

# **Nittany Amateur Radio Club**

**W3YA**

## **85 Repeater**

### **General Operation Overview**

The State College 85-repeater operates on 146.850 MHz. A truly regional machine, the 85-repeater covers almost all of central Pennsylvania and is centered on the State College area. There are eight receivers located on mountaintops surrounding the State College region. Three of the receivers are at the main repeater site, and five receivers are located at remote locations. Having eight receivers at six sites greatly enhances the performance of the 85-repeater system. Talking on the 85 repeater is easy; simply push the talk button on your microphone and talk. All complex switching between the repeater's eight receivers is handled automatically.

The 85-repeater is an open machine; you do not need a PL tone to access the repeater. However, to take full advantage of the repeater's advanced coverage, you should set your radio to transmit a PL tone of 146.2 Hz. All modern 2-meter radios have this feature, and transmitting this tone will allow you full access to all of the system's remote receivers. Without this tone, your signal will be limited to the receivers at the main repeater site. Note that during periods when the repeater's "stray input eliminator" is active, you will need to transmit the PL tone to have any access to the repeater. This only happens when there is severe interference from other repeater systems.

The repeater always transmits its own PL tone of 146.2 Hz. It is recommended that you program your receiver's tone squelch function (CTCSS) to 146.2 Hz. This will eliminate many sources of local interference that enter your radio directly, i.e. signals not coming from the repeater such as computer and security systems. This type of interference tends to open your receiver's squelch with annoying noise bursts as you drive around town.

The NARC control operators can assist you if you have any questions.

The 85-repeater consists of one central 2-meter transmitter with eight separate 2-meter receivers located at six independent receiver sites. These remote sites are linked back to the main repeater transmitter. A receiver voting system selects the receiver with the best signal to be broadcast by the repeater's transmitter. Three of the eight receivers are located at the central transmitter site and operate in an open mode with dual squelch – no PL tone required for access. The remaining five receivers are located at remote locations; all five remote receivers require PL tone for access. This greatly reduces stray pickup from other repeater regions.

### **85-Repeater Sites**

Rx #	Site	Function	Mode
1	Little Flat - Wide North Antenna	Main Site	Open – Dual Squelch
2	Little Flat - South West Antenna	Main Site	Open – Dual Squelch
3	Little Flat - Broad East Antenna	Main Site	Open – Dual Squelch
4	Pine Grove Mountain	Remote Site	P.L. Access 146.2 Hz
5	Purdue Mountain	Remote Site	P.L. Access 146.2 Hz
6	Rattlesnake Mountain	Remote Site	P.L. Access 146.2 Hz
7	Lewistown (Blue Mountain)	Remote Site	P.L. Access 146.2 Hz
8	Downtown State College	Remote Site	P.L. Access 146.2 Hz

### **Repeater Features**

#### **Repeater Voice ID**

The repeater speaks its call-sign ID every ten minutes in its own voice when the repeater is active. The repeater will always wait until you let up on your mic key before giving its voice ID. If you key up over top of the repeater's voice, it will simply switch to its CW ID.

#### **CW ID**

The CW ID is sent only if a repeater user transmits during voice ID. Example: The repeater sends, "W3YA/R" in international Morse code. The CW ID is also used during net operations.

## **Repeater formats**

The 85-repeater supports multiple operational formats. This allows the repeater's operating parameters to be tailored to specific communication applications. Each memory format can support independent IDs, messages, timer settings, and courtesy tones.

Example: The voice ID may be suppressed during net operations. Each format has a unique courtesy tone, which is used to identify the repeater's current format. Currently the 85-repeater can operate in the following operational formats:

Normal operation format

Net operation format

Stray-input noise reduction format

Severe weather alert format

## **Specialized Courtesy Tones**

The 85-repeater has the ability to generate unique courtesy tones depending on the repeater's mode (format) of operation. The tones consist of one to three tones played in sequence. These tones change with the repeater's usage and are currently set as follows:

Normal Operation – 400 Hz short beep

Net Operation – 1000 Hz long beep

Stray-input reduction mode – 2 beeps of differing tones (800 Hz & 1000 Hz)

Severe Weather Alert format – 3 beeps (300, 600, 900 Hz)

## **Stray Input Interference Eliminator**

From time to time, stray inputs from other repeater regions will plague any repeater. This interference is characterized by a weak signal that continually brings up the repeater. Typically you can hear only one side of a conversation. This interference can go on for several hours. The 85-repeater has two features to eliminate this type of interference. First, the three open receivers incorporate dual squelch. This is where weak signals of distant origination require PL to access the system, and strong, local signals do not require PL. Second, during periods of severe interference, any control operator can switch the three open receivers to PL access. This eliminates stray-input interference by insuring that the repeater accepts only signals intended for the State College repeater. The system automatically reverts back to open access after one hour, and a control operator can reset the system manually. This mode of repeater operation is indicated by a dual courtesy tone – two beeps.

## **Scheduler**

The 85-repeater has a multi-function scheduler that fully automates repeater operation. The scheduler contains a twenty-four-hour clock and a yearly calendar that permit repeater events to be scheduled to the minute. An example is to automatically change the repeater's format to net-operation format during scheduled nets such as the ARES/RACES Sunday night net.

## **Voice Synthesizer**

The 85-repeater has its own voice. Sounding somewhat mechanical, the repeater has a vocabulary of 475 words. The repeater's voice is used to announce repeater formats, IDs, and alarms.

## **Bulletin Announcements**

NARC informational bulletins are broadcast daily at 7:15 PM. Three bulletins are normally active, and are broadcast automatically by the scheduler. The 85-repeater records bulletins in non-volatile digital memory.

## **Autopatch**

The telephone autopatch is open to members and non-members alike.

## **Back-up redundancy**

In addition to the normal transmitter, power amplifier, and eight receivers, the 85-repeater incorporates a fully independent back-up transmitter and repeater controller.

## **NOAA Severe Weather Emergency Broadcasts**

The 85-repeater has an interface to the NOAA weather broadcast system. When a severe weather alert is broadcast by the NOAA weather service, the repeater will re-broadcast the warning. The repeater will periodically announce the nature of the warning during the alert period determined by NOAA. The alert is cancelled automatically or can be cancelled by a control operator.

## **Repeater Control**

The 85-repeater is operated for the Nittany Amateur Radio Club of State College, Pa, and is owned by Eric Brooks N3EB and Woody Brem K3YV. A control team monitors repeater operation, maintains equipment, and offers assistance to repeater users. Repeater use, policies, and rules are determined by the Nittany Amateur Radio Club and the repeater owners.

