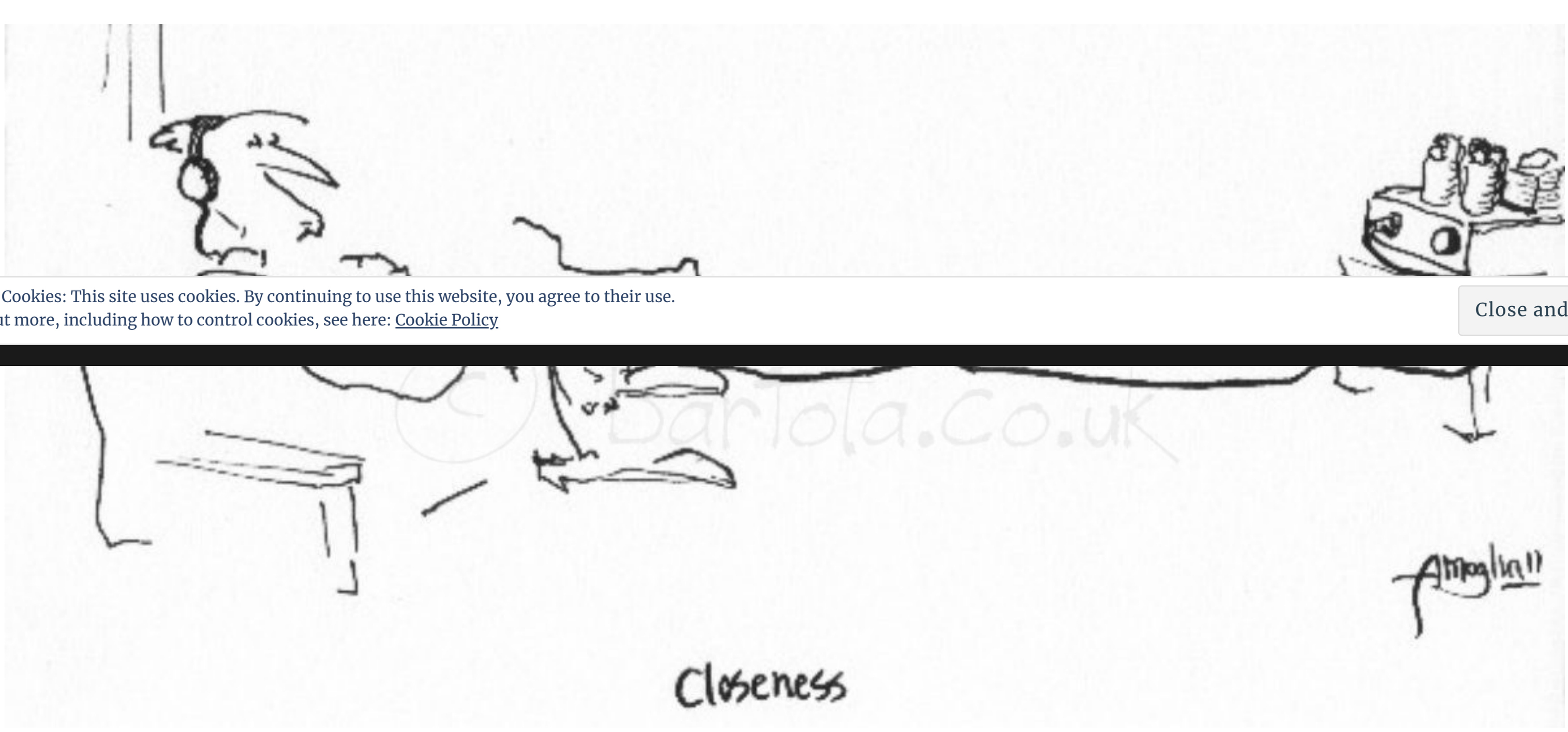
Bartola® Valves

All about electronic valves and hi-fi



Tag: GU-50

"Schade" SE Amp Example

February 14, 2017

Driver, Gyrator PCB, Output Stage, THD, Valves & Hi-Fi

12HL7, GU-50, gyrator PCB, pentode driver, pentode with gyrator load, Schade, Schade feedback

7 Comments

Introduction

On my last post I covered how the gyrator PCB can be used in a pentode driver. The pentode driver is the best candidate in a "plate to plate" / shunt feedback or "Schade" feedback amplifier which is the name typically used in the DIYAudio world. The triode doesn't work well here as you need high gain and low distortion with a load which can get quite low (due to the feedback effect of the feedback resistor). I'm not going to cover the subject as it has been covered (and discussed) extensively before by many people, so I suggest you do a bit of research yourself if you are interested in the subject and want to learn more.

A Study example

Continue reading

+16

New HT bench supply

October 13, 2012

Power supplies, Valves & Hi-Fi

600V bench supply, GU-50, GU50, GU50 right-handed mode, HT bench variable supply, HT regulator, HT tube supply, HT valve supply, HT variable supply, right-handed mode, tube curve tracer, tube series regulator, valve curve tracer, valve series regulator, Valve tester, valves

3 Comments

600V HT Bench Power Supply

After being out of action for over a month due to visits, holidays and business travel, I finally got the opportunity to get my hands back on the 600V bench supply. I need to repair my valve tracer, but firstly need the bench supply back again. Otherwise won't be able to do all tests I want to around my 814 DC-coupled SE amplifier and many driver stages I want to try on my workbench before moving to the next stage.

AN IMPROVED DESIGN TO AVOID FIREWORKS

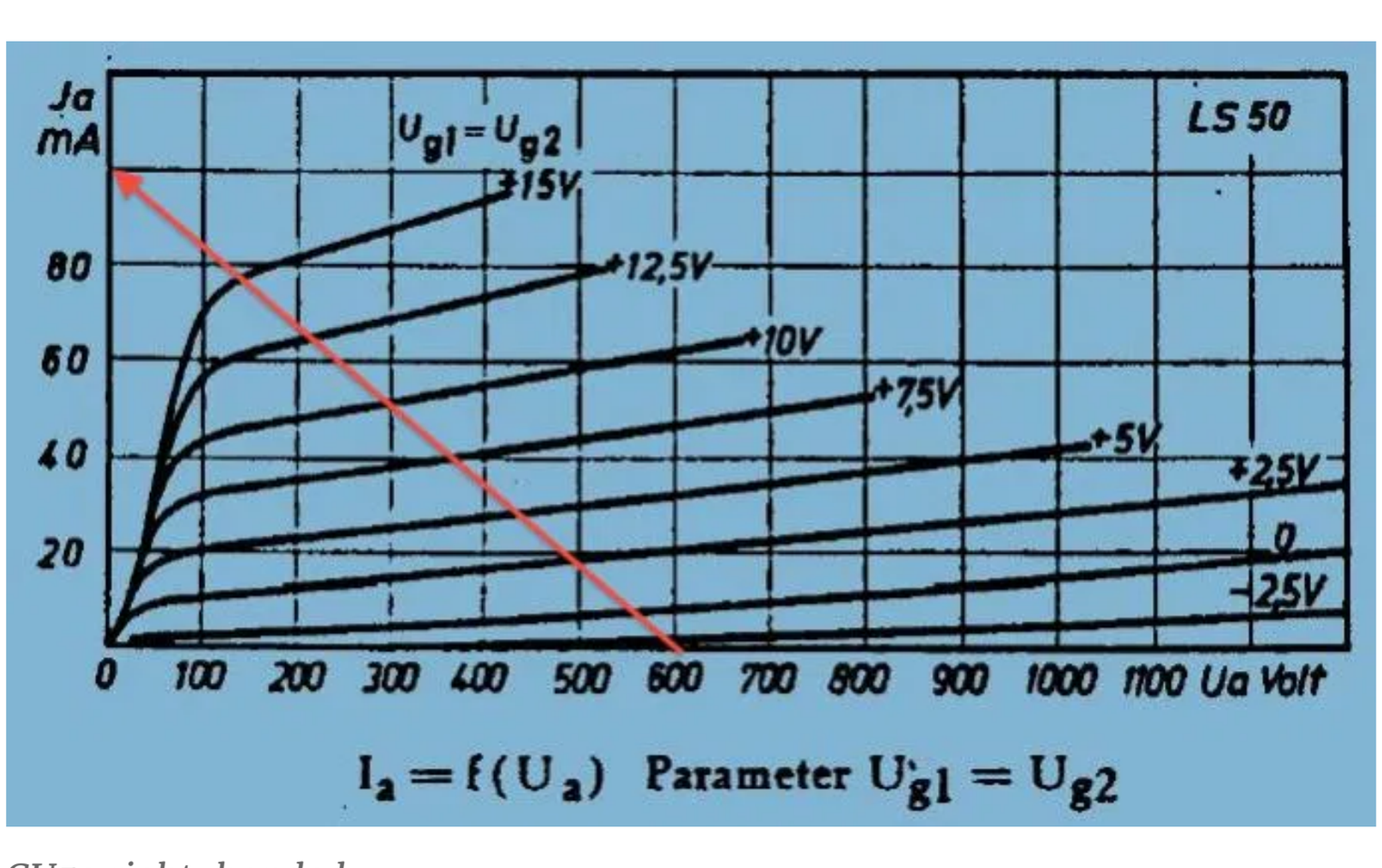
Tired of my old HT (+600V) variable bench power supply to suffer collateral damage when accidentally shorted whilst testing transmitting valves for output stage (i.e. FQP3n80c MOSFET passive regulator blowing out), I decided firstly to decide a simple and yet effective valve stabiliser. As nothing comes for free, these were my design constrain factors:

1. Input raw supply is +620V @ 100mA
2. Filament secondary winding is 15V @1.5A
3. No additional secondary winding is available for a floating screen supply (e.g. pass valve is pentode)
4. Output voltage ideally should be 0-600V

So with the restriction of not using a pentode as pass valve, I looked out for candidates to match my requirements and instantly thought about GU-50 in triode-strapped mode. Yes, I know that UG2 limit is 250V, not 1,000V as anode max voltage. But, in triode strapped specs are not shown.
As recently checked this with the 814 triode strapped, and seems to be ok UG2=Ua in triode mode. 7N7 also said this was ok and Morgan Jones previously tested this as well with similar valves.

So, question here initially was: could the GU-50 withstand 600V in triode mode or should I needed to look out for other options?

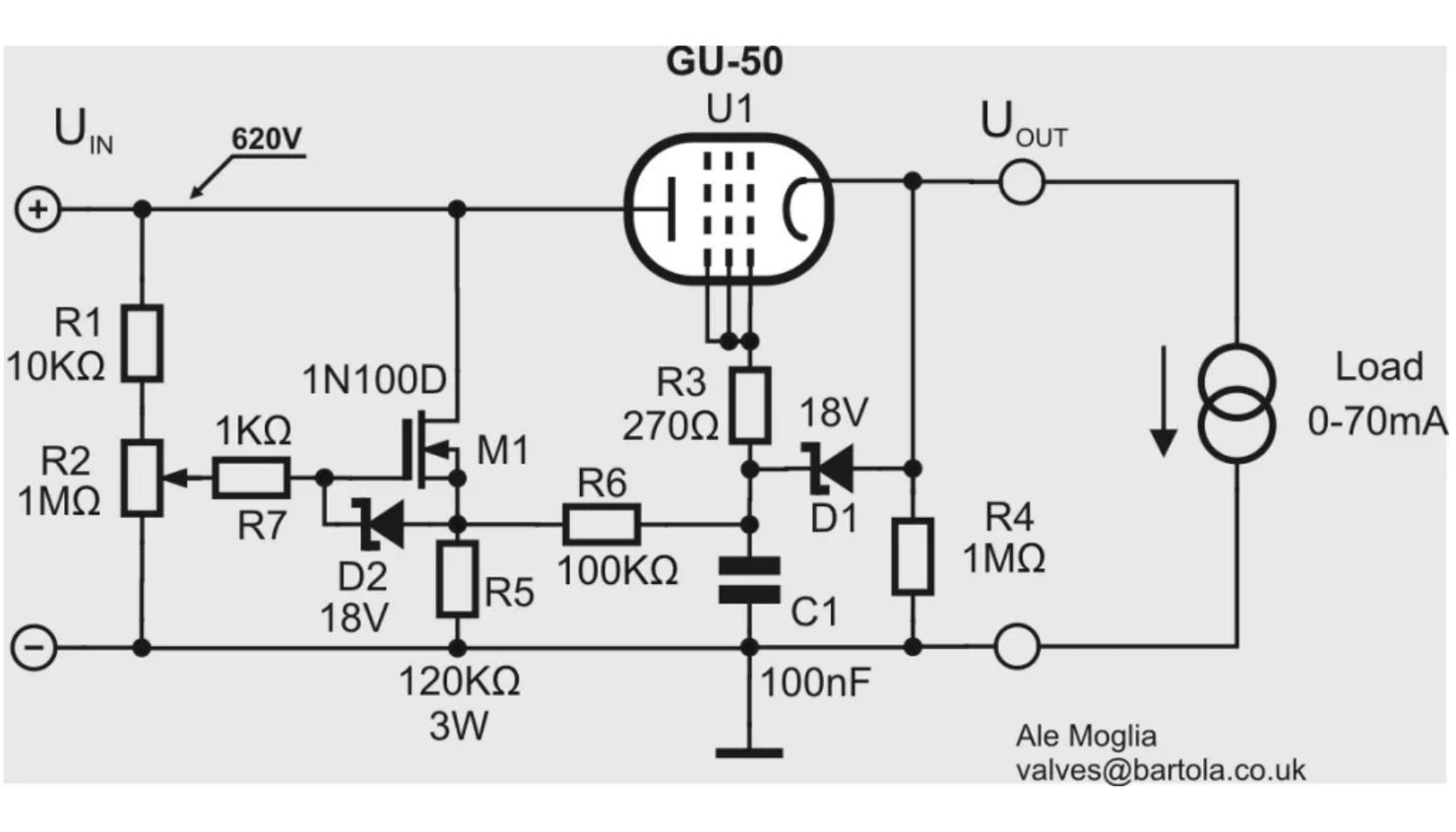
After asking for some help in DIYaudio forum to see what was the best option on this topology and the recommendation was to use the GU-50 in "right-handed mode":



GU50 right-handed

In this mode GU-50 was able to provide the regulation required (or close to it) with minimum driving requirements (i.e. 0V to +15V)

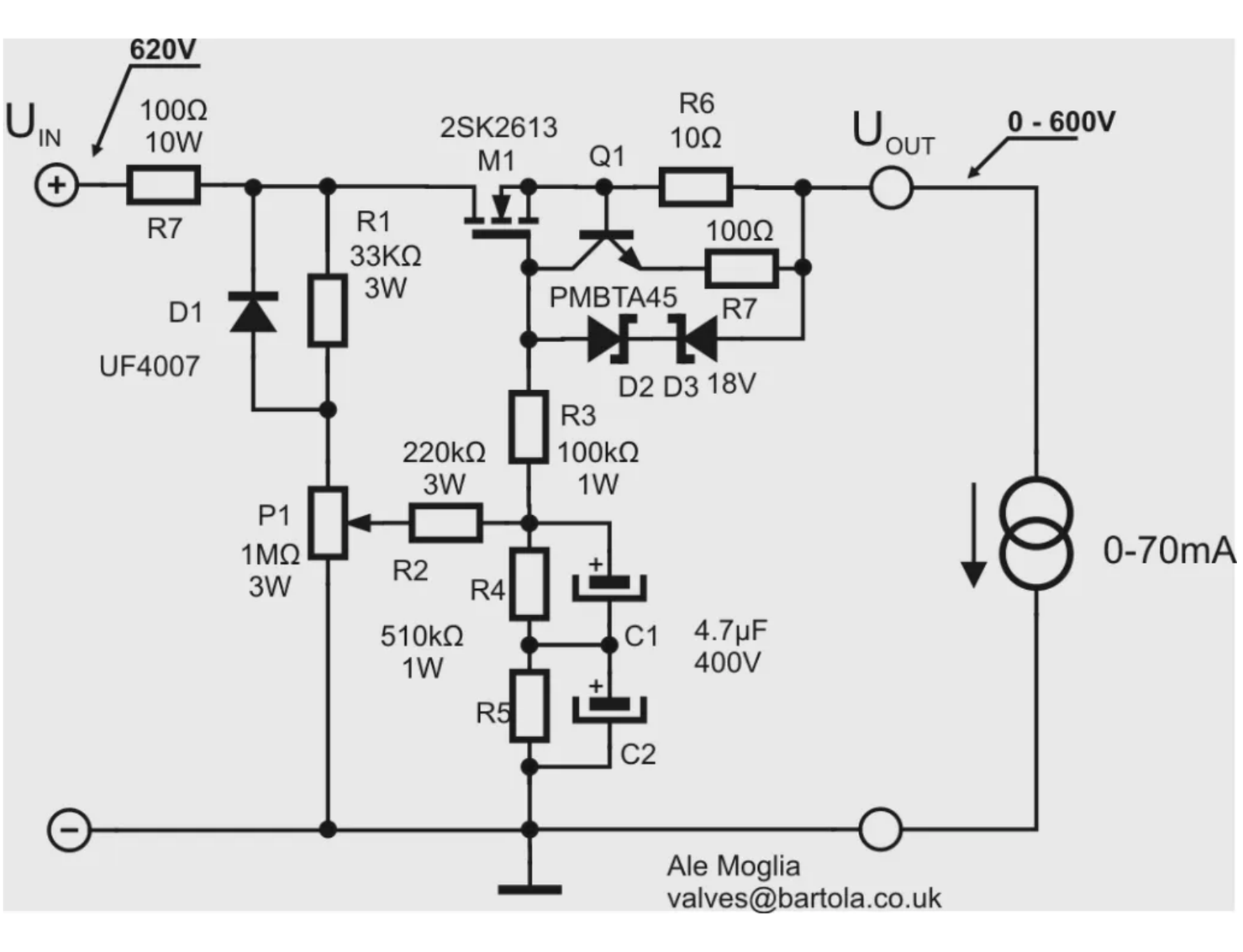
First version of the passive regulator:



The MOSFET is in source follower mode to provide the necessary grid current, albeit not sure how much grid current the GU-50 needed in right-handed mode. So the value of R6 must be adjusted on test. In order to survive an output short, R6 needs to be in the order of 100K and 3 or 4W to avoid blowing up the 18V zener protecting the grid.

The circuit above is very interesting as the anode dissipation of the GU-50 is very handy for this setup and requirements. Is important to highlight that the circuit has no regulation, so if this is a requirement a different topology must be explored.

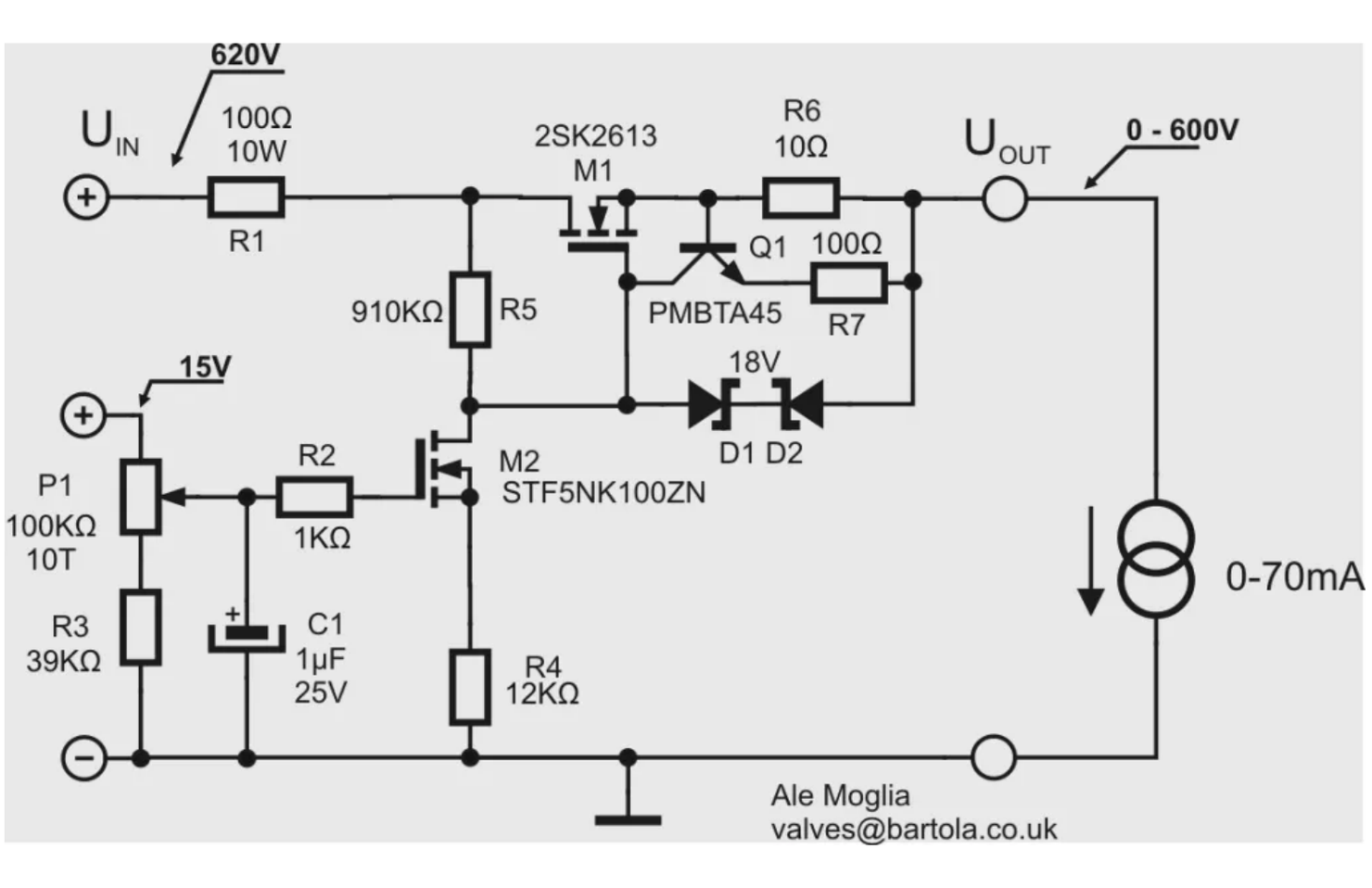
If we look at the sandy option here, then the following equivalent is comparable:



R2 and R3 are required to protect silicon from output short. Q1 provides current limitation with R6. This topology suffers from same issues related to regulation as previous circuit.

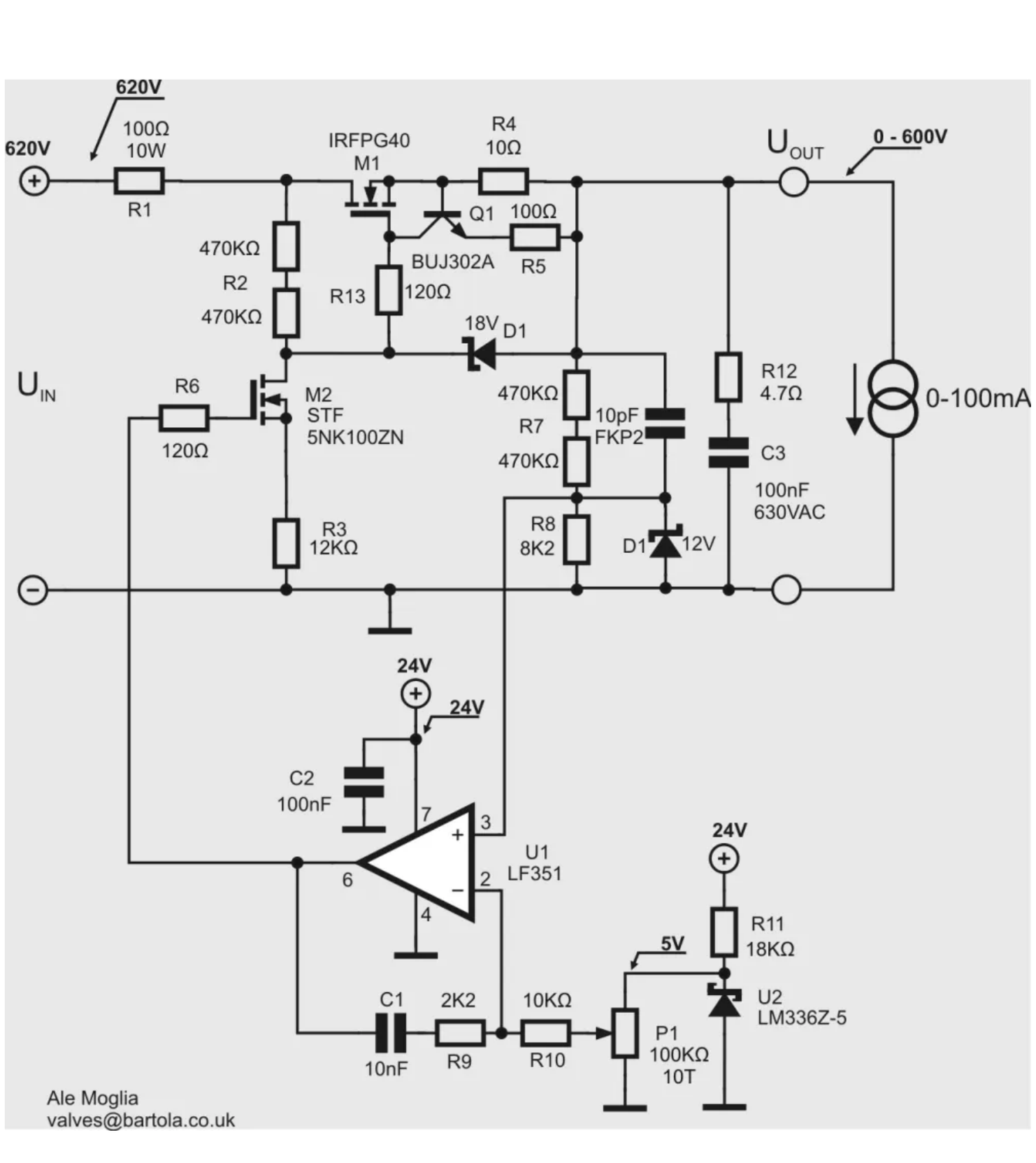
A big issue on the two circuits presented before is that the potentiometer is stressed at full raw HT supply. This is far from ideal and despite the specific power requirements of the pot, we also need to ensure that the part can withstand the voltages used.

A slight modification (requiring an additional LT supply) can solve this problem:



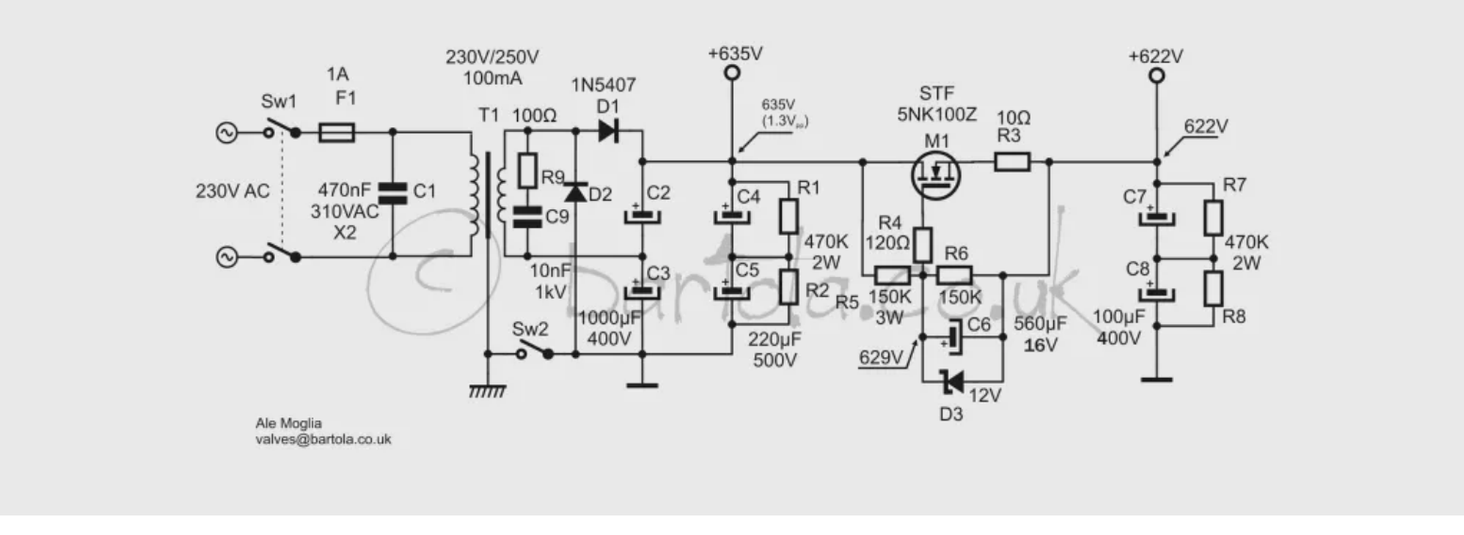
Now P1 is connected to 15V. The gain of the M2 stage is significant so stability of circuit above is an issue now.

So if we have already introduced an LT supply in the circuit, then is a better choice to look at a feedback regulator.



A more complex circuit indeed, but a more effective one. The op-amp provides regulation by sensing output from R7 and R8 divider and comparing it to the stable reference from the output of P1. R10, R9 and C1 limit the HF gain response of the op-amp. R12/C3 and the 10pF FKP2 Wilma cap across R7 optimise the HF response of the overall regulator. D1 will protect the op-amp input (specially if 10pF cap is fitted). R1 is an additional protection for M1. M1 requires a good sink if wider regulation is needed. When output voltage is low and high current is drawn, then M1 is bearing all the effort and will dissipate a lot of heat (just do the maths).

The raw supply stays the same, however the gyrator stage was optimised as shown below:



The MOSFET was changed for am 1000V TO220FP plastic package one which is better from an insulation perspective given voltages used in this circuit. R5 and R6 changed to 150K 3W ones to provide protection to the zener and M1 in case output is shorted.

I will build this and report results shortly.

+51

ABOUT BARTOLA® VALVES

This is my humble contribution to that warm and unique sound that the valves provide to our ears.

As an enthusiast of electronics, here is my repository around valves, hi-fi amplifiers and everything I found interesting to share related to music reproduction. Hope you enjoy this.

SEARCH THIS BLOG

Search …

DISCLAIMER

Many of the devices described in this site use or generate potentially lethal electric currents. If you use the information in this site to kill yourself, your friends, family members, acquaintances, total strangers, pets, electronic devices or burn down your house, it is not my problem!

SUBSCRIBE TO BLOG VIA EMAIL

Enter your email address to subscribe to this blog and receive notifications of new posts by email.

Join 217 other subscribers.

Email Address

SUBSCRIBE

CATEGORIES

Select Category

TOP POSTS & PAGES

- 300B SE Amp: build part VII (D3a driver)
- 300B SE Amp: build part VIII (Cap Boards)
- Gyrator PCB
- Source Follower PCB
- Hybrid Mu-follower (aka Gyrator) Rev08 PCB Update
- 01a Preamp (Gen2)
- 45 SE Amplifier
- 6SF5 driver for 300B/GM70/813 SE Amps
- VT-25 Preamps in Lockdown
- 300B SE Amp: build part VI (Fixed Bias Board)

RECENT POSTS

- 300B SE Amp: build part VIII (Cap Boards)
- 300B SE Amp: build part VII (D3a driver)
- 300B SE Amp: build part VI (Fixed Bias Board)
- 300B SE Amp: build part V (Fixed Bias)
- 300B SE Amp: build part IV (Board 1 finished)
- 300B SE Amp: build part III (Layout)
- 300B SE Amp: build part II
- VT-25 Preamps in Lockdown
- 300B SE Amp – here we go
- Mini CCS
- 3 versions of the gyrator board
- 01a Preamp from South Korea
- 46 driver
- The return of the Mule (RE084)
- Goodbye McCoy

RECENTLY LIKED POSTS

- About me
- Ba DHT Preamp Build
- 300B SE Amp: build part VIII (Cap Boards)
- 300B SE Amp: build part VII (D3a driver)
- 6Z49P-DR/6J49P-DR Pentode
- 300B SE Amp: build part V (Fixed Bias)
- 300B SE Amp: build part VI (Fixed Bias Board)
- 600V feedback regulator finished!
- The Shunt Cascode Driver
- 300B SE Amp: build part III (Layout)
- 4P1L Siberian Gen3: Loctal socket board
- 300B SE Amp: build part IV (Board 1 finished)
- Driving hard (Part I)
- 300B SE Amp: build part II
- 300B SE Amp - here we go
- THD measurement
- THD benchmark
- Monolith Magnetics S9
- DHT Audio Shootout @ London
- 2P29L DHT Preamp - final build

MOST LIKED POSTS

- 4П1Л/4P1L triode curves
- Curve tracer
- About me
- Library
- 6P36S / 6П36C beam tetrode in triode mode
- For Sale
- 6E5P/6Э5П and 6E6P-E/6Э6П-E in triode mode
- 6Э6П-E and 6Э6П-ДР datasheets
- THD benchmark
- Russian pentodes in triode mode

ARCHIVES

Select Month

- RSS - Posts
- RSS - Comments

BLOGROLL

- (new adventures in) ultra-fi
- || DHTRob – weBlog ||
- 2A3 Maniac
- 6th Street Bridge
- Boozhound Laboratories
- DIY Open Source Hifi
- doityourselfaudio
- Electronic projects and reviews
- Gainphile
- Golden Tubes
- hifi heroin
- Holger Barske
- jazzbo8's adventure
- Junkyard Jukebox
- Kenji Mizushima's 2A3/45 designs
- Lab JC
- Martinsson's Blog
- MindFlux
- MyElectrons
- Plugins
- Red Spade Audio
- retro vintage modern hi-fi
- Richard Sears, Vacuum Tube Audio
- silvercore Blog
- simplepleasuretubeamps
- Tube Amps DIY – Handmade audio tube amplifiers, DIY loudspeakers
- VINTAGE SOUND
- VinylSavor

bartolavalves

View Full Profile →