

TOA IP Series Dual Power Amplifiers

by Michael McCook

TO A manufactures three amplifiers in the IP series — the IP-300D, the IP-450D and the IP-600D. I reviewed the higher-power version, the IP-600D, which is a two-rackspace unit for contractor applications. With these amplifiers, TOA continues to round out its contractor line of professional audio components.

Features

The IP-600D (\$1,798) delivers 600 W/channel into 4 ohms. It offers three output modes and can be operated in stereo, parallel and bridged mono. In the parallel mode, the input signal to Channel 1 feeds both Channels 1 and 2. The signal levels of both channels can be set independently. Bridged mono requires a total connected speaker impedance of 8 ohms, vs. 4 ohms for stereo or parallel.

The input to Channel 1 goes to the designated BTL output terminals. The rear panel output terminal block also provides a removable jumper that can help to counteract ground loops in the signal path and a cover to be applied after termination for safety.

Intended for permanent installs, the IP-600D is ruggedly built and has all necessary design features, including detachable handles and mounting brackets, forward-facing cooling fans and pushlock-type input level control knobs. The control knobs can be removed and settings secured with the supplied covers. The amplifier has a steel chassis and brushed zinc panel, both black.

Level controls and indicators for Channels 1 and 2 are located on either side of a power switch and indicators are set in the center of the faceplate. There is one indicator per channel for input signal, peak/distortion, protection circuit and level control bypass.

The protection circuit indicator lights as a self-test when the IP-600D is powered up. During operation, it lights to indicate any one of three conditions: a



short circuit, excessive heat sink temperature or unusual DC voltage output. In the event of those conditions, an output relay cuts load to the speakers to prevent damage.

Electronically balanced inputs to Channels 1 and 2 are through back-panel terminal blocks or TRS jacks. Optional balanced input transformers are available for internal installation in the IP-600D.

In use

The unit can be operated or monitored with remote equipment that connects via designated I/O terminals for each channel. This requires the use of an optional interface unit available from TOA. When remotes are in use, front-panel level controls are disabled via switches on the back panel. This status is indicated on the front panel, as previously mentioned.

I used the unit while doing sound reinforcement for a performance by several bands. I used the IP-600D operating in parallel to drive four Klipsch KP-350 loudspeakers in the medium-sized venue.

Later, I swapped the TOA amp out with a Crown CE-2000 to run four Community CSX38 floor monitors. The unit provided smooth, clear power and I was able to appreciate some of the design nuances firsthand. For example, the variable speed cooling fan keeps fan noise low, and at 40 lb (18 kg), it has a decent

weight-to-power ratio.

It's a minor consideration, but I liked the positive feel of IP-600D's detented control knobs and used the pushlock feature to recess them when I was away from the rack.

Summary

Although I usually turn to a short list of reliable power amps from QSC, Crown and Crest when sourcing an installation, I will now consider a fourth alternative: the IP Series from TOA. Overall, the IP-600D impressed me as a versatile, well-built component that provides the appropriate features and functionality at a competitive price point.

It should be immediately welcome to contractors already familiar with and using TOA components.

At a Glance

Applications:

Permanent installations

Key Features:

600 W/channel into 4 ohms;
ruggedly built; remote operation
and monitoring (optional)

Price:

\$1,798

Contact:

Contact TOA at 800-733-4748

On The Bench

TOA IP-600D Amp Bench Measurement

TOA's IP-600D delivered a lot of power, very cleanly. At its upper reaches, output was probably constrained by my building's AC line capability more than any internal limitations (though TOA does specify power requirements of 115 V, $\pm 10\%$, which I met). For this reason I have made rated power measurements at 1 dB below the manufacturer's specs; with a stiffer AC source, the IP-600D would meet, and probably exceed, its specs.

Figure 1's frequency response plot shows both channels, but as these are essentially identical it is hard to tell. The low-frequency rolloff approximates 12 dB/octave below 20 Hz and is probably a deliberate ultrasonic filtering action (always a good idea in my book).

The same could be true at the top end, which looks like a rather steeper filter (about 36 dB/octave) at 22 kHz or so. I could not duplicate TOA's specified response of 20 Hz to 20 kHz, +0, -0.5 dB, from either set of inputs.

The figures for THD + noise against frequency for 1 W, were impressive and reflected the TOAs excellent performance.

Figure 2 plots power in Watts (horizontal) against THD + noise in percent (vertical), for the IP-600D driven by a 1 kHz tone (for clarity I show only channel in all cases; channels were effectively identical). Reading left to right along the 1% horizontal line, these plots show results for both channels driving 8.5; both channels driving 4.5; and bridged into 8.5. **Figure 3** displays the same three

tests in the same order, with a 10 kHz signal. (Below 1 kHz results were similar to Figure 4; above 10 kHz up to 20 kHz results resembled Figure 5).

These plots are typical of high-power solid-state amplifiers, though the TOA appears to clip just a bit more gradually (the end-lines are a tad less vertical) than some, though probably not enough so to make an audible impression.

In **Figure 4** I've assembled two spectrum of noise tests, plotting re: 1 W/8.5. The two lower, bundled traces show both channels with the IP-600D set for stereo; the single, higher trace is from bridged operation. The TOA is a shade less quiet than the very best hi-fi amps (I measured stereo S/N of around 81 dB re: 1 W, A-weighted), which is still quite good.

Bridged operation was a bit noisier/dirtier, just as I'd expect, though the additional susceptibility to 60 Hz hum is somewhat less common. Still, at 80 dB down this should not impact any real world application other than, perhaps, use as a control room monitor amp. (The IP-600D's rather robust and bumptious fan would probably rule that out, anyway.) The TOA survived plenty of abuse, and sustained extended, severe high-frequency clipping without complaint, but it did get more than a little warm to the touch, particularly on the bottom panel. You might want to avoid racking it with other heat-producers, and route heat-sensitive cabling carefully.

—D. Kumin

Power at clipping (1% THD+N); both channels driven:

8.5	4.5	Bridged -8.5
376/376	540/543*	>1135*

THD+Noise at -1 dB re: rated power (due to AC limits):

8.5	4.5	Bridged -8.5
0.05%	0.08%	0.6% (at 825 W)

*AC-line limited: max. drop: 9 v, to 110 vac (bridged/8.5)

Freq. Response (1W, 4.5: +0, -3 dB, 20 Hz-20 kHz; -3 dB at 20 Hz and 23 kHz)

Input sensitivity: +6 dBu for rated output/4.5

Input impedance: (bal): 21 k.5
(unbal): 10 k.5

Input overload (unbal;1 kHz): +21 dBu

S/N (A-wtd./8.5): 81.1 re: 1w (107.2 dB re: 400 W)
S/N (A-wtd./8.5, bridged): 75.3 dB re: 1 W

Damping Factor (re: 8.5):

30 Hz	1 kHz	10 kHz	20 kHz
202	202	153	86

Notes:

- Unless otherwise specified, tests refer to the unbalanced inputs, with both channels driving 4.5 loads, and measurement bandwidth of <10 Hz to 30 kHz).
- Rated Power (continuous average per channel, both channels driven): 400 W.p.c. at 8.5; 600 w.p.c. at 4.5; 1200 Watts bridged (one channel) at 8.5; all with frequency/bandwidth and THD unspecified.

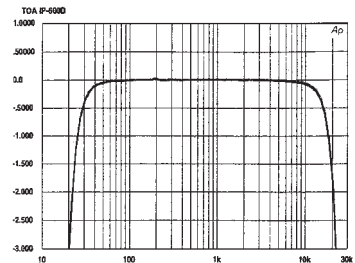


Figure 1: Frequency response (1W/8 ohm), graphed on 10 Hz to 30 kHz scale

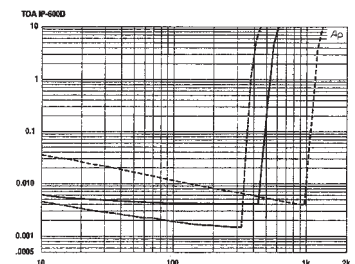


Figure 2: Watts vs. distortion at 1 kHz for (left to right) stereo 8 ohm, 4 ohm, bridged 8 ohm

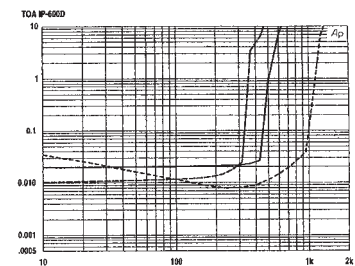


Figure 3: Watts vs. distortion at 10 kHz for (left to right) stereo 8 ohm, stereo 4 ohm, bridged 8 ohm

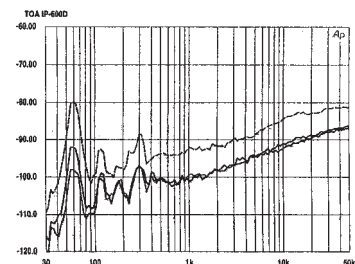


Figure 4: Spectrum of noise + distortion, shown re: 1 w/8 ohm; stereo (lower), and bridged-mono (upper, single trace)