THE COMPLEMENTARY FEEDBACK PAIR.

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The simple emitter-follower is lacking both in linearity and load-driving ability. The first shortcoming can be addressed by adding a second transistor to increase the negative feedback factor by increasing the open-loop-gain. This also allows the stage to be configured to give voltage-gain, as the output and feedback point are no longer inherently the same.
This arrangement is usually called the Complementary Feedback Pair (hereafter CFP) though sometimes known as the Szilaki configuration.

CFP EMITTER-FOLLOWERS.
This circuit can be modified for constant-current or push-pull operation exactly as for the simple emitter-follower. Just plug and play.

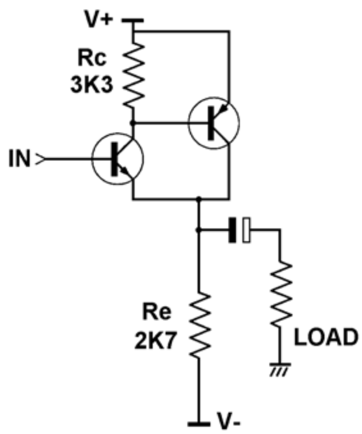
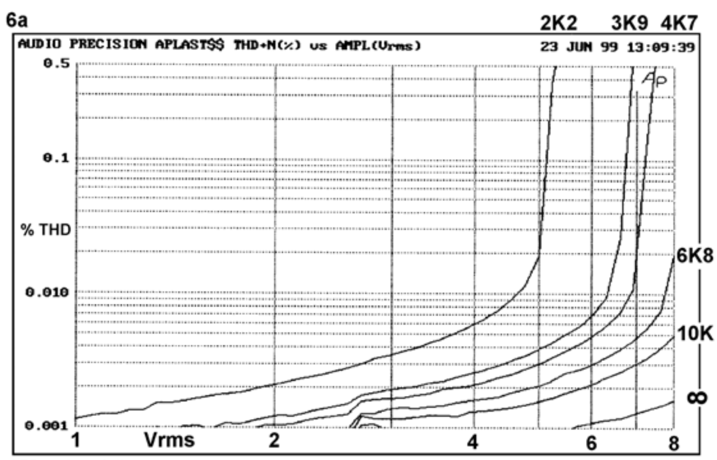


Fig 9: The CFP emitter-follower.

The single transistor is replaced by a pair with 100% voltage feedback to the emitter of the first transistor.
The emitter resistor Re has been kept at the same value as in the simple emitter-follower to allow meaningful comparisons. The value of Rc is crucial to good linearity, as it sets the Ic of the first transistor, and also determines its collector loading.
The value of 3K3 shown here is a good compromise.



CFP emitter-follower

Fig 10: Distortion and loading effects on the CFP emitter- follower. THD at 6Vrms, 6K8 load is only 0.003% compared with 0.07% for the simple EF. Re is 2K7 as before. (6A)

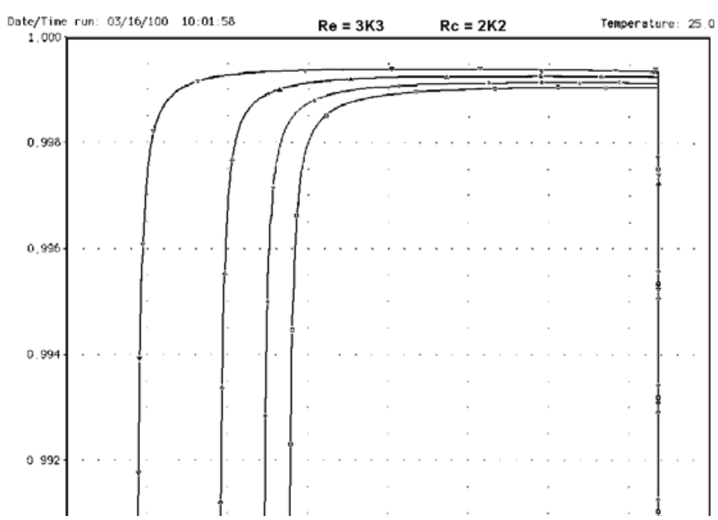


Fig 10a: SPICE simulation of the circuit in Fig 9, for different load resistances.

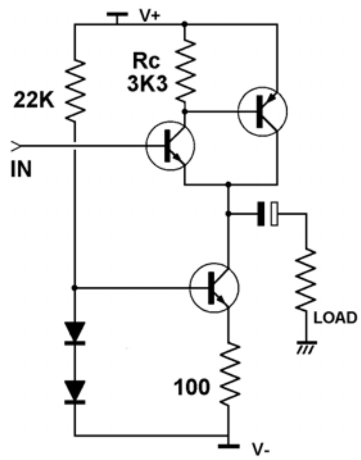


Fig 11: Constant-current CFP follower. Once more the resistive emitter load is replaced by a constant-current source to improve current-sinking.

The 6Vrms,6K8 THD is now too low to measure; it is below 0.0008%. (yes, three zeros after the point- this simple circuitry can be rather effective) See the plot below.

The quiescent current remains at 6mA.

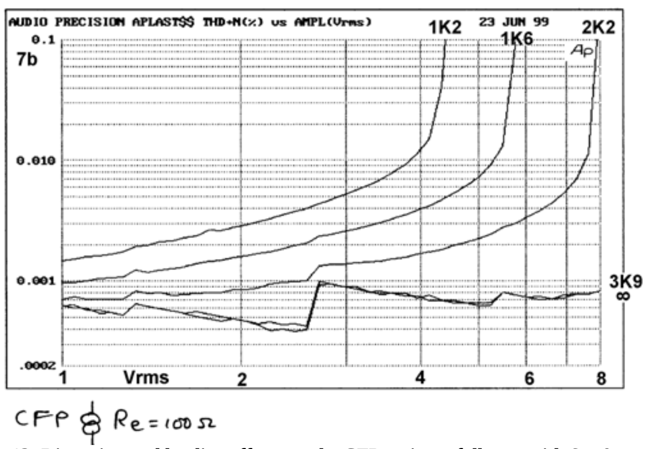


Fig 12: Distortion and loading effects on the CFP emitter- follower with 6 mA current-source. The steps on the lower traces are artefacts caused by the measurement system gain-ranging as it attempts to measure the THD of pure noise. (7B)

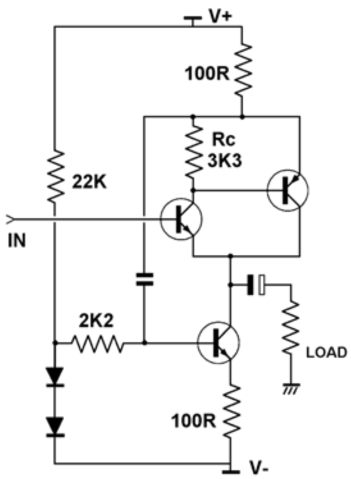


Fig 13: Circuit of a push-pull CFP follower.

This version once more gives twice the load-driving capability for no increase in standing current.

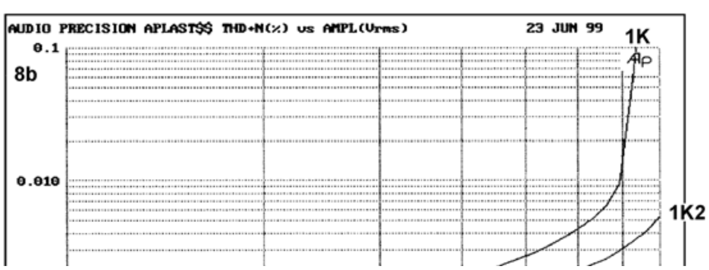


Fig 14: Distortion and loading effects on the pushpull CFP emitter-follower. The load must be as heavy as 1K6 before measurable distortion is generated. 6 mA quiescent current as usual. Steps on lower traces are artefacts of the measurement system. (8B)