

W1SYE Repeater Update April 15, 2013

Rick Brendlinger (N3RWB), Ed Gosling (W1NQH), John King (WA1ABI), and Willy MacLean (W1LY) visited the repeater site on Sunday April 14 to begin Phase 1 of the planned repeater maintenance activities. They performed the following tasks:

- General housekeeping in the repeater vault. Visually inspected all equipment. Inspected all power and RF cables. Replaced all room light bulbs.
- Replaced the repeater controller's on-board backup batteries. The existing AA batteries were well past their expiration date and had leaked a small amount of battery electrolyte onto the battery holder terminals. Cleaned terminals and installed fresh batteries.
- Adjusted the repeater receive audio level to fully deviate the repeater transmitter.
- Adjusted the voice synthesizer audio level such that the voice synthesizer level is somewhat lower than a human repeater user's voice level.
- Measured the post-duplexer repeater transmitter RF power output. The RF power into the main Heliac transmission line (post duplexer) was recorded at 27 Watts. This means that 20 Watts of RF power is reaching the repeater antenna. This is a respectable figure, which should be adequate for coverage of Newport County.
- Downloaded the controller's original W1SYE programming to a laptop hard drive. This was a safety precaution in case something went wrong during the upload described in the next step.
- Uploaded a new W1SYE control program to the controller. Features of the new control program included below.

New features of the new W1SYE repeater control program:

- **Request Time of Day (T-I-M-E)** – Any repeater user can command the repeater to key up and announce the current time by entering the DTMF (Touch Tone) code **8463** (the letters T-I-M-E on a telephone.) This feature may be helpful in determining how well you can access the repeater from your current location. If the repeater can hear your transceiver well enough to decode its DTMF tones, you likely can get a voice message though.
- **Temporarily Disable PL (N-O-P-L)** – Any user can command the repeater to drop the input PL requirement for a 30-minute period by entering the DTMF (Touch Tone) code **6675** (the letters N-O-P-L on a telephone.) PL from the user's transceiver is not required to activate this feature. The repeater will automatically return to normal input PL required operation after 30 minutes. The repeater can be forced to return to normal input PL required operation before 30 minutes elapses by entering 6675 a second time within the 30 minute window. This feature may be useful in a number of scenarios, especially in emergencies.

Changes in the new W1SYE repeater control program:

- **Courtesy tone changed** – The courtesy tone is now a single beep that occurs one second after a user unkeys. A second, distinctive 2-tone courtesy beep is stored in the controller memory for future use. This alternate courtesy tone will be used to indicate that the repeater is operating on battery power. The hardware needed to implement AC power fail detection will be installed at a future date.
- **Voice ID's modified** – Two voice ID's are now programmed in the controller: an "Active" voice ID and an "Idle" voice ID. The Active ID, used when a QSO is in progress, is short and succinct. The Idle ID is more verbose and is used only when the repeater has been idle for more than 10 minutes. In the event that a user talks over a voice ID, the controller will now switch to a CW ID that will allow the user to be heard while still fulfilling the ID requirement.
- **ID interval changed** – The ID timer has been set to 9 minutes, 50 seconds. It had previously been set to 8 minutes.
- **Promiscuous ID's retired** – The repeater will no longer ID spontaneously at 15 minutes past each hour. A CW ID will fire at 18:55 hours each weekday to remind users of the NCRC net at 19:00 hours. This ID will not fire if a QSO is in progress.

Current repeater state and future planned improvements

The repeater now has a new Hustler G7 antenna fed with brand new Andrew LDF4 Helix transmission line, both professionally installed by Willy MacLean (W1LY.) The repeater transmitter is delivering 20 Watts of RF power to the antenna. This power level should be sufficient to provide receive coverage to hand held portable transceivers nearly anywhere in Newport County. User reports from all areas are solicited.

The repeater audio levels are reasonably balanced, and the transmitter is 100 per cent modulated (5 KHz deviation) by the repeated user audio.

The repeater's receiver is moderately to severely impaired by desense from the repeater transmitter. A cracking noise which may or may not be related to the desense issue is evident on moderately weak received signals. Both of these issues are severely limiting the repeater's talk-in range. It is not possible to reliably access the repeater using a handheld portable transceiver from many areas of Portsmouth. User reports from other areas are solicited.

The next phase of repeater work will focus on the RF system, particularly the receive side. This will be challenging work. Problems of this nature often have multiple layered root causes. Troubleshooting usually requires specialized test equipment and almost always requires a great deal of patience. After we have achieved the desired end state of totally quiet desense-free receiver performance, we may wish to consider adding an RF preamplifier to the receive chain. We are not even close to the point where we should be thinking about a preamp now.

An AC power good / power fail detector that can provide logic signals to the controller needs to be designed, constructed, and installed in the repeater rack. This would make an excellent club project. Is anyone interested in leading this effort?

We may wish to consider upgrading the existing repeater system backup battery (lead-acid) with a new state-of-the art LifePo4 battery. This would be an expensive upgrade, but it would offer far greater reserve capacity, nearly zero maintenance, and a ten-plus year lifespan. We may also wish to look into the feasibility of supplemental solar power. This would be a good discussion to have at a regular club meeting.