Stereo Review

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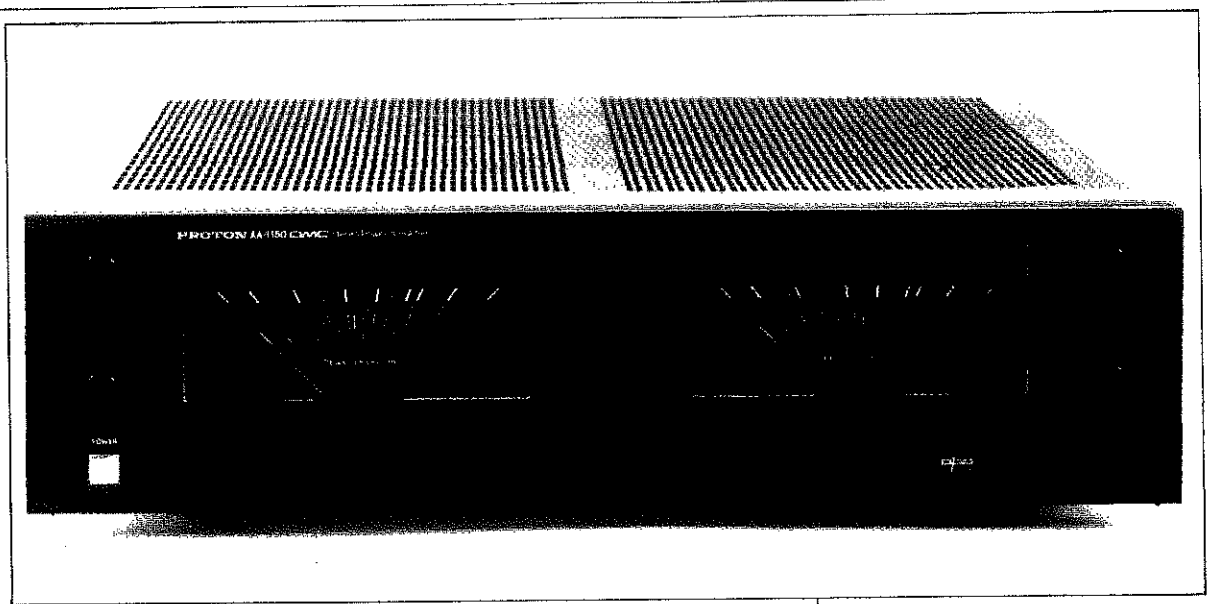

PROTON D1150 (AA-1150) POWER AMPLIFIER

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PROTON'S Dynamic Power on Demand (DPD) amplifiers use a form of two-level signal-controlled power supply that makes it possible for them to deliver very large peak power outputs—several times their relatively low continuous power ratings—for periods of up to several hundred milliseconds. This DPD capability goes well beyond the range usually defined by an amplifier's dynamic-headroom rating, which is a measure of the maximum power delivered during a 20-millisecond tone burst.

Unlike most amplifiers using bi-level power supplies, Proton's DPD units are not designed to sustain their higher power levels for extended periods. Since the average power needed to reproduce most musical programs is relatively low, and many times that level may be required only during program peaks lasting less than a few hundred milliseconds, the Proton engineers decided to derive the short-term higher voltage from charged capacitors. Although the capacitors' output voltage decreases exponentially with time as the amplifier draws current during a program peak, this characteristic conforms well to the typical decay characteristics of musical waveforms. During the intervals between peak demand levels, the capacitors are recharged from the second power supply, which has to supply only a very low average current. And since the high-voltage capacitors are switched into the circuit only at peak power levels, no switching effects are ever audible.

The D1150 is rated at only 50 watts per channel continuous output into 8 ohms from 20 to 20,000 Hz with no more than 0.015 percent distortion, half as much power as Proton's earlier amplifier, the D1200. Peak power is rated as a maximum of 400 watts into 2 ohms, with a dynamic headroom of 6 dB.

Like the D1200, the D1150 is a handsome component. Its most striking features are the two large peak-power output meters, which are illuminated in a soft blue-green and calibrated in both watts and decibels relative to the 50-watt rated output. The scales span a range from −40 dB (5 milliwatts) to +9 dB (400 watts), giving readable indications at all normal operating levels. Between the meters are three LED indicators for the DPD system. These flash at instantaneous levels of 0, +3, and +6 dB, and a red LED shows when the amplifier's protection circuit has been tripped. An illuminated pushbutton power switch is the only control. The rear apron contains only the line fuse, input jacks, and five-way binding-post output terminals for a single pair of speakers.

Internally, the D1150 is a dual-mono amplifier, constructed symmetrically around the front-to-back center line, with separate power

transformers and power supplies. Both sets of output transistors and their heat sinks are in the central portion of the chassis. The metal cabinet, finished in black, is extensively ventilated on its top and bottom surfaces, and the upper portion of the front panel is covered with a clear protective plate. The Proton D1150 measures 16½ inches wide, 14½ inches deep, and 4¼ inches high, and it weighs 25 pounds. Price: $459. Proton, Dept. SR, 737 W. Artesia Blvd., Compton, CA 90220.

Lab Tests

Preconditioning the D1150 at 17 watts per channel into 8 ohms for an hour made its top moderately warm to the touch, but it never became hotter during our subsequent tests. In normal listening use, it ran only slightly warm. The 1,000-Hz output power into 8 ohms at clipping was 68 watts per channel, which increased to 105 watts into 4 ohms and 136 watts into 2 ohms.

The distortion of this amplifier, under most conditions of use, was among the lowest we have ever measured and close to the limits of our measurement capability. At 1,000 Hz, the total harmonic distortion (THD) plus noise was slightly under 0.002 percent from 1 watt to more than 60 watts output into 8 ohms. The 4-ohm readings were not much higher, about 0.0025 percent, and even into 2-ohm loads the distortion was between 0.003 and 0.004 percent up to more than 90 watts.

Across the full audio frequency range, the distortion varied only slightly with power output between 5 and 50 watts into 8 ohms. It was typically between 0.0015 and 0.0025 percent from 20 to 5,000 Hz, reaching a maximum of 0.0124 percent at 20,000 Hz and 50 watts. The 1,000-Hz distortion characteristic into different load impedances was typical of other good amplifiers: The distortion readings decreased as the output increased from 1 watt up to the level just before clipping occurred. As usual, the distortion was higher into low load impedances, but our typical readings of 0.002 to 0.005 percent are indicative of the amplifier's excellent linearity.

Measurements of the amplifier's DPD characteristics confirmed the effectiveness of this system. Driving 8 ohms at 1,000 Hz, the D1150's dynamic power reading (using a 20-millisecond burst) was 324 watts, for a dynamic headroom of 8.1 dB. The prodigious short-term output capability of this "50-watt" amplifier was demonstrated by its 811-watt dynamic output into 2 ohms! Both of these figures substantially exceeded the amplifier's ratings.

The 8-ohm dynamic power dropped to 225 watts at the end of a 100-millisecond burst. For longer burst durations, we used a 50-percent duty cycle or simply increased the on time at a given power level until the output waveform was maintained for the desired measurement period. The maximum power decreased gradually from 217 watts after 200 milliseconds to 182 watts after 1 second. A 72-watt output could be sustained for a full 5 seconds. Although amplifier power meters in general are of dubious value, we also noted that the D1150's meters usually read within 2 or 3 dB of its actual output (into 8 ohms). The meters have a fast attack time and a slower decay time, which makes their indications reasonably accurate.

The amplifier's frequency response was flat within 0.7 dB overall from 20 to 20,000 Hz and down 3 dB at 11 and 75,000 Hz. An input of 150 millivolts was required for a reference output of 1 watt (1.05 volts for the rated 50 watts), and the A-weighted noise level was −91.2 dB referred to 1 watt. The slew factor was greater than 25, and the amplifier was stable driving complex reactive loads, with only a single small overshoot on a 10,000-Hz square-wave test signal.

Comments

Our measurements of the Proton D1150 speak for themselves. Although it is something of a distinction for it to be quite possibly the world's most powerful "50-watt" amplifier, the proof of its worth lies in how well it handled actual music programs, not test signals, at high levels. If it did not sound right, all its clever design would be of little value to the purchaser.

We are happy to say that the D1150 passed our listening tests with flying colors. As we increased the volume level until the DPD indicators began to flash, first at +3 dB and eventually at +6 dB, the sound remained clean (but loud!), with no signs of clipping. Few people would wish to listen at such levels, but for those who do, the D1150 compares very favorably with conventional amplifiers rated at several times its continuous output, and it is considerably less expensive than most of them.

We did not encounter any unwelcome surprises in our bench testing or listening. The D1150 was trouble-free and reliable both on the bench and in the music system. Even its internal construction showed no signs of the casual assembly techniques sometimes found in popular-priced components; removing the top cover confirmed the sense of quality we received from its performance. All in all, it is an excellent product.

LABORATORY MEASUREMENTS

1,000-Hz continuous power output at clipping: 68 watts into 8 ohms, 105 watts into 4 ohms, 136 watts into 2 ohms

Clipping headroom (relative to rated output): 1.3 dB (8 ohms)

Dynamic power output: 324 watts into 8 ohms, 544 watts into 4 ohms, 811 watts into 2 ohms

Dynamic headroom: 8.1 dB (8 ohms)

Sensitivity (for a 1-watt output): 150 mV

Harmonic distortion (1,000 Hz): 8 ohms, 0.0038% at 1 watt, 0.0018% at 50 watts; 4 ohms, 0.0051% at 1 watt, 0.0028% at 80 watts; 2 ohms, 0.0079% at 1 watt, 0.0034% at 90 watts

A-weighted noise (referred to a 1-watt output): −91.2 dB

Frequency response: 20 to 20,000 Hz +0, −0.7 dB; −3 dB at 11 and 75,000 Hz

Note: Due to a revision in Proton's model number assignment policy, the D1150 reviewed in this column has been renamed the AA-1150. The product is identical.

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