Modern Walkman considerations

Emiel @ S2Go – Version 7 - May 2022

Can you upgrade an existing Walkman to become a daily driver portable music device in 2022?

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Given recent price developments of the WM-DD33 in the Netherlands, Germany, Belgium, most likely going to switch order: DDII to become candidate #1.

Awaiting DDII recapping results by Valentin to objectively establish is power output needs to be further enhanced.

If not needed, only by adding a bass expansion board & 3 or 4 position switch, can turn the DDII in a DD-100 on steroids!

Introduction

Is a completely redesigned, new Walkman in 2022 feasible, or is an upgrade of an existing Walkman a better alternative?

- A complete new Walkman with a new mechanism on a small scale would be extremely costly. Given that it took the Sony corporation more than 10 years to perfect the DD mechanism (DD33 as end of line) in the 80s-90s of the previous century when tapes were all the rage, it would be very challenging to meet or exceed that benchmark.
- That lead me to believe there are several advantages of re-using a proven Walkman over a modern player (2015 and later). Picking candidates with a good mechanism and feature set, not overly expensive to purchase and relatively easy to upgrade would provide a more solid base than a modern RTM or AliExpress USB device. The latter mechanisms and heads are of sub-par quality, but are the only ones produced new recently and are really cheap to acquire.
- Candidates: players #1 WM-DD33 and #2 WM-DDII, recorder #3 WM-D3.
- All candidates feature: relatively low wow & flutter, stable disc drive mechanism, proper frequency response for playback of all tape types, Dolby B noise reduction, and can be purchased in must-be-serviced condition between 75-125 Euros, although the latter may vary from country to country.
  September ’21 update: WM-DD33 prices are up in Netherlands, Belgium and Germany: 150 Euros + seems to be the new norm. Therefor candidate #2 might be the cheaper alternative.
- Recording capability a must? Pick #3, as it is practically impossible without extensive redesigns and mechanical changes to add to #1 and #2.
- Candidates are considered base devices, not donors, as most of the improvements are reversible (some with more efforts than others). One could still potentially ‘destroy’ a unique analogue device when modifications are done improperly.

Candidate #1 - Sony WM-DD33 – Playback only

A. WM-DD33 starting point – the end of the famous disc drive line of Sony's very capable and proven portable cassette players and recorders. Why not WM-DD30?

1. DD30 feature/functionality: no difference compared with DD33, except for availability - DD30 is often not as readily available as DD33,
2. DD30 door design: as flawed and flimsy as candidate #2 and #3, something that has been addressed in the DD33 (finally).

B. Benefits

1. Energy efficient mechanism: almost equal to DD-100 (super rare) and older DDII (not as rare as DD-100, no quartz though -> considered candidate #2).

C. Suggested improvements

1. Bass expansion: MegaBass with 3 modes -> change to match modern headphones heavy on bass, add 1 mode to switch off, going to 4 modes,
2. Relatively weak headphone output: improve to drive popular larger headphones, example is Marian's DD improvement S2Go with additional PCB,
3. Power: convert 2x AA cells (1.2-1.5v) to 1x 3.7v, according to service manual page 6 3.6v should be fine, creating room for more circuitry,
4. Bluetooth enable: add transmitter to pair with wireless headphones and/or modern receivers, etc.

Candidate #2 - Sony WM-DDII – Playback only

A. DDII is one of the predecessors of candidate #1 DD33, improvements made after DDII release are not included:

1. Lack of bass expansion: resulting in a sound image that might be perceived as weak on bass,
2. Not quartz powered: still stable, speed tweaking is relatively easy when taken apart,
3. Door design: flimsy, could be solved with other case (see stretch improvements).

B. Benefits

1. DD-100 is a DDII PCB paired with a bass expansion sub PCB, leading to suggested improvement #1 and combine with improvement #2,
2. Energy efficient mechanism: almost equal to DD-100 (super rare) and newer DD33 (-> considered candidate #1),
3. DDII comes with better headphone output than #2: would still benefit from improvement to drive popular larger headphones.

C. Suggested improvements

1. Bass expansion: to be added, configurable (or fixed) to suit most modern headphones that tend to be heavier on bass,
2. Headphone output: improve to drive popular larger headphones, example is Marian's DD improvement S2Go with additional PCB,
3. Power: convert 2x AA cells (1.2-1.5v) to 1x 3.7v creating room for more circuitry,
4. Bluetooth enable: add transmitter to pair with wireless headphones and/or modern receivers, etc.,
5. Speed: improve speed tweaking perhaps with through-hole deck side variable resistor.

Candidate #3 - Sony WM-D3 – Recording capable

A. D3 is built on predecessors of candidate #2 DDII, improvements made after D3 release are not included

1. Lack of bass expansion: resulting in a sound image that might be perceived as weak on bass,
2. Not quartz powered: still stable, speed tweaking is relatively easy when taken apart,
3. Door design: flimsy, could be solved with other case,
4. Power consumption: not as efficient as DDII or DD33, but still very portable and usable with suggested power improvement below.

B. Benefits

1. Recording capability (tape type I & II): virtually impossible to adjust without changes on PCB, change to allow changes on the fly,
2. Availability: although rarer than candidate #1 & #2, obtainable for 125 Euros in must-be serviced condition, not as appreciated as others.

C. Suggested improvements

1. Bass expansion: to be added, configurable (or fixed) to suit most modern headphones that tend to be heavier on bass,`
2. Headphone output: better than candidate #1 and on par with #2, would still benefit from improvement to drive popular larger headphones out of the box – require test to see if already present line out satisfies this need
3. Power: convert 2x AA cells (1.2-1.5v) to 1x 3.7v creating room for more circuitry,
4. Bluetooth enable: add transmitter to pair with wireless headphones and/or modern receivers, etc.,
5. Speed: improve speed tweaking perhaps with through-hole deck side variable resistor.

Stretch improvements for all candidates

These are (very) nice to haves, but are considered stretch due to technical complexity, cost, required changes and/or reversal.

In no particular order:

1. New case 3D printed plastic case, to allow for:
    a. change or addition of bass expansion switch,
    b. better and/or more components like larger capacitors,
    c. change 3v power jack to 5v micro USB port for modern phone chargers to charge 3.7v li cell like a standard mobile phone,
    d. Bluetooth signal transmission,
    e. fix flimsy door design,
2. New PCB, complete or partial, to easily fulfil suggested improvements:
    a. relocate components, for instance to better fit larger capacitors,
    b. optimize energy efficiency,
    c. less cluttered layout,
    d. save space by reducing PCB footprint,
3. Headphone jack: change contact surfaces gold plated like DD9 - only if it delivers measurable improvements,
4. Noise reduction: Dolby B functionality in all candidates, does this need further improvement? Dolby C with discrete components is not trivial, proprietary chips hard to acquire.

Q&A

Q1 - Why not WM-DD30 for candidate #1 WM-DD33?

1. DD30 feature/functionality: no difference compared with DD33, except for availability - DD30 is often not as readily available as DD33.
2. DD30 door design: as flawed and flimsy as candidate #2 and #3, something that has been addressed in the DD33 (finally).

Q2 - Why not WM-DDIII for candidate #2 WM-DDII?

1. DDIII feature/functionality: difference compared with DDII is addition of quartz, greatly appreciated,
2. DDIII is often not as readily available as DDII and when available, most likely much more expensive.

Q3 – Why not WM-D6C or D6 for candidate #2 WM-D3?

1. D6 feature/functionality: no difference compared with D3, except for physical size.
2. D6C adds Dolby C noise reduction and recording on metal (type IV) tape types. These are great capabilities, but are they necessary to make a 2021 great portable cassette music device?
3. D6 and D6C are not as readily available as D3 and when available, most likely much more expensive.

Q4 – Why only these Sony devices?

The DD mechanism is arguable unrivalled and Sony enjoyed the largest market share in the 80s, not just due to the quality of the DD line. While other manufactures (Sanyo, Aiwa, Panasonic, etc.) did release great devices, these competing devices are quite rare and expensive due to the number of produced DDs. It would be more difficult to create multiple different upgrade kits or guides for these other devices, as instructions and solutions can vary from type to type, while the basics of the DD line have remained largely the same in the 10+ year production timeframe.

Addendum - Bass expansion

In the 80s and early 90s, a lot of headphones sold or paired with Walkmans, lack the capability of representing a deep bass. This also includes early Discmans.

Sony, as other manufacturers, developed equalizers and also dedicated bass expansion circuits (DOL > MegaBass / EX DBB) to mitigate this.

Retrofitting this feature to devices without bass expansion is cumbersome, especially when for MegaBass (and comparable, competitive alternatives), in-house developed closed IC were used.

Until now I have only found DOL to be made of discrete components. For this option, a donor devices is therefor not necessary.

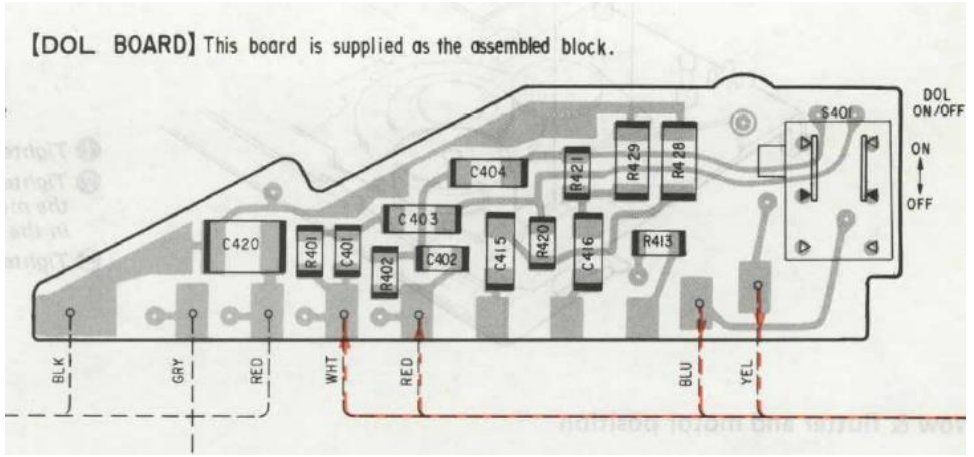
Complemented with the fact the DD-100 is a DDII + a couple of resistors + DOL board, it would be beneficial to explore this option for candidate #2. Candidate 3 (WM-D3) would also benefit from it, but there is no sufficient space.

Side remark: the DD-100 was paired with rebadged studio headphones at the time of release. The circuit therefor might deliver too powerful bass expansion for the modern day headphones and IEMS. There is no 3 stage switch that usually came with the MegaBass option on Walkmans.

Worthwhile exploration would be how to add a 4 stage switch to the DOL board to make it comparable to a mix of DD-100 & DD33.

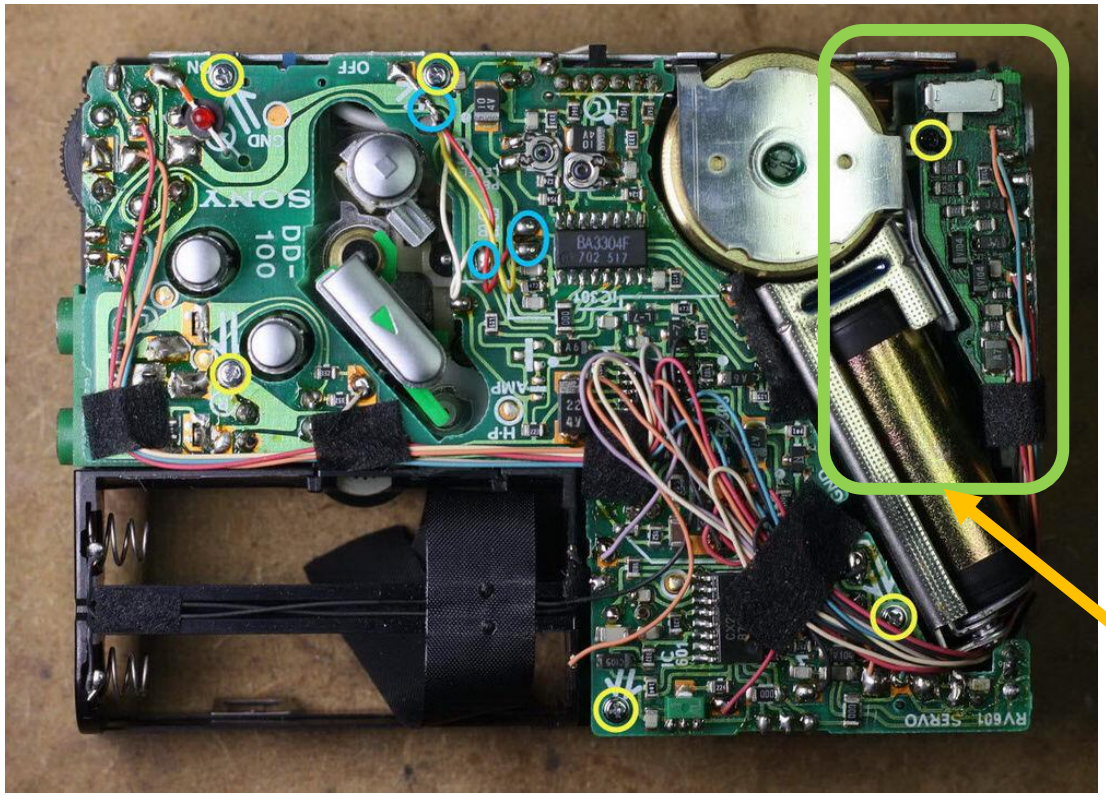
The 4 suggested settings: off – min – med – max.

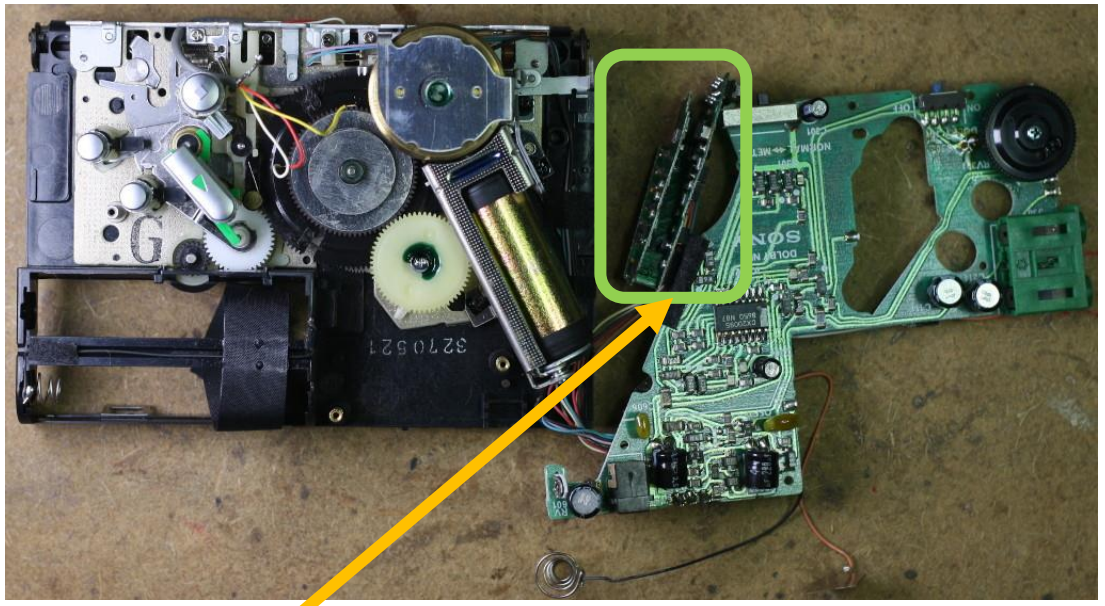
When possible, combined bass expansion with an increase in headphone output to be able to drive the modern, beefier (studio-like) headphones.



Source: Schematic DD-100 Service Manual

Addendum - Bass expansion, DD-100 interior

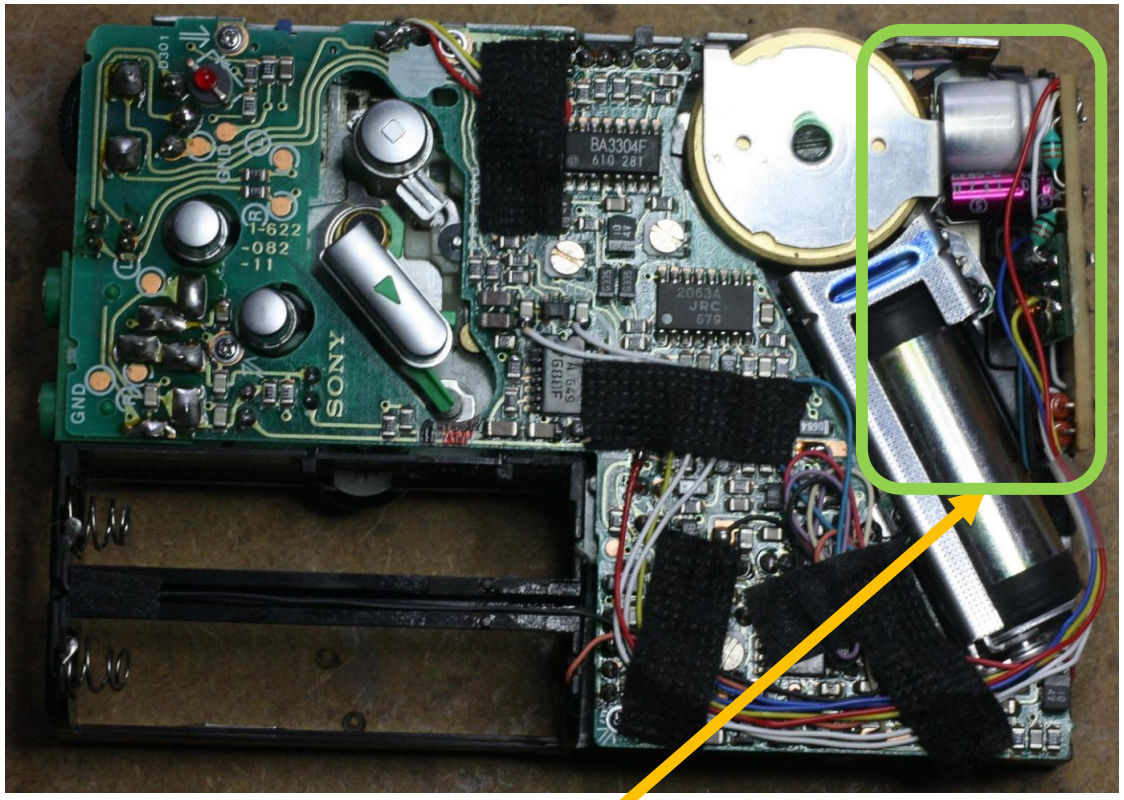




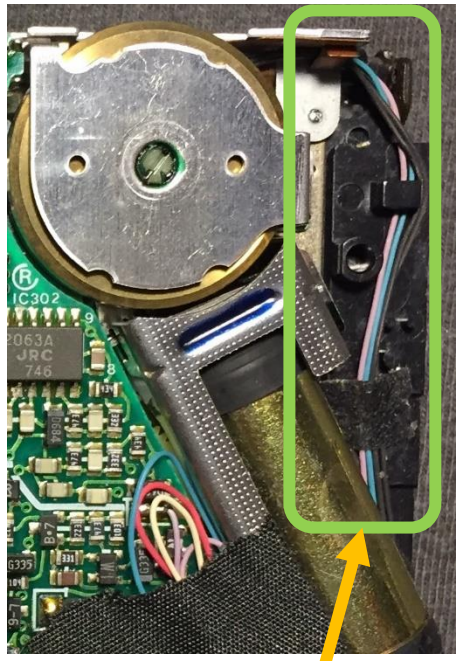
Additional DOL daughter PCB in DD-100

Source: Fix Your Audio DD repair guide

Addendum - Bass expansion, DDIII additional space



Additional PCB - Marian output improvement for DD, DDII, DDIII, DD30, not DC2 or DD-100



Additional PCB space of WM-DDIII

Source: S2Go threads and images

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