

# Precision SHOOTING

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# Barrett's Ballistic Computer: BORS

**BY FRED BARKER**

The Barrett Firearms Manufacturing Company, long known for their various rifles for the .50 caliber Browning machine gun round, has developed a new and unique on-rifle ballistic computing apparatus—BORS. The BORS unit consists basically of 1) a metal box containing a computer, thermometer, barometer, and battery that has a four-button keypad on top and a rear-facing illuminated screen; 2) a special elevation knob set into a forward extension of the metal box and which replaces the rifle scope's elevation knob; and 3) scope-to-rifle attachments for a Picatinny rail—a rear half-ring below the box unit and a complete forward ring (see illustrations). BORS also contains sensors for canting of the rifle and inclination of the bore from the horizontal (or pitch). The computer takes input of the bullet's ballistic coefficient and its muzzle velocity, along with its instant determinations of ambient temperature, barometric pressure and any incline of the muzzle, and calculates the bullet's trajectory.

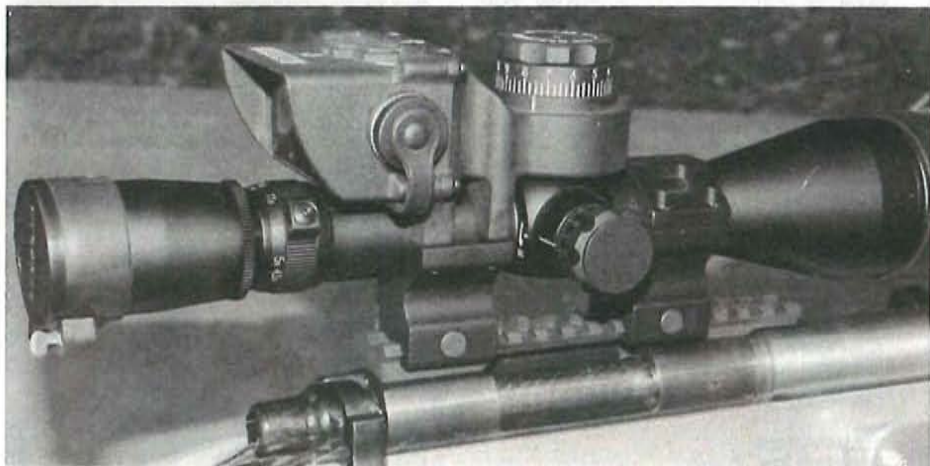
Barrett's design engineers have mostly intended BORS to be used by a shooter and spotter pair, with

the spotter first obtaining the distance to a target via a laser rangefinder. The shooter then simply looks at the default settings on the screen and turns the elevation knob (a part of the BORS unit that replaces the scope's original elevation knob) from the sight-in distance to the distance given by the laser rangefinder. BORS immediately considers the several factors that determine the trajectory and sets the crosshair's elevation for the shot. Simple and quick! However, BORS cannot read wind velocities (that would be too much to expect!) and the factory windage knob remains on the scope—windage estimates are left to the

shooter and spotter.

BORS also has an emergency rangefinder capability, that works rather like a surveyor's transit and stadia rod—and also like various scope reticles—that subtend so many inches per hundred yards of range. The BORS rangefinder works—after pushing several buttons—by the operator first setting a vertical separation or “target size” of 1, 3, 6, 9, 12, 15, or 20 feet (or similar metric spacings), next pointing the rifle's scope at a distant target of that size and (with rifle rested firmly) setting the intersection of the

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*The BORS on author's Remington 700 1,000-yard rifle with Leupold 4.5-14X sight.*

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crosshairs on the bottom or top of the target, and turning the BORS elevation knob so that the crosshair intersection travels to the top or bottom (respectively) of the target. The distance to the target is given on the screen, a button is pushed to give the screen default readout, and the BORS elevation knob is turned so that this distance reading goes from the sight-in distance to the target distance figure. The operator can then shoot, knowing that the ballistic calculation done by the BORS computer includes the ambient temperature, barometric pressure and any inclination of the barrel.

The rifle cartridge's ballistic coefficient and muzzle velocity, or one of 106 standard cartridges contained in the computer, are

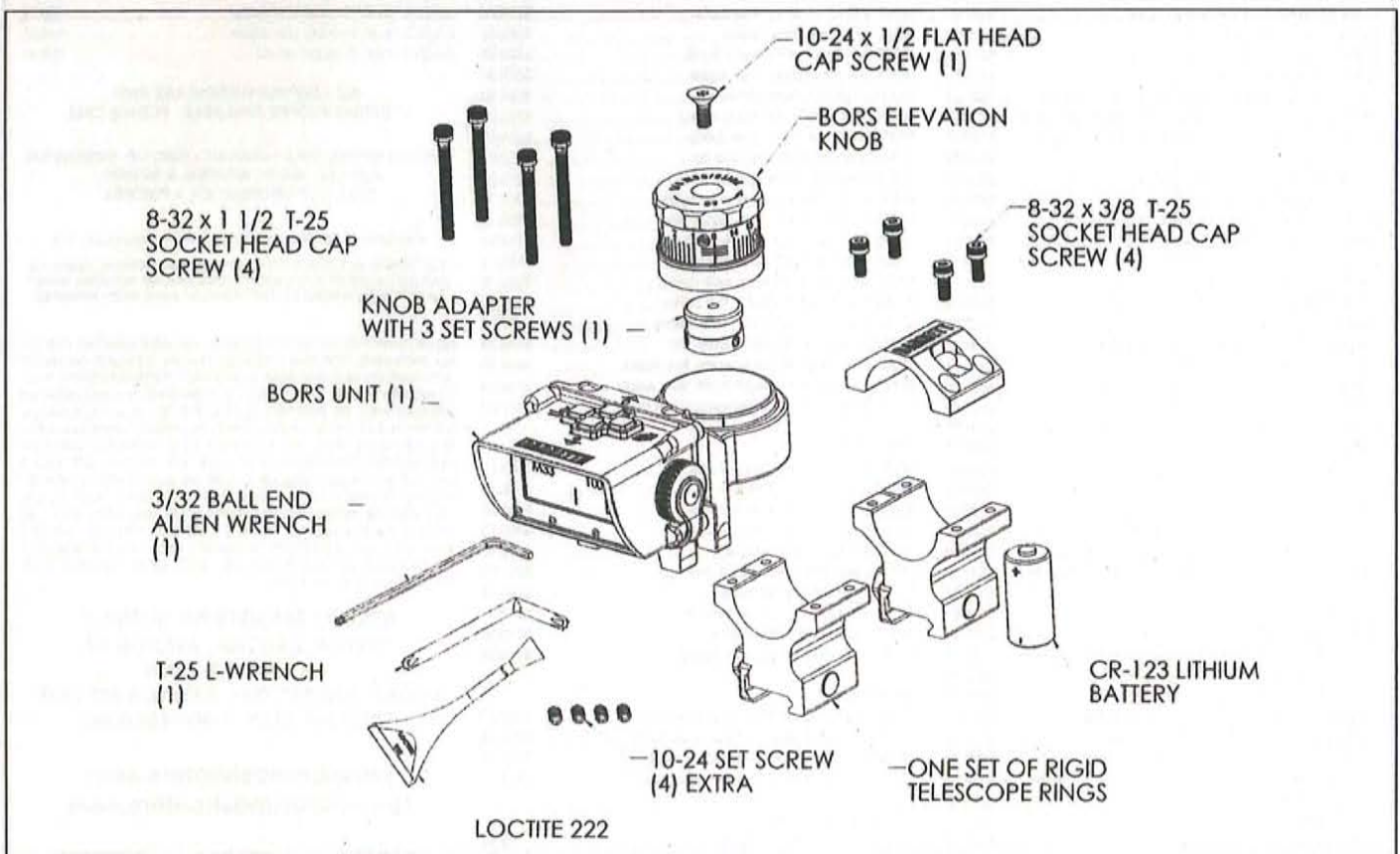
entered into BORS, so that it is able—(as mentioned above) with temperature, barometric pressure and its built-in inclinometer sensor (giving the angle of the rifle's bore with the horizontal)—to calculate the trajectory of the bullet. With a very flat-shooting cartridge and a scope having a good range of vertical adjustment the BORS will read and calculate distances to more than 2,500 yards. Many PS readers will remember reading in Sierra's reloading manual the calculations needed—after reading a thermometer and a barometer—to adjust a bullet's trajectory for these ambient variables..

Barrett engineers designed the BORS unit for use in severe (i.e., military) conditions, from  $-4^{\circ}\text{F}$  to  $+158^{\circ}\text{F}$ . It weighs 13 ounces, the illuminated liquid-crystal display has 12x2 characters, the tiltmeter operates to  $90^{\circ}$  on both sides, and its CR123 lithium battery gives a run of more than 30 hours.

The BORS operating manual gives detailed instructions for mounting the unit to a scope and then onto the rifle's Picatinny rail base. It then describes the screen's default setting, which includes cartridge name, zeroing distance and sideways tilt (or cant) indicator. A push of a button shows ambient temperature and barometric pressure on the screen, but not the inclination or pitch of the barrel's bore. The keypad's four buttons give access to any of six displays:

ZERO CARTRIDGE  
DETERMINE RANGE  
SELECT CARTRIDGE  
CARTRIDGE INFORMATION  
CHANGE UNITS  
CHANGE SETTINGS

Zeroing the rifle to the BORS unit is done by shooting a group at the default distance of 100 meters (110 yards), turning the BORS elevation knob and the scope's



*Components of the BORS, from Barrett's operating manual.*

windage knob so the reticle is centered on the group, setting the BORS elevation knob to "0" via two screws, and then confirming the zero on the screen by a keypad button. A screen read-out tells what cartridge has been entered. Units for all variables are easily changed from English to metric. The screen's brightness, contrast and duration of illumination can be set as desired.

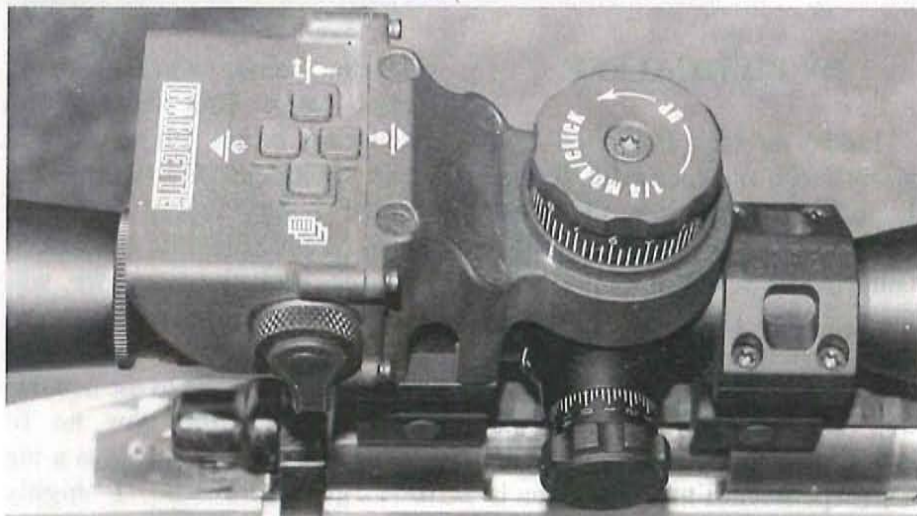
Readers may wonder about the accuracy of emergency distance readings by BORS made with the settings of 1, 3, 6, etc. feet. If a Marine ranges a Taliban fighter who is 5 feet 6 inches high, rather than 6 feet, a distance error of about 10% will result. Hence Barrett's firm recommendation of using BORS with a laser rangefinder. Our military does have laser range finders that are much more accurate at more than 1,000 yards (and rather more costly) than those available to most of us from Cabela's or Midway. Using an effective laser in conjunction with the ballistic computations and distance settings of the BORS probably is the way the military will go (from discussion with **PS** contributor and expert sniper competitor Jacob Gottfredson, who has used a BORS unit). For us civilian prairie dog shooters the best laser rangefinder (from Leica, Swarovski, or whomever) can be used to give us the distance setting on the the BORS screen for shots to perhaps 1,000 yards. Using a BORS in this way is much superior to the old method of calibrating the clicks on a scope's elevation knob for distance. I should also note here for younger **PS** readers that custom barrel maker and rifle shooter Dan Lilja wrote what may be the best-ever articles on long-range field shooting in a four-part series in **PS**: March 1989, February 1991, and January and February 1992. In those days Dan used a World War II-surplus Barr & Stroud optical coincident-image rangefinder, which may

not give the plus-or-minus 1 or 2 meters accuracy at 1,000 yards of good laser rangefinders but which is much more reliable than lasers from 800 yards to several kilometers.

Barrett currently makes the BORS for use with Leupold's Mark IV rifle scopes of 4.5-14, 6.5-20 and 8.5-25 powers, without illuminated reticles (which don't fit under the BORS box), and they now (Nov. 2007) are considering adapting them to other scopes. A kit with BORS mounted on a Leupold MK-IV 4.5-14X scope sells for \$2,700, and the basic BORS unit

for \$1,500. In January of 2008 Barrett Ballistic Software will be available; which will allow users to create their own ballistic tables and upload or download them to and from the BORS unit.

Unfortunately the BORS kit I've used here must return to Tennessee, and some prairie dogs next summer will escape liquefaction. It is a well-conceived and well-made instrument. Those who use them will gain in long-range effectiveness.



*Top view of BORS, showing keypad and elevation knob.*



*Screen of the BORS, ready to go!*