

Equipment Profiles

- Sony Model TC-666D Stereo Tape Deck
- C/M Model 35D Stereo Power Amplifier
- C/M Model CC-2 Stereo Preamplifier
- Koss Model ESP-6 Electrostatic Stereo Headphones

Sony/Superscope Model TC-666D Stereo Tape Deck

MANUFACTURER'S SPECIFICATIONS—

Four-track system, stereo or mono. Reel Size: up to 7 in. Motors: Three. Tape Heads: Four. Frequency Response: $7\frac{1}{2}$ ips, 20-22,000 Hz; $3\frac{3}{4}$ ips, 20-15,000 Hz. Wow and Flutter: less than .09% at $7\frac{1}{2}$ ips; less than 0.15% at $3\frac{3}{4}$ ips. Signal-to-Noise Ratio: without SNR, better than 53 dB; with SNR, better than 59 dB; (SNR is "Sony-Matic Noise Reduction System"). THD, less than 1.5% at 0 dB line output. Dimensions: $17\frac{3}{16}$ "W x $8\frac{1}{16}$ "H x $16\frac{3}{8}$ "D. Weight: 48½ lbs. Price: less than \$575.00.

The Sony TC-666D stereo tape deck proves that a sophisticated tape deck can be designed with an attractive, uncluttered control panel. This deluxe deck, for use with a high-quality stereo audio system (it does not incorporate power amplifiers or speakers), has a number of truly meaningful features. For example, its "Sony-Matic Noise Reduction System" reduces tape noise during playback of recorded tape by 6 dB through simply sliding a switch to another position; the deck has the ability to reverse automatically at the end of the recording without need for placing a metallic strip on the tape end; the TC-666D can record as well as play back monophonically or stereophonically in both directions. Other fine features include: three motors, four tape heads, dual-level headphone output, a scrape flutter filter. But those are only a few of the excellent features of this machine.

Starting at the top of the panel, the four-digit counter is seen at the center, with the usual two reel spindles to left and right. The head covers are next, centered on the panel from right to left, with the tape tension arms extending from both sides. At the left are two rectangular buttons for speed selection, $7\frac{1}{2}$ and $3\frac{3}{4}$ ips, the automatic tape re-

verse switch, and an instant-stop button. To the right of the head covers is the direction selector lever, the horizontally shaped stop button, the two narrow buttons for fast forward to left and right, and between them the play button. Each of these buttons operates a microswitch which in turn actuates the proper relay circuits. All of these controls (with the exception of the instant-stop button) are black, while the top plate is finely satin-finished anodized aluminum. The black lower portion of the top accommodates the SNR switch and the headphone jack at the left, and the power switch and a minute pilot light at the right. A sliding plate (with the model number displayed when it is closed) covers the two miniature microphone-input jacks, the two red record buttons, and the two small aluminum recording-level controls. The dual VU meter is visible at all times, and indicates both when recording and playing back. There is no playback volume control (one would use the control on the stereo hi-fi system for this purpose).

At the rear is a recessed panel which accommodates the AUX input phono receptacles, and another pair for line output. In addition, there are two fuse holders—one for a 2-amp fuse which protects the main power supply, and one for a 1.6-amp fuse which protects the transport mechanism. Power for actuating the many relays is derived from the main power supply and is d.c. In addition, there is a switched a.c. receptacle, and a two-position headphone-level switch.

The unit employs a total of 32 silicon transistors and 19 diodes. There are three motors, and 4 tape heads—2 for erasing, and 2 for combination record/playback. These are mounted from left

Fig. 1—Sony Model TC-666D stereo tape deck (bottom photo reveals hidden controls when control-panel slide is opened).



to right as forward erase, forward record/play, (capstan), reverse record/play, and reverse erase.

The capstan motor is a reversible hysteresis-sync type, and the spooling is done by torque motors. These are energized by relays actuated by the control circuits—some by simple pushbuttons and others by the sensing section which reverses the direction of tape travel on the incidence of more than ten seconds of silence on side 1 and side 2 of the tape. Thus a pre-recorded tape can be put on the machine and started. When it has finished the music on that side and silence on both sides of the tape continues for ten seconds, the sensor circuitry operates, and the direction of travel is reversed. There is no need to put metallic tapes on the tape at the points where reversal is desired. The TC-666D must be used with an external amplifier if you want to hear your music through loudspeakers. If you want to listen without disturbing others, you can use phones of the usual low-impedance type. The monitor circuit employs separate transistor which drives a transformer to match your phones. At the same time, this transistor also drives the recording-level meter, thus avoiding the effect of the recording equalization. Some machines drive the VU meter direct from the recording amplifier, and with its usual pre-emphasis, the meter indications are not in accordance with the program level content. This is a definite advantage, in our opinion.

Circuit Description

The two channels are identical, with each consisting of six transistors arranged with one pair as the preamplifier, followed by another pair which provides some of the recording equalization. A single transistor feeds the recording head through the constant-current resistor and a bias trap. Additional high-frequency recording boost is provided by a resonant circuit across the emitter-to-ground resistor. It is resonant at 20 kHz for $7\frac{1}{2}$ ips, and at approximately 14 kHz for $3\frac{3}{4}$. Separate level-set controls provide for each of the directions of tape motion, as do level-set and equalization controls for playback. The recording level controls—one for each channel—employ a circuit which is designed to provide optimum control of the input signal as far back in the amplifier as possible without the possibility of degrading performance of the first two stages due to overload. This is accomplished by increasing the feedback from the collector of the second stage simultaneously with

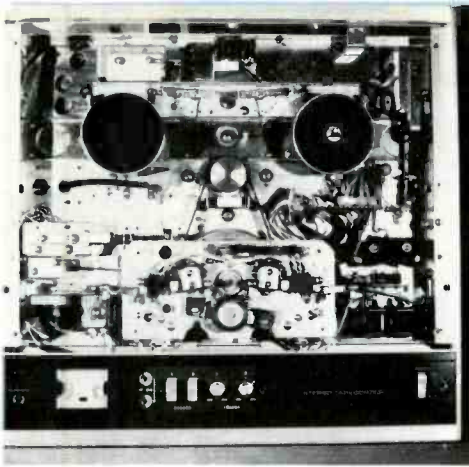


Fig. 2—Top view of Sony TC-666D chassis with cover plate removed.

decreasing the signal fed to the base of the third stage. Thus input levels which would normally be distorted in the first two stages are kept under control by the feedback circuitry to provide an especially high S/N in the recording function.

When this is followed by the Signal Noise Reduction System in the playback mode, it results in a S/N which is relatively high, in comparison with most other machines. The SNR operates by reducing the gain of the playback amplifier when its output goes below a pre-determined level—approximately 30 dB below 0 VU as indicated on the meter. When this happens, the overall gain is reduced by about 6 dB, resulting in an unprecedented S/N of 59 dB. In effect, it might be said that the circuit functions as an expander with a very low threshold level—everything above that level is expanded 6 dB, while everything below is reproduced at normal gain.

The SNR is purely a function of the reproduce circuit. Any tape, including commercial pre-recorded tape, can be benefitted by this noise reduction system by simply throwing this switch to the SNR position.

The third and fourth stages of the amplifier are another feedback pair with additional bias-frequency degeneration, and the output of the fourth stage feeds the monitor and VU meter circuits, as well as the recording driver stage, which is equalized for the recording characteristic. Its output feeds the recording head through the constant-current resistor and another bias trap to the head-switching circuits.

Bias is furnished by a push-pull transistor pair at a frequency of approximately 160 kHz—the highest frequency we have yet encountered in a consumer-type tape recorder.

The “silence sensor” circuitry involves a group of three transistors in a cascode connection, followed by a rectifier which triggers a long-time-constant multivibrator after a 10-second period of silence, and it, in turn, actuates a medium-power transistor

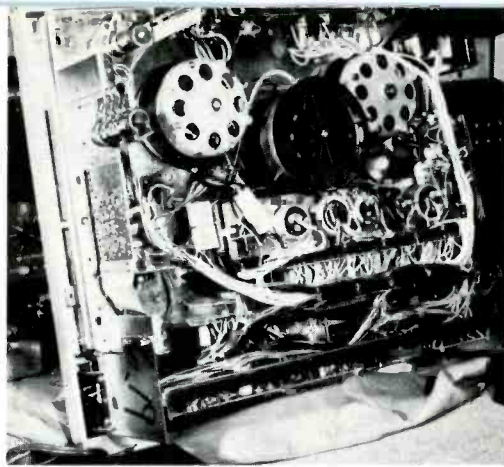


Fig. 3—Rear view of Sony stereo tape deck shows three motors.

which operates the reverse relay. The action functions only on the passage of tape in the forward direction. Once the tape has reversed and played through, the machine stops when the tape runs out.

Operation

The TC-666D is remarkably easy to use. For playback, one puts the reels in place, drops the tape into the slot—making sure to feed it around both of the tension arms. Then with the direction selector in the forward position, depress the PLAY button. When the music finishes and is silent for ten seconds, the reversing sensor circuit operates, the direction selector lever moves to the reverse position, and the machine reverses.

To record, move the sliding cover over and depress the red RECORD button corresponding to the channel on which you wish to record (or both for stereo). Adjust the level, and while holding the record buttons down, press the PLAY button. Aux inputs at levels above 61 mV, although usually in the vicinity of 250 mV, can be accepted, while the microphone jacks accept a minimum of just under 0.2 mV, which will accommodate practically any microphone—high or low impedance.

The deck may be used in either a horizontal or vertical position, using reel caps (provided) for the latter.

Performance

One of the criticisms of noise-reduction systems has always been that they caused a change in the frequency response, and to many listeners that was more objectionable than the noise itself. We tried to determine if there was any effect in the TC-666D and we came up with the astounding measurement of identical response at levels of 0, -10, -20, and -30 dB. Response at normal levels is shown in one of the illustrations here for both playback from a standard tape as well as in the record/playback mode for both speeds. The differences in level between channels was less than the width of the line. We

measured wow and flutter at .075% at 7½ ips and 0.14% at 3¾. S/N measured 54 dB without SNR, and 59 dB with the SNR circuit in operation. Channel separation measured better than 45 dB, and crosstalk between adjacent channels—which could be a problem on any four-track machine if the tape were recorded in both directions as it normally would be—measured 44 dB.

Less than 0.1 mV fed into the microphone jacks would provide a 0-VU recording level, as would a signal of 29 mV at the AUX inputs. The measured signal at the output jacks was 0.8 V for a signal of 0 level. And in keeping with its superb operating figures, we mustn't forget that the mechanical aspects of the machine are equally top-notch. Tape spooling in the rewind and fast forward positions was smooth, and required 54 seconds in either direction for a 1200-ft. reel.

With its fine measurements and high mechanical quality, one would natur-

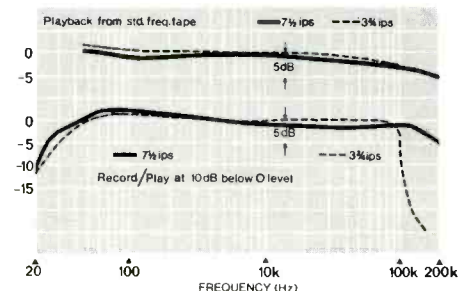


Fig. 4—Frequency response curves of Sony TC-666D tape deck at 7½ ips and 3¾ ips speeds.

ally expect an equally high standard of reproduction, which is just what we heard. The noise reduction system eliminates tape hiss during relatively silent periods on recorded tapes. And we liked the solid action of the solenoid-operated relays when a pushbutton was depressed. Further, the machine's mechanism operated quietly, indicating that it is also well designed from a mechanical viewpoint.

In addition to its unusually handsome appearance, the TC-666D is furnished with a plastic dust shield and the usual accoutrement which accompany any Sony gear: set of patch cords, elaborate instructions, and to our complete satisfaction, a schematic listing all parts values, transistor types, and such desirable information. In short, the recorder is presented in a manner befitting its excellent performance.

The Sony TC-666D stereo tape deck is not inexpensive, but for a unit that is obviously intended for the “fusspot” recorder who wants to have both his high quality and automatic conveniences, it appears to be well worth the price (less than \$575.00).

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