Operating principle of the Longbow radar gun is based on the Doppler Effect involving a Doppler frequency shift of a radar signal during reflection from a moving object. Doppler frequency shift is proportional to the object speed; therefore the speed measurement consists of the difference measurement between frequencies of the radiated signal and returned signal from the target. Digital low-frequency signal's processing based on Fourier transformation is used for the spectrum analysis and for frequency value measurements.The full spectrum analysis functions to provide singling out the fastest target speed against a background of slower targets and to measure both the patrol car speed and the target speed while moving or stationary. Two independent channels are used for selection of targets by the direction of their movement. Measurement of the relative phase shift between the Doppler signals of two channels allows for making the determination of the target movement direction. Output signals from two channels are entered into digital memory where these signals are saved, and further processed to obtain information on the targets' speeds. When receiving information about the measured speeds, the digital data is displayed on the LED indicator and on the LCD display. After each measurement cycle the microwave oscillator is switched off, which allows to reduce consumed power of the police radar gun and to increase the noise immunity of the device. The firmware programming also governs the information distribution and storage in RAM, the measurement of time elapsed from the speed reading being captured, and its indication. Furthermore, the CPU and its programming provides the radar operating mode setting and performs a number of service functions, including monitoring of the power source condition.

The instrument is encased in a shockproof plastic case. The front and rear parts of the instrument are safeguarded by elastic rubber protectors. A dielectric lens of the transceiver antenna is mounted in the front part of the casing

A microwave unit consisting of the oscillator, mixers, waveguide channel and horn antenna is installed in the case of the police radar gun. A circuit board containing amplifiers is mounted on the microwave unit. The antenna is a conical horn, gunn diode based antenna. The polarization is circular, and has a gain of 19dBi. It is designed to produce an unmodulated output of 24.15 ± 0.10GHz.

The CPU continuously monitors the trigger switch. Upon activation of the trigger, the antenna emits the specified radio energy. The RF energy is then reflected from the target vehicle (if present) and is received back at the antenna. This received signal is then mixed in the receiver diodes, extracting the doppler shift. The signal is then amplified, and digitized by a stereo A/D converter. The digitized signal is then analyzed by the CPU using digital signal processing techniques. If a valid target or targets are present, the relevant data is displayed on both the LED and LCD displays.