Vol. 11 No. 7 September 1997

September Meeting: Friday 26 September at 7:30PM at the Springboro Huntington Bank (basement) located at the intersection of SRs 73 & 741. Program: **Modify a Radar Detector** to a 10 GHz FM Receiver. A Workshop conducted by Sam, WA8ZDF. Details on the next page!

Contents

Upcoming Events: Oct. 4, Midatlantic Conference (Packrats), Warminster PA
contact John at JohnKB3XG@AOL.com or (610) 584-2489
Oct. 10-12 TAPR Digital Conference, Baltimore MD (near A/P)
Oct. 17-19 AMSAT NA Symposium, Toronto Canada
Oct. 18/19 EME Contest
Oct. 23-26 Microwave Update, Sandusky OH,
contact Tom, WA8WZG@WA8WZG.com or (419) 732-2944
Registration $ 40 before Oct. 2, $ 45 after

Radar detectors (see May issue) will be available at the meeting.

Life must be lived Forwards, but can only be understood Backwards
Drive safely, Speed can kill.

De N8ZM

It's been a long time since the last issue of Anomalous Propagation, and now that fall is officially here, we should get back into the groove. Certainly we had one of the best picnics cum antenna measurements ever way back in early August, and as always, thanks are in order to Karen and Daun Yeagley for hosting the event. We had a very good crowd, comfortable weather, and far too much good food to be able to sample it all. I hope that all of you who were there had as much fun as I did, and for those who couldn't make it this year, we'll probably do it again next August. Gerd has the results of the antenna measurements elsewhere in here, so I'll let him report on that. Of course, he deserves the credit for putting all the details in place so that we can have good data to use in evaluating our designs. And thanks to all who helped with the setup and cleanup activities so that testing could proceed quickly. My personal thanks go to Daun for lighting the gas grill for me (a long, sad story), and to all the folks who made the burgers and dogs disappear after I torched them!! Can you believe two blimps (as in airships) flew by on the same day?! One even took time to fly a circle around us, just 'cause we asked. All in all, a very fine day in the country.

For the September meeting, on the 26th, Sam Laube, WA8ZDF, is going to conduct a workshop to take us through the steps to modify a radar detector into a simple receiver for the 10 Ghz ham band. Sam says that it only takes about an hours work, and a handful of parts to accomplish, so we are going to try it. I will have a supply of detectors with me if you haven't already picked up one of the KRD-16 models that MVUS has been selling. For this one night, the price will be one dollar each for as many as you want.

You will need to bring some parts and some tools, and if you don't have everything on this list, hopefully someone else will have it and will share. If you have extras of any of these parts, please bring them along as I realize this is short notice to do much scrounging.

OK, here it goes. The basic tools are: a small (less than 30 watt, small tip) soldering iron, solder, cutters, needle nose pliers, small regular and phillips screwdrivers, Dremel like tool, and a source of 8 to 12 volts at 150 ma or so.

Parts needed are:
1 - 27uHy choke, molded, axial leads
1 - 4700 ohm 1/4 watt
1 - 1000 ohm 1/4 watt
1 - 5600 ohm 1/4 watt
1 - 10K pot for tuning, physical characteristics not critical
1 - .1 uF ceramic or ?? capacitor
1 - 1 uF Tantalum or electrolytic, 15 volts or higher a few inches of wirewrap or other small hookup wire

The following parts are for adding a small audio amp, AFC circuit, and an analog "S" meter to the receiver:
1 - LM386 IC amplifier
1- 100 uF Tantalum or electrolytic, 15 volts
1 - small 8 ohm, .2 watt speaker
1 - 20K pot
4 - 10K ohm 1/4 watt
2 - 100K ohm 1/4 watt
1 - 1 uF Tantalum or electrolytic, 15 volts
1 - 1 ma, full scale, meter

Like I said, if you have extras of anything, please bring them to share, and if you don't have all of the stuff, bring what you can, you'll still be able to make a start and see how it's done.
Later this year, Sam says he hopes to be able to show us how to make a transmitter for 10 Ghz to work with the receiver, possibly using a radar detector as the starting point. Sounds like a lot of fun!

See you there, Tom.

This and That

P3d delayed again. It is now certain that P3d will not fly on the Ariane 502 scheduled for 30 September. Only one small Irish satellite and two full weight well "instrumented" dummies will be on board. Reasons for P3d's absense are explained in AMSAT bulletin that came out in late July. P3d's special status with ESA (European Space Agency) puts it in a category akin to a "standby passenger" and the next opportunity for launch (on 503) should come in about 5 to 6 months.

Sunspot Cycle 23 is underway. It has now been determined that the sunspot minimum took place in May of 96 with a low of 8.1. This made cycle 22 the 3rd shortest on record (since 1755) with 9 years and 8 months. Early September the solar flux climbed above 100 for the first time since March of 94. G0CAS

Big Ear. On a recent visit to the site we were told that the antenna is still in use and will be up to the point of dismanteling now scheduled for December. Somewhat in disrepair, the antenna is still an impressive site. It has the size of three football fields and was built in 1963. A tour will be offered from the Microwave Update Conference in Sandusky in October (see page 2). Now for the good news: a new radio telescope is planned to be built further out in the country.

Plain front panel. An Australian company, Emtronics, offers a shortwave receiver with a good old- fashioned front panel with only three knobs and 4 pushbuttons, cool!

Who needs 5,000 batteries? For his first big order from Cadillac the inventor Kettering needed 5,000 stronger batteries than were available at the time to power his electric self starters. He wrote to all the battery manufacturers and got no or negative anwers. So he was delighted when a salesman of a major manufacturer wanted to meet him. The salesman, however, was just simply curious to see what kind of fellow needed 5,000 batteries. They did work out a special order and Kettering got his batterries. Roz Young DDN

Enourmous filter. Medical science indicates that your central nervous system tosses out 99% of what your senses register so as not to bother your busy brain with same. This diposes of countless commercials, I suppose. L.M.Boyd

Writing with digits. The numerical key pad has the numbers 2 through 9 also labeled "ABC" "DEF" etc. This is often used to type letters in telephone devices like fax mashines. The scheme used is quite simple and you do not have to bother the look-up-table. For "A" press 2 once, for B press 2 twice, for E press 3 twice...get the idea? KF4TP

He who learns but does not think is lost, he who thinks but does not learn is in danger. Confuzius

Oscar 10 still performing. Launched 16 June 1983, Oscar 10 is still usable to some degree. As the appogee is now moving back to the northern hemisphere the US and Europe will have a better "shot" at it. Another veteran is 13 year old imaging satellite: Landsat 5. After 70,000 orbits it is still performing well. This satellite was designed for just three years of service.

"A human being is the best computer available to place in a spacecraft.... It is also the only one than can be produced with unskilled labor." Werner von Braun

If Microsoft ran the nation's airports, the 2PM flight from Dayton to Memphis would finally leave the ground at 3AM the next day. And there would probably be some bugs in the breakfast. Bill Husted

Coffee Can Feeds as Reference Antennas

Al, WA5LUA has perfected the art of measuring the gain of coffee can and similar antennas to the point where repeatability to within .5 dB is achieved. This means you can build one of these antennas and can be pretty sure of its gain. Al is using 2 equal antennas and measures the power transfer over a short distance (compact range). Reflections are kept to a minimum by mounting the antennas about 12 ‘ above ground and keeping the immediate area around the antennas clear. Below you find the dimensions for a 1296 MHz and a 2304 MHz antenna. An exact description how Al did it can be found in the 1997 Proceedings of the Central States Conference on pages 167 to 174.

Dr. Al Torres, Mission Research Corp. AMTA Abstract

Radio Frequency (RF) Visual Detection Concept

A unique and novel concept is presented for the visualization of Radio Frequencies. The concept will allow the visualization of radio waves in a manner which can not only provide detection of their presence but which can also describe their spatial properties, e.g. distribution profiles.

The concept is composed of three components: An energy absorbing material, which is normally transparent to RF, a heat conductive bonding agent, which is also transparent to RF, and a liquid crystal sheet which is designed to be transparent to RF. The developed concept is shown by Figure 1.

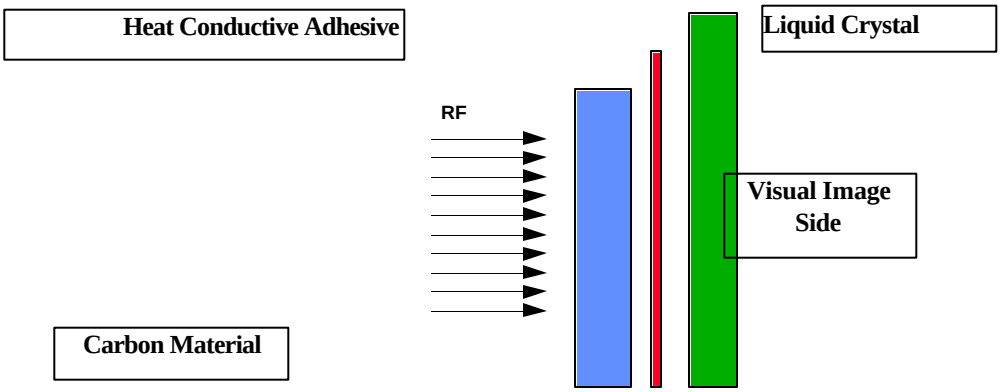

Figure 1: RF Visual Detection Concept Layout

As radio waves impact the energy absorbing material, which is made out of polyester with impregnated carbon particles to produce a resistivity level between 1500 and 5000 ohms per square, a very small incremental amount of heat is generated by these carbon particles. The heat generated by the carbon sheet is then transferred by the heat conductive adhesive to the back plane of the liquid crystal sheet which ultimately then projects the "pattern" of the RF wave impacting the carbon sheet. The typical temperature range of the liquid crystal sheet is in the domain of 77 to 105 F but such sheets can be adjusted to large variants of heat temperatures. The concept is relatively simple to fabricate but it is sensitive to the RF field to be detected. The power level of the RF source should be known before an optimum sheet can be produced. The concept is independent of RF wavelengths or frequency; it is also independent of waveform modulation.

The concept is useful for the detection and visualization of active antennas, RF leaks detection (e.g. microwave ovens) and any electromagnetic radiation generated by RF transmitters. It could also be used as a visual detector for servicing active RF components such as cellular telephones and communication equipment.

MVUS Picnic and Antenna Measurements, 9 August 1997

By Daun, N8ASB and Gerd, WB8IFM

This was the 4th year of this annual event at Karen and Daun's place out in the country next to the Clinton County Airfield (suitable for "fly-ins"). There were not that many airplanes this time but we were treated to a "fly-over" by the Goodyear blimp going south, and early arrivals did see another blimp going north and even made contact and got it to make a loop overhead.

The weather forecast was for 60% chance of rain, so I brought my big umbrella and it worked! In the late news the weatherman admitted his error (very unusual!) and talked about "The rain that never came!"

It was a pleasant afternoon with sunshine and temperatures in the upper 70s. In spite of the big canopy under which we had set up the equipment it was hard to see the traces on the CRT. Daun had hooked up an extra monitor with the brightness cranked up all the way, but it was still impossible for the party that was holding the test antenna to see. We had to depend on Daun's considerable skill at the "controls" to call out data and help maneuver the antenna. Later clouds came up and with the additional shade the operator, with some squinting, could see the trace. Somebody mentioned: maybe we should do the measurements after dark!

Besides all the theoretical knowledge, a lot of experience and skill is very helpful. That point was again driven home at the recent Central States measurements. There the same people, Mark, WB5TEM for VHF/UHF and Kent, WA5VJB for the microwaves have been doing the antenna measurements for many years. And it is fascinating to watch these guys.

Attendance was down a bit from previous years and there were fewer antennas. A few bands were skipped altogether. We started measuring around 2pm, took the picnic break between 3:30 and 5:30 and finished around 6:30pm. Results are on the next page.

Aside from the antennas, some members brought in filters/ duplexers for tuning and we did a little SWR tweaking as well. Steve, WA3OJX brought in some goodies from Drake, a brand-new 2m FM transceiver with lots of "bells and whistles" and an integral modem. Also a short-wave receiver: the SW-8 which sports a synchronous detector that eliminates a lot of the selective fading experienced in SW listening. Tuning in to CHU (7333 MHz), we all got to "synchronize" our watches to "within one second".

As in previous years we were using a network analyzer for the measurements. This time the HP 8719 D, with a frequency range from 50 MHz to 13.5 GHz, output power of 10 mW and sensitivity of - 90 dBm.
With our range and reference antennas we were generally in the 40 to 50 dB "attenuation" readings. Since we had to feed the source antennas by RG-8 type cable, we had to shorten the range at microwave frequencies considerably. It would pay to have a piece of hard-line available or to use an independent source. The advantage of the network analyzer, aside from supplying the source, is capability of sweeping across the frequency of interest. E.g. on 2m we set the range from 140 to 150 MHz and were able to see the gain across that range. Quite a few antennas had their best gain "off" frequency. Time constraints did not permit "trimming of the elements". Another advantage of the analyzer: return loss could quickly be determined and often showed why a particular antenna was an "under achiever".

9August '97 MVUS Antenna Measurements

2m / 144 MHz

Reference	8 el, 12' (W1JR)		11.1 dBd
WB8IFM	Flexa Yagi 6 el, 7' boom		9.3 dBd

70 cm / 432 MHz

Reference	11 el, 50"		9 dBd
WB8GXB	turnstyle / 28"x28" reflector		2.3 dBd
		or	5.3 dBdc
WB8IFM	"cheap Yagi" 11 el, 60" boom		9 dBd
		@430 MHz	11 dBd
WB8IFM	Flexa Yagi 13 el, 93" boom		10.8 dBd
		@430 MHz	12 dBd
WB8GXB	helical antenna, 24 turns / 10' boom		11.4 dBd
		or	14.4 dBdc
WB8IFM	X-Yagi, 9 el, 45" boom		5.1 dBd
		or	8.1 dBdc

33 cm / 903 MHZ

Reference	17 el, 60"		12.6 dBd
WB8GXB	10 el, 47" boom (Cushcraft)		11 dBd
N8EHA	parab. refl. 17"x48", feed: dipole/refl.		7.3 dBd
		w/o parab. refl.	- .4 dBd

23 cm / 1296 MHz

Reference	stacked quad with reflector 5"x9"		9.5 dBd
WD8JPP	rubber ducky / groundplane		2.5 dBd
WD8JPP	folded dipole / reflector 9"x18" ret. loss 10 dB		10 dBd
WB8ZDF	stacked quad with reflector 10"x10"	11 dBd	
"	helical antenna, 4 1/2 turns, 10"		5.5 dBd
		or	8.5 dBdc
"	loop Yagi, 45 el, 12' (Down East)		20.2 dBd
WB8IFM	dish 36", dual feed (DJ9HO)		18.6 dBd
"	loop Yagi, 26 el, 77" boom (Sonim)	16.2 dBd	
"	helical antenna, 8 ½ turns, 19"		9.5 dBd
		or	12.5 dBdc

13 cm / 2304 MHz

Reference	dual feed (DJ9HO), 36 " dish ('96)	18.1 dBd	
W8BI	dish 24", helical feed		16.1 dBd
		or	19.1 dBdc

3 cm / 10368 MHz

Reference	3" horn		13 dBi
KA8EDE	big horn # 1		13.9 dBi
"	3" poly pyramide	9.6 dBi	
"	7" " "		10 dBi
"	feed horn (can shape)		8.3 dBi
WB8IFM	little horn/ AT68UP		7.5 dBi
"	" " with 5" plexi		10 dBi
"	" " " 7 " poly rod (curtain)		10.5 dBi
"	" " " 12" poly rod		13 dBi
"	dish 20" with little horn as feed (hand held)	25 dBi	

n/a	open waveguide	6 dBi