DAVID – V2

KT88 PP Amplifier , 28 - 50 Watt

Date : 05.06.2012

Design by: Dipl. Ing. J. Leven

CONTENTS:

1. **Amplifier Description**
2. **Amplifier Circuit Diagram**
3. **Power Supply Circuit Diagram**
4. **Measurement Results of Amplfier**

DAVID, High End PP Verstärker, 6SN7 Eingangs Röhre(DC gekoppelt) , 12AU7 (ECC82) Treiber , KT88 Endröhre .
Der Verstärker kombiniert die Klang Vorteile eines SE Verstärker mit der höheren Ausgangsleistung einer Gegentakt Schaltung (Push-Pull) ,dies bedeutet ein gleichmäßig abfallendes Klirr Spektrum ähnlich einer SE Endstufe und keine Auslöschung der geradzahligen Harmonischen .
Die KT88 kann in Trioden - oder Ultralinear Modus geschaltet werden .
Die Gegenkopplung ist mit 5dB(Triode) - 9dB(Ultra) niedrig gehalten, ein straffes Netzteil , exakt einstellbare Arbeitspunkte der Röhren in Verbindung mit dem LL1679 garantieren Klang auf sehr hohem Niveau .
Ruhestromeinstellung (Quiescent current setting), siehe unten .

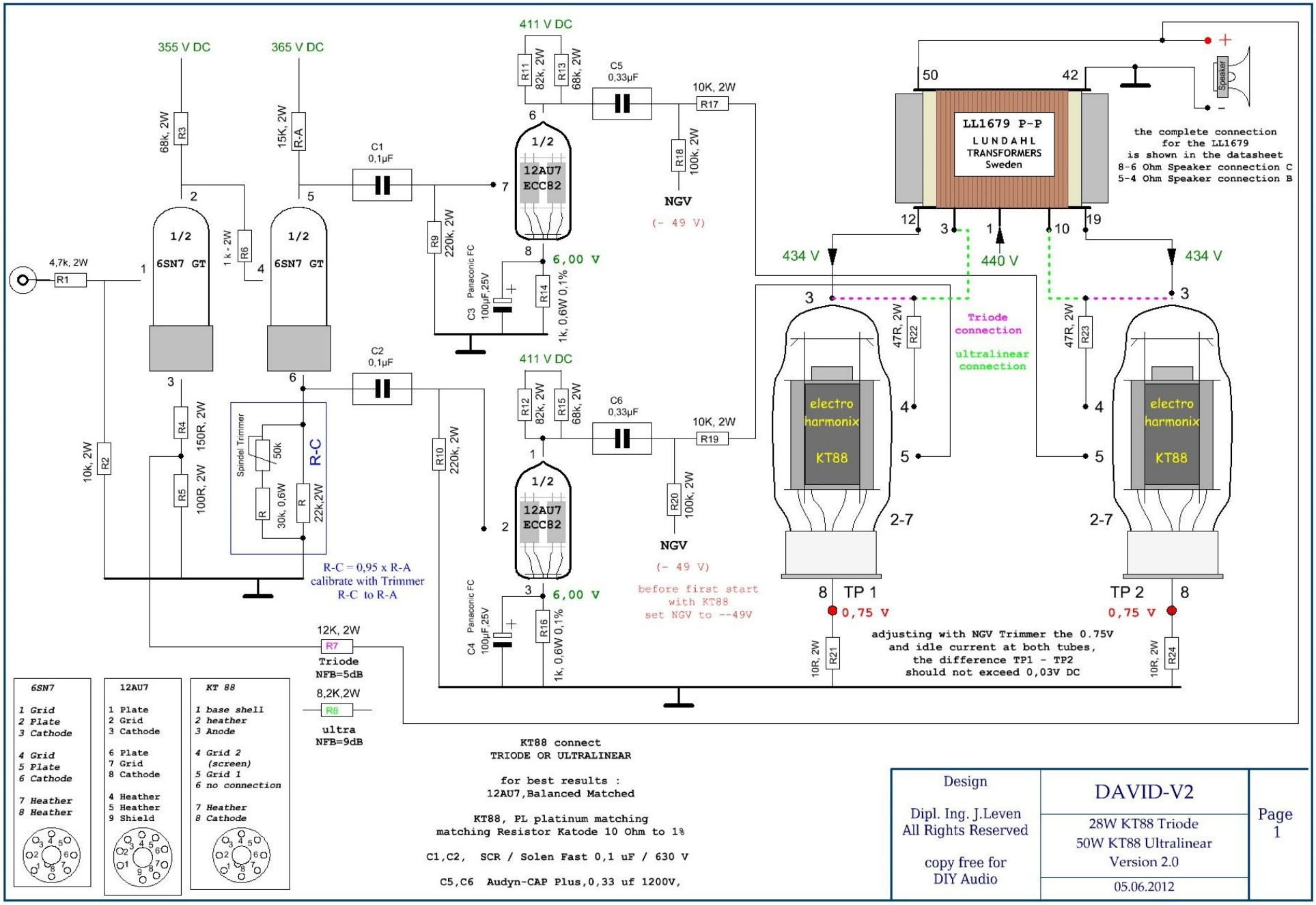
This is a High End Amplifier with 6SN7 input tube, 12AU7 driver, KT88 Power Tubes
and Lundahl LL1679 output transformer.

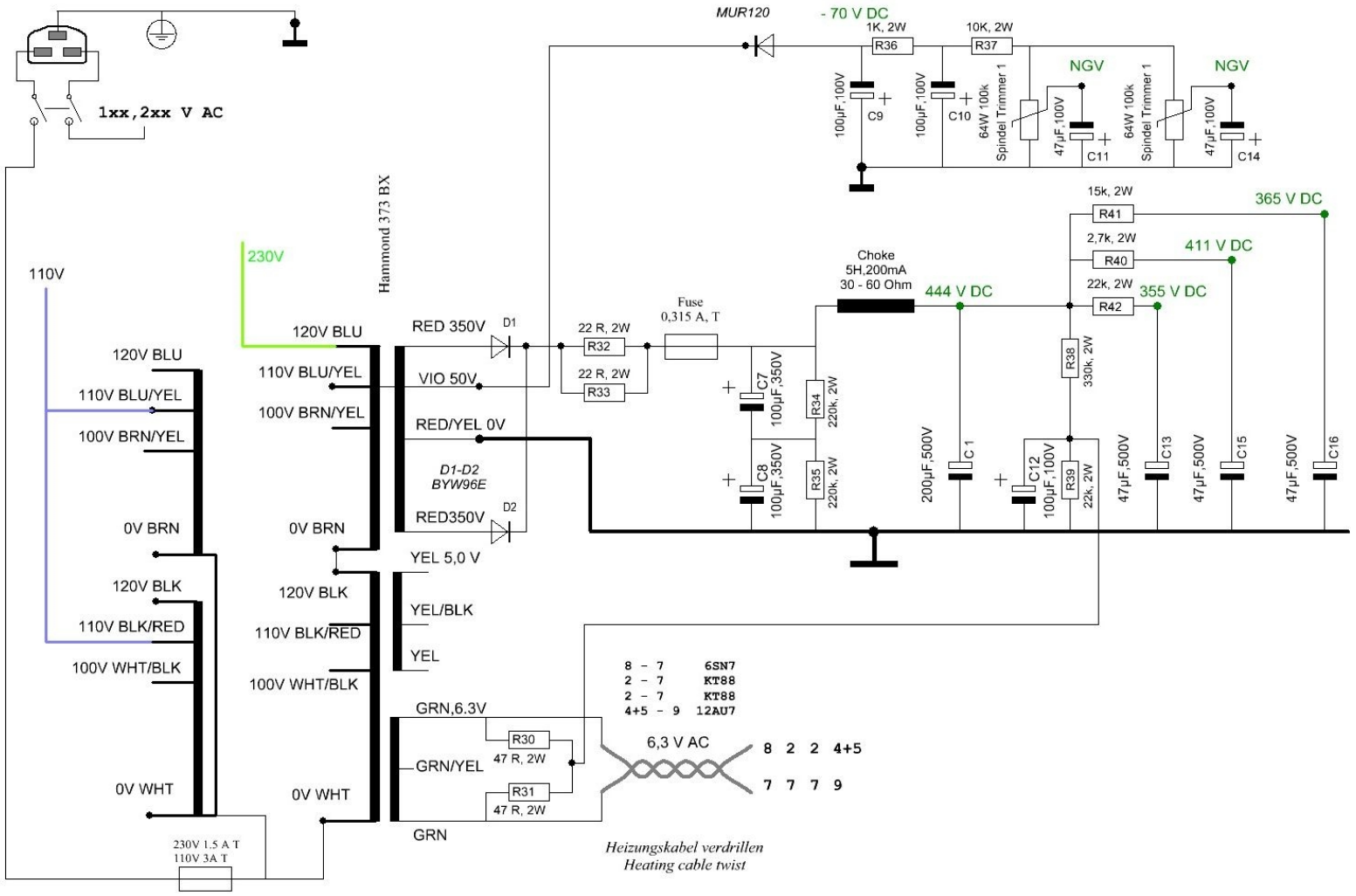
This Amplifier combines the benefits of a good SE amplifier with the Ouput
Power of a Push Pull Amplifier. This means a low harmonic Distortion Spectrum as seen with SE designs, and no cancellation of the even Harmonics over the full range of the output Power.
The KT88 can be operated in triode mode or ultra-linear mode.
A small feedback is ised: 5dB (triode mode) or 9dB (ultra linear mode).
This results in a harmonically decaying spectrum.
The amplifier has a stabile power supply with high capacitance energy storage and choke filter, for convenient and precise adjustment of the tube bias.

Quiescent current setting:

The quiescent current of the output tube may, by setting the negative bias NGV can be adjusted easily and accurately.
Before the first operation, this is put at about -49V with the help of the trimmer.
Measured at operation with the output tube voltage at the 10 Ohm Resistor with a multimeter
and quiescent current control.
After about *3 minutes of warming up* the tube should the DC voltage and thus the Quiescent current at TP1, TP2 set to a fixed value.
The quiescent current is calculated from:
TP voltage divided by the resistance R (10R)
e.g. Voltage at TP 0,72 V, resistance R Catode, 10 Ohms, 0,72 V / 10 ohms = 0.072 A
The change from a quiescent current NGV change causes the output tube.

Schematics

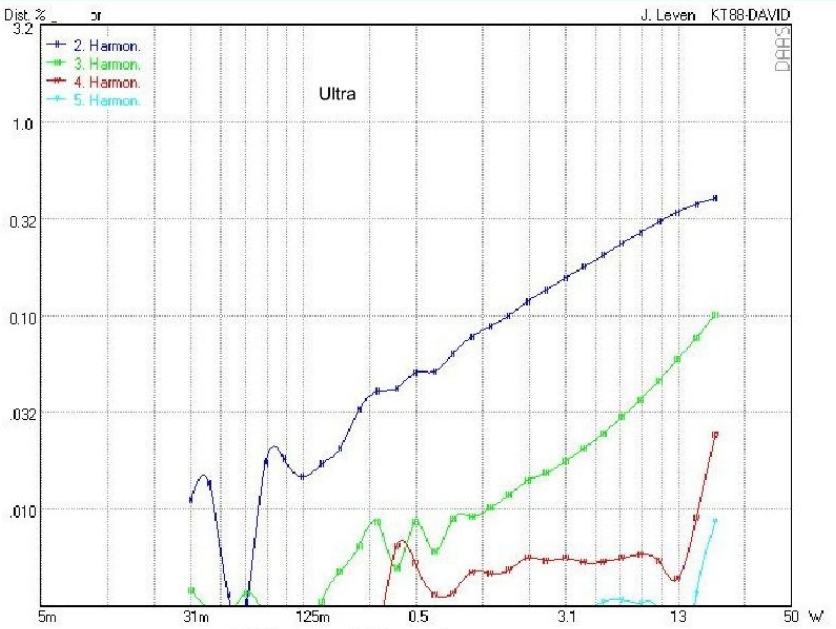

411 V DC
355 V DC
365 V DC
411 V DC
C5 0,33µF
10K, 2W
R17
R18 100k, 2W
NGV
(- 49 V)
R11 82k, 2W
R13 68k, 2W
68k, 2W R3
15K, 2W R-A
C1 0,1µF
1/2 12AU7 ECC82
6,00 V
R9 220k, 2W
C3 Panaconic FC 100µF,25V
R14 1k, 0,6W 0,1%
4,7k, 2W R1
1/2 6SN7 GT
1 k - 2W R6
1/2 6SN7 GT
C2 0,1µF
R4 150R, 2W
R5 100R, 2W
10k, 2W R2
Spindel Trimmer 50k
R 30k, 0,6W
R 22k,2W
R-C
R-C = 0,95 x R-A
calibrate with Trimmer
R-C to R-A
411 V DC
R12 82k, 2W
R15 68k, 2W
C6 0,33µF
10K, 2W
R19
R20 100k, 2W
NGV
(- 49 V)
before first start
with KT88
set NGV to --49V
R10 220k, 2W
1/2 12AU7 ECC82
6,00 V
C4 Panaconic FC 100µF,25V
R16 1k, 0,6W 0,1%
12K, 2W R7
Triode
NFB=5dB
8,2K,2W R8
ultra
NFB=9dB
LL1679 P-P
LUNDAHL
TRANSFORMERS
Sweden
Speaker
the complete connection
for the LL1679
is shown in the datasheet
8-6 Ohm Speaker connection C
5-4 Ohm Speaker connection B
434 V
440 V
434 V
Triode
connection
ultralinear
connection
47R, 2W R22
47R, 2W R23
electro harmonix KT88
electro harmonix KT88
TP 1
0,75 V
TP 2
0,75 V
10R, 2W R21
10R, 2W R24
adjusting with NGV Trimmer the 0.75V
and idle current at both tubes,
the difference TP1 - TP2
should not exceed 0,03V DC
6SN7
1 Grid
2 Plate
3 Cathode
4 Grid
5 Plate
6 Cathode
7 Heather
8 Heather
12AU7
1 Plate
2 Grid
3 Cathode
6 Plate
7 Grid
8 Cathode
4 Heather
5 Heather
9 Shield
KT 88
1 base shell
2 heather
3 Anode
4 Grid 2 (screen)
5 Grid 1
6 no connection
7 Heather
8 Cathode
KT88 connect
TRIODE OR ULTRALINEAR
for best results :
12AU7,Balanced Matched
KT88, PL platinum matching
matching Resistor Katode 10 Ohm to 1%
C1,C2, SCR / Solen Fast 0,1 uF / 630 V
C5,C6 Audyn-CAP Plus,0,33 uf 1200V,
Design
Dipl. Ing. J.Leven
All Rights Reserved
copy free for
DIY Audio
DAVID-V2
28W KT88 Triode
50W KT88 Ultralinear
Version 2.0
05.06.2012
Page
1



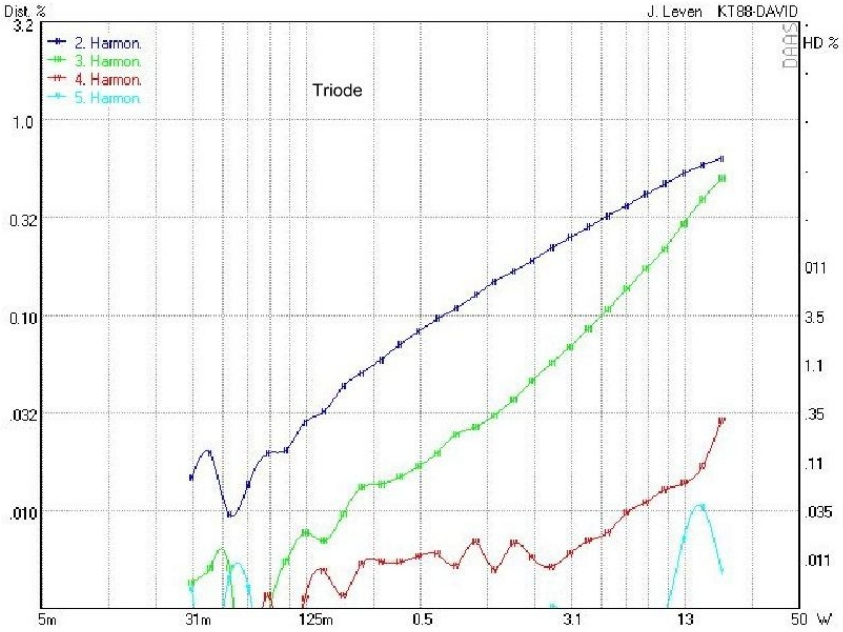
all voltage data refer to operation
with tubes
without tubes the voltage increasing
on the open circuit voltage,

the NGV voltage is independent of the operation with tubes

Design Dipl. Ing. J.Leven All Rights Reserved copy free for DIY Audio	DAVID-V2 28W KT88 Triode 50W KT88 Ultralinear Version 2.0	Page 2

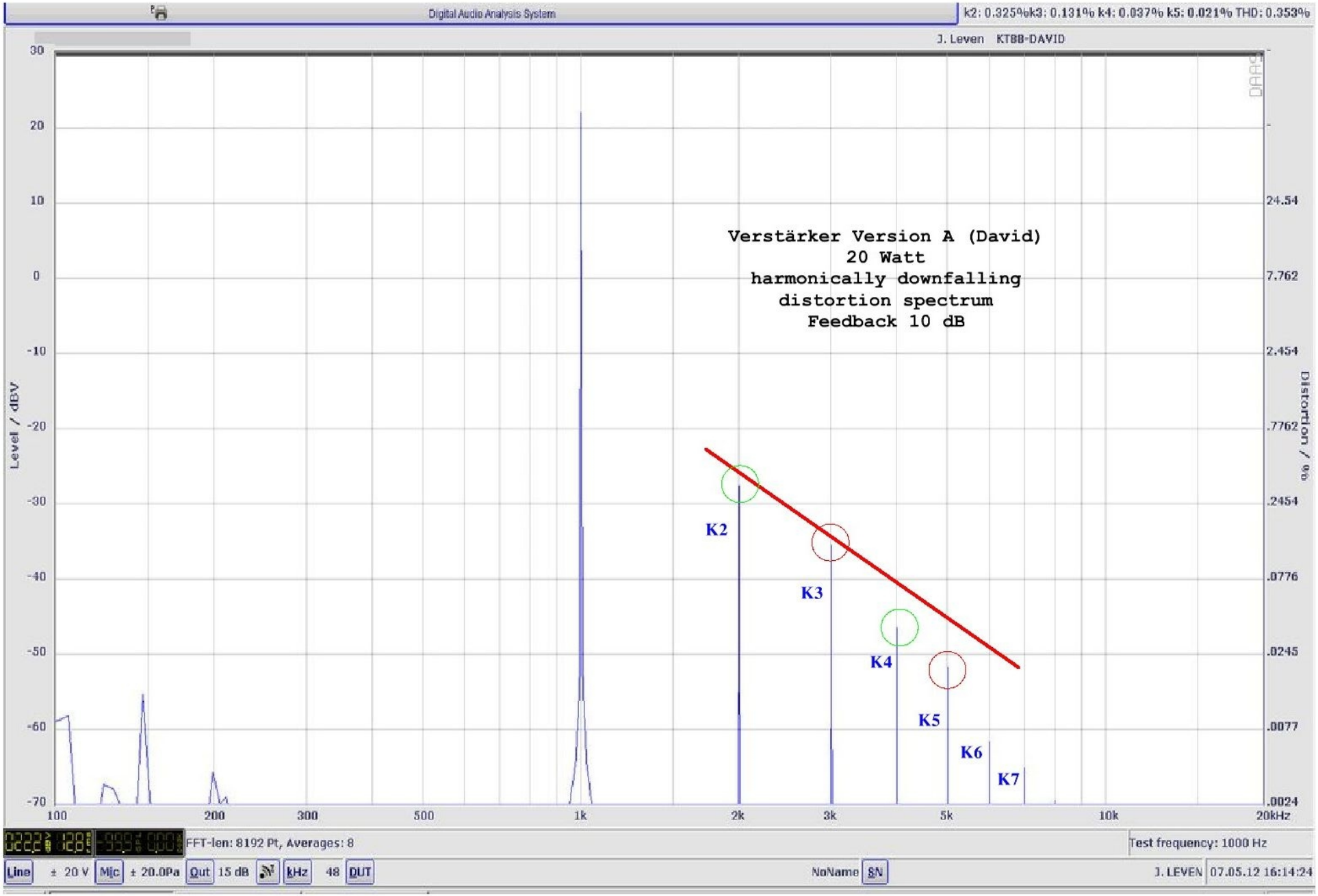


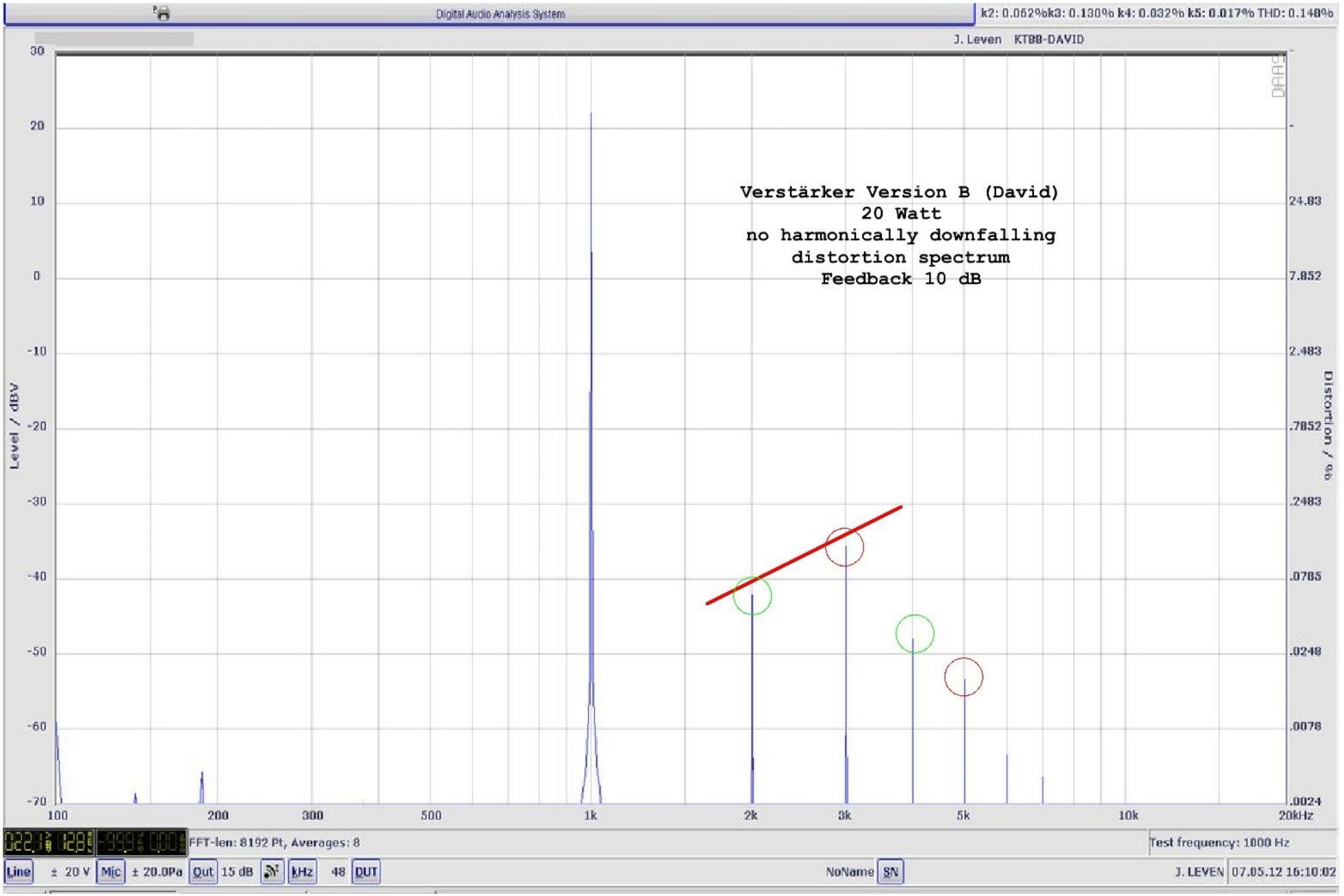
THD curve with increasing power



DAVID,KT88 PP	Ultralinear	Triode
Tubes:		
EH-6SN7,EH-12AU7,EH-KT88		
Power output (8 Ohm)	50 Watt	28Watt
Frequency response		
10 W -1dB	7Hz-72kHz	10Hz-58kHz
total harmonic distortion		
1 kHz 20 Watt,THD	0,43 %	0,77 %
1 kHz 10 Watt,THD	0,30 %	0,49 %
1 kHz 1 Watt,THD	0,07 %	0,11 %
Hum (V)	0,002	0,002
Damping factor at 8 Ohm	5,1	5,3
Feedback	9 dB	5dB
Input Impedance:	15 k	

Design Dipl. Ing. J.Leven All Rights Reserved copy free for DIY Audio	DAVID-V2 28W KT88 Triode 50W KT88 Ultralinear Version 2.0	Page 3


Digital Audio Analysis System
k2: 0.325%k3: 0.131% k4: 0.037% k5: 0.021% THD: 0.353%
J. Leven KT88-DAVID
Verstärker Version A (David)
20 Watt
harmonically downfalling
distortion spectrum
Feedback 10 dB
K2
K3
K4
K5
K6
K7
Level / dBV
Distortion / %
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
24.54
7.762
2.454
.7762
.2454
.0776
.0245
.0077
.0024
100
200
300
500
1k
2k
3k
5k
10k
20kHz
FFT-len: 8192 Pt, Averages: 8
Test frequency: 1000 Hz
Line
± 20 V
Mic
± 20.0Pa
Out
15 dB
kHz
48
DUT
NoName
SN
J. LEVEN
07.05.12 16:14:24


Digital Audio Analysis System
k2: 0.062% k3: 0.130% k4: 0.032% k5: 0.017% THD: 0.148%
J. Leven KT88-DAVID
Verstärker Version B (David)
20 Watt
no harmonically downfalling
distortion spectrum
Feedback 10 dB
Level / dBV
Distortion / %
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
24.83
7.852
2.483
.7852
.2483
.0785
.0248
.0078
.0024
100
200
300
500
1k
2k
3k
5k
10k
20kHz
FFT-len: 8192 Pt, Averages: 8
Test frequency: 1000 Hz
Line
± 20 V
Mic
± 20.0Pa
Out
15 dB
kHz
48
DUT
NoName
SN
J. LEVEN
07.05.12 16:10:02