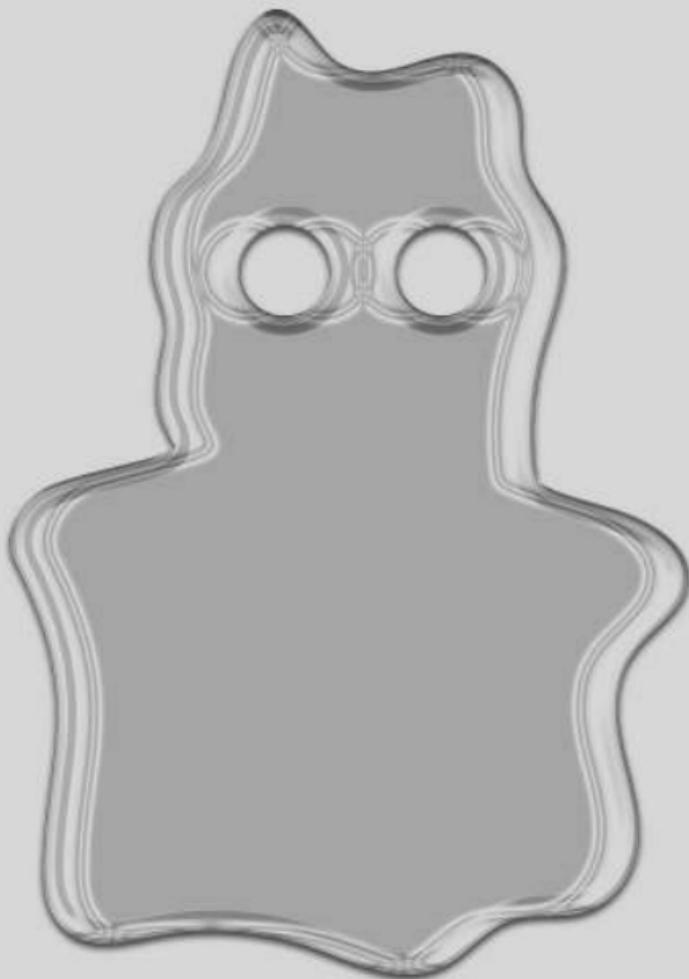


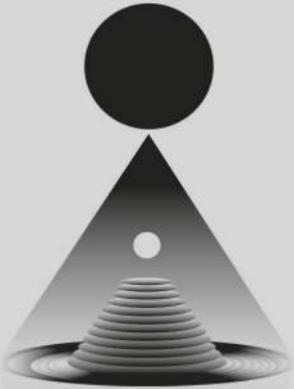
# DARK MATTER

## FEEDBACK OBSERVATORY

# ENSPEA BASTL



# DARK MATTER



CASPER BASTL



IS A VOLTAGE CONTROLLED AUDIO FEEDBACK MODULE INSPIRED BY THE MISUSE AND ABUSE OF DESKTOP AUDIO MIXERS... AND SPACE

## WHY FEEDBACK?

Feedback occurs when a system listens to itself. The impact of the feedback can be generally defined as negative or positive where negative feedback calms the system and positive feedback excites it.

DarkMatter is a system that uses positive feedback to excite audio energy. It does this by sending an audio signal into an amplifier that is then fed back into itself to be re-amplified, then back into itself to be re-amplified and so on. If there were NO limits on this circuit the amplitude would increase forever and it would destroy everything. But it won't. It can only amplify up to the breaking point of the circuit. Not literally breaking, but it's the point at which it can no longer do what's being asked of it. And this point is where a lot of interesting things happen. Things get messy, audio information gets lost, noisy information gets found.

Meanwhile the feedback amplifier is having an existential moment listening to itself, amplifying its own silence over and over. Going deeper and deeper into the void. Eventually that silence turns into something. It becomes the sound of the circuit itself, its own resonant frequency.. It's a really big topic but suffice it to say it makes an audible oscillating tone. The character of the tone can

be tweaked by adding a volume control and equalizer into the loop.

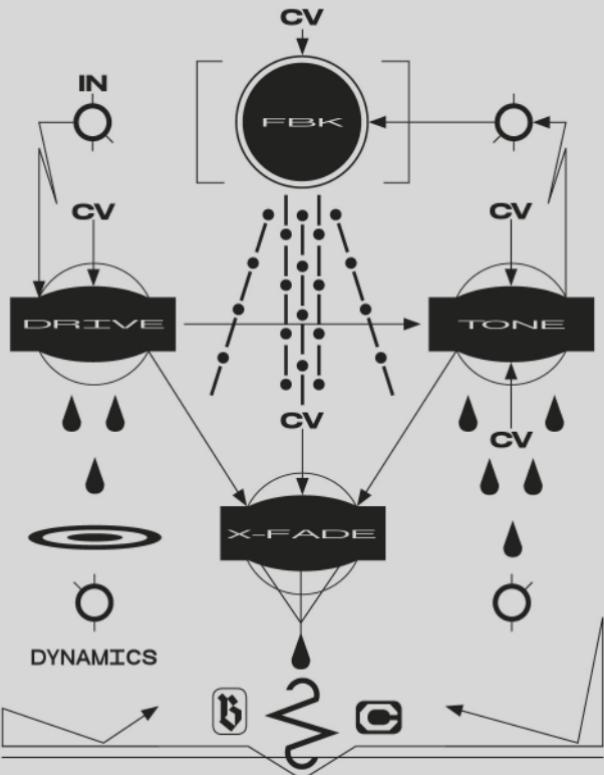
So here's what it all comes down to, the resonating soul of the amplifier and the recklessly over amplified external audio signal battling it out in the feedback thunderdome. Now that there are two signals blasting around the feedback loop they have to fight for control of the bandwidth. As the external audio pushes in the signals crush together filling the space around each other. Eventually it pushes hard enough and the oscillation dies. But as soon as it steps back the feedback tone rushes back in. This is why I like to think of audio feedback as sort of the negative space around a sound, like a sonic shadow. A dark counterpart. Or like the roots of a tree even, a sort of complex dirty reflection of its other half. I also talk about it like it's a wild animal a lot. A little crazy and untamed. And like a cosmic banshee emerging from the dead blackness of ancient space. The analogies get thrown around fast and free here but the point is that feedback has a magic zazz to it that defies easy explanation. It's evocative and deep and kind of awful and totally beautiful and I think it should be enjoyed.

-Casper

DARK MATTERRRRRRRRR  
RRRRRRRRRRRRR.

DRIVE  
DYNAMICS  
TONE  
FBK  
¤ X-FADE

Dark Matter has five parts that come together to form a feedback tweaking ecosystem where the pieces push and pull on each other and fight to survive. Their shared goal is to unleash the crazy power of audio feedback and to then give you a bunch of tools to tame and control it, CV it, sync it and play it.



# DRIVE

VCA PREAMP with soft-overdrive for shaping and modulating your main input signal.

## 1A SIGNAL INPUT JACK

Input to DRIVE VCA. Applies x3 gain and soft clipping at +/-5V.

## 1B DRIVE FADER

Set the volume and overdrive.

## 1C DRIVE CV INPUT JACK

Apply CV modulation to the drive level.

CV range = +/-5V

## 1D DRIVE CV POT

Attenuate CV from the input jack.

# DYNAMICS

AN ENVELOPE FOLLOWER. Tracks the INPUT signal and generates a CV envelope that represents its pitch and loudness. The envelope is used for tweaking the feedback but also has a dedicated output jack for external routing. It is internally normalised to the X-FADE and FBK CV input. Here it can be adjusted to control signal ducking and gating as well as tone and pitch modulation. It works especially well when tracking drum beats.

\*NOTE!\* The follower has a low pass filter on the input. This makes it more sensitive to low frequencies so it can pick out the kick in your drum signal or track the pitch of a melody.

SIGNAL IN



ENVELOPE OUT



## 2A DRY/DRIVE SWITCH

Choose the audio source for the DYNAMICS follower pre or post DRIVE VCA (i.e. pre or post DRIVE fader and DRIVE CV input).

## 2B DECAY SWITCH

Set the decay length of the envelope from snappy to sluggish.

## 2C DYNAMICS OUTPUT JACK

Envelope output. Range 0/+5V.

# TONE

BASS AND TREBLE TONE SHAPING. A 2 band equalizer that shapes the combined signals from the DRIVE and the FEEDBACK stages. The BASS and TREBLE faders cut into the sound while the BASS and TREBLE BOOST knobs add overdrive and saturation. Specially designed to work with overdriven feedback signals.

## 3A BASS FADER

Set the BASS level.

## 3B BASS BOOST POT

Amplifies and saturates the BASS signal.

## 3C BASS BOOST CV INPUT JACK

Apply CV modulation to the BASS BOOST level.

Un-attenuated input.

CV range = +/-8V.

## 4A TREBLE FADER

Set the TREBLE level.

## 4B TREBLE BOOST POT

Amplifies and overdrives TREBLE signal.

## 4C TREBLE BOOST CV INPUT JACK

Apply CV modulation to TREBLE BOOST level.

Un-attenuated input.

CV range = +/-8V.

## 6 HYPER DRIVE SWITCH

Increases the amplitude of the DRIVE signal as it enters the TONE section. Used to amplify and distort the DRIVE signal so it can cut through "hot" saturated feedback.

## DARK MATTER

FEEDBACK OBSERVATORY

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# FBK

CONTROLS THE INTENSITY OF YOUR FEEDBACK LOOP.  
FBK is a VCA that takes the TONE output, filters it a little to make it friendlier for feedback purposes and then sends it back into the TONE input. This creates the feedback loop. The character and impact of this loop on your final output signal depends on many things: the density and DRIVE of your input signal, the amplitude of the FEEDBACK loop itself and especially the BASS and TREBLE settings. CV everything! Add other elements (echo/chorus/etc.) into the FEEDBACK loop patch by using the FBK OUT and FBK IN jacks.

## 6A FBK FADER

Set the amplitude of the feedback loop. This will have effects ranging from drastic tone shaping of the input signal to resonant oscillating and frequency tuning.

## 6B FBK CV INPUT JACK

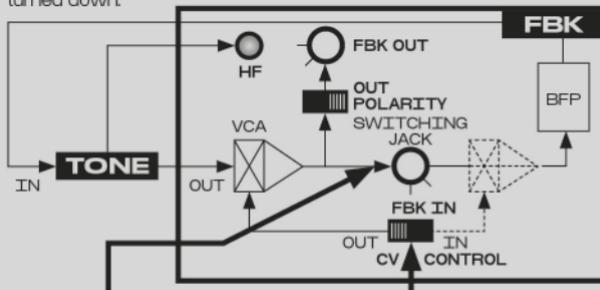
Apply CV modulation to FBK level. The jack is normalised to the DYNAMICS output. Plugging in a patch cable breaks normalisation. CV range = +/-5V.

## 6C FBK CV POT

Attenuvert CV signal from FBK CV input jack. CV signal is fully attenuated when the knob is at 12 o'clock. Turning left applies inverted modulation. Turning right applies NON-inverted modulation.

## 7 HF WARNING LED

Indicates that there is sustained high frequency content present in the FBK signal. Flashing, pulsing and glowing is fine, but if the light is very bright and steady then it's a good sign something should be turned down.



This is where the loop is. When you plug into the FBK IN jack it breaks the loop!

Move the FBK VCA from the input to the output.

# EXT FBK

## EXTERNAL FEEDBACK TOOLBOX

Why keep all that feedback in one place? Use the EXT FBK section to extend your feedback loop out of Dark Matter and into the world... and back. Patch through external audio FX or go nuts and patch through the CV ins and outs of VCOs. Maybe that VCO should modulate an LFO patched to the FBK CV. Use all 7 input jacks on DarkMatter to make weird, multi-tentacled feedback things.

## 9A FBK IN AND 9B FBK OUT JACKS

Use these jacks to make external feedback loops.

The FBK OUT signal is normalised to the switching terminal of the FBK IN jack; this is where the internal feedback loop happens. Plugging in a cable will break the connection, which in turn breaks the feedback loop. The loop can then be re-patched through other modules OR the FBK IN jack can simply be used as a second input to the TONE section. In this scenario Dark Matter becomes more of a VCA crossfading, tone shaping, wave wrangler.

## 9C OUT POLARITY SWITCH

Invert the polarity of the output signal from the FBK OUT jack.

This is used to correct any polarity inversion that may occur when patching through external modules. If there is no inversion then the switch should remain in the "+" position.

## 9D CV CONTROL SWITCH

Choose to control the level of the signal coming IN to the FBK IN jack or OUT of the FBK OUT jack. The level is controlled with the FBK fader and CV controls.

The UN-selected channel defaults to full amplitude (no attenuation). This is useful when making feedback loops with echo and reverb, and in unconventional feedback patches.

\*NOTE!\* If the feedback loop is disconnected and you are using FBK IN as a second input to TONE, make sure to set CV CONTROL to IN so you can use the FBK fader and CV to control the FBK IN level.

## X-FADE

Crossfade between the clean signal and the fed-back craziness. Works well with the DYNAMICS section. Use the dynamics of your incoming audio signal to play your mix.

### 8A X-FADE FADER

Fade between clean INPUT and fed-back TONE

### 8B DRIVE/DRY SWITCH

Set the X-FADE INPUT signal to the direct INPUT(clean) or post-DRIVE (post fader and CV).

### 8C X-FADE CV INPUT JACK

Apply CV modulation to the X-FADE mix.

The jack is normalised to the DYNAMICS output. Plugging in a patch cable breaks the normalisation. CV range = +/-5V.

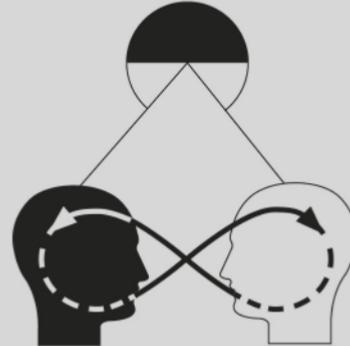
### 8D X-FADE CV POT

Attenuvert CV signal from the X-FADE CV input jack.

CV input signal is fully attenuated when the knob is at 12 o'clock. Turning left applies inverted modulation. Turning right applies NON-inverted modulation.

### 8E X-FADE OUTPUT JACK

Buffered output from the crossfader signal mixer.



INFINITY

DARK MATTER

## DUDE WHY ISN'T MY FEEDBACK LOOPING?

¶It's important to maintain a positive (in phase) feedback loop. Some modules and FX pedals invert signals that pass through them. It's uncommon but not unheard of. If this happens in your loop it will make negative feedback which will kill your signal. Flip it back with the OUT POLARITY switch.

¶Some modules just want to squeal. This can be caused by signal filtering and phase offset in the module. Try flipping the OUT POLARITY switch. If that doesn't help a well tuned low pass or band pass filter added into the loop most likely will.

¶Some modules just want to groan and pop. This is caused by too much amplitude in your loop. Try turning down the FBK level and/ or reducing the BASS level. In some cases switching between CV CONTROL IN and OUT will make a big difference.

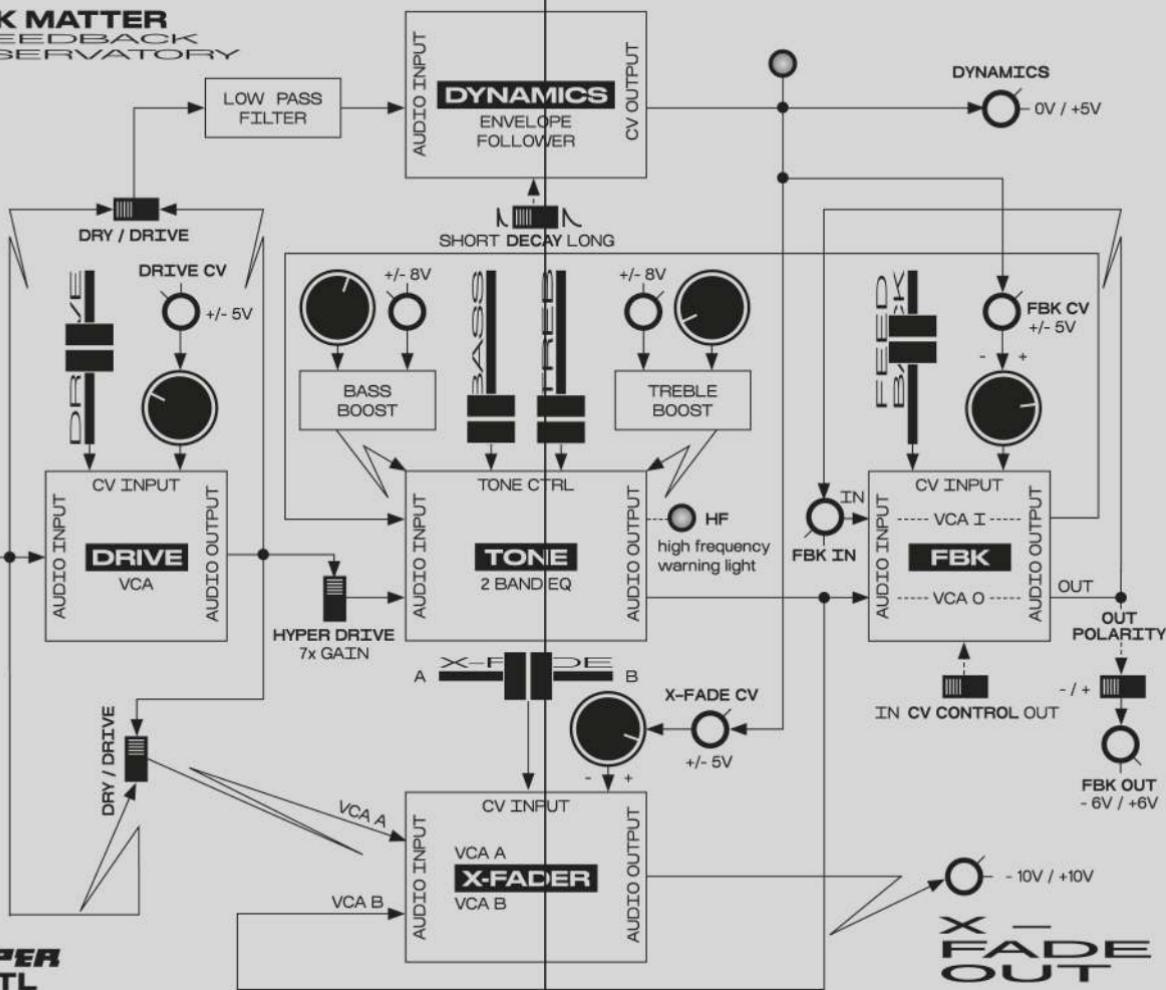
SPEAKER



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**DARK MATTER**  
FEEDBACK  
OBSERVATORY

+/- 12V



**CASPER**  
**BASTL**

# QUICK START

- Increase DRIVE until the DYNAMICS led glows with the incoming signal.
- Set X-FADE to the middle and bring up FBK.
- Adjust BASS and TREBLE to shape the feedback distortion and tone.
- Adjust X-FADE CV and FBK CV pots to apply the DYNAMICS envelope to the balance and intensity of the feedback.
- Switch between short and long envelope lengths with the DECAY switch.
- Help the drum signal cut through the feedback by switching on HYPER DRIVE.

## BONUS

Use gates and LFOs synced to your drum sequencer to modulate the other CV inputs.

## DRUMS



# QUICK START

- Connect audio waveform to INPUT.
- Keep DRIVE level low and switch HYPER DRIVE off.
- Adjust BASS and TREBLE to shape the waveform.
- Increase FBK level.
- Adjust DRIVE, TONE and FBK to bring in sub octave tones and harmonic distortion.
- Connect LFOs to CV inputs to animate wave shape and tone.

## BONUS

- Connect second audio waveform to FBK CV.
- Turn FBK CV knob a few degrees past the middle.
- With a bit of fine tuning the feedback will sync to the external VCO and do battle with your INPUT signal.

## EXTRA BONUS

- Connect drum signal to INPUT and connect oscillator melody to FBK CV in jack.
- Turn up FBK CV a few degrees.
- This should give you feedback synced to your melody and gated by your drums.

## TONES



**DARK MATTER**  
FEEDBACK  
OBSERVATORY

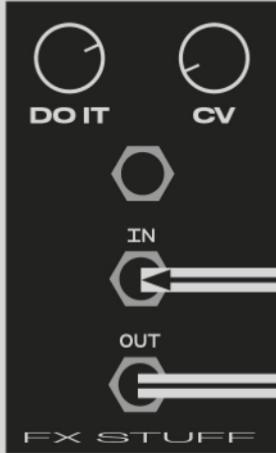
# QUICK START

- Connect FBK OUT to the input of FX.
- Connect FBK IN to the output of FX.
- Increase FBK and adjust TONE controls .
- If there is no feedback and/or the HF LED is brightly lit flip the POLARITY switch.\*
- Adjust FBK level and CV.
- If using an echo or reverb try switching CV CONTROL between OUT and IN.
- Flip on HYPER DRIVE to overpower the FX loop.  
Works especially well with drums on the INPUT and an echo in the FBK loop.

\*Some modules will invert the polarity of the feedback loop. If this happens it will kill the feedback. Use the OUT POLARITY switch to fix the signal.

## EXTERNAL FEEDBACK

ECHO  
REVERB  
FILTER  
PHASER  
DISTORTION  
???



MO



SO MUCH DISTORTION

LOOPS



PULSER



X-FEEDBACK



WEIRD ECHO

DARK MATTER

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# FEATURES

## DRIVE

- Input VCA with gain and soft clipping
- Hyper drive switch for extra punch

## TONE

- 12 band equaliser
- Voltage controlled bass and treble boost/overdrive.

## DYNAMICS

- Envelope generated by INPUT signal
  - Outputs 0-5V. Normalised to FBK CV and X-FADE CV inputs
  - Low and High decay time switch
  - Input pre or post DRIVE switch
  - Envelope monitor LED

## FEEDBACK

- Voltage controlled feedback
- High frequency "warning" LED
- External feedback loop section
  - FBK OUT and FBK IN jacks
  - Output phase switch
  - FBK VCA in/out switch

## CROSSFAADER

- Voltage controlled crossfade between input and feedback
- Input pre/post drive crossfade switch
- DYNAMICS envelope normalized to mix CV input

## TECHNICAL DETAILS

- 13 HP
- PTC fuse and diode protected 10-pin power connector
- 24 mm deep
- power consumption +12V: < 75mA; -12V: <50 mA

## HEADERS

There are 4 sets of headers on the back of the PCB.

FOLLOW (right most header): Move the jumper to switch between a low pass or all pass filter at the input of the DYNAMICS envelope follower.

DRIVE+FBK OUT, X-FADE OUT, DRIVE IN: These are buffered inputs and outputs used for connecting with future expanders and for making internally normalised connections between other casper modules.

## CONNECTING THE MODULE TO YOUR SYSTEM!

Before connecting the ribbon cable to this module disconnect your system from power!

Double check the polarity of the ribbon cable and that it is not shifted in any direction.

The red cable should match the -12V rail both on the module and on the bus board!

## PLEASE MAKE SURE OF THE FOLLOWING

- you have a standard pinout eurorack bus board
- you have +12V and -12V rails on that bus board
- the power rails are not overloaded by current

Although we put protection circuits in the device, we do not take any responsibility for damages caused by wrong power supply connection. After you connected everything, double-checked it and closed your system, so no power lines can be touched by hand, turn on your system and test the module.

# DARK MATTER

## FEEDBACK OBSERVATORY

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