Below is a wiring detail for making the 7 connections from the circuit board to the outputs,

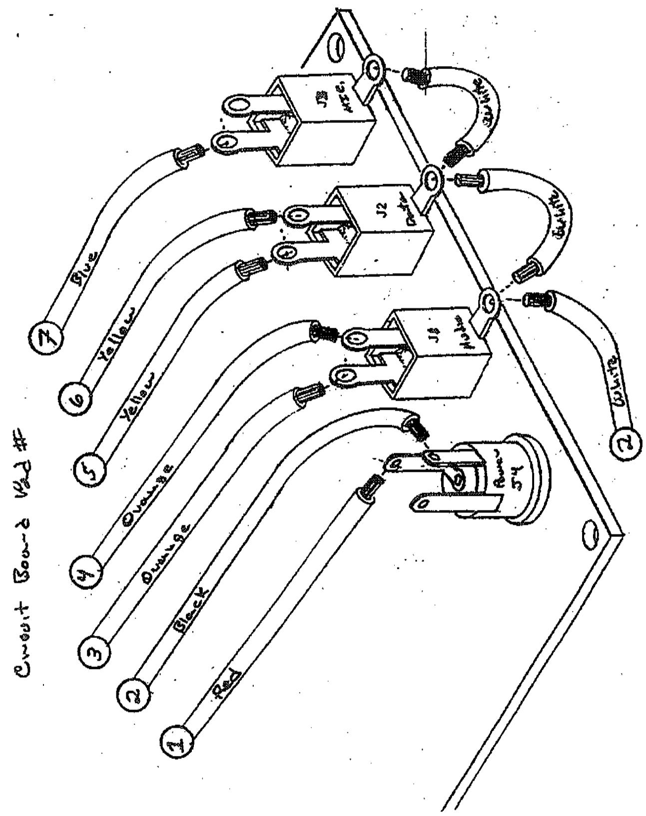


Figure 4. Wiring diagram for connections from the PCB to the front panel.

Orders may be placed for the VLF3 receiver using the order form at the end of this *Journal*. Kits will be shipped as soon as possible, but it may take a few days to get all components in stock and the assembly instructions written and tested. Orders will be shipped as soon as possible and in the order in which they are received.

A "Natural" VLF Antenna

By Shawn Korgan
Gilcrest, CO

This simple approach to a VLF antenna originated from an article I read in a science magazine while in middle school in 1986. The article made reference to certain types of trees that could be used as antennas for TV reception in desert locations. Unfortunately, I did not keep the article and therefore cannot provide any additional information regarding it.

Ever since reading that article, it has intrigued me how a person could utilize a tree as an antenna. It was not until just recently that I thought of trying this method for VLF reception. I was pleasantly surprised at the results. Not only can an ordinary tree function as an E-field antenna for VLF receivers, it can even outperform standard E-field antennas!

Who would have imagined that nature itself has provided most of us with VLF E-field antennas? Most of us have several of them growing in our own backyard!

To begin my simple experiment, I grabbed a few three-inch nails, a hammer, a 1-watt audio amplifier, a foot long stake that could be used as a temporary ground rod, and a short length of hookup wire. I methodically went from tree to tree, hammering a nail into each tree (approximately six feet above the ground). After this, I proceeded to hook the input of the audio amplifier to the nail in the first tree while at the same time connecting the ground of the audio amplifier to the ground stake inserted in the ground. I was surprised at just how much signal was immediately noticed in the way of loud sferics. I continued my experiment, trying each of the half dozen trees in our yard and found that two outperformed the rest as VLF antennas.

All the trees on our property (Sumac, Cedar, Locust, Crabapple, Catalpa, Elm and Ponderosa Pine) worked well as VLF antennas. The two trees which outperformed the rest, as VLF antennas, were the trees that were the greatest distance from overhead power lines. After further testing, I ended up using a little pine tree as my "new" VLF antenna. This tree is not the tallest tree in the yard by any means. It is only a measly fifteen feet tall while other trees easily reach forty feet in height. Nonetheless, this tree had the cleanest sounding signal with regards to power line interference and natural VLF radio signals.

Now came the ultimate test! I was about to compare the pine tree (configured as a VLF antenna) with the simple eight foot vertical E-field antenna mounted fifteen feet above the ground on the roof of the house. This is the antenna I have been using for the past year for VLF reception. Believe it or not, I was capable of monitoring chorus and Russian ALPHA signals when tied to the tree antenna which were not capable of being received while tied to the rooftop antenna. The pine tree was clearly outperforming the eight foot vertical antenna mounted on the roof! Does this give anyone ideas for a favorite listening spot that may have trees or a windmill nearby? Could this method be used to monitor natural VLF signals when located deep within a dense forest? Quite possibly!

At this point, I decided to make the pine tree my permanent VLF antenna. I proceeded to run a twenty foot length of RG-6 coax between the tree and the house (approximately two inches beneath the surface of the grass). I then soldered the center conductor of the coax to the nail in the tree. After this, I experimented with an actual four foot copper ground rod trying different positions around the tree with the ground rod tied to the shield of the coax. I was somewhat surprised to hear a wide difference in response depending on where the ground rod was positioned. If the ground rod was positioned over three feet from the tree, power line interference increased in relation to VLF natural radio signals. The best distance from the tree to the ground rod was approximately one and one half feet. I also noticed that power line interference could be drastically reduced if the ground rod was inserted on the east side of the tree.

After experimenting with the ground rod and locating the best position for it to be installed, I inserted it into the ground permanently and ran an insulated wire from the ground rod, up the tree, to the shield of the coax. I used a wire connector to connect the shield of the coax with the wire from the ground stake. After this, I applied hot glue around the exposed shield of the coax cable to prevent moisture from shorting the hot conductor with the shield/ground.

Time has yet to tell what effect winter will have upon this natural antenna. Will it still function properly in winter? So far, wind speeds reaching as high as 30 mph have not adversely affected VLF reception. The same wind speed against the eight foot vertical antenna can be heard creating vibrating and whistling type sounds in the VLF receiver.

Already, I have been pleasantly impressed with the little pine tree antenna which has provided monitoring of both chorus and whistlers during the past several days.

If you have not already tried your "natural" antenna, maybe it would not hurt to give it a try! And by all means, do not forget to disconnect your "natural" antenna from the VLF receiver when it is not in use or when threatening weather approaches! Remember, whistlers are rarely heard originating from nearby lightning. Most whistlers are generated by lightning hundreds of miles away from the VLF receiver!

Coordinated Observation Schedule November 2002

By Bill Pine Ontario, CA

The Coordinated Observations for November/2002 will be held on November 23 and 24. All data is welcome and should be submitted even if the conditions are quiet. It is not required that you observe on both days. Any data you can contribute is valuable. The procedure to use for Coordinated Observations will be as follows:

1. Use the Data Cover Sheet and Data Log forms found at the end of the *Journal.* (Make copies as needed.)
2. Put a voice introduction at the start of each session indicating your name, your INSPIRE Team name (and number, if assigned), the date, local time and UT time.
3. Record for 12 minutes at the start of each hour that you can monitor on the specified days. Keep a detailed written log of all signals that you hear and indicate any items of interest. When you submit your tapes, spectrograms will be made of any parts of the tape that you indicate.
4. Place a time mark on the tape on the hour and each two minutes for the next 12 minutes. Use Coordinated Universal Time (UTC) for all time marks.
5. Record at 8 AM and 9 AM **LOCAL** time.
6. In addition, record on other hours to compare results with those in neighboring time zones. For example, an observer in the Central Time Zone might record at 7 AM (8 AM EDT), at 8 and 9 AM CDT and at 10 AM (9 AM MDT).
7. Use 60 minute tapes (30 minutes per side) with two sessions per side. It is preferred that you record on one side of the audio tape only.
8. Label all tapes and logs to indicate the sessions monitored and send to:

   Bill Pine
   Chaffey High School
   1245 N. Euclid Avenue
   Ontario, CA 91762

9. Your tapes will be returned with spectrograms of your data. An article reporting on the results will appear in the next *Journal.*
10. SPECIAL NOTE: If you are hearing whistlers, replace the data tape after 12 minutes with a "Whistler" tape and continue recording with time marks every two minutes. If we get whistlers, this would be a good opportunity to try to determine the "footprint" of a whistler (the "footprint" is the geographical area where a whistler can be detected).

Specified Coordinated Observation Dates for April/2002:

Saturday, November 23

Sunday, November 24

INSPIRE FIELD OBSERVERS

November/2002

New to the roster of observers is Loren Lund, Team S-6.

(Unless noted otherwise, all longitudes are West and latitudes are North.)

Team #	Observer	Location	Longitude/Latitude
S-1	Kathryn Robinson. O'Connor High School	Helotes, TX	98° 47' / 29° 35'
S-2	Mark Mueller Brown Deer High School	Brown Deer, WI	87° 56' / 43° 10'
S-3	Elizabeth Quick John Marshall High School	San Antonio, TX	98° 72' / 29° 54'
S-4	Bill Pine Chaffey High School	Ontario, CA	117° 41' / 34° 14'
S-5	Jim Hoback John Jay High School	San Antonio, TX	
S-6	Loren Lund La Salle High School	Union Gap, WA	120° 30' / 46° 33'
I-1	Shawn Korgan	Gilcrest, CO	104° 67' / 40° 22'
I-2	Linden Lundback	Watrous, Sask,	105° 22' / 51° 41'
I-3	Robert Bennett	Las Cruces, NM	106° 44' / 32° 36'
I-4	Mitchell Lee	San Jose, CA	120° 40' / 39° 16'

Report on Field Observations 3/2002-9/2002

By Bill Pine
Ontario, California

The report on "Coordinated Observations" has been replaced with the report on "Field Observations". The purpose of this change is to encourage INSPIRE participants to make field observations and share their results with others. Notice in the article title that the time range for these observations is a 6-month span from March through September. Any observations made during that time should be sent in and all reports will be included in this article. The span of time for field observations for the next issue of the *Journal* will be October through February.

The guidelines for observations are:

1. Fill out a log cover sheet and data sheets for each observation.
2. Place a voice introduction on each tape indicating team, date and start time.
3. Insert a time mark every two minutes during the observations.
4. Submit the data as indicated on the Coordinated Observation page.

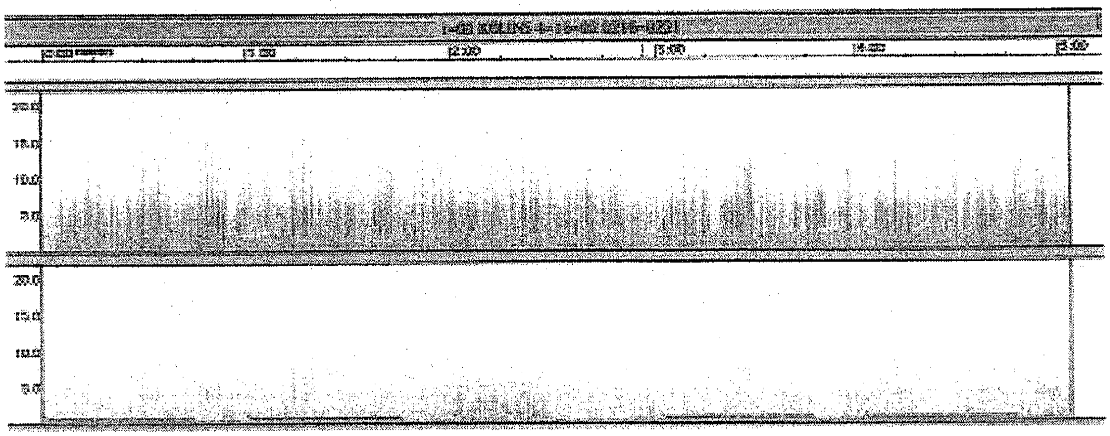
The observations in this report will be given in chronological order and will include the Coordinated Observation sessions. Leading off the report will be Shawn Korgan with an observation made as part of the KOLINS research project.

4/16/02 0216 UT – 0237 UT Team I-1 Shawn Korgan, Gilcrest, CO

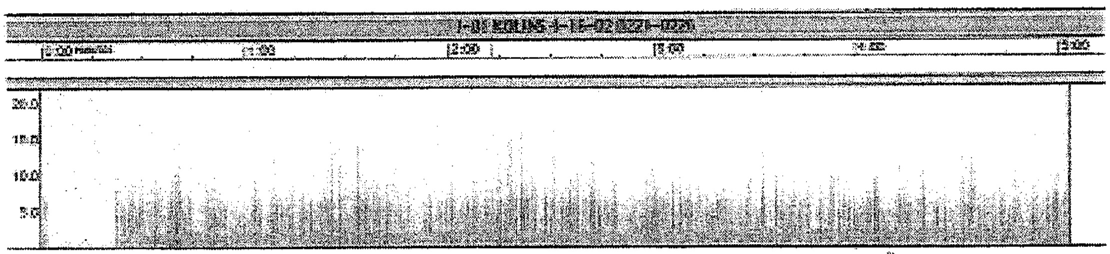
The KOLINS Operations are a joint operation between the Russian KOLIBRI satellite and INSPIRE. The satellite is programmed to transmit on a schedule that is custom designed for each observer. Shawn recorded a pass on April 16. The signal was not found in the data and it was not verified that the satellite had transmitted on schedule.

For his sessions, Shawn puts WWV radio on one track of the stereo recording with the VLF data on the other track. For analysis purposes, spectra were created for each 5 minute part of the data. The first spectrum shown includes both tracks with WWV on the lower track; the other spectra show the data track only.

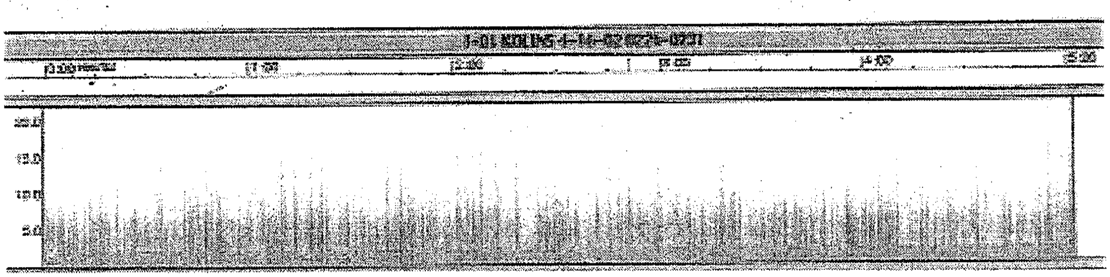
0216-0221 UT



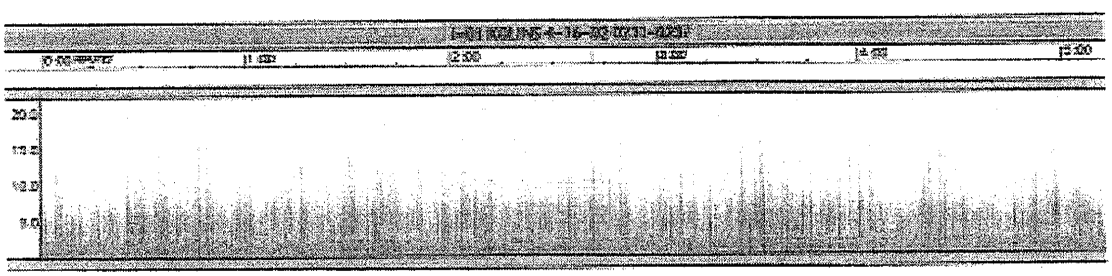
0221-0226 UT



0226-0231 UT



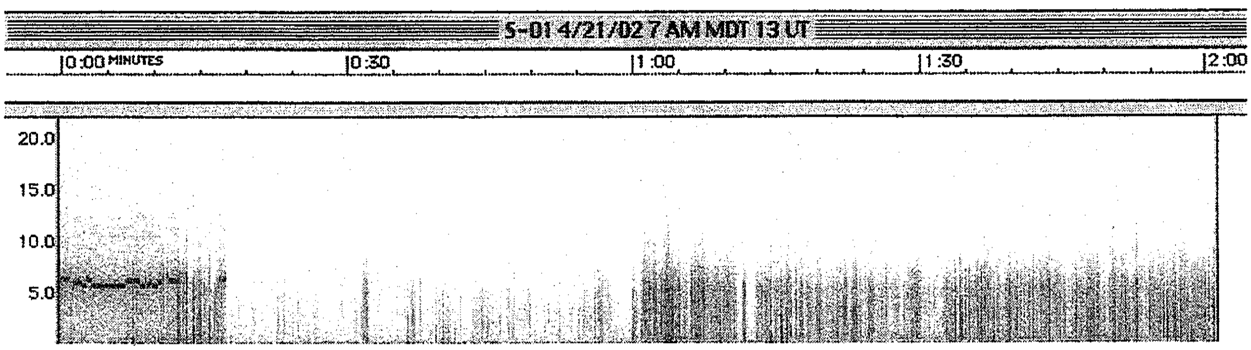
0231-0236 UT



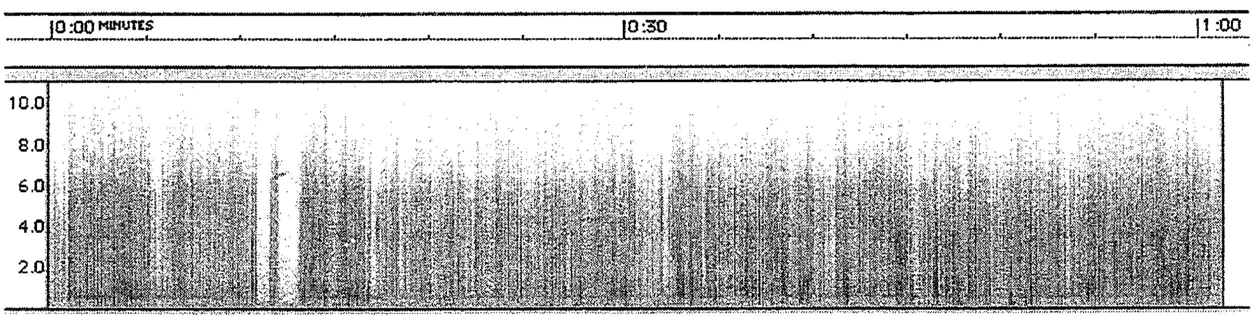
4/21/02 1300 UT 7 PM CDT Team S-1 O'Connor High School, Helotes, Texas

Kathryn Robinson and her students from O'Connor High School in Helotes, TX, were observing around sunset on April 21. Student members of the team included Corey Davis, Lauren Dulling, James Higdon, Amanda Ledesma, Amy Lee, Kevin Lessard, Andrew Luevano, Devon Luna, Brandon Rabenault, Justin Warren, and Bonnie Watson.

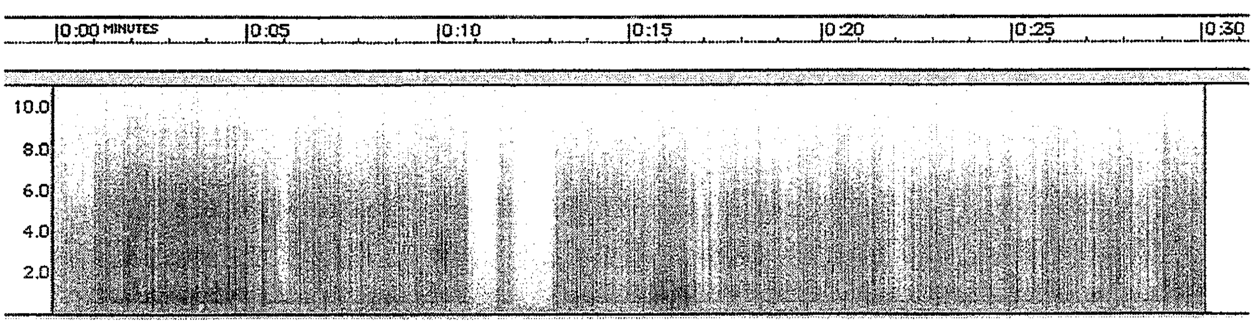
The evening session featured a nearby thunderstorm with many strong sferics and tweeks. The team also observed at sunset on Sunday, April 22, but reported quiet conditions.



The first minute included some oscillation in the receiver and some level setting.



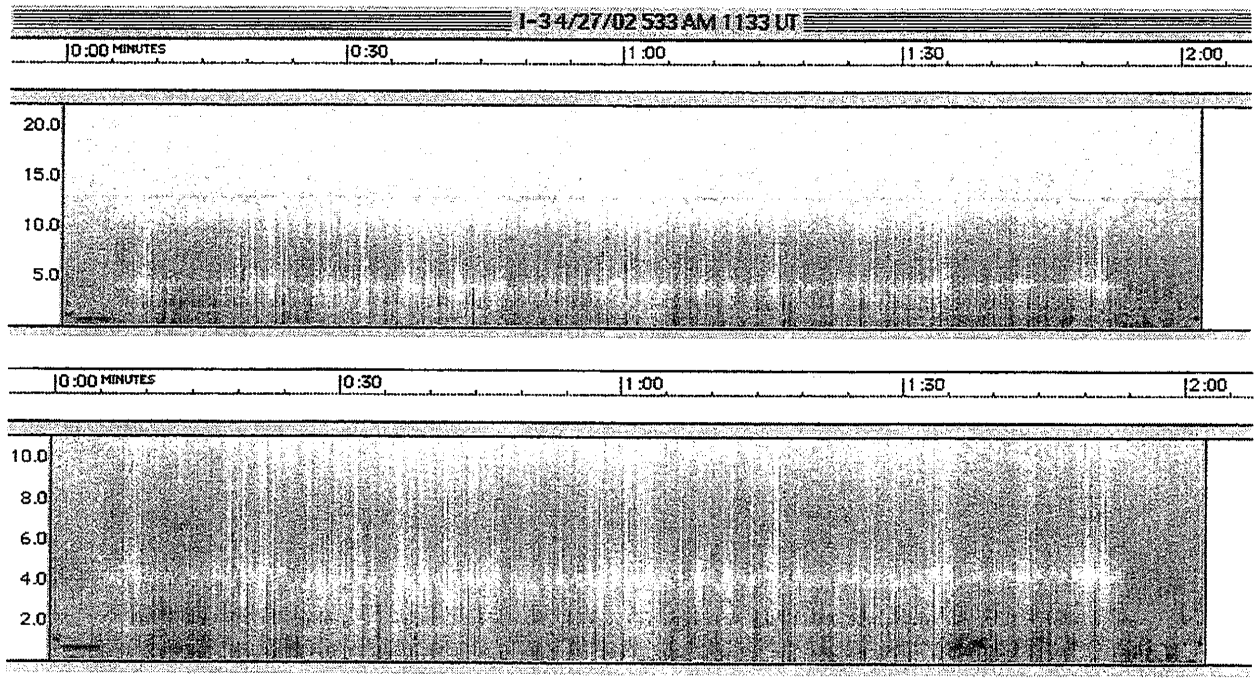
This is the second minute using a 0-11 kHz frequency range. The sferics are so dense that they are almost constant.



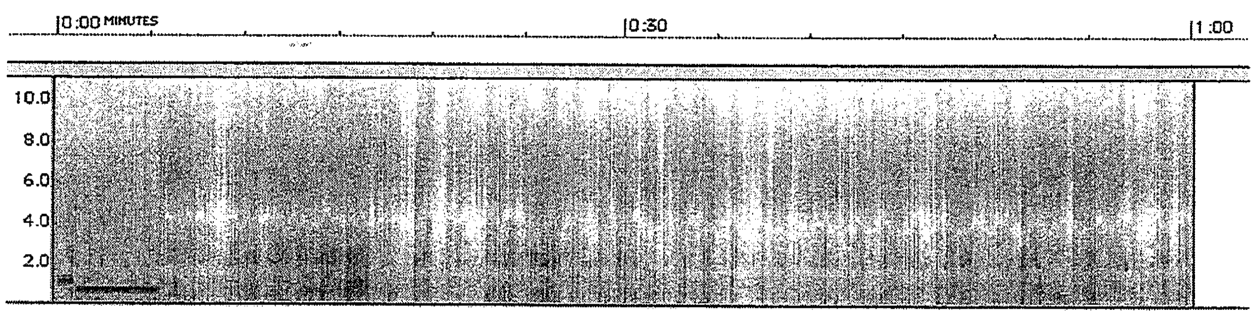
The first 30 seconds from above.

4/27/02 1133 UT 5:33 AM CDT Team I-3 Robert Bennett Las Cruces, NM

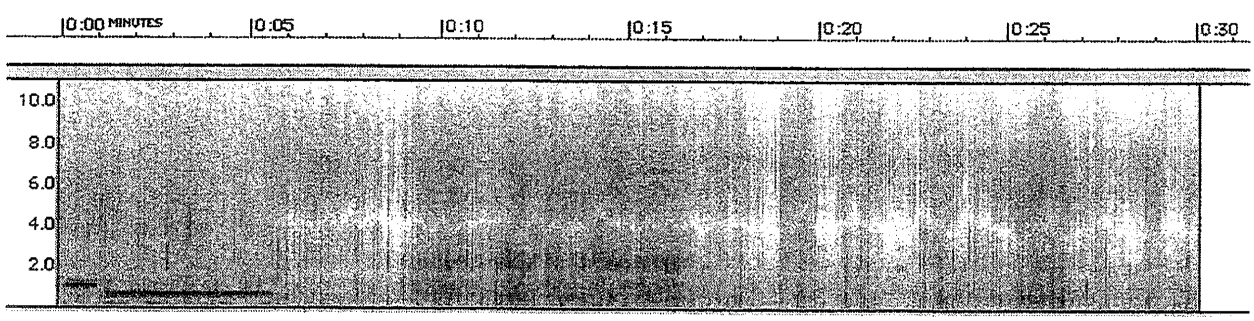
Bob started the Coordinated observations at 5:30 AM CDT.



The first 2 minutes of the first tape. Dense sferics and tweeks with many whistlers in the background, but not visible on the spectrogram.

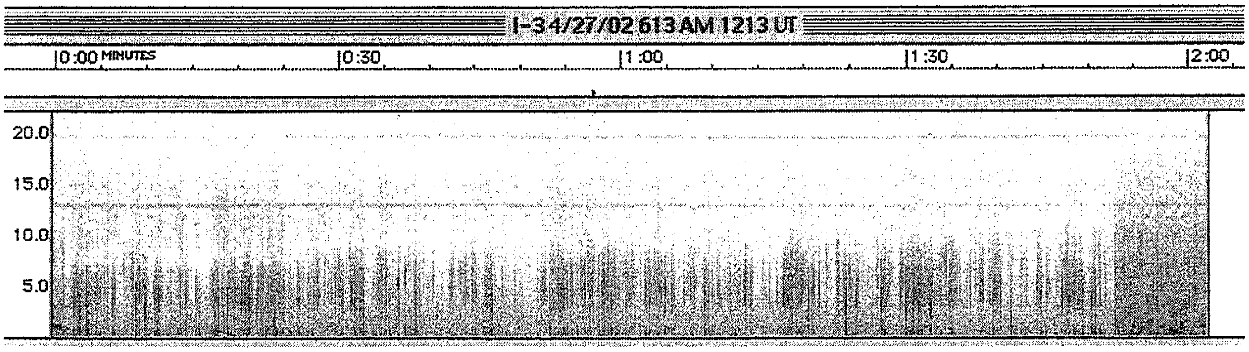


The first minute.

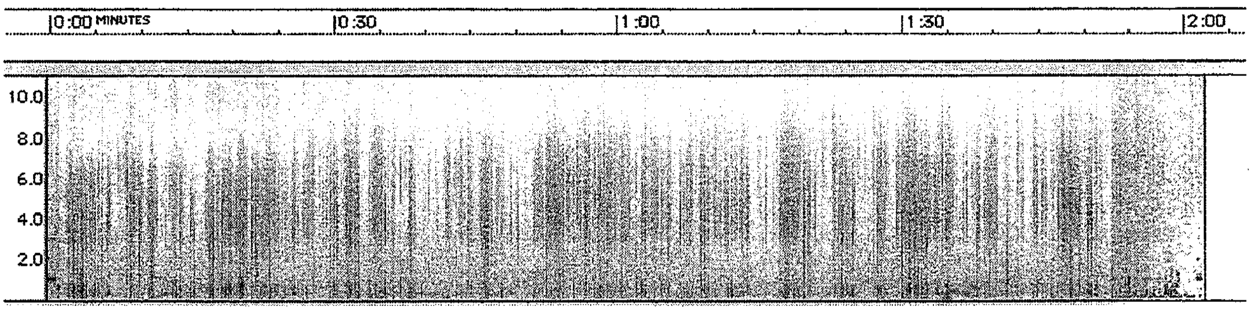


The first 30 seconds.

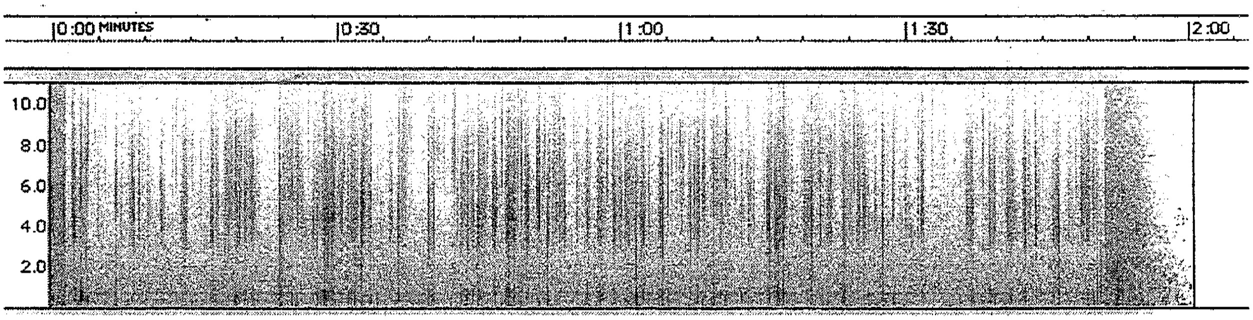
4/27/02 1213 UT 6:13 AM CDT Team I-3 Robert Bennett Las Cruces, NM



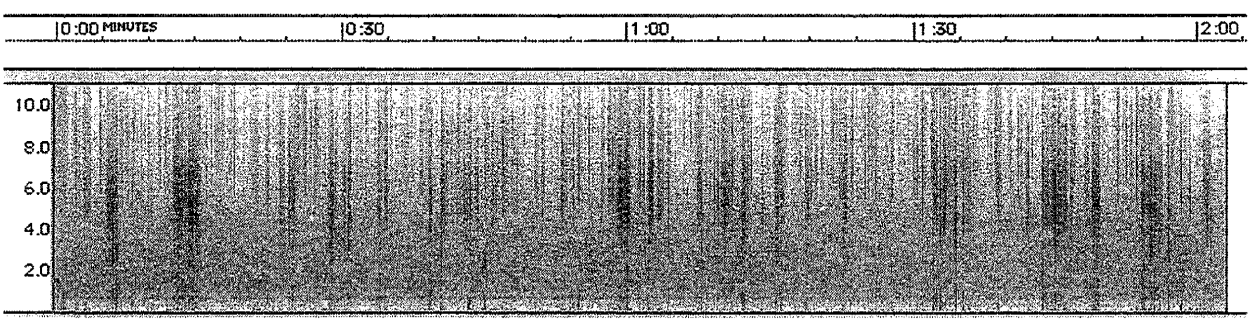
Conditions are quieting down somewhat.



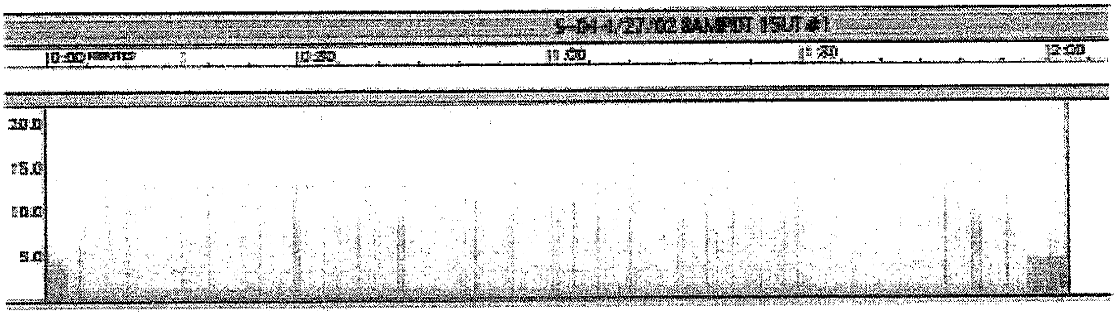
4/27/02 1300 UT 8 AM CDT Team I-3 Robert Bennett Las Cruces, NM



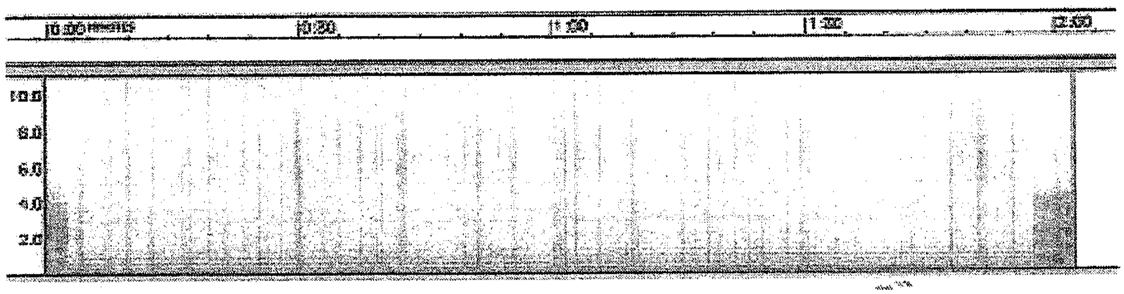
4/27/02 1400 UT 9 AM CDT Team I-3 Robert Bennett Las Cruces, NM



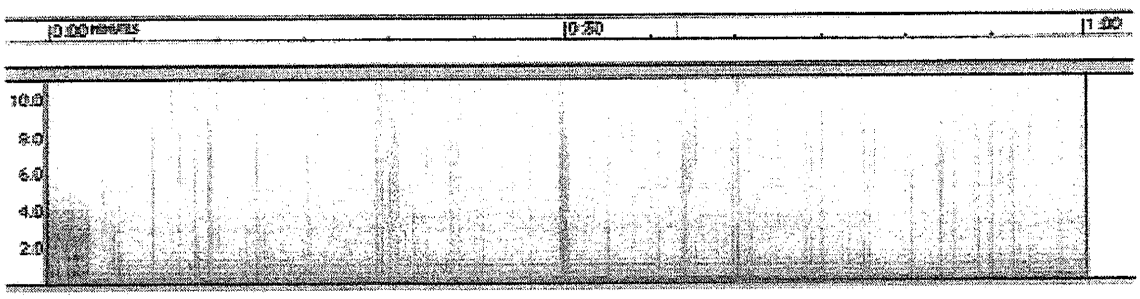
4/27/02 1500 UT 8 AM PDT Team S-4 Chaffey High School, Ontario, CA



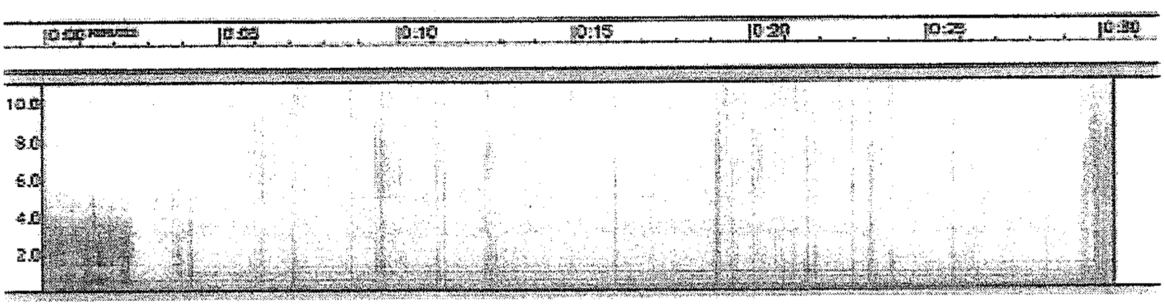
Receiver #1 (ACTIVE receiver with 1 meter loop antenna) Quiet conditions.



0-11 kHz range.



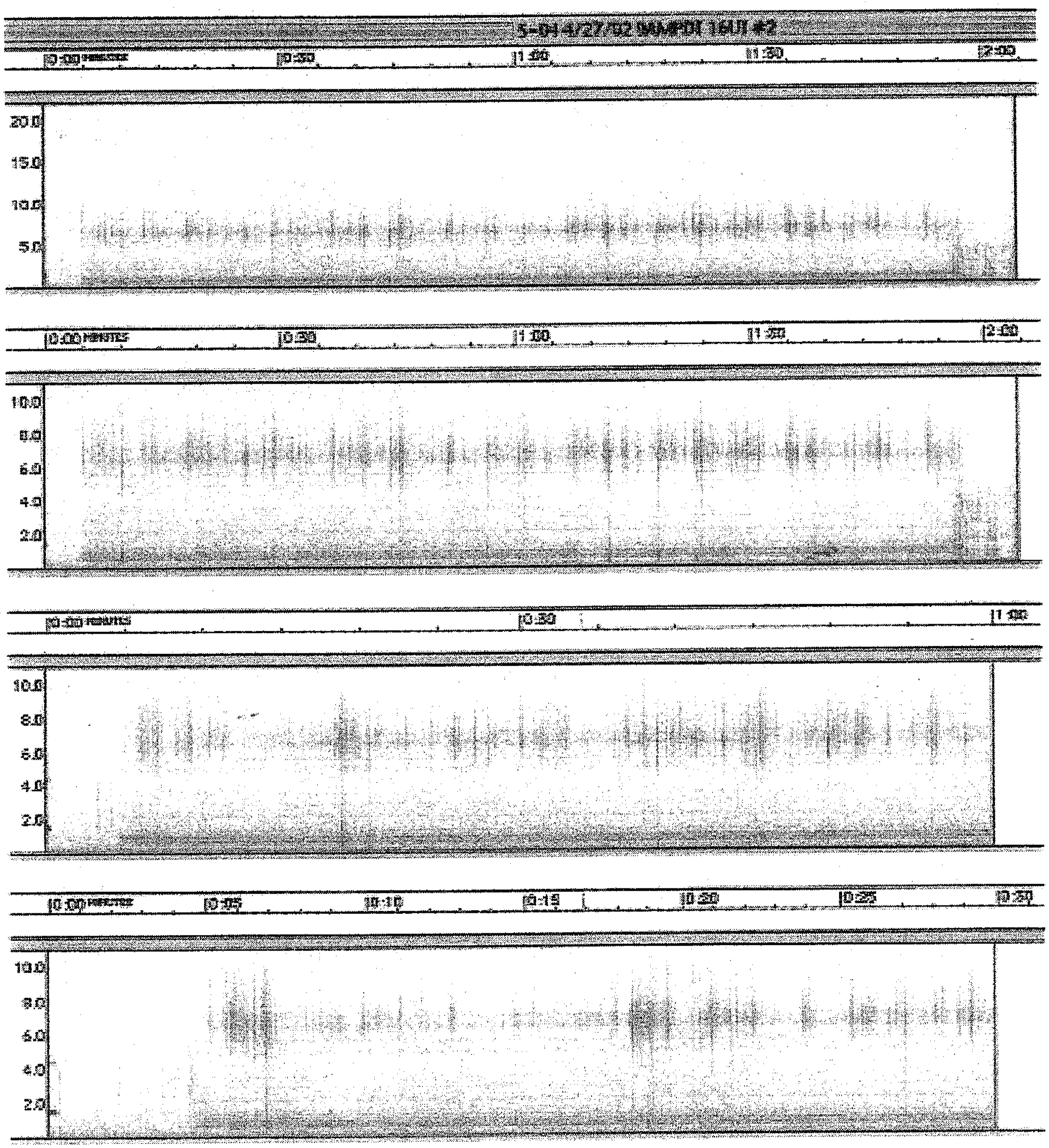
First minute.



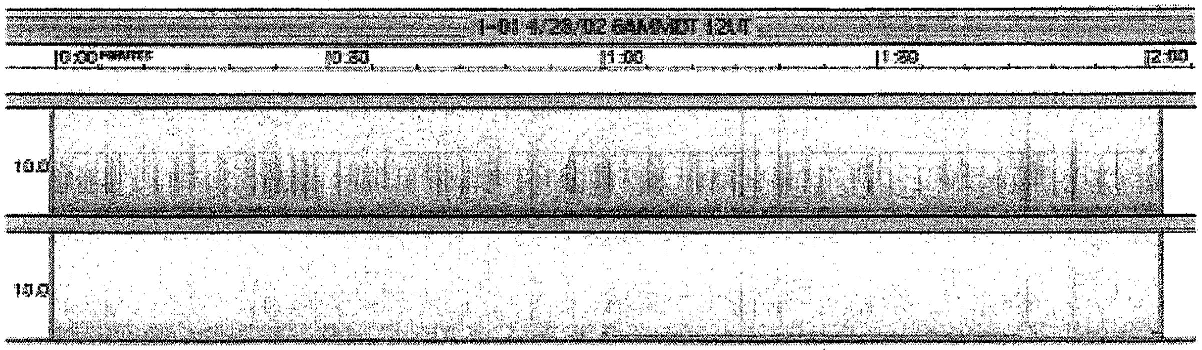
First 30 seconds.

4/27/02 1600 UT 9 AM PDT Team S-4 Chaffey High School, Ontario, CA

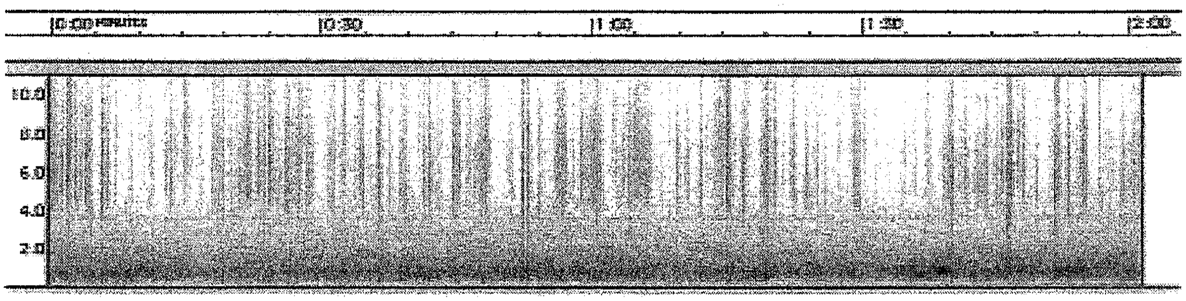
Quiet conditions continued.



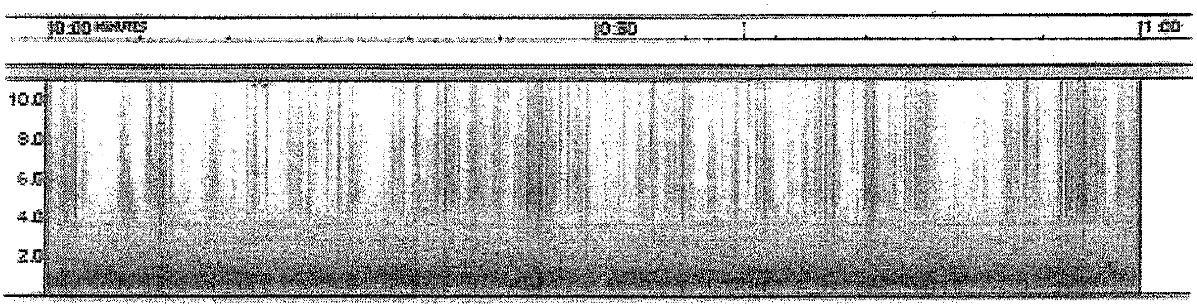
4/28/02 1200 UT 6 AM MDT Team I-1 Shawn Korgan Gilcrest, CO



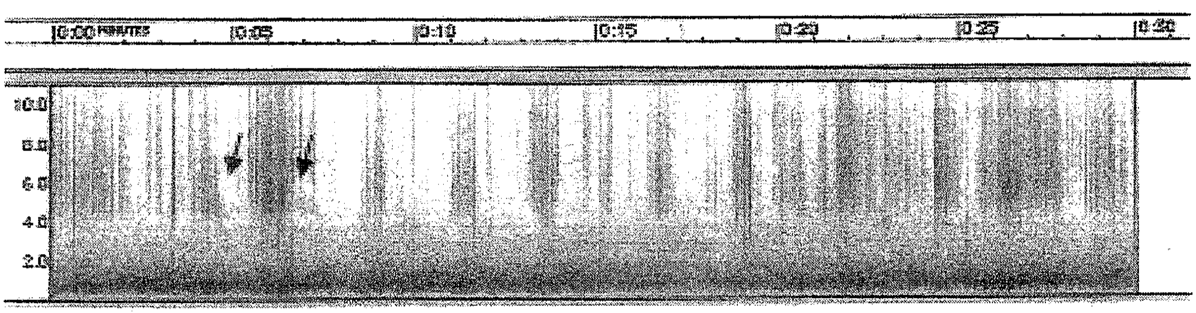
VLF on the top track, WWV on the bottom track. Strong sferics.



0-11 kHz range.

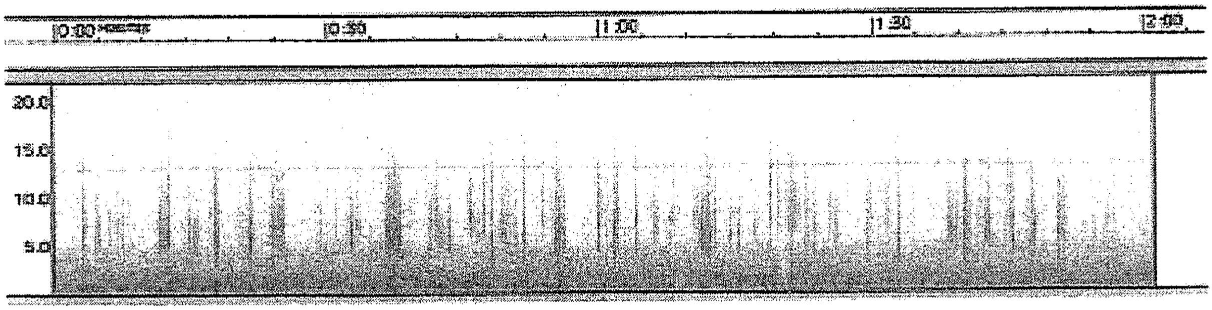


First minute.

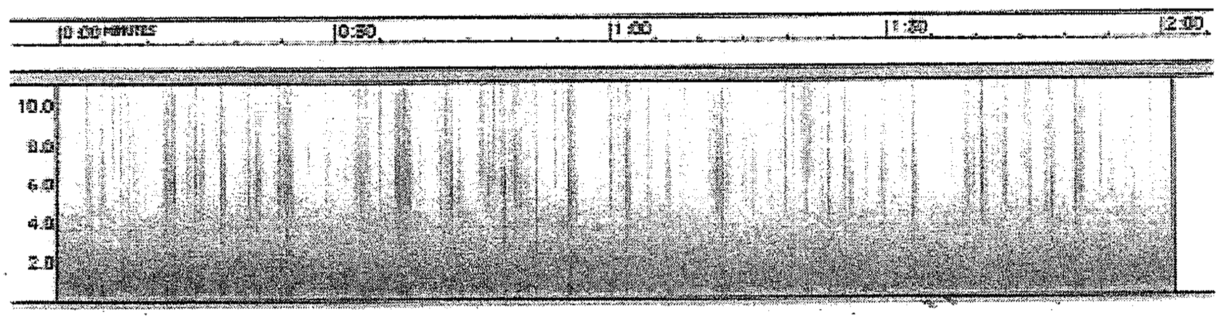


Arrows point to whistlers.

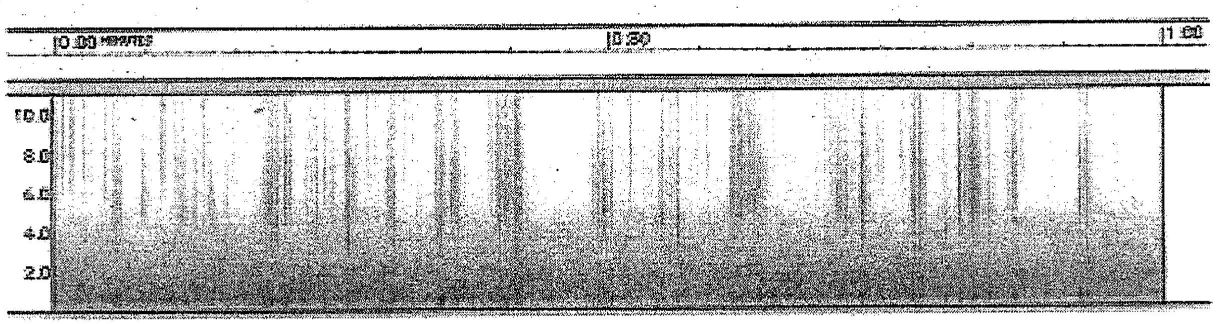
4/28/02 1300 UT 7 AM MDT Team I-1 Shawn Korgan Gilcrest, CO



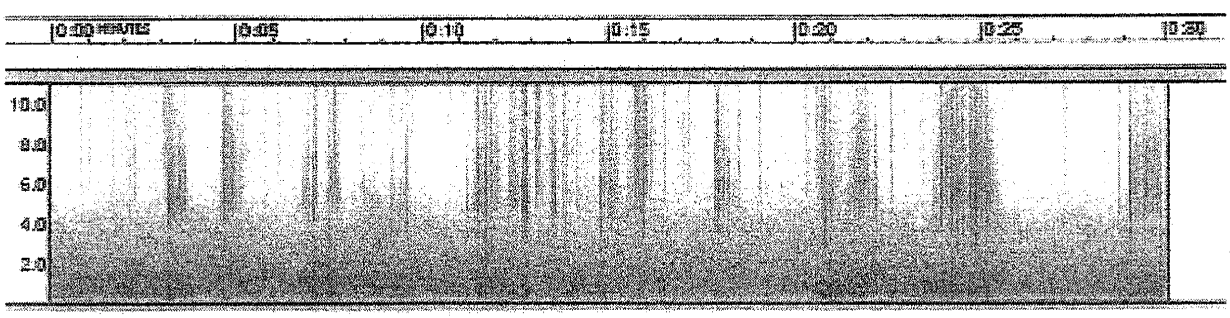
Strong sferics with many faint whistlers.



0-11 kHz.

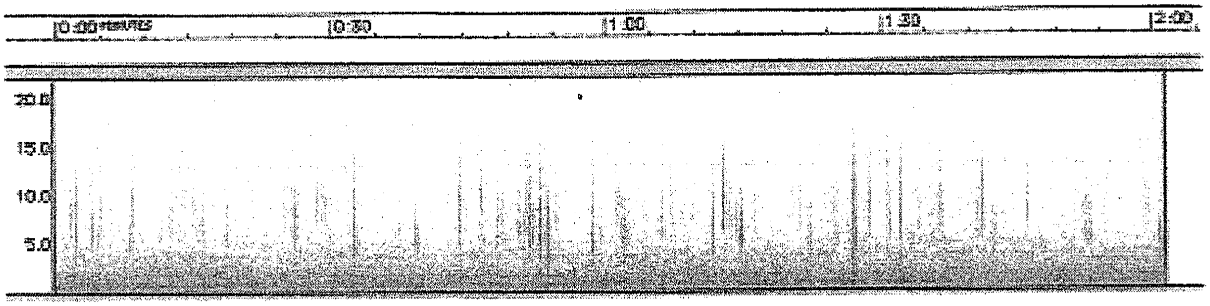


First minute.

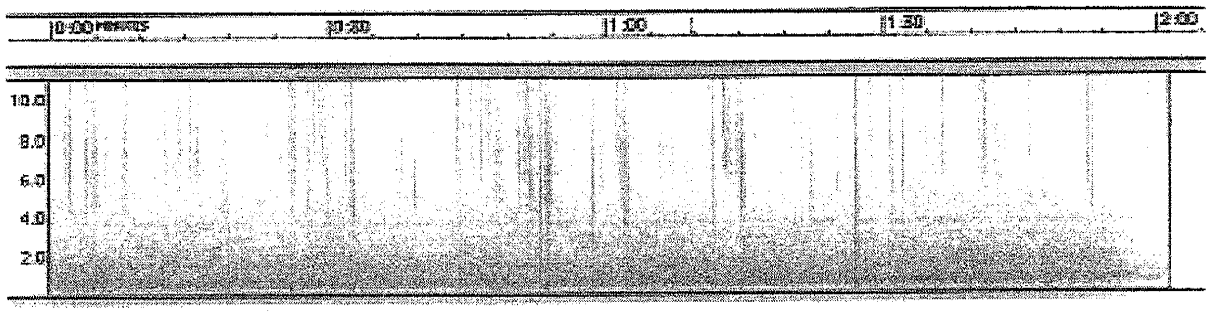


First 30 seconds.

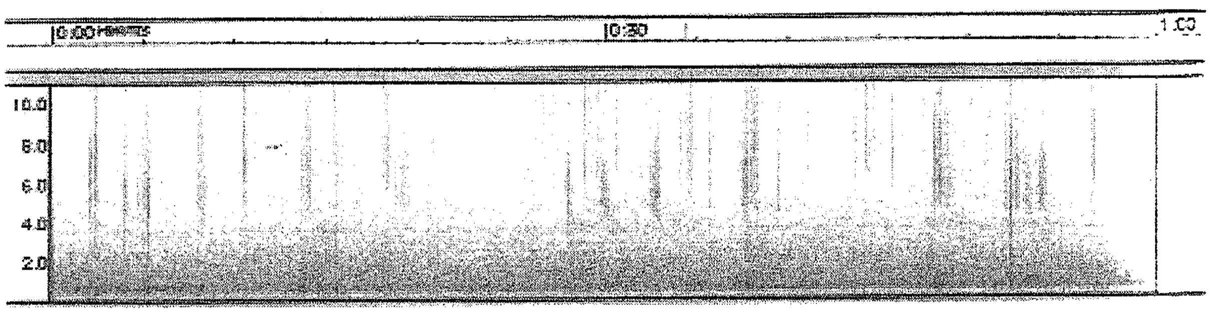
4/28/02 1400 UT 8 AM MDT Team I-1 Shawn Korgan Gilcrest, CO



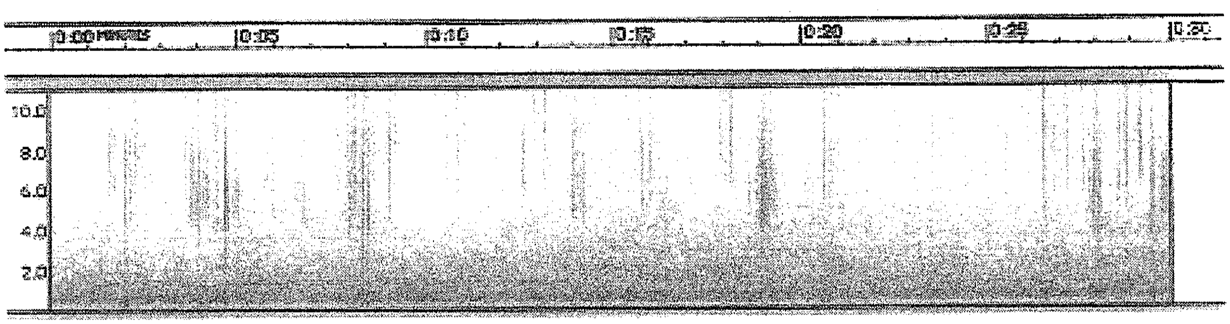
Conditions are much quieter.



0-11 kHz range.



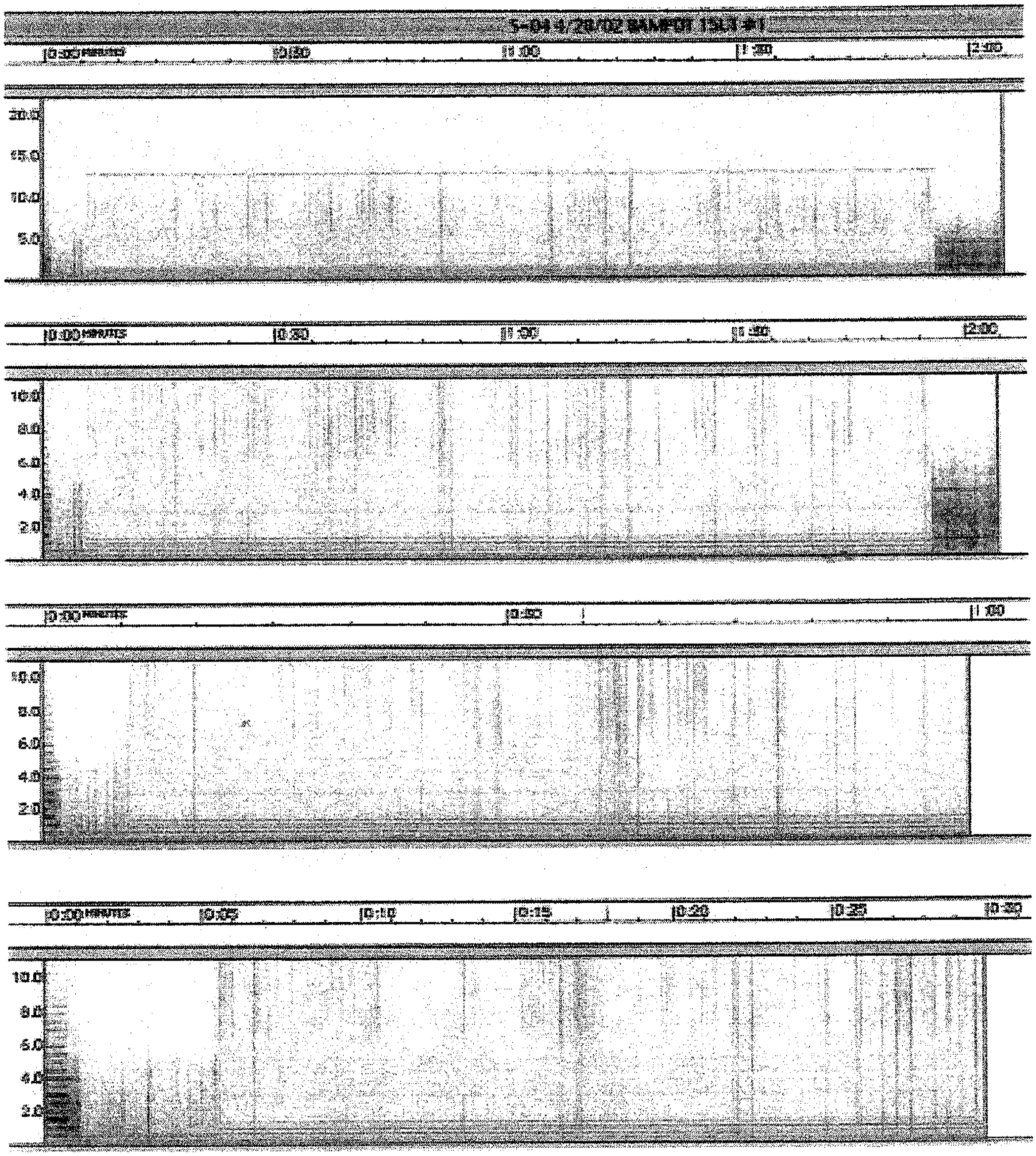
First minute.



First 30 seconds.

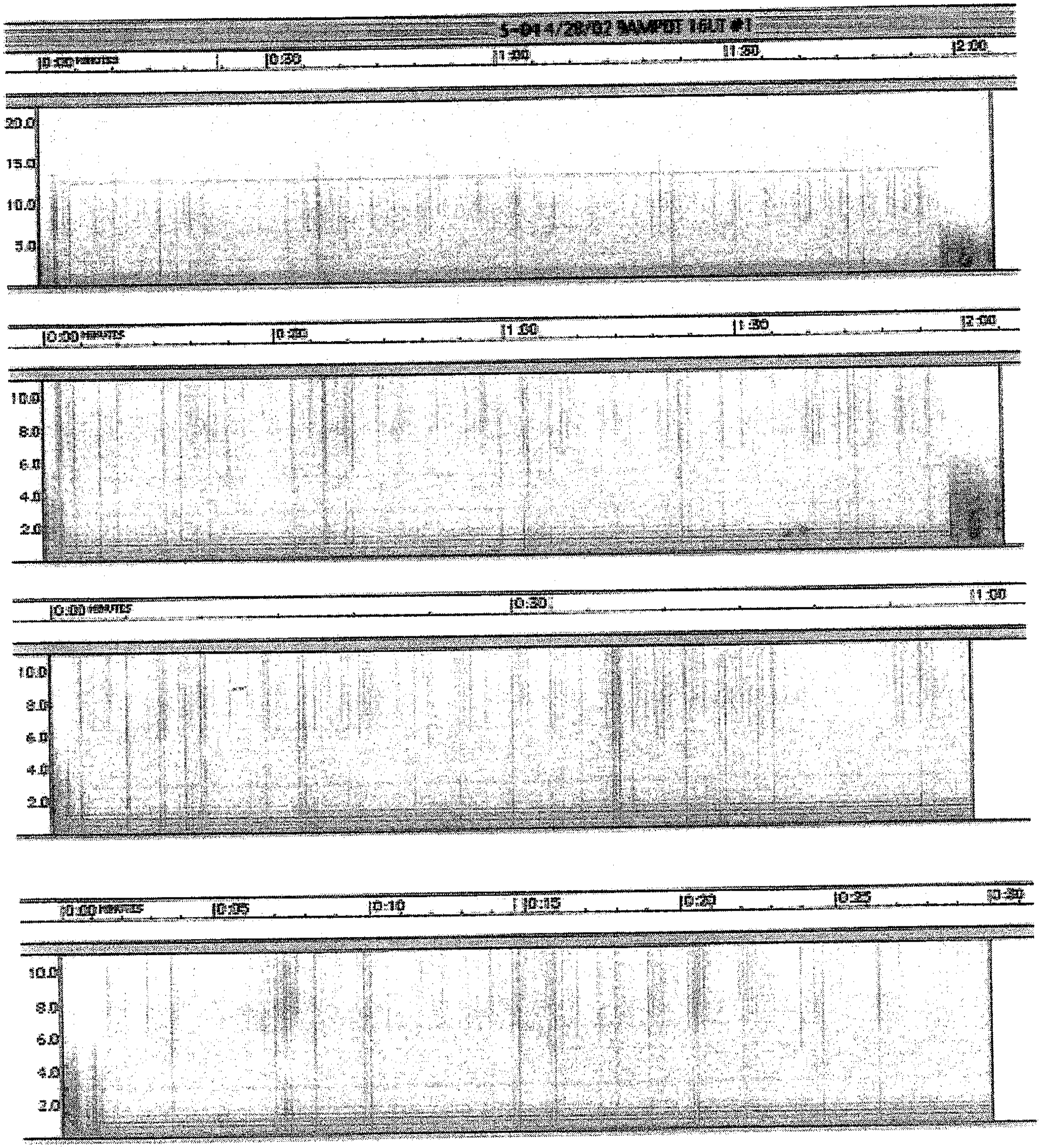
4/28/02 1500 UT 8 AM PDT Team S-4 chaffey High School Ontario, CA

Quiet conditions prevailed on April 28.



4/28/02   1600 UT   9 AM PDT   Team S-4 chaffey High School   Ontario, CA

Quiet conditions continued at 9 AM.



Data Log Cover Sheet (copy as needed)

INSPIRE Observer Team ______________________ Team Number: ____

Equipment: Receiver ______________________

Recorder ______________________

Antenna ______________________

WWV radio ______________________

Site description: ______________________________________

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

Personnel: ______________ ______________ ______________

______________ ______________ ______________

Team Leader address: Name ______________________

Street ______________________

____

City, State, Zip, Country ______________________

email: ______________________

Local Time to UT Conversion Table

EST + 5 = UT	EDT + 4 = UT
CST + 6 = UT	CDT + 5 = UT
MST + 7 = UT	MDT + 6 = UT
PST + 8 = UT	PDT + 7 = UT

INSPIRE Data (copy as needed)

INSPIRE Observer Team ____________________ Team Number: ____

Coordinated Observation Date: __________ Receiver ________

Tape Start Time (UT) __________ Tape Start Time (Local) __________

Local weather: ______________________________

Code: M - Mark (WWV or Voice) S - sferics T - tweek W - whistler A - Alpha C – chorus
Sferic Density: D: ___ Scale of 1-5 (1 – Very Low, 3 – Medium, 5 – Very High)

Time (UT)	Entry		Observer
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________
________	M-WWV M-V S T C W ____________________	D: ___	________