack mount your Chameleon, you'll need the optional Rack Mount Kit which allows one or two units to be installed side by side in a standard 1RU rack space.

Each Rack Mount Kit consists of a custom rack panel with cutouts for all front panel controls and displays. A blank filler panel is also provided if you are mounting only one unit.



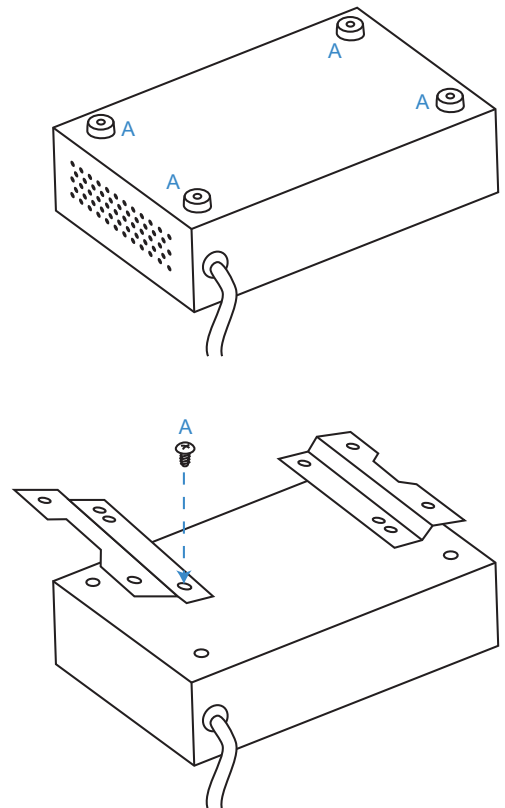
When rack mounting, remove the four rubber feet ("A") from the bottom of the gadget with a #1 Phillips screwdriver.

Remove the four front panel 3/32" hex screws ("B"). You can rummage around your toolbox for your own hex key, or use the one we thoughtfully provide in the mounting kit.

Line up the Chameleon so that the holes exposed after removing the socket head screws line up with the mounting holes ("C") in the rack panel.

Attach the rack panel to the front of your unit with the same screws you just removed. If you dropped one and it immediately got lost in the shag carpet (as these things always do), don't panic – we've included spares in the kit.

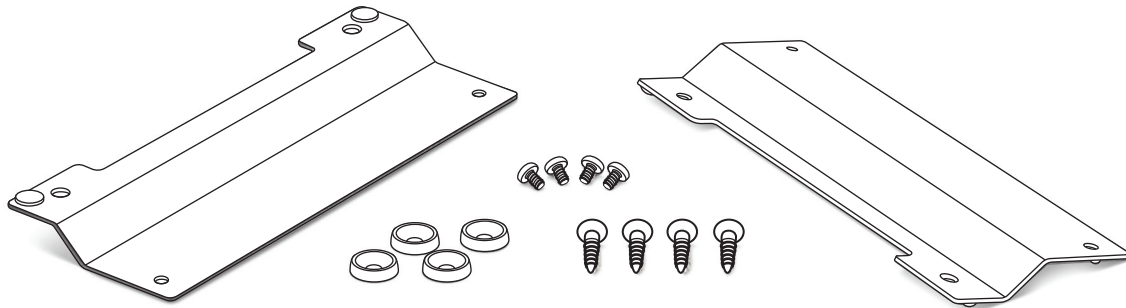
Finally, use the provided rack screws (all four, please) to mount your Chameleon.



Attaching your Chameleon to a wall.

Wall-mounting an audio processor is a bold decorating statement, but we don't judge. If you prefer to secure your unit to the inside of a rack, cabinet, or other flat surface, the optional Wall Mount Kit comes in handy.

Each Wall Mount Kit includes two brackets, four No. 6 screws, and four cup washers.

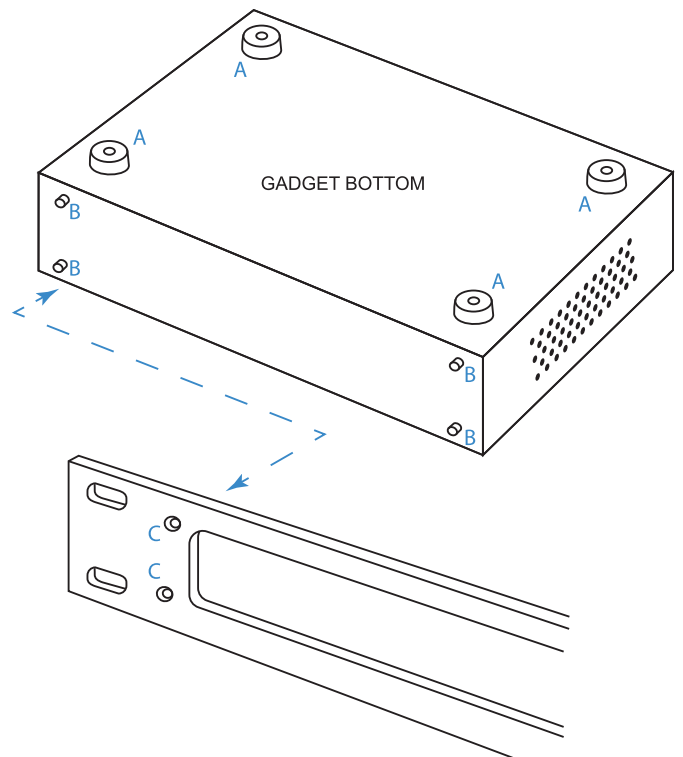


Remove the four rubber feet ("A") from the bottom of the gadget with a #1 Phillips screwdriver, being careful to save the screws.

Align the bracket holes with the holes in the bottom of the gadget, then attach the brackets using the screws removed from the rubber feet.

Use the four No. 6 screws ("B") and the four cup washers ("C") to secure the gadget to a plywood surface. Drilling pilot holes is recommended to reduce the risk of splitting the wood.

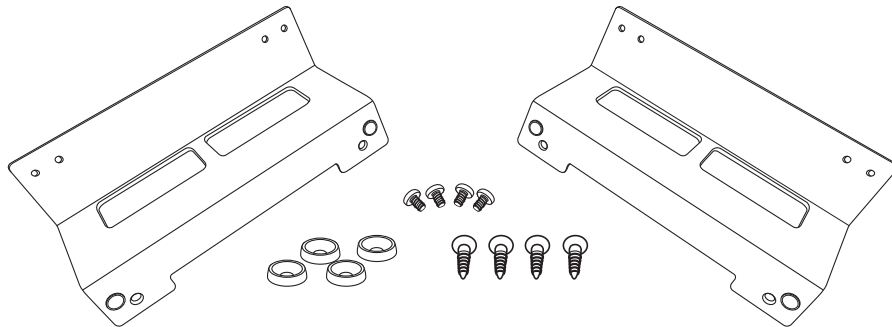
Different hardware (not supplied) will be required if you are mounting the gadget to a drywall (or other) surface.



Mounting your Chameleon under a counter.

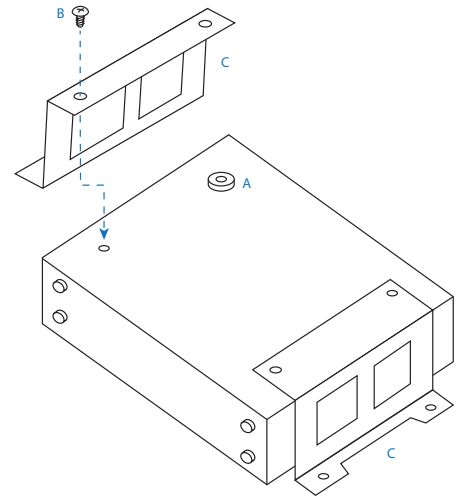
Your Chameleon can be mounted under a counter, desk, or table using the optional Under Counter Mount Kit.

This kit includes two brackets, four No. 6 wood screws, and four cup washers suitable for mounting to a plywood surface. Different hardware (not supplied) may be needed if the mounting surface is a different material.

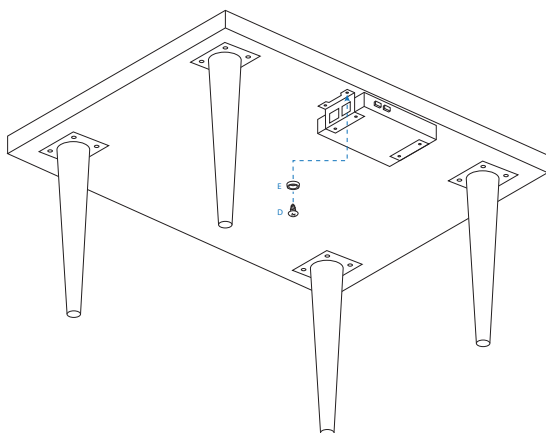


Remove the four rubber feet ("A") from the bottom of the unit using a #1 Phillips screwdriver, being careful to save the screws.

Line up the brackets ("C") so that their mounting holes line up with holes exposed after removing the rubber feet. Orient the brackets as shown in the diagram to the right so that the deeper flat side supports the gadget and the "notched" side faces the under-mount surface.



Use the pan-head screws ("B") removed from the rubber feet to secure the brackets to the gadget.



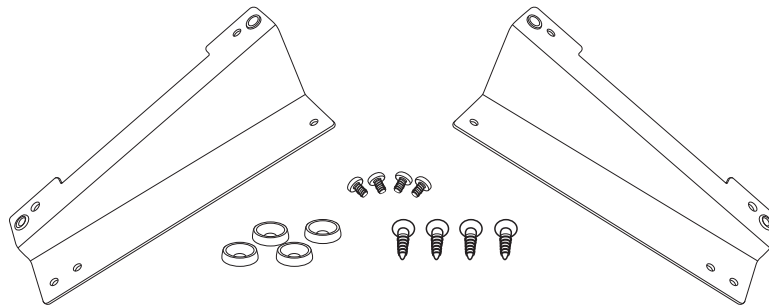
Use the four provided No. 6 screws ("D") and the four cup washers ("E") as shown in the diagram to the left to secure the gadget to the plywood underside of the counter, desk, or table.

Drilling pilot holes is recommended to reduce the risk of splitting the wood.

Using your Chameleon on a desktop.

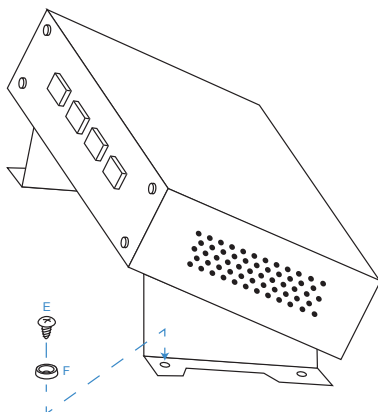
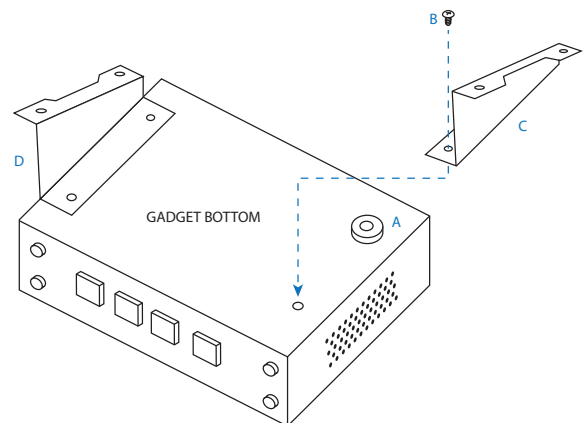
If you like the idea of using the Chameleon on a desktop but prefer a more permanent installation along with the convenience of having it angled up toward the user, we've got you covered with the optional Desktop Bracket Kit.

This kit includes two brackets, four No. 6 wood screws, and four cup washers suitable for mounting to a plywood surface. Different hardware (not supplied) may be needed if the mounting surface is a different material.



Remove the four rubber feet ("A") from the bottom of the unit using a #1 Phillips screwdriver, being careful to save the screws.

With the bottom of the Chameleon facing up and the front panel facing toward you, line up bracket "C" with the holes exposed after removing the feet on the right side of the gadget. Orient the bracket as shown in the diagram to the right so that the flat side is attached to the unit, and the "notched" side sticks up with the notch facing outwards. Use the pan-head screws ("B") removed from the rubber feet to secure the brackets to the unit.



Use the four provided No. 6 screws ("E") and cup washers ("F") as shown in the diagram above to secure the gadget to a plywood surface.

Drilling pilot holes is recommended to reduce the risk of splitting the wood.

Targeted loudness control for television.

You're familiar with the problem: dialog mumbles, the soundtrack swells, and then a commercial break arrives like a marching band through the living room. You've watched your meters like a hawk and kept every peak politely below 0 dB — yet the perceived loudness still swings like a screen door in a windstorm.

That's because your peak meter measures voltage, and loudness standards measure loudness. Related? Sure. Interchangeable? Not even close. (For the full story, see "About LUFS" later in this guide.)

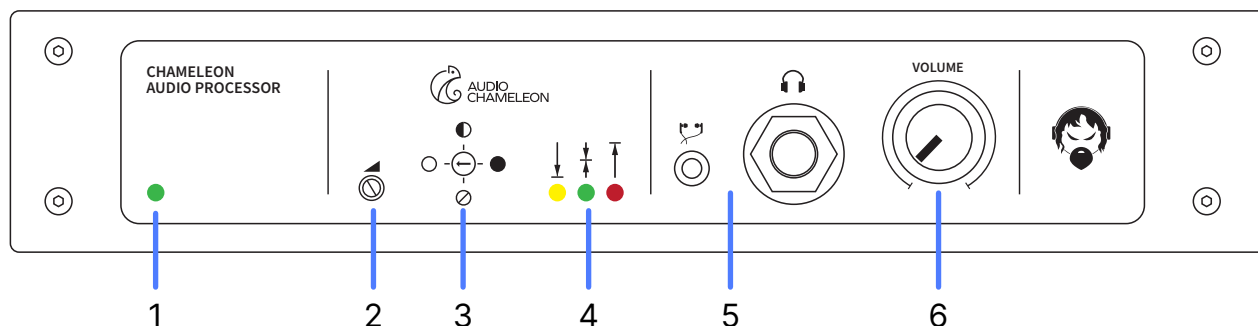
Broadcasters fix this problem with program audio processors that use a combination of signal modification tools to shape sound and control loudness — the usual acre of knobs, buttons, meters and spectrographs. You could spend years learning how to set up one of these devices. But who's got the patience? All you want is consistent, compliant sound.

Chameleon TV gives you exactly that. The Chameleon multi-band processing engine listens to your incoming audio and continually adjusts its own parameters to fit the content. No thresholds to set. No attack and release to tune. No need for the expert — just hook it up, flip a few switches, and Chameleon gets right to work.

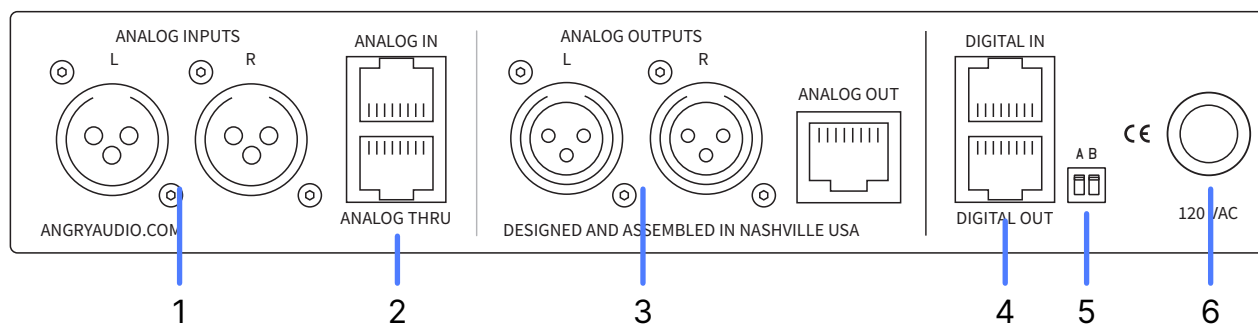
Chameleon processing is the work of Cornelius "Corny" Gould, Angry Audio's processing architect — the engineer behind the legendary Omnia.11 and a member of the AES Broadcast and Online Delivery committee. Corny spent decades designing and tuning broadcast processors. Then he built one that does it for you. Chameleon makes the moves a veteran processing engineer would make, except it never gets bored, never gets distracted, and never goes home.

CTV features our precision loudness controller. Run it calibrated at -24 LUFS for ATSC A/85 (CALM Act) compliance, or set any target from -24 to -16 LUFS to cover EBU R 128, streaming platforms, and everything in between. Dialog stops mumbling. Music emotes. Effects don't send anyone scrambling for the remote. Commercials behave. Finally.

Controls & Connections



1. **Power LED.** Green means go.
2. **Calibration trimpot.** With the rear Loudness Switch up, this trims output level. With the switch down, it adjusts your LUFS target between -24 and -16. See “Operation.”
3. **Density selector.** Three processing density settings, plus bypass.
4. **Activity LEDs.** Processing, gating and clipping indication. See “Operation.”
5. **Headphone jacks.** ¼" and 3.5mm, driven by our exclusive headphone amplifier circuitry — happy with high or low impedance headphones. The jacks are mutually exclusive.
6. **Volume control.** Adjusts headphone level for both jacks.



1. **ANALOG INPUTS.** Balanced stereo on XLR-F and StudioHub+ RJ45.
2. **ANALOG THRU.** Parallel to the analog input — daisy-chain the same source to other devices.
3. **ANALOG OUTPUTS.** Balanced stereo on XLR-M and StudioHub+ RJ45 (StudioHub+ jack includes ±15VDC for compatible devices).
4. **DIGITAL IN / DIGITAL OUT.** AES/EBU on StudioHub+ RJ45.
5. **DIP switches A and B.** The Loudness Switch and the Dialog Enhancer. Read further for details.
6. **Power.** Internal supply with a 6-foot cord. No wall wart. You're welcome.

Connect your audio.

Chameleon TV has both analog and digital (AES/EBU) inputs and outputs. Input selection is automatic: simply connect to your choice of inputs. If the AES and ANALOG connections are used simultaneously, the AES input has priority and CTV will use that audio. If the AES input falls silent for more than 20 seconds, CTV switches to the ANALOG inputs. This is useful for setting up automatic failover to a backup (analog) input — a free redundancy feature, courtesy of the management.

Best performance is achieved using the digital input and output on StudioHub+ RJ45 connectors.

Working in SDI?

CTV is a stereo audio device, but it plays happily in a video plant. Sandwich it between a pair of Blackmagic Design Mini Converters: an SDI to Audio converter de-embeds your audio and feeds it to CTV via AES/EBU, CTV does its thing, and an Audio to SDI converter re-embeds the processed audio. Run a BNC from the first converter's SDI OUT to the second converter's SDI IN to carry the video through. Your feed comes out the other side loudness-compliant — video untouched, audio under control.



Sandwich the CTV between a pair of Blackmagic Mini Converters and your SDI comes out the other side compliant — video untouched, audio under control. Blackmagic Design Mini Converters sold separately.

The DIP switches.

Find the DIP switches on the rear panel, adjacent to the line cord.

Switch A is the Loudness Switch.

UP: calibrated mode — your output loudness is fixed at -24 LUFS for ATSC A/85 (CALM Act) compliance, and the front-panel trimpot acts as an output level trim. DOWN: adjustable mode — the front-panel trimpot sets your loudness target anywhere from -24 to -16 LUFS.

Switch B is the Dialog Enhancer.

UP: engaged. DOWN: disengaged. The Dialog Enhancer improves speech intelligibility and consistency on most program material. This one's to taste: we suspect most users will prefer it engaged, but if your content is mostly music, try it both ways and trust your ears.

The activity display.

- The **amber** LED at left is the Gain Lock indicator — processing is frozen and gating is active.
- The **green** LED at center tells you the processing section is engaged and audio is actively being processed.
- The **red** LED at right tells you your audio is overdriving CTV's inputs and clipping is occurring. Reduce input gain until the LED darkens.

Headphones.

Plug into either the 1/4" or 3.5mm front-panel jack (they're mutually exclusive) and set your listening level with the Volume knob. Our headphone amplifier will drive high or low impedance headphones without complaint.

Feed other devices.

The ANALOG THRU connector is useful for daisy-chaining the same input source to multiple devices. The ANALOG OUT StudioHub+ RJ45 provides audio and $\pm 15\text{VDC}$ to certain types of connected devices.

Processing controls.

Chameleon TV is so easy to use that there's hardly any tweaking to do. Put the tweaker back in the drawer with the burnishing tool and the spare U-matic heads; they've earned their rest. Choose your desired audio processing mode using the selector switch on the front panel:

- The 6 o'clock position (□ symbol) is **Bypass** mode. This allows you to compare processed audio with unprocessed audio during setup.
- The 9 o'clock position (○ symbol) selects **Open** processing — the lightest setting, with good dynamic range and a light amount of smoothing.
- The 12 o'clock position (◐ symbol) selects **Medium** processing — a good amount of audio density, and probably the setting most users will prefer.
- The 3 o'clock position (● symbol) selects **Dense** processing — the most processed setting, delivering the most consistent loudness.

Setting the loudness target.

The Loudness Switch (rear DIP switch A) and the Calibration trimpot on the front panel work together.

- **Calibrated mode (switch A up):** output loudness is fixed at -24 LUFS — dialed in at the factory for CALM Act / ATSC A/85 compliance. In this mode the trimpot functions as an output level trim.
- **Adjustable mode (switch A down):** the trimpot sets the loudness target. It's a multi-turn screw without end-stops: 20 turns (or more) clockwise sets the target to -16 LUFS; 20 turns (or more) counter-clockwise sets it to -24 LUFS. To hit a target inside the range — say, -23 for EBU R 128 — you'll need a LUFS meter downstream while you adjust. We recommend the free Youlean Loudness Meter software.

“What is LUFS and why should I care?”

Good question! LUFS stands for Loudness Units relative to Full Scale. It's a standardized way to measure the perceived loudness of audio content. Instead of just watching for the loudest bits of audio and squeezing them down, LUFS looks at the overall loudness of your content, providing an accurate representation of how loud something sounds to viewers' ears.

A LUFS meter tracks two things your peak meter ignores. First, frequency: humans don't experience loudness equally across the spectrum — we tolerate loud bass far more easily than loud cymbals — so the meter filters the signal to match perceived sensitivity. Second, time: a single drum hit might be many times louder than a shrieking guitar, but its short duration means we don't perceive it as loud. The meter averages accordingly. That's why audio that “looks fine” on a peak meter can still be miles off its loudness target.

Keep in mind, LUFS is not equivalent to dB — they are entirely different units, and loudness compliance can only be verified with a LUFS meter. (You may also see “LKFS.” Same thing, different naming convention.)

Loudness targets that matter for TV and streaming:

- Broadcast TV, USA: -24 LUFS (ATSC A/85, mandated by the CALM Act)
- Broadcast TV, Europe: -23 LUFS (EBU R 128)
- Streaming platforms: about -16 LUFS (AES streaming recommendations; individual platforms vary)

Miss the platform's target and they'll normalize your audio for you — kind of like letting the airline repack your suitcase. Everything arrives, just not the way you packed it. Deliver at the right loudness, and your content sounds the way you intended on the other end.

For more about LUFS, loudness and levels, read Cornelius Gould's white paper [Audio Loudness in the Age of Digital Media](#), a free download from our site.

Specifications

Part numbers

North America	120VAC, US plug	p/n 991038
Australia	240VAC, AU plug	p/n 991038A
Europe	240VAC, EU plug	p/n 991038E
United Kingdom	240VAC, UK plug	p/n 991038U

Included in the box

Chameleon TV Processing Gadget, pocket trimpot adjustment tool, and a power cord (permanently attached to the gadget, but technically in the box).

Audio Performance

Nominal level:	+4 dBu — Analog in and out
Maximum level:	+24 dBu — Analog in and out
Latency:	4 ms — Input to output, all modes
Loudness measurement:	ITU-R BS.1770 — Basis of A/85, R 128, AES

Connections

Analog Input:	balanced +4dBu stereo, XLR-F and RJ45F (StudioHub+ pinout)
Analog Through:	parallel to Analog Input (StudioHub+)
Analog Output:	balanced +4dBu stereo, XLR-M and RJ45F (StudioHub+ includes $\pm 15\text{VDC}$)
Digital Input:	transformer isolated AES/EBU, RJ45F (StudioHub+), ASRC, 44.1kHz to 48kHz sampling rate
Digital Output:	transformer isolated AES/EBU, 48kHz S/R, RJ45F (StudioHub+)

Power and environmental

Power Input:	120VAC 50/60Hz (North America Version) 240VAC 50/60Hz (Australia, Europe, U.K Versions)
Power Consumption:	15VA
Operating Temp.:	0° to 40° C (32° to 104° F)
Storage Temp.:	-20° to 45° C (-4° to 113° F)
Relative Humidity:	0% to 90% non-condensing
Cooling:	Venting chassis (fanless)

Product Dimensions

Product Dimensions:	8.5 × 6.25 × 1.7 inches (21.6 × 16 × 4.32 cm)
Product Weight:	3.5 pounds (1.59 kg)

Shipping Weight & Dimensions

Shipping Dimensions:	12 × 9 × 6 inches (30.5 × 22.9 × 15.3 cm)
Shipping Weight:	5 pounds (2.27 kg)

Compliance in the U.S.

In the U.S., this Gadget complies with the limits for a Class A computer device as specified by FCC Rules, Part 15, Subpart J, which are designed to provide reasonable protection against such interference when this type of equipment is operated in a commercial environment.

...and in Canada.

CAN ICES-3 (A) / NMB-3 (A) This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

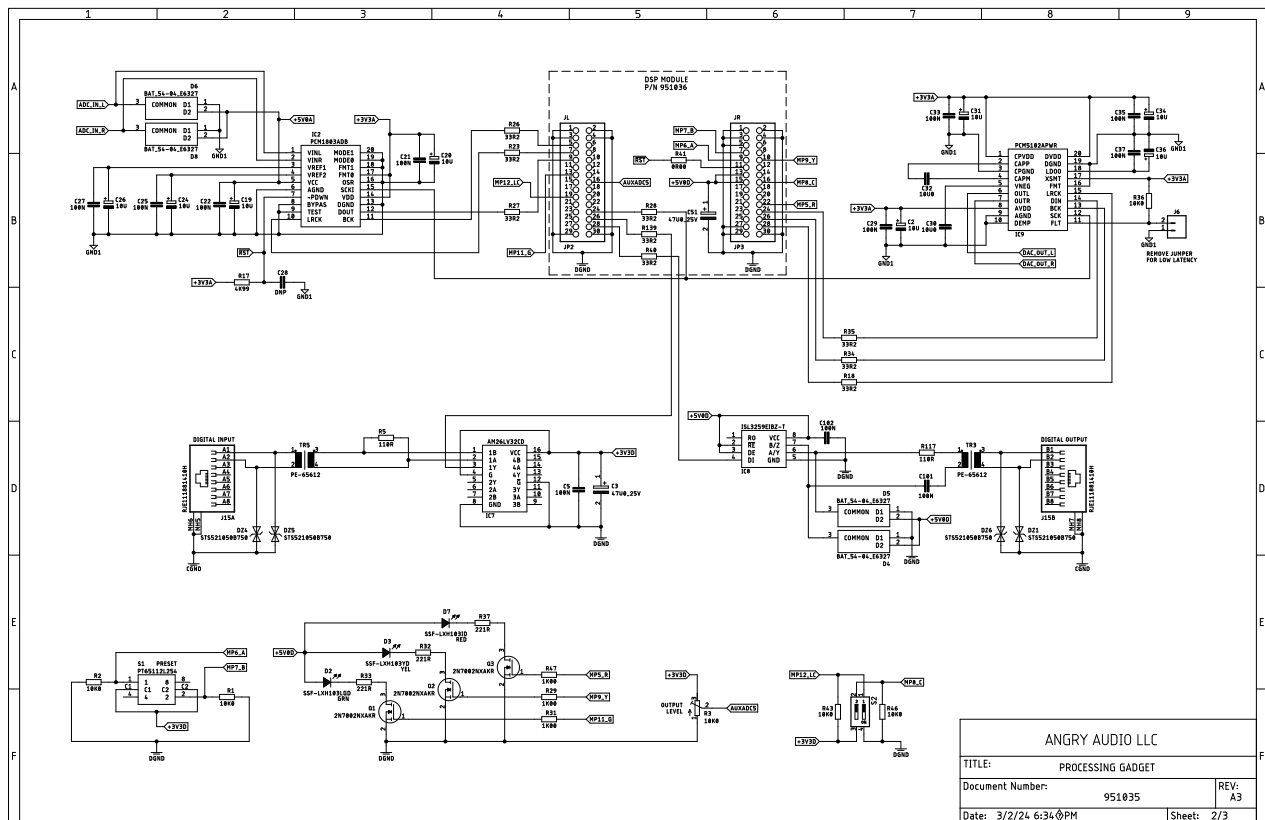
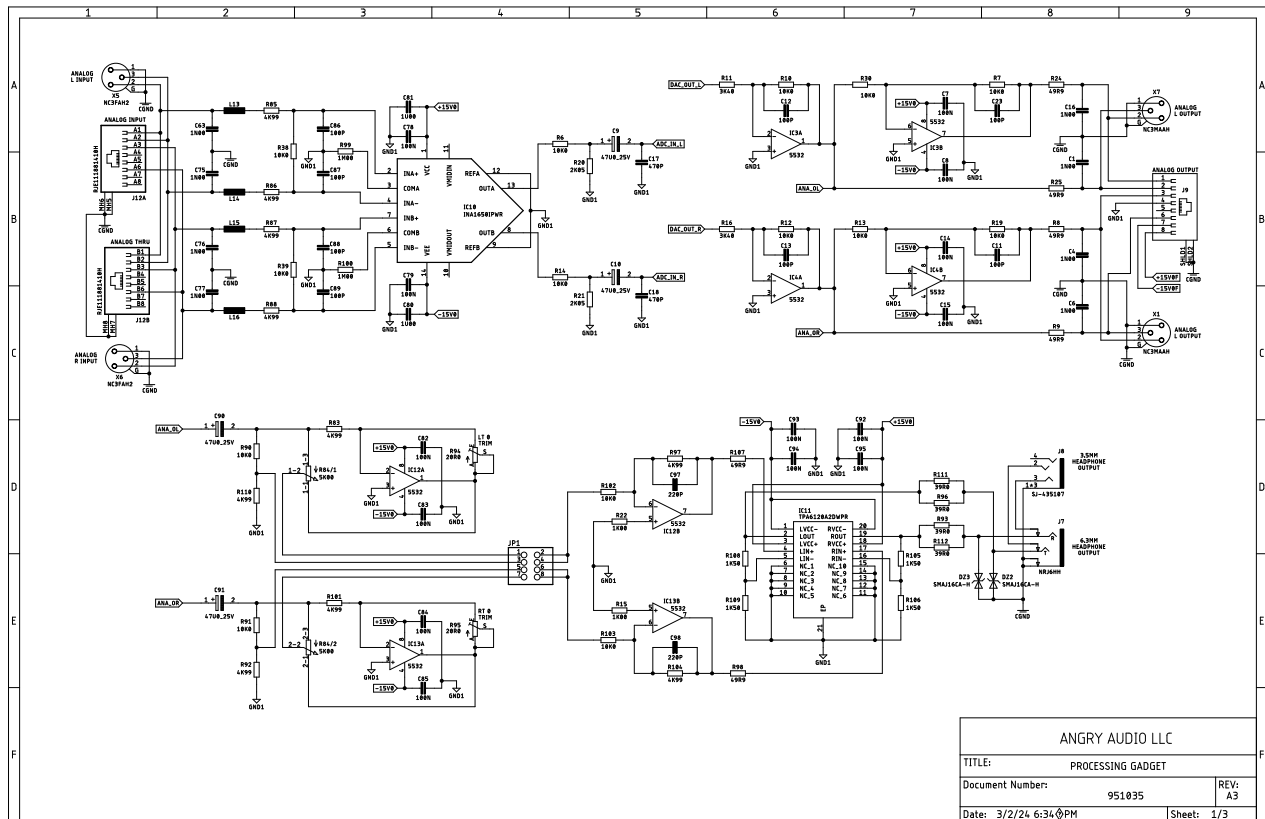
...and in Europe.

This Gadget complies with the requirements of the EEC Council Directives 93/68/EEC (CE Marking), 73/23/EEC (safety – low voltage directive), and 89/336/EEC (electromagnetic compatibility). Conformity is declared to standards EN50081-1 and EN50082-1.

...and in Oz.

This Gadget complies with all directives issued by the Wizard, provided nobody looks behind the curtain. No flying monkeys were involved in its development.

Schematics



Schematics

