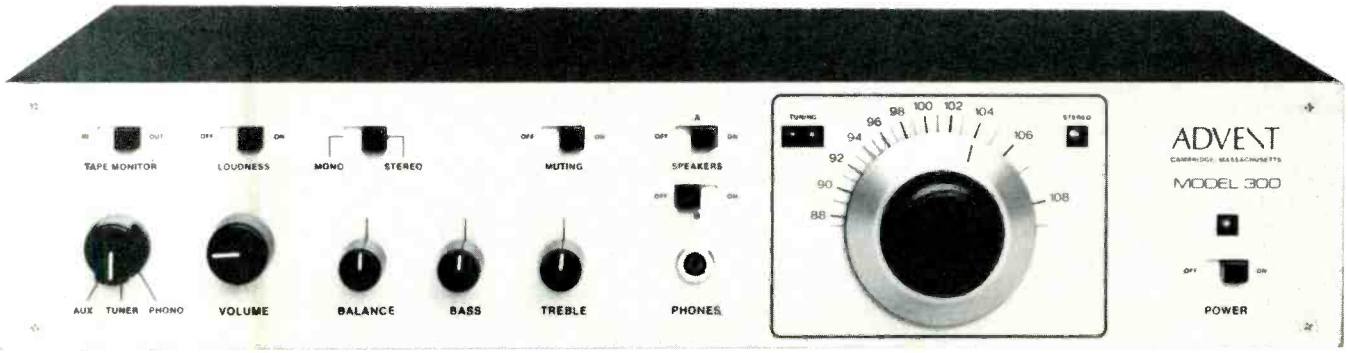
Advent Model 300 Stereo FM Receiver



MANUFACTURER'S SPECIFICATIONS

FM Tuner Section

Usable Sensitivity: Mono, 2.5 μV (13.2 dBf).
50-dB Quieting: Mono, 3.5 μV (16.1 dBf); stereo, 35 μV (36.1 dBf).
S/N: Mono, 73 dB; stereo, 70 dB.
Frequency Response: 30 Hz to 15 kHz ±1 dB.
THD: Mono, 0.15 per cent @ 1 kHz; stereo, 0.2 per cent @ 1 kHz.
Stereo Separation: 40 dB @ 1 kHz; 28 dB from 30 Hz to 10 kHz.
Image Rejection: 46 dB.
I.F. Rejection: 70 dB.
Spurious Rejection: 70 dB.
AM Suppression: 60 dB.
Capture Ratio: 1.6 dB.
Selectivity: 70 dB.

Amplifier Section

Power Output: 15 watts per channel, minimum continuous power into 8 ohms, 40 Hz to 20 kHz.
Rated THD: 0.5 per cent.
Rated IM Distortion: 0.3 per cent.
Input Sensitivities: Phono, 2.0 mV; high level, 100 mV.
Phono Overload: 100 mV.
S/N Ratios: Phono, 80 dB below 10 mV input, "A" weighted; Aux & Tape, 80 dB.
Tone Control Range: Bass, ±10 dB @ 100 Hz; treble ±10 dB @ 10 kHz.
Infrasonic Filter Response: -1 dB @ 20 Hz, -31 dB @ 4 Hz.

General Specifications

Power Requirements: 120 V, 60 Hz, 100 watts max. (optionally available for 12 V "portable" operation).
Dimensions: 15¾ in. (40 cm) W x 3 in. (7.6 cm) H x 9 in. (22.86 cm) D.
Weight: 12 lbs (5.4 kg).
Price: $259.95.

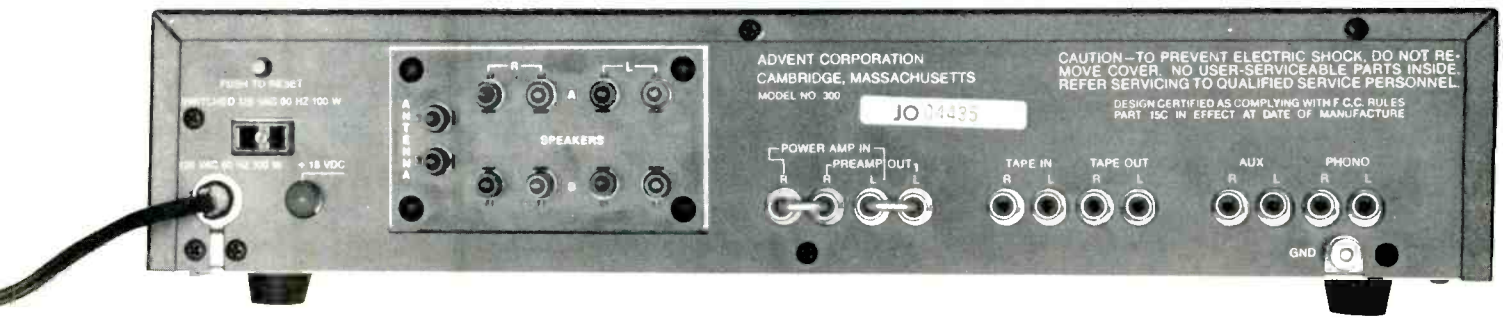
Anyone familiar with Advent Corporation's history in the electronics business will recognize that this company is not one which introduces products by the dozen every couple of years. The Advent loudspeaker and the Advent "smaller" speaker, both introduced several years ago, still stand as excellent examples of acoustic-suspension, sealed-box speaker design and are still selling as briskly as ever. Advent's dedication to their large-screen projection TV system has also been well publicized. And now, Advent brings to the audio industry its version of the stereo receiver.

Advent's Model 300 is low in power capability (by today's standards at least), has no bright lights or dial scales, uses about as simple a front panel control layout as might be imagined, and could conceivably be regarded by style-conscious audio buffs as something of an "ugly duckling". Still, behind that black front panel Advent has packed quite a bit of good audio performance capability and made it available at a reasonable price. There are a few aspects of the Model 300's design with which we take issue, but by and large, the accomplishments within the 300 are considerable.

Visually, the most outstanding difference between this receiver and others is the absence of the usual dial-scale/pointer arrangement. A simple, smooth-acting vernier tuning knob, fitted to a slower turning rear knob etched with a single thin line, selects frequencies which are calibrated at every MHz. An LED indicator to the right of this elemental tuning arrangement denotes the presence of a stereo signal, while a pair of LEDs to the left are used in lieu of a center-of-channel tuning meter. When both lights glow equally, you are correctly tuned to the station. To the right of this tuning-indicating arrangement is a simple slide-type power on/off switch, with a pilot light indicator just above.

Along the upper left of the front panel are six slide switches, of simplest possible construction. These take care of the single tape monitor circuit, loudness control switching, mono-stereo mode selection, FM interstation muting, speaker "A" on/off, and speaker "B" on/off. The usual stereo 'phone jack is positioned below the last pair of speaker switches. Rotary knobs along the bottom left of the panel take care of program selection (*FM*, *Phono* and *AUX*), master volume, balance, bass and treble. That's all there is on the front panel.

The rear panel is equally simple in layout, containing the usual array of input and tape output jacks; a preamp-out, main amp-in jack and wire jumper arrangement; a simple screw-terminal speaker connection points (for two pairs of



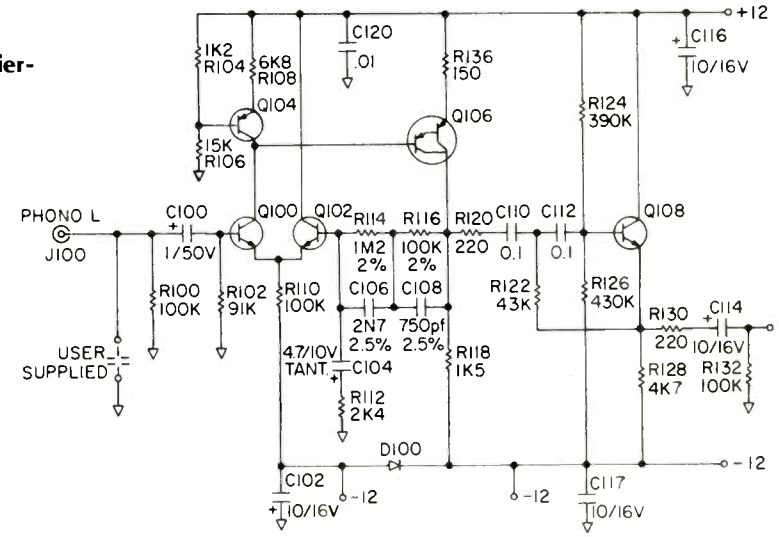


Fig. 1—Phono preamplifier-equalizer circuit.

speakers); a resettable circuit breaker button; a chassis ground terminal; a single switched a.c. convenience receptacle, and a jack which provides a d.c. voltage of +18 volts to power such accessories as the MPR-1 mike preamplifier.

Internal Layout

Two major circuit boards are used for most of the parts of the Model 300. The tuner PC board is isolated from the amplifier and power supply sections by chassis dividers, one of which serves as a heat sink for the small output transistors used in this receiver. A three-section tuning capacitor, plugged directly into the r.f. PC board, is directly coupled to the vernier tuning knob, the outer section of which goes through a bit more than three revolutions to get from 88 MHz to 108 MHz. The i.f. circuitry seemed to be conventional (at least visually, since no schematic was on hand), and a phase-lock-loop multiplex decoder section is employed for stereo decoding.

All parts relating to the audio PC board are mounted directly to it, with the exception of the slide switches referred to earlier. The unique preamplifier-equalizer circuit developed for this receiver is positioned near the left-rear of the chassis. In a paper presented by the circuit's inventor, Tomlinson Holman, at the 52nd AES convention in October, 1975, the author published the basic schematic of this preamp. Advent's adaptation is shown here in Fig. 1. A bi-polar differential-input configuration was chosen for its inherent non-saturating quality, its good isolation between the feedback loop and input (which contributes to non-interaction with cartridge source impedance), and greater freedom of choice of impedances in the feedback loop so that high frequency load (and slewing performance) can be optimized.

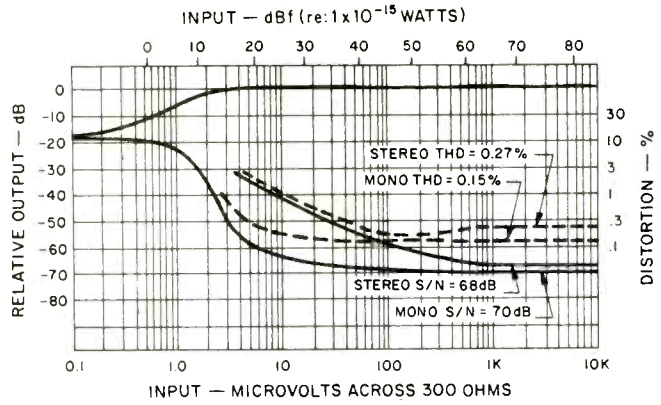
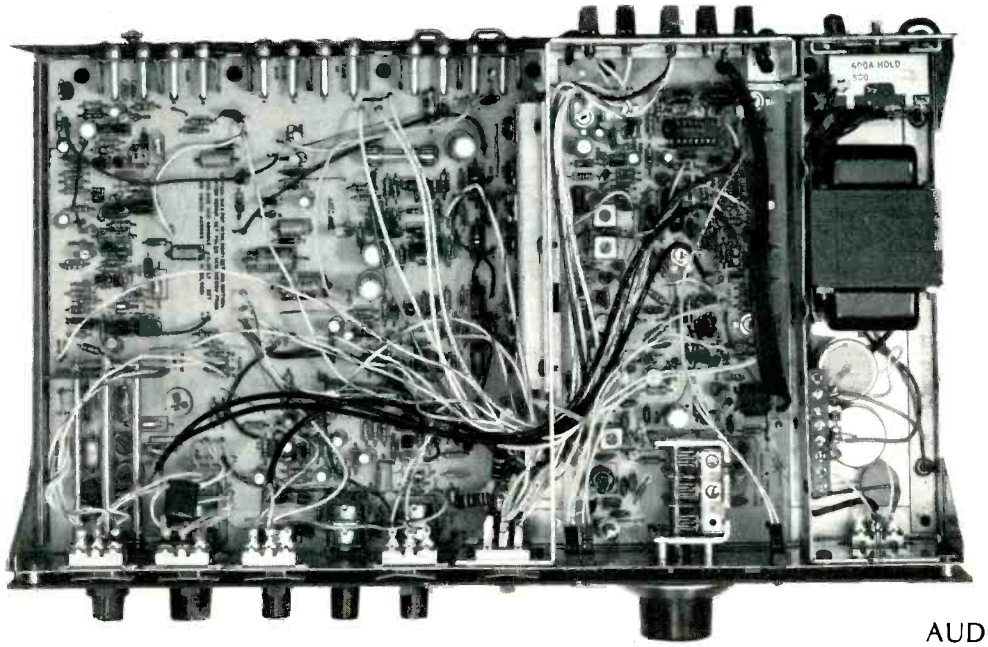


Fig. 2—FM quieting and distortion characteristics.



The use of current source loading of the first stage produces high stage gain, which results in high open-loop gain. This in turn results in large closed-loop, RIAA-feedback loop gain which keeps input impedance high and distortion low. In this design, an active filter network is used to obtain a complex pole pair which, when combined with a real axis pole produced by C104 and R112 yields an 18-dB-per-octave high pass filter which Advent calls its infrasonic (or sub-sonic) filter. It's virtually flat down to 20 Hz, then down as much as 31 dB at 4 Hz (the worst record-warp frequency) without audible side effects. Chief considerations in the design of this pre-amp were how it would perform when fed signals from a "real, live" cartridge, rather than from signal generators.

FM Performance Measurements

Usable sensitivity of the FM tuner on the Model 300 was 2.1 μV (11.6 dBf) in mono, 3.5 μV (16.1 dBf) in stereo, while the 50-dB quieting points were reached with signal input strengths of 2.5 μV (13.2 dBf) for mono and 30 μV (34.74 dBf) for stereo. As graphed in Fig. 2, best quieting in mono was 70 dB, while in stereo it measured 68 dB. Lowest distortion (with a 1-kHz audio signal modulating the carrier 100 per cent) was 0.15 per cent for mono and 0.2 per cent for stereo, though at the required 65 dBf test point, THD in stereo was a bit higher than for either lower or greater signal strengths. It should be noted that stereo S/N and THD readings had to be made using the IHF approved 15-kHz low-pass filter, without which excessive amounts of carrier output appeared at the output of the receiver and would have given false (and high) indications of noise and distortion. Stereo threshold (switching) occurred at 2.0 μV (11.2 dBf), while muting threshold was set at 4.0 μV (17.2 dBf); both should be

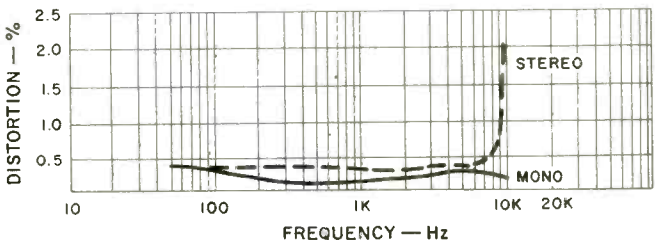
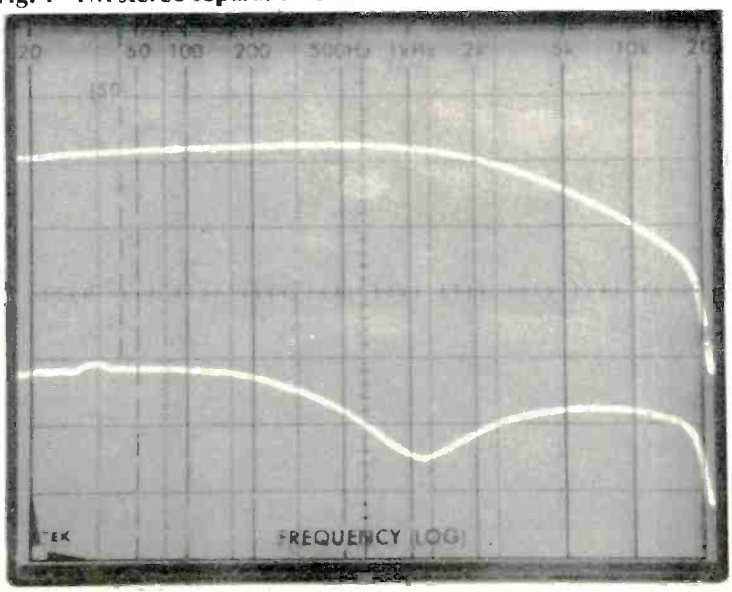


Fig. 3—Distortion vs. frequency for FM.

Fig. 4—FM stereo separation characteristics.



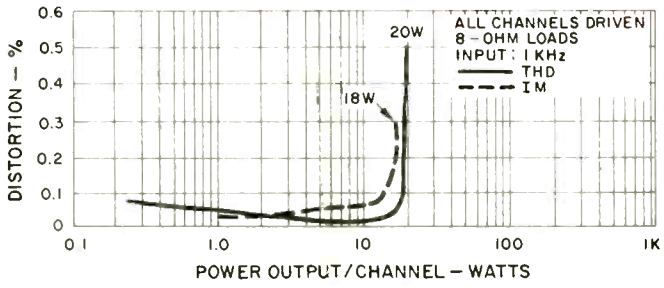


Fig. 5—Harmonic and intermodulation distortion characteristics.

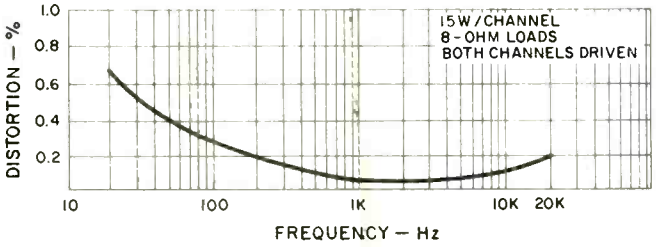


Fig. 6—Distortion vs. frequency.

considered excellent choices in terms of the other capabilities of the tuner section. Selectivity measured 75 dB, capture ratio was 1.5 dB, image rejection was 50 dB, and i.f. rejection measured 73 dB. Frequency response was just about perfect (based upon 75 microsecond de-emphasis) all the way out to 15 kHz but was down by about 1.5 dB at 30 Hz. Dial calibration was perfect from one end of the dial to the other, though equal indication of the two tuning LEDs did not correspond exactly to lowest distortion points—probably a case of slight misalignment of the detector circuit. (*Editor's Note:* Advent says that drift in the regulator for the LED display, a problem since solved, is more probably responsible for the non-correspondence.)

Distortion versus frequency of the modulating signal for mono and stereo is plotted in Fig. 3. Stereo separation was plotted by means of our spectrum analyzer, with the "desired" channel shown as the upper trace of Fig. 4 and the cross-talk shown as the lower trace. Separation measured in excess of 40 dB at both 1 kHz and 100 Hz. (Note that the de-emphasis of the receiver has not been compensated for.)

Amplifier Section Measurements

With a 1-kHz test signal input, the Model 300's amplifier sections were able to deliver 20 watts per channel into 8-ohm loads before the output reached a distortion level of 0.5 per cent. Rated IM distortion of 0.3 per cent was reached at a power output level of 18 watts per channel. Advent's claimed power band is from 40 Hz to 20 kHz, instead of the more common frequency extremes of 20 Hz and 20 kHz used by most amplifier and receiver manufacturers. Had they wished to specify the broader band limits, the receiver would have had to be rated at around 12 to 13 watts per channel.

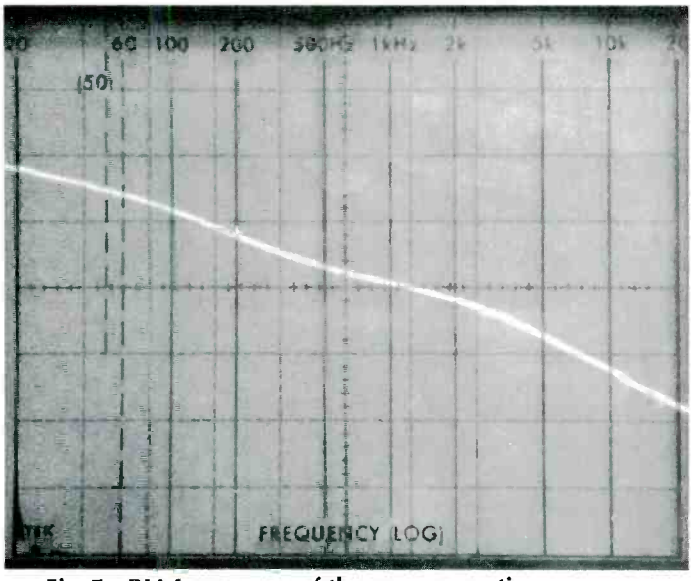


Fig. 7—RIAA response of the preamp section is within ±0.5 dB.

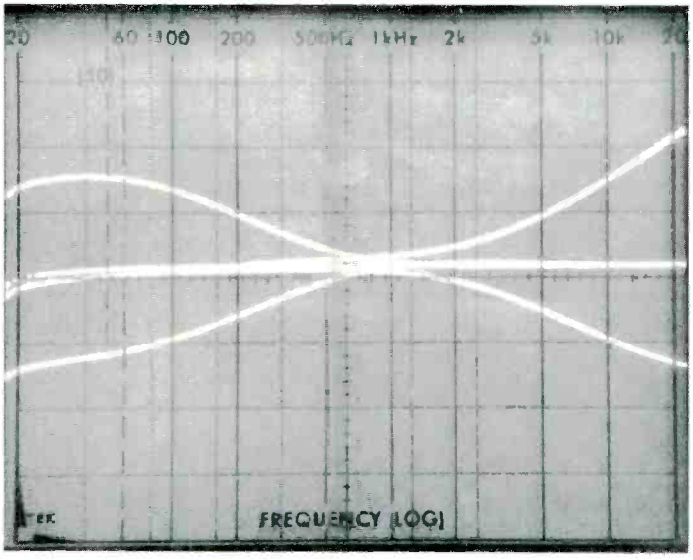
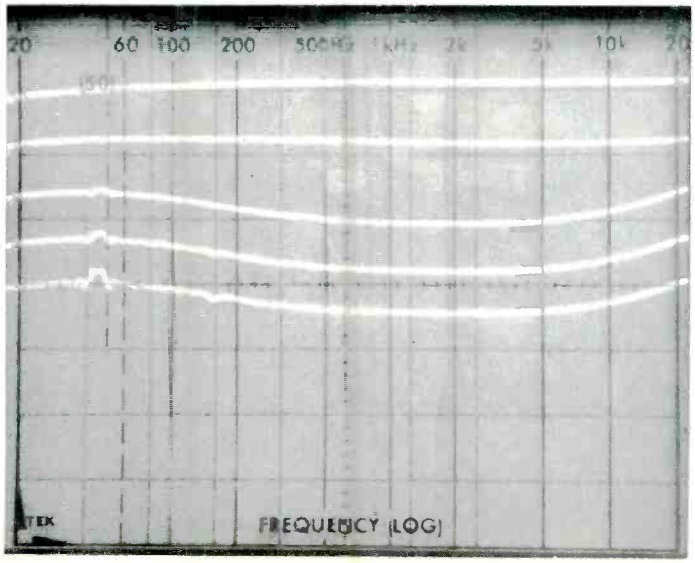


Fig. 8—Tone control range.

Fig. 9—Loudness compensation characteristics.



The Advent 300 amplifier circuit is obviously designed primarily for music reproduction and not for "sine-wave testing". During the course of our tests, the circuit breaker interrupted output upon several occasions when we operated at or near maximum power output. No such interruptions occurred during subsequent listening tests, even when the amplifier was driven into momentary overload or clipping. IM and THD versus power output are plotted in Fig. 5, while harmonic distortion, at the rated 15 watts per channel output versus frequency, is graphed in Fig. 6.

Phono equalization (RIAA) was accurate to within ±0.5 dB from 30 Hz to 15 kHz, and signal-to-noise in phono measured 80 dB unweighted (referred to a 10 millivolt input, in conformance with Advent's published specifications) or 85 dB using an "A" weighting curve network. Phono overload measured 100 mV at 1 kHz. Overall RIAA response is shown in the 'scope photo of Fig. 7 referenced to a 1-kHz "0 dB" point.

Tone control range (plotted in Fig. 8) provided a bit more boost than cut for both the bass and treble controls, but was otherwise typical of tone control action with mid-frequency "hinge points." Loudness compensation circuits incorporated in the Advent 300 provide both bass and treble emphasis at progressively lower master volume settings, as illustrated in Fig. 9. Unweighted signal-to-noise ratio at the high-level (AUX) inputs measured 81 dB below rated output, while residual noise at minimum volume measured 84 dB below rated output.

Listening and Use Tests

If one had to rate the three sections of this little receiver in order of merit, the preamp-equalizer section would win first place. So long as listening levels were kept within bounds, the performance of this newly engineered preamp-equalizer is superb. There was no feeling of "peaked" response between 10 and 15 kHz, where improperly loaded cartridges normally tend to exhibit distinctly audible resonances. Transient response during phono playback seemed limited entirely by the cartridge being used rather than by the preamp-equalizer electronics of the receiver, and we were able to detect greater differences between cartridges using this preamp section than is typically the case. To realize the full potential of this preamp section, it is important that a high quality pickup be used—even if its cost seems out of balance with respect to the cost of this receiver or your other matching components.

Next in order of preference we would rank the FM tuner section. Advent has managed to balance the elements of this tuner circuit (front end, i.f., and stereo decoder) to obtain the best performance possible within the constraints of the receiver's selling price.

While we would agree with Advent that the low power output of the Model 300 produces greater "loudness" than the numbers would suggest, we do not agree that the power output is truly adequate for use with low-efficiency acoustic suspension speaker systems if you seek truly big sound. Fifteen watts or a bit more, power band limited to 40 Hz at the low end, still sounds like just about that power level, and big sound lovers are urged to couple the receiver to high-efficiency speaker systems which are reasonably plentiful these days.

Since, so far as we know, the preamplifier circuitry contained in the Model 300 is not available elsewhere, perhaps the best way to enjoy big sound with the 300—if this is your aim—is to follow one of Advent's own suggestions: Use the Advent 300 as a tuner-preamp to feed its fine phono and FM signals to a more powerful basic amplifier! *Leonard Feldman*

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