

Equipment Profiles (continued)

Ampex Model 1461 Stereo Tape Recorder

MANUFACTURER'S SPECIFICATIONS:

Speeds: $7\frac{1}{2}$, $3\frac{3}{4}$, and $1\frac{7}{8}$ ips. Preamp overall frequency response: $7\frac{1}{2}$ — ± 4 dB 70-15,000 Hz; $3\frac{3}{4}$ — ± 4 dB 50-7500 Hz; $1\frac{7}{8}$ — ± 6 dB 50-3000 Hz. Preamp S/N from peak record level: $7\frac{1}{2}$, 46 dB; $3\frac{3}{4}$, 43 dB; $1\frac{7}{8}$, 39 dB. Flutter: $7\frac{1}{2}$, 0.15%; $3\frac{3}{4}$, 0.2%. Speed accuracy: $7\frac{1}{2}$, $\pm 2\%$; $3\frac{3}{4}$, $\pm 3\%$. Fast wind time (1200 ft. tape): 150 sec. Tone control range: +8, -10 dB at 10 kHz; +15, -6 dB at 100 Hz. Power output per channel: 8 W rms into 8-ohm load. Dimensions: $23\frac{1}{2}$ " wide x 14" high x $8\frac{1}{2}$ " deep. Weight: 46 lbs. Price: \$485.00.

This three-speed, $\frac{1}{4}$ -track recorder/reproducer is equipped with facilities for reverse play, with the automatic reversing being dependent on a 20-Hz signal which the user places on the tape at the ends of the recorded portion of the tape. This signal is generated by a mechanical device which rotates in the field of a coil, so no additional electronic equipment is necessary. It is fed into the recording amplifier after the record-level control, so it is only necessary to press the button to put the reversing signal on the tape at the proper level. This may be done on both ends, and when desired, the machine will run continuously until stopped. If desired, the machine will reverse at the end of the forward play, and then stop when the tape has played through in the reverse direction.

Another feature of the 1461 is the automatic-threading reel. To thread the machine, you put the left reel of tape on, draw out about 18 in. of tape and drop it in the slot, and start the transport. The automatic reel picks up the tape and starts it winding properly on the take-up reel. This feature will appeal to the non-technical user.

The overall width of the case, shown in Fig. 1, is the result of the storage space for two "cube" speakers. Each of these 6-in. cubes connects to one of the channels by phone jacks at the rear of the case, and for portable use, they fit into the case one above the other, at the left side, and may be heard through the grille cloth. For stereo use, however, they should be removed from the storage space and placed to the right and left of the unit at suitable distances—a maximum of 10 feet is permitted with the attached cords.

At the center and above the head cover can be seen the speed-change lever which actuates a forked arm that moves the capstan-drive belt to the desired one of the three pulley diameters. At the far left in Fig. 1 are the two record-level meters which indicate the signal level during the recording operation, and when switched to tape monitoring they indicate the output level from the tape itself. Their indications are not affected by the volume control during playback, and during recording they are not affected by the record equalization, which is most desirable.

Below the meters at the left is the tone control, with the small knob for treble boost or cut, and the large knob for bass. Next to the right is the playback level control—the small knob for channel 1 and the large one for channel 2. Neither of these affects the recording and they act only upon the speaker output, not the monitor or line outputs.

Another small panel at the right, Fig. 2, accommodates the record buttons. Fig. 2, accommodates the record buttons. These may be depressed while the tape is stationary so as to set levels, and must be held down when the play lever is actuated if you wish to record. Otherwise they jump up to the normal position. To their right are the two microphone input jacks, and below

them is the reverse button to put the 20-Hz signal on the tape. To its left is a slide switch which changes equalization. One position is labeled $7\frac{1}{2}$, while the other is marked $3\frac{3}{4}$ - $1\frac{7}{8}$. The two slower positions use the same 120- μ sec equalization, so only two switch positions are necessary.

Below this panel are the record-level control at the left, and the selector at the right. The small knob on the level control adjusts recording level on the left channel, and the large knob adjusts

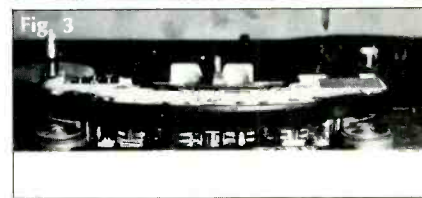


Fig. 2—Microphone input jacks, the record buttons, the reversing-signal button, and the equalization control switch all appear in the lower right corner of the panel, along with the mode selector switch and the record-level controls.

Fig. 3—The four heads are seen under the head cover, along with the two capstans.

level for the right channel. The small knob of the dual selector switch sets the reverse mechanism to operate only at the end of the forward run, or to play continuously.

The left lever at the center of the head cover is the fast-wind control, while the right one is the play lever. Below and between them is the direction lever, which actually reverses the motor rotation, and thus the direction of tape motion. Under the head cover are four heads—erase, record, forward play, and reverse play, shown in Fig. 3, and two capstans, each with its pressure roller. This use of two capstans ensures tight contact with the heads without the need for pressure pads.

Facing the rear of the housing, the line input and output phono jacks are located at the upper left corner in a recessed opening. The storage space at the right for the two cube speakers is accessible when a hinged panel is opened. In the partition between the

Fig. 1—Ampex Model 1461 Auto-Thread, Auto-Reverse, Three-Speed Tape Recorder. The speaker compartment at left hides two stowaway speaker systems that can be removed and spread up to 20 ft. apart for stereo playback.



Equipment Profiles (continued)

speaker space and the recorder chassis are the two speaker jacks, and a three-circuit jack which provides for the connection of stereo headphones. When the plug is inserted in the 'phones jack, the speakers are cut off.

Circuit Description

The two channels are electrically identical, of course. The play-amplifiers utilize four transistors each, the first two an equalized pair with switching to provide the different equalizations for the 7½-ips speed and the two lower speeds. The monitor selector switch is between the two pairs of transistors, and correctly interconnects the two channels for mono, and connects the output pair to either the playback preamp or the record preamp for source or tape monitoring. The record-level meter is at the output of the play amplifier, and thus directly across the monitor output.

The record amplifier is composed of three transistors, the first two as a feedback pair to provide sufficient gain from the microphone input, while the third introduces the high-frequency boost required for the recording process. It is followed by two bias-trap circuits, and feeds the record head, with the bias adjustment controlling the amount of bias.

The bias oscillator, operating at 96 kHz, consists of a pair of transistors in push pull, followed by the necessary bias switching. The power supply utilizes a pair of diodes to provide 43 V for the power amplifier section, together with a voltage-dropping resistor and a zener diode to regulate the supply to the record and play sections to 27 V.

The power amplifiers use a single-transistor input, followed by a Baxendall-type tone control, three booster stages, and a complementary-symmetry output pair which puts out a signal of 10 W per channel into 8 ohms. The reversing process is furnished by a four-stage amplifier tuned to 20 Hz with its output fed to a solenoid which actuates the reversing switch. Thus there is a total of 53 transistors and 25 diodes in the unit, in addition to the aforementioned zener which regulates the supply to the low-level stages.

Performance

The 1461 beats its specifications in every particular, as shown in the curves of Fig. 4. The record/playback curves show a boost at 10 kHz (for 7½ ips), and a similar boost at 7500 Hz at 3¾ ips, but in view of the excellent response from a standard tape, it is likely that the bias was adjusted for the con-

ventional tape, rather than the 202 which we normally use for tests, and which usually requires less bias than conventional tape. The record/play response at 7½ ips was measured at 50 to 21,000 Hz ± 4 dB (the spread listed in the specifications), 50 to 12,000 at 3¾ ips, also ± 4 dB, and approximately 30 to 4700 Hz ± 4 dB (although the specs list a spread of ± 6 dB) at 1⅞ ips.

The 3-per cent distortion point occurred at 8 dB above the indicated zero recording level at 7½ ips, with distortion at zero level measuring 1.8 per cent. This gives S/N's of 50, 44, and 40 dB at 7½, 3¾, and 1⅞ ips, respec-

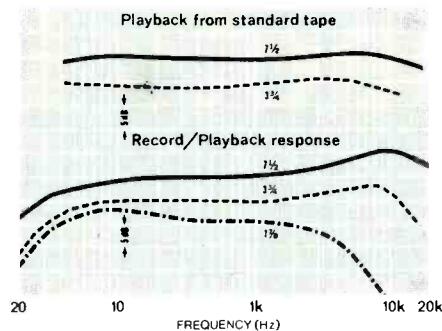


Fig. 4—Performance curves—Upper pair: playback from standard tape at two speeds. Lower set: record-playback response at the three speeds.

tively. Channel separation was measured at 41 dB, which was the same for adjacent-track mono recordings. Flutter-and-wow was measured at .08 per cent at 7½ ips, 0.17 at 3¾, and 0.21 at 1⅞, all of which are excellent.

Ampex lists speed accuracy at ± 2 per cent at 7½ ips and ± 3 per cent at 3¾. We presume they mean speed "error," since we would normally refer to these "accuracies" as 98 and 97 per cent, respectively. Actually, the error at 7½ ips was 2 per cent and zero at 3¾.

The input signal for a zero indicated recording level was a minimum of 1.3 mV at the microphone inputs and a maximum of 30 mV, which would accommodate practically any microphone available. The microphone input impedance is 150k ohms, which is adequate for any dynamic, although not suitable for crystal or ceramic microphones. The line-input minimum was 0.3 V for a zero-level recording, with a maximum of 3.0 V. The line output measured 0.51 V at the same zero level, and the speaker output with the volume controls at maximum was 6.5 V across 8 ohms, which corresponds to 5 watts per channel, although the maximum output was measured at 10 watts/channel with increased input signal.

Two Ampex model 702 dynamic microphones are furnished with the

1461, together with simple plastic stands for them. These are suitable for the average recording use, although the instruction book lists three other models which might be selected optionally if the principal use for the recorder involved considerable microphone pickup.

The two model 1414 loudspeakers which are furnished with the machine have a usable output from 50 to 12,000 Hz, and are remarkably flat over that range—an unusual response for such small enclosures. They make a fine complement to the recorder, which according to the table in the January issue would be rated as "good to excellent" in every particular. It is easy to operate, sounds good, and the advantage of the reversing feature should not be overlooked, particularly when it can play continuously. One could record a reel full of choice musical selections at 1⅞ and furnish 8½ hours of continuous stereo background music with a minimum of operating manipulation—just turn it on and let it run.

When it is desired to place a reel on the right spindle to feed back to the left spindle—as one would normally do if no reversing feature were present, the automatic-threading reel may be removed without tools and a new, longer spindle screwed in. This must be done if one wishes to put a reversing signal at the end of the second side, but it is a simple operation and one which is amply described in the instruction booklet, which, by the way, is excellent. In addition, we must not forget to mention that a complete schematic is furnished with the instrument, as well as an empty reel, two reel retainers, and a soft compartmented carrying case for the two microphones.

Overall, the Ampex Model 1461 is an attractive, complete, portable tape recording/reproducing system. Its automatic tape threading and automatic reverse features should be appealing to persons who are "all thumbs" when it comes to handling open-reel magnetic tape. Further, the compartment for speaker storage is a clever idea since one can play back tapes monophonically without setting up the two speakers. Insofar as portability is concerned, the stowaway-speakers make it easier to carry (but at 46-lbs. one is not likely to travel too far on foot with it). As measurements have indicated, its audio performance should please even those with discerning ears. Handling of the machine is good, too, though the mechanically-operated Play/Record and Fast-Wind controls may "clunk" a bit too loudly for one who likes solenoid-relay-operated controls.

Check No. 55 on Reader Service Card