Base Spreading Resistance $r_{bb'}$ – Measurement Approach[23]

The $r_{bb'}$ measurement set-up is given in Fig. 3.28. The device under test is operated at about 1mA. The total gain G_1 of the circuit is about 50 dB, with S_2 closed. With S_2 open total gain G_2 will be

$$G_2 = G_1 + 20 \times \log \frac{R_6 + R_7 + R_8}{R_5}$$

$$= G_1 + 2.997 \text{ dB} \quad (3.114)$$

[23] Tom McCormick 1992 in a letter to Wilfried Adam – as a follow-up of Mr Adams 1989 EW&WW article on "Designing low-noise audio amplifiers"

All capacitors should have a value large enough to ensure a flat frequency response in $B_{20\,k}$. For NPN devices power supply should be +15 V and all capacitors reversed.

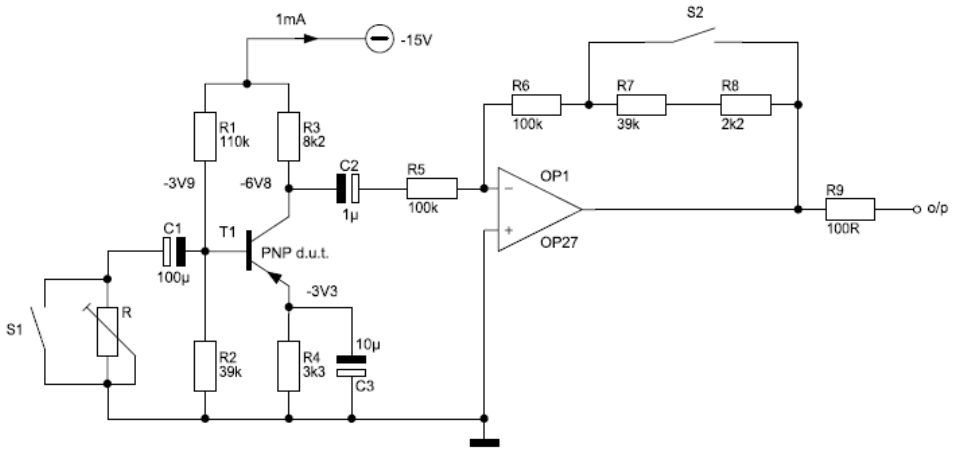

Fig. 3.28 McCormick $r_{bb'}$ measurement set-up

The measurement approach goes like follows:

Step 1: measurement of noise in $B_{20\,k}$ at the output of OP_1 with S_1 closed and S_2 opened, resulting in a total gain of G_2 and an output noise voltage of $e_{N.out.1}$

Step 2: decrease of circuit gain to G_1 by opening of S_1 and closing of S_2

Step 3: adjustment of R as long as the test circuit produces the Step 1 output noise voltage $e_{N.out.1}$

Step 4: measurement of R: this will be the value of $r_{bb'}$ of the d.u.t.

The principal method behind this measurement result comes from Eqs. (3.17–3.19) that describe the noise voltage sum of two resistors – in our case of equal valued R (after adjustment) and $r_{bb'}$.