JOLIDA SJ 302A INTEGRATED AMP

Who says tube amplifiers have to be expensive? In the growing market of comparatively affordable tube amplifiers, here's one from JoLida, the SJ 302A, that delivers 50 watts per channel. This unit has integrated-amp features yet sells for just $849.

JoLida, which was formed in 1983, deals primarily in industrial electronics, such as transformers, microwave tubes, and telecommunications equipment. It is also a major supplier of tubes and other component parts to the guitar-amplifier and high-end audio markets. JoLida does make five amplifiers, however, that range in power from 20 to 70 watts per channel and in price from $550 to $1,400 (with the SJ 302A right in the middle).

Rated Power Output: 50 watts into 8 ohms, 19 Hz to 100 kHz.
Dimensions: 17 in. W x 7½ in. H x 15 in. D (43.2 cm x 19.1 cm x 38.1 cm).
Weight: 39 lbs. (17.7 kg).
Price: $849.
Company Address: 10820 Guilford Rd., Suite 209, Annapolis Junction, Md. 20701; 301/953-2041.
For literature, circle No. 93

The front panel of the SJ 302A carries a selector switch with positions for four high-level sources, an on/off switch, and controls for balance and volume. On the rear panel are signal input jacks, five-way output binding posts (for each channel's ground, 4-ohm, and 8-ohm speaker connections), and an AC fuse and IEC line-cord jack.

Standing up from the attractive, welded-steel chassis are eight tubes: two 12AX7s for the input stage, two 12AT7 drivers, and two pairs of EL34 output tubes. Power and output transformers are mounted directly to the chassis top plate; the tubes and remaining components are on subplates or p.c. boards just underneath. The overall quality of parts and construction is good—better, in fact, than one might expect for a product in this price class.

Circuit Highlights

The SJ 302A's circuit topology is quite conventional except for its input stage. This stage uses a 12AX7 twin triode whose two sections are connected in series—similar to, but not the same as, the popular (and relatively new) mu-follower design. In the input circuit, the plate of the lower triode section is connected to the cathode of the upper tube through a cathode resistor; the plate also directly feeds the upper triode's grid. In addition, signal input is applied to the lower tube's grid. The concept behind this configuration is to present a semiconstant current load to the lower triode so that its voltage gain will approach its mu (amplification factor). Relatively low output impedance is maintained by taking output to the next stage from the cathode of the upper triode. The output of this first stage is directly coupled into a long-tailed phase inverter that uses a 12AT7 dual triode. The phase inverter's output is capacitor-coupled into the output stage, which uses an Ultra-Linear configuration with fixed bias.

Individual bias adjustments for each output tube permit matching their plate currents. A five-pin in-line socket on the chassis has contacts for ground and each tube's cathode voltage, which can then be checked with any DC voltmeter able to measure 40 millivolts with decent resolution. Overall negative feedback of some 5 dB is taken from the 8-ohm tap on the secondary of the output transformer back to the cathode of the first stage's lower triode section. The overall gain is said to be about 32 dB, about 6 dB higher than usual for a power amplifier, to accommodate low-output line-level signal sources.

The output of the four-position source selector feeds the volume control, which in turn feeds the input stage. The ends of the balance pot are connected to the wipers of the volume-control sections, and the balance pot's center tap is grounded. Because of this design, keeping the volume fully up and the balance control all the way to one side (an unlikely, but possible, scenario) will short out one channel of the signal source. This would not be particularly kind

Photo: Michael Groen

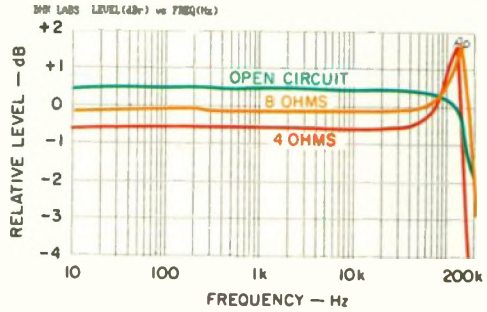

Fig. 1—Frequency response.

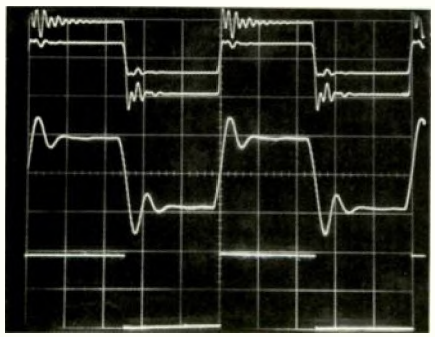

Fig. 2—Square-wave response for 10 kHz into 8 ohms (top), 10 kHz into 8 ohms paralleled by 2 microfarads (middle), and 40 Hz into 8 ohms (bottom).

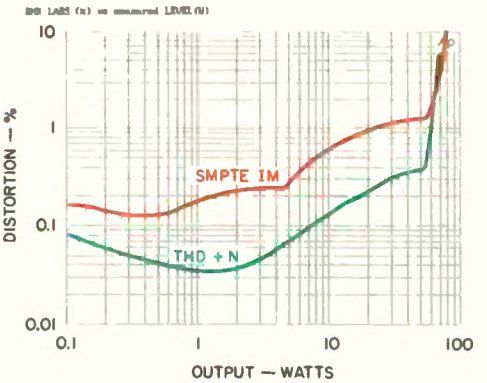

Fig. 3—THD + N and SMPTE-IM distortion.

to signal sources. However, in this age of predominantly high-level signal sources, making an integrated amplifier out of a power amplifier simply by adding input selection, volume, and balance (but no extra gain stages) is very sensible.

Measurements

Because performance of the SJ 302A's two channels matched very closely, data is shown for the right channel alone unless otherwise noted.

Voltage gain was 34.2 dB on the 8-ohm taps with 8-ohm loading. Although I didn't measure it, the gain with 4-ohm loads on the 4-ohm taps should be about 3 dB less. The SJ 302A's gain should be enough for most modern high-level program sources.

Frequency response on the 8-ohm tap for open-circuit, 8-ohm, and 4-ohm loading is plotted in Fig. 1. The SJ 302A has a somewhat greater bandwidth than most tube power amplifiers, albeit with some high-frequency peaking and consequent ringing. Oddly, it's the responses without 4- and 8-ohm loading, not the response with the open circuit (no load), that has a peak at the high-frequency end of the amplifier's bandwidth! I don't recall seeing any other amp do this. When I used the 4-ohm tap, the bandwidth was similar, but the peak (with 4- and 2-ohm loads) was essentially gone. Rise and fall times were each 1.2 microseconds with volume fully clockwise, output at ±5 volts, and 8-ohm loading on the 8-ohm tap. With the volume set for 6-dB lower output, rise and fall times increased to about 1.6 microseconds; that's still pretty fast, especially for a tube amplifier.

Square-wave response is shown in Fig. 2. The top traces are for 10 kHz into an 8-ohm load on the 8-ohm tap. The larger trace is with the volume control at maximum, and the smaller trace, at half amplitude, is with the volume down approximately 6 dB. Ringing is reduced when the volume is at the –6 dB point because the lower volume setting slows the rise time. (This is a common phenomenon: The amplifier's input capacitance and the equivalent resistance of the volume- and balance-control circuit form a first-order low-pass filter.) Note also that the ringing is different for each half cycle. This is usually caused by coupling differences between each primary half of the push-pull circuit's output transformer and its secondary windings. In the middle trace, the 8-ohm load is paralleled by a 2-microfarad capacitor; the ringing characteristic seen here is typical of most power amplifiers. The 40-Hz trace (bottom) exhibits admirably little low-frequency tilt, verifying that the response extends below 20 Hz.

Both total harmonic distortion plus noise (THD + N) and SMPTE-IM distortion are shown in Fig. 3 as functions of power output for 8-ohm loading on the 8-ohm tap. With 4-ohm loading, 44 watts was attainable at the 8-ohm tap; with a 16-ohm load, power at this tap was 33 watts. Figure 4 shows THD + N versus frequency; the rising THD + N below about 1 kHz at the low power levels is due to signal modulation from the power supply's ripple frequency of 120 Hz. At higher power levels, the rise in distortion at low frequencies is due to the output transformer's increasingly nonlinear magnetic characteristics. A spectrum of

DESPITE ITS FAIRLY MODEST COST, THE LITTLE SJ 302A TUBE AMP SOUNDED REMARKABLY GOOD.

the 1-kHz harmonic-distortion residue at 10 watts into 8 ohms on the 8-ohm tap (not shown) revealed admirably low high-order components. The third was the dominant harmonic, as it should be in a well balanced push-pull amplifier. All in all, the SJ 302A's distortion was typical for a well-designed tube power amp.

Interchannel crosstalk was almost identical in the two measurement directions. With volume fully clockwise, the crosstalk level was about –77 dB up to a frequency of 500 Hz, increasing to –70 dB at 2.2 kHz and to –55 dB at 20 kHz. With volume set to about –20 dB of attenuation, crosstalk was some 15 to 20 dB higher.

Output impedance on the 8-ohm taps was about 0.4 ohm. Damping factor, the ratio of the tap impedance to the output impedance at that tap, is plotted for both channels in Fig. 5. What is unusual here is the increase in damping at the upper end of the audio range, a phenomenon I have no ready explanation for. Input impedance measured about 32 kilohms.

Output noise as a function of measurement bandwidth was 1 millivolt wideband,

740 microvolts from 22 Hz to 22 kHz, 200 microvolts from 400 Hz to 22 kHz, and 170 microvolts A-weighted. The EIA S/N was 84.5 dB, with the left channel about 2 dB quieter than the right.

Dynamic power was 68 watts at the beginning of the EIA tone-burst signal and 64 watts at its end; with the 68-watt measurement, that means dynamic headroom was 1.3 dB. Steady-state power at the visual onset of clipping was 60 watts. The AC line-current draw was 0.7 ampere at turn-on, before plate current started to flow. It was 1.5 amperes at idle and 3 amperes at 60 watts per channel.

Use and Listening Tests

I found the SJ 302A amp worked flawlessly, and its gain was entirely adequate for all of my signal sources. I got the distinct impression, from its stable performance and solid build quality, that this amplifier would be reliable in the long run. One thing that may be troublesome, however, is the outside diameter of the RCA input jacks, which seems to be smaller than standard; I would advise gently squeezing the outer contacts of any signal cables before plugging them in.

My intial listening impressions of the SJ 302A were favorable. (These early impressions are often pretty much in line with my impressions after more extended listening; sure enough, I concluded that this was an amp I could live with.) Space and dimension were quite good, and there was little irritation. Tonal balance was essentially neutral; the bass was just a bit "tubey," or underdamped, but otherwise musically consonant, and the amp had an amazing amount of impact and "whack." Pushing the SJ 302A hard produced a more than adequate and satisfying sound level, and it overloaded gracefully. I got very musically satisfying sound with all my signal sources. This little amp sounded remarkably good, despite its relatively modest cost. I liked the JoLida quite a bit; anyone wanting to experience tube amplifier sound without paying a fortune should check it out. A

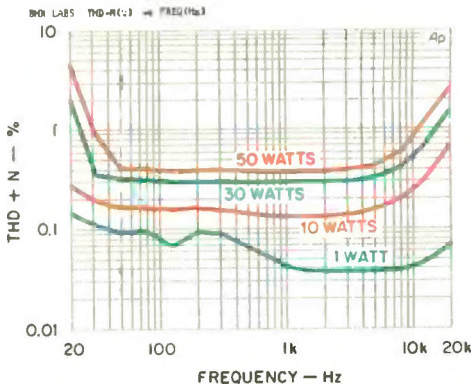

Fig. 4—THD + N vs. frequency.

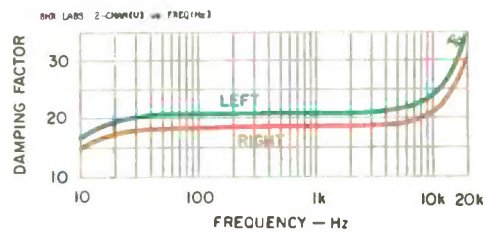

Fig. 5—Damping factor.