

This current pulse effectively shorts the zener, and so the section of load resistance in parallel. This process is iterated until the offset cannot be reduced further.

The new OP07 thus created had some impressive offset specifications. It was reported that the entire distribution of parts trimmed had offsets of $150\mu\text{V}$ or less, and a prime grade, the OP07A was specified at $25\mu\text{V}(\text{max})$ for offset. Importantly, since this trim method also simultaneously reduced drift as the offset is nulled, the trimmed OP07 amplifiers had drift rates of $0.6\mu\text{V}/^\circ\text{C}(\text{max})$, and typically much less than this.

The zener-zap trim technique was a valuable innovation in its own right, as it could be applied to other devices to reduce errors, and at a low additional cost to the manufacturing process. It is today one of many active trim techniques used with precision op amps (see the more detailed discussions of trimming in Chapter 1).

The OP07 went on to become the "741" of precision op amps, that is the standard device of its precision class. It was (and still is) widely second-sourced, and many spin-off devices followed it in time.

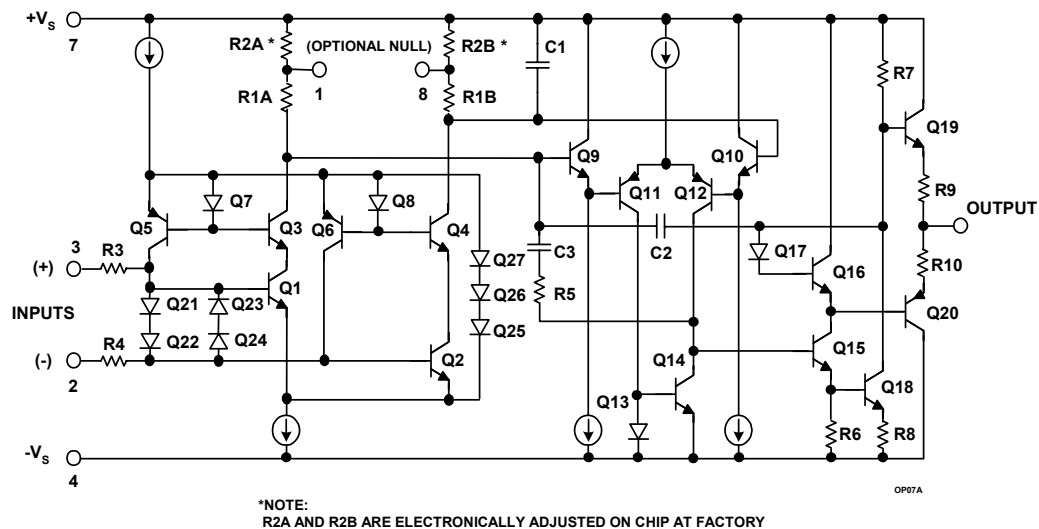


Figure H-22: The OP07 monolithic IC op amp

PMI went forward with the OP07 op amp evolution, and introduced the OP77, a higher open-loop gain version of the OP07 in 1988. The best grade OP77A featured a typical gain of $\sim 142\text{dB}$, an offset of $25\mu\text{V}$, and a drift of $0.3\mu\text{V}/^\circ\text{C}(\text{max})$. Later, an additional device was added to the roster, the OP177. This part offered similar performance to the OP77A, as the OP177F, specified over the industrial temperature range.

Prior to the 1990 acquisition of PMI by ADI, the ADI designers turned out some excellent OP07 type amplifiers in their own right. Designed by Moshe Gerstenhaber, the AD707 essentially matched the OP77 and OP177 spec-for-spec, operating over commercial and industrial ranges (see Reference 28). It was introduced in 1988. The AD708 dual was also offered in 1989, providing basically the performance of two AD707's. Moshe Gerstenhaber also designed the AD708 (see Reference 29).