

Equipment Profiles

- Revox Model 77A Stereo Tape Recorder
- Sansui Model 2000 AM/FM Stereo Receiver
- Acoustic Research Model AR-3a Speaker System
- Benjamin Model 1050 Compact Music System

ReVox Model 77A Stereo Tape Recorder

MANUFACTURER'S SPECIFICATIONS—Tape Speeds: $7\frac{1}{2}$ & $3\frac{3}{4}$. Motors: Three, incl. electronically governed capstan motor. Reel size: $10\frac{1}{2}$ in. max. Tape Heads: Three. Wow & Flutter: .08% max. at $7\frac{1}{2}$ ips; 0.1% max. at $3\frac{3}{4}$ ips. Frequency response: 50-15,000 Hz ± 1.5 dB at $7\frac{1}{2}$ ips; 30-20,000 Hz, +2, -3 dB at $7\frac{1}{2}$ ips; 50-10,000 Hz $\pm 1\frac{1}{2}$ dB at $3\frac{3}{4}$ ips; 30-16,000 Hz +2, -3 dB at $3\frac{3}{4}$ ips. Distortion: 2% max. at $7\frac{1}{2}$ ips, 3% max. at $3\frac{3}{4}$ ips. Crosstalk: Better than 45 dB (stereo) & 60 dB (mono). Equalization: record, NAB; playback, NAB and IEC (switchable). S/N: 58 dB at $7\frac{1}{2}$ ips; 56 dB at $3\frac{3}{4}$ ips. Oscillator frequency: 120 kHz. Inputs: low- and high-Z microphone; radio, aux. Outputs: 2.5 V across 600 ohms; 200-600-ohm phones. Output amplifiers: optional plug-in, 8 W/chan. rms. Remote control: optional; plug-in prov. on chassis. Weight: 34 lbs. Price, \$499.00 without power amplifiers, \$569.00 with amplifiers (both with wood base). Portable version with amplifiers, built-in speakers, leatherette carrying case, \$599.00.

When the predecessor of the current ReVox 77A was reviewed in these pages (Feb. 1966) it was readily apparent that the reviewer could find little fault with the machine. The same could be said of the 77A, which boasts complete transistorization, electronic speed control, remote-control facility, and a quality of construction which puts it in the deluxe class.

Its control layout is similar to the older G-36, in that the knobs perform basically the same functions. Transport operation is controlled by five pushbuttons at the left side of the panel — FAST REWIND, FAST FORWARD, PLAY, STOP, and RECORD. Below these are two controls combined with concentric switches; the left knob controls

playback level, the right one controls balance. See Fig. 2. The left switch, actuated by a clear plastic disc at the base of the knob, has four positions—STEREO, CH I, CH II, and MONO. The right switch is marked NAB, INPUT, and IEC, and controls the source of the signal being monitored—the input signal or the playback from the tape with either NAB or IEC equalization. The latter provides for European recordings made with DIN 45513 or CCIR II equalization. (The difference is shown in Fig. 9.) At the right are the two VU meters, flanked by two red push-push switch buttons which select the channel to be recorded, and below them another pair of concentric controls and switches. See Fig. 3. The knobs control recording level on the two channels, while the switches (six positions) select the source. Two positions are used for introducing echo or for sound-on-sound recording. Between the two groups of controls are three phone jacks—stereo headphones and left- and right-microphone inputs. To the right of the controls are the pilot light and the line

switch/tape tension switch: $3\frac{3}{4}$ small reel, designated by a small o; $3\frac{3}{4}$ large reel, designated by a large O; off, $7\frac{1}{2}$ O, and $7\frac{1}{2}$ o. Thus, optimum tape tension can be achieved. The power switches are cam-operated micro-switches, while the equalization and speed changes are accomplished by a long slide switch with the contacts located adjacent to the circuits they control.

Above the control panel is the tape-path shield—a plastic strip which covers the path of the tape, and which swings down out of the way for threading. We would have preferred this to be a metal strip to ensure against warping. The reel turntables are in the upper part of the front panel, with spring-loaded sleeves which hold the reels in place on the splined spindles. Between the reels is a 4-dial digital counter which resets by a single push-button. The cover panel is black plastic, and it snaps into fittings on the chassis.

Along the top at the rear are the connectors for inputs and outputs—a 10-terminal DIN socket for the remote

Fig. 1—Revox Model 77A with $10\frac{1}{2}$ -in. reels, and a second view that exposes its high-quality interior.

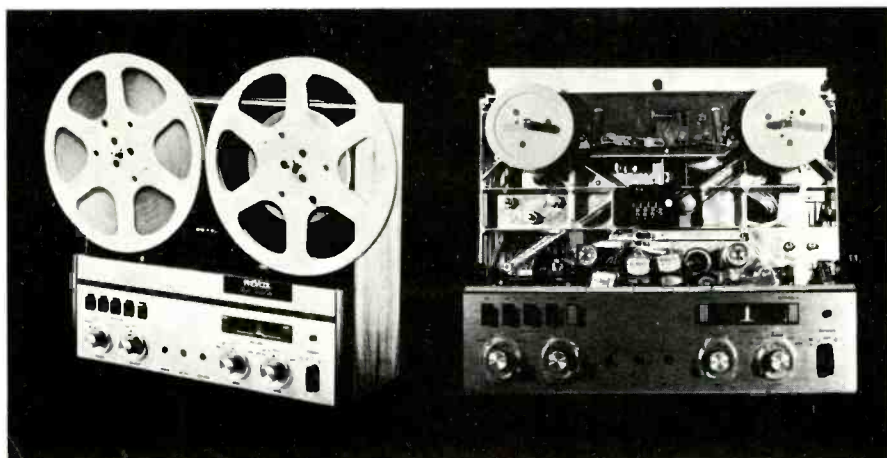
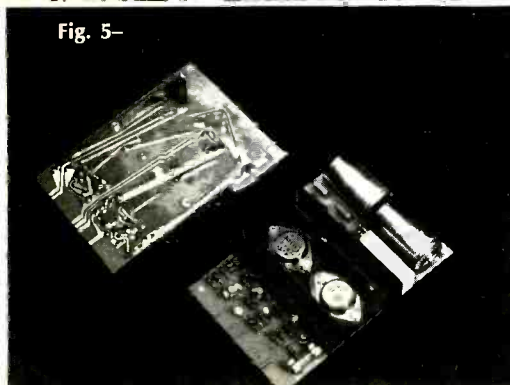
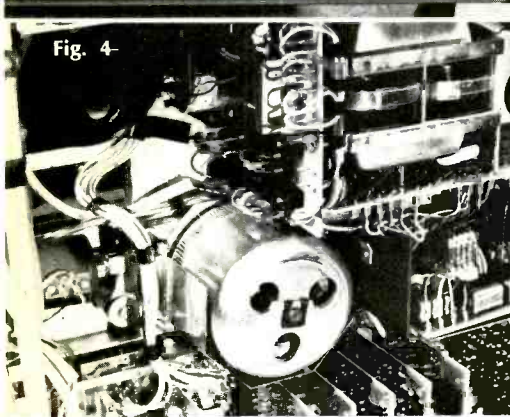
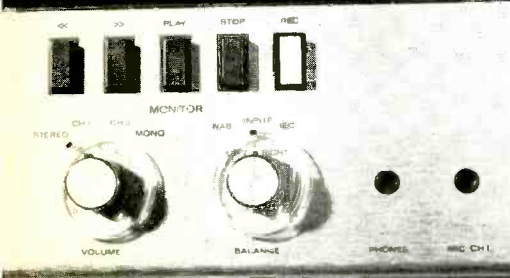


Fig. 2—Closeup photo shows pushbutton operating facilities.

Fig. 3—Right side of the Revox's front panel focuses on a one-knob speed control (small zero and large zero markings provide automatic tape tension adjustment for use with small or large reels, respectively) and on-off power switch.

Fig. 4—Rear view exposes electronically-governed capstan motor and printed-circuit boards.

Fig. 5—Solid-state power amplifier plug-in module.



Equipment Profiles (continued)

control with its dummy plug, the two speaker sockets, also DIN types, two pairs of phono jacks for aux and mic inputs, a 5-terminal DIN socket for connection to radio, another pair of phono jacks for outputs, and the line cord receptacle. The voltage selector switch and the line fuse are accessible through a plastic door on the back of the cabinet.

The 77A comes in a variety of combinations—the recorder chassis in a wood housing; the same with the power amplifiers; the same in a carrying case with or without amplifiers; and in another carrying case with a pair of loudspeakers and the power amplifiers. Each case has a “cheater” plug which completes the a.c. line connections to the recorder when it is installed in the case. To use the instrument out of the case, one must put in a dummy plug, which is actually a European-type line plug.

With the tape-path shield open, one has access to two additional push-push switches—one turns off the power to the reel motors for easy editing, and the other switches off the speakers.

The unit is built on cast end trusses which provide a remarkable solidity to the chassis, the rear view of which is shown in Fig. 4. Along the lower side can be seen the printed circuit boards. The record and play amplifiers are duplicated, one for each channel. These printed circuit boards simply plug into jacks which are mounted on the front section, adjacent to the switches and controls. Adjustable controls, which can be seen along the upper edges of the boards, face downward, and are accessible through holes in the retaining plate. This plate is covered with a paper sheet on which are printed the locations and functions of the various controls. Each location is designated by a circle which actually covers a hole in the plate, thus permitting access to the controls simply by punching out the paper. Above the circuit boards is the relay panel, which performs all of the transport controls.

The two spooling motors are Papst torque models, and they operate on 35 V for 7-in. reels, and on 42 V for 10½-in. reels. The capstan motor is built by the manufacturer of the Revox and the famous Studer line of professional recorders—Willi Studer. The rotating outside of this motor is grooved as shown in Fig. 4, and these grooves are “read” by a pickup head similar to a recording head. Its output is fed to the speed-regulating circuit board which holds the speed constant, regardless of line frequency or—within

limits—voltage. Changing from the European 50-Hz line frequency to the U. S. standard of 60 Hz requires no change whatever in the machine. This panel employs 9 transistors and a diode bridge. Since the change for 7½ ips to 3¾ requires only the application of 22 V to the control circuit, the speed change is entirely electrical.

The power transformer has four primaries which are switched to accommodate the six possible line voltages. It has five secondaries—two furnishing 32 V a.c. separately to the two power amplifiers, if they are used, one furnishing a rectified and filtered 24 V d.c. to the control circuits, one furnishing a rectified and regulated 21 V d.c. to the remaining circuit boards, and one furnishing a number of a.c. voltages to the motors, as required.

Of the seven printed circuit boards, one is the input amplifier which is shared by both channels. This employs six transistors—three for each channel. This is followed by switching and the record amplifier boards, one for each channel. Each of these has five transistors and four adjustable controls—high-end equalization for each speed, low end equalization, and recording level. It also has bias traps and provides drive for the VU meter. The record relay board switches on the oscillator through a transistor and removes a short from the output of the record amplifier. It also provides a dummy load for the erase head that is not in use when recording on only one channel.

The two playback boards, each with five transistors, provide all the necessary playback gain. The oscillator board furnishes the necessary bias and erase voltages at a frequency of around 120 kHz. Two transistors are used in a push-pull circuit and four controls are provided to adjust bias on both channels at each speed.

The power amplifier boards, shown in Fig. 5, are mounted above the capstan motor. Each is separately fused, and provides its own d.c. supply by means of a bridge rectifier. The circuit is a quasi-complementary arrangement, and an output power of 8 W is provided to loads from 4 to 16 ohms. When using the model which has the speakers in the housing, plugging another set into the DIN sockets cuts off the built-in speakers.

Operation

The tape is threaded over a solid post and under the guide—a stationary ring with a sand-blasted surface to provide some stabilizing drag—past the

erase head, under the lifter and past the record and play heads, then under the capstan and another guide and up to the takeup reel. Just ahead of the erase head, the tape passes between a light and a light-dependent resistor. When the tape is in place, the light is shaded, and operation is normal. When the end of the tape passes through the recorder, light energizes the cell and the machine is stopped. To free the tape reels for easy threading or for editing, depress the "reel motors off" button and then depress either of the fast-wind buttons. These will release the brakes so the tape can be moved freely. The pressure roller can be moved against the capstan by another lever to permit editing with ease. To restore the machine to normal operation, simply press the stop button and press the reel-motors-off button again.

In playback, the STEREO position of the switch is used for stereo material; CH I will play the material on track I into both outputs; CH II will do the same for the other channel; MONO will play both tracks combined into both outputs. Similarly, in recording, if only one of the buttons adjacent to the meters is depressed, both inputs will be recorded on the respective channel, thus making it possible to mix two separate inputs monophonically. If neither button is depressed, the record button is ineffective and tape can not be erased inadvertently.

Echo is obtained by re-injecting the playback signal while recording, and can be done only in the mono mode. Similarly, sound-on-sound recording—also mono only—can be done by recording a signal on one track, rewinding, then re-recording that signal combined with another on the other track. Both of these facilities are provided for simply by correctly positioning the controls. In all, it is a most flexible machine.

Performance

Let it be said first that this is the "flattest" machine we have ever encountered. Using Scotch Dynarange 202 tape—which the machine's equalization and bias were set up for—the record/play curve was flat to within ± 1 dB from 20 to 20,000 Hz (which is better than the specs). The difference between channels was never more than 1.3 dB. Response at 22,000 Hz was down only 5 dB. These figures were for $7\frac{1}{2}$ ips. At $3\frac{3}{4}$ ips, the same can be said for the range from 20 to 15,000 Hz, with the maximum deviation at 17,000 Hz being only 5 dB. Flutter

measured .03% in the band from 0.5 to 6 Hz, .06% in the band from 6 to 250 Hz, and .07% in the overall band from 0.5 to 250 Hz at $7\frac{1}{2}$ ips. Overall flutter at $3\frac{3}{4}$ ips measured at 0.1%.

Frequency-response curves are shown in Fig. 6. The dotted line on the $7\frac{1}{2}$ curve shows the effect of the IEC equalization. Both channels were so close that the width of the line would include both.

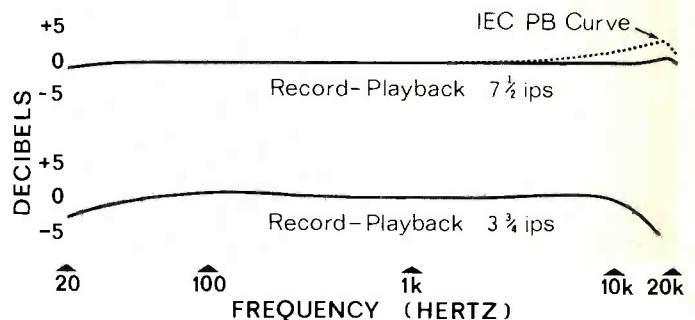
At $7\frac{1}{2}$ ips, hum and noise measured 62 dB below the 3% distortion point, which was 9 dB above the indicated 0 level. (Using professional standards, this is 53 dB below the 1% point, also excellent.) For this measurement, the standard "A" weighting network was used. At $3\frac{3}{4}$ ips, hum and noise mea-

—pull out the line cord and the machine stops with no spillage of tape.

A few additional figures: Fast forward and rewind times for 1200 feet of tape measured at 62 sec. each way. The required input signals for 0-level recording were as follows: AUX, 15 mV; MIC HI, 1.2 mV; MIC LO, 0.15 mV; RADIO, 1.2 mV. Output signal measured at the external jacks was 2.5 V into 600 ohms with a 0 level on the tape.

In use, the machine was a dream to handle. The push buttons, which control operation of the transport, actuate relays and are thus not burdened with any mechanical function. In the record mode, the VU meters are illuminated—both for stereo and only one if only one channel is being recorded. Repro-

Fig. 6—Revox Model 77A's frequency response at both its speeds.



sured 58 dB down. Distortion (THD) at 1000 Hz, measured at 0 recording level, was 1.3 and 1.9% respectively at $7\frac{1}{2}$ and $3\frac{3}{4}$ ips. At the same level, distortion at 100 Hz was 1.5 and 1.9%, and at 10,000, it measured 2.7% at $7\frac{1}{2}$ and 3.4 at $3\frac{3}{4}$.

At the output of the power amplifiers, distortion measured 0.42% at 1000 Hz, 0.2 at 100, and 1.2 at 10,000, all at 8 W output (into 8 ohms), which is the rated output of the amplifiers. Measured through the tape at a recording level of -10 dB, 1000-Hz distortion measured 2.0%. Channel separation in the stereo mode measured 48 dB, while in the mono mode it measured 58 dB. On the whole, a rather impressive set of performance measurements.

The electronic speed control held the speed exactly "on the nose" at all input voltages from 135 down to 92, where a buzz appeared in the output of our sample. Our final observation resulted from the use of a 100-W amplifier feeding a reversed 25-V transformer to produce 115 V at the output, and with a varying low-frequency signal from an audio oscillator from 40 to 70 Hz, we again found no speed variation, although the buzz appeared again at 42 Hz. The recorder was fully "fail safe"

duction at $7\frac{1}{2}$ ips sounded the same whether monitored from source or tape; at $3\frac{3}{4}$ ips there was only the slightest difference in the highest frequency range. The pleasure of listening to reproduction with such an extended frequency response and a minimum of flutter is difficult to describe without "gushing," but that is what is necessary to get the idea across that the 77A is a superb machine.

In 1966, our review concluded with this: "Somewhere along the line we trust that you have reached the conclusion that we are enamored of this machine. Because we are." We can think of no better ending, yet we decidedly prefer the new 77A reviewed here because; it's solid state; it's flatter; and it's mechanically and electrically quieter.

The machine has just about everything the serious recordist could wish for in the way of performance and flexibility. And the high-quality workmanship under the top deck gives promise of long life. In fact, excepting the plastic escutcheons, et al., the unit is as "professional" as you can hope for in its price class.