

MAC PASS REPEATER GROUP

Amateur Repeater Operations in Southwest and Western

Montana

P.O. BOX 63
JEFFERSON CITY, MONTANA 59638
406-933-5355
406-459-3625 CELL

www.wr7hln.org

towers@macpassradio.com

NEWS 6/24/2013

After 10 years, we finally have all 8 sites operating. The lone hold out, Badger Pass west of Dillon at 7,250 feet, became fully operational yesterday. As was mentioned in the last newsletter, Badger has been the one site where commercial power has not been available. On Sunday the 23rd, we completed the installation of a Solar Power Plant and the repeater to operate from it.

First, the description of the volts and amps, and there is a lot of them. The power is being generated by Four Kyocera 130-watt Solar Panels wired in parallel to provide about 32 amps, at 20 volts to the Morningstar MPPT Charge Controller at peak sun light. The controller then converts this 20-volt DC supply to three levels of charge current to the battery bank. In the morning, when the panels begin generating, the controller will hit the batteries with an "Absorption Charge" of about 14.5 volts, normally for about 30 minutes. This is to recharge the batteries from any overnight draw down. At the end of that charge, the controller spends the rest of the day "floating" the batteries at 13.2 Volts DC. However unlikely that we will ever use it, the controller also has the ability to "Equalize" charge the batteries at about 15.5 volts. The solar panels are mounted to a frame that keeps them at a 66-degree angle pointed to the south. This steep angle is too much during the high sun summer months, but is perfectly aligned to point directly at the sun in the winter when the sun is much lower on the southern horizon, and, at a time when it is only available for 8 hours in a day. The high capacity of the panels along with 18 hours of sun in the summer more than compensates for the panel angle.

The Storage "Deep Cycle" Battery Bank consists of 6, 1235 AMP 2-Volt cells made by Trojan Battery. This produces about 12.8 to 13.1 volts DC at 1235 amps to run the equipment connected to them. One of the things that actually draws the most current during the day is the Charge Controller itself at about 5 Amps per day, along with a small percentage of normal self discharge from the Flooded Batteries.

Second, the repeater and it's operation. When we began looking into a solar powered repeater at this site, we looked at Multiple Options. While we would like to be able to use the trusty Motorola MSF-5000 found at all the other sites, we found that when operating on a 12VDC system, they draw about 2 to 2.5 amps per hour in the standby mode. Initially this was a large concern because of battery and solar panel planning, and we elected to go another route. We looked at Motorola Mitrek Mobiles, crystal controlled and capable of very low standby current, but they are really getting long in the tooth and may be more problems than the one plus of low current drain. We finally settled on a Tait TB7100 DC only repeater. After testing one of these and finding very good results, especially in current draw, we bought one from Tait out of New Zealand. This is a commercial quality radio that takes up only one rack unit in height, about an inch and a half. Transmit power is 40 watts continuous duty, and has a very sensitive

receiver, allowing us to forego the normal ARR GassFet Preamp, another current drawing device. The most impressive part was this units current draw in the standby mode. 160 milliamps!! That is less than 4 amps per day. The transmitter is drawing about 7 amps when transmitting. And based on an ultra conservative prediction of 2 hours transmit per day, we calculated out a need, with the charge controller and self discharge of about 26 to 28 amps per day. Remember, in one peak sun hour, the panels will generate about 30 Amps to the batteries, all the rest of the day is simply current that is being mostly shunted into a load and turned into heat.

With a battery capacity of 1200+ amps, we feel that this combination will never come anywhere close to ever discharging more than 100 amps, and that will be an extremely cloudy day, for several days. One other advantage to the 66-degree winter angle on the Panels is that snow will have a hard time sticking to the panels.

We have only done some coverage testing on the repeater so far. We know that from Dillon North on I-15 we lose coverage about 3 mile south of the Wisdom/Divide exit, and coverage south is good to within a couple miles of the Idaho/Montana border. State route 41 from Dillon north works fine through Twin Bridges and all the way to I-90. We also tested I-90 briefly from that point back to the west to a point just east of Homestake pass into Butte. We have also tested many years ago and found State Route 278 from I-15 to Jackson works well, along with the State Park of Bannack. From the tower, we can see west to Idaho and the Big Hole area so future testing will have to be done.

And finally, in the next few weeks we hope to install a Echolink link system to tie in this repeater with the rest of the system. When you all start hearing people in Dillon and that area on the system, you will know it has been completed.

Although no photos will be included in this newsletter, look for them to be posted under the Badger Pass portion of the club website soon.

In other news, this last Saturday the 22nd, our Lookout Pass repeater served as the command frequency for the inaugural 50 Mile Trails run from the West side of Lookout Pass at Mullan, Idaho to St. Regis, Montana. Over 250 runners took place in the event that is slated to become an annual thing. The Lookout Pass repeater worked perfectly for covering all the many deep canyons of the run's course, many places where cell phone coverage was non-existent.

Planned work includes changing out the two meter repeaters antennas on Mac Pass to Telewave ANT140F2 antennas very shortly. With the constant high winds on MacDonald Pass we hope this change will eliminate some of the "crackly noises" sometimes experienced. By the way, the UHF/VHF remote base on Mac Pass is working great.