

The Lafayette Model HE-73 Precon

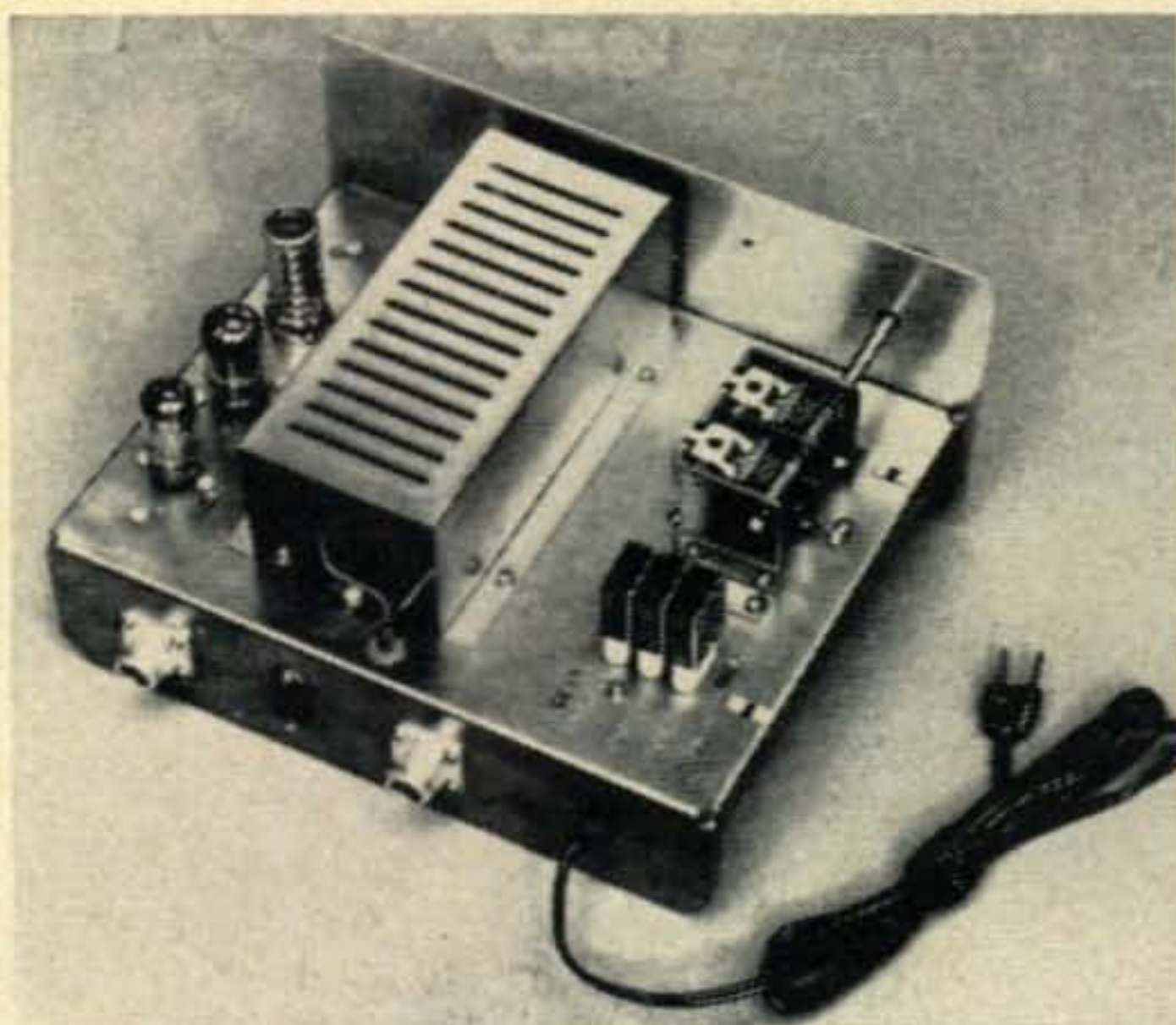
LAFAYETTE Radio Electronics Corporation has come up with a novel innovation for a receiver accessory. This is their Model HE-73 Precon for installation between the antenna and a receiver to serve *either* as an r.f. amplifier/pre-selector on the 10 through 80 meter amateur bands or as a crystal-controlled converter for the 10, 15 and 20 meter bands. It can also be used on the 11 meter Citizen Band. The mode of operation may be chosen with a front panel selector switch. A self-contained a.c. power supply is also included.

Pre-Selector

As a pre-selector, the Model HE-73 will provide additional r.f. amplification for a receiver, resulting in increased gain and sensitivity. In many cases it also will better the overall signal-to-noise ratio of the receiving system. Besides this, it will add front-end r.f. selectivity and thereby improve i.f. image rejection. This is an especially desirable feature for single-conversion receivers which use a low-frequency i.f. system. With receivers which do not have an r.f. stage ahead of the first mixer, the use of the HE-73 not only will improve the r.f. selectivity and i.f. image rejection, but will also increase the sensitivity considerably.

Referring to the block diagram, fig. 1A, high gain is obtained by the use of two stages of r.f. amplification, while the desirable selectivity characteristics are obtained with a high- Q r.f. circuit in each stage, both of which are gang-tuned from the front panel to peak up the signal.

A 6BA6 pentode, V_1 , is used in the first r.f. stage and the pentode section of a 6BL8, V_{2A} , in the second stage. (The triode section of the 6BL8 is not used during pre-selector operation). This stage is followed by another 6BA6, V_3 , which is triode-connected in a cathode-follower



Top view of the HE-73. The power supply is enclosed within the shield at the center.



Lafayette Model HE-73 Precon is a neatly styled pre-selector/converter combination. The knob at the upper left is used to peak up the signal. Those at the bottom are the function switch, bandswitch and gain control. A pilot light is at the left.

circuit to provide a low impedance output. A control in the cathode of the first stage permits adjustment of the gain to prevent overloading of the receiver with strong signals. Bandswitching is employed for optimum performance on each of the amateur bands between 10 and 80 meters.

Crystal-Controlled Converter

When used as a crystal-controlled converter, the HE-73 will make a sensitive double-conversion system out of a single-conversion receiver for use on the 10, 15 and 20 meter bands. High signal-to-noise ratio with excellent image rejection will be realized and it will make possible a higher degree of frequency stability than usually is experienced on these bands with many receivers. Also, it will extend the frequency range of receivers which have limited coverage.

A block diagram of the converter arrangement is shown in fig. 1B. V_{2A} is now used as a pentode mixer instead of a straight-through r.f. stage, while the triode section of the 6BL8, V_{2B} , is used as a crystal oscillator/doubler. Fundamental type crystals are used with the output of V_{2B} doubling the crystal frequencies of 12.25, 8.75 and 5.25 mc to 24.5, 17.5 and 10.5 mc to provide the mixer with heterodyning frequencies for the 10, 15 and 20 meter bands respectively.

When the converter is used for 10, its output frequencies fall in the 3.5 to 5.2 mc range over which the receiver must then be tuned. On 15 the tuning range is from 3.5 to 3.95 mc, and on 20 meters it is from 3.5 to 3.85 mc. These ranges are directly marked on the panel of the Precon. The actual received frequency may be determined by adding the frequency indicated on the receiver's dial to the heterodyning frequency for the band in use. For example: A receiver dial reading of 3.8 mc plus the heterodyning frequency of 17.5 mc (for 15 meters) equals 21.3 mc, the frequency to which the system is tuned.

Since the converter is crystal-controlled, the

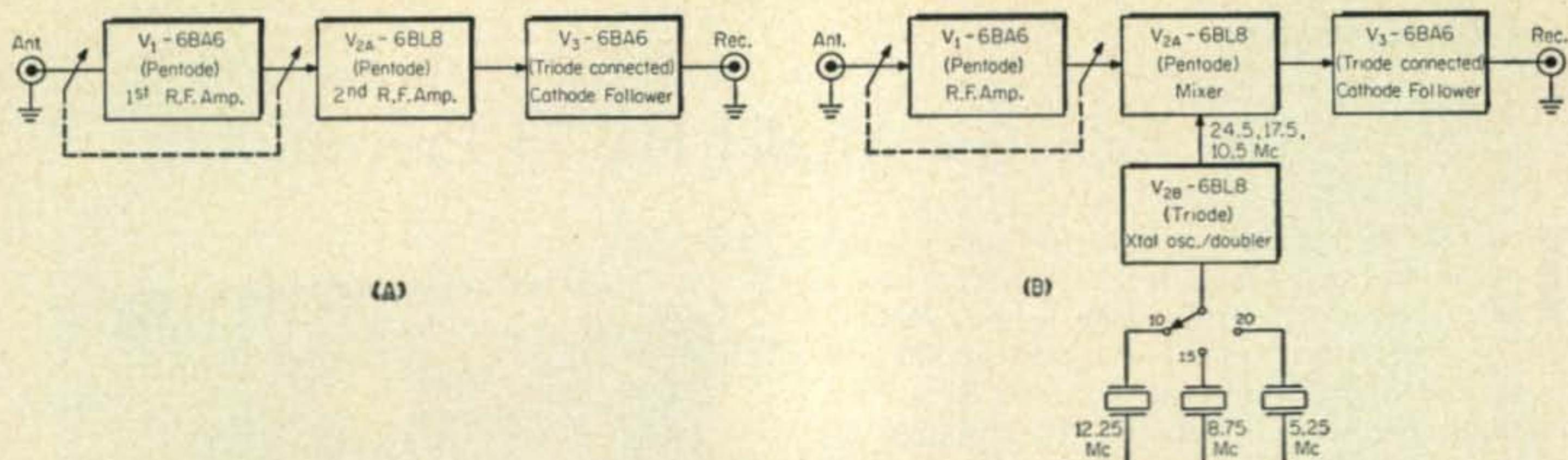


Fig. 1—(A) Block diagram of the HE-73 Precon when used as a pre-selector. (B) Block diagram when used as a converter.

correctness of the frequency, as determined above, will depend on the accuracy of the receiver's dial calibration. Receiver frequency stability usually is greater in the 3.5 mc region than it is at the higher frequencies, so the overall stability of the system, when used on the higher bands, will likewise be better.

Controls

A three-position function switch provides a choice of straight-through operation (antenna connected directly to the receiver, bypassing the Precon), pre-selector, or converter operation. When either of the latter two are used, the self-contained a.c. power supply, using a solid-state rectifier, is switched on at the same time. Power is turned off for straight-through operation (switch at OFF). The input impedance of the unit is approximately 50 ohms with the output designed for feeding into a low impedance.

A bandswitch selects the desired range of operation. Each band is identified on the panel with large numerals together with the converter's output frequencies (the tuning range required for the receiver) on each band.

The gain control is also located on the front panel, as is an antenna-trim control. The latter tunes the two r.f. circuits to insure a high signal-to-noise ratio and to maintain good r.f. selectivity.

SO-239 coax connectors for the input and output circuits are located on the rear apron together with a two-terminal receptacle for connecting to an external control circuit to remotely disable the B-plus circuit of the unit.

Performance

Measurements, as well as listening tests, indicated the Model HE-73 to perform exceptionally well. When used as a pre-selector, the gain was found to be 18 db on 10 and 15 meters, 34 db on 20, 27 db on 40 and 45 db on 80 meters. With a single-conversion receiver having a 455 kc i.f., image rejection on the 10 meter band was improved by almost 25 db.

Used as a converter, the sensitivity averaged better than 0.5 μ v for a 15 db signal-to-noise ratio. Noise figure on 10 meters measured near 6 db, equal to or better than the average communications receiver. When operated as a pre-selector, similar results were obtained. Used in conjunction with several manufactured receivers costing over \$500, it improved the sensitivity,

signal-to-noise ratio and the noise figure. Less cross modulation was also experienced.

With regard to noise, it should be kept in mind that this refers to the inherent noise of the receiving system alone. Man-made noise picked up through the antenna will be amplified to the same extent as will the signal, so the benefits resulting from improved noise ratios will be realized only at quiet locations.

I.f. signal rejection (3.5 to 5.2 mc) was measured at an average of 60 db.

Physical Specifications

The unit is ruggedly and nicely fabricated with easy accessibility of components, should servicing become necessary. It is housed in a medium gray perforated cabinet measuring 10" w. $\times$ 6" h. $\times$ 8" d. The upper half of the panel is a glossy medium gray, the lower half is semi-matte aluminum. Weight is 9½ pounds; power consumption is approximately 18 watts.

The Model HE-73 Precon will be found a worthwhile accessory for improving receiver performance. It is an imported unit, supplied with a complete operating manual. It carries a price tag of \$49.50 and is marketed by Lafayette Radio Electronics Corp., 111 Jericho Turnpike, Syosset, L. I., New York 11791—W2AEF



"... days getting the rig peaked up on ..."