FR-6/U Frequency Meter, part of AN/URM-81



The FR-6/U is a heterodyne frequency meter covering from 100 to 500 MHz over two bands. The instrument was made by Lavoie Laboratories, Morganville, NJ in the fifties. This sample was made to an order dated 1957.

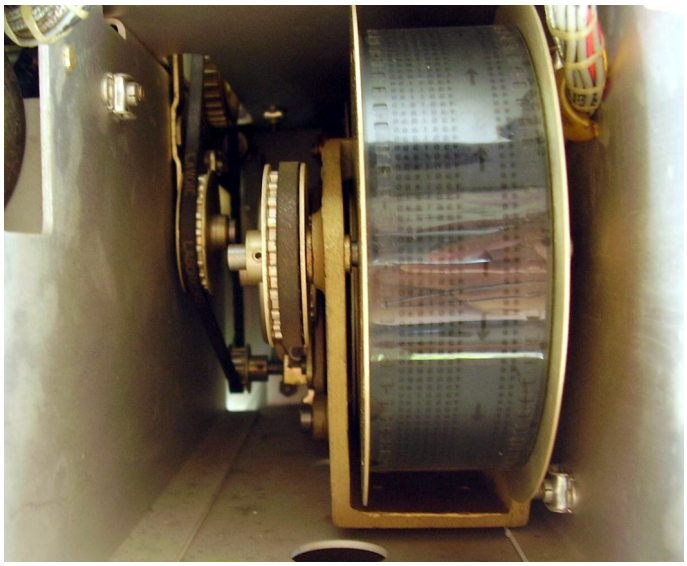
The operating principle is quite simple, more or less similar to the one used in the BC-221. The basic resolution is 1 kHz and accuracy is one part in 100.000 or 10 ppm. These figures are the result of an extremely accurate mechanical and electrical design which incorporates the best knowledges of the time. In particular special care was paid to the design of the variable oscillator, to which the unknown frequency is compared by heterodyne. Accuracy and stability of a simple VFO could not meet the expected specs of the instrument. For this reason designers decided to use a couple of oscillators, each with very special features.

The internal reference is given by a 4 MHz oscillator controlled by a thermostated quartz crystal. A high-stability interpolation oscillator, operating between 166 and 340 kHz, beats with the reference oscillator to generate a frequency variable from 4.166 to 4.340 kHz. The low operating frequency and the limited frequency coverage of the variable oscillator grant excellent stability and negligible errors. When operating in the 250 to 500 MHz band, the band switch activates a frequency doubler which gives in ouutput a frequency ranging from 8.332 to 8.680 kHz. This signal is fed into a limiter stage and then to a tuned amplifier to select one of the high-order harmonics. The input signal is then mixed with the selected harmonic for a zero beat.

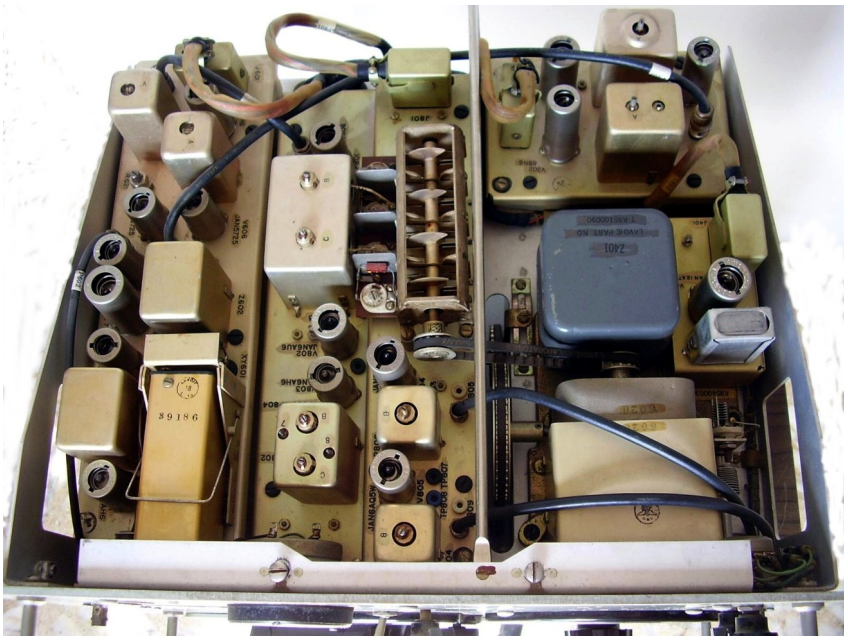
After having annotated the readings of the harmonic generator (Coarse reading) and of the interpolation generator (displayed on the projection scale), the unknown

frequency is read in the individual calibration book stored into the bottom latch drawer. The calibration tables give 5.800 division per each tuning range. The accuracy of the interpolation oscillator is adjusted by calibration at the nearest check point, indicated on the projection scale, by comparison against harmonics of the crystal reference oscillator.

Meter weights 30 lbs. 25 vacuum tubes plus 5 diodes and one bridge rectifier. Tubes are: 2 x 6X4W, 0A2, 0B2, 4 x 6AH6, 2 x 6AQ5W, 4 x 6AU6, 6BA6W/5749, 3 x 6BN6, 2 x 5725/6AS6W, 4 x 12AT7, 5814, 3 x 1N34A, 2 x 1N238, 1 bridge rectifier.



The film mechanism used to read the fine tuning divisions recorded on the 35 mm photographic film roll. A second replacement film roll is stored in the bottom of the chassis.



Internal view of the top deck. From left, the reference crystal oven chassis, the tuned band-pass amplifier and the variable frequency beating oscillator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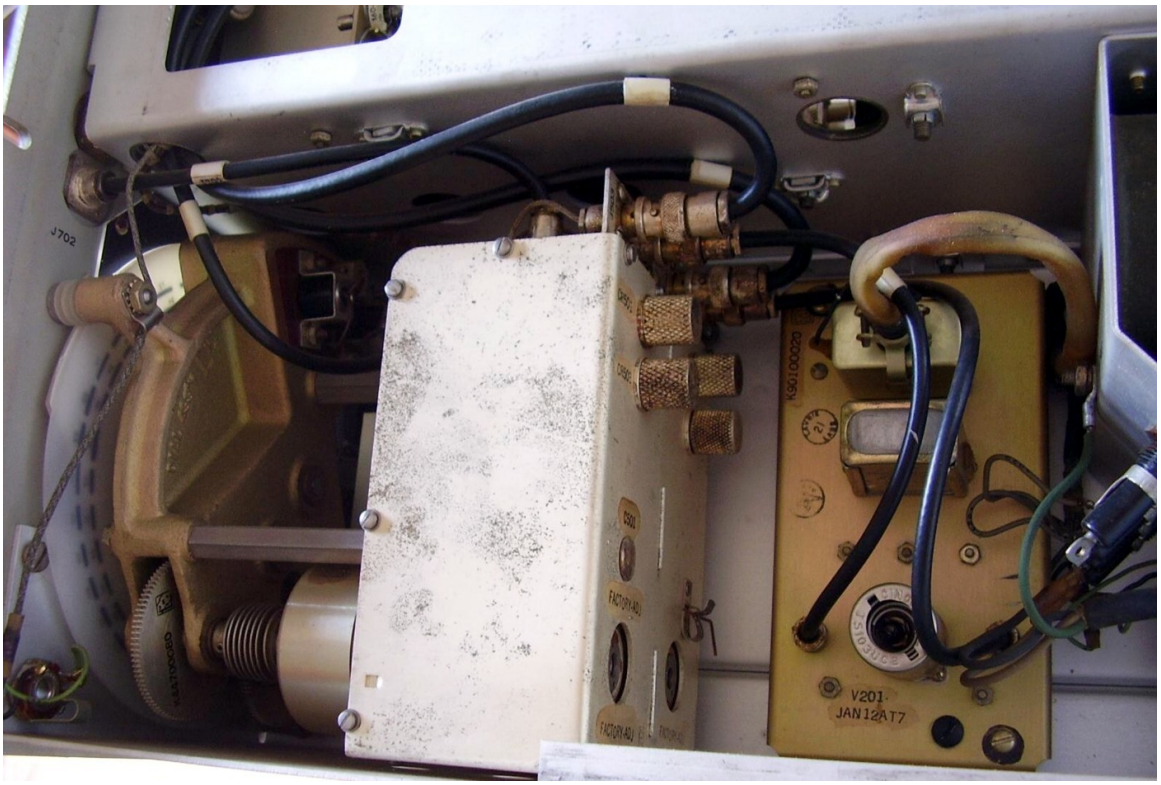
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