

# THE HRO-500

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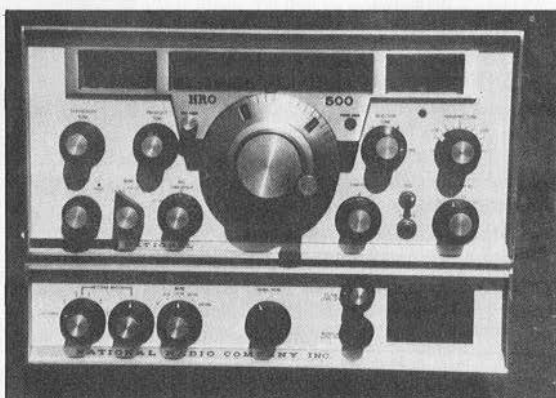
By 1964 the famous tube-type HRO had reached the end of the trail. Even with its beautiful PW dial and added slide-rule display, it could not compete with other premium receivers in the market, including National's own 303 and 400. The virtues of plug-in coils - stability and freedom from drift - had long been superseded by other, less costly and cumbersome, methods. The time had come to say goodbye to an era.

To replace the HRO-60, the designers were obviously given a clean slate: Use the latest in transistors and state-of-the-art technology to design a premium receiver to knock the socks off Collins and put National on top again. The result of the design effort was the HRO-500.

Although physically quite different, the HRO-500 is conceptually similar to the tube-type units that it replaced. In place of the coil units, there is a frequency synthesizer. The synthesizer is really a high-frequency voltage-controlled oscillator (VCO) locked to a 500-kHz crystal standard. The VCO generates 60 stable frequencies, 500 kHz apart, from 12 to 37.5 MHz. The receiver tunes in 500-kHz ranges. To avoid images, triple conversion is used below 4 MHz; above 4 MHz, double conversion.

Like other receivers in the National line, the 500 uses a sharply tuned six-pole IF filter for selectivity. Four positions are available: 8.0, 5.0, 2.5 and 0.5 kHz. The 2.5- and 0.5-kHz ranges can be tuned over a range of  $\pm 3$  kHz. In addition, an effective tunable notch filter is provided. It has a range of  $\pm 10$  kHz centered around the receiver IF frequency and provides 50 dB of attenuation. Separate product and AM detectors are provided.

The 500 is designed to operate from 0.005 to 30 MHz. This enormous range is covered in five main bands. On all bands except the first, an RF

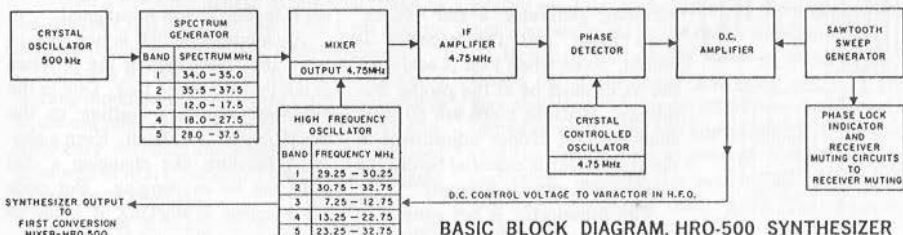


preselector is used to peak the incoming signals. For the first tuning range, 5 to 500 kHz, an out-board preselector, the LF-10, is required to achieve the rated sensitivity.

With its wide tuning range and selectivity controls, the 500 is very usable, both on today's ham bands and for general-coverage purposes. As a broadcast and shortwave DX receiver, the 500 has many advantages. Naturally the broad tuning and variable selectivity make digging out weak signals easy. However the 500 was also designed to tune all bands at full sensitivity. Handling the full range of strong broadcast and shortwave signal strengths is accomplished by adjusting the AGC threshold in three 10-dB steps.

When used as a ham receiver, the 500's sensitivity, selectivity and stability are on a par with those of most modern transceivers. Audio quality, on the other hand, appears superior. The 500 incorporates an audio amplifier that delivers 1.5 watts into a 3.2- $\Omega$  load.

For the collector, the 500 is a truly impressive object. At 32 pounds, it is unusually heavy for a completely transistorized receiver. A look into the interior reveals the reason. The inside is dominated by two completely shielded enclosures



BASIC BLOCK DIAGRAM, HRO-500 SYNTHESIZER

