
Sony Pro TC-D5

Autor:

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TC-D5
(1978)

High bias refers to metal or metal-oxide tapes, whereas normal bias is the non-metal, lowest grade tape.

Normal bias = type I

High bias = Metal Oxide, type II, and Metal, type IV.

What is Type I, Type II, Type III, and Type IV cassette tape?

These are IEC (International Electrotechnical Committee) standards. They provide broad standards for all tapes, and end the need to align a deck for an individual tape. Type 1 is for normal "iron oxide" tapes (Fe_2O_3), Type 2 is for high-bias "chromium oxide" tapes (CrO_2), Type 3 (obsolete) is for FeCr (ferric chrome), and Type 4 is for Fe (Metal). Type 2 tapes tend to be more expensive than type 1, and type 4 tapes are the most expensive. This is because type 2 tapes tend to have less noise and flatter high frequency response than type 1, and type 4 tapes tend to have even flatter highs and even less noise.

Some Type 1 tapes are more expensive than other Type 2 tapes, and may be worth the extra price. More expensive tapes come in better shells, have better lubrication, fewer dropouts, smoother frequency response, and better uniformity from tape to tape. Even though the types imply a particular tape formulations, the type really refers to the tape performance. For example, some iron oxide tapes have an unusual oxide formulation with very small grains that conforms to the type 2 standard better than the type 1 standard. These tapes will be labeled type 2, but may not have any chrome in them.

Most modern cassette recorders sense the tape type by the holes in the back of the housing and adjust bias and equalization to compensate for the differences. A few top cassette recorders (the Revox and several Nakamichis) automatically align to a particular tape by recording test tones and then setting their own equalization.

In practice, each brand and model tape is slightly different. For the very best recordings, adjust your recorder for the tape you use most, or buy the tape which works best in your recorder. Manufacturers adjust each recorder for a specific tape at the factory. So the best tape might be the one

referenced in the recorder owner's manual. In a recording studio, it is common to align the bias and equalization for the specific tape used, and stick with that tape."

"Bias is the inaudible high frequency signal used to overcome a tapes coercivity. The bias adjustment on a recorder will effect the maximum output level for different frequencies, the sensitivity for different frequencies, and the 3rd order harmonic distortion level. It has either no effect or only a very slight effect on the biased noise level (depending on tape type) and no effect on print-through. See the specification sheet for the tape being used for details."

Maxell "high bias" XL2 tapes are actually type I iron oxide tapes with the metal particle ground fine enough to rate a type II rating somehow. in practice, they are just as noisy and flat sounding as regular type I. i've been using fuji's CrO2 tapes for my record collection (portable ety er4s --> emmeline sr71 --> sony d3 pro walkman) and like the dynamics and musicality.

An audio signal isn't recorded onto magnetic tape by itself. It is primed with a high frequency bias current applied through the recording head along with the audio signal. This bias current is different for ordinary tape and low noise/high output tapes.

The low noise/high output tapes have a higher magnetic particle density and a wider dynamic range. To make use of these advantages you need a switchable bias current.

The bias signal applied to the tape optimizes the frequency response. Each different type of tape (type I through IV) requires a slightly different bias to optimize the frequency response of that particular tape.

Well-known professional portable recorder which played Attila the Hun vs. the competition, the TC-D5 was THE field recorder throughout the late 1970s and 1980s alongwith the smaller and just as excellent WM-6DC and paved the way for the TCD-D10 digital series.

The "D" in TC-D5 stands for DENSUKE : a nickname forged after a Sony portable recorder was shown in a 1950s popular weekly press cartoon of the Mainichi newspaper. The name stuck and Sony Densuke survived the original Densuke characcter, hero of the cartoon.

Of course, in absolute Sony style, Densuke isn't written or tagged anywhere : one just has toknow if a recorder is of the Densuke family or not. Starting with the TC-D5 series, those belonging to the Densuke family always had a "D" added to their name : TCD-D3, TCD-D10 etc, where the second D is the Densuke (and the first is Digital).

Explanation:

Biased noise level (weighted)

Weighted biased noise level is a measure of a tapes residual noise. The tape is externally erased. The recorder adds recommended bias but no signal. The output is filtered (per NAB standard) the compared to the 0 dB reference level.

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Over bias

Over bias is the value used to set bias amplitude of a tape recorder. It is amount of output level reduction (in dB) the bias amplitude must be increased from the level that gives the maximum output level. It is most common to use 10 kHz as the recorded frequency for this adjustment. The over bias specified depends upon tape type, record head gap, and tape speed. It is usually given so that the third harmonic distortion and modulation noise are minimized rather than maximum output or maximum sensitivity. Although good results can usually be obtained by adjusting the bias for maximum sensitivity (peak bias) at 1 kHz and 15 ips, using over bias is usually a more accurate way to adjust the bias.

The D5's diecast aluminium case holds "pro" features and functions and an excellent but untypical mechanism : the Disc Drive.

Small rubber / metal capstan driven at its edge by a 90° slanted motor with a Magnedisc system inside the flywheel to correct speed on the fly.

The overall low-mass of the ensemble allowed the D5 to remain fairly immune to speed changes caused by the movement of the enclosure and the added Magnedisc made the drive absolutely stable. Shake it wildly dancing the rumba while recording : no wow, no flutter.

The rest of the TC-D5 sees a Ferrite & Ferrite rec/play head, a DC-DC converter (3V to 12V), a simple Dolby, a well-calibrated limiter, two backlit VU meters indicating battery level as well, two MIC inputs with 0dB/-20dB attenuator, RCA i/os and a small 5cm monitor built-in loudspeaker.

The Type I / Type III tape selector switch has a third (automatic) detection for Type II tapes.

Nagra of the little man. After the era of portable tape recorders this tape decks were often used by broadcasters to e.g. O-Tones for exterior take. The PRO version ii has balanced XLR inputs that can work with mic and line level. However, one of the XLR inputs has been shut down, see photo. On the output side RCA connectors and a headphone jack are available. If headphones are not connected, the signals from the internal speaker to play. With Nagra or Stellavox products the deck can not keep up, of course, is but much easier to handle. In addition to band selector, noise reduction, and Aussteuerungsinstrumenten mechanical register is still a switchable limiter installed, which protects against any clipping.

Updated in 1980 as TC-D5M with the sole addition of Type IV tape compatibility. This however called for a slight change in the head type : S&F (Sendust & Ferrite) instead of the original F&F.

The maintained switch automatically "sees" Type IV if the selector is on Type III, just as the original TC-D5 automatically "saw" Type II if the selector was on Type I.

RCA i/os got gold-plated, too, but the rest is the same.

Updated later on as TC-D5Pro and TC-D5ProII, the latter surviving until at least 1999, while the TC-D5M remained on sale until 2005 ! And still selling very well then, despite its own Sony DAT competitors.

The TC-D5 was the machine that while clearly not being a "personal stereo cassette player" in the accepted sense of the term contributed immensely to the development of the Walkman idea and the Walkman range. Launched in 1978, it immediately became a favourite of senior people in the Sony company as a source of high quality portable music, despite the lack of suitable lightweight headphones, its large size and its high price. This provided the idea for a cheaper, smaller version that could be sold cheaply enough to become widely popular.

The TC-D5 was not the first Sony portable stereo cassette recorder, there had been many models aimed at both the amateur and the professional user, though they had all been fairly large and heavy, similar in both size and scale to the domestic cassette decks of the period. They were typically based around the mechanicals of the larger machines and had included mains power units and full-sized loudspeakers, all factors not conducive to small size and low weight.

The TC-D5 was different to these models and the design was clearly focused on portability. It operated on batteries only, had only a small "monitor" loudspeaker and most importantly, used a mechanism specially developed for small machines. However, the TC-D5 was first and foremost a high quality product, and none of these factors were allowed to detract from this. The signal processing circuits required a higher voltage than the two "D" sized batteries allowed, so a DC-DC converter was employed to step up the 3V to 12V, enough to power high-grade amplifiers and the excellent limiter and Dolby B processor that the machine included. Of particular note, and most important, were the microphone amplifiers, which offered low noise and a wide dynamic range, making the TC-D5 the perfect choice for outdoor recording, news gathering and other such tasks. Also of interest was the head which was made of ferrite. This material not only has excellent electrical properties, it is also very hard and resistant to wear, reducing the need for frequent readjustment.

The best electronics in the world would have been wasted if the mechanical sections of the machine had not been of equal quality. A big problem with any portable machine is that of wow and flutter, random tape speed changes that slur the sound and lend it a diffuse, wavering quality. Large, stationary recorders can be fitted with large flywheels and powerful motors to minimise these effects, but in portables this is not only impractical due to the size and power

constraints, it also is counter productive as large rotating masses become unstable when the machine is moved or carried.

To avoid these problems, the TC-D5 used the "disc drive" principle. The capstan flywheel was small and driven at its edge by a motor whose axis was at 90 degrees to that of the capstan spindle. The capstan was fitted a bevelled rubber tyre and the motor had a cone-shaped extension to its shaft to match. The two were held in contact by light spring pressure, which also held the capstan securely in its lower bearing. A pickup coil inside the flywheel bearing measured the speed that the capstan rotated at and this information was used to regulate the speed of the motor. The electronics could respond quickly, and this, combined with the low and well-damped rotating mass, effectively made the tape speed absolutely stable and unaffected by movement, tape friction, temperature and battery voltage.

TC-D5 drive

The rest of the mechanism was built to a level of precision to match, and in plan was little larger than the cassette. Despite its specialised nature, similar mechanisms appeared in other Sony models, for example the FX-412 TV/radio/cassette, though this had a conventional belt drive for the capstan.

FX-412

The exterior of the TC-D5 had to be tough for the machine to be useful as a portable. The front panel was a single die-casting, complete with a finger recess to aid operation of the tape transport keys. The top and bottom were black painted metal and the rear edge (on which the machine was likely to put down on when used with the carrying strap) was protected with a thick rubber block. The battery compartment had a simple but sturdy catch so that batteries would not fall out if the machine was jarred. Simple controls and large meters (illuminated if necessary) also helped to make the TC-D5 useful for its intended role. The limiter could be used to prevent tape overload, whilst chrome tapes were automatically sensed and adjusted for. Minor controls, such as that for switching the Dolby system in and out, were placed inside the cassette compartment (but visible from the outside) where they could not be knocked. In the original version, normal, ferrichrome (a Sony speciality) and chrome tapes could be used. Sony's own tapes were recommended but the machine could be adjusted by the dealer to suit any make of tape.

Despite its high price, the TC-D5 was a very successful model and remained in production in various forms for over 20 years. The TC-D5M was a popular variant, this used a Sendust head which while being not as wear-resistant as the original ferrite one but did allow Metal tapes to be used. There were also two versions aimed at the professional user, the TC-D5 Pro and TC-D5 Pro 2. The Disc Drive servo would eventually become a part of the better Walkman models, where its compact size and superior stability gave the Sony machines an extra edge over their imitators. The idea of a very high quality recorder would also appear later in the Walkman range with the WM-D6, which aimed to offer the same quality in an almost pocket-sized package.

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- 2 Head 4 track Stereo with Off Tape Monitoring
 - Normal and half speed recording and playback
 - Pitch control 20%
 - Cue and Review
 - XLR mic input
 - Automatic record level (switchable)
 - Line out & Line in RCA/phono
 - Built-in loudspeaker
 - Volume and tone control
 - Headphones out (6.3mm / 1/4" jack)
 - Low battery LED indication
 - VU meter with peak LED
 - Ambient noise control
 - Rec Level Limiter (switchable)
 - Tape types I,II or IV (Fe, CrO2 or Metal)
 - Microphone attenuation (0dB, -10dB, -20dB)
 - 2.5mm Remote Start/Stop jack
 - External Speaker Jack
 - Memory rewind

Measurements: 237 x 48 x 168

Condition:

Type:
Analog Recorder

Media Type:
Cassette
Form Factor:
Portable

Inputs/Outputs:
Headphone TRS 1/4" Out, S/PDIF RCA Out, XLR In
Brand:

Sony

Features:
Battery-Powered, Built-In Speaker(s)
Model:

tc-d5 proII

Country/Region of Manufacture:
Japan
MPN:

Does Not Apply

Additional Inputs/Outputs:

AES/EBU XLR In

Tracks:

2

Mic/Line Input:

Line XLR

UPC:

Does not apply