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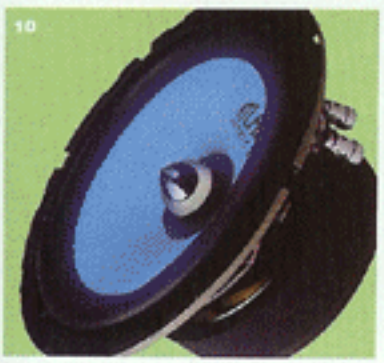

DEPARTMENTS

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German Engineering that Tears Down Walls

XETEC P-5 EVO

TEXT: BOB NORVELLE
TESTING: REDROCK ELECTRONICS
PHOTOS: CASEY THORSON

Xetec is a new kid on the block here in the U.S. Based in Germany, they've come up with an interesting combination of features and construction in their Prestige series. If it's very German at all, it should be well engineered, reliable and probably pretty expensive to boot. This round we had a chance to look at the top of the Prestige line, the Xetec P-5 EVO.

The P-5 EVO is a 5-channel amplifier containing everything a body wants for a complete system. Channels 1-4 are Class AB rated at 100 watts into 4 ohms and 130 watts into 2 ohms. It has bypassable 12dB per octave highpass and lowpass crossovers ranging from 20Hz to 4kHz. The subwoofer is a discrete Class D channel rated at 360 watts into 4 ohms and 560 watts into 2 ohms. The sub channel is well equipped with a 10Hz to 45Hz subsonic filter, 40Hz to 160Hz lowpass crossover and variable phase from 0 to 180 degrees. There's also a parametric equalizer with a frequency range from 20Hz to 180Hz, Q range of 0.5 to 20 and a gain of –8 to +8dB.

COSMETICS

The amplifier is heavy and black, though not as big as I expected for a 1,200-watt package. The cast-aluminum heatsink takes on a "waffle iron" style, though this one has a slightly arched top and a 4-inch-square control panel centered in the field of heatsink fins. Power, ground and remote connections are at one end. The three pairs of RCA inputs, input balanced/unbalanced switches, 2/4/6 channel mode switch, speaker connections and the jack for the bass level control (BLC) are on the opposite end panel. Gain, crossover, phase, subsonic and parametric EQ controls are all on the center control panel on the top. The controls are covered by a sheet metal plate, which allows only the LED diffuser through when installed. The Allen wrench to remove the cover plate is included. You will need three different Allen wrenches to make your electrical connections on this amp, which really bugs me. If your Allen wrench set is anything like mine, it's a pile of small dark things in the bottom of the toolbox drawer. Finding a single one that fits is cool, finding three is a miracle. One other non-optimum feature is all the terminals are angled down, making it difficult to insert the cable ends after the amplifier is mounted, so make your connections before you screw it down.

CIRCUIT DESIGN

The balanced/unbalanced switches at the inputs allow you to use this amp with a balanced-output source unit, but anyone could find this to be the key to eliminating alternator whine from the system. A standard RCA setup uses the center pin as the only "signal" source because the outside ring is "grounded." The input of the amplifier (any amplifier) compares the ups and downs of the signal voltage against the ground reference voltage and amplifies the difference between the two. That works fine if the ground voltage is always the same zero volts, but in the real world, the ground reference usually isn't all that steady. What if you have some ups and downs on the ground conductor of the RCA cable? Remembering that the amplifier is only interested in the difference between the two conductors, it will superimpose the ups and downs from the ground side into your music. Here's the stinger: So-called "ground" in a car is definitely not steady; there is simply not enough mass in a car to stabilize all of the electrical fluctuations. Why do you think it's called "ground" anyway? (Clue: In Europe it's referred to as "Earth.")

A car body is more of a ground path than an actual ground, and the negative terminal of the battery is the ground itself. If you think of the electrical flow in the car as being like water, the flow starts from the positive side of the battery. We'll ignore the whole electron-vs.-hole argument for the sake of this illustration. The positive side of the battery is 12 volts higher than the negative, so think of the water source being 12 feet higher and the battery as a water reservoir with a high tank and a low tank. As long as the water stays up there, it doesn't do any work—it has to fall down over a water wheel or hydroelectric generator or something like that. Electricity is the same; it has to drop across a device, like a light bulb filament, before any results are produced. When the water falls, it fills up the return canal that carries it back to the battery—the more water that falls, the higher the return canal fills up, right? In the same way, the ground paths in a car will rise and fall (voltage goes up and down) as things are turned on and off. If there is resistance in the ground path, like a dam in the canal, the fluctuations will be greater.

TEST RESULTS XETEC P-5 EVO

Output power @ 1%THD, 1kHz, 14.4Volts	
Stereo @ 4ohms	4 x 137 +1 x 369
Stereo @ 2ohms	4 x 215 + 1 x 583
Bridged @ 4ohms	2 x 425
Output power @ 1%THD, 1kHz, 12.5Volts	
Stereo @ 4ohms	4 x 107 + 1 x 362
Stereo @ 2ohms	4 x 172 + 1 x 547
Bridged @ 4ohms	2 x 336
Distortion at rated power, 1kHz, 14.4volts	.0.6 % @ 4 ohms, All channels driven
Input sensitivity	300mV to 7.9 volts
Frequency response (+ 1dB)	0Hz - 38kHz
S/N ratio (A weighted, below clipping, min gain)	87dB
Slew rate	12V/mS
Damping Factor @ 100Hz, 4 ohms	180
Idle current	2.5amps
Maximum current consumption, unclipped	69 amps @ 1103 watts
Efficiency at 1/3rd power lowest impedance	42%
Efficiency at full power, 1%THD, lowest impedance	83%
Crossover slope, front and rear	12dB/octave
Crossover range, lowpass	22Hz – 4.7kHz
Crossover range, highpass	18Hz – 4.4kHz
Crossover slope, subwoofer	12dB/octave
Crossover range, lowpass	44Hz – 190Hz
Crossover range, highpass (subsonic)	10Hz – 48Hz
Subwoofer parametric EQ frequency range	20Hz-160Hz
"Q" Range	0.5-2.0
Boost	+ 5dB
Subwoofer level control	Unknown
Dimensions	11"L x 11" W x 3"H

Back to the system, if the amp sees a fluctuation in the voltage of the ground line, it will add that to the signal. The RCA ground of the amplifier usually has some resistance to the power ground, though not much. If the source unit is grounded at the same point that the amplifier is grounded, there is no problem. Usually the amp is at least 10 feet away from the source, though, so the chance of having equal ground capability, or potential, is virtually zero. Let's say your amp is grounded at the same spot that your brake lights are grounded, and let's say there's a slight resistance between that spot and the battery's negative terminal. Your CD player is grounded to the firewall near the battery's ground strap, so it has no resistance in the path. Electricity is like water in that it will take the path of least resistance, which in this case could easily be your RCA cable ground. When you step on the brakes, you are very likely to hear a pop in your system as the voltage level on the ground rises.

Now, back to the Xetec input switches—if you select "balanced," the amplifier treats the RCA ground just like a signal input, so it's not connected to the amplifier ground anymore. The RCA ground can no longer act as the return path for the brake lights and the pop is gone.

On the inside of the P-5 EVO the circuitry mirrors the external layout. There are two power supplies near the power/ground connectors—one for the four AB channels and one for the Class D sub channel. On the topside of the main pcb are seven vertical daughter boards, which explains the relatively compact footprint of the amp. The signal comes in at the center of the opposite end, and the signal processing circuitry is pretty much contained on four vertical daughter boards on the bottom side of the main board. Now that I think about it, the amp is taller than most, 3" at its highest point. There are sections of the heatsink that are a solid 1" thick. Talk about thermal mass! The four channels on one side and the sub channel on the other flank the signal area.

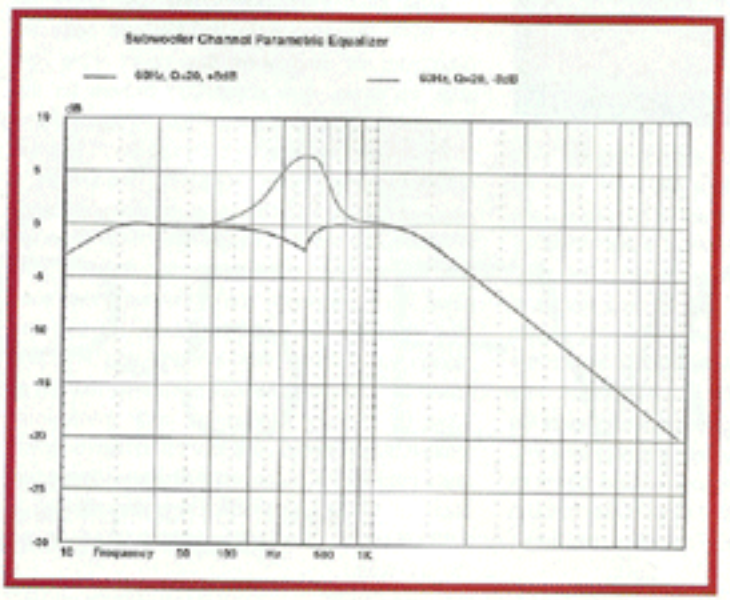
Xetec uses quality components throughout the P-5 EVO. Precision resistors, film and polyester capacitors are used where they count along with good op amps. How about Burr Browns for the front end, eh? Pricey, but with THD at 0.0003% and 25V/mS slew rate, they're probably worth it. If the rest of the amp doesn't match up, though, it's a waste of money, so let's look at the power supply.

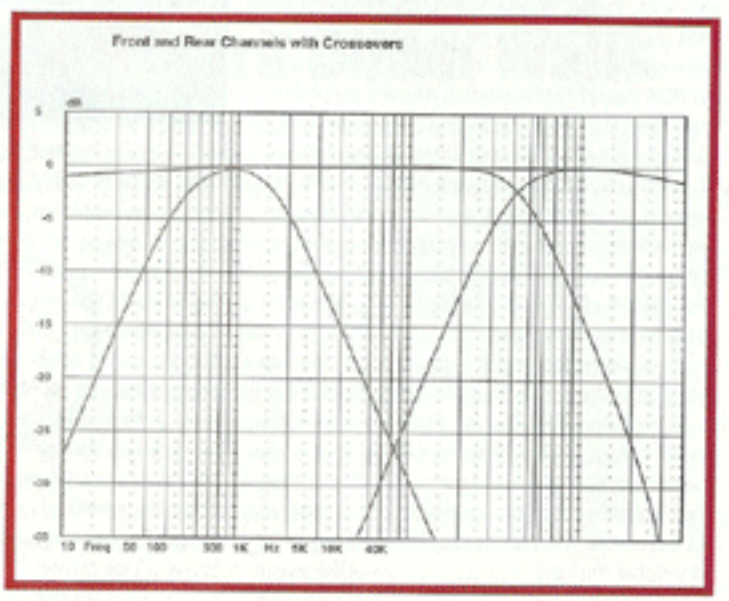
Power comes in through nice, large 4-gauge solid terminal blocks and then to two 40A ATC style fuses. Each fuse feeds one of the two power supplies through a good-sized inductor. The two litz-wound transformers look identical and are controlled by a single TL494CN pwm chip running at 23.5kHz. Primary filtering on each transformer totals 8,800µF. Xetec uses four IRF3205s to switch each transformer, rated at 200 watts dissipation each, or 1,600 watts total. Secondary filtering is 8,000µF on the Class AB side and 5,000µF on the Class D side.

The amplifier stages on the AB side use a double-sided daughter board for each channel, with secondary caps arranged adjacent to each respective output device. A single TIP35C/TIP36C pair for each channel handles the power to the speakers. Based on the data sheet for these large devices, each channel should be good for up to 250 watts.

On the Class D side, Xetec is using a proprietary discrete format rather than a chip solution. Again, most of the amplifier stage is contained on two daughter boards. There are a total of six 125-watt devices feeding the subwoofer through a pair of iron core inductors for a total of up to 900 watts.

It took a little while to notice, but I had the feeling that something was missing in this amplifier. Oh yeah, no hang-offs! Hang-offs are all those transistors and rectifiers that have to dissipate lots of heat. They have to contact the heatsink, so they are usually soldered in at the edges of the circuit board so that the device hangs off the sides and can be clamped to the heatsink. This makes an amp easier to build on the production line, but it forces the engineers to put things in certain places whether they want to or not. You know how engineers can be: Every now and then someone will go up against the system and put those heat-generating devices wherever they want. In the Xetec P-5 EVO, most of the devices are actually pretty close to where they would normally be, but there are several in the center of the circuit board. In each case, there is a clamping bar on the top side of the board that presses the board against the device and sandwiches it to the heatsink. Besides being able to put the devices close to the associated circuits (which can lower the noise floor) it also makes better use of the heatsink from a thermal point of view. The devices, and the heat, can be spread out over the sink instead of group together in hot spots.





PERFORMANCE

The P-5 EVO's measured frequency response was 9Hz to 36kHz, as opposed to the 5Hz to 30kHz in the manual. Power measurements exceeded the manufacturer's ratings in all cases, and most other measurements were refreshingly close to the specs in the manual, indicating that the manual uses "engineering" specs rather than "marketing" specs. The measured SNR was 87dB, a little lower than the 92dB spec, but still respectable. I measured 0.6% THD with all channels driven to full power at 4 ohms. The manual states 0.02%, but doesn't give the load or power conditions, so it may well be true under different test parameters.

The crossover specs in the manual do not seem to correspond with this model, so I based my comparisons on the numbers printed around the crossover controls on the center panel of the amplifier. Channels 1-4 are labeled to have a crossover range of 20Hz to 4kHz as stated; I measured 18Hz to 4.4kHz for the highpass side and 22Hz to 4.7kHz for the lowpass. The subwoofer channel is marked with a lowpass of 40 to 160Hz while my measurements show 44 to 190Hz. The subsonic filter should be 10 to 45Hz, whereas I tested it at 10 to 48Hz. The parametric EQ gain was shy of the + 8dB label, measuring closer to +5dB, and the Q shows a range of 0.5 to 20, but I think they meant 0.5 to 2.0. That's what showed up in my tests anyway, and Q of 20 would not be very useful in my opinion.

The protection circuits worked fine. I repeatedly triggered the shortcircuit and thermal protection on the bench with no lasting effects to the amplifier.

There was no discernible turn on/off noise. I did notice that the turn-on delay is pretty long, almost two seconds, so you won't have any problem at all adding signal processors in front of this amp.

MANUAL

The owner's manual is in German and English, and Germans have definitely translated the English section. Phrases like "...fix the device using screws..." are a dead giveaway, as are the numerous metric references without imperial equivalents. I don't know a 16cm speaker from a 13cm speaker, but the manual has crossover frequency suggestions for both (sure, I can figure it out, but I'm not telling you!). The instructions are complete, but not obvious. Any experienced installer would be fine, but then they probably won't read the instructions anyway. I think a novice would have a difficult time with the setup if the manual were his only resource. However, there are good line drawings of the end-plates and the signal controls, and a good summary of using the balanced/unbalanced input switches to solve ground loop issues. The stated warranty is two years, though no return instructions or conditions are included in the manual.

LISTENING

I installed the Xetec in the trunk of the LSE connected to 6 1/2" front separates, 6" x 9" rears and a DVC 12" sub in a sealed enclosure. I started with Donald Fagen's *Kamakiriad* to get the crossover and gains set just right and settled in for a good listen. The bass guitar and low Fender Rhodes bass notes were well defined on "Snowbound" and the cymbal work in the intro to "Tomorrow's Girls" was very impressive. I moved on to Extreme's *Pornografitti* to see how the system handled an onslaught of electric guitars. The bass and kick drum on "Decadence Dance" were really tight, but the snare sounded a little too big and boomy. Fiddling with the tone controls on the deck and the crossovers on the amp did not remedy the situation. Next up was my new Bass Mekanik, *Max Killa Hertz*. I did adjust the subwoofer level a little, OK a lot, and listened way too long to this one. There was not a track on this disc that the P-5 EVO could not handle. There were some, however, that my separates complained about. Even with the sine bombs, I could hear and feel the notes until the track stopped. On most systems you can see the woofers flapping but can't hear or feel anything.

After a little recovery time I listened to Dee Dee Bridgewater's recording of "Killing Me Softly." Bridgewater has a very high, sweet voice, which came through with lots of presence. Mary Chapin Carpenter has a much lower voice, however, and when listening to "Only a Dream," her voice seemed a little strange, as though in a tunnel. I disconnected the rear channels to make sure it wasn't a front to rear phase issue, but couldn't fix it. This is the same frequency range as the aforementioned snare that sounded a little off. It's a little puzzling because there is no hump in the frequency response, and the upper and lower ranges sounded extremely nice. Bias set too high, maybe? I'd like to listen to another sample to see if maybe it's just this one amp.

Overall I enjoyed this listening test, probably because I could listen to everything at once, being a 6-channel amp and all. The subwoofer was very impressive. I left the subsonic filter all the way down to 10Hz because I was using a sealed box, tweaked the EQ up a little around 45Hz and turned the phase control until the sub sounded like it was in the dash. It was tight and clean, not sloppy at all, and lot's of fun.

CONCLUSION

As a whole, the amplifier performed very well on the bench and in the car. Even with the puzzling anomaly in the midrange, it's a very high-quality unit with power to spare. This is a great single-amplifier solution that should appeal to owners of up-scale cars. (My Buick would definitely be at the bottom end of the range.) Suggested retail is $1,449.00 and total 2 ohm power at 1%THD is 1,130 watts, so you're at $1.28/watt. For reference, a solid mid-fi amp, say two channels putting out a total of 1,000 watts, will be around a dollar a watt, so this one would be a little on the high side. However, this is a 5-channel amp with the right amount of power for the front and rear speakers, plenty for the subs, and a very useful set of features. Typical German engineering, I guess. ✖

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