



DaD Tape

User's Manual

September 2001

DUY DaD Tape

DUY DaD Tape is a revolutionary approach to the simulation of the analog tape sound for digital audio systems.

Main features

- Real analog tape sound, with its classic warmth, within the digital domain, and with characteristics and control impossible to achieve in conventional tape recorders.
- Modelling of the four most representative tape recorders on the market: an old vintage machine with valve circuitry, a transistor-based machine of the late 60s, an operational-amplifier-based machine of the 70s and a machine of the latest generation.
- Simulation of the three most common noise reduction systems, plus a proprietary noiseless-tape mode.
- Switchable tape speed (7 1/2 ips - 15 ips - 30 ips) allows maximum control and even permits unusual combinations of tape recorders and speeds.
- User-adjustable operating level.
- Independent input and output sliders and meters.
- Easy and intuitive user interface.

Applications

- It rounds off peak transients and adds warmth to electronic and acoustic instruments, either individually or by sections or sub-mixes.
- Especially suitable for percussive sounds.
- Mastering of complete mixes.
- Typical applications include music, film soundtracks, audio post-production, mastering, broadcast and multimedia.

1. About analog tapes

The history of analog recording starts with early electronic sound. For many decades analog technology provided the only way to record sound but in just twenty years digital technology has revolutionized the way music is recorded and produced. Digital technology has enabled us to work with almost unlimited dynamics, virtually no distortion, and a flat frequency response, characteristics that were undreamt of during the analog years. Today, it is generally accepted that digital audio sounds almost perfect.

There are, however, many musicians and producers who believe that analog tape sound is more suitable and effective than digital for certain instruments and musical styles. Many listeners have argued that some digital recordings sound harsh and clinical. analog sound has never been criticized in this way. So why does everybody agree on the quality of the analog recorded sound?

There are certain things that make analog recordings sound different to their digital counterparts.

2. About DUY's DaD series

DaD series is a revolutionary new approach to the simulation of analog systems for digital audio.

As we have said before digital audio systems can sound clinical at times and in order to overcome this problem most professionals are using hybrid systems. Analog technology is more appropriate in many situations, but suffers several inherent problems including noise, hiss, hum, etc. If it were possible to get analog sound, within the digital domain, then we could benefit from the best of both worlds.

At DUY we have worked out the way to digitally simulate the analog world without compromises. The technology that we are developing is known as "modelling", a term you may be familiar with. As a result we are proud to introduce the ideal approach: analog sound within the digital domain.

2.1- About DaD Tape

DaD Tape is the second in a series of plug-ins for analog simulation. The first was DaD Valve.

We modelled five known brands of tape recorders and all significant parameters including noise, non-linearities, frequency response, impedance, etc. As a result of this modelling we are able to provide all the best characteristics of analog tape recorders.

One of the most important features of analog tape recorders is that they don't clip. The sound of their distortion is "rounded" and "warm" in character. Another important feature is noise. You will be able to decide to what extent you wish to include it on your recordings. You will also be able to achieve something that is not possible in the analog world. The total removal of noise whilst retaining the characteristics of analog sound.

We developed our model using a Silicon Graphics workstation. Having got the results we were looking for, our software was then ported to other platforms without losing any of its sonic characteristics.

3. Configuration and system resources

DUY's DaD Tape plug-in can be configured both as a mono or a stereo device. The stereo mode is selected automatically when it is inserted in a stereo track. In stereo mode both channels are controlled from the same front panel. Two "output level meters" appear automatically when in stereo mode. The stereo link is transparent to the user and can not be overridden.

For up to date information about resource allocation on your platform, please refer to the latest instructions on your installation CD.

4. External controls

DaD Tape provides the most common parameters found in an analog tape recorder. The only critical adjustments are the input and output levels. We'll describe them in detail in sections 4.2 and 4.6, but let's have a look first at the front panel interface from top to bottom.

4.1- Top push button panel

This panel varies according to the the program from which you are opening DUY DaD Tape. One common button to all applications is the "bypass" switch. By toggling the bypass you can make a direct comparison between direct and processed sound. Sometimes, depending on the combination of sounds and settings, the comparison will be straightforward. However, if needed, you can trim the input level to match the processed and unprocessed output readings. You can then compare the perceived level difference which should be higher for the processed sound. This perceived level increase is due to the modelling process.

4.2. Input level

The input level stage has two elements: slider and overflow light.

An Input level slider is made available to the user in order to allow the setting of an optimum operating level. This will allow tracks recorded at very low level to get the extra gain they need to be suitably processed. The Input level default value is 0 dB, which is suitable for medium to high level signals. You can switch to the default value at anytime by pressing the "input level" area while holding the Option key. You can also make fine adjustments by clicking the "Cmd" key while moving the slider.

The overflow light turns red when any internal overflow occurs. It returns to the normal blue color only after clicking it with the mouse. Overflow is not an indicator of tape distortion.

You should lower the "input level" every time you see the overflow indicator go red. It might also be necessary to adjust the Input level slider when changing a setting. Most of the time a slider setting of between -3 dB and +3dB, depending on the original track's recording level, will be sufficient.

DUY DaD Tape

4.3. Input and output level bargraphs

High precision mono or stereo level bargraphs with peak hold are provided as a visual reference.

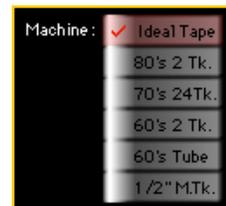
The Input level bargraph provides a reading of the first stage of the plug-in, before it reaches the modelling stage. The output level meter measures the peak level of the plug-in's processed or unprocessed signal, depending on whether Bypass is on.

The bargraphs can be used to optimize the various settings. By checking the output level meter you can make a comparison of the perceived difference between the processed and bypassed signals with the same peak reading. Please refer to the Bypass description (4.1).

When DaD Tape is inserted into a stereo channel the second bargraph automatically appears.

4.4. Machine type

We have modelled five of the most representative tape recorders on the market, and we have even included the "ideal tape" mode, which could be thought of as an engineer's "dream machine". Top quality 1/4, 1/2 and 2 inch tape was used in all modelling tests, apart from the "Ideal tape" whose response was created artificially.



- **"Ideal tape"**: This mode provides all the desirable features of an analog tape machine, with none of the aspects usually considered as faults. We took out the 'wow and flutter' and unwanted high frequency alinearities, and left the "rounded and warm" characteristics that make the tape sound desirable. The perfect machine is quite linear, so don't expect a radical effect with low level signals. Try it out for yourself.
- **"80's 2 Tk"** is a two track machine of the latest generation. It is a state of the art quarter inch analog recorder providing crystal clear sound. It is a standard machine in most A grade recording studios.
- **"70's 24 Tk"**: A professional two-inch 24 track machine of the 70's. Tracks 12 and 13 were used for modelling. It features operational-amplifier-type circuitry and low noise transistor input stages.
- **"60's 2Tk"** is a transistor-based machine of the late 60's, one of the very first professional stereo machines, still in use at DUY studios for radio commercial copying.

DUY DaD Tape

- "60s Tube": An old vintage machine with valve circuitry. Subtle asymmetrical distortion can be appreciated even with medium level signals. It gives a very "rounded" sound, ideal for voices and guitars.
- "1/2" Mik" is the cheapest of all the recorders we simulated. It is a half-inch multitrack tape recorder. Though its dynamic range is somewhat limited it is nevertheless extremely effective on drums, drum loops and other percussive sounds.

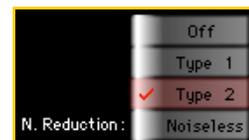
4.5. Speed

A tape speed switch is available for each of the tape machine models. You can choose between 7 1/2 ips, 15 ips and 30 ips. Note that in the real world not all speeds are available to all tape brands. We decided not to have this limitation in order to provide maximum control and allow unusual combinations of tape recorders and speeds.



4.6. Noise reduction

We offer a simulation of the two most common noise reduction systems, plus a proprietary noiseless-tape mode. Noise reduction OFF is also available. Type 1 noise reduction is a well known system providing subtle noise reduction. Type 2 provides state of the art performance in tape noise reduction. Noiseless mode provides all the usual characteristics of a tape recorder minus noise.

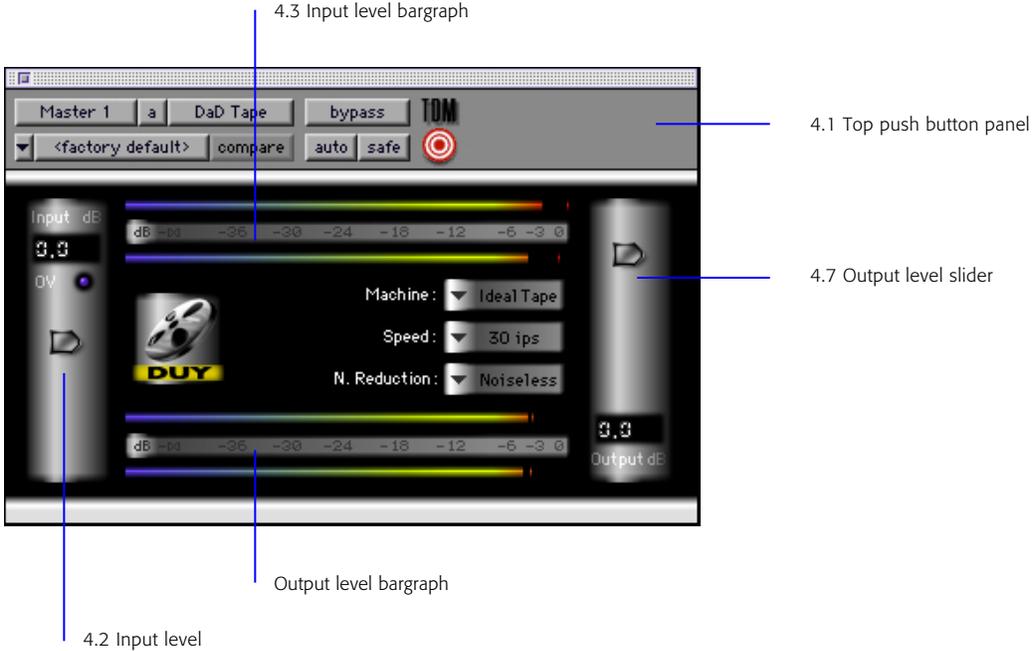


4.7. Output level slider

An output level slider is also provided. Its primary use is to allow the matching of the input and output peak readings. It can be used to optimize the various settings for a perceived level increase in signals with the same input and output peak readings. Please refer to Bypass description (4.1).

The output level slider is set to 0 dB as default value.

DUY DaD Tape



5. How to use DUY DaD Tape

DaD Tape's setup is very straightforward but there are some simple rules you should follow.

Optimum results will be achieved by selecting the most appropriate instruments for treatment, and this can be done by experimentation. As a starting point you could apply DaD Tape to the most percussive sounds: bass drum, toms, snare, etc. moving on to distorted guitars, bass guitars and voices. Remember that any sound that you would have liked to have recorded with an analog tape recorder will benefit from the processing.

6. A psychoacoustic theory

There are some well known, but often forgotten, principles that should be remembered in order to make the best use of DaD Tape.

The brain, the best neural network ever created, perceives and identifies sounds by learning from, and comparing to, hundreds of thousands of aural references. These references, or templates, that we call individual sounds are learned and stored in our brain in an evolving process that is both hereditary and environmental. The genetic side of the process is what makes it possible for us to identify hundreds of mathematically related sine waves as one individual sound. It is the environmental side which allows us to differentiate between a flute and an oboe, for example.

DaD Tape generates harmonics. If properly adjusted, DaD Tape's new harmonics will be perceived as sounds closely related to the original sound. Thus only the original sound will be heard, but with added characteristics. If you overstep the mark, you could make non-linearities become annoying. The more complex the original sound is, the more perceptible the non-linearity will be, and the more difficult it will be to get beneficial results. To avoid going beyond these limits please read the above instructions thoroughly.

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