

Detailed Remote Weather Reporting VIA Packet Radio

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Abstract

This paper will describe a unique way to view real-time dynamic weather station information via packet radio in extreme detail and accuracy.

Introduction

Union County Ohio had been looking for an accurate and truly dynamic monitoring tool for watching weather station activity over a vast area for SkyWARN and EMA HAZMAT use. A program called URANIUM (For Radio Active Weather Reporting), gives Union County public services, as well as Amateur Radio SkyWARN people, a way to see actual moving or dynamic displays of up to 6 (six) weather stations on a single screen, and can collect data of an unlimited number (limited to actual channel use or congestion) of weather stations. Until now, this had never been done in a manner which is affordable to the Amateur Radio community. Watching the remote display of a Uranium station is the same as standing at the weather station itself watching the rose movement, and rise and falls of all data collected from each station. To date, Uranium is being used by assorted public services including SkyWARN, Ohio State Police, Union County Police, Fire, National Weather Services, EMA, as well as assorted Emergency Management EOCs (Emergency Operations Centers) in the state of Ohio.

Uranium makes use of a standard TAPR or TAPR clone TNC, 2 meter radio (or police scanner), and a computer. It monitors weather stations using a "type E" or "type F" beacon. These beacons are transmitted from each Uranium host station in a compressed unconnected info AX25 packet. One beacon is transmitted approximately once a minute. Each minute packet contains a wind speed and direction transmission, while every 5 (five) minutes, a beacon is transmitted which contains current temperature, average wind speeds and directions, humidity, high and low data for the day. Optional stations can transmit 1 (one) minute lightning strike data, and rain collection. The collected data is compiled at the remote site to display dynamic and real-time charting of all data, as well as an azimuth rose which cycles through the last 5 (five) received direction and speed beacons to give you a dynamic movement every second of each station.

The appearance is a real-time moving display of each weather host. With the beacons received, Uranium has the ability to display the heat index, dew point, cumulus cloud level based on collected data, heating and cooling degree units, average or mean temperature, as well as current trends. All this data can be archived and retrieved at later dates or times for charting, tabling, or whatever the needs may be.

Some of the other abilities of Uranium, which don't depend on the packet beacons include sunrise and sunset data, as well as moonrise and moonset data. Data displaying even the azimuth location of each

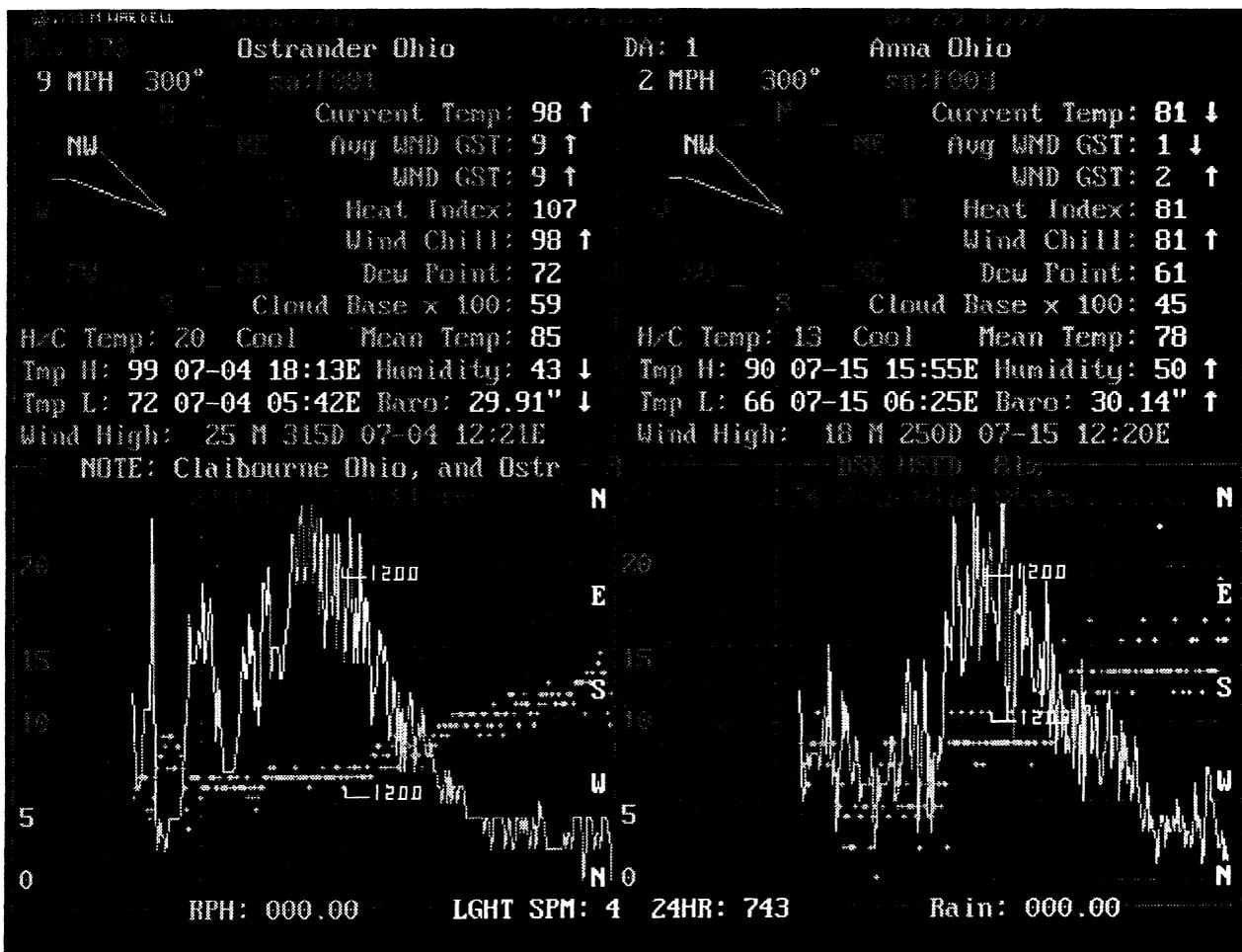
rise or set can be displayed as well as ecliptic moon information. WWV accurate time is also transmitted each hour to keep the remote stations accurate and correctly timed.

There is also a messaging ability within each host which can transmit Weather Forecasts or warnings. If the option is turned on, Uranium can update each remote with a message which is transmitted one line at a time. An entire Forecast message, if fairly long, can propagate to each remote station in about 10 (ten) minutes, keeping channel congestion to a minimum.

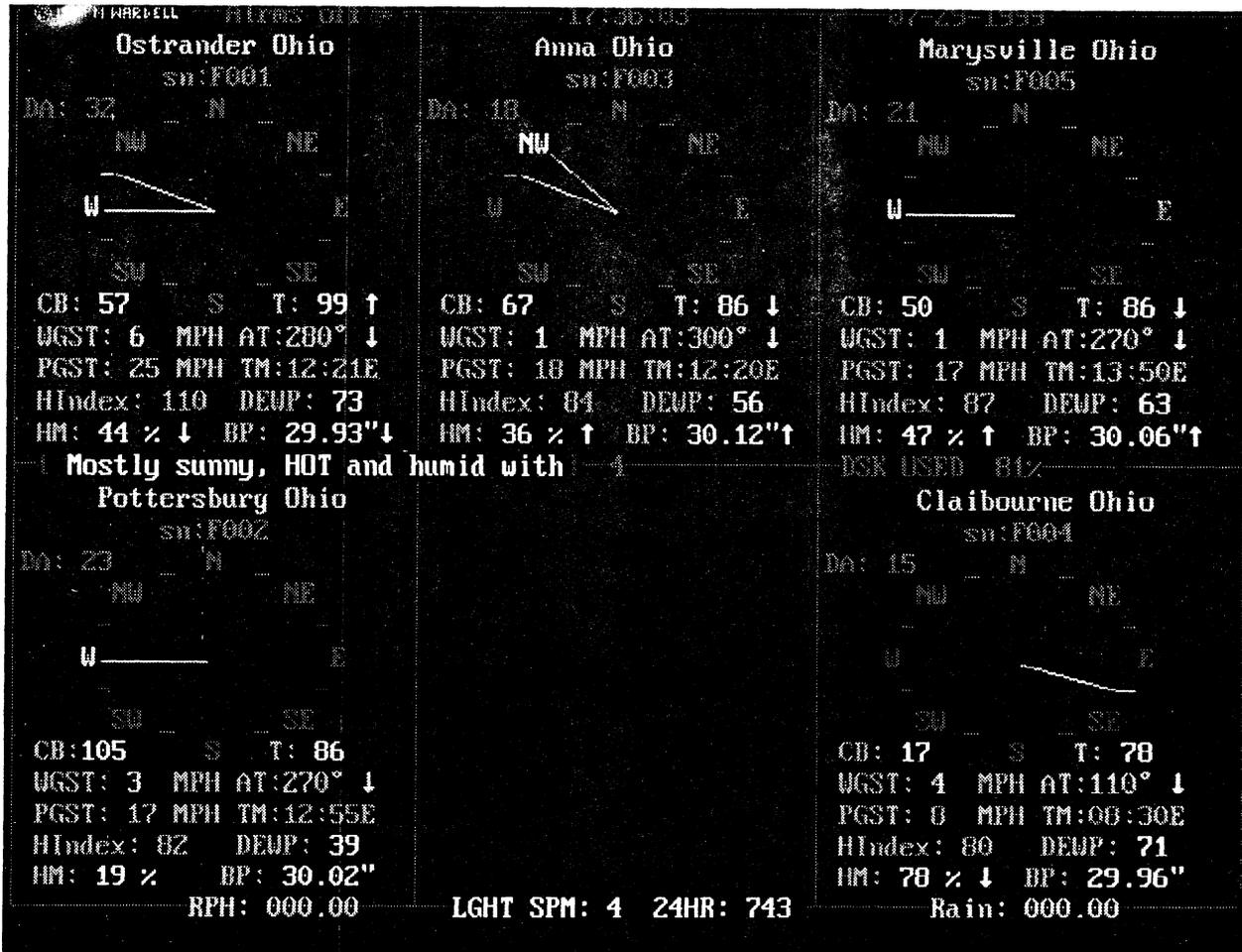
Uranium has a collection of alarm conditions which can be set to warn of any extreme change or conditions which the user wishes to be notified. These alarms can be audible or visual. Some of these include barometric pressure threshold alarms, wind gust threshold alarms, fog condition alarms, forecast warnings, watches, or advisory alarms.

The charting of the data collected is easy to read and intuitive to understand. For example, if a temperature drops below freezing, the chart line will change color to imply the threshold. All alarm conditions also can be set to chart changes.

The following example is one of the display screens showing wind speed and direction charting, as well as the above stations current displays all in real-time movement.



In order to monitor more stations, you can move to a 6 (six) station display which will display its current data dynamically moving.

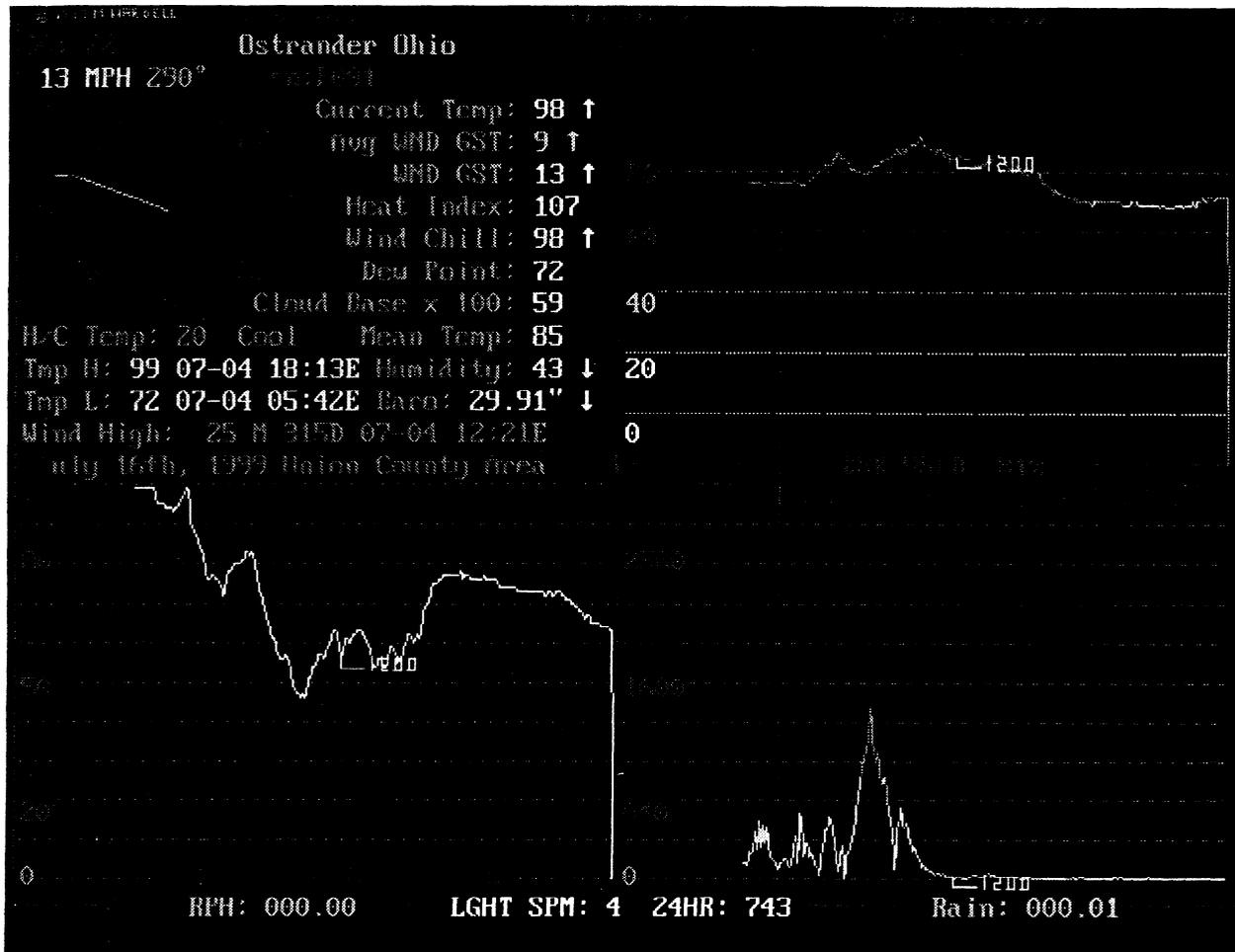


The above example shows 5 (five) stations being monitored. Note that there is a scrolling marquee in the center left of the display. This will scroll across the screen continuously. You can also see the current rainfall Rate Per Hour as well as the total rainfall since midnight. In the center bottom, you have a current count of lightning data collected. Lightning strikes per minute, and since midnight. Since Uranium is saving all its data, you can also see how much disk space you have remaining at the center right.

Lightning data can also be charted in real-time as well as the history. Lightning strike data is collected by an inexpensive device being sold by StormWise for about \$60. This device can track lightning strikes as far as 250 miles from the receive antenna and is immune to man made noises.

Currently, Uranium hosts can transmit data from the EarthQuest weather stations, and the Capricorn II weather stations. These devices, recommended by the National Weather Service, can almost guarantee the accuracy of each display since they are both certified, and preset by the companies which sell the devices.

Below, is an example of single station monitoring. These charts include the temperature trend since midnight, barometric pressure, and lightning strike data received from the Ostrander Ohio weather station. Note, that even though this screen only shows one stations data, all other weather stations are still being monitored and data saved.



Time and space restraints don't allow me to go over every option built in to Uranium. But its abilities are impressive to the amateur meteorologist, as well as the professional.

Uranium was written by myself over the passed 3 (three) years with help from Meteorologists from the National Weather Service, EMA, and other public service people. It is extremely stable, intelligent, and has been known to run trouble free for months without a glitch. Uranium remote is available as Shareware, and can be distributed freely among licensed amateur radio operators. A small shareware fee can register and unlock all of Uranium's abilities. The only requirement is you need at least one weather host in your area to receive the weather data. If you have a Uranium host in your area, but don't want to use Uranium, all hosts transmit an APRS compatible beacon to show up on any current APRS station (assuming they are monitoring the correct frequency).

Conclusion

In short, Uranium is an impressive weather forecast and monitoring tool for any amateur radio or public service / emergency use. It uses a standard packet station, and requires no special equipment on the receive side. Anyone who has a need for extreme weather detail, real-time weather station displays, or simply want to archive weather data, will find Uranium will fill those needs plus some.

Uranium has proven itself **many** times over in west central Ohio, and is a powerful severe weather warning **and** monitoring tool which evolves with its users needs and wants.

Uranium has no limitation on receive sites since what is being transmitted as an unconnected packet beacon.

Please feel **free** to contact me via email at **n8lhg@midohio.net** if you would like more information. I can also send you a copy of the users manual if you are interested in more detail as to how Uranium works, and its abilities.

73!

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