

# TEQUILA-Mk3-SST

A Perfect Line-Preamplifier

by Barbara E. Gerhold, "TUBECLINIC"

*...make the design of a line-stage as simple as possible but don't make it any simpler.*

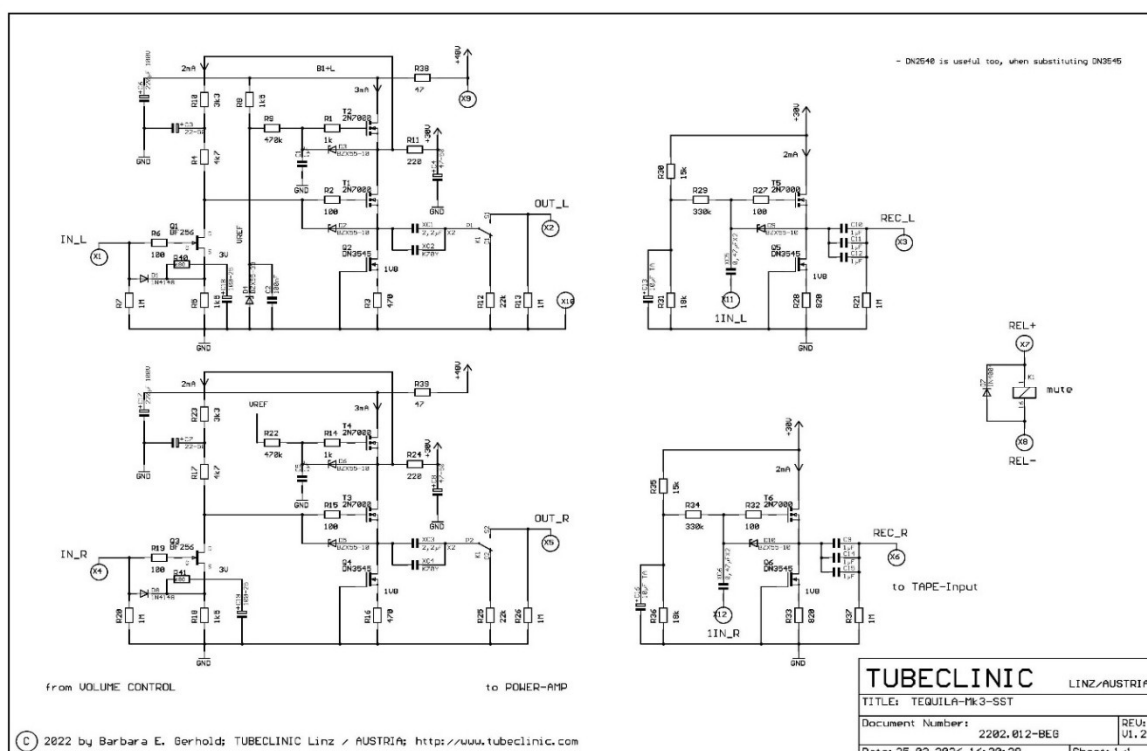
*Georg Ritter von Krauß<sup>i</sup> (a famous designer of locomotives) said → "... A development or a design is only perfect when you can't take away a single part of it without affecting the entire function."*

## INTRO

Preamplifiers connect all your home audio & video components. The preamp is easy to use, very flexible, and gives you the best audio performance. On the backside of each *TEQUILA-Mk3*-preamp, you'll find an enormous number of connectors to meet all your demands.

Generally spoken this Line-Stage Preamp is a copy of my well-known design "Universal Unity-Gain Driver". I only added a JFET input to derive a purely resistive and lowest value capacitive input impedance. Additionally, I added an output (Muting-) relay and a unity-gain driver stage per channel. Here you can connect a tape loop, a headphone amp, a ... you name it ... or all of them. It buffers all these gears off from the main output, so there will be no interaction in between.

## THE SCHEMATIC



### ***THE INPUT STAGE***

In the meantime, all followers expect a very simple JFET or D-NMOS input stage anyway, because such stages work very close to a triode and prefer to produce even-order harmonics in case of accidental overdrive. With good dimensioning in the normal working range, such designs are extremely clean (very low distortion even without over-all NFB) and give a good headroom. In terms of sound, they are hardly distinguishable from a triode.

### ***THE UNITY GAIN DRIVER STAGE***

Right here is the "Uni-DRV" driver stage that I copied from myself. Basically, it consists of a voltage-controlled NMOS (T1 – 2N7000) which "rides" on a CCS (Q2 – DN3545 or DN2540). The output impedance is determined by its (constant) quiescent current. This is set by R3 (470Ω), but can be changed individually at any time. Assumed,  $-U_{gs}$  of the D-NMOS is 1,85V then →

$$I_q = \frac{1.85V}{470\Omega} = \sim 4mA$$

The upper limit of the quiescent current (or  $I_{q\_max}$ ) is only limited by the maximum power dissipation of the transistors.

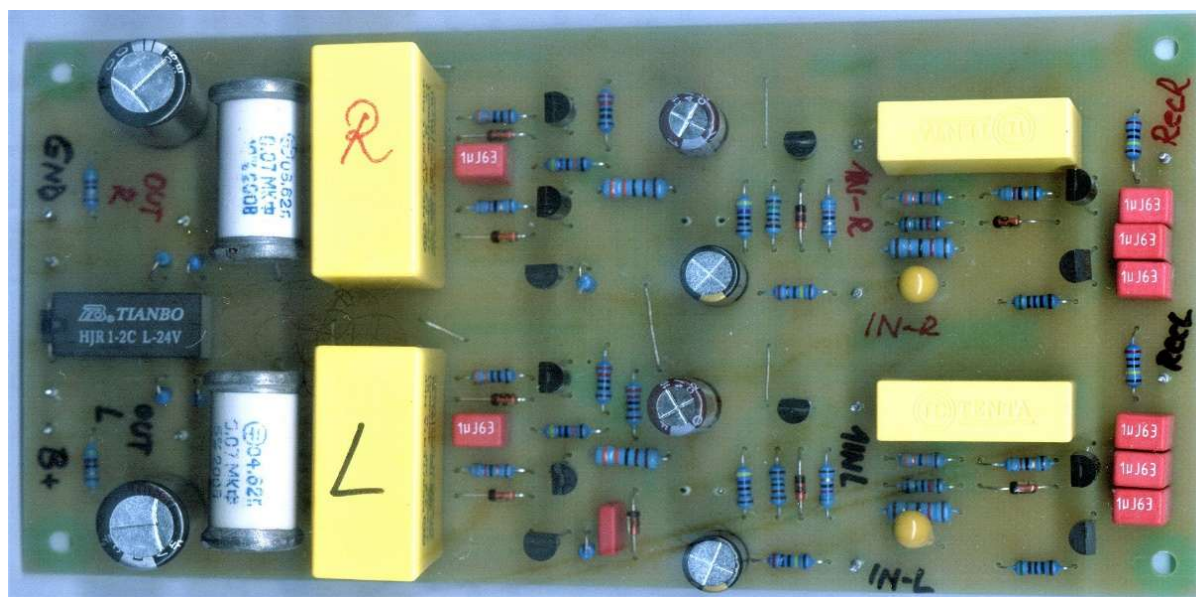
### ***THE AUX-OUTPUT***

Like I described on top of this article, I added a unity gain stage to decouple any "other" load from the main output. It is primarily intended for the connection of such equipment that has its own volume control. Like a Tape Deck or a Headphone Amp or ... Normally you will connect its input (1IN-L, 1IN-R) in parallel to the input of the main volume control.

It works exactly like the main output stage and again you can determine its output impedance by choosing "your" value of R28 (820Ω → ~2,2mA). The above equation is correct too for this instance.

### ***THE GYRATOR***

At the power supply connection of this stage, one gyrator is arranged per channel. This ensures the best channel separation possible and, because it is "a choke built from sand", also the most noise-free supply source you can build. This ultimately enables a signal-to-noise ratio (SNR) of >90dB. I would like to add here - again without using over-all NFB.



### ***THE CHOICE OF COMPONENTS***

**Caps** are MKP-X2 by TENTA and/or WIMA as well as some additional NOS MIL RuPIOs (pls. refer to the schematic).

**El. caps** are only NICHICON Muse AUDIO GOLD, type UKZ. Only in the supply I used standard NICHICON, type VY.

**Resistors** are standard metal film 1%, type SMA-0207 or -0414.

**JFETs** by Philips, ON or Fairchild; **NMOS** are by IR and **D-NMOS** are by Supertex.

**Diodes** and **Z-diodes** are from several brands. Pls. refer to the schematic.

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### ***OUTRO***

In the meantime, it is already becoming difficult for me to find new words for the same Audio experience. I have to repeat myself constantly, but all the new components from the series of Current-Sourcing Devices have the same "stable smell" and timbre. The same designs and principles are regularly applied, which makes it not really surprising in the end.

#### ***MAYBE A FEW TIPS ON THE DOS AND DON'TS, OR WHAT IS USEFUL FOR OPTIMAL PERFORMANCE AND WHAT IS BETTER NOT TO DO:***

- Guys, please don't try to change the dimensioning of the components. That was a lot of work and has now reached an optimum. Even if this violates your "faith" - for some of you. However, this does not apply to places (such as quiescent currents) where this is expressly noted.
- It makes no sense to just build one device from this series and then expect miracles. This is a "total work of art" (LOL! 😊), that is internally coordinated. The final experience only results when all parts play together.
- Don't skimp on capacitors and use exactly those types that are indicated on the schematics. I always use MKP-X2 types when it comes to signal-carrying capacitors. This type is basically not sooo expensive because it was not hyped by an Audio-Pope. Actually, it is intended for Electro-Magnetic-Interference (EMI) suppression, but for this you need a particularly low ESR at high frequencies and this property has also proven itself in the field of Audio.
- Russian NOS MIL Paper-in-Oil (RuPIO) types represent the salt in the soup, if not the whole spice shop with the scents of the fine world. But they have to be used in a targeted manner, usually parallel to an MKP-X2 in order to be able to develop their fine timbre. Use them sparingly and always only the specified types. Sparingly is important here, because an oversalted or over-seasoned dish too is no longer a pleasure in the end.
- As electrolytic capacitors I basically only used Nichicon Audio Muse. This has amazing tonal advantages over more conventional patterns. These are then used in the area of power supply, where you don't need an Audio Muse ... In addition, it should be noted that electrolytic capacitors have not been used anywhere at signal-carrying positions.
- The semiconductors are – as long as they are selected (possibly even in pairs) and are the correct, specified types – relatively uncritical. Nevertheless, it is worthwhile to invest a little more time and effort in the selection and to draw from a larger number of specimens. Don't expect that if you need e.g. 10 # of a JFET, you only need to buy 20 # and everything will be fine! I only buy 100 # of the small signal NMOS and D-NMOS used. But they don't cost the earth either.
- For resistors, please only use metal film types SMA-0207 (0.6W) and SMA-0414 (1W). The resulting SNR will thank you! Please stay away from carbon resistors!

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As you know - all information about the printable, full-size schematic and the PCB is again situated in a binder enclosed to this website.

If you have any further question, you can contact me via eMail.

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<sup>i</sup> **Georg Krauß, since 1905 Ritter von Krauß** (\* 25 December 1826 in Augsburg; † 5 November 1906 in Munich <https://de.wikipedia.org/wiki/M%C3%BCnchen>) was a mechanical engineering entrepreneur and founder of the locomotive factories Krauß & Comp. in Munich and Linz (Upper Austria). Still evident in Germany as Krauss Maffei Company.