

# ARC AUDIO FD4150

PRECISION SONICS  
WITH FOOSE STYLING

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**OKAY, I'LL ADMIT IT: I'M A GEARHEAD.** When I don't have my fingers in something that plays music, I like to play with cars and bikes, actually anything with an engine will do. Just ask my neighbor how his Lawn-Boy ran with my motocrosser's Avgas!

So, when the folks at CA&E brought me a Chip Foose designed amplifier from Arc Audio, it got my attention. I have a lot of respect and admiration for Chip's talent, and he's created some of my favorite cars to say the least. So, what can he do for mobile amp design?

As you would expect, the Arc Audio FD4150 looks pretty cool. It has some classic hot-rodder styling cues such as the flawlessly finished brushed and machined aluminum heatsink, complete with two different lengths of badge trim that can be used depending on whether or not you choose to also use the two endcaps that cover all the connections. Both of these nameplates are quality pieces, made of solid, nicely machined aluminum, and slip into a channel across the top of the heatsink. Another cool feature of this

design: since the nameplates can be inserted either way, you can choose which way to orient the amp in a given installation. Pretty cool! Alas, the endcaps are plastic and painted silver, but they do look good and fit well. It's typical Foose — well done, resulting in more of a classic look than something wild and wacky.

A medium-sized 4-channel amplifier, the FD4150 measures approximately 21 3/4" x 10 3/8" x 2 3/8". The power and speaker connections use standard Phillips style screws and are on one end, with the signal connections and controls on the other. This arrangement allows for less noise in the design by keeping the noisy power and ground cables, as well as the internal circuitry, as far away from the signal and speaker conductors as possible. A small green LED on the signal end of the amp tells you it's on.

There's not a lot of flash here; just solid cosmetics and attention to the engineering details that matter when it comes to performance. Turning the amp over, I found a cooling fan (designed to draw air in through the bottom panel and push it out

each end of the amp) and switches for the selection of high-, low-, or all-pass crossover settings. Since these switches are something that you would set before mounting the amp and seldom need to change, having them under the amp is no biggie.

The FD4150 has all the normal functionality you would expect in a quality multi-channel amp, and a couple of extra features that are not so common. In addition to the expected highpass, lowpass and fullrange modes, the crossover section boasts selectable frequency ranges from 55Hz to 550Hz for the front channel and a x10 switch to extend the range to 5,500Hz for the rear channels. There are also user-selectable 12 or 24dB/octave slopes for the front channels that will remove the low frequencies from sensitive mids much quicker than the standard 12dB/Oct slope. Additionally, a control for bass boost level allows up to 18dB of boost, at 45Hz. Special signal steering switches for using the amp in bridged mode allow the user to select whether the left or right signal is used when stereo

bridging, or the sum of the two for subwoofer applications.

## DESIGN

Inside the Arc Audio FD4150, as with other Arc products I've evaluated, I found a well laid-out PCB and a lot of very good quality parts. Surface mount parts make up the majority on the PCB, which I like to see; not only do surface mount parts allow greater flexibility with PCB layout because of their small size, they also have ultra high tolerance values. Using parts like this ensures the design will work as intended, even when mass-produced. The capacitors are high quality as well and the low signal level caps were of the poly type and much better than ugly old electrolytics in this application. This kind of attention to detail matters when you care about sound quality, and the designers at Arc Audio obviously do.

The power supply uses six of the expected Mosfets, in this case, TO-220 case 50N06's. Each of these parts has a 120-watt initial rating, so there is plenty of current capability in the amp. There are four 3,300 $\mu$ F caps in the power supply, for a total storage ability of 13,200 $\mu$ F.

It's a typical Class A/B amp, using a triple Darlington arrangement with rugged and high-speed (3MHz) TIP35 bipolar output transistors. I'm not a big advocate of using a lot of output filtering, as in my opinion it can make driving reactive loads difficult. Although the FD4150 does have a significant LC network on each of the four channel's outputs, in fairness, these filters help to stabilize the design, as well as remove unwanted junk from the output. The PCB is a top-quality fiberglass double-sided board with attention to details that improve signal to noise and reliability. The build quality of the PCB was nice; the solder flow looked very good. I did notice a couple of minor resistor mods, but they were done well, showing fine workmanship.

## PERFORMANCE

As I put the FD4150 through its paces on the unforgiving, yet accurate, Cogent bench, I was pleased to see that it actually exceeded all of its advertised power numbers. With a fully regulated power supply, the amp makes very good power, whether at 14.4 volts or 12.5 volts, although as the voltage drops, physics being what they are, the amount of current needed increases. With a battery voltage of 12.5 volts at full power into a 2-ohms-per-channel load, I measured a current draw of 92.3 amps ... just before I blew the amp's three internal 25-amp ATC fuses. Putting the fuses inside the amp's chassis saves space on the end panels and provides a cleaner-looking design, but

it's always a pain when you have to change them. Disconnect the power, unmount the amp, remove the bottom cover, and try to pull the old ones out with fingers that are too big ... you get the idea. I much prefer them accessible from the outside.

Distortion measured a very low 0.008% at rated 4-ohm power at a battery voltage of 14.4 volts. Efficiency at full power into 2 ohms was good for a multi-channel amp, at just over 57%. The frequency response bandwidth of this amp was very good, from below 10Hz it's almost ruler flat out to 30kHz. Signal to noise was a low -112dBA, referenced to full power, and stereo separation also was better than average, with a -74dB spec at 5kHz. This is where the attention in the PCB layout pays dividends.

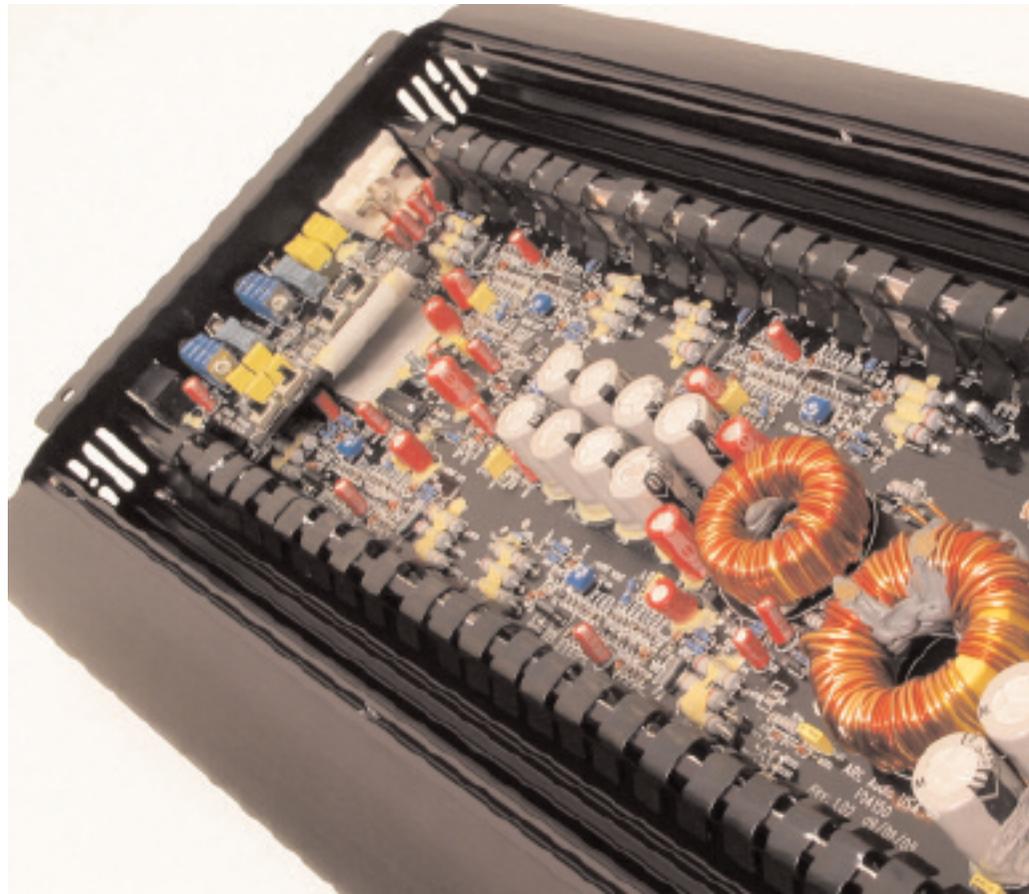
The crossover settings and slopes were accurate, as was the bass boost control.

The amp performed admirably and passed all my "ugly" tests, including dead shorting the outputs. It simply protected as it should and then recovered automati-

cally when I

removed the short.

Thermal performance is something I consistently measure, and I have come away very impressed with the thermal performance of the FD4150. While the amp's heatsink did get very hot during the test, its power neither diminished nor shut off. I would bet money that owners of this amplifier would very seldom have any complaints about its ability to keep going when driven hard. Suffice to say, it's one of the very best multi-channel amps I have measured from a thermal perspective.





**MANUAL**

The owner's manual is a small booklet and covers all four of the FD series amplifiers. It is reasonably well written and easy to understand for those who don't tend to lean toward the technical. Adequate instructions with drawings are given for

installation and setup, and some good points on gain setting are included. A few things are omitted, like the fuse location and size. There are quite a few spelling and grammatical errors in the manual as well, but really, how many people will actually read it? That being said, it wouldn't hurt to correct the errors. 🐛



**PERFORMANCE DATA**

**OUTPUT POWER @**  
 1%THD, 1KHZ, 14.4VOLTS  
 Stereo @ 4 ohms 100 watts x 4  
 Stereo @ 2 ohms 191 watts x 4  
 Bridged @ 4 ohms 375 watts x 2

**OUTPUT POWER @**  
 1%THD, 1KHZ, 12.5VOLTS  
 Stereo @ 4 ohms 100 watts x 4  
 Stereo @ 2 ohms 182 watts x 4  
 Bridged @ 4 ohms 360 watts x 2

Distortion at rated power, 1kHz, 14.4volts	0.008% @ 4 ohms
Input sensitivity	256mV to 2.6V
Frequency response ( + 1dB)	<10Hz - 30kHz
S/N Ratio (A weighted, full 4 ohm power, min gain)	> -112dB
Stereo separation	-74dB @ 5kHz
Slew rate	*More Than Adequate
Damping factor @ 100Hz, 4 ohms	166
Idle current	2.1A
Max current consumption, unclipped	92 amps @ 182 watts x 4 @ 2 ohms
Efficiency at 1/3rd power lowest impedance	31.9%
Efficiency at full power, 1% THD, lowest impedance	57.6%
Crossover slope	-12dB/octave or -24dB/octave (Front channels)
Crossover range, lowpass	55Hz - 550Hz Front
Crossover range, highpass	55Hz - 550Hz Front
Crossover range, lowpass	55Hz - 5,500Hz Rear
Crossover range, highpass	55Hz - 5,500Hz Rear
Low frequency boost (remote)	0 to +17dB @ 45Hz
Dimensions	21.75"L x 10.375"W x 2.375"H

**LISTENING**

I really enjoy listening to various products and firmly believe that there are definite sonic differences in amplifiers caused by different design techniques, response curves, etc. BUT, I will also say that if you take two amplifiers and correct the response curves, fix any inter-channel gain differences, and never drive either one to clipping, it would be very difficult indeed to tell them apart. However, that's not how these things typically get set up and used.

To be fair, I don't often evaluate the sound quality of an amplifier in my

vehicle. I find that the differences between many amplifiers are sometimes subtle, and to give every amp the fairest comparison possible and not lose some of each amp's sonic signature to road noise and the like, I use the very familiar and sometimes painfully accurate reference system in my lab.

An old friend of mine was asked once to describe the perfect amplifier. He said, "That would be a straight piece of wire, with gain." Totally uncolored sound is the goal, and the best way I can think of to describe the FD4150's sonics is transparent. It imparted no real character of its own to the music, which is precisely what a good amp should do (or not do, depending on your point of view).

I played popular music, classical, jazz — even some old Supertramp CDs. But no matter what I put on, it sounded as the artist intended. Owners of this amplifier will have no sound quality complaints. About the only thing I found while listening was that perhaps the amp's dynamics sounded ever so slightly compressed or flattened, with a very slight loss of detail, but to be fair, this comment falls well into nitpicking territory. What I described would never be heard in a vehicle, at least while driving.

**CONCLUSION**

The Arc Audio amplifier is a well-built, good-sounding, easy-to-use amplifier. At around the \$800 mark, it's not the least

expensive amp out there, but you get a well-engineered design, good overall quality, all the features you need, great sound, and styling from the legendary Chip Foose. To me, that's a pretty good deal. 🐛

