

# (High End, Ultra Low Jitter) Master Clocking, Multistage Reclocking & DA Conversion Revisited Workshop

with Urs Lee Weber & Peter MacTaggart

Programm:

1. Gentleman - we have the world's best 10 MHz master clock for audio here - a special OCXO (oven controlled quartz oscillator) with extraordinary low phase noise figure of minus 120 dBc @ 1 Hz - the Mutec Ref.10 SE 120. Please think of how to test it in real with your equipment and content. We also have the Mutec iClock, which can deliver any Wordclock frequency derived from the master clock.
2. We demonstrate 8-stage Reclocking, using 8 Mutec MC-3 and MC-3+USB downstream reclocker, driven by the Ref.10 SE 120.

Lunch Break - (Urs Lee will try to improve existing digital master by the anti-jitter wash bank).

3. 'Serious DAC revisited': Do we (still) have the best DAC? We compare the Burl B2 DAC, Lynx HiLo, T+A DAC 8, Moon 280D (all Delta-Sigma designs), and Gustard R26 (with the hyped R-2R circuit, discrete output stages, twin linear PSU, 10 MHz clock input. We have the Antelope Audio Pure 2 with 10 MHz master clock input and also the Dangerous Music Convert Two. We test with and without external sync. We seem to be the very first to try the Pure 2 slaved to high end masterclock.
4. Discussion about High End DACs - Rockna Wavedream, dCS Rossini, LessLoss Echo's End Reference Supreme. Varia.

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Workshop  
10:00-12:00

## Motivation

After Peter and Urs Lee have experienced the effect of deep jitter cleaning - we feel that we MUST share this finding with anyone seriously interested in improvement of digital reproduction.

Target: Analyze the influence on sound when the AES (or S/PDIF) signal (44.1 to 192 kHz) is washed of jitter downstream with a cascade of eight Mutec reclockers (MC-3+USB and MC-3) synchronized to a Mutec Ref-10 SE 120 ultra low phase noise (-120 db/c @ 1 Hz) master clock. Far better than any (Rubidium) atomic clock, btw.

The engineers and producers are kindly asked to bring their work and we play it trough the anti-jitter Waschstrasse.

Requisites:

8 externally synchronizable (10 MHz) Mutec reclocker, Mutec master clock Special Edition.

A passive comparator switch will make A/B comparison possible - „washed contra unwashed“.

Urs Lee will try to improve existing master by de-jittering and re-recording it.

12:00 Lunch.

13:00-15:00

Actual comparison of DACs - „Do we still have the best?“

(This will end by all of us buying the winner...)

How does a DAC sound synched to high quality masterclock.

Reference to the high end audiophile world - Abendrot Audio Hengst (a 45 kCHF (!) 10 MHz Rubidium master clock) and Morgenrot Audio Stute (synchronizable DAC).

Note: On first sight, it sounds good - „atomic clock“ - a Rubidium oscillator is in fact an atomic clock, BUT it's main quality is long-term stability, while we ask for short-term stability, minimum jitter @ 1 Hz - (Phase noise: the hole in the middle of an analog record is also never truly in the middle!) - the Mutec Ref-10 SE 120 has by far the better phase noise figures than any Rubidium.

Devices under test - we generate wordclock on demand by a Mutec iClock, which is synched to Mutec Ref-10 SE 120.

1. Burl B2 DAC (well known and proven, but now slightly aged design). Note: Manual states all other DACs sound „sterilized“. Do we hear BOPA1 or BOPA8 Opamps?
2. Burl B2 DAC synched to external high quality Wordclock (discouraged by manufacturer, just to prove if it's getting worse)
3. Lynx HiLo
4. Lynx HiLo with external wordclock.
5. Antelope Pure 2 Slave to 10 MHz Input. Note: This should sound best, in theory. Noone on Internet has ever tested it, we are the Spear-team.
6. Antelope Pure 2 Free running on local clock
7. Antelope Pure 2 Slave to Wordclock input
8. T+A DAC 8 in 'Wide' Mode (Filter starts at 120 kHz), 'Bessel 2' Upsampling & Filter setting. Peter's preferences from two filter onset settings and four upsampling/filter style settings. Note: Manual says - if the input quality qualifies (by low jitter), then the local oscillator becomes the reference. Effect of de-jittering can be heard clearly with this device, still. Chip: 8 x Burr Brown.
9. Dangerous Music Convert Two (Antelope and Dangerous are a lean by Flyline Music, with special thanks).

We must check with every test candidate how they react on the anti-jitter wash street.

Another contenders to the pedestal would be

Crane Song Solaris Quantum (hard to get at)

Shiit Yggdrasil

RME ADI-2 FS

Lavry Gold DA-N5 Quintessence (10k Euro)

Extremist 'HiFi' DAC „Border Patrol“ - 96 kHz only, Tube rectified DC source. Said to be the warmest around.

Most expensive: dCS Rossini Apex, 30900 Euro. With atomic Wordclock 44 kCHF.

Altmann Attraction DAC

Denafrips Terminator Plus- OS and NOS converter - ca 4 kCHF.

Less Loss Echo's End - ca 32 kCHF - Panzerwood housing!

After extensive reading in all possible forums - we believe to have a decent selection in front of us.

Bring your own converter, from studio and/or home - we hear it.  
Urs Lee's Music samples (streamed from Tidal (FLAC) and/or local file)

1. Malia - "Convergence" Album: Rising Venus

Peter's Music samples (streamed from Tidal and/or Qobuz)

1. Saint Jhn & Sza: „Just for me“.
2. Travis Scott, 'Utopia' Album, „Until further notice“.
3. Madonna, 'Madamme X' Album: „Crave“.
4. Kendrick Lamar & SZA: „All the stars“.
5. Tinashe '333' Album: „I can see the future“.

Please suggest and bring in your test music.

As playback chain we can use equipment of your choice delivering digital audio as AES signal, and also Peter's highly optimized dual (Windows 10 based) PC JPlay twins, JPlay Classic and Audiophile Optimizer 3.0, On the 'hybernated' JPlay Audio PC Kernel Streaming (a must!) to Focusrite 6i6 USB Interface (free running async USB 2.0 - Koax S/PDIF out). On the JPlay Control PC Roon Server and/or Foobar 2K as UPnP renderer with Asio and Resampler Plugins can be used. The Control PC accepts UPnP signal and plays files from media. The latest Audirvana Studio is an alternative, too.

Your comments, hints, content to hear, and more studio and/or private DACs for comparison are warm welcomed!

Yours,  
Peter

With special thanks to Marcel Kummer, a deeply dedicated audiophile from Luzern, owner of a 8-stage reclocking bank and the above master clock, Marcel Wattenhofer of Audio Insider, Zurich.

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About Peter:

Peter has started audio career at age of 16 - he was building tube amplifiers (the layout persists till today), then as theatre sound mixer, has balanced a musical in Brno, Czech Republic. Then he has mixed Germany tour of a rock band. Shortly after he became resident theatre sound engineer for Edi Baur Theaterproduktion, Zurich, and was on tour with numerous famous swiss actors. He has also worked for Dr. W.A. Günther and Studer Revox. He has founded Sun Tonstudio in Eschlikon with Anita Baur, which later fused with Sinus Studio in Bern. Anita left him with the former engineer of Sinus, so life goes.

Then 18 years in Sinus Studio Bern as resident engineer (with Eric Merz, [www.ericmerz.ch](http://www.ericmerz.ch)). He has recorded numerous hits and known acts like Rumpelstilz, Krokus, Span, Andreas Wollenweider, Earl Hines, Keith Richards, Jimmi Duncombe, Toni Vescoli, Urs Böschenstein, Hazy Osterwald, Jürg Marquard, Peter, Sue & Marc, Sue Shell, Roland Zoss, Starter, Extrem Normal, Züri West, Pepe Lienhard, Stephan Sulke, Peter Hinnen, I Kong, Oliver Mandic, Johnny Thompson Singers, Stars of Faith, Katja Epstein, Koreana, Red Catholic Jewish Orthodox Chorus, etc.. He has recorded Montreux Jazz Festival, Jazz Festival Lugano, Country Music Festival Frutigen, for SRF Radio Studios Bern and Zurich and for numerous well known and less known record labels. He studied percussion on Konservatorium Zurich, audio engineering with Prof. John Borwick at University of Surrey. (Powerplay had a Midas console and was located in Horgen, at that time). Live he has mixed the Open Air Festival St. Gallen, Joan Baez, Tours of Billy Cobham, Stephan Sulke, Andreas Wollenweider, u.v.A. He has recorded soundtrack of the „Kleine frieren auch im

Sommer“ movie and soundtrack for the Hitfair, with Jürg Marquardt as speaker.  
He has produced 70 live dance events (with Katharina Grossenbacher, - EDM, House, Deep House)  
- with high end amplification - pure FM Acoustics, 3-way 35 kW. This wonderful system was in use  
5 years as PA for Berner Tanztage dance festival, with an analog Studer console, called 'the small  
wonder'. It was super-transparent, an early act of Mr. Weiss - Weiss Engineering today.  
He was first in CH to use Aphex Aural Exciter (on a No.1 Hit), we've payed fee per minute!  
Recently he has mixed live act of an Indian Band in Schinzenhof, Horgen (great acoustics, btw.)

Silvia Hagen, the former studio manager of Powerplay, has started the great escape from  
recording studio to IT and networks. And how - she wrote THE school-book on Internet Protocol  
Version 6, for the famous O'Reilly publishers - every IT chief in the world has it on bedside table.  
Truly extreme intellect act, Silvia.

As time engineer, (deep in NTP) Peter has re-designed the worldwide time distribution subsystem  
of the UBS (using eight custom. GPS disciplined) Rubidium atomic clocks, strategically placed  
across ther globe), he became „ Mr. Time“, responsible for time synchronization of all systems of  
the UBS. He has delivered synthetic time for the UBS Y2K test environment and co-developed a  
rack mounted time server with Meinberg Germany - meinberg.de. He has created 'Certified UBS  
Time', UTC(UBS), periodically re-approved by metas.ch, our national metrology institute in  
Wabern bei Bern. (Your Timestamps are an untrusted self-declaration, unless certified by METAS.  
Talk to Peter). Peter is Certified Network Security Engineer and Certified System Security  
engineer, educated by Siemens in Munich. At this examina, he was sweating blood. He is also IT  
Security Auditor, educated by InfoGuard.

He builds his own firewalls (<https://mactaggart.ch>) and has equiped numerous VIP clients with  
it, incl. some IT Security experts.

He has accompanied the internationally famous EMF Guru Josef Peter for five years as his  
measurement technician for non-ionizing radiation.

As recording engineer Peter has worked in Hansa Studios Berlin, Zuckerfabrik Stuttgart,  
Soundville Studios Luzern, Shanti Studio Iseltwald, etc. In Powerplay Studios he has workerd  
multiple times with Peter Reber, Al Copley and Furbaz. Daniel Dettwiler ([danieldettwiler.com](http://danieldettwiler.com))  
gave him his first reclocker, the Grimm CC-1, an ear-opener. Thank you, Daniel.