

73 Tests the Poly-Comm 62B 6 & 2 Meter Transceiver



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A strong newcomer in the VHF equipment field is the Poly-Comm Model 62B, 6 and 2 meter transceiver. This compact little unit is designed for mobile and home station use, containing a universal power supply for both modes of operation. Study of the specifications will show that the manufacturer, Polytronics Lab Inc., really took on a task in designing the unit.

This transceiver proved to be very difficult to evaluate. The time proven approach is to compare any new equipment with the competition in the areas of features provided, performance and cost. In this instance, the usual yardsticks do not exist. No competitive product provides 6 and 2 meter coverage, self contained universal power supply and self contained VFO for both bands.

The photo shows the external details of this attractive little package. A universal mobile mounting bracket, provided but not shown, allows the unit to be mounted in almost any mobile location. Before going into the results of the test, a brief circuit description is in order. Reference to the block diagram and the specifications will assist in understanding the following discussion.

The receiver section, designed for AM reception only, consists of a 12 tube superheterodyne circuit using triple conversion on 2 meters and double conversion on 6 meters. A high gain, cathode coupled, dual triode rf stage works into a Nuvistor first mixer. A 94 mc, crystal controlled Butler oscillator supplies the injection signal. On 6 meters, the oscillator is disabled and the signal idles through the first mixer. A voltage regulated, Colpitts oscillator, operating at 46.595 ± 2 mc is used to supply injection to the second mixer. The oscillator and second grid mixer circuits are gang-tuned,

resulting in a second *if* frequency of 5.405 mc. A stage of amplification follows, feeding the third mixer. Here, a 4.95 mc crystal oscillator is used to produce the final 455 kc *if* frequency. Two stages of 455 kc amplification are used to obtain the desired selectivity.

It will be seen that the rf-*if* portion of the receiver section is essentially a good design, double conversion 6 meter receiver with a high performance, crystal controlled converter used to provide 2 meter coverage. The results are very good and actual tests show that the claims of image rejection and selectivity are actually exceeded in production. The price paid for this superior performance is the presence of the two spurious responses pointed out in the specifications.

Silicon diodes are used in the detector, AGC delay and ANL circuits to provide excellent, hum-free performance. A dual triode is used in the squelch and first audio stages which drive the parallel connected 6BQ5 audio output tubes. These tubes, which are also used as modulators in the transmit condition, drive an internal $2\frac{1}{2}$ " PM speaker. Rear-chassis terminals are provided for use of an external speaker if desired.

The 62B transmitter section is more or less conventional except for the inclusion of the internal two band VFO. A switch permits selection of the VFO or a front panel mounted crystal. The oscillator frequency is tripled in the plate circuit and feeds a frequency doubler, driving the 7551 output stage on 6 meters. An additional tripler stage is switched in to give 2 meter coverage. The modulator consists of a high gain pentode followed by a triode which drives the 6BQ5 modulator tubes. The ceramic microphone supplied with the transceiver is matched to the speech system for optimum re-

sponse. A side advantage is that the audio gain may be fixed and still provide good performance.

Antenna feed requirements for both the transmitter and receiver are a reasonably flat 51 ohm termination. SO-239 connectors are used for separate 6 and 2 meter antennas. In the event one of the increasingly popular two band antennas is used, an internal strap connection will permit using a single connector for both bands.

The internal power supply employs a special power transformer which allows operation from the ac line or, using a conventional vibrator circuit, operation from 12.6 volts dc. Circuit switching is accomplished by inserting the appropriate power cord in the chassis connector. Four silicon diodes in a voltage doubler configuration supply the high voltage requirements. Another silicon diode powers the dc relays when the transceiver is operated from the ac line.

The unit loaned for the test, Serial Number 12B719, was accompanied by a letter from Bud Hargreaves, W2SXB, Chief Engineer of Polytronics. The letter said, in part, "... We have found that evaluations of equipment have been stilted and have been directed toward the good points, etc. We hereby authorize you to mention any undesirable features which you may find in the unit. . . ." Bud went on to specifically mention a couple of problems in the equipment. Some problems exist in any product but they are normally kept a dark secret by the manufacturer. If an unwitting user points out one of these problem areas, the manufacturer all too often expresses shocked surprise that such a condition could exist. The frank and open attitude of Polytronics is indeed a refreshing change.

Bud's statement was taken at face value and the transceiver really put through its paces, both on the air and on the bench. A local amateur, who prefers not to be identified, had expressed an interest in looking over the 62B and I was quick to take advantage of his experience. His competence is based on many years of professional and amateur VHF equipment design experience and backed up by some rather extensive test facilities. After inspection and limited testing, the unit was hauled to the basement lab and given the works. The tests resulted in 8 pages of notes, too lengthy to reproduce here. Environmental testing equipment was not available so specifications relating to temperature, shock, humidity and vibration were not checked. I don't claim that full-fledged compliance testing was conducted but a wealth of equipment was available and the balance of the specifications were checked out to the extent required to detect any serious departure from the manufacturer's published claims.

The 62B appeared capable of meeting or exceeding all specifications except those on transmitter VFO stability. As noted in the specifica-

tions, frequency stability of the VFO is cited as being within $\pm 0.02\%$ from -20°C to $+60^{\circ}\text{C}$. This figures to be $\pm 29.2\text{ KC}$ at 146 MC. Bench tests showed drift in excess of this. Tests were conducted at room temperature of 21.5°C , using thoroughly warmed up and calibrated equipment. The 62B was turned on after being off for 24 hours and the VFO "spot" switched on only long enough to accomplish the measurements conducted at 5 to 10 minute intervals. Results, from a starting frequency of 144.312 MC, were as follows:

VFO drifted down 106.0 kc in 1st 30 minutes
VFO drifted down 24.0 kc in 2nd 30 minutes
VFO drifted down 12.0 kc in 3rd 30 minutes
VFO drifted down 2.5 kc in 4th 30 minutes

At 5 hours and 36 minutes, the transmitter was operated key down for 10 minutes, resulting in an additional downward drift of 600 cycles. At the conclusion of this test, a thermometer placed loosely on the top of the cabinet read 53°C , a rise of 31.5°C over ambient.

Receiver stability measurements were conducted on 2 meters and performance was within specifications of $\pm 0.06\%$. This test was conducted by accurately measuring the second oscillator frequency. From a cold start, the unit drifted up 27 kc in 35 minutes and then drifted down 12 kc in 1 hour and 37 minutes. Drift on 6 and 2 meters is essentially the same.

Inclusion of the VFO feature in a 6 and 2 meter transceiver of compact construction poses many problems. Extreme supply voltage and temperature variations, vibration and shock are present in mobile operation. The oscillator tank switching problem is another obstacle that must be overcome. Polytronics has chosen the oscillator-frequency multiplier approach and the results serve to highlight the problem. The stability, while certainly not the best, is probably as good as can be expected in a competitively priced equipment of this type.

While the "state of the art" approach of a limited range, high frequency VFO and crystal controlled frequency converters could be used, a number of tuning ranges would be required for full coverage of both bands. Further, the increased circuit complexity required to reduce spurious output frequencies would probably price the equipment out of the market.

The balance of the test proceeded nicely. Receiver performance is all that is claimed. Selectivity was found to be even better than that cited in the specifications. 6 db bandwidth was measured at 3.9 kc and 40 db bandwidth at 19.5 kc. This degree of selectivity is very comforting to have, however it imposes more stringent stability requirements on the receiver circuitry and makes any drift in the received signal more pronounced. Retuning of the 62B is required during warm up. Sensitivity is excellent and overall performance such that weak signals really come up over the noise. S-meter readings were correlated with input level and each S-unit between S1 and S8 reflected an

average of 5.4 db increase in signal level. Image rejection is exceptionally good. The second and third *if* frequencies could not be detected on the 2 meter band, with the full 2 volt output of a General Radio 805-C signal generator pumped into the antenna connector. The two 2 meter spurious responses were present at the predicted intensity.

The receiver audio system is more than adequate and no trouble was encountered with microphonics when using the internal speaker. The shock mounting used for the receiver tuned circuit assembly and the transmitter VFO really shows its merit under conditions of vibration and shock. The squelch circuit works well and can be set to trip on signals way down in the noise. The squelch threshold is fully adjustable and the adjustment holds for extended periods.

Power output of the transmitter was measured, using a Bird Termaline Model 61 RF Wattmeter. Measured power output into this 50 ohm load of 9 watts on 54 mc and 5.5 watts on 148 mc agreed with the final inspection check list packed with the transceiver.

I was very much impressed by the quality of components used in the 62B. Teflon insulated wire is used throughout the unit and all metal parts are heavily plated. The quality of workmanship in the assembly and wiring is uniformly good. Careful attention to mechanical details, including the shock mounting of the receiver tuning elements and VFO, contribute to the overall performance. Physical layout of the front panel is good although the compact size of the unit does make some compromise necessary. The front panel mike connector is comparatively large and, as a consequence, the PA tuning and loading controls are a bit difficult to reach. Fortunately, these controls do not require constant attention so no hardship is imposed. The recessed front panel provides ideal protection for the controls in the mobile environment and this feature should not be sacrificed. However, when the unit is placed on the operating table, the meter and dials are somewhat obscured by the cabinet overhang. Flip-out extension feet mounted on the bottom front of the cabinet would tilt the transceiver at a convenient viewing angle.

On the air performance was excellent and, except for some comments on VFO drift, reports were consistently good. Modulation quality was reported as excellent. Receiver drift was noticeable during warm up but, once stabilized, the receiver is a real pleasure to operate. I believe the logical approach is to accept the VFO as a bonus feature, to be used as a crystal substitute only as required. The dual band coverage and many other desirable features result in overall performance of the 62B that places it ahead of competitive factory assembled products on the basis of dollar value received.

... W4WKM

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