DESI DECIBEL

SWETON® SPEAKERS Since 1982

Loudspeaker, amplifier and mixer knowledge for the people who sell sound. Every week.

A note to our partners

Last week we wired speakers to the amplifier. This week we look at what sits between them: the crossover, which decides which driver plays which notes. Get it right and a cabinet sounds clean all night; get it wrong and the compression driver fails first. This week's product, the 15 PT 500 MB GOLD, is the mid-bass most two-way cabinets are built around.

Rahul Agarwal, Sweton Speakers

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Speaker School — Lesson 3

What a speaker crossover does

A crossover is a filter that splits the music into bands and sends each band to the driver built for it: low notes to the woofer, high notes to the compression driver. No single driver plays everything well, so the crossover makes a cabinet work as one speaker.

1 Why it is needed — each driver has one job

A 15-inch cone is heavy: bass and punch, not clean treble. A compression driver's diaphragm is light: clear treble, but a bass note would tear it. The crossover gives each only what it can handle.

> **Tell the customer**
> **A cabinet without a crossover is a compression driver waiting to burn.**

2 Passive crossover — inside the cabinet

Coils and capacitors between the amplifier and the drivers; one channel feeds the whole cabinet. Simple and cheap, the usual choice for DJ and PA boxes. Sweton makes dividing networks for this.

> **Tell the customer**
> **Match the crossover's power rating and crossover frequency to the drivers in the box.**

3 Active crossover — before the amplifier

A processor splits the signal first and each driver gets its own amplifier channel. More amplifiers, but more control, a limiter per band and no power lost in coils. Used in line arrays and big systems.

> **Tell the customer**
> **More channels of amplifier, but every driver is protected separately.**

4 Crossover point — where the hand-over is

The note, in hertz, where the woofer stops and the compression driver starts. Too low overworks the HF driver; too high makes the woofer dull. Sweton's enclosure guide gives the right point.

> **Tell the customer**
> **Use the crossover point printed in the enclosure guide, not a guess.**

A two-way cabinet with the 15 PT 500 MB GOLD: who plays what

15 PT 500 MB GOLD	50 Hz–3 kHz	Bass, punch, body of the voice. Low-pass 3.0–3.5 kHz
Compression driver (1 or 1.4 in)	1.5 kHz up	Clarity, consonants, cymbals. High-pass 1.5–1.6 kHz
Subwoofer (optional)	Below 100 Hz	Lowest bass. Add an 18-inch when needed; high-pass the mid-bass

The 15 PT 500 MB GOLD rolls off naturally above 3 kHz, so the two filters need no overlap and no boost.

Amp Corner — Amplifiers

Reading the clip and protect lights

The front panel tells you what is happening inside the amplifier. Two lights matter more than the rest: clip and protect.

The rule: clip means the signal is too big; fix it at the mixer or the input knob. Protect means the amplifier has stopped to save itself; fix the load, the cooling or the wiring. Never turn the level up to get past either.

Clip	Protect	Signal
Signal too big Blinks on the loudest beats: normal. Glows steadily: the waveform is being squared off, which heats the voice coil. Bring the mixer master down.	**Amplifier stopped** Over-temperature, too low a load, DC at the output or a shorted cable. Switch off, let it cool, check load and cables, restart at low level.	**Music present** Green light: the channel is receiving signal. Dark while the mixer meters move: the cable or input selector is the problem, not the amplifier.

Example: at a wedding the sub channel trips to protect after an hour. Four 8 Ω subwoofers were in parallel on it: 2 Ω on a 4 Ω amplifier. Rewired two per channel, it ran all night.

Three habits that keep the lights green

Open the amplifier input knobs fully and control loudness at the mixer master. Half-closed inputs push the mixer into clip first.

Keep 10 cm of free air behind the fans; never put amplifiers in a closed box.

If protect trips twice in one programme, stop and find the cause. The third trip is often a dead output stage.

Mixer Desk — Mixers

Monitor mix: what the singer hears

The main speakers face the crowd; the singer hears them late and from behind. A stage monitor, fed from the mixer's aux send, gives the stage its own mix so everyone stays in tune and in time.

Setting a monitor mix in four steps

1. Connect the monitor amplifier to an aux output. Set that aux to pre-fader, so the stage mix does not move with the main faders.
2. On the singer's channel, raise that aux send until the singer can hear themselves. Keep the other channels low.
3. Add only what they ask for: a little keyboard for pitch, a little kick for time. Less is better on stage.
4. If it rings, cut that band on the aux EQ or move the microphone. Never raise the monitor to fight feedback.

Common stage complaints

"I can't hear myself"
Raise the vocal in the aux send, not the main fader

"Everything is too loud up here"
Lower the other instruments in the aux, keep the vocal

Feedback from the monitor
Microphone pointing at the wedge; turn it or cut 2–4 kHz

Monitor sounds boomy
Cut the low EQ on the aux; floor wedges gain bass

Why pre-fader: a post-fader aux follows the main fader, so lowering the singer for the crowd also lowers their monitor; they sing harder and feedback starts. Pre-fader keeps the stage mix steady whatever happens out front.

Product of the week — Sweton PT Series

15 PT 500 MB GOLD

Sweton 15-inch mid-bass speaker with 500 W AES power, 98 dB sensitivity and a 77 mm voice coil, for two-way DJ and live-sound cabinets.



Sweton 15 PT 500 MB GOLD, 15-inch mid-bass driver

15 PT 500 MB GOLD specifications

Nominal diameter	**388 mm (15 in)**
Impedance	**8 Ω**
Power handling (AES)	**500 W**
Program power	**1000 W**
Sensitivity (1 W / 1 m)	**98 dB**
Frequency range	**50–3500 Hz**
Voice coil	**77 mm (3.03 in), copper**
Winding	**Outside**
Former	**Glass fibre**
Magnet	**Ferrite**
Depth	**150 mm**

Best use and cabinet type

Live sound, DJ and PA two-way cabinets, and stage monitors. Use a bass reflex (ported) enclosure: Sweton's enclosure guide recommends 80–100 litres net with two 100 mm ports, 120 mm long. A sealed 50–65 litre box gives a tighter response for vocal monitors.

Amplifier power needed

500 to 1000 W at 8 Ω for each driver, run without clipping.

Keep in mind

- Cross it to the compression driver as the guide says: low-pass 3.0–3.5 kHz on the 15, high-pass 1.5–1.6 kHz on the HF.
- Pair it with a 1-inch or 1.4-inch compression driver of 80–100 W AES, 105–108 dB, titanium diaphragm.

Read it with the four numbers

Power handling

500 W AES, 1000 W program, on a 77 mm coil. The GOLD is the efficient version of the 15 PT 500 MB: more mid, more prominent bass, same power.

Sensitivity

98 dB from a 15-inch. With 500 W, that calculates to about 125 dB at 1 metre, so a 500 W amplifier channel is enough.

Impedance

8 Ω. Two in parallel make 4 Ω: one cabinet with two 15s, or two single cabinets on one channel, both fine on a 4 Ω amplifier.

Frequency response

50–3500 Hz, Fs 49 Hz. It reaches up to 3 kHz cleanly, so the compression driver can take over higher, where it is safest.

Three lines for your counter

1. 98 dB from a 15-inch: as loud on 500 W as an ordinary 15 on 1000 W.
2. Built on the Klippel Analyzer and tested on CLIO 12.5. Fs 49 Hz, so it plays low enough to work without a sub in small halls.
3. Made in Kolkata, India by Sweton, since 1982, and reconeable.

Open the enclosure guide | Open the spec sheet

Thiele-Small parameters for cabinet makers

Fs	Qts	Qes	Qms	Vas	Xmax
49 Hz	**0.38**	**0.38**	**23.46**	**127.34 L**	**± 5.4 mm**
Bl	**Sd**	**Re**	**Le (1 kHz)**	**Mms**	**EBP**
20.55 T·m	**907.92 cm²**	**5.4 Ω**	**0.86 mH**	**97.33 g**	**129 Hz**

Overall diameter 388 mm, bolt circle 373 mm, baffle cut-out 358 mm, depth 150 mm.

Counter Talk

Selling

Customer

"Your compression driver burnt in two weeks. The cabinet maker says it is weak."

How to answer: three questions before blaming the driver

1. **What crossover is in the cabinet, at what frequency?** None, or one below about 1.5 kHz, sends bass into the HF driver. That burns it.
2. **Was the amplifier clipping?** A clipped signal sends extra high-frequency energy straight into the HF driver.
3. **Is the diaphragm available?** Yes. Sweton supplies diaphragms; the driver is repaired, not thrown away.

Then open the cabinet and look at the crossover. In most burnt-HF cases it is missing, wired wrong or under-rated. Fix it first.

Myth or truth?

"A bigger compression driver can take bass, so no crossover is needed."

Myth

Every compression driver has a diaphragm a fraction of a millimetre thick. Bass makes it move further than it can. The crossover is the only thing between the amplifier and that diaphragm.

See Sweton compression drivers

Question of the week

Last week's answer

Two per channel in parallel, 4 Ω each channel: all four at full power, amplifier within its rating.

A two-way cabinet has a 15 PT 500 MB GOLD and a 1-inch compression driver. What crossover point would you tell the customer, and why not lower?

WhatsApp your answer to **70444 11800**

The answer is in the next issue.

Next week

Issue 04

Speaker School
Ported vs sealed cabinets: what the port does

Amp Corner
Limiters: the cheapest insurance

Mixer Desk
Microphone technique for MC and singer

Next product
18 PT 1500 SUB, 18-inch subwoofer

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