

## Classic Radio

# The SideBand Engineers SB-33 and SB-34 SSB Transceivers

The SideBand Engineers (SBE) was formed in 1962 by Faust Gonsett, W6VR, of Gonset VHF equipment fame. The SB-33 was the first successful solid-state SSB transceiver released to the amateur radio marketplace in 1963. The SB-34 followed the SB-33 in 1966, and it had some improvements plus a built-in 12 V dc power supply for mobile operation.

### The SBE-33's Clever Design

The SB-33 (see Figure 1) was a compact radio with attractive blue knobs and a speaker grille. It even had a carrying handle on the side. It weighed about 15 pounds. The SB-33 used three tubes — two final amplifiers and a driver tube — with transistors for all other circuit functions. The radio operated SSB only on the phone portion of the 80-, 40-, 20-, and 15-meter bands. The radio included a built-in speaker and an internal ac power supply, selling for \$389.50 at a time when the Collins KWM-2 sold for \$1,150 without the power supply or speaker.

The circuitry of the SB-33 (see Figure 2) had some clever ideas. The SB-33 had no frequency shift when switching sidebands. This was accomplished by using an intermediate frequency (IF) of 455 kHz, using a 2.1 kHz Collins mechanical filter to provide receiver selectivity and single sideband (SSB) when transmitting. A higher IF was used at five times 455, or 2275 kHz. This was made by multiplying the 455 kHz carrier frequency by either four or six and then adding or subtracting the 455 kHz IF, generating

a lower sideband (LSB) or upper sideband signal (USB). Adding the 455 kHz signal to 1820 kHz did not invert the sideband, but subtracting 455 kHz from 2730 kHz did. There was no carrier shift using this method, so no correction from the VFO was needed.

### The SB-33's Bilateral Circuit Design

Much of the RF and IF circuitry of the SBE-33 was bilateral in that it used two transistors wired across each other in opposite directions. One was biased **ON** for receive, and the other biased **ON** for transmit. The other transistor was biased **OFF** when not in use. This design directed signal flow in the proper direction for receive or transmit. The RF tuned circuits and IF transformers were used on both receive and transmit, a very clever design that minimized duplication of circuitry.

### Geneva Mechanism

The band switch, preselector tuning, and driver tuning were all controlled by a single knob. The knob was connected to a mechanical design called a *Geneva mechanism*, driving both the band switch and the preselector and driver tuning variable capacitor. Starting with the knob all the way clockwise at the word **STOP**, the knob rotated tuning the multi-section variable capacitor for about 80 degrees, and the band switch stayed on 80 meters.



Figure 1 — A restored SideBand Engineers (SBE) model SB-33 with a companion digital VFO. [Dale Parfitt, W4OP, photo]

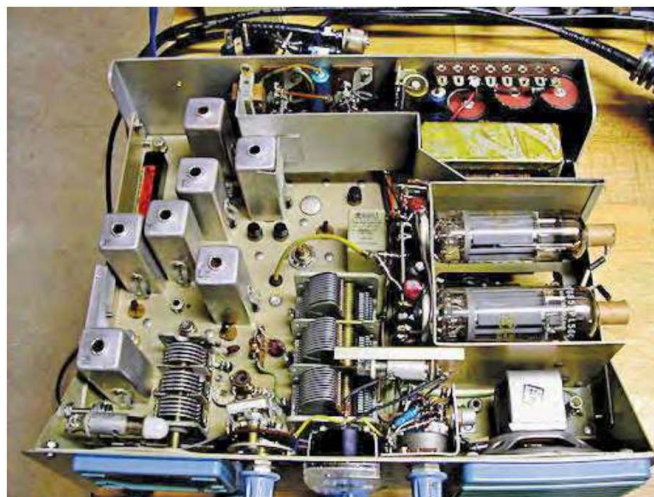


Figure 2 — An inside look of the SB-33 after restoration. [Dale Parfitt, W4OP, photo]





**Figure 3** — A restored SideBand Engineers (SBE) model SB-34. [Dale Parfitt, W4OP, photo]

Continued rotation would cause the band switch to move into the next 90-degree segment, switching the radio to the 40-meter band and allowing about 80 degrees of rotation. This again tuned the variable capacitor without moving the band switch. Continued counterclockwise rotation would move the band switch to 20 meters and again enter 80 degrees of tuning. The final step in counterclockwise rotation would access the 15-meter band and the last 80 degrees of tuning rotation. It was a very clever combination of two related controls.

### Vacuum Tubes

The radio used three vacuum tubes in the transmitter in the RF driver and final output amplifier stages, where semiconductors were not readily available for high-power RF applications in 1962. The two final output tubes were black and white television horizontal output tubes, or *sweep tubes*, characterized as the 27GB5 pentode or the European number PL500. They were used in parallel to produce up to 135 W peak envelope power (PEP). It provided about 60 W average power on 80, 40, and 20 meters and about 50 W output on 15 meters. A type-12DQ7 pentode tube was used as the driver tube for the 27GB5 finals.

### Transistors

The transistors were all germanium and were mostly PNP types. As was often done with transistors for their first decade of use, sockets were provided for all transistors to make replacing them easy. This practice was a carry-over of the accommodation from vacuum-tube circuitry.

### The SBE SB-34

By 1966, SBE introduced a new version of the radio, the SB-34 (see Figure 3). Overall, the SB-34 was quite similar to the SB-33, but the blue knobs and speaker grille were



**Figure 4** — An inside look of the SB-34 after restoration. [Dale Parfitt, W4OP, photo]

replaced with gray features, which had come into style for amateur radio products. The SB-34 ran only SSB on 80, 40, 20, and 15 meters with up to 135 W PEP input power. The SB-34 also had a built-in speaker, an ac power supply, and an added 12 V dc power supply for mobile operation.

The clever system for sideband selection in the SB-33 was retained for the SB-34, as was the unique Geneva mechanism on the combined band switch and driver/pre-selector tuning. Added as a new feature, the SB-34 the main tuning dial and knob had about 270 degrees of rotation, allowing a six-to-one planetary reduction drive to provide fine tuning of SSB signals. Rotation beyond the 270 degrees bypassed the reduction drive, providing fast tuning to the part of the band desired. This was a very clever addition that made tuning to any part of a band simple and quick and still allowed precise tuning of SSB signals.

The SB-34 used a 12DQ7 driver again but switched the output tubes to 6BG5, which is a European EL-500. These tube filaments can be lit from 12 V dc for mobile operation. Faust Gonsett and his team at SBE built so many clever and patented ideas into the SBE rigs that Raytheon, a big military contractor, bought the company to get SBE's patent portfolio.

### SBE Decline

SBE moved on about 1970 to make a model SB-35, but few were made for sale and it likely only reached prototype phase. In 1972, SBE offered the digital-readout SB-36, which was manufactured by a company called Robyn. SBE offered a few 2-meter FM radios that did very little in the amateur radio marketplace. SBE went into the CB radio business, but then completely vanished by 1975. It was a sad ending to a very innovative company.