PA0LQ audio filter and mains QRM noise blanker

The following is a translation of a description I made for *Electron* of June 2000; the magazine of the Dutch amateur radio society VERON (to be translated as *Society for experimental radio research in the Netherlands*). Audio filter and noise blanker were designed and used by Harry Grimbergen, PA0LQ.

Audio filter

The upper part of the circuit diagram shows a non-ringing audio filter with 1000 Hz centre frequency and 30 Hz bandwidth.
The opamps are of the low noise type.
The values of resistors and capacitors may deviate up to 10% from the indicated values, as long as they are stable. For the capacitors polystyrene or mica types are to be preferred.
R1...R4 determine the resonance frequency of the four filter sections. Their reactance is about 180 ohm. To find the exact values they are temporarily replaced by variable resistors. The filter is fed from an audio generator of which the frequency is measured by a counter (its dial cannot be read with sufficient accuracy). The output voltage is indicated by an oscilloscope or a VTVM. The resonance frequencies are now adjusted as follows:
By R1 to 966 Hz
By R2 to 982 Hz
By R3 to 1018 Hz
By R4 to 1034 Hz.
When tuning is completed the value of the resistors is measured and the variable resistors replaced by metal film ones, or a combination of such resistors. Even the best variable resistors are not stable enough for this application.

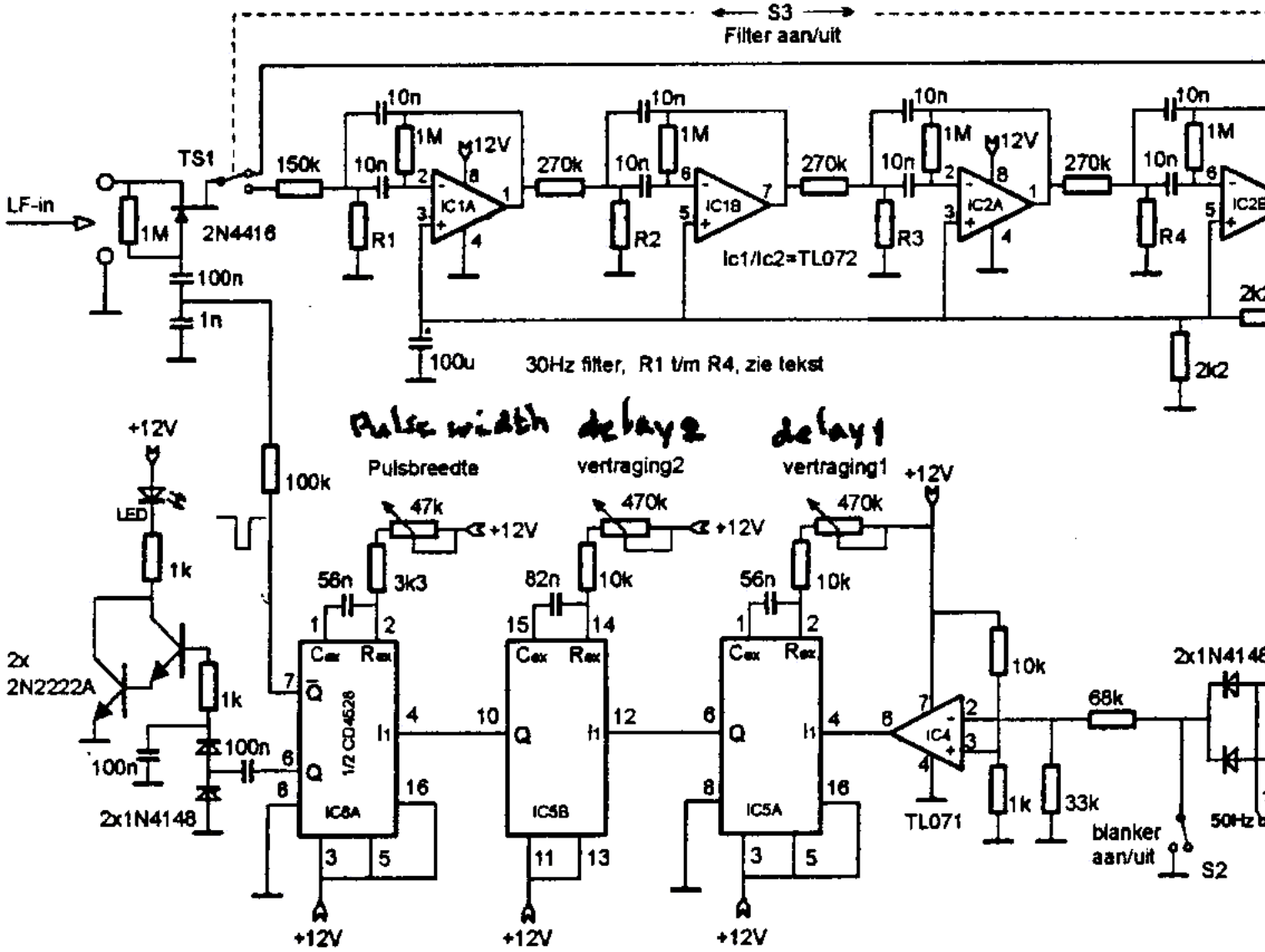
Noise blanker

Harry, PA0LQ, suffered from pulse interference that was related to the mains frequency, as caused by light dimmers with triacs or thyristors. He therefore made a noise blanker that is shown in the lower part of the circuit diagram. The system does not help against interference from fluorescent tubes, energy saving lamps and electric motors with a commutator, as used in electric shavers and other appliances.
The blanker functions as follows.
By means of two resistors and diodes half-sinewaves with frequencies of 50 or 100 Hz are derived from the secondary winding of T1. The two 50 Hz voltages that can be selected differ in time by half a period of the mains signal. Opamp TL071 converts the voltages into square waves that drive two monostables in cascade. Then follows a third monostable that determines the width of the "hole" that is made in the signal. Variable resistors "Pulse width", "Delay 1" and "Delay 2" permit to position the blanking pulse exactly on the interference pulse. A LED indicates when the blanking pulse is present. The blanking pulse drives the gate of TS1, used as a switch.
The selectivity of the 30 Hz filter causes the holes to be refilled almost completely. Readability of CW is affected only when more than 20% is cut by the blanker.

Also for LORAN?

John Rabson, G3PAI, asked me whether the PA0LQ noise blanker could also be used on LORAN signals. PA0LQ thinks this is possible but the blanker must then be driven by LORAN pulses that come from a separate receiver, tuned to 100 kHz. I think that this could be a rather simple receiver, for instance of the TRF type. It should not be too selective in order to preserve the shape of the LORAN pulses.

Dick Rollema, PA0SE


S3
Filter aan/uit
LF-in
TS1
2N4416
1M
100n
1n
150k
10n
1M
12V
IC1A
R1
270k
IC1B
R2
IC2A
R3
IC2B
R4
Ic1/Ic2=TL072
100u
30Hz filter, R1 t/m R4, zie tekst
2k2
+12V
LED
1k
2x
2N2222A
100k
Pulsbreedte
Pulse width
vertraging2
delay2
vertraging1
delay1
47k
3k3
56n
470k
82n
10k
IC6A
IC5B
IC5A
1/2 CD4528
100n
2x1N4148
10k
68k
IC4
TL071
33k
2x1N4148
blanker
aan/uit
S2
50Hz