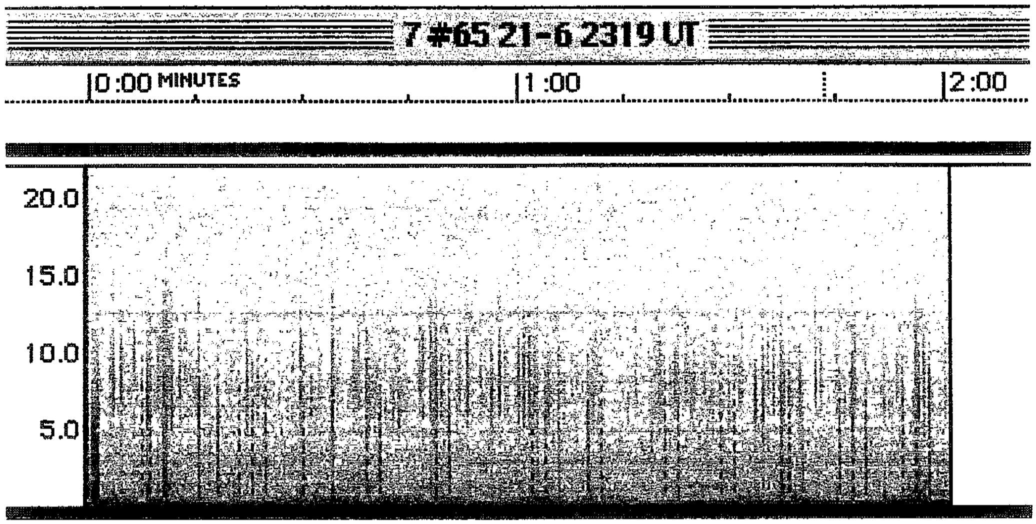
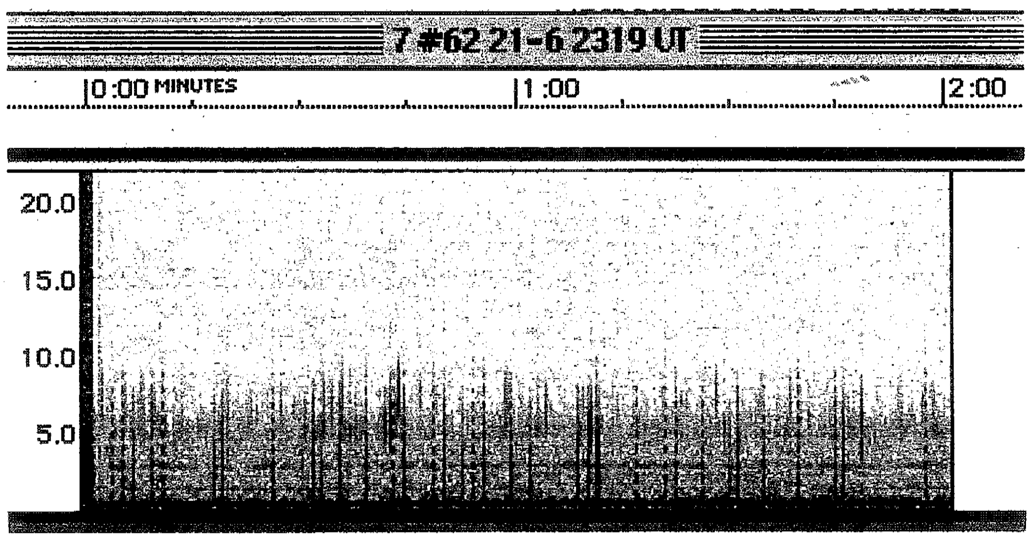
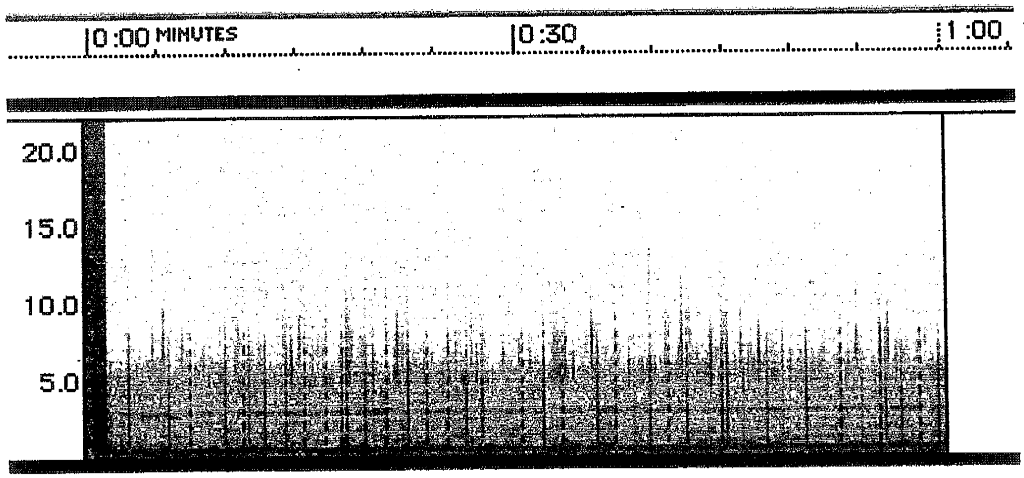


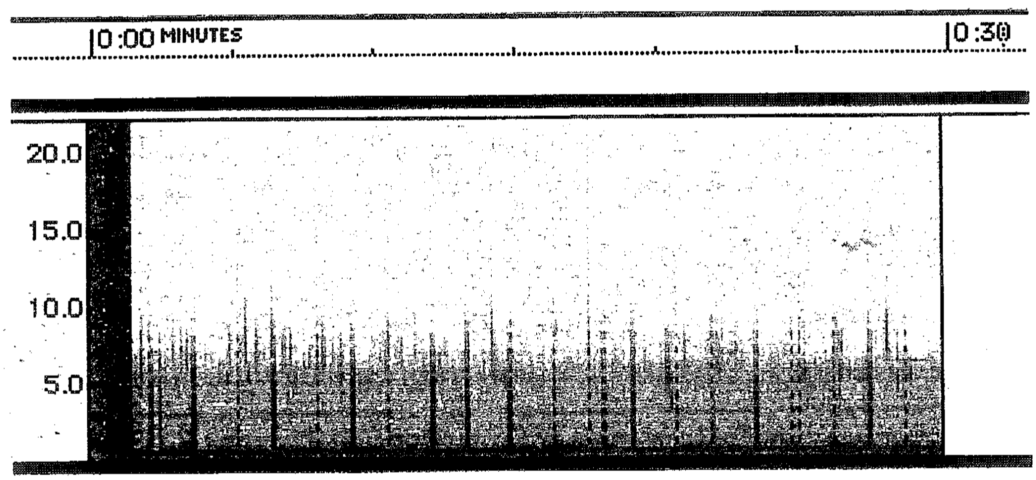
Team 7. Dean Knight, Sonoma Valley High School, Sonoma, CA. Sferics, but no tweeks. LORAN is present as is Alpha.



Team 7. This is receiver #62, which employs a 145 foot longwire antenna oriented east-west.

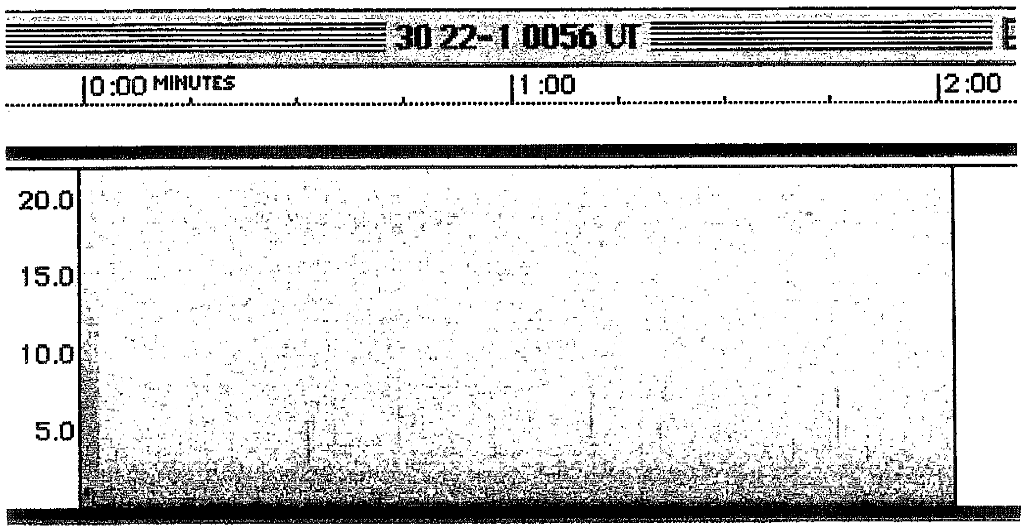


First minute from above. The vertical dashes are LORAN signals, which sound like rapid clicks.

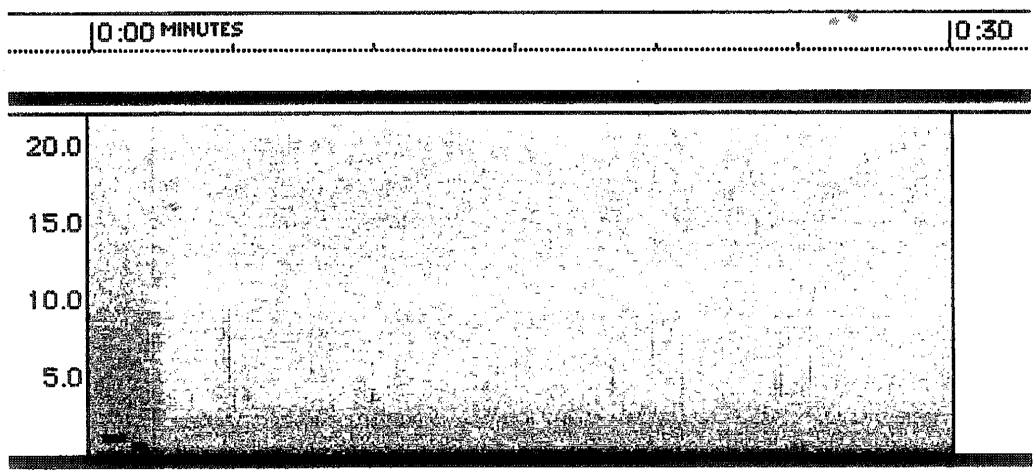


First 30 seconds. LORAN is prominent.

22-1

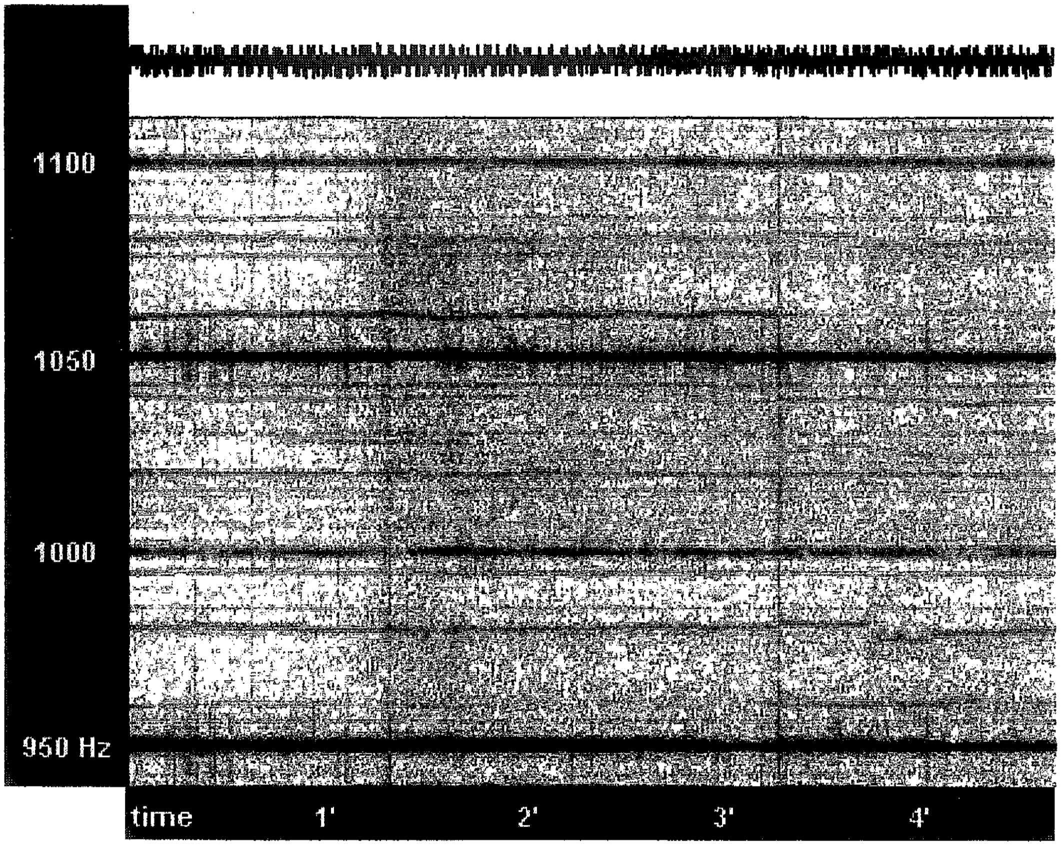


Team 30. Linden Lundback and Brian Cowan, Watrous, Saskatchewan, CANADA. This shows extremely quiet conditions. Linden and Brian are experienced observers who are very successful whistler hunters. Conditions this quiet might make one suspicious that the equipment is not operating properly. Sometimes it is this quiet, however.



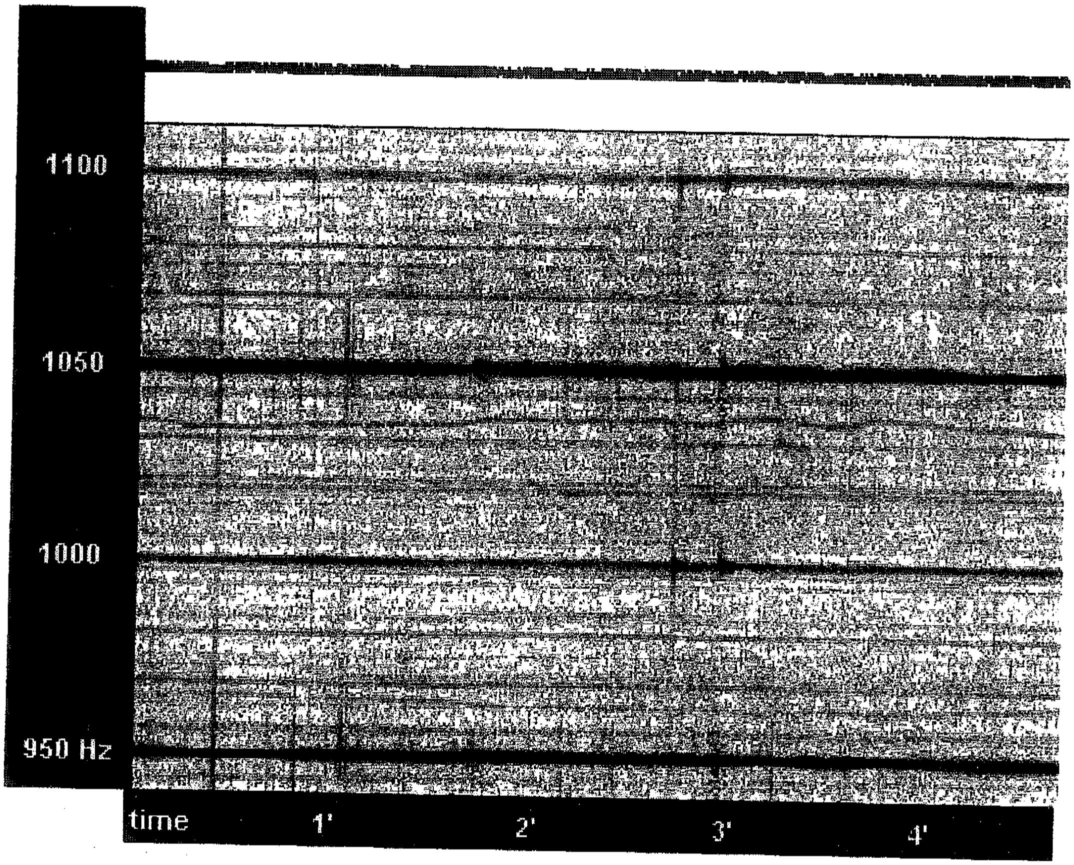
First 30 seconds. The dash at the beginning is the 1 kHz WWV tone.

E27-1



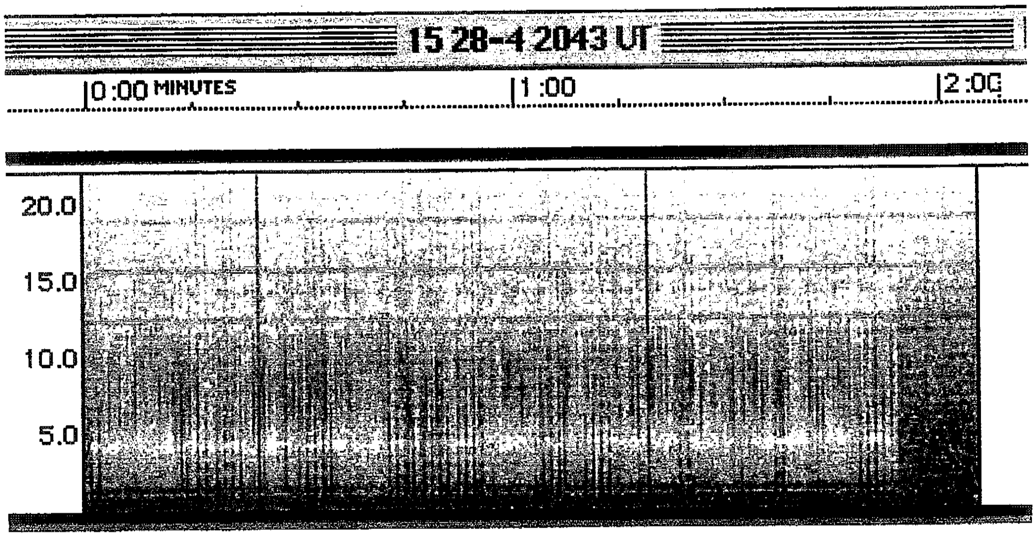
Team E5. Renato Romero, Cumiana, ITALY. "Static noise low, some interference from power line. Nothing around 1000 Hz."

E28-1

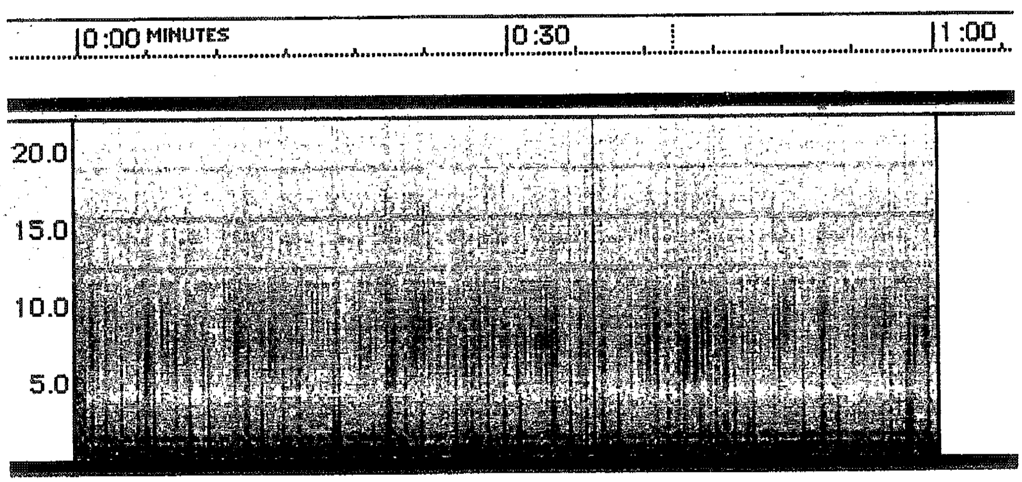


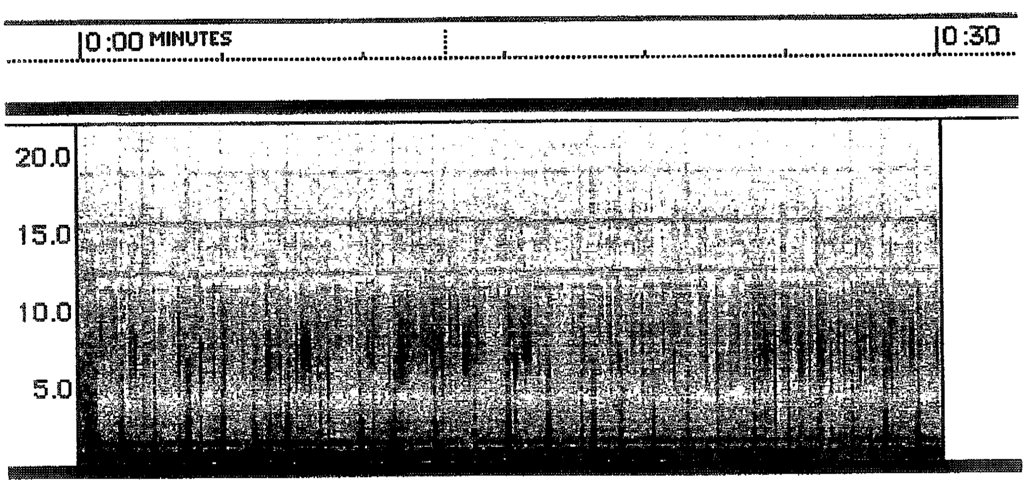
Team E5. Renato Romero, Cumiana, ITALY. "Static noise low, some interference from power line. Many weak tones in horizontal field. Nothing around 1000 Hz. "

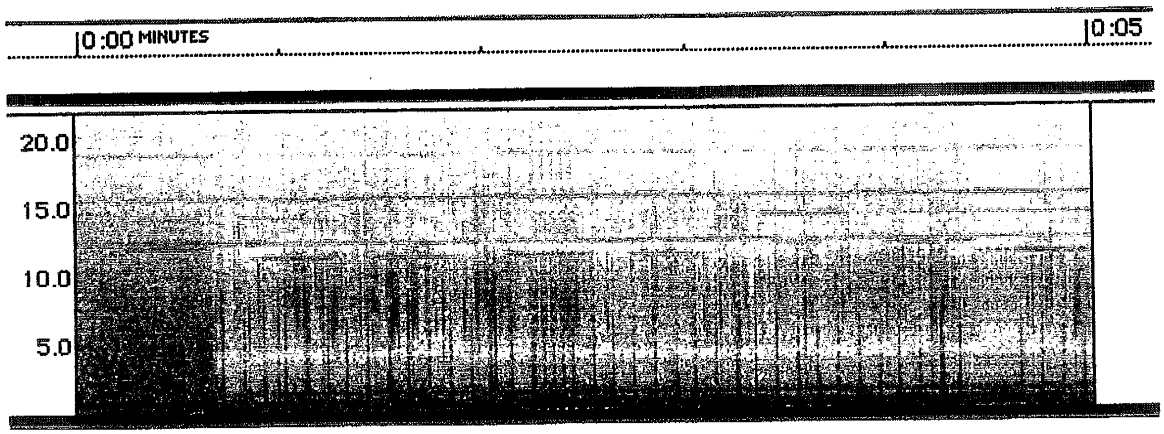
28-4



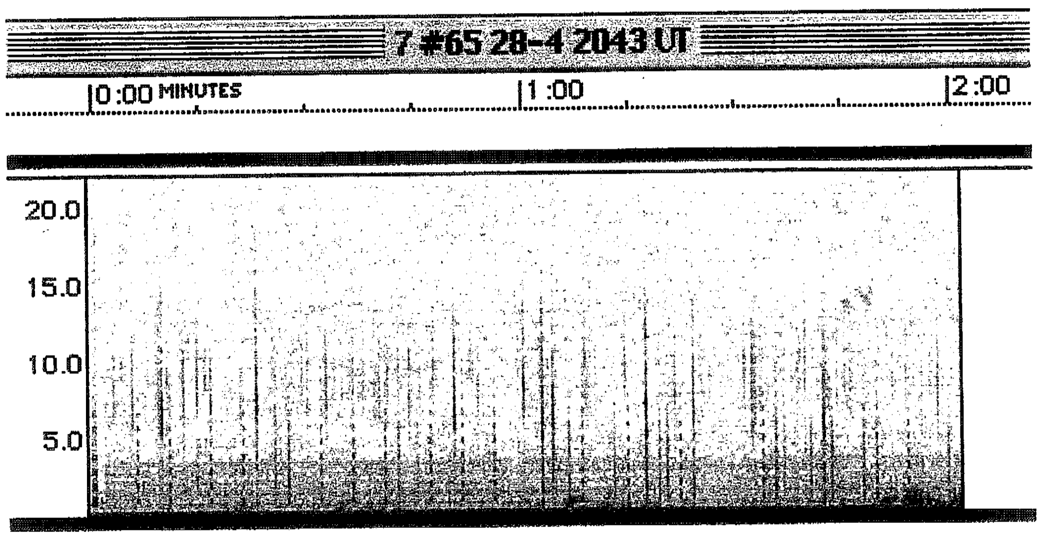
Team 15 Robert Bennett, Las Cruces, NM. Dense sferics, LORAN and Alpha.



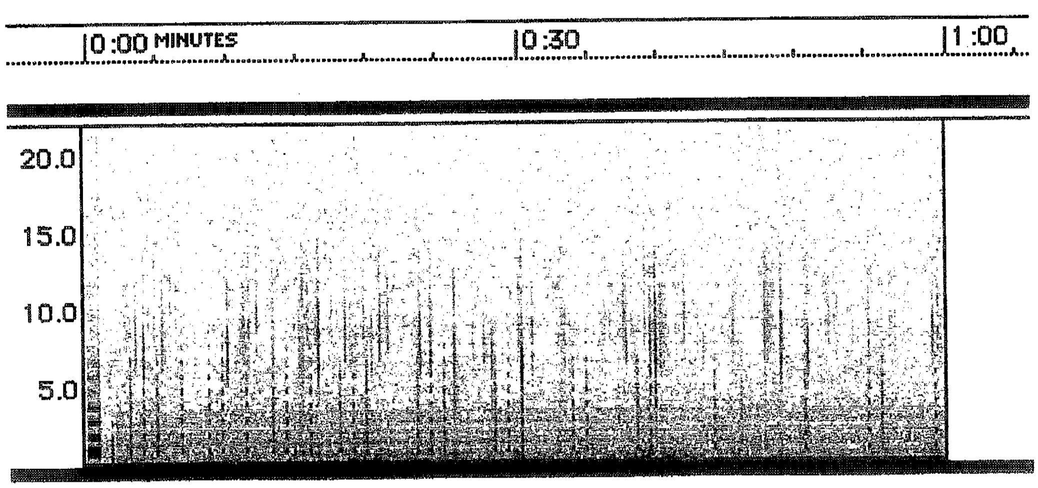




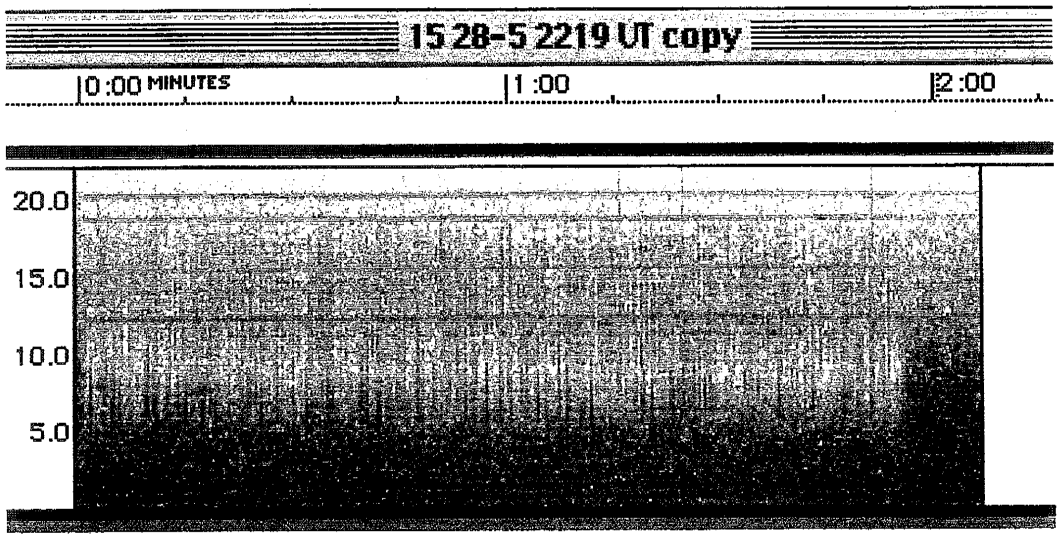
Close-up of 5 seconds showing Alpha dashes between 12 and 20 kHz.



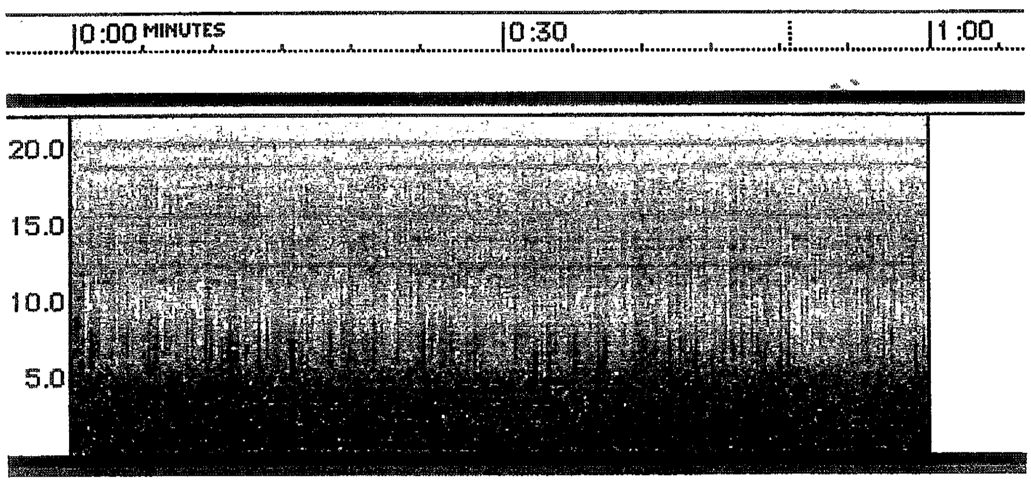
Team 7 Dean Knight, Sonoma Valley High School, Sonoma, CA. LORAN is strong, indicating that the receiver is working well. Very quiet conditions in contrast to those in New Mexico. Notice there are no Alpha signals which indicates poor propagation of this frequency range at this time.

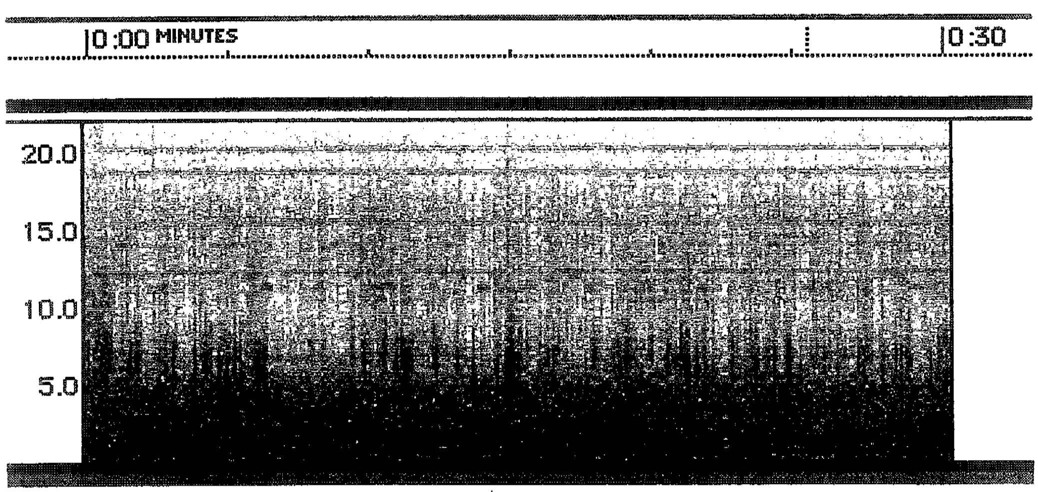


28-5



Team 15 Robert Bennett, Las Cruces, NM. About 1.5 hours after 28-4, sferics are even more dense.





Report on Coordinated Observations 11/99

By Bill Pine
Ontario, California

The purpose of the Coordinated Observation Program is to provide an opportunity for INSPIRE participants to gather data at convenient times for purposes of comparing the resulting signals and attempting to interpret them. Since there is no manmade source of VLF that is being studied here, the signals of interest are those of natural origin. As in most natural radio listening, we would like to hear something "interesting". Most of that time that would be whistlers, but other sounds such as tweeks, chorus, triggered emissions and even hiss are also interesting. Observing whistlers, however, remains the prize for faithful listening. The problem with whistlers is that they are not the most common natural radio signal. Since coordinated listening schedules are determined arbitrarily and in advance of the listening sessions, it is only a matter of luck if whistlers are available to be detected. The experience of the author is that whistlers are heard about once every four or five morning sessions. When they are present, you will probably hear a lot of them until the rotation of the earth carries the ducting magnetic field lines into an unfavorable alignment. Conditions during November 1999 varied. There were some interesting signals observed including chorus, whistlers and an amazing echo train caught by an observer in Colorado. The following report includes sample spectrograms from contributing observers.

This table summarizes the sessions monitored by observers.

Date	11/20				11/21			
Time		1300	1400	1500	1200	1300	1400	1500
Team								
11			C					
25		C	C			C	C	
30			C	C			C 11/27	C 11/27
32						M	M	

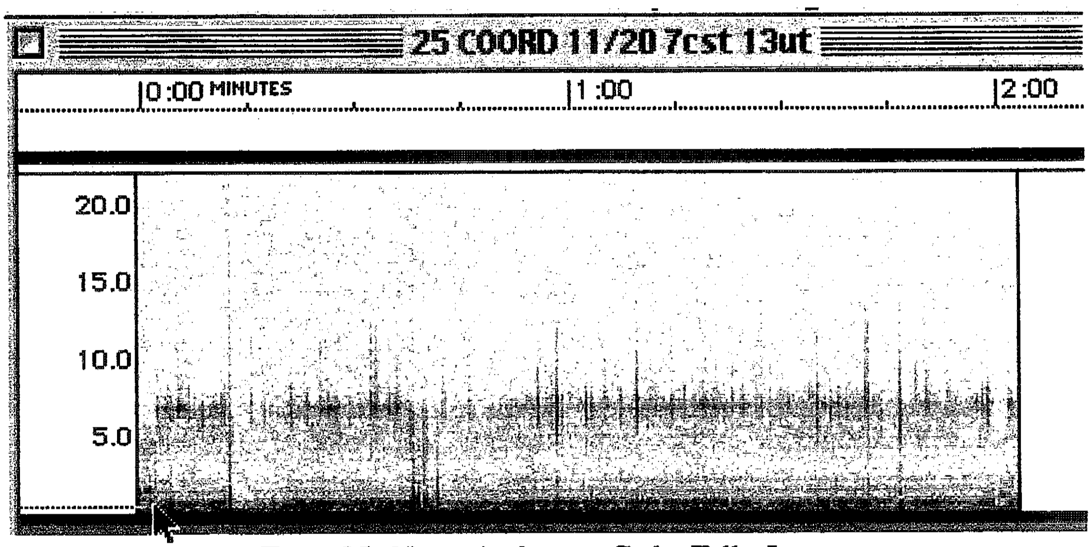
The times indicated are UT times.
The letter in the box indicates the time zone of the observer:
E = EST = UT-4, C=CST = UT-5,
M = MST = UT-6 and P = PST = UT-7

Observers:	Team 11	Mark Mueller, Brown Deer, WI Brown Deer High School	(CST)
	Team 25	Norm Anderson, Cedar Falls, Iowa	(CST)
	Team 30	Linden Lundback, Watrous, Saskatchewan, CANADA	(CST)
	Team 32	Shawn Korgan, Gilcrest, CO	(MST)

For analysis purposes, a spectrogram was made of the first two minutes of each 12-minute hourly session. Additional spectrograms were made of any items of interest and of any segments requested by the observer. Time marks were placed on the tape every two minutes and a complete log was made of each session.

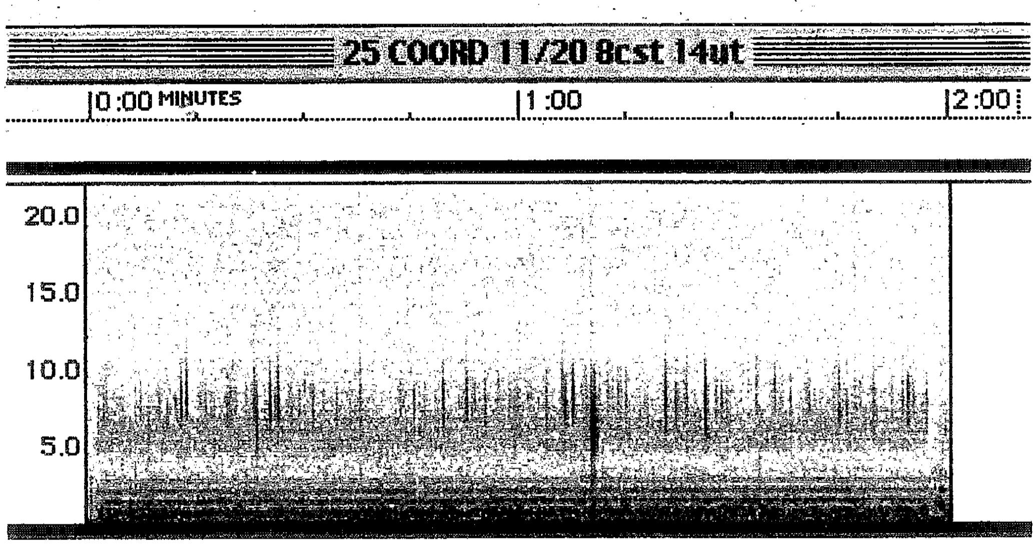
11/20/99 1300 UT

Norm Anderson started off at 0700 CST (0800 EST).

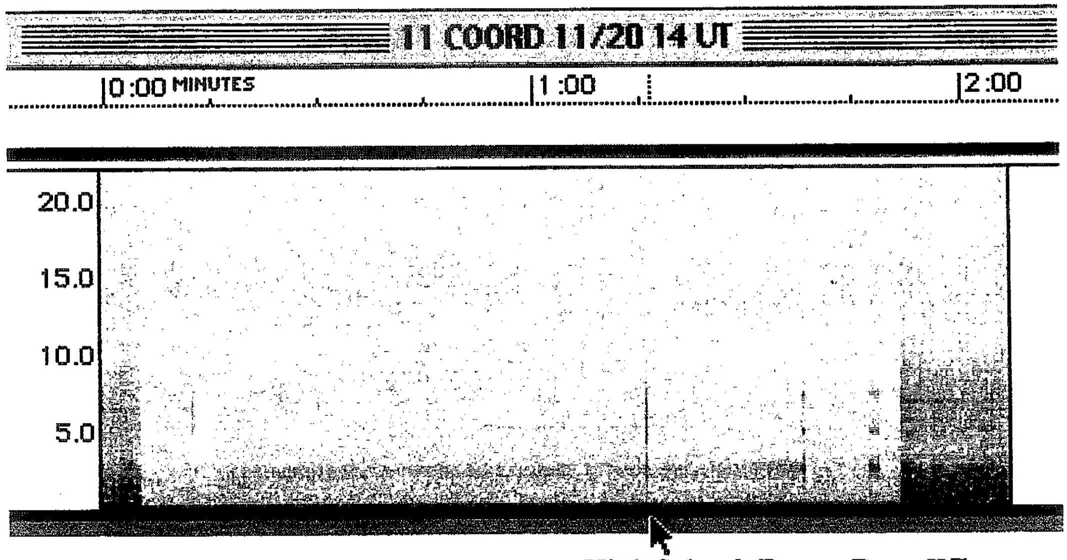


Team 25. Norm Anderson, Cedar Falls, Iowa
Arrow shows 1300 UT WWV tone. Very quiet conditions.

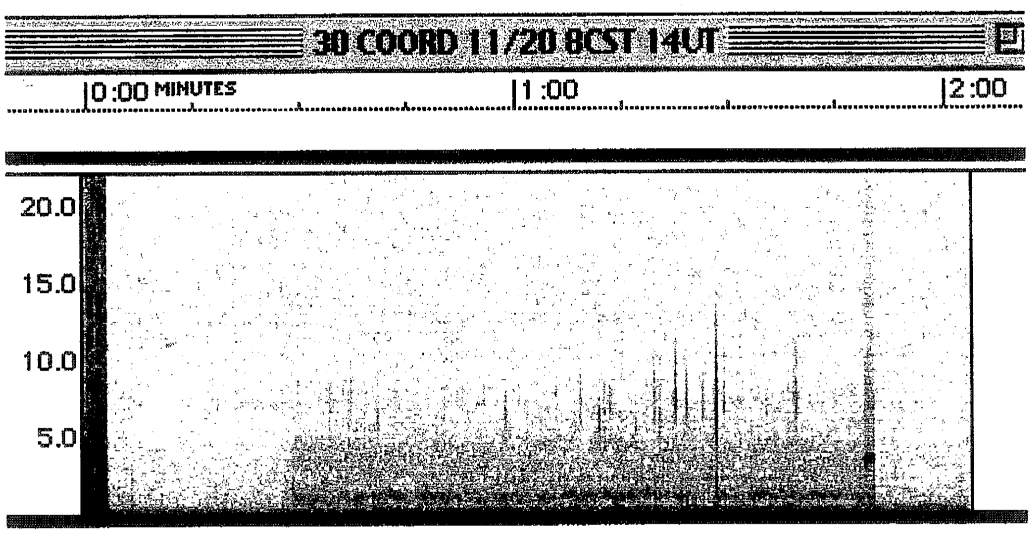
11/20/99 1400 UT



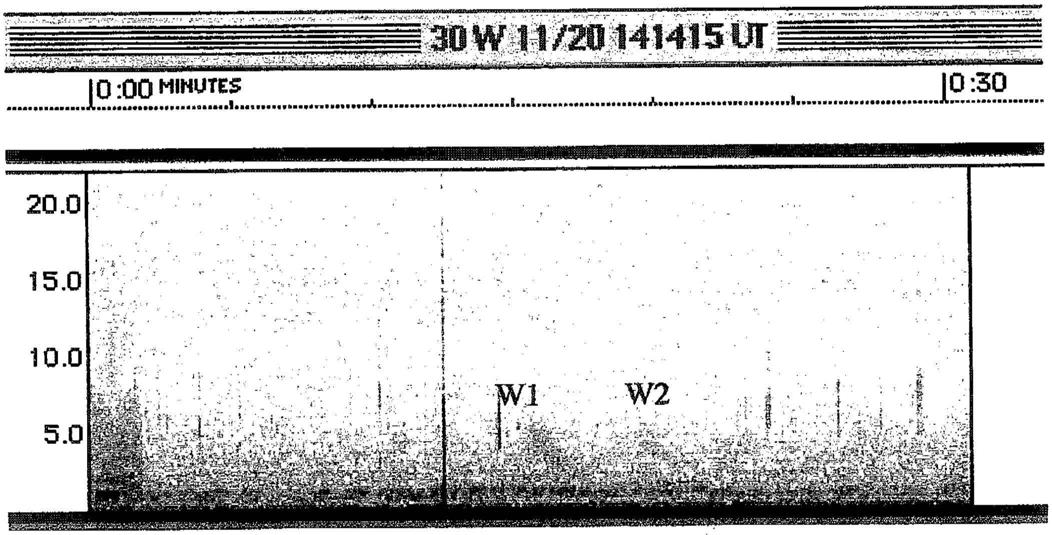
Team 25. Norm Anderson, Cedar Falls, Iowa



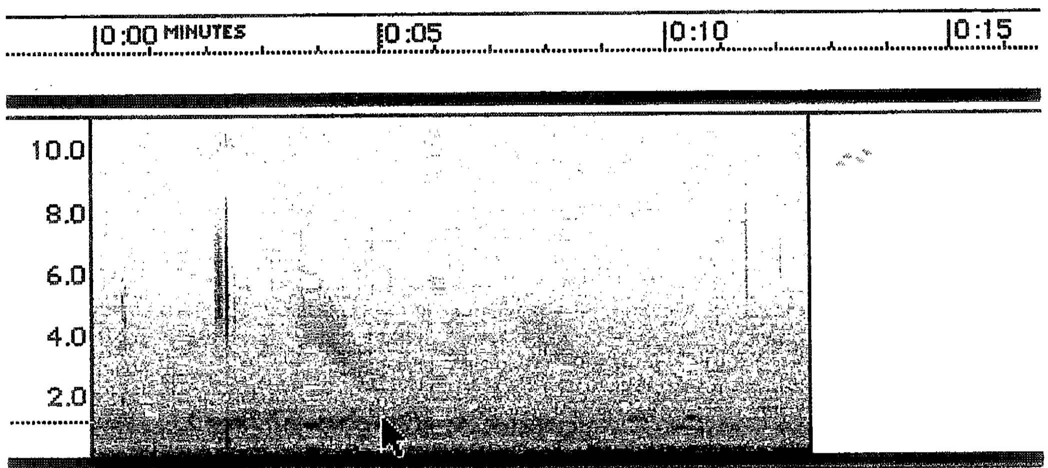
Team 11. Mark Mueller, Brown Deer High School, Brown Deer, WI.
The arrow points to a strong sferic in the middle of some real quiet conditions.



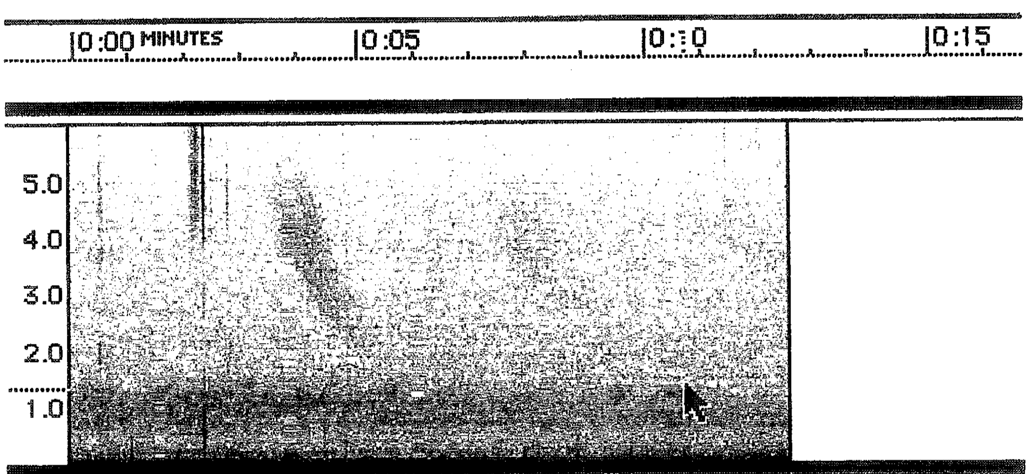
Team 30 Linden Lundback / Brian Cowan Watrous, Saskatchewan, CANADA
At the start of the day's observations, it took about 30 seconds to get the signal adjusted.
Generally quiet conditions with sferics, chorus and weak whistlers.
It is an advantage to observe from farther north. Chorus is almost never heard in Southern California and whistlers are also less common there.



From the "Whistler Extra" tape following the scheduled coordinated observations. W1 logged at 141415 UT; W2 (looks like an echo of W1) logged at 141418 UT.

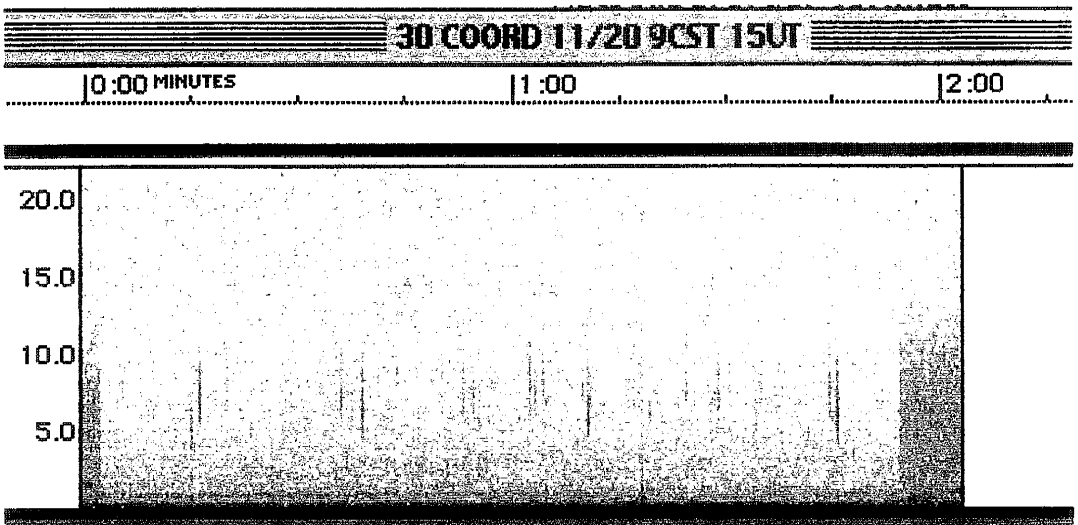


The arrow points to W1.
The local sferic that caused the whistler and echo can be seen at :02 seconds.

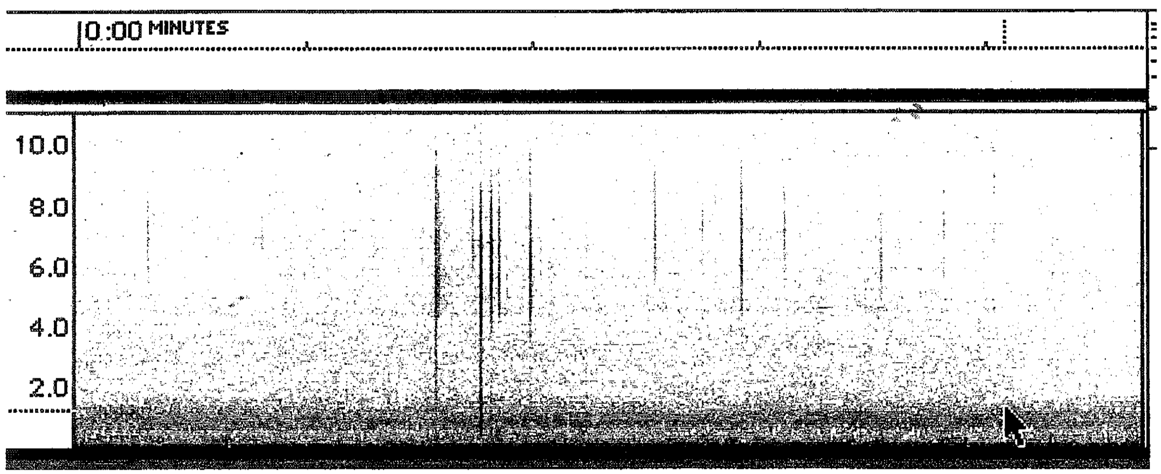


Same as above using a 0-6 kHz frequency range. Arrow points to W2.

11/20/99 1500 UT

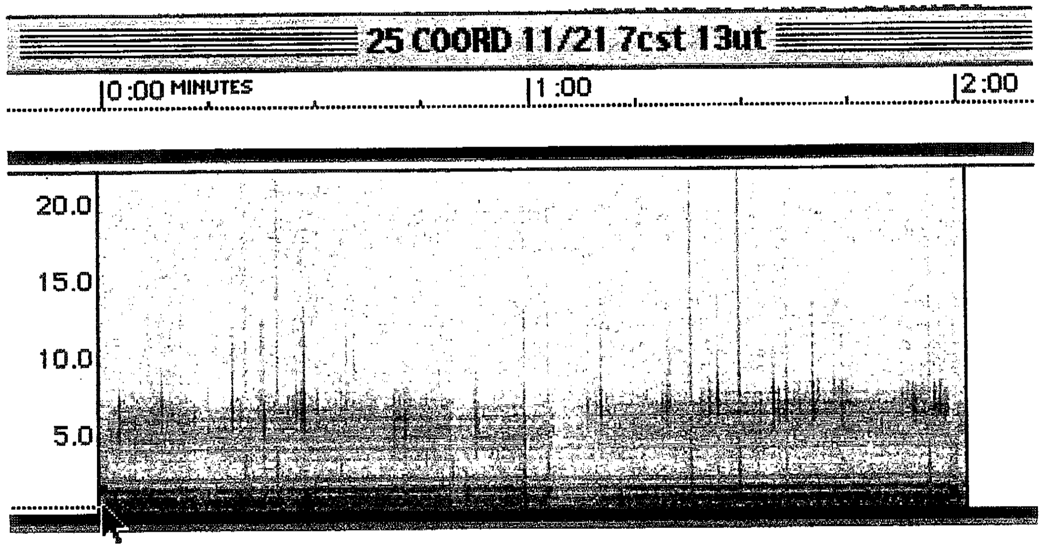


Team 30 Linden Lundback / Brian Cowan Watrous, Saskatchewan, CANADA. Quiet.

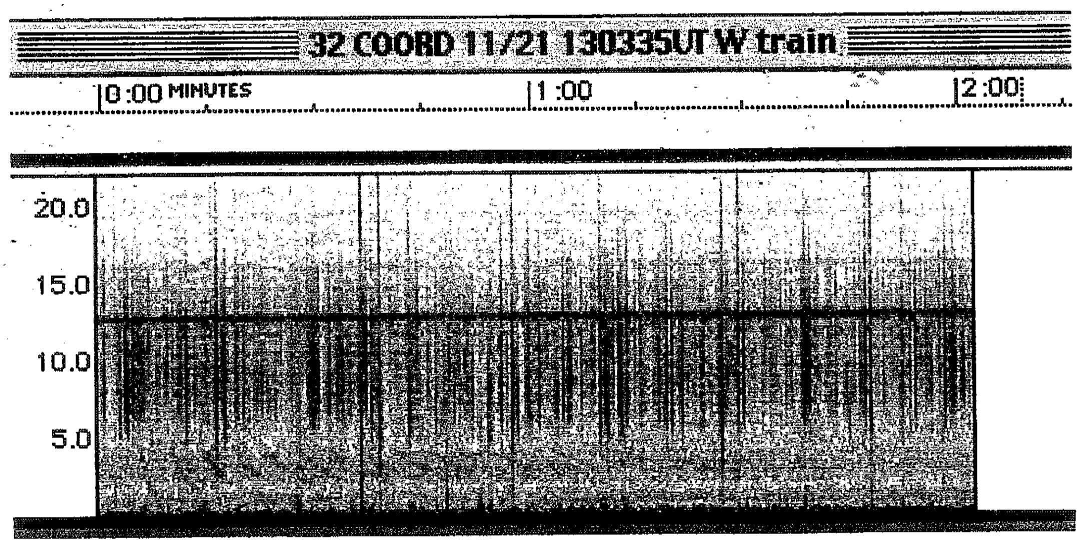


Arrow points to the bottom of a faint whistler recorded on another "Whistler Extra" tape.
Whistler was logged at 15:22:58 UT.

11/21/99 1300 UT



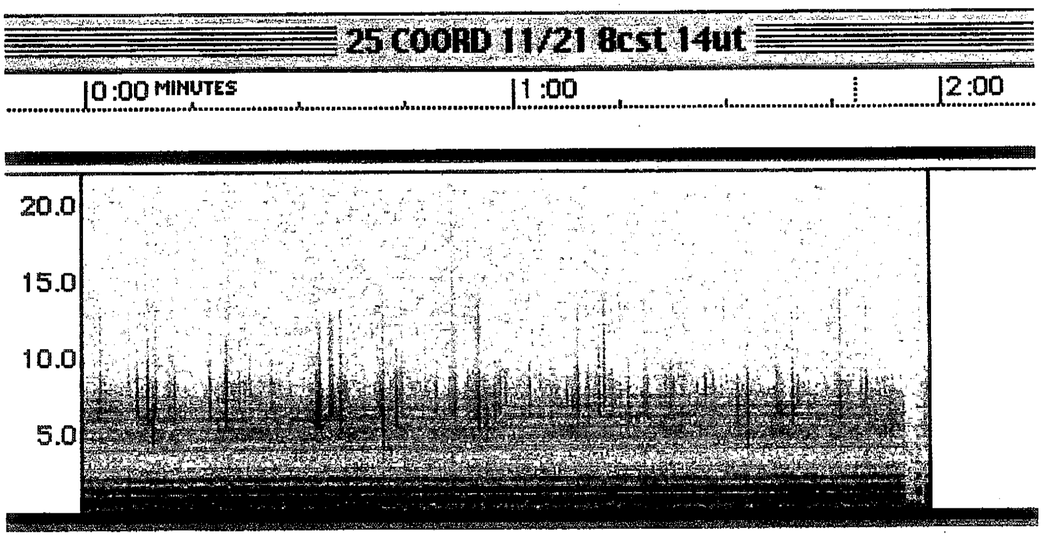
Team 25. Norm Anderson, Cedar Falls, Iowa
A bit more hum on this day, but still good reception of quiet conditions.



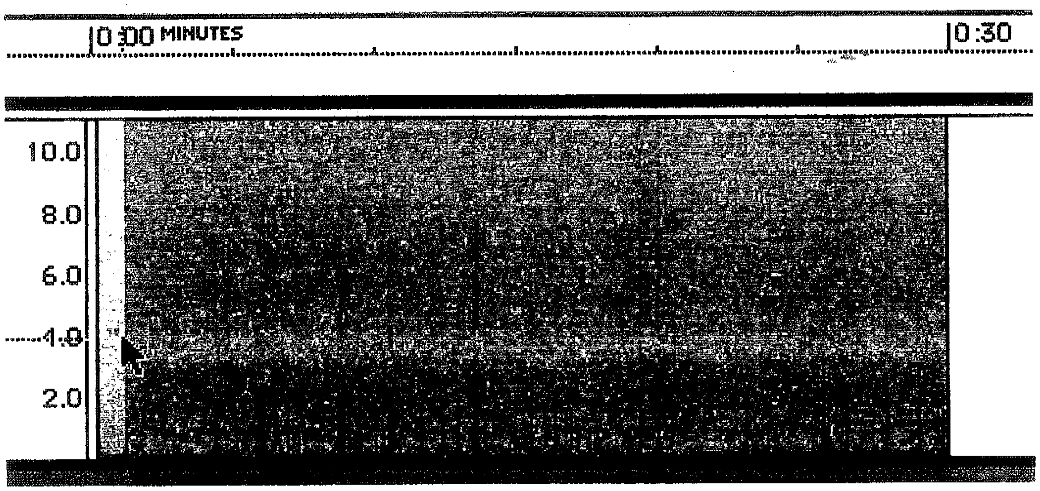
Team 32. Shawn Korgan, Gilcrest, CO
This is a "long whistler" logged at 13:03:35 UT. Shawn reports hearing the whistler for more than two minutes. It is actually one whistler with 26 echoes in the two minute period. Actually, the echoes don't stop there, but continue to fade.

Time marks were a problem on this tape. Shawn tried to put WWV continuously on one track with the signal on the other track, but WWV did not record for some reason. This is probably a good thing since the practice of putting WWV on one track is discouraged. The reason is that on a recorder with automatic gain control (AGC), strong signal on one track will reduce the sensitivity of both channels and may adversely affect the recording of the receiver signal. It is certainly a good thing nothing harmed the recording of this amazing echo train!

11/21/99 1400 UT

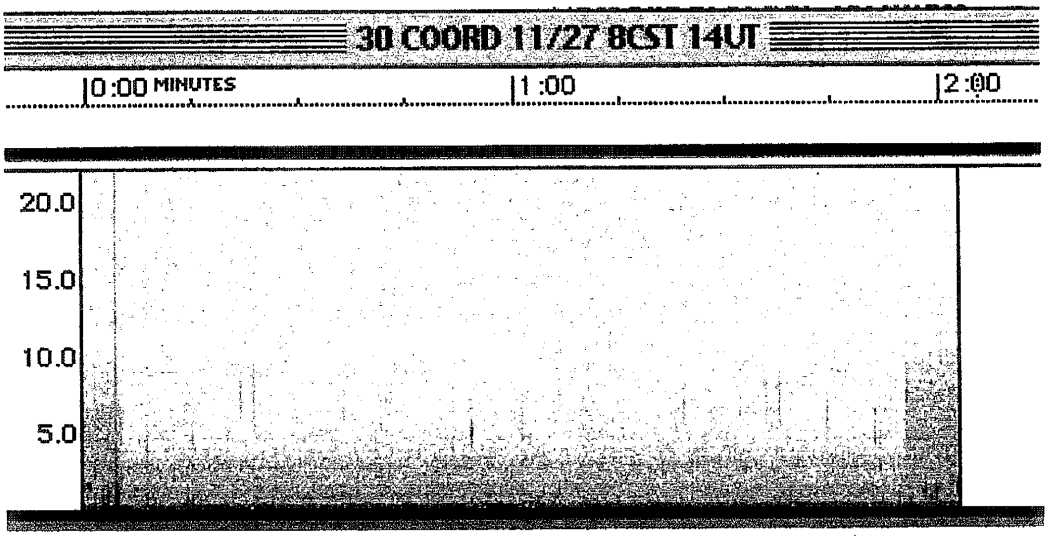


Team 25. Norm Anderson, Cedar Falls, Iowa
Similar to an hour earlier.



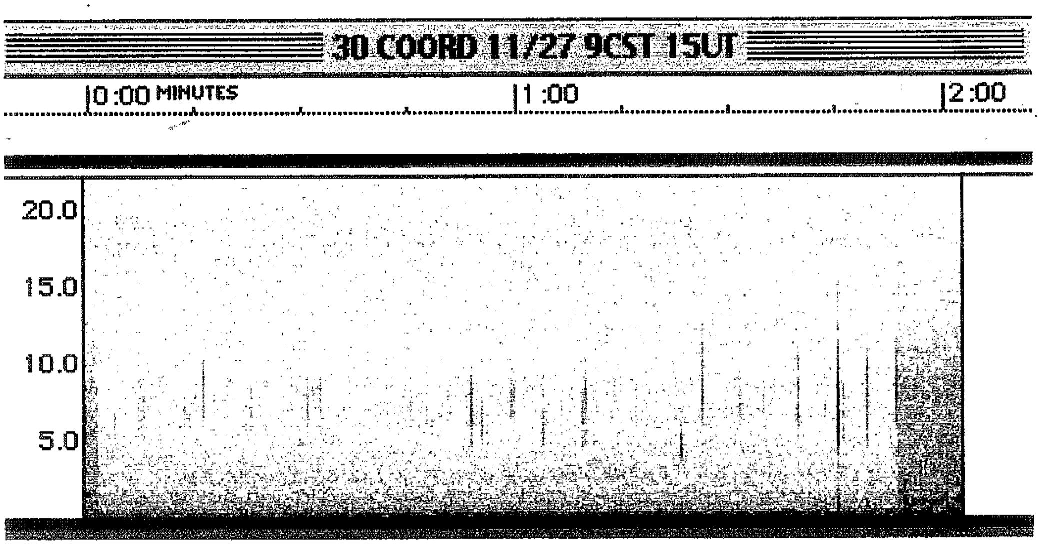
First 30 seconds. Arrow points to "beeps" at 7:00 AM EST.

11/27/99 1400 UT



Team 30 Linden Lundback / Brian Cowan Watrous, Saskatchewan, CANADA
Linden and Brian also recorded on the weekend following the Coordinated Observations.
Conditions were very quiet for both hours.

11/27/99 1500 UT



Team 30 Linden Lundback / Brian Cowan Watrous, Saskatchewan, CANADA

Notes From the Field

Communications from INTMINS Participants

Edited by Bill Pine
Chaffey High School
Ontario, CA

Notes and messages often accompany data submissions from INTMINS participants describing various aspects of their experiences as observers. As an ongoing feature, some of these communications will be summarized in *The INSPIRE Journal*. The following summaries are in the approximate order in which the data was received by INSPIRE. In addition, some communications will be included from INSPIRE participants who did not record and submit data.

Team 32 Shawn Korgan Gilcrest, CO

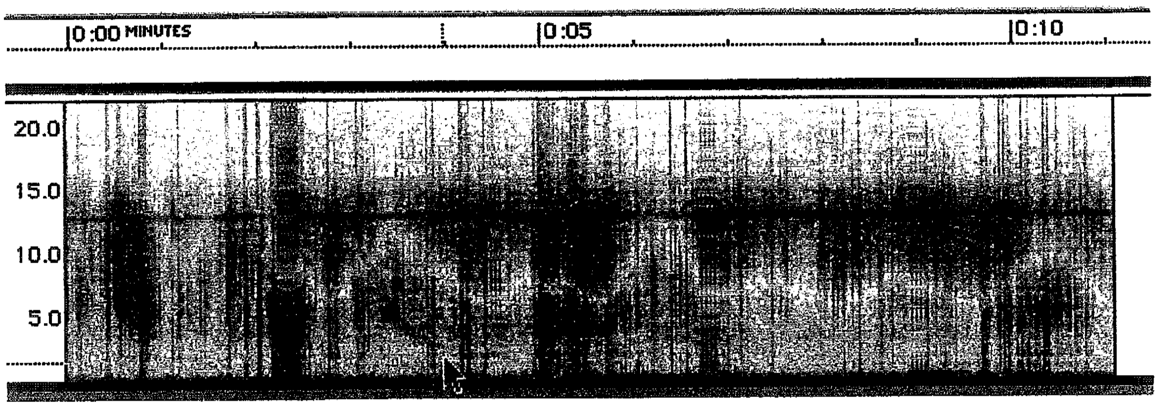
Shawn sent in a tape containing excerpts from several sessions recorded during June and July 1999.

> I found out recently that listening to VLF on top of a high mountain (12,000 feet or better) makes a huge difference in how one receives VLF signals. I have come to the conclusion that a person can hear five to ten times more on top of a tall mountain that at ground level near home. I hear sounds in the mountains that I have never heard on the ground before like strange chirps and weird whistlers that are not normally heard on the ground.
>
> One day when I was up recording on Trail Ridge Road (a mountaintop road in Colorado), I started hearing strange bouncy sounding signals that usually came in pairs of two to maybe seven or so. I could not for the life of me figure out what these strange sounds were. y friend noticed that we seem to only hear them when cars were going by. He was right. We could actually watch cars drive over certain spots in the road and hear corresponding bouncy signals. I concluded that it was shock waves from the pavement rebounding from the vehicle that was driving on that part of the road. Also, only the heavier vehicles seemed to really set off the sounds and I could only hear the sounds when the pavement was at a certain temperature. When the outside temperature reaches about 45-50 degrees F or so, then I start to hear these strange signals. If the temperature rises above that then I do not hear them. I describe them as bouncy sounding chirps (some rising in frequency and some falling in frequency). I can hear these sounds from vehicles approaching up to 1000 feet away. You may want to use the headphones to hear these sounds on the tape. [*Editor's note: The sounds were definitely on the tape, but very subtle. Unfortunately, I was unable to get them to appear on the spectrogram due to their faint nature.*]
>
> I found a perfect way to test my VLF receiver. I noticed that a rubber band is easily picked up by a VLF receiver. When my receiver is working properly, I can hear a large rubber band about 3 feet away with a three inch antenna on my receiver. If something is not working right, like when my FET is going bad, then I can only hear the rubber band sound about one foot or less away from

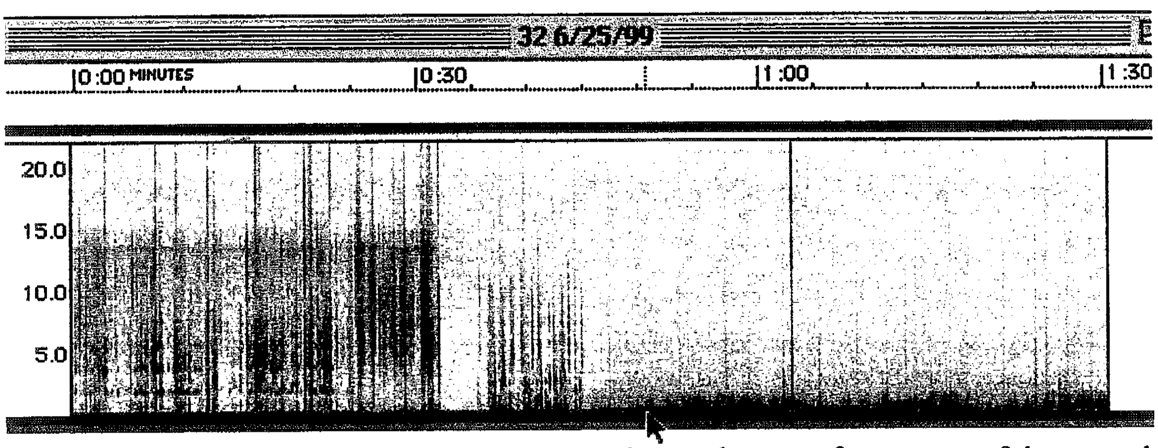
the VLF receiver. This may be a good way to test the sensitivity of different receivers to VLF signals and to determine which receiver is best.

One more note: I am corresponding with a gentleman at the NIST (WWV towers) in Fort Collins, CO, about the 13 kHz signal I am hearing on my VLF receiver. I want to make sure that the signal is coming from the WWV tower. I have no heard back from him for a week or so. Steve McGreevey questioned whether such a signal could be coming from the WWV towers. I just want to find out for sure where the signal is coming from and put the issue to rest.

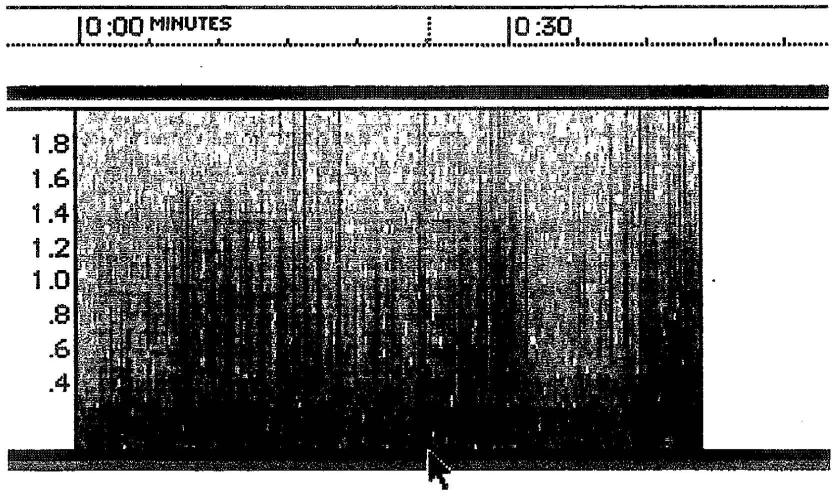
Here are some samples from Shawn's summer 1999 observations.



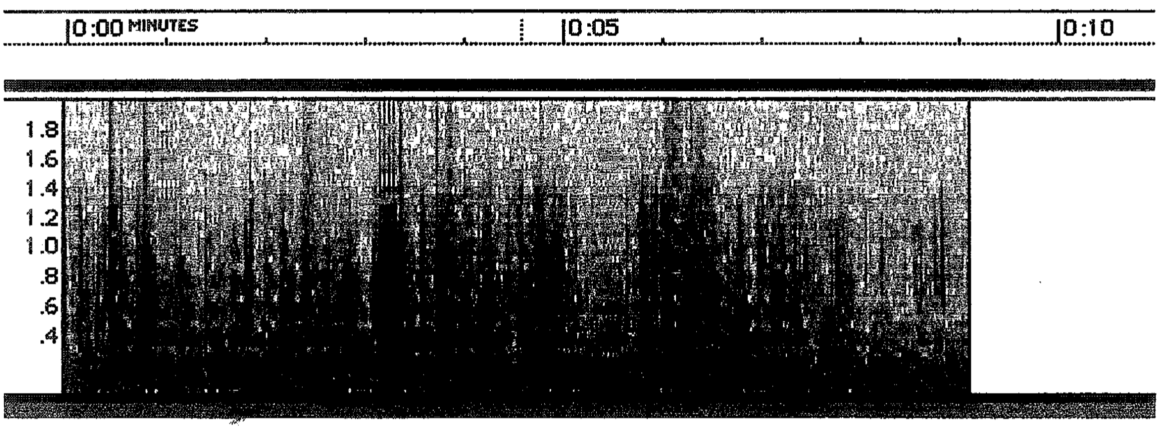
6/18/99 A good whistler followed by a couple of echoes.



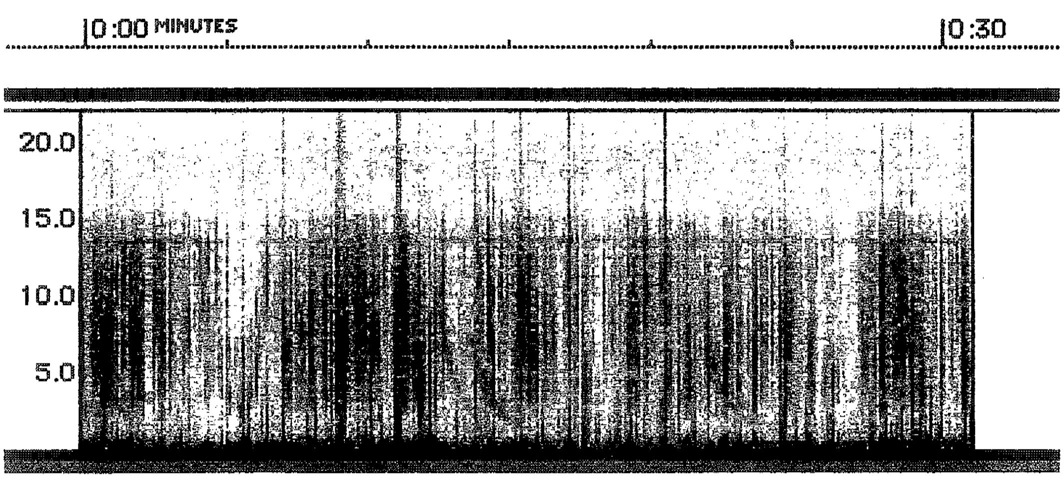
6/25/99 Tweeks on Trail Ridge Road. The arrow points to the start of a segment of the tape where the sound is slowed by a factor of 18.5. The result is an eerie sound.



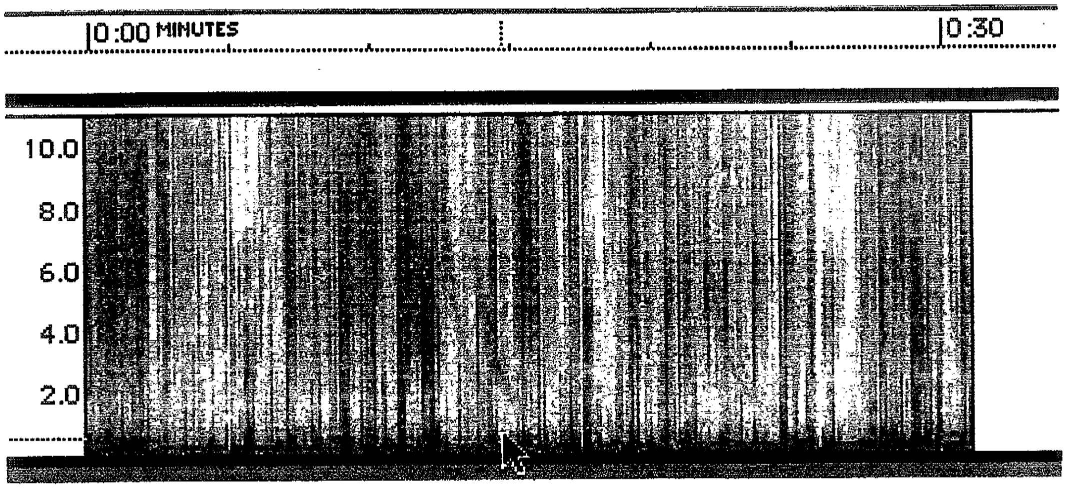
A 0-2 kHz view of the slowed tweeks. The arrow points to a burst of tweeks.



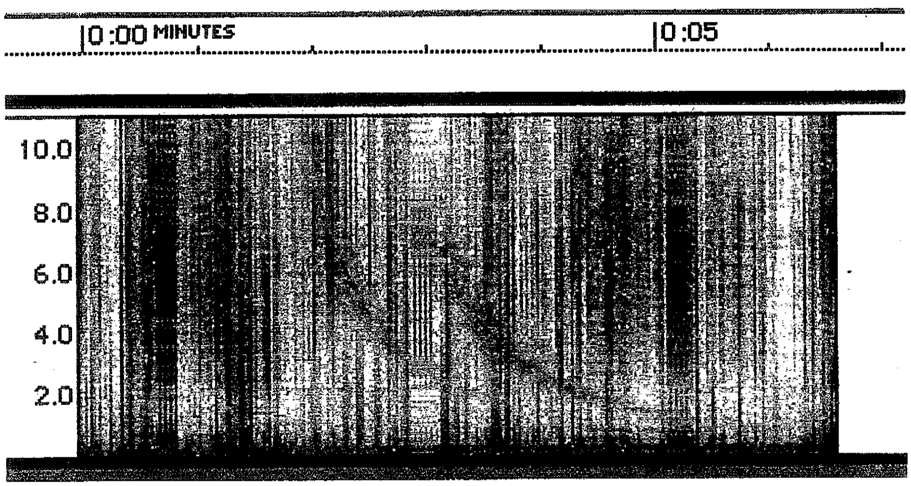
Nine seconds of the slowed tweeks. Actual time is about 0.5 seconds.
Note the drawn out "hooks" and harmonics.



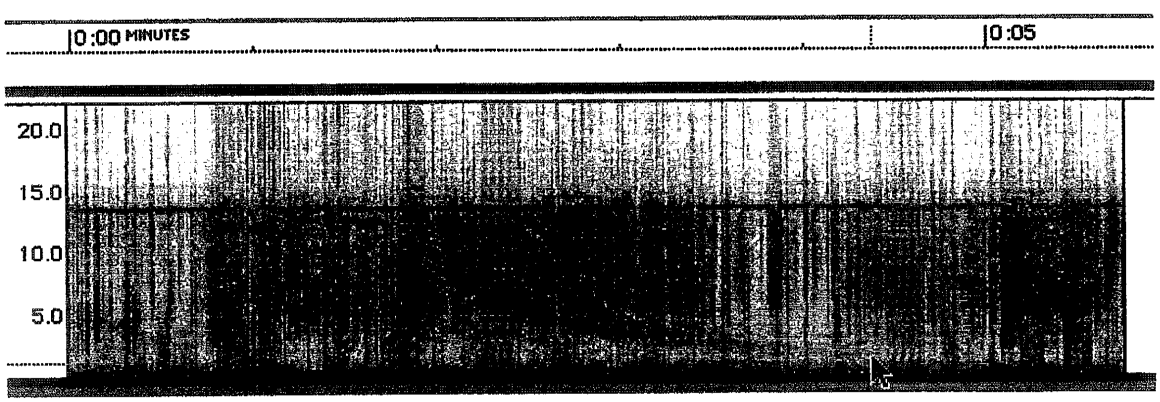
7/2/99 Mt. Evans. Several strong whistlers.



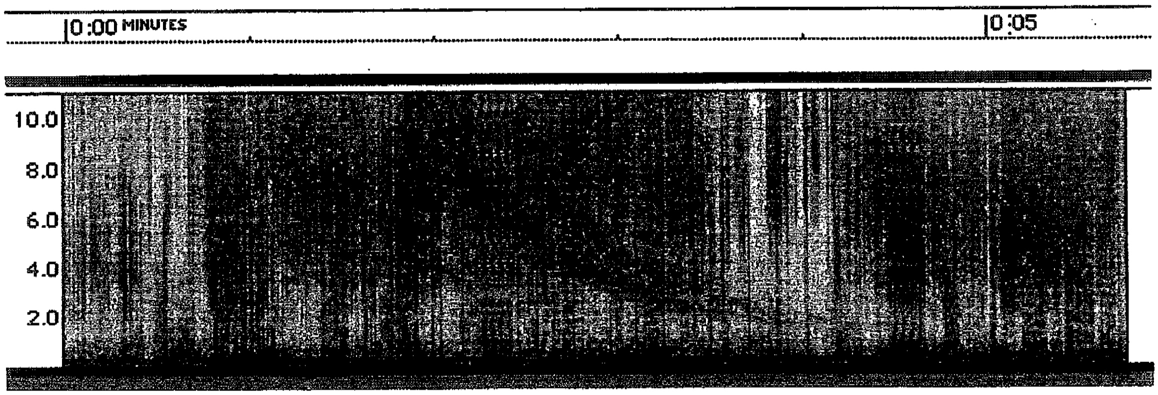
The same whistlers using a 0-11 kHz frequency range.



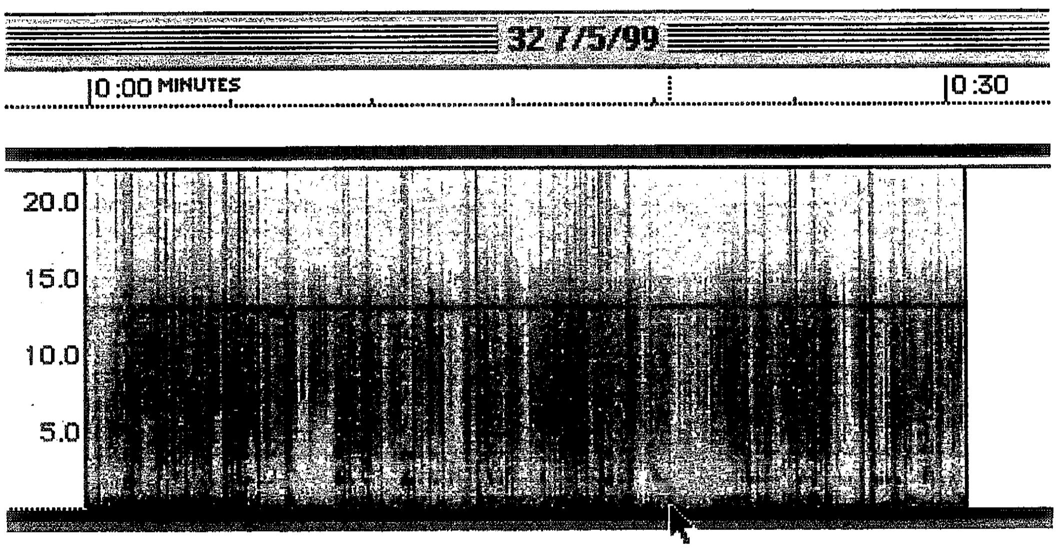
A close-up of the same two whistlers. They are not echoes, but rather two separate whistlers. The way to tell is that their slopes are the same. Notice how far down the second extends.



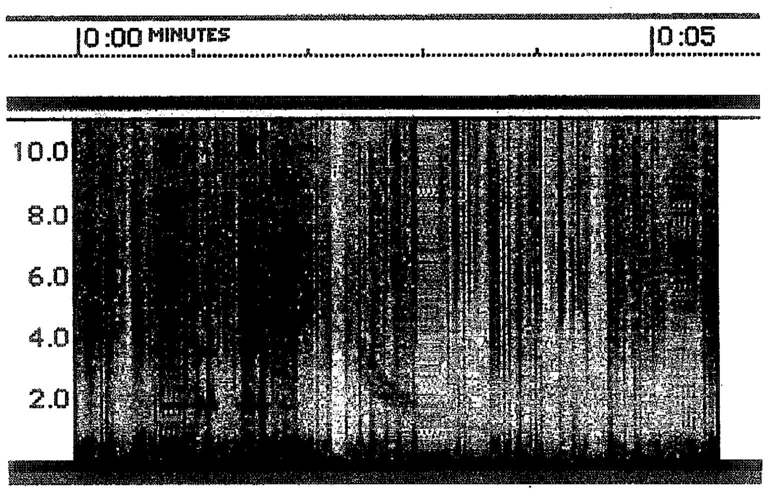
A long dispersion whistler.



The same whistler using 0-11 kHz frequency range. 8 kHz to less than 2 kHz in 2.5 seconds.



7/5/99 Trail Ridge Road Arrow points to prominent whistler that occurred during a lull in sferics following a burst of sferics and tweeks.



A close-up of the whistlers following a burst of tweeks.

Team 7 **Dean Knight** **Sonoma, CA**

Sonoma Valley High School

Dean and his students set up 3 RS-4 receivers with Bell and Howell Model 3185-A recorders and different antenna arrangements. Receiver "#62" uses a 145 foot long wire antenna oriented East-West. Receiver "#64" uses a 198 foot long wire antenna oriented North-South. Receiver "#65" uses a 91 foot longwire antenna oriented East-West. Sonoma Valley High School Team members are indicated below.

	21-2	21-6	28-4		21-2	21-6	28-4
Bret Allen		x		Kayla Egnew	x	x	
Chantelle Amontito	x		x	Ashley Love Evans	x		
Joey Ameroso	x	x		Katie Everidge	x	x	
Sacha Bendayan		x		Steffen Guadeid	x	x	
Sean Brooks		x	x	Kara Mazzo	x		
Alex Cali	x	x		Jenna Mendez		x	x
Alex Chevillot	x		x	Jeff Pitts			x
Lauren Clementino		x		Fernando Ramirez	x	x	
Alison DeWald			x	Bobby Shackford		x	x
Jonathan Duff	x			John Shackford		x	
Sara Devi	x			Rachel Smith	x	x	x

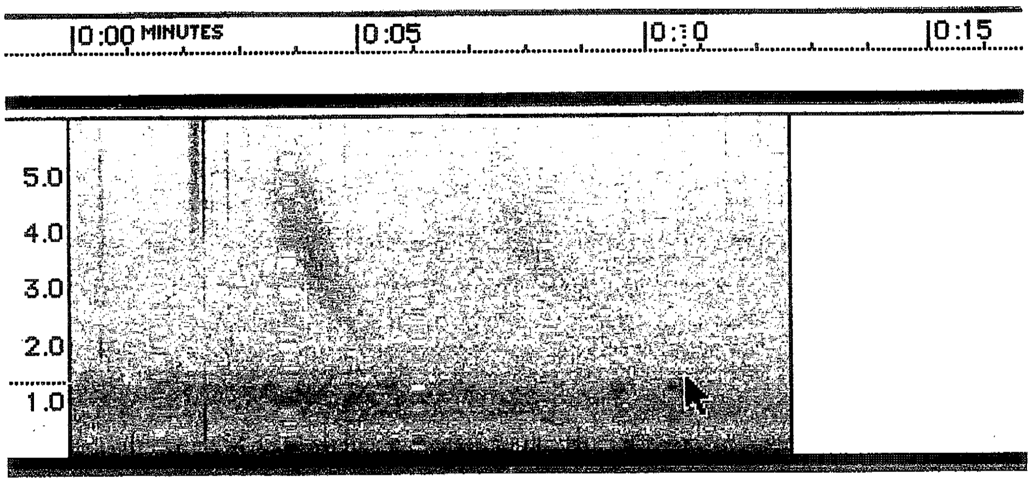
Team 30 **Linden Lundback** **Watrous, Sask., CANADA**

Brian Cowan

Linden, along with teammate Brian Cowan, submitted this report.

> We were not able to record many of the sessions for this time period. Our observations on November 20, 1999, proved very interesting with many whistlers (some good) and a number of whistler chains that were quite dramatic. I think this was the first time we picked up good whistler chains where consistently timed echoes could be observed. A faint chorus was also heard on these tapes. November 27 sessions were quiet and uneventful. Our Ariel/Istochnik observations did not result in an audible signal discovery although we believe we had a visual of the station directly overhead at 00:57 UTC, which was a bit of a reprieve.
>
> In past newsletters, an example of each session (or nearly each session) has been included. That is good in my view but it would also be interesting to review the same time sample windows from a number of observers for a session that had generally good VLF activity. Our team would find it interesting to see any time differences in prominent sferics, whistler footprints, chorus phenomenon, etc, We were also wondering in particular who is using the VLF recording information and if any scientific enlightenments have resulted from this information.
>
> *[Editor's Note: What we need to have in order to get the cross comparison information you suggest is lots of listeners and some luck. We are certainly making progress on the first, and the second is only a matter of time. The number of experienced observers continues to grow and the quality of the observations is constantly improving with experience. In 1992, we had 11*

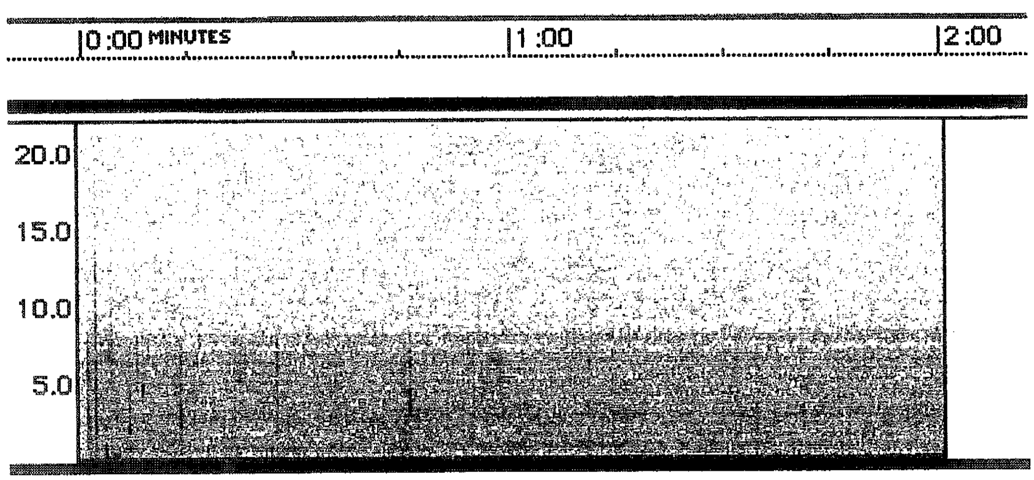
observers from across the country record the same whistler (Big W) and we think that is the largest number of observers to record a single event.
As far as scientifically useful information from our observations, I can point to one, at least: we have demonstrated that the electron gun power of ISTOCHNIK is not sufficiently large to result in detection at the surface of the earth with our equipment. Planning is going on right now for proposals to have a similar instrument on the International Space Station that will have both more power and a frequency of operation that is higher and therefore farther above the powerline hum interference. If we ever get a positive result with ground observations, there are many space scientists who will be very interested in that.]



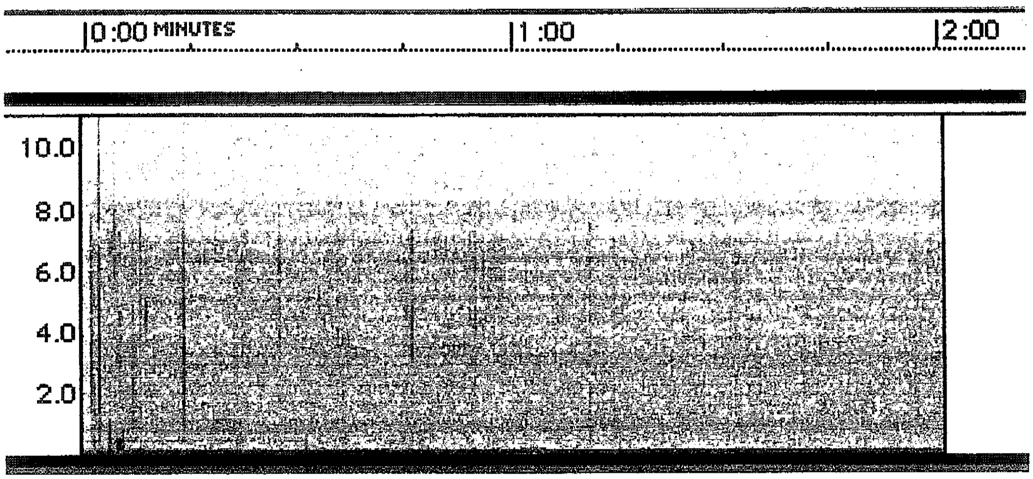
Whistler and echo logged on 11/20/99 at141415 UT

Team AL **Sara Scarritt** **Birmingham, AL**

Sara is a student in Birmingham, AL, who built a VLF-2 receiver and made observations during the Leonid meteor shower in November 1999. The following is a sample from her tape starting at 01:43 CST.



0-22 kHz frequency range and very quiet conditions.



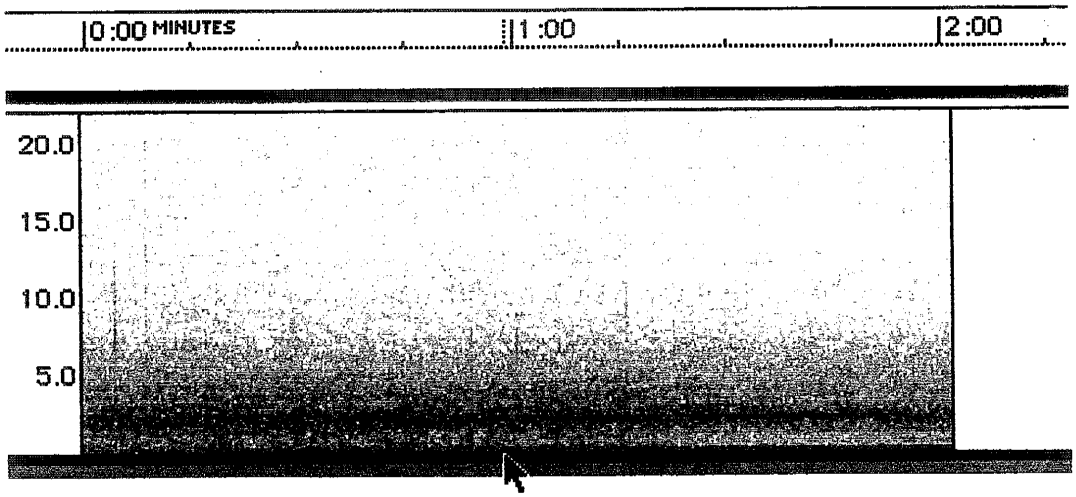
0-11 kHz frequency range.

Team 31 **Lee Benson** **Indianapolis, IN**

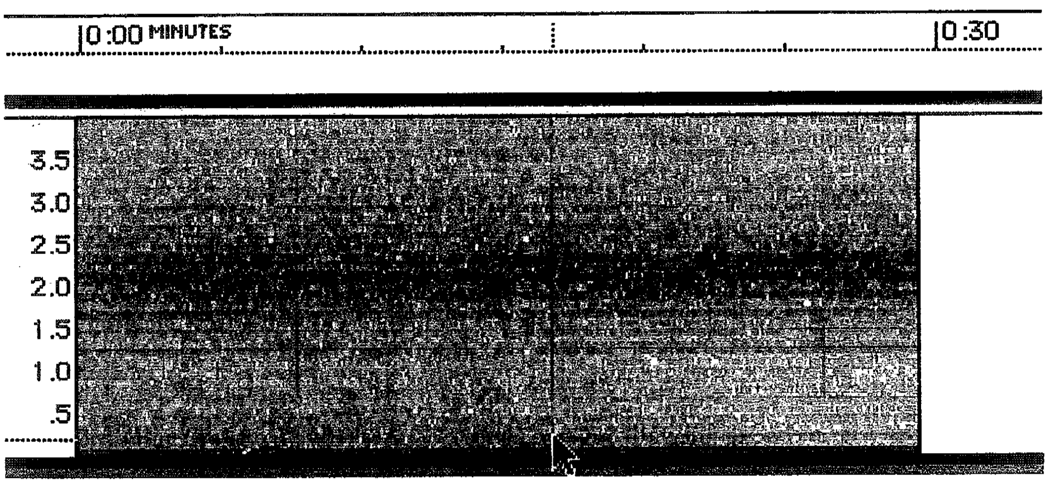
This week (11/8-12) I was in the Smoky Mountains (hills to someone from CA) *[Beautiful to this Californian who has been there! – Ed.]* and used the opportunity to be in a quiet place to do some UN-coordinated observing. Just before I left I happened to read a NASA news piece about an unexpected meteor shower (science.nasa.gov/newhome/headlines/ast05nov99_1.htm). I wasn't able to take all my equipment because I was at an environmental camp with 30 5th graders. I did manage to sneak in my McGreevey WR-3E and my tape recorder. I couldn't take my WWV radio because none of the kids could have them. I didn't get out until late evening (9:30 – 10:00 EST) but there were still in my estimation 10-15 meteors per hour visible from my location. I didn't get a very good ground on my tape so there was a lot of noise from it but that is very apparent on the tape and didn't seem to bother too much in the range of 6-10 kHz where most of the signals appeared. The signals are much different from those I recorded in April 99 in Indiana, especially in the second half. All the relevant information follows:

Location:	Tremont, TN, S of Knoxville
	36° 38.4'. 83° 41.3' plus or minus GPS error
Site:	Road side in a small valley surrounded by 1,000 foot ridges.
	Side of road with a clear view of the sky.
	Nearest power lines about 100 yards.
Meteors:	Observed 5 in the half hour. Longest track: 15° of sky.

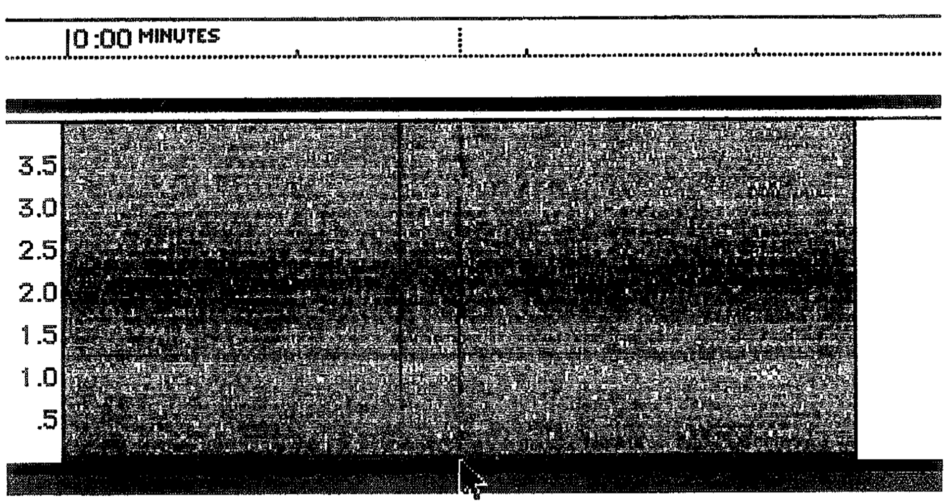
At the end of a session a cop almost ran me down. They apparently don't have many people listening to the solar wind at night around here. After our discussion I bet he knows more about the magnetosphere, the solar wind and plasma physics than all the rest of the force combined. I think I persuaded him I wasn't drunk or on drugs but I don't think I convinced him that I wasn't crazy.



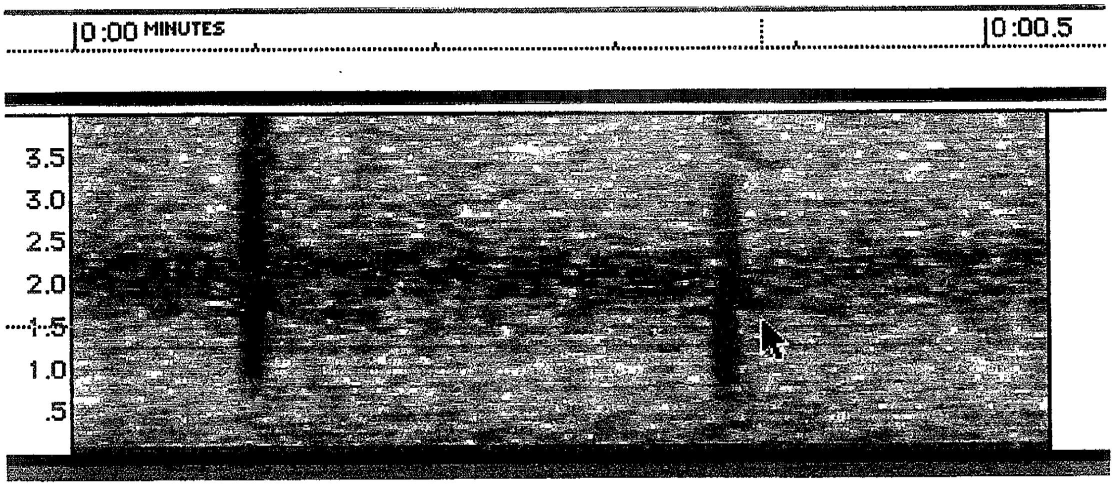
This is two minutes from the second half of the tape when things were running smoothly. The arrow points to a strong tweek.



This is the same tweek using a 0-4 kHz frequency range.



The tweek again in a 3.5 second time interval.



The arrow shows the tweek "hook" at about 1.7 kHz with a harmonic also present at 3.4 kHz. Tweeks are relatively common in the evening and through the night.

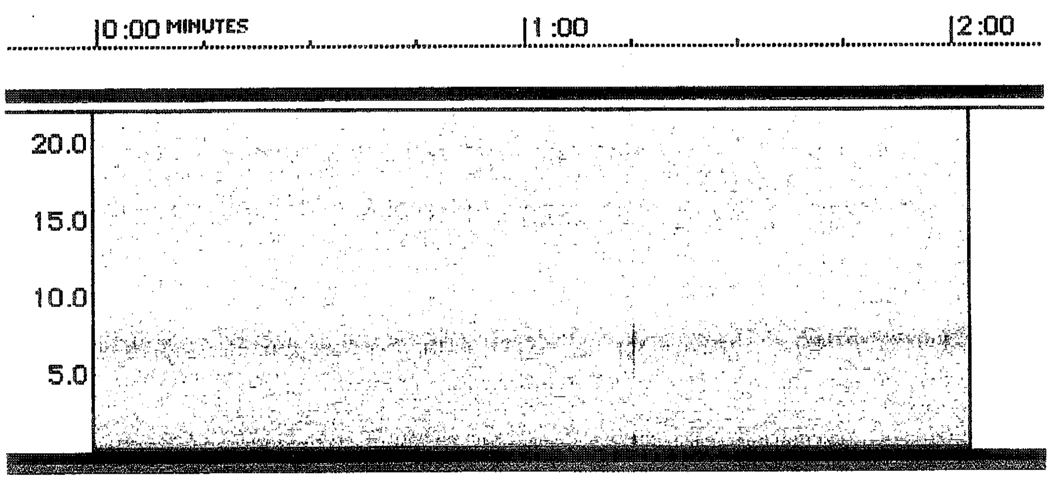
Team UK John Hislop Ursuline College, Kent, England

In a note passed on by the INSPIRE UK Coordinator, Sarah Dunkin, John writes:

Side A has about 10 minutes of recording for the period before totality, about one half hour before.

Side B starts at midday French time (10:00 UTC) from the pips of the BBC World Service. The time of totality was 27 minutes later. The recording stops a few minutes after that – when we set off or the champagne!

I'll be surprised if there is any difference in the recordings. I received a poster from EUMETEOSAT that shows the moon's shadow moving across the Earth. It's such a small area that the ionosphere would hardly be affected. Anyway the experiment was worth trying!



Two minutes coinciding with totality. Very quiet conditions (and probably not due to the eclipse!).

Data Log Cover Sheet (copy as needed)

INSPIRE Observer Team ______________________________ Receiver ________

Operation _________________

Date ______________ Tape Start Time (UT) _____________

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Operation details: Tape start time: __________ UT __________ local

Operation start time: __________ UT __________ local

Operation type: ___________________________

Operation stop time: __________ UT __________ local

Tape stop time: __________ UT __________ local

Equipment: Receiver ______________________________ WW V reception:

Recorder ______________________________ _________________

Antenna ______________________________ _________________

WWV radio ______________________________ _________________

Site description: ____

Longitude: _____° _____ ' W Latitude: _____° _____ ' N

Local weather: ____

Personnel: ______________________ ______________________ ______________________

______________________ ______________________ ______________________

Team Leader address: Name ________________________________

Street ________________________________

____

City, State, Zip, Country ________________________________

INSPIRE Data (copy as needed)

INSPIRE Observer Team ____________________ Receiver ________

Operation ____________

Date __________ Tape Start Time (UT) __________

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Code: S - sferics 0 1 2 3 4 5 M - Mark T - tweek W - whistler O - OMEGA C - chorus
L M H

Time	Entry		Observer
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
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______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______
______	____________________	S: 0 1 2 3 4 5	______