BridgeCom Systems BCM-220 222 MHz FM Transceiver

Reviewed by Rick Palm, K1CE
QST *Contributing Editor*
k1ce@arrl.org

Using BridgeCom Systems' new 222 MHz (1.25 meter band) mobile radio was a walk down memory lane for me. In the late '70s and early '80s, I was part of a small, quirky but devoted group who ragchewed on two 220 MHz repeaters in northern Connecticut and western Massachusetts. One machine was on Talcott Mountain overlooking Hartford, and was run by the son of a major city developer. The other was owned/controlled by my longtime friend, Paul Koplow, WA1VEI, on Mt Lincoln in the Berkshires. Our radios back then were quirky, too: mine was a Midland (crystal-controlled, no PLL) that looked like a battered, old CB radio from a trucker's cab — the kind you might find today in a pawn shop. Later I had a Yaesu Memorizer for the band, which was a great radio. We rolled our eyes and suffered one user who used the autopatch to talk with his wife on his commute home every evening with over-the-top kissing and cooing sounds. Off-air and even on-the-air counseling sailed over his head.

Nowadays, the 222 – 225 MHz band is still a great spot for repeaters and their disciples. I had a lot of fun getting back on this band thanks to the BridgeCom BCM-220. Continuing with the nostalgic theme here, the company, which is based in Smithville, Missouri, evokes the feel and quality of those old radios in their new products, especially this one. The BCM-220 is built like a tank, with commercial-grade construction, and a high-quality, heavy-duty mic that eschews the numerous functions/buttons that populate some mics. The BCM-220's mic has a simple DTMF keypad and only three function buttons below it: the first to switch between memory and VFO modes, and the second and third buttons for frequency or channel up and

down. That's it — and I love it! It's heavy and feels good in my mic hand. Indeed, all of the radio's functionality seems to be focused on the essentials, and that's a plus in my book.

The front panel-mounted speaker sends the audio straight out to where it should go: directly at the user. With 4 W of audio on tap, received signals boom out of the speaker with little distortion. The speaker's grill also gives the radio a nice retro look. Also on the front panel is a knob that doubles as a power switch and volume control. A second knob rotates for channel or frequency up/down, and you push it to enter settings. The controls have a quality feel to them when manipulated.

The RJ series mic jack (also used for the programming cable — more on this later) is located on the lower left side of the front panel. To the right of the mic jack are four keys. Pressing the S key initiates or halts scanning memory channels or VFO frequencies. Pushing the A key brings

up the Alignment Mode, which allows setting of the squelch and RF power output levels (5, 10, 20, or 30 W), deviation for voice transmission, channel spacing, and other parameters.

Pressing the B key brings up another set of adjustable parameters, named the Radio Personality Menu Mode, I suppose to differentiate it from the Alignment Mode. From this menu, the operator can adjust the frequency step size, receive squelch mode (carrier, CTCSS, DCS), TX squelch (CTCSS and DCS tone transmission) choices, frequency offset for repeater use (in North America, minus 1.6 MHz is the standard), a scan unmute function, and scanning parameters such as scan speed time, hang time, wait time, stuck mic (or windbag) time out timer adjustment, and beep alert tones off/on.

The last button to the right is the delta symbol (Δ) key which, when pushed and held down, opens the squelch for monitoring purposes. (Releasing the button restores the squelch state.) As ARRL Lab Test Engineer Bob Allison, WB1GCM, noted, there is no way to leave the squelch open without keeping the button pushed in. Bob also observed that in settings, the minimum squelch level is 1 (not off) and is set to the 12 dB SINAD level. So, there is no way to keep the squelch open without continual manual intervention. He had to hold the button down to make measurements.

Display

The LCD screen is easy to read, backlit, and is not cluttered with superfluous icons. On the top line going across is the received signal strength indicator, followed by a symbol for CTCSS/DCS on, a musical note indicating that beep tone alerts are on, an S symbol indicating that the memory channel frequency is in the scan list, a W or N for wideband or narrowband, an animated S symbol indicating scan mode

Table 2
BridgeCom BCM-220, serial number PD040004

Manufacturer's Specifications	Measured in ARRL Lab
Frequency coverage: 219 – 220 MHz (data only) and 222 – 224.995 MHz.	Receive and transmit, as specified.
Modes: FM.	As specified.
Power requirements: Receive: ~0.4 A (maximum audio),180 mA (standby); transmit, 6.7 A (30 W), 2.5 A (5 W) at 13.8 V dc ±15%.	At 13.8 V dc: Receive, 360 mA (max volume no signal), 172 mA (standby), 29 mA (power off). Transmit: 7.06 A (30 W), 5.36 A (20 W), 3.62 A (10 W), 2.68 A (5 W).

Receiver	Receiver Dynamic Testing
FM sensitivity: 12 dB SINAD, 0.25 µV.	For 12 dB SINAD, 0.2 µV.
FM two-tone, third-order IMD dynamic range: Not specified.	20 kHz offset: 71 dB*; 10 MHz offset: 86 dB.
FM two-tone, second-order IMD dynamic range: Not specified.	82 dB.
Adjacent-channel rejection: Not specified.	20 kHz offset: 71 dB.
Squelch sensitivity: 0.22 µV (threshold).	At threshold, 0.2 µV (min), 1.0 µV (max).
S-meter sensitivity: Not specified.	27.2 µV for full scale indication (4 bars).
Audio output: 4 W at 5% THD into 4 Ω load.	As specified. THD at 1 V_{RMS}, 2.2%.

Transmitter	Transmitter Dynamic Testing
Power output: 30/20/10/5 W.	36/24/11/5 W at 13.8 V dc. 34 W (high power) at minimum specified voltage.
Spurious signal and harmonic suppression: 75 dB.	As specified, meets FCC requirements.
Transmit-receive turnaround time (PTT release to 50% of full audio output): Not specified.	Squelch on, S-9 signal, 144 ms.
Receive-transmit turnaround time ("tx delay"): Not specified.	15 ms.

Size (height, width, depth): 1.8 × 6.5 × 6.7 inches (including protrusions). Weight, 2.4 lbs.

Price: $240. With programming kit, $290.

*Measurement was noise limited at the value indicated.

is activated, RF power output indicator, and data channel (for 219 – 220 MHz data channel operation) enclosed in brackets. The frequency or memory channel reads across the lower line.

Operation

I found the radio to be easy and enjoyable to operate. To get started out of the box, I turned the radio on by pushing/holding the volume knob, typed in my local (Holly Hill, Florida) repeater frequency output, set the transmit offset to –1.6 MHz, followed by the receive and transmit CTCSS tones. I hit the mic's PTT button and I was on the air in VFO mode — rotating the select knob on the right changes the frequency up/down according to the frequency set size.

I entered my local repeater's data into a memory channel by simply pushing/ holding the select knob for 2 seconds. The radio puts the data into the next available memory channel and appends —MEM to the frequency on the display. Storing and deleting memory channels are easy functions to perform, made even easier with the use of the optional programming cable and software that are available with the radio. There are 250 memory channel slots available, more than enough for the 45 repeater pairs, control link frequencies, and simplex frequencies in the band according to the band plan.

Data operation frequencies (between 219 – 220 MHz) are also selected (only by the programming cable/software) and stored in the memory bank. Stored frequencies are limited to those permissible under the FCC rules; for example, frequencies between 220 – 222 MHz cannot be selected

or put in memory channels, barring transmission *and* reception.

To change from VFO mode to memory channel mode, the user pushes the SELECT knob button. These basic functions can also be performed by pushing the three buttons below the DTMF pad on the back of the mic. Push the A button to toggle between VFO and memory channel modes. The B button is the "down" button — lowering the frequency or to the next memory channel — while the C button is the "up" button.

Back to the radio's front panel. The user pushes the A button to enter the Alignment Mode, which includes the squelch control (1 – 9). Rotate the SELECT knob until the display shows SQUELCH in the top line and the value below it, then push the SELECT button again, rotate it to the value of choice, and set it by pushing the SELECT button again. Rotate the SELECT knob to cycle through the other parameter choices to make changes in a similar fashion. Changing the RF power output level is accomplished in this menu set, something that may be used frequently. However, I decided to leave other parameters such as transmit voice and tone deviation to technicians' benches. Parameters in the Radio Personality settings menu, entered by pressing the B button on the front panel, are adjusted through the same process.

Scanning is easily accomplished in VFO or memory mode. Simply push the big S button on the front panel, the scan starts, and an animated circled S icon lights up on the top line of the display. Default direction is up, but that can be changed by rotating the SELECT knob one click up or down as indicated. When a carrier is detected on the scan channel or VFO frequency, scanning is paused. If the un-mute condition is "carrier" — set in the scanning parameters menus — the radio will ignore the CTCSS requirement and un-mute the radio. Otherwise, the radio will wait a programmed amount of time for the programmed CTCSS (or DCS) tone to un-mute.

Memory channels in the scan list are indicated by an S in the display's top line; channels can be deleted from the list and the S disappears. Other scanning parameters such as scan speed time, hang time, and wait time are all easily programmable.
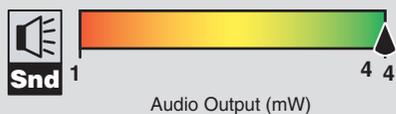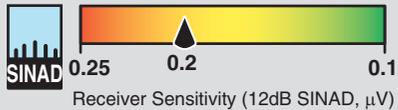
Programming Cable and Software

I used the programming cable and software to program the memory channels into the radio, and had complete success with memorizing/channelizing several area repeaters. It is perhaps the simplest and easiest system I've ever used. The software loads easily and accesses a COM port to communicate with the radio via the cable that plugs into my laptop's USB port on one end, and the radio's RJ series mic jack on the other.

Once the software is installed, click the READ icon, which prompts the software to communicate with the radio and download the existing memory channels and operating parameters such as CTCSS tone on receive and/or transmit. The information is then displayed in a table format that looks like a simplified *Excel* spreadsheet. Editing each of the values is quick and easy. Another option allows the user to program radio-wide parameters. Once all additions, deletions, and changes are typed in, clicking on the WRITE icon results in communication with the radio to upload the new values.

The radio also supports data operation in the US data-only 219 – 220 MHz band. The programming cable and software are used to store these channels designated as data only. No voice operation is permitted and the radio will not allow voice transmission there. A TNC or other data device can be connected to the radio's accessory connector on the back of the radio. The manual has a chart of the pinouts.

The radio also supports upgradable firmware. A flash upgrade utility ships with the BCM-220 programming software.

Summary

I enjoyed operating with the BridgeCom BCM-220. It reacquainted me with a great repeater band that is starting to see more use, thanks to the introduction of more radios that cover the band. I found it refreshing to use a radio that was purposefully reduced to basic functions, rendering ease of operation — less is more, in my book. Audio booms out of the front panel speaker, and audio reports I received from area hams were all good. (Thanks to Ed Kuhnley, KI4RF, for the use of his fine repeater and his patient assistance with me and my on-the-air assessments of this radio.) The radio seems to be constructed for rigorous duty, with a solid, heavy mic that features the seldom-seen, almost old-fashioned mic clip.

The companion programming software is easy to use and reliable. Included in the box is a hard copy operating manual, which has clear descriptions of operating parameters, functions, modes, and how to change them as indicated.

I would recommend this radio to anyone looking to try the 1.25 meter band, or to get back on the band after a long hiatus, as was the case with me.

Manufacturer: BridgeCom Systems, 102 NE State Route 92 Hwy, Suite C, Smithville, MO 64089; **www.bridgecom systems.com**; tel 816-532-8451.