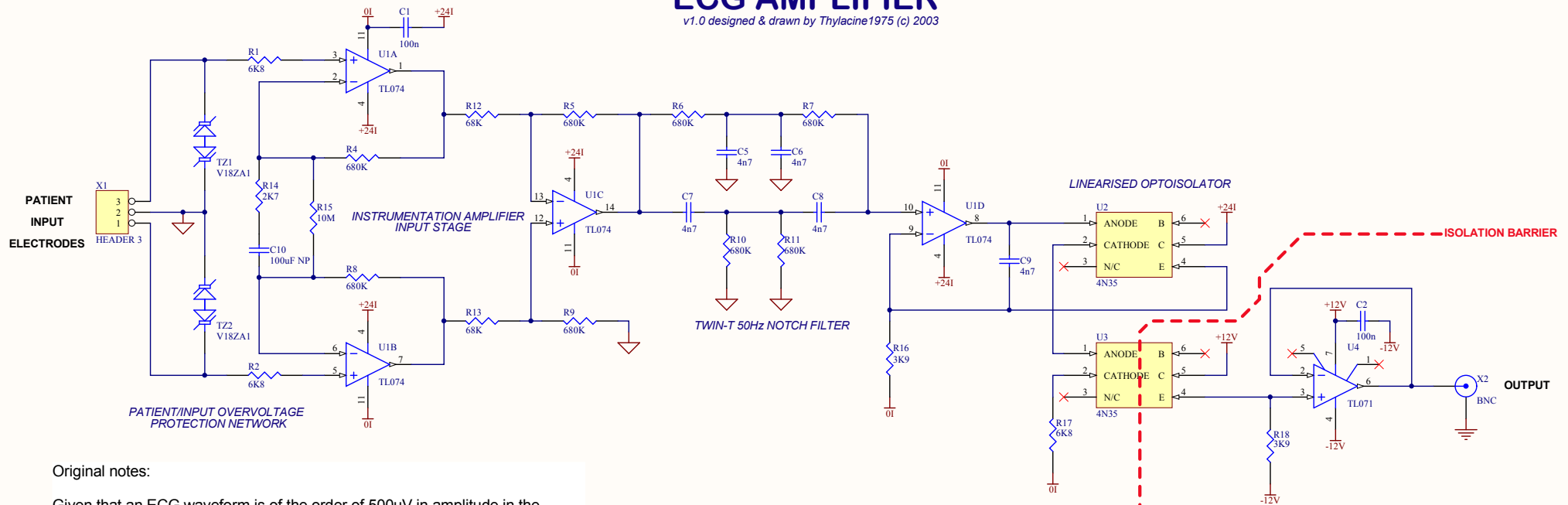


ECG AMPLIFIER

v1.0 designed & drawn by Thylacine1975 (c) 2003



Original notes:

Given that an ECG waveform is of the order of 500uV in amplitude in the presence of significant 50Hz common mode interference, a differential amplifier configuration is required to recover the desired signal. The ECG waveform is typically considered to have a frequency range extending from 0.01 - 250Hz, but to remove interference from respiration and to permit realistic component values, the range 0.5 - 150Hz is acceptable.

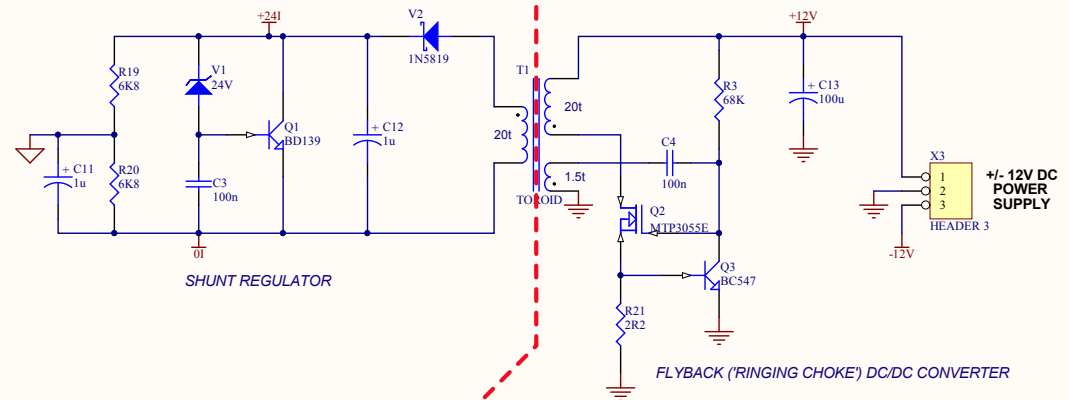
Note that the range of frequencies does not include DC. This is to avoid large DC output offsets arising from electrochemical reactions occurring between the skin and the electrodes (plus, perhaps only a stopped heart would produce a DC voltage? :-)

For patient safety, there is to be no more than 10uA of current flowing between any electrode or any electrode and earth. This condition must also be satisfied in the advent of an equipment fault, thus implying that any electronics attached to the patient be isolated from the mains or other power supply. The exact degree of isolation would be specified in an applicable standard, but for demonstration purposes, isolation able to withstand a 1KV potential difference will be considered suitable.

In summary:

- Amplifier bandwidth: 0.5 - 150Hz
- Typical AC gain 5000
- Patient-Instrumentation isolation $\geq 1\text{KV}$
- Earth/Interelectrode leakage currents $< 10\text{uA}$
- Strong rejection of 50Hz common mode signal required.

Good quality signals can be recovered by placing the electrodes either side of the chest (at the point where the biceps touch the upper body when hanging the arms by the side), but the correct positions for medical purposes can be found on the internet.



TOROID T1 - THE 1.5t GATE WINDING SHOWN WITH LONG (UNTRIMMED) LEADS

MATERIAL: L8 FERRITE
(e.g. JAYCAR ELECTRONICS LO-1234)

