**BARC's BARK**

May 2018

Repeaters: Voice 2 m 146.70 MHz (-)**70cm 448.90 MHz (-)****IRLP/EchoLink 147.510 MHz****(100 Hz PL)**Web Site: www.qsl.net/w0dk/

Pres. Mike Stutzer ---- KDØFDJ

V.Pres. Carey Fuller ----- KXØR

Treas. Mike Derr ----- W3DIF

Secy. Lee Ciereszko,III - N4TCW

Trustee Dave Sharpe ----- KIØHG

BARC Jrs Mike Wilson ---- K2KR

Coming Events

Sat. June 16: Boulder Airport Day

The biennial event features planes and plenty of fun for young and old alike. BARC participates by assisting the Boulder Airport in set-up, and serving as docents throughout the day. The set-up is done between 7:00am and 8:30, although we surely don't shlep stuff for that whole period. For those serving as docents, the public starts arriving at 9:00. Bring an HT if you have one. The event ends at 3:00, but you don't have to be there the whole time. Those who have already signed-up to assist will soon be contacted to set the specific hours you can attend.

Additional volunteers are needed – contact me michael.stutzer@colorado.edu

Tues. June 19, 6:00pm: BARC SwapMeet

We will meet in the parking lot in front of the **Boulder Intergalactic Airport Terminal Building**, for our annual Trunk and Tailgate sales event. To ensure adequate sunshine, we will start at 6:00pm, one hour earlier than our usual meeting time.

Sat-Sun. June 23-24: FIELD DAY!!

We will again be at Betasso Park for Field Day activities, commencing at noon on Saturday and ending a bit before noon on Sunday. As in previous years, come any time to enjoy a beverage and snack, schmooze at the picnic table and tables under our big tent, or operate a radio. We just try to have a good time and avoid a contest atmosphere.

Volunteers are needed to help set-up the gear early Saturday morning, before the sun beats down on our hoary heads. We park quite close to the operating site at Betasso Park (see map and directions at the end of this newsletter), so our gear just needs to be carried a short distance from there, and then set up under our famous tents. With enough volunteers, the job is done easily and quickly.

Some of you volunteered at our monthly meeting; *additional volunteers are needed – contact me michael.stutzer@colorado.edu*

May Monthly Meeting

Our semi-annual show-and-tell again demonstrated the broad variety of home brewed projects concocted by members.



Brings new meaning to the term "Home Brew" (it has been repurposed as a UHF cavity filter by Don, NOYE with assistance from Dan Swanson.)



Dave, KG0EW with his Arduino-driven display proclaiming "Hello, World!"



Dick, W0QM giving a good explanation of the merits of "pre-distortion". Those things he is waving helped him implement that.



Phil, WE7A and his nifty station clock + more



Carey, KX0R used microtoggles in his microtuner



The slide says it all

QRP Into The Wind



Sporadic Me

We all know that more sunspots would excite the ionosphere, and thereby excite us HF'ers and the Boulderites working at NOAA's Space Weather Prediction Center. Those who don't want to wait a few years should recall that this is the Sporadic E season, when the E-Layer gets all in a tizzy and enables good, 1000+ mile contacts on the 10 and 6 meter bands.

To find openings, some people monitor beacon activity, either directly or via an app. But I just plug-in my cherished, completely stock President Washington SSB CB rig, tuned to 27.385MHz (LSB) -- the calling frequency long used by SSB CB stalwarts. If there is a Sporadic E opening, you'll hear plenty right there.



The great President Washington CB SSB

I doubt that all current high school students would know that President Washington lived before the CB craze (the 1970s), and certainly none of them would know that Betty Ford used the CB handle "First Mama". In those days, Uniden was willing to put real quality into this high-priced, frequency-synthesized chassis (sold under a number of labels, including Radio Shack), with an 8 pole IF filter and SSB crystal filters in place of tuned circuits for the upper and lower sidebands. One website refers to it as the "Holy Grail" of CB radios, although I doubt that many of the thoughts it conveyed could be characterized as Holy.

I have raved about this \$7 used beauty before, which sits all year waiting for resurrection during the early summer Sporadic E season. A couple of weeks ago, I connected my homebrew, 2-element wire beam and was immediately greeted by a loud CQ from a guy in Battle Creek, MI. I wondered if Battle Creek was named after some large scale conflict. But the Wikipedia sez that some government land surveyors got in a fight with a couple of Potawatami natives. I hope the city is more interesting than its name.

The Battle Creekian liked my fine 12 watt PEP audio, so I decided to call CQ and was answered by "98 Cleveland Ohio". I eventually worked "Wisconsin 963" as well as a guy in Prior Lake, Minnesota. All of these were perfectly gentlemanly QSOs, and I'm sure some of these folks were also Hams. Before you send any flame mail to me about this out-of-ham-band activity, be advised that the FCC has now made CB skywave legal, eliminating the infamous 155.3-mile distance limit adopted in the trucker era. If you dust-off your own rig, listen for my vertically

polarized handle “627 BOOOOOULDER, Colorado” on 27.385MHz (LSB).

The unfortunate readers who only own Ham rigs can tune them to the 10 Meter calling frequency 28.400MHz (USB). If you hit an opening, look for the ubiquitous “Todd from Georgia” on 28.425MHz, who must be the most frequently heard guy on 10 meters.

An Arduino-based Display for a Remote Coax Switch

David Patton, KG0EW

When a knee injury kept me off my feet for several weeks, I decided to learn a bit more about Arduino microcontrollers. If you’re not familiar with Arduino, it is an open-source electronics platform (you can download the programming tools for free) that incorporates low-cost microprocessor-based hardware with a user-friendly programming language. The availability of cheap microprocessors, an array of third-party add-on boards, and an enormous library of software tools – including complete programs – piqued my interest.

Since barely passing a C++ course in college, I haven’t tried programming anything more challenging than our satellite TV box. So I wasn’t exactly brimming with confidence when Amazon delivered Arduino UNO clone microcontrollers, several Arduino-sized prototype boards, and a handful of parts. However, reading through the first several chapters of Jack Purdum’s *Arduino Projects for Amateur Radio* provided a basic understanding of the Arduino, and a starting point for experimenting with the UNO and software.

At less than \$10 delivered to your doorstep, the microcontroller is a great deal. Like the original open-source UNO design, the clone I purchased is built around the Atmel ATmega328P microprocessor, and includes 32K of flash memory, 14 digital input/output pins, 6 analog input/outputs, a USB connection, a power jack (6 to 12V DC), both 3V and 5V DC control voltages, a serial programming (ICSP) header, and a reset button. While 32K of memory sounds tiny, it is

plenty for a most applications. Other, more powerful microcontrollers are available if needed.

After following several programming examples in Purdum’s book, I understood the basics and had a first project in mind: a display for a remote-controlled coax switch. While I have only have two HF antennas (and can select either from my antenna tuner), I have several radios to select from. Using a coax switch “in reverse” (several inputs to one output) easily handles the task. The switch, a Six-Way Relay Box by Top Ten Devices, is remotely controlled via a six wires: the desired position is selected by grounding the associated control wire. The relay box and coax runs are behind the radios, while the control switch is mounted on a shelf above the radios. I already had a mechanical switch box, but I was always looking for the note card where I had listed the radio was associated with each switch position. An LCD display to show the selected radio would be a nice addition for the shack. This required a task that is ideal for an Arduino: identify which switch port is active by determining which of six control lines is at ground, and display the radio designator associated with that switch port.

Building the LCD display board was a simple matter of following the instructions in Purdum’s book. Alternatively, you can find dozens of on-line examples. I built the circuit on a small prototype board that was sized to interface with the Arduino, and with headers installed, the LCD display board plugged directly into the Arduino. I could have purchased a pre-built LCD assembly, but I enjoyed building the circuit myself. If you’re new to Arduino, these small boards that plug directly into the Arduino are called “shields.” Shields are available for an astonishing variety of tasks, from a basic LCD display to an entire VHF transceiver.

Writing the code to operate the LCD display was trivial - all the difficult programming was available in a library included with the Arduino (also available for free download from the Arduino website), and what little code I needed to write was well described in both Purdum’s book and on-line. Writing the code to detect which

antenna port was selected, on the other hand, took some trial-and-error.

The Arduino UNO has six analog pins that can be used as either inputs or outputs (Analog I/O pins, for short). Let's see: six antennas positions; six Analog I/O pins... say, even I could figure this out! To control the remote coax switch, I planned to use one pole of a small two-pole, six-position rotary switch to ground the selected control line, then use the second pole to put 5V to the desired Analog I/O on the Arduino. The code to measure voltage on an analog I/O is described in the book; simple! So I was a bit surprised when the circuit didn't work. Some more reading on the Arduino website turned up the problem: I had left the Analog I/O pins floating, an UNO no-no. Adding 10k resistors to ground fixed the problem - in fact, I only needed to put a resistor on the first I/O, and the circuit worked as expected. At this point, I wrote the entire software routine, which in Arduino speak is referred to as a "sketch." And it appeared to work well.

Recognizing that I was probably enjoying a bit of beginners luck, I decided to post the sketch and a description of the project on the Arduino forum. The forum, like the entire Arduino website www.arduino.cc, is an amazing reference. Within a few hours, several pithy critiques were posted. All savaged my code, but also gave specifics on what I had done wrong, with details on how to fix the problems. Some suggestions were admittedly over my head, but one reply in particular was helpful: configure the Analog I/O's as digital inputs, and then, using the internal 5V output as reference, simply ground the desired input. If I hadn't already had the two-pole rotary switch in my original relay control box, this solution would have allowed me to use a less-expensive single-pole switch. After some more reading and experimenting, both the sketch and the switch assembly were soon running flawlessly.

The next step was putting the assembly in a nice housing. Admittedly, this is where many of my projects go off the rails - especially projects with an LCD display that requires a large rectangular hole in the case. On past projects, I've printed a front panel on heavy paper, glued the paper on the front of the case, and covered that with a piece of

plexiglass. Using an Exacto knife, it is easy to cut perfect rectangular holes in the paper for the display, and the paper covers the less-than-perfect holes in the case. Using this method also makes it easy to print very professional looking front panels with all controls and inputs labeled. The plexiglass cover then protect the paper and the LCD screen, and is easy to drill for round connectors and mounting screws.

For this project, however, the small plastic box I used had rounded edges, and wasn't very conducive to the approach described above. Using a Dremel tool and patience, I was able to cut a close facsimile to a rectangular hole for the display. Once assembled, it was functional, but certainly not elegant. So I covered the front of the case with, of all things, black duct tape! A thin strip of aluminum tape covered the tape seams, and added a bit of retro flair. I may never use this construction technique again, but in this instance, it looks great:



My Radio Selection Switch using Arduino Display

The switch is mounted on a shelf above the main radio location, and a quick glance confirms which radio is connected to the antenna tuner. I have several QRP radios, and if I swap one out on the bench, it is a simple task to reprogram the Arduino to display the correct radio name. This was just about the perfect winter project: fun, educational, and functional.

Arduino-based displays are showing up more frequently in QRP radio kits (the TenTec Rebel was the first), and since the code is open-source,

USS Colorado BB-45 Memorial

A group of University of Colorado students will activate and operate a ham radio event, **June 2-3** at the University Memorial Center (UMC), to commemorate the USS Colorado, the state's namesake World War II battleship.

Paul Veal, N0AH said the event would honor the ship's history, promote historic exhibits in the UMC Veterans Memorial Lounge, and give a nod to the new USS Colorado (SSN-788), a nuclear powered U.S. Navy Virginia-attack submarine that was commissioned in March.

"This is a community effort," Veal said. "We selected the UMC because CU Boulder has been a great supporter of preserving the ship's history." The Colorado Battleship BB-45 Memorial Club **AB0BX will operate on 70 centimeters to 40 meters from 10 a.m. to 7 p.m. on June 2 and from 12:30 p.m. to 5:30 p.m. on June 3** at the UMC. Madisen Purifoy-Frie, KE0KCM, the student project manager for AB0BX, said the event would "have an emphasis on inviting any veteran to be a guest operator, but the public is also welcomed to visit the operation."

Located on the second floor of the UMC, the Veterans Memorial Lounge displays plaques honoring Colorado veterans – including CU students – who died in both world wars, the Vietnam War and during military conflicts in Korea, the Persian Gulf, Iraq and Afghanistan. The lounge also features a room of artifacts from the USS Colorado BB-45 such as the ship's wheel, blow horn, bells, uniforms, manuals, flag and photos. Etched in a glass wall in the lounge are the names of those who perished in battle on the ship.

This has received financial, logistical and financial support and interest from the Boulder Amateur Radio Club (W0DK), the Grand Mesa Contester Club, and the recently resurrected CU ARC (W0YQ), Veal said.

QSL information is available at www.qrz.com under AB0BX. For more information, contact

Paul Veal at 303-703-8448 or via email at n0ah@arrl.net

VE Activity in May

During May, seven candidates were tested. One passed a general to extra upgrade, five new technicians passed and one did not pass. Many thanks to the volunteer examiners who make this happen each month. As a reminder, BARC V.E. exams are held on the first Thursday of each month, 7:00 p.m., in room 20 at the LDS Church in Louisville (corner of South Boulder Road & Washington Street). See the BARC website for V.E. exam information <http://www.qsl.net/w0dk>.

Stuff From ARRL, QRZ, etc.

Brando Inducted into the CQ Amateur Radio Hall of Fame

Marlon Brando, FO5GJ (SK), iconic movie actor, was recently inducted into the CQ Amateur Radio Hall of Fame.

His life-long desire to win the CQ World Wide DX Contest was impeded by long hours spent preparing for his varied acting roles, followed by even longer hours spent on the movie sets. During the fleeting hours when he could operate from his QTH on the waterfront of Hoboken, New Jersey, Brando was often heard on 80 meter nets, lamenting his inability to participate in the contest:

"You don't understand. I coulda been a contender. I coulda won my class. I coulda been somebody, instead of another bum on these 80 meter nets."

Home-Brew Electric Blanket Kills Ham

The death of a radio amateur in New Zealand last summer has been traced to a tragic malfunction of an electric blanket he had modified. Arthur Earle Plimley, ZL1TAG became a Silent Key last

August after a fire erupted in the room of his home in Thames. A new report reveals that the fire had been set off by a 40-year-old electric blanket that he had modified. (*editor's note: I did not make this up.*)

Last Ham Standing Returns to the Airwaves

Mike Baxter KA0XTT hasn't let his amateur radio license languish and neither has the Last Man Standing Amateur Radio Club. Recent word is that the popular TV show will live and breathe again this fall on the Fox Network.

National Defense Authorization Act Inserted into the Amateur Radio Parity Act.

In a bid to gain passage of the costly National Defense Authorization Act, congressional Republicans have inserted the controversial bill into the wildly popular Amateur Radio Parity Act. "This will help insure passage of the vital National Defense Authorization Act, containing funds to adequately pay and equip our men and women in uniform", said Rep. Paul Ryan, Speaker of the House of Representatives. "Nobody in their right mind opposes the Amateur Radio Parity Act, except some disgruntled Hams upset with the leadership of the amateur radio lobby. If Marlon Brando, FO5GJ were still alive, he would have told them 'I've seen horrors at ARRL Board meetings, but you have no right to judge me or them'."

For Sale

BITX-40 SSB Transceiver Kit - \$45

This is a complete SSB transceiver for 40 meters. The kit includes the fully assembled circuit board, with a separate bag of connectors, controls, and wiring. It does not include a case. For more information on this unique radio, visit <http://www.hfsignals.com/index.php/bitx40/>

NOTE: This is the original version of the circuit board, and includes varactor tuning, not the Arduino VFO and display.

All documentation is electronic, and I am happy to send that to anyone interested. Contact: *David Patton, KG0EW* at 303-319-9848 or kg0ew@arrl.net.

Ameritron AL-811 Linear

This AL-811 is in great condition, with original manual and box. It is yours for \$525.00. Contact: *Sid Hughes, K0SCH*
303-660-1734 (H)
303-663-1192 (W)
303-917-7380 (M)
k0sch@arrl.net

Free Linear for a Guy with Good Back

10 - 80m 8877 1 KW Linear Amplifier. My kids will not know what to do with it when I am gone...but you will!

It is based on a modified "Loudenboomer" mounted in a floor cabinet on rollers. 2 KV ~ 1A and 24 V relay PSU in base. 120 V AC input.

This comes with built-in bypass coax antenna relays, Collins fwd/rev power sensor with desktop meter, desktop PA current meter, 6-way antenna selector switch, and one spare 8877 tube that (I think) is good. Requires about 30W drive for SSB 1 KW PEP output.

Please note that this is a homebrew amplifier (only rough schematics available) with no fancy microcomputer control and protection. You must select the band, tune and adjust loading and drive level. It is not foolproof. You can blow the expensive tube quite easily (I know). I give no warranties or right of return.

When you come to get it, you will see why you need to have a strong back (or extra backs with you) to carry it up my basement stairs.

Contact: *Dick, W0QM, G3FNL*
W0QM@ARRL.net 303 494 7244

From Jim Schatzman's Inventory

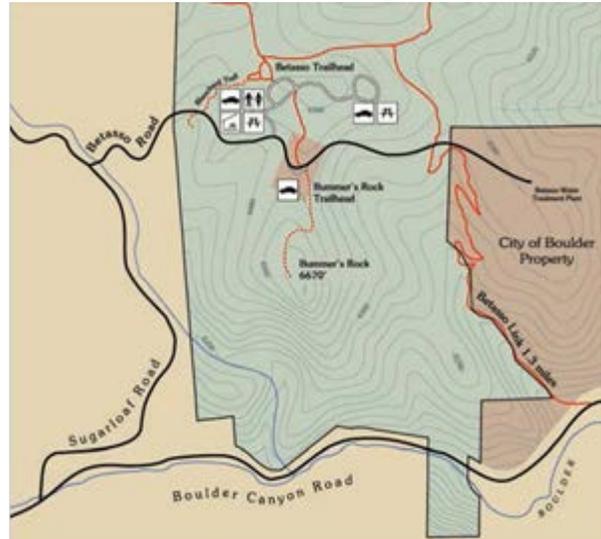
HP/Agilent 8568B Spectrum Analyzer 100Hz to 1.5 GHz + 6GHz Signal/Tracking Generator in excellent working condition. Original CRT replaced with color LCD upgrade. Fan replaced with quiet model. Works great with free KE5FX software to make fast computer screen dumps (requires GPIB USB or Ethernet interface readily available on Ebay and other sources). **Also includes DS Instruments TG6000 tracking generator and software.** Tracking generator can be used with the 8568B and also can be used as a stand-alone signal generator up to 6 GHz with free software.

Currently set up in my home lab in Aurora so you can come try it out before buying. It is surplus to my needs because I have several SAs and am out of space. This analyzer with the LCD upgrade runs \$1500 plus shipping on Ebay, while the TG6000 goes for \$719. **You can buy both the spectrum analyzer and the tracking generator from me for \$1500 total.**

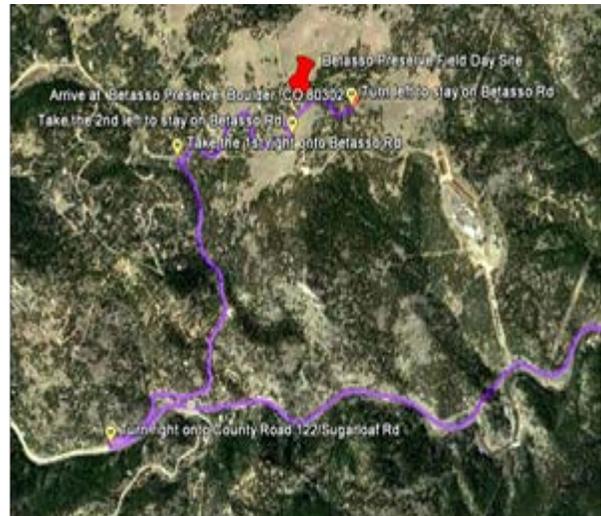
I also have multiple Tektronix 2465 300 MHz oscilloscopes, cleaned, repaired, and calibrated, for which I am asking \$300 each with set of 4 probes.

Contact: Jim at 303-577-2616 daytime or 303-873-9969 evenings.

The Last Picture Show



FIELD DAY location: Betasso Preserve
Park your car nearest the Trailhead
We set up at the picnic shelter next to it



Drive Sugarloaf Road to Betasso Road,
Stay on it somehow to the parking area near the
Trailhead.

If you get lost, wander aimlessly until you find the
Park Ranger, and claim you were chased by a
starved bear that couldn't penetrate the park's
bear-proof trash cans.