The INSPIRE Journal

Volume 4 Number 2
April 1996

INTMINS-April/96 Schedule Not Ready At Press Time!

Last week the Space Shuttle docked with MIR for transfer of personnel and other scientific objectives. Whenever this happens there is a need to maneuver MIR both into position for rendezvous and to return to its normal orbit after the docking. At press time (March 25) the two space vehicles were still docked. While we have good orbital elements for the docked pair, there is no chance that MIR will maintain that orbit until the end of April. In consultation with Bill Taylor, I decided to go to press with this issue without the April/96 operation schedule. The schedule will be included as a separate insert when the *Journal* is mailed. You should have found the schedule in the envelope with your copy of the Journal. If that is not the case, let me know right away and I will get a copy of the schedule to you. You will have received this issue as soon as possible after it was determined that MIR had achieved a stable orbit.

Also in this issue:

- Information on new subscription procedures.
- Announcement of a new, redesigned INSPIRE VLF receiver
- A report on the ongoing research of the Italian INSPIRE investigators.
- A report on data gathered for the INTMINS-November/95 operations.
- A report on data gathered for the recently completed special observations.
- Copies of data log forms and an INSPIRE order form.

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The INSPIRE Journal is a publication of The INSPIRE Project, Inc., a nonprofit educational/scientific corporation of the State of California. The purpose of the INSPIRE Project, Inc., is to promote and support the involvement of students in space science research. All officers and directors of the corporation serve as volunteers with no financial compensation. The INSPIRE Project, Inc., has received both federal and state tax-exempt status (FEIN 95-4418628). The *Journal* is published two times per year: November 1 and April 1. Submission deadlines: October 1 and March 1

Contributions to the *Journal* may be sent to:

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

email: pine@nssdca.gsfc.nasa.gov
pinebill@aol.com
Fax: 909 931 0392

Subscription Update

This issue marks the end of the fourth year of publication of *The INSPIRE Journal*. For a couple of reasons we are changing the way subscriptions will be handled. The first reason, of course, is cost. The *Journal* has grown and so have postage rates. The second reason is that a two year subscription term is not working well. The original thought was that renewing every two years would be more convenient for subscribers and less work for the editor. The second of these has not worked out since subscribers have started subscriptions at all points during the two years meaning that renewals would be due at all different times. It will work better if all renewals happen at the same time. With all of this in mind, the following changes will take effect:

1. The one year (two issues) subscription rate will be: $ 6 US, Canada, Mexico; $10 Overseas rate

2. All subscriptions will expire each year after the November *Journal* issue.

This means that all current subscriptions will expire next fall after the November 1996 (Volume 5 #1) issue. According to my records, all current subscribers have received the April 1995 (Volume 3 #2) issue, the November 1995 (Volume 4 #1) issue and, of course, this one (Volume 4 #2). So, next fall, everyone will have received at least the four issues promised with the last subscription.

I appreciate your patience with this long explanation. I hope this is fair to all; if there is a problem, please let me know. My goal is that everyone get their money's worth with *The INSPIRE Journal.*. Thanks.

INSPIRE Workshop

On February 10, 1996, an INSPIRE workshop was held in Washington, DC. Local host was David Snyder of Gallaudet University, which provided excellent facilities. The workshop was sponsored by the District of Columbia Space Grant Consortium (DCSCG), which was represented by Dr. John Logsdon. The morning consisted of presentations by INSPIRE personnel on natural radio, INSPIRE activities and INTMINS. In the afternoon, an informative presentation was given by a representative of the local power company on radio interference and the locations of quiet sites. This was followed by a lab session on receiver kit construction. After dinner at Gallaudet, the day culminated with a data recording session on the athletic field as MIR passed to the east with ISTOCHNIK operating. It was too cloudy to see MIR although the orbital viewing parameters were good (in this case, an early evening pass - 7 PM local - with a dark sky). We did hear the datalink radio signal, so we knew MIR was there. Later analysis of the data tapes did not reveal the 1 kHz signal from MIR. We were unable to get to the desired site because of the recent flooding on the Potomac.

Attendance included 14 enthusiastic individuals, some of whom were hearing about INSPIRE for the first time. All agreed that the day was a resounding success. Plans are already being made for the "second annual" DC workshop in 1997!

If you would like information about hosting an INSPIRE workshop, contact Bill Pine at the address shown on Page 2. INSPIRE would sponsor the workshop and pay all costs.

INSPIRE Is Now on World Wide Web:

URL: http://www.gsfc.nasa.gov/education/inspire/inspire.html

New email Address and Fax for INSPIRE

There are now additional means to communicate with INSPIRE (in this case, Bill Pine):

email:	pine@nssdca.gsfc.nasa.gov
	pinebill@aol.com
Fax:	909 931 0392

(Since I will be working in DC this summer, the nssdca address is best during that time. My family will be monitoring the aol account this summer and will be able to forward messages. If you need to send a fax this summer, contact me by email for the fax number in DC. - ed.)

Field Observation "Loaners" Available

We have had several INSPIRE participants take advantage of the field setups available from INSPIRE. The setups include an RS4 receiver with antenna, a cassette recorder with headphones and microphone, an audio tape and connecting cable. All you need to provide is a ground rod. (A 3/4" metal pipe or EMT conduit is recommended.)

You may borrow a field setup for 1-2 months and use it as often as you want. You will have only three obligations:

1. Provide return postage (about $5) and return the equipment when done.
2. Record an audio tape of one or more of your field observation sessions and return the tape with the equipment.
3. Write a short (1-2 pages) note for the *Journal* about your experiences.

This is a way to find out if you want to build a kit for yourself. If you have a field setup already, this can provide you with a second field station to allow you to check out your components. If you would like to borrow a field setup, send your request to Bill Pine at the address shown on Page 2 (USMail, email or fax).

New INSPIRE Receiver Coming Soon!

The venerable RS4 receiver has been completely redesigned and will be available soon as the IR2 (INSPIRE receiver #2). We are currently testing and troubleshooting the prototype. John Kohus has done an excellent job with circuit design and he will be providing the kits for INSPIRE, as he has done for the RS4. This receiver will have several features that will make it easier to use and better suited to INTMINS observations. It is expected that the new receiver will be available next fall, or perhaps sooner. An article describing the new receiver will appear in the next issue of the *Journal*.. If you would like to hear about the new receiver as soon as it is available, please send a self-addressed, stamped envelope to Bill Pine at the address shown on Page 2.

RS4 Receiver Kits and Assembled Receivers Available Now

INSPIRE RS4 receiver kits and assembled receivers are now in stock and available for immediate delivery. These items are available on a "while supplies last" basis. Please use the INSPIRE order form on the last page of the *Journal.*

INTMINS-April/96 Operations Schedule

By Bill Taylor, Washington, DC
Stas Klimov, Moscow, Russia
Bill Pine, Ontario, CA

The April 1996 INTMINS Operations schedule has been determined. Operations will occur on the last two weekends: April 20-21 and April 27-28. Data gathered will be analyzed and reported on in the November 1996 issue of *The INSPIRE Journal*. The schedule for operations at the end of November 1996 will also appear in that issue.

Gathering Data:

The data gathering plan will be changed from that used in November 1995. In order to allow more flexibility dealing with orbital changes by MIR between now and when the operations occur, the following data gathering schedule will be followed:

Step 0: Completely check out all equipment. A good method is to set up everything in your living room. All you will hear is household 60 Hz, but you will know the equipment is working. This is also a good time to fill out the log cover sheet (see page 68 of the *Journal*).

Step 1: Define "T-time" as the starting time for operation of ISTOCHNIK.
Convert the UT time to local time.
Arrive at your site with time to spare.

Step 2: Start data recording at T minus 12 minutes.
Prior to this time place a brief voice introduction on the tape identifying the observers and the operation number.

Step 3: Place time marks on the tape at: T-12, T-10, T-5, T, T+3, T+8, T+13, and near the end of the tape. Use UTC times only. Note that this schedule brackets the scheduled time of operation of ISTOCHNIK with time marks. Use 60 minute tapes and place one operation per side.

Step 4: Keep a written log (see page 69 of the *Journal*) of time marks and descriptions of everything you hear.

Step 5: Review your tapes and revise your logs if necessary.

Step 6: Mail your tapes and logs to Bill Pine at the address shown on Page 2.
Enclose $2 postage for the return of your tapes (no envelope required).
You will receive a copy of the spectrographs made from your data.
If you would like a copy of the complete data set from all observers, enclose an additional $3 for copying and postage. Your data will be incorporated in the data analysis report article in the *Journal*.

Mode of Operation:

The two instruments on MIR are Ariel and ISTOCHNIK. Ariel is a plasma generator and operates for 5 minutes, alternating between axes. ISTOCHNIK is a modulated electron gun that accelerates a beam of electrons and emits them into space. The electron beam is turned on and off at frequencies of either 10 hertz or 1000 hertz (1 kHz), which should cause the radiation of electromagnetic waves in the VLF range at those two frequencies. ISTOCHNIK operates for a total of 2 minutes 40 seconds on the following schedule:

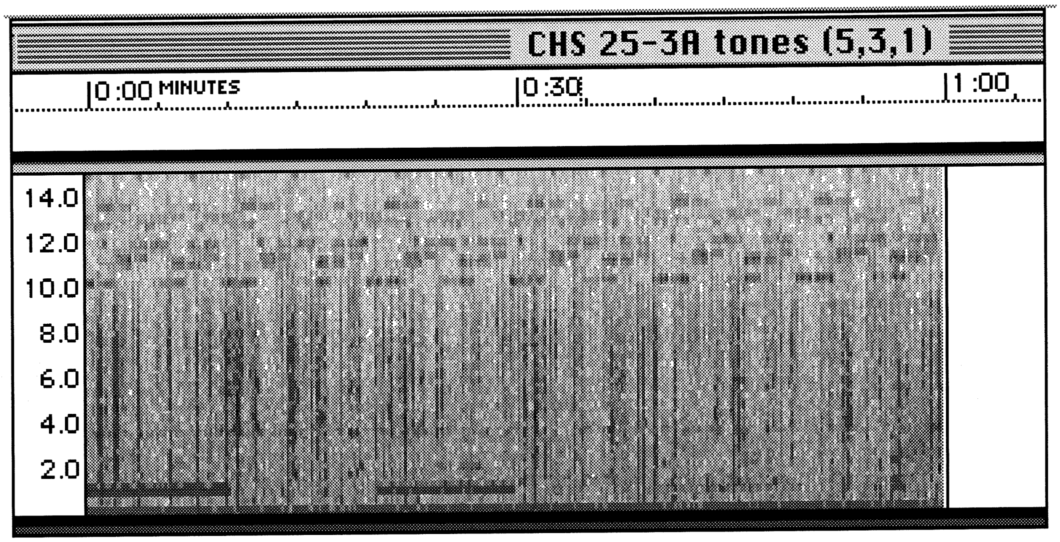
ISTOCHNIK mode:	10 seconds modulate at 10 Hz
	10 seconds modulate at 1000 Hz
	10 seconds modulate at 10 Hz
	10 seconds modulate at 1000 Hz
	repeat for 2 minutes 40 seconds of operation

On each pass, Ariel will either operate first or last, whichever gives the most coverage over INTMINS observers. Since the signal from ISTOCHNIK is more powerful, it is the one most likely to be detected. For that reason, the schedule emphasizes the operation of ISTOCHNIK.

What Are Data Analysts Looking For?

When a data tape is analyzed, a sound file is created of the time interval of ISTOCHNIK operation. Voice time marks on the tape are used to navigate within the data tape to ensure that the appropriate time interval is analyzed.

From the sound file, software (SoundEdit Pro on the Mac; GRAM on the PC) is then used to make frequency-time spectrographs of the file using various frequency ranges and time intervals in an attempt to find the signal from ISTOCHNIK. The following spectrograph was made using SoundEdit Pro.

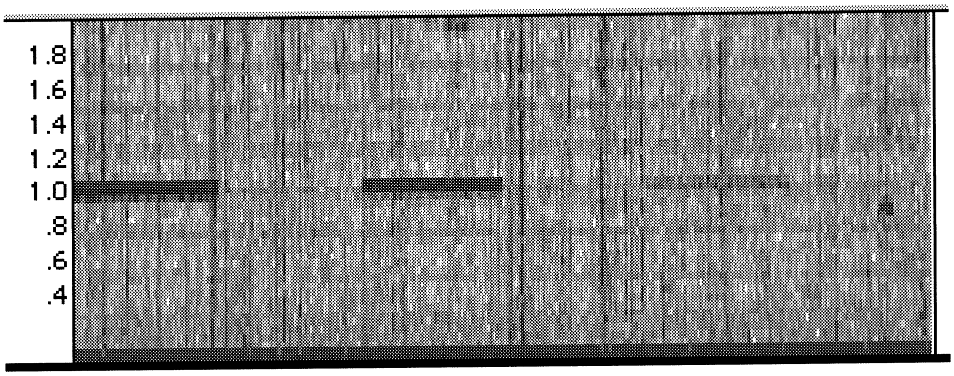


Note: The numbers 5, 3, 1 refer to 5%, 3%, and 1% of the maximum tone volume generated by the software. The first horizontal 1 kHz dash (from 0 - 10 seconds) is at 5% volume; the second dash (from 20-30 seconds) is at 3% volume; the third dash (from 40-50 seconds) is at 1% volume. Note that the last dash is not very prominent against the background.

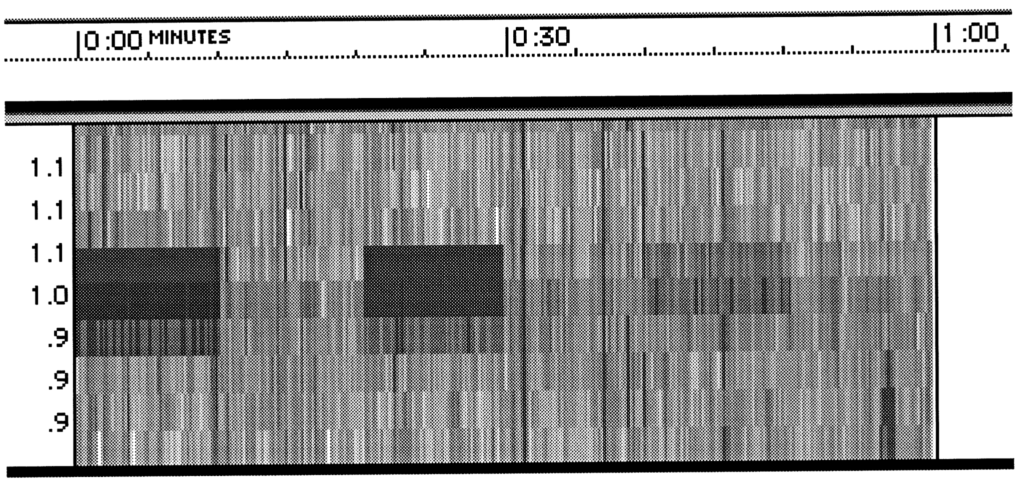
Note that the last dash is not very prominent against the background.

First, the tone generator function was used to generate a 1 kHz tone for ten seconds. The volume level of the tone was adjusted with the software to a small percent of the maximum level available. This was to simulate the expected low level of the signal from ISTOCHNIK. The tone signals were then alternated with ten seconds of silence to simulate the 10 seconds of 10 hertz operation which we do not expect to detect. The "mix" function was then used to superimpose the tone file on some actual data.

It is important to point out that even at 1%, the simulated signal is probably stronger that the signal from ISTOCHNIK by the time it reaches the surface of the earth. The following is a spectrograph of the same file using a frequency range of 0-2 kHz.



Using this frequency range, the horizontal dashes are easier to see. Next is a spectrograph of the same file using a narrow frequency range of 800-1200 Hz.



Even with this frequency range, the dash at the far right is difficult to see. Analysis of the sound file with an Excel spreadsheet might be necessary to detect the 1 kHz signal in an actual tape.

INTMINS Schedule

In the last week of March, the shuttle docked with MIR with separation not occurring until late in the week. In order to get reliable projections for tracks late in April it became necessary to wait until MIR's orbit stabilized. Since the deadline to get the Journal to the printer was past, it was decided to include the INTMINS-April/96 operating schedule as a separate insert.

Italian VLF Research in the Field
Part II

By Flavio Gori
INSPIRE European Coordinator
Florence, ITALY

In the previous article, we talked about VLF research investigating (or attempting to investigate) some "strange" phenomena all of us hear about every day in the newspaper. In our case it is relating to visions of the Virgin Mary that a lady claims to receive. As you may remember, our method is to coordinate with the time of the vision: a VLF recording session (with colleagues living far away and us as close as possible to the site), a fast series of slides (including infrared) and a video recording.

After three sessions we had only one interesting slide to show, as was shown in the previous *Journal.* Though we could not explain what it might be, the slide showed a blue-white ray of light going up (or down) almost over the bell tower of the church where the lady meets the Virgin Mary. In a very welcome telephone conversation with my friend, Bill *Pine (The INSPIRE Journal* editor, as you know), he said that a phenomenon called blue jets (an atmospheric electrical item now being studied by NASA) seems to occur at a very high altitude, higher than the clouds appear to be in our slide. Unfortunately the Xerox copy published in the *Journal* did not contain as much detail as the slide itself shows.

In my previous article, I reported that the slide was sent to Dr. Otha Vaughn, an *INSPIRE Journal* reader and electric atmospheric researcher. Shortly after the *Journal* arrived in my home, he sent a fax to tell me what he thought it might be: an ice crystal falling through the atmosphere or an airplane vapor trail. He is not sure of the explanation. Neither am I.

Anyway, this is the situation at the end of June 1995. As I wrote in that article, the lady says she has an appointment with Virgin Mary on the last Sunday of June, August, October, December and so on. In the August appointment we could see nothing strange in the slides, the videotape and the VLF recording. It all looked and sounded exactly as we saw and heard it at the time. We were very surprised to see in the local newspaper (LA NAZIONE of Florence) that many people reported seeing many variations in the color of the sun that appeared to roll down towards the small church and then returned to the sky. We saw nothing like that. In both the slide and the videotape, the sun appeared the same as usual. Our eyes agreed with what the films showed.

The same paper reported about a man who claimed to have seen the light rays go in and out of the church and the sun roll. The paper identified the man as very expert in lights since he works with lights for the musical and theater world. Unfortunately, the man was the same one we interviewed in December 1994 and he told us he is a bus driver! More, as you probably remember, he is not really a light and photo buff since he told us about the "strange cloud" in the low part of the Virgin Mary's picture that appears in photographs but is not seen directly. This proved to be just a reflection coming from outdoors and striking the glass that covers the picture while the human eye sometimes cuts it off automatically.

So we cannot always rely on what the general journals report.

On the last Sunday in October we planned another monitoring trip. Florence, our town, and Ostina, the very small town where the phenomenon of the Virgin Mary occurs, are in a line with Florence at one end, Ostina roughly in the middle and Grosseto, another Tuscany region town on the sea, at the other end. Grosseto is about 150 kilometers southwest in the line of sight from Florence and there is an important aeronautical N.D.B. (Non Directional Beacon, used in direction finding in the aeronautical world) transmitting in the low frequency range exactly at 406 kHz. I wondered if that signal arriving in Florence could be influenced, during its travel from Grosseto, by the Ostina phenomenon.

While Max Mastrosimone, Dario Javaheri and I went to Ostina, Nader Javaheri remained at home to record the 406 kHz signal. Before leaving home I started up my Icom R 71 to record two central Europe Time and Frequency Stations: DCF77 in Mainflingen, Germany, and HBG in Neuchatel, Switzerland. Since their frequencies are very close (77.5 and 75.0 respectively), using the wide filter of the receiver we can monitor the two signals in a sufficient manner. Using the IROE/Grey software I can monitor by PC screen the signal/noise situation, directly recording on the RAM disk first and then on the hard disk. I can then look for influences on the signals at the time of the vision.

So this time we had photographic slides, videotape, VLF, LF low and LF high.

The first answers from the slides and videotape were negative. We needed more time to analyze the radio data since it is not easy to see if there is something interesting there. I would repeatedly watch the PC video display, varying the time-window display, in an attempt to affirm something.

After some days I felt sure enough to say that in our three kinds of electromagnetic recordings we did not find anything that correlated on all three recordings. In the 406 kHz by Nader, there is a little change in the propagation, maybe a some very weak signals like "bip-bip" at the time of the alleged beginning of the phenomenon, but on the VLF tape from near the site we did not hear this. The same was true for the Time Signal stations, though their emissions, coming from the north, are not in the best direction for the phenomenon and site we are studying.

We are still working with various tools, just to use a cross reference, trying to find out if we can discover anything in more than one medium, both radio and optical, that is related to the phenomenon. Anyway, this time it was interesting to note the "bip-bip" sound in the 406 kHz recording at the right moment of the phenomenon and for some minutes after, say 4-5 minutes. Something similar happened in the April and June sessions in the VLF/ELF range. It has not happened in two ranges at the same time.

Our job in the electromagnetic kingdom will go on. With Nader, a famous amateur antenna maker, we studied and developed a magnetic ferrite antenna, able to reach 5-6 kilohertz, so we are almost able to study the OMEGA stations and their propagation in the 10-14 kilohertz range. As all of you can understand, especially those of you living in a noisy town like us, it is not really easy to hear the OMEGA signals with all of the very strong manmade noise. We have made many efforts to hear and, more important, to use these signals. I'll not tell the whole story of the many "dull" evenings spent trying to pull out the signals in a useful way from all of the noise. There were also many filters and electrical material, both analog and digital, purchased and built by Nader himself - and then put in the trash!

After several weeks of work, we were able to monitor the OMEGA signals and the Alpha signals, too, in an almost acceptable way. As you probably know, Alpha is the Russian equivalent of OMEGA and is used for navigation by the Russian people. These signals are just a little above the OMEGA frequencies and a little bit shorter in duration. The transmitting stations are in the Russian territory from Europe to Asia to far eastern Asia. There are three stations, all transmitting at the same three frequencies with a little delay between each.

Though not in a very perfect way, we did work with these signals. Of course our sessions were most useful at the time when people are not watching television since that brings much more noise to our antenna. Even so, the magnetic ferrite antenna is able to cut off a good part of the electrical noise.

We were ready to go into the field once again on the last day of the year, December 31, 1995, at the usual time of 18:00 local. We were prepared to monitor Natural Radio (VLF) with OMEGA and Alpha signals and the Time and Frequency signals as stated earlier. In addition, as for the other times, we had photographic slides and video tape.

On this session we had a small group since Max Mastrosimone and I were the only ones who could go. Max was able to take videotape while the VLF recording and slides were my jobs in close to the church. We were on the site about two hours before the time in order to prepare our tools and find the best location, both for optical and radio observation. This time it was not possible to coordinate a recording with our colleagues Nader and Dario Javaheri and Dr. Roberto Pozzo as has happened on other days. The last day of the year is not a day like others, so we can understand.

As is normal in winter, we had cold and rainy weather. Fortunately, the hard rain stopped about one half hour before the beginning of the VLF recording session, permitting more comfortable field operations. Before leaving home I started recording the 406 kHz N.D.B. from Grosseto. I stopped the recording when I returned home, recording for almost 4 hours.

That evening I began the software analysis of both the tape and hard disk recording sessions. At first view, in the 406 kHz recording, something is still visible at about 18:00 local time (as in the previous time) when the vision appears. In the VLF tape, after some hours sitting in front of the PC, I concluded that nothing was there. The same was true in the slides.

As I told Bill Pine during a telephone call, at this time we are not able to print the sonograms in an acceptable way. The software cannot give the correct resolution in the gray scale, so it is not possible to recognize the signal from the background noise for sure. This is not the case in the video display, where we can see acceptable resolution.

In the paper, it was reported that the lady saw and talked with the Virgin Mary, but no one saw anything unusual. Neither did we.

The last observing session planned was for the last Sunday in February. This marked one year since we started monitoring the Ostina phenomenon. Max Mastrosimone with his camera and I with my WR3 radio and Sony TCM 38 recorder, all mounted on a walking stick, were in the field. The weather situation on February 24 was really cold and cloudy. The humidity was high and our condition was really unpleasant. Maybe the cold and humidity were the cause of the Sony TCM failure, which did not work in the RECORD mode, ruining 50% of our job. I decided not to record the OMEGA and Alpha signals since they are strongly influenced by the televisions in the neighborhood. At home, the ICOM 71 was tuned to 406 kHz, connected to the PC and recording the Grosseto NDB. So the results useful for us were photographic and 406 kHz.

The digital PC recording shows no particular sign in the time window from 17:45 to 18:15 local time (the vision happens at 18:00 local time). Nothing appeared in many other time windows before and after the principle one, so I think I can say that our investigation of the ionosphere shows no "strange" anomalies associated with that time. The photographs taken by Max show nothing strange either.

So after one year of research, what can I say? Our tools were used well and we have tried to update our instruments as far as we can every time we can. We are working in fields where we have a little bit of experience. We did our best.

We had an interesting slide on the first day and two interesting recordings in the 406 kHz region, where we did capture some propagation anomalies at the time of the supposed visions. In the last 406 kHz session we did not find anything. We can't say what this means. In order to compare the NDB emissions, I am planning to monitor 406 kHz for some weeks to try to understand something more about this signal on an every day basis.

In the VLF/ELF range during the April and June 1995 sessions, we captured some bips that were randomly spaced and not heard in the next sessions. I have to say that the VLF/ELF recordings were not useful in all sessions and this is one of the most unfortunate aspects of our effort. In the last field day we thought about finding another site, higher than our present site and quieter (less electromagnetic pollution), since I am not convinced that LF might give more information than VLF/ELF.

We can only say that using these instruments we were not able to discover anything for certain that was related to the visions, if they really occur. This is not to say that they do not occur. This means simply that we were not able to find anything. Maybe the ELF/VLF and LF, the software used to make sonograms, the infrared and panchromatic slides and the video camera are not the right tools to investigate such a phenomenon. We probably need to use other tools, though some bips recorded in the LF and VLF/ELF (but not on the same date) seem to provide some clues and could be a first step in a way to keep on this investigation.

Anyway, what we are looking for is a cross reference; if we find some other evidence in the same time as the LF data, then we could say something more. On the other hand we can say that it is important to have found one (though small) clue in this research, a difficult field to investigate.

It may be that this kind of phenomenon cannot be investigated by human tools or does not have a simple scientific explanation.

As a conclusion, I can say that more research could be made by other INSPIRE teams all over the world to investigate the many strange phenomena that seem to happen every day. More stations and more tools at work means more useful data to collect and study. Our research has been just the beginning.

I am sure there will be more to report at the end of the next research year, right here in *The INSPIRE Journal* pages.

INTMINS - November/95 Data Analysis Report

by Bill Pine
Chaffey High School
Ontario, CA

The second session, in an ongoing series, of INTMINS observations was conducted in November of 1995. Instruments were operated on board the MIR Space Station in accordance with the schedule published in the November, 1995, edition of *The INSPIRE Journal*. INSPIRE observers attempted to record the VLF radio signal emitted by ISTOCHNIK, the modulated electron gun carried on MIR. ISTOCHNIK can be modulated at frequencies of 10 hertz and 1000 hertz. Since the 10 hertz signal is outside the design band of the RS4 receiver and usually is obscured by manmade hum, the 1000 hertz signal is the one we are attempting to detect.

This report consists of the following sections:

1. INTMINS Summary - a description of operations, observations and results.
2. INTMINS Observers - a description of the observers submitting data including locations and equipment used.
3. INTMINS Data - sample spectrographs and descriptions of data submitted.

1. INTMINS Summary

Operations were scheduled for November 17 over Europe and November 19 and 25 over the United States and Canada. All passes consisted of the following instrument sequence:

ISTOCHNIK mode:	10 seconds modulate at 10 Hz 10 seconds modulate at 1000 Hz 10 seconds modulate at 10 Hz 10 seconds modulate at 1000 Hz repeat for 2 minutes 40 seconds of operation,
Ariel mode:	alternate between plasma generators.

Since it is more likely that ISTOCHNIK will be detected than Ariel, due to the difference in the power output of the two instruments, the time of operations of ISTOCHNIK was used for the production and analysis of spectrographs.

November 17

(Note: All times are UT on the date indicated.)

Pass Number	ISTOCHNIK Start Time	ISTOCHNIK Stop Time	Path During ISTOCHNIK Firing	Number of Observers Recording Data
17-1	05:50	05:52:40	Sardinia, Central Italy	5
17-2	07:28	07:30:40	E. France, Germany	5

These operations occurred as scheduled and on the predicted path. Most observers were in Italy at locations roughly between the two passes. One observer recorded from England, to the north and west of the track. Computer analysis by spectrograph did not yield evidence of the ISTOCHNIK signal.

November 19

Pass Number	ISTOCHNIK Start Time	ISTOCHNIK Stop Time	Path During ISTOCHNIK Firing	Number of Observers Recording Data
19-1	10:08	10:10:40	Off Mid-Atlantic Coast	1
19-2	11:43	11:45:40	MI	2
19-3	13:17	13:19:40	ND, MN	3
19-4	14:55	14:57:40	Manitoba, Canada	2
19-5	16:35	16:37:40	NY	3
19-6	18:12	18:14:40	GA	3
19-7	19:46	19:48:40	TX	3

Unfortunately, ISTOCHNIK failed to operate as scheduled. It appears that the problem lies in the onboard timer for the 1000 hertz mode. This timer, which has been on board for eight years, appears to have stopped prematurely and aborted the entire cycle. In order to avoid this problem on the 25th, the length of the operating cycle will be reduced from 160 seconds to 140-150 seconds.

Emphasis for data analysis for data taken on the 19th was changed from a search for the 1000 hertz signal to one of coordinated observations. The time interval examined remains the scheduled time of operation of ISTOCHNIK.

November 25

During the week between the November 19 and 25, unanticipated changes in the orbit track were discovered. These alterations probably resulted from some maneuvering of MIR during that time. The effect of this change was to delay the passage of MIR by several minutes, but only a small shift in the geographic track was associated with this. It was determined that if ISTOCHNIK could be reprogrammed to delay firing for 10 minutes, then the operation would occur over nearly the same geographic track as in the original plan. Instead of the operation of ISTOCHNIK occurring five minutes into the data session, it would occur fifteen minutes into the session, during the last three minutes of data recording.

A request to change the timing was conveyed to Stas Klimov and he was able to make the changes. Also, since data recording would stop 20 seconds after the end of ISTOCHNIK operation, the "Pass Type" was changed to "Ariel first". The following table reflects the adjusted operation times for ISTOCHNIK.

Pass Number	ISTOCHNIK Start Time	ISTOCHNIK Stop Time	Path During ISTOCHNIK Firing	Number of Observers Recording Data
25-1	07:49	07:51	Off South-Atlantic Coast	1
25-2	09:21	09:23	TX	2
25-3	10:56	10:58	CA	2
25-4	12:34	12:36	WA	1
25-5	14:14	14:16	Manitoba, MN	3
25-6	15:46	15:48	South BC	1
25-7	17:23	17:25	OR, NV	2

(Note that ISTOCHNIK operated for 120 seconds (2 minutes) on all passes.)

Spectrographs were made of the appropriate time interval on each data tape. No evidence of the 1000 hertz signal was found.

A striking confirmation that the revised schedule was an accurate depiction of the track of MIR was seen by California observers of Pass 25-3. As the Chaffey High School Team was recording data for this pass, MIR was observed to pass over at exactly the right time. By using STSORBIT-PLUS, a satellite tracking program written by Dave Ransom, I had determined that the conditions (a dark, predawn sky) would be right for visual observation. STSPLUS predicted the azimuth, altitude and time that MIR would first emerge from Earth's shadow - and the prediction was accurate to within a degree for position and a few seconds for time. As the six of us watched the western sky, we saw a bright light (about as bright as Venus) suddenly appear and move smoothly across the sky to the northeast. We watched MIR pass about a degree below the North Star and proceed, fading as the reflection aspect deteriorated, to the east disappearing behind the mountains behind our data site. It was truly an awe-inspiring moment. Seconds after MIR disappeared, we put the last time mark on the data tapes, packed up and went home.

It was a quiet trip down the mountain, due mostly to the fact that it was 4:30 in the morning, but we all agreed that what we had been a part of was impressive. A Russian space vehicle, manned by Russian cosmonauts, supported by the Russian Space Agency (IKI) had operated a piece of scientific apparatus for the benefit of a group of high school physics students in Southern California. What a wonderful example of international cooperation - and are we not lucky!

2. INTMINS Observers

In the November, 1995, issue of *The INSPIRE Journal* (Volume 4 #1), six observer teams were profiled. In order to avoid repetition of those descriptions, the same team numbers will be retained permanently by those six and descriptions of new teams will be added.

The original INTMINS teams were:

Team #	Observer	Location
1	John Lamb, Jr. East Texas State University	Commerce, TX
2	Stephen G. Davis	Fort Edwards, NY
3	Don Shockey	Oklahoma City, OK
4	Mike Aiello	Croton, NY
5	Jean-Claude Touzin	St. Vital, QC, CANADA
6	Bill Pine Chaffey High School	Ontario, CA

New INTMINS teams, with their permanent team numbers and descriptions are shown below. INTMINS observers are described in the following format:

X. (team number) Name of observer — Location
Team Name
Longitude: of observation site
Latitude: of observation site
Description of observation site
Receiver: description of receiver used
Recorder: description of recorder used
Antenna: antenna type and description
WWV: WWV radio used (if any)
File code: used for naming data files for storage

7 Dean Knight — Sonoma, CA
Sonoma Valley High School
Longitude: 122° 33' W
Latitude: 38° 21' N
Orchard near "high" meadow in Jack London State Park, Glen Ellen, CA
Receiver: INSPIRE RS4
Recorder: Radio shack CCR-81
Antenna: long wire, 76 ft. running NE to SW
WWV: Eversonic Model 903 - multiband with 6' whip
File code: Knight CA

8 Mike Dormann — Seattle, WA
Longitude: 123.4° W
Latitude: 47.2° N
Cranberry Marsh, Matlock, southwest Washington State
Receiver: INSPIRE RS4 modified
Recorder: RS CTD 69, Magnavox boombox
Antenna: 25 foot guyed pole vertical wire
WWV:
File code: Dormann WA

9 Robert Moloch — Greentown, IN

Eastern Elementary School
Longitude: 85° 58' W
Latitude: 40° 28' N
Flat field, .25 mile from AC
Receiver: INSPIRE RS4 (2 stations)
Recorder: Bell & Howell, Aiwa
Antenna: 6' telescoping
WWV:
File code: Moloch IN

10 Bill Taylor — Washington, DC

INSPIRE
Longitude: 38° 54' W
Latitude: 77° 2' N
Haines Point, park on the Potomac River near the Capitol
Receiver: INSPIRE RS4, ACTIVE B-field
Recorder: Sony DAT, one receiver on each channel
Antenna: 3 m vertical, 3 m high x 7 m long loop
WWV:
File code: Taylor DC

The following teams, denoted by a team number beginning with "E", are from Europe.

E1 Flavio Gori — Florence, IT

Longitude: 11° 50' 18" E
Latitude: 43° 50' 18" n
Elev. 2000 ft., no trees within 300 ft., about 1 km from power lines
Receiver: WR-3
Recorder: Sony TCH 38
Antenna: whip
WWV:
File code: Gori IT

E2 Silvio Bernocco — Torino, IT

Longitude: 7° 12' E
Latitude: 44° 54' N
Vaccera Pass in the Alps, open ridge top, elevation 1500 m
Receiver: INSPIRE RS4
Recorder: Aiwa TP37 mono
Antenna: 20 m wire on a 10 m fishing pole
~~WWV:~~ DCF 77 controlled clock
File code: Bernocco IT

E3 Fabio Courmoz — Aosta, IT

Longitude: 7.7° E
Latitude: 45.7° N
Open valley, elevation 1200 m (approx.)
Receiver: Homemade (RX1)
Recorder: Sanyo M 2511
Antenna: 2 m whip
WWV:
File code: Courmoz IT

E4 Joe Banks London, UK

Longitude: 0° (40 miles due south of Royal Greenwich Obs.)
Latitude: 50° 52' N
Lewes, East Sussex, on hill adjacent to Lewes Prison
Receiver: INSPIRE RS4
Recorder: Philips portable DCC recorder
Antenna: 6 foot telescopic whip
WWV:
File code: Banks UK

E5 Renato Romero Cumiana, IT

Longitude: 7° 24' E
Latitude: 49° 57' N
Plain at 10 km from mountain
Receiver: RS4 self made
Recorder: Philips D6350 (mono)
Antenna: 1 m whip on 10 m fish cane
WWV:
File code: Romero IT

Summary of passes recorded.

Team Pass	E1	E2	E3	E4	E5
17-1	x	x	x	x	x
17-2	x	x	x	x	x

Team Pass	1	2	3	4	5	6	7	8	9	10
19-1					x					
19-2					x				x	
19-3					x	x	x			
19-4					x		x			
19-5		x			x			x		
19-6	x							x	x	
19-7	x					x		x		

Team Pass	1	2	3	4	5	6	7	8	9	10
25-1										x
25-2			x						x	
25-3						x	x			
25-4					x					
25-5		x		x	x					
25-6	x									
25-7	x					x				

3. INTMINS Data

The purposes of this section of the report are:

1. To summarize the data gathered in light of the objective which is to detect the electromagnetic waves emitted by ISTOCHNIK.

2. To provide feedback to observers so they can know how their equipment operated and how well they captured the signals available.

3. To provide *Journal* subscribers with descriptions of signals of interest that they might encounter in the field.

4. To give recognition to INSPIRE observers and to encourage others to participate at this level.

November 17

Since ISTOCHNIK operated in accordance with the original schedule, the approach to analyzing data gathered on November 17 was:

1. Create a 2 minute 40 second sound file that coincides with the scheduled operating time of ISTOCHNIK. The filename indicates the observer identification code, pass number, start time and duration.

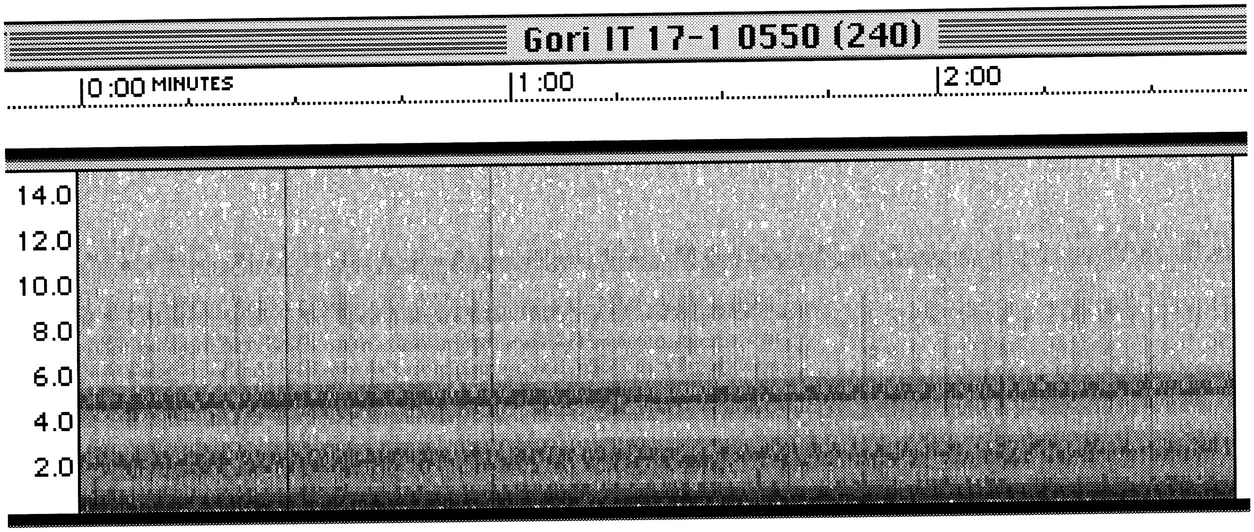
2. Make a spectrograph of the entire file using a frequency range of 0-15 kilohertz. This frequency range includes all of the OMEGA frequencies.

3. Make subsequent views of portions of the file. These shorter intervals are either 1 minute or 30 seconds. Use a reduced frequency range chosen to make the 1 kilohertz range easier to examine.

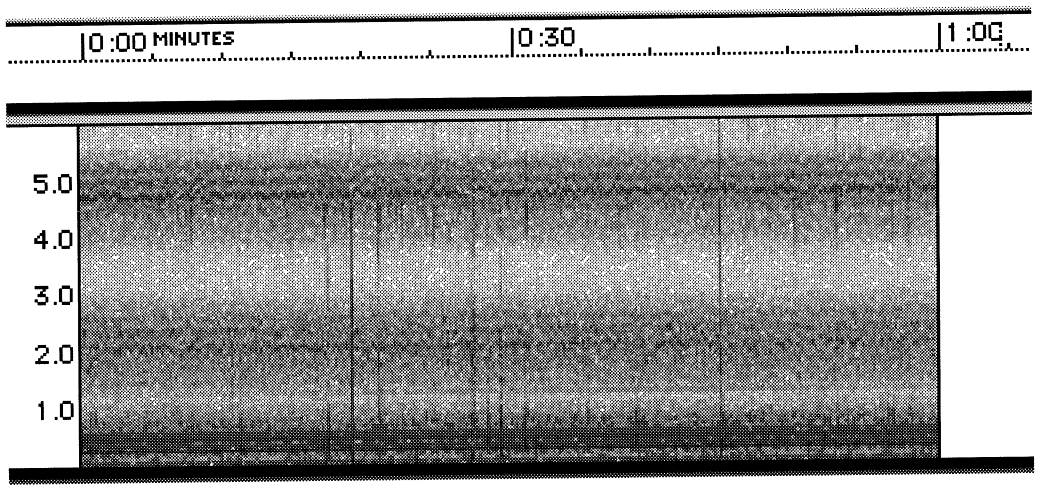
Pass 17-1

<u>Flavio Gori - E1</u>

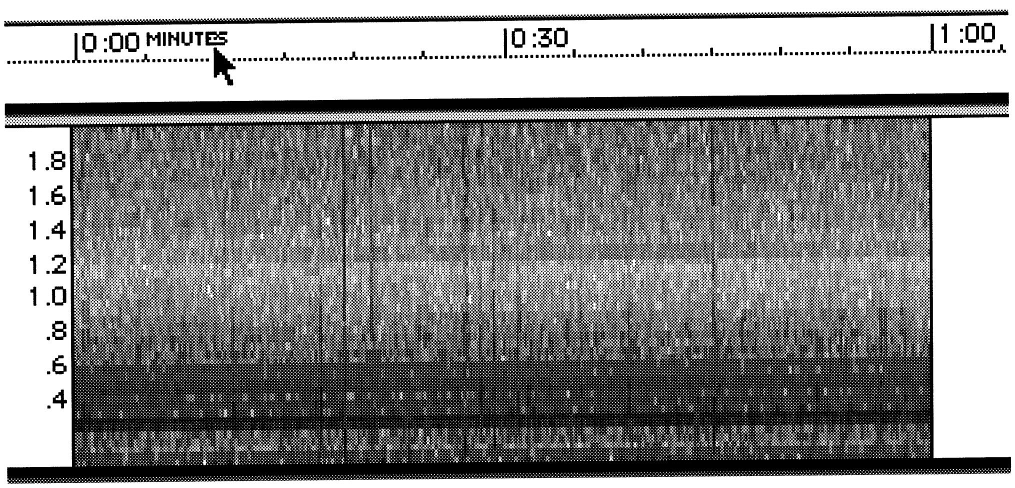
A good example of the data analysis spectrograph sequence is illustrated by Flavio Gori's data from Pass 17-1.



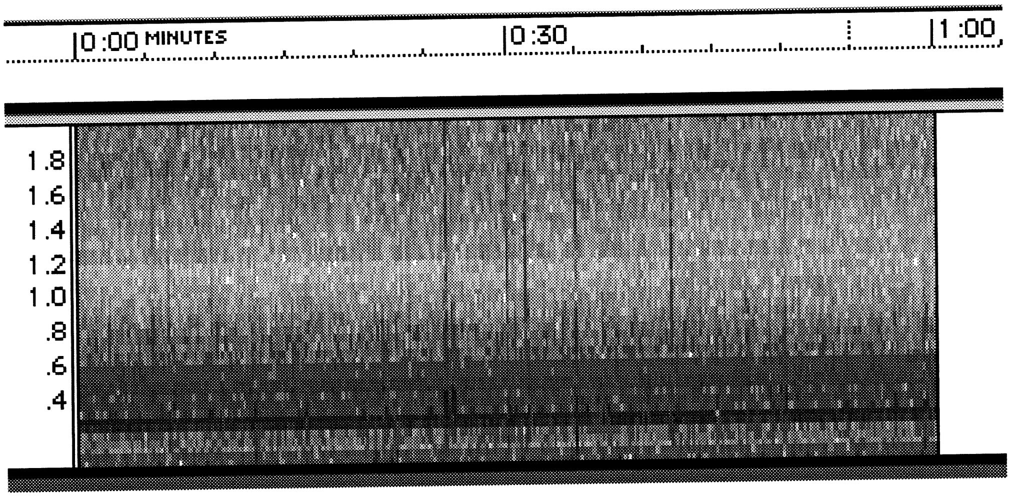
Gori IT 17-1 Entire file



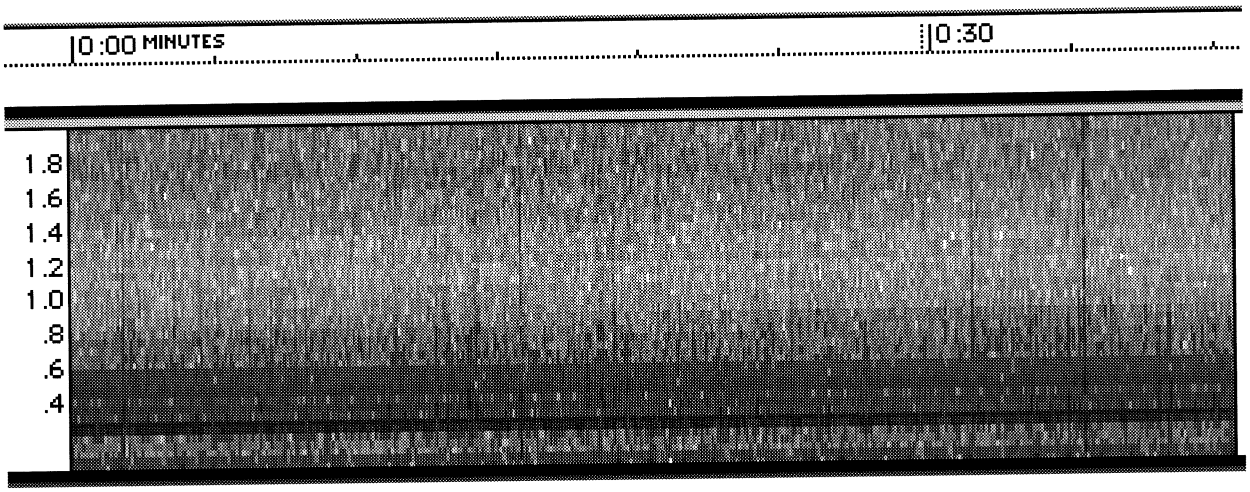
First minute: 0-6 kHz



First minute: 0-2 kHz



Gori IT 17-1 Second minute: 0-2 kHz



The last 40 seconds: 0-2 kHz

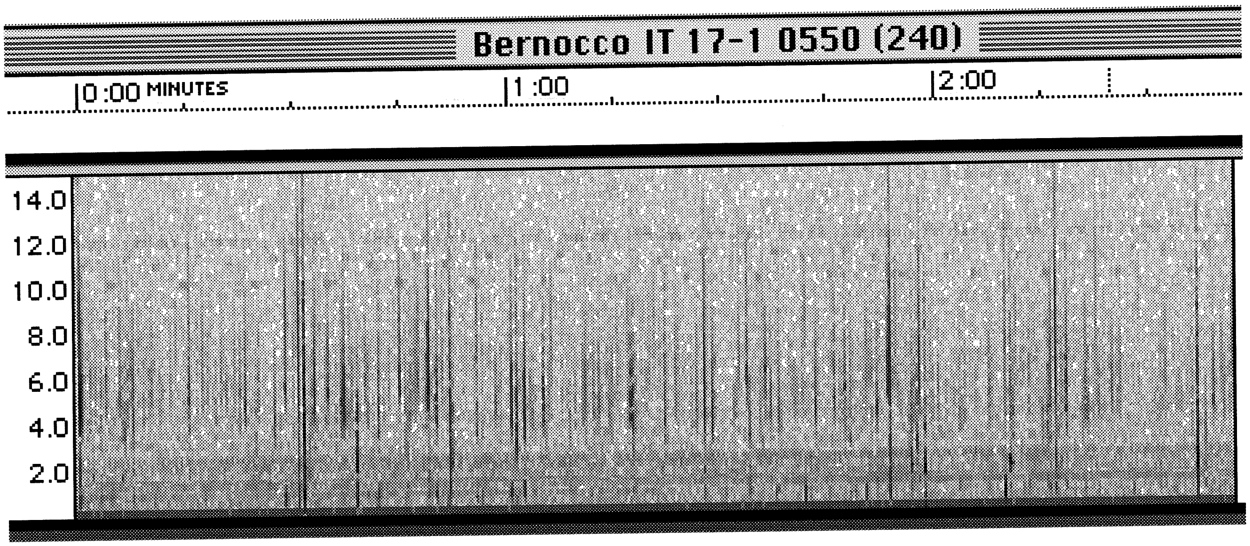
Notice that the sferics are generally light. There is quite a bit of hum evident in the audio tape, but it shows up at about 600 hertz and below, so does not interfere with the 1 kHz area of interest. No 1 kHz intermittent signal is evident.

Flavio sent a copy of an article that appeared in the Italian newspaper La Nazione (The Nation). The article includes a photograph of Flavio and a description of the INSPIRE operations with the MIR Space Station. Flavio says, "Some years ago a paper like that would not even think to talk about (INSPIRE). The times the are a changin ..." Flavio also sent greetings from his wife, Edy, and their new baby daughter, Marina, whose photograph showed her to be a beautiful baby.

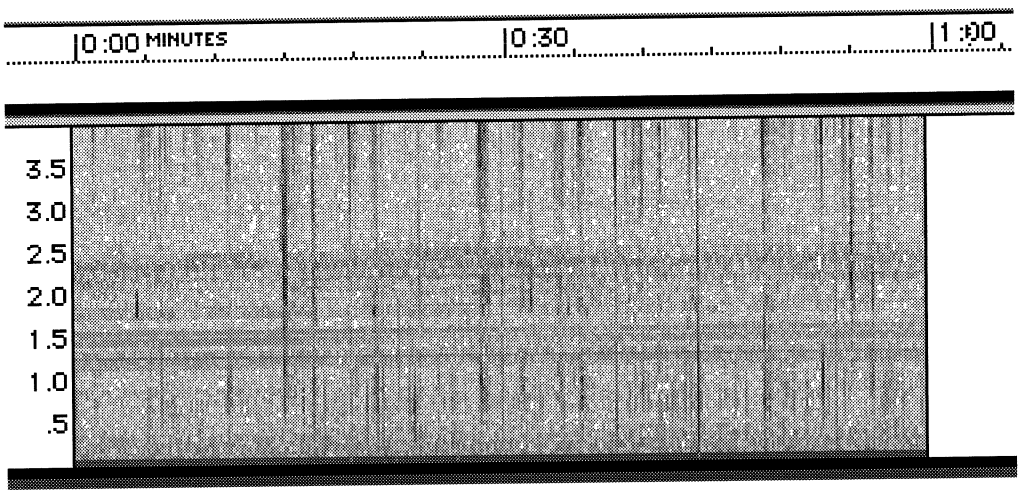
Flavio has acted as European coordinator for INSPIRE since 1992. His organizational skills, energy and enthusiasm have resulted in placing four Italian teams in the field for INTMINS observations.

Silvio Bernocco - E2

Silvio makes his observations from a pass in the Alps. The following spectrographs are from Silvio's 17-1 data.



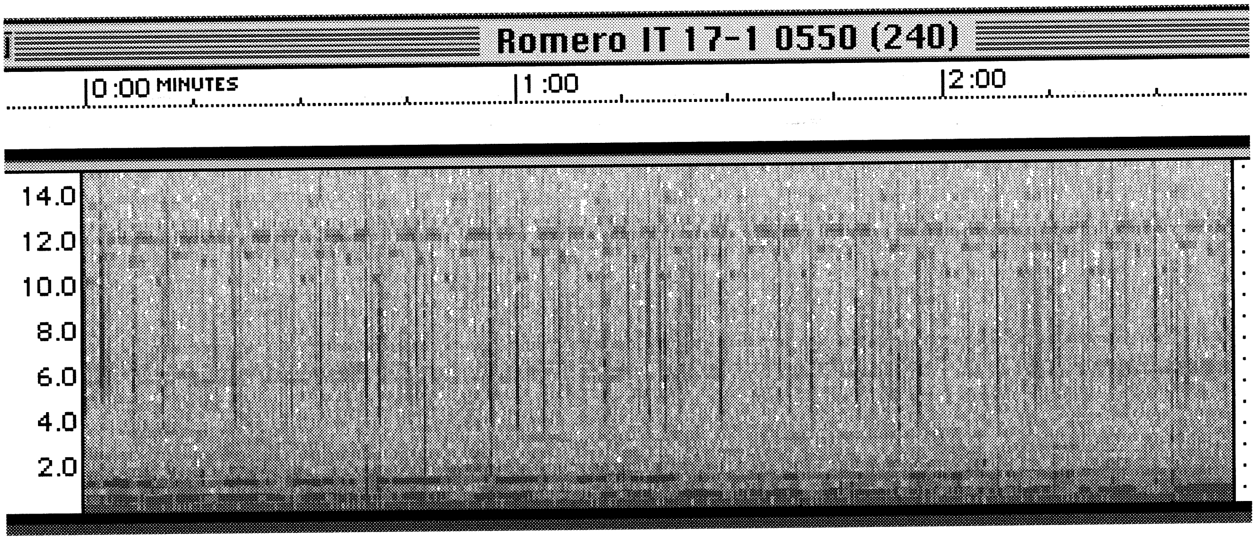
Bernocco IT 17-1 The entire file: 0-15 kHz Note OMEGA.



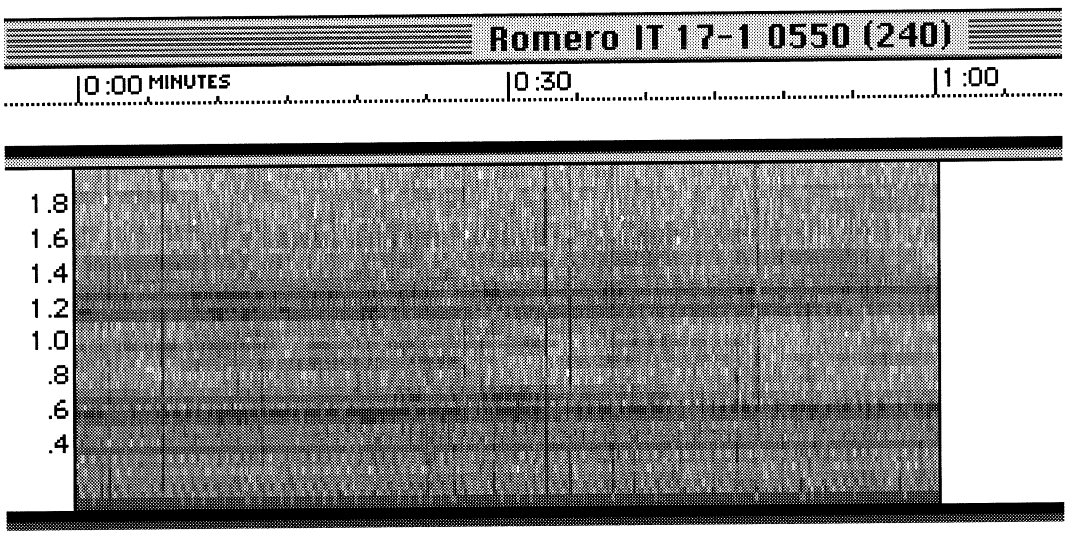
The last minute of the above. MIR's closest approach. 0-4 kHz. No 1 kHz signal.

Renato Romero - E5

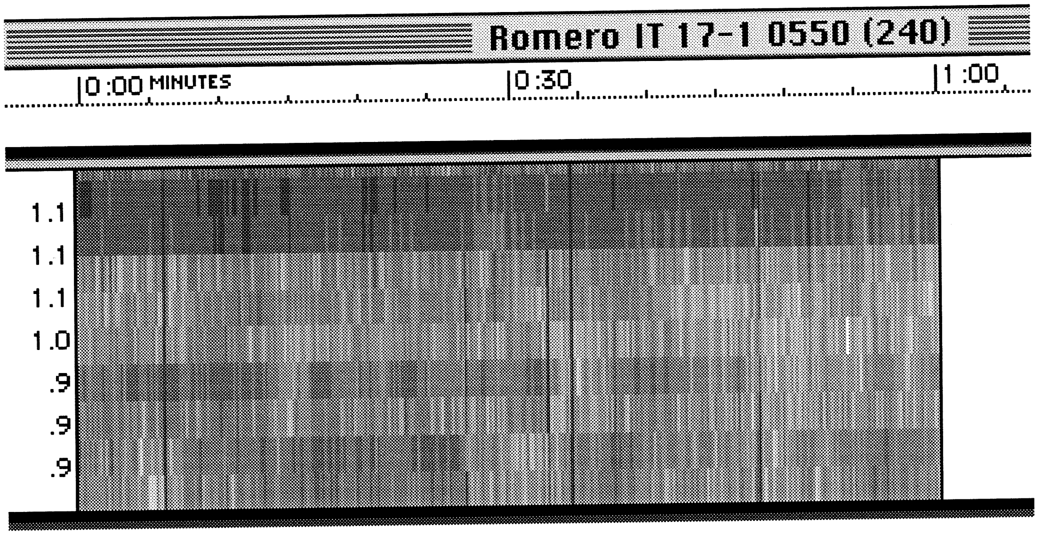
Renato lives 6 kilometers from an electric power station with a high voltage line. His recordings show a relatively low level of hum.



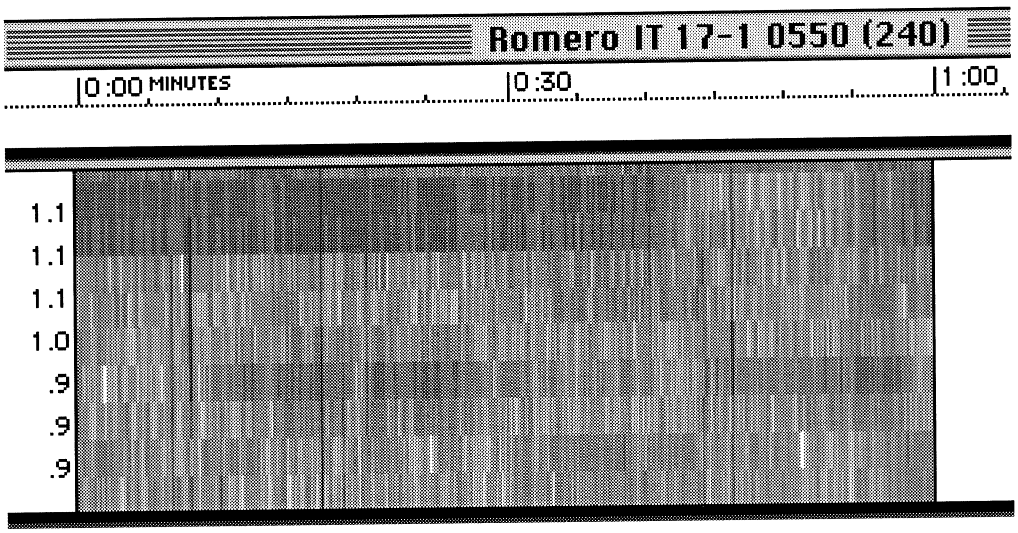
Romero IT 17-1 Entire file: 0-15 kHz. Note the prominent OMEGA.



First Minute. Something appears near 1 kHz.



First minute. Frequency range: 900-1200 hertz. Something appears just below 1 kHz, but the 10 seconds ON/OFF periodicity is missing.

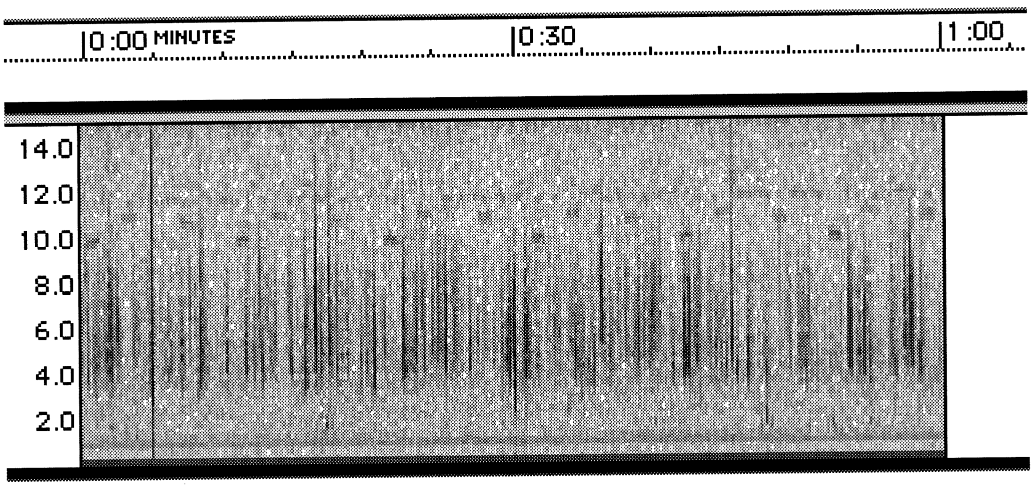


Second minute. 900-1200 Hz.

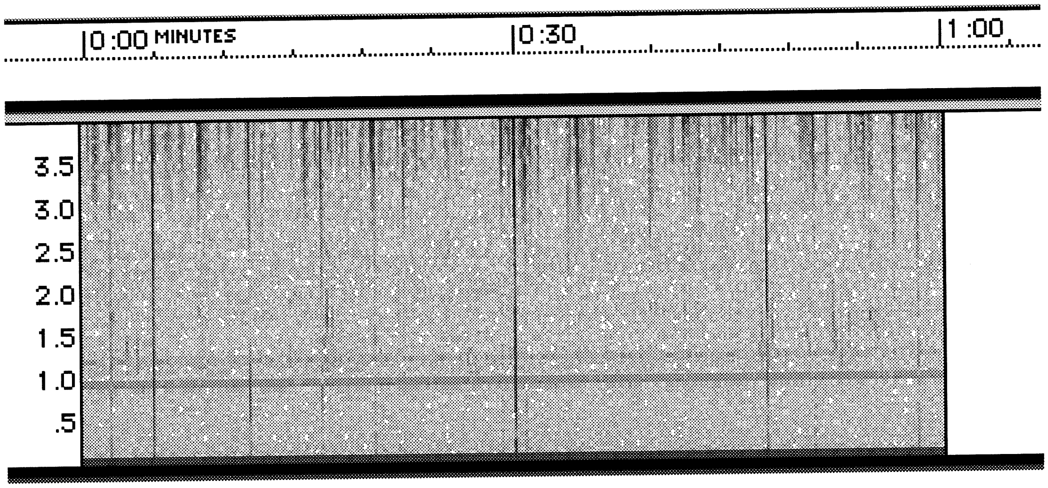
Joe Banks - E4

Joe braved some cold weather to record his data. He describes his site as "fairly loud", but he has observed tweeks and whistlers there, so he felt it would be good for INTMINS transmissions, also. The spectrographs show a definite band of hum that should not, at first glance, interfere with INTMINS transmissions. Unfortunately, the hum band is right at 1000 hertz. The INTMINS signal, if present, could be seen as a periodic (10 seconds ON/OFF) darkening of this band. No such pattern is apparent. Spreadsheet techniques may be needed to fully analyze this data.

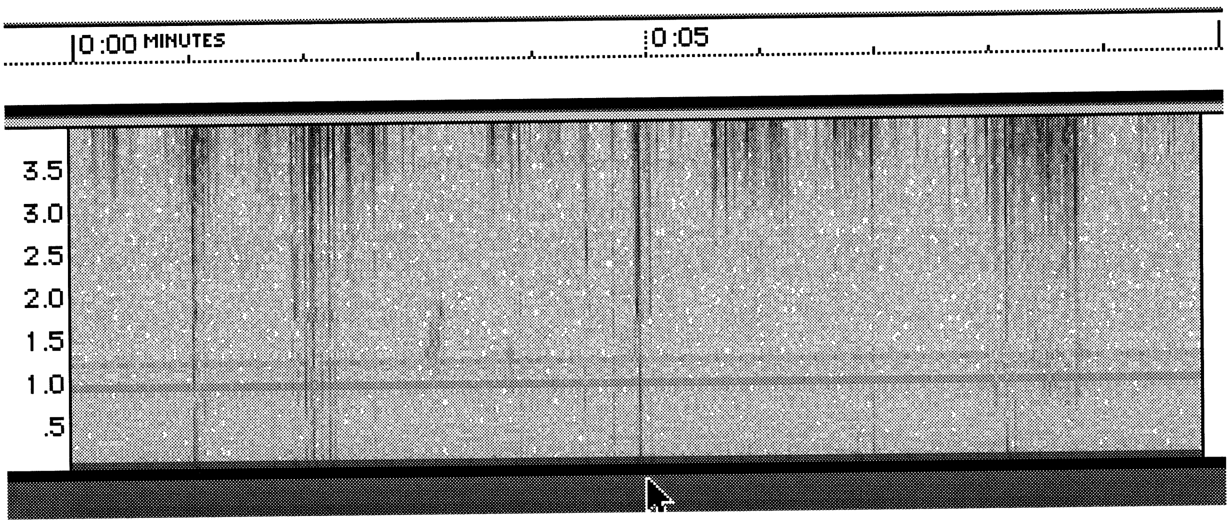
Banks UK 17-1 Entire file: 0-15 kHz



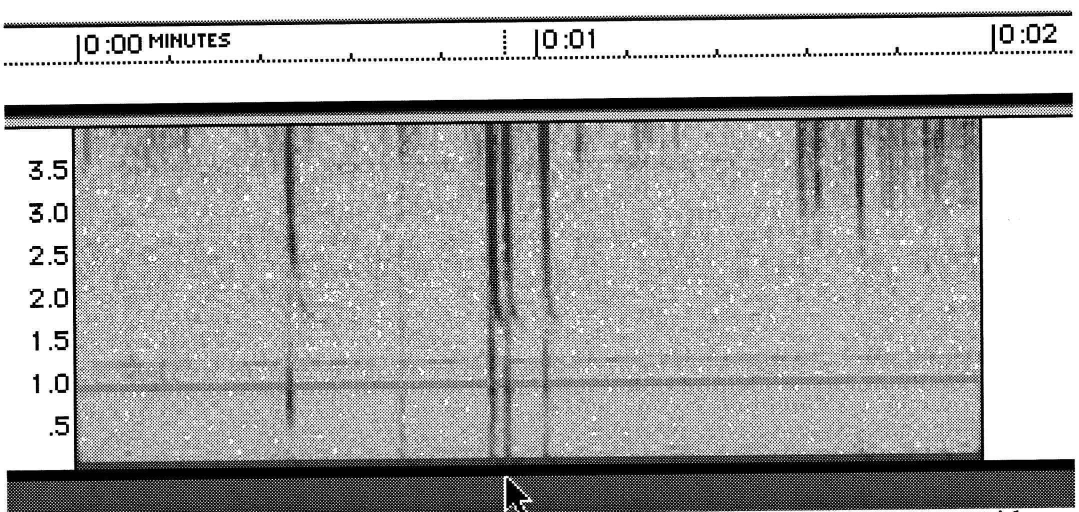
First minute. 0-15 kHz. Note the prominent OMEGA signals above 10 kHz.



Banks UK 17-1 First minute. 0-4 kHz. Note the hum band near 1 kHz. Note the strong sferic at 30 seconds.



Ten seconds centered on the strong sferic (arrow).

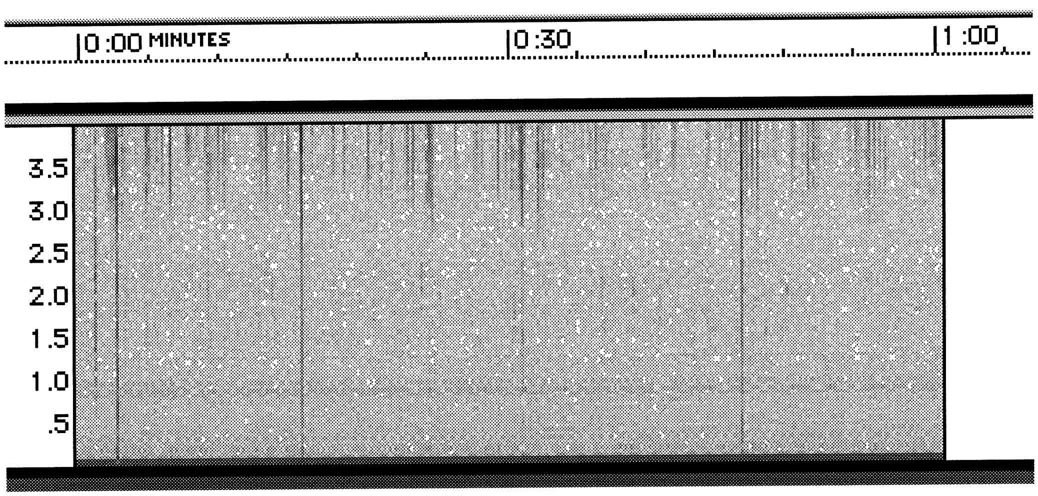


Two seconds centered on the sferic. A quick burst of three tweeks becomes evident.

Pass 17-2

Joe Banks' recording of Pass 17-2 shows a marked reduction in hum level. This is probably due to a change in VLF propagation conditions in the time between the two passes. Sunrise occurred in this same interval and that can greatly change propagation conditions.

Banks UK 17-2 Entire file: 0-15 kHz.

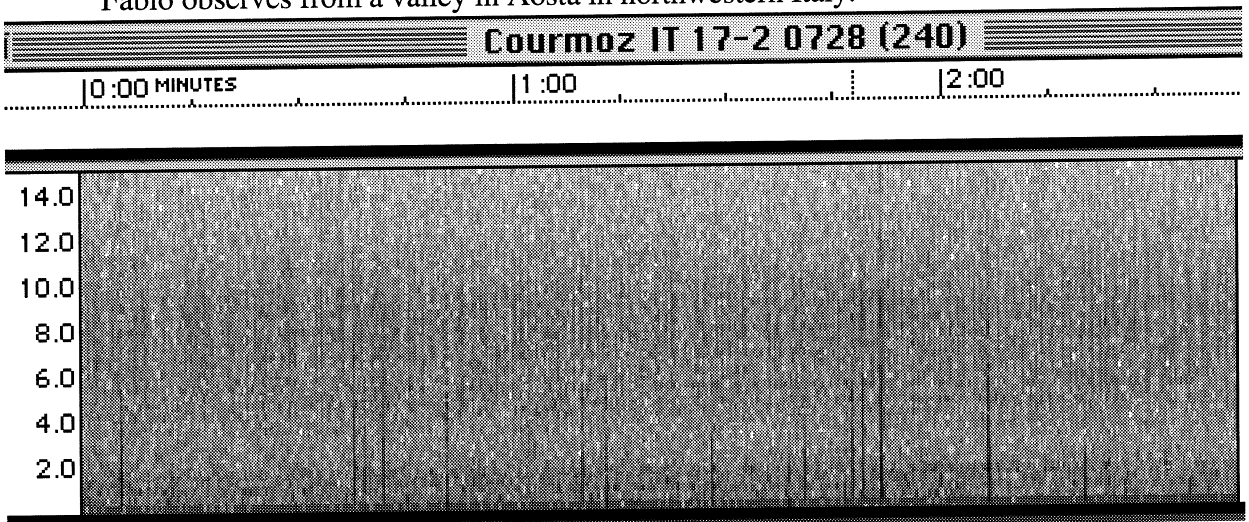


First minute: 0-4 kHz

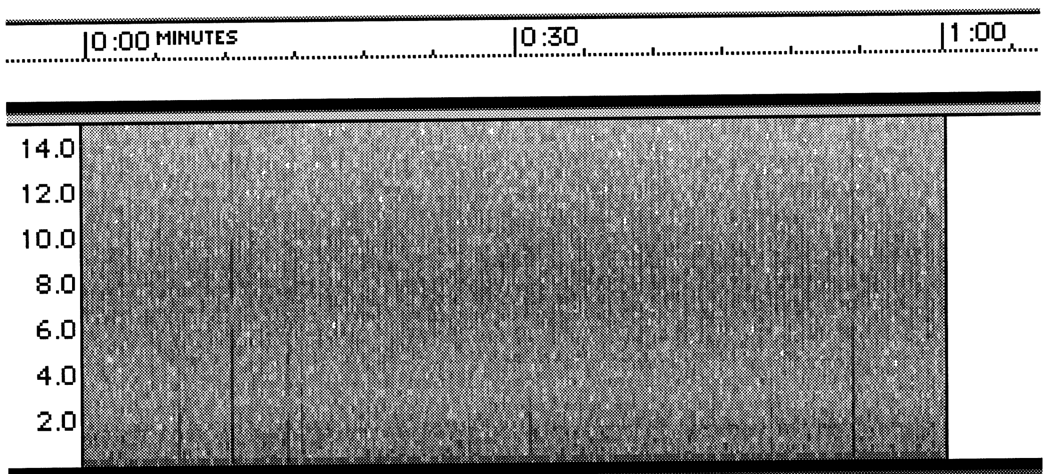
Joe also tried to observe VLF signals associated with the Leonid meteor shower. He saw two meteors, but was unable to connect them definitively with VLF emissions.

Fabio Courmoz - E3

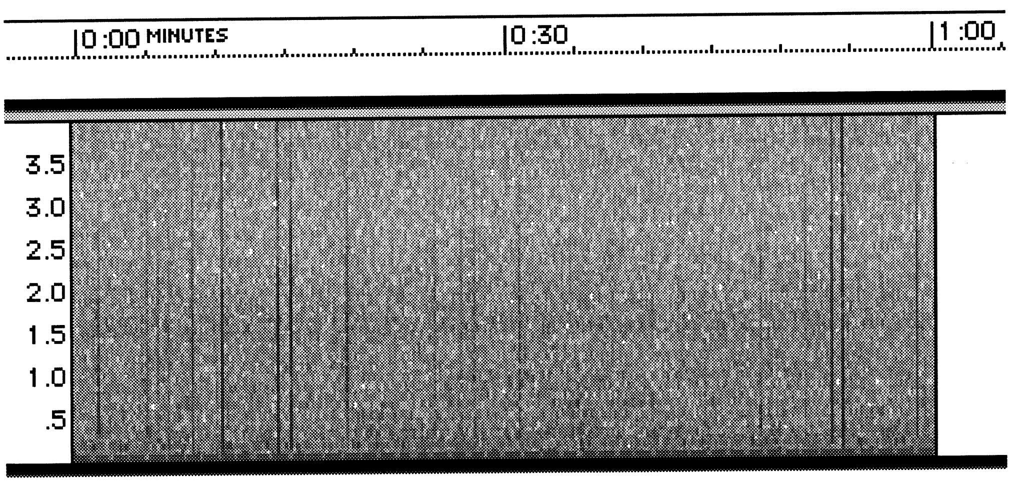
Fabio observes from a valley in Aosta in northwestern Italy.



Courmoz IT 17-2 Entire file: 0-15 kHz



First minute. Light sferics. Very little hum.



First minute. 0-4 kHz. No hum, no 1 kHz, either.

November 19

Since ISTOCHNIK failed to operate on schedule, data analysis reverted to the type used in coordinated observations. In this, rather than search for the 1 kHz signal, a particular time is selected and recordings of that interval are compared. The question then becomes: what is observed that is alike and what is different? The following procedure was followed:

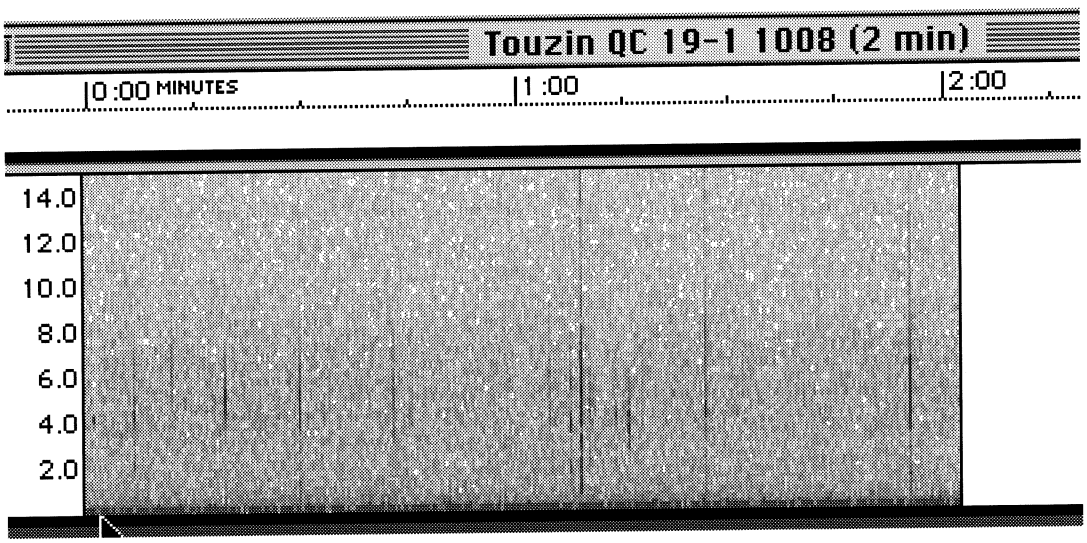
1. A 2-minute sound file was created starting at the scheduled ISTOCHNIK start time.
2. A 0-15 kHz spectrograph was made of the file. The filename indicates the observer identification code, pass number, start time and duration.
3. Spectrographs were made of the first minute and then the first thirty seconds of the original file. Note the time scale at the top of the spectrograph to identify which view is present.
4. Additional spectrographs were made of any interesting phenomena such as whistlers, tweek bursts, tweeks, etc., which appear.

Pass 19-1

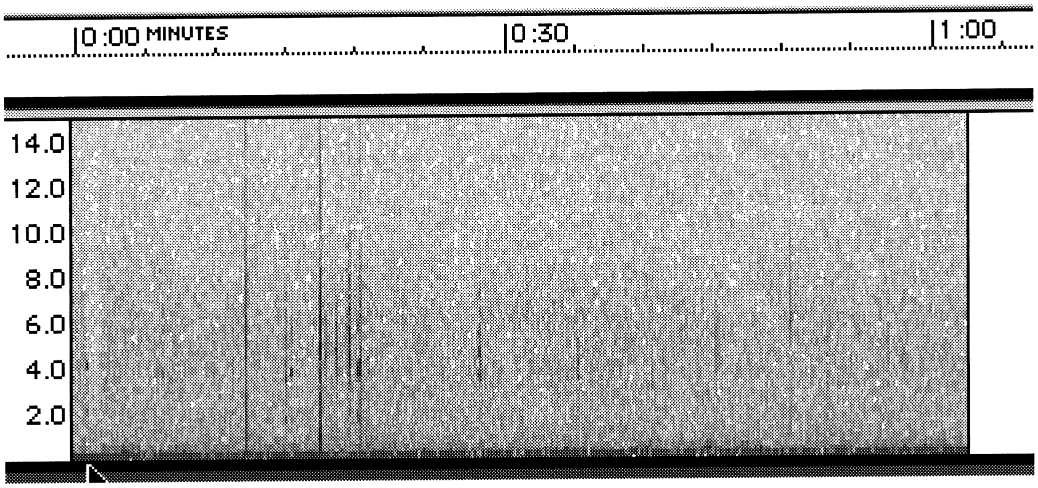
<u>Jean-Claude Touzin - 5</u>

Jean-Claude also had to deal with intense cold - sometimes as low as -20° C! Occasionally, time marks were missed because his mittens froze and made it impossible to remove the plug in time. He covered the first five passes on the 19th - a total time on site of about 7 hours. In spite of the difficulties, Jean-Claude recorded data of execllent quality.

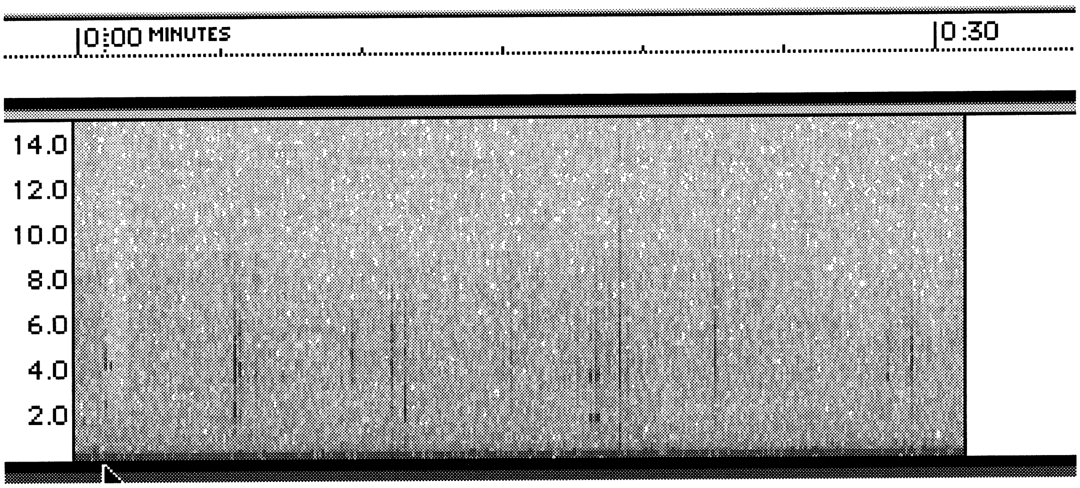
Jean-Claude says, "I think that I will have to make myself a small cabin near my square loop ... with a stove! But I have a river to cross ... this is a little bit complicated. One day ..."



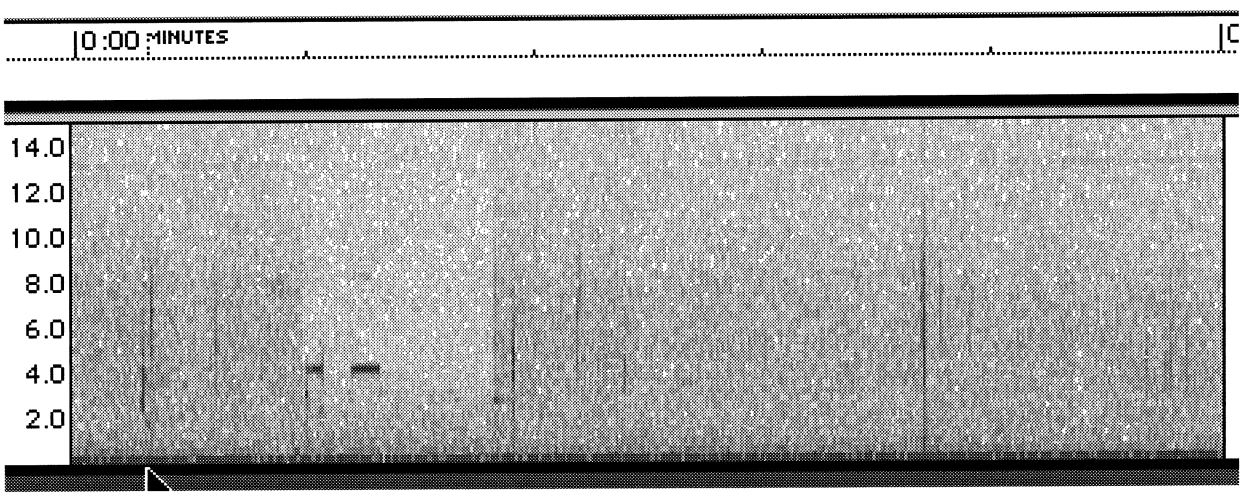
Touzin QC 19-1 Entire file: 0-15 kHz



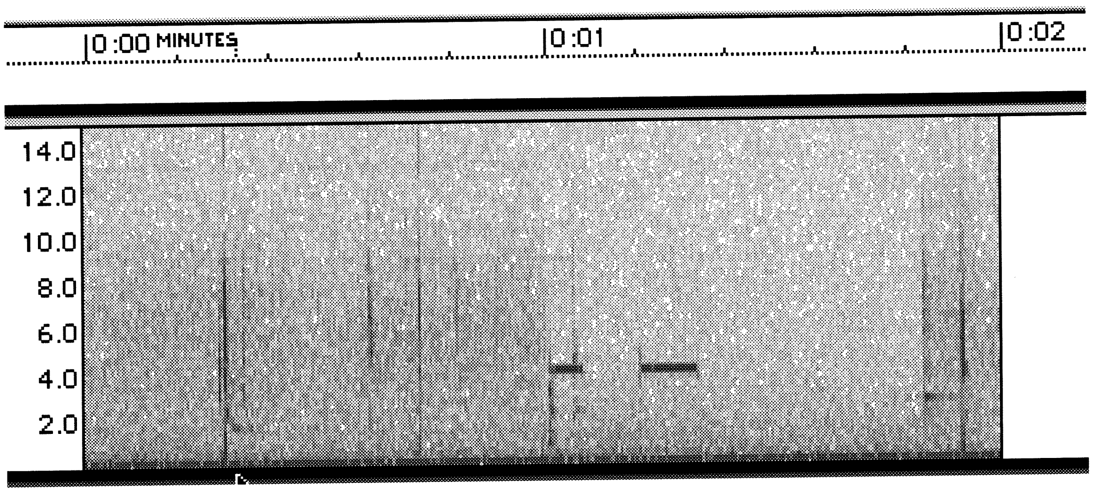
Touzin QC 19-1 First minute. 0-15 kHz. November 19 was a very quiet day for all observers.



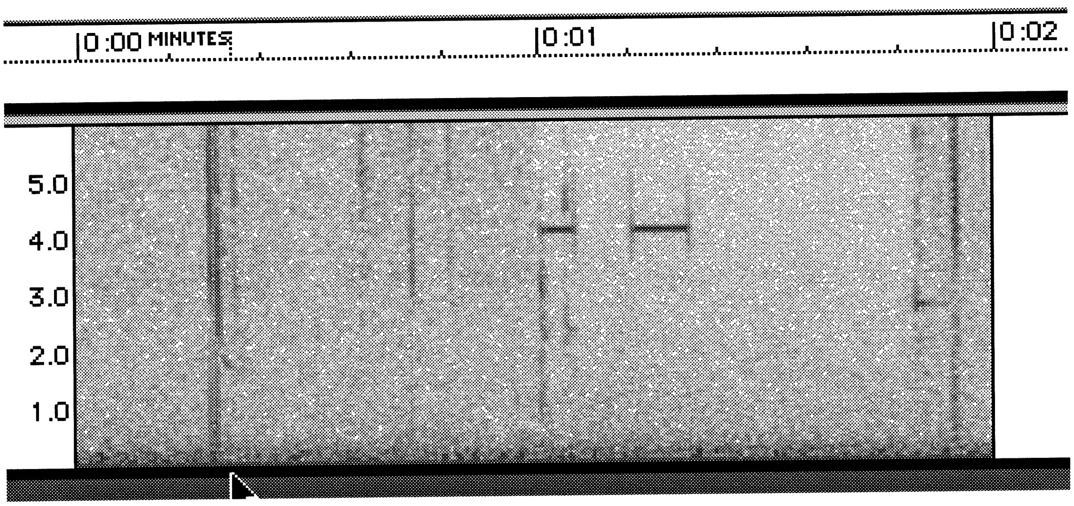
First 30 seconds. 0-15 kHz Arrow points to the time beeps at 4 kHz.



Touzin QC 19-1 5 seconds from just before the time beeps (at 1 second). Arrow points to tweek.



Touzin QC 19-1 2 seconds. Tweek at .3 sec, time beeps at :01 sec.

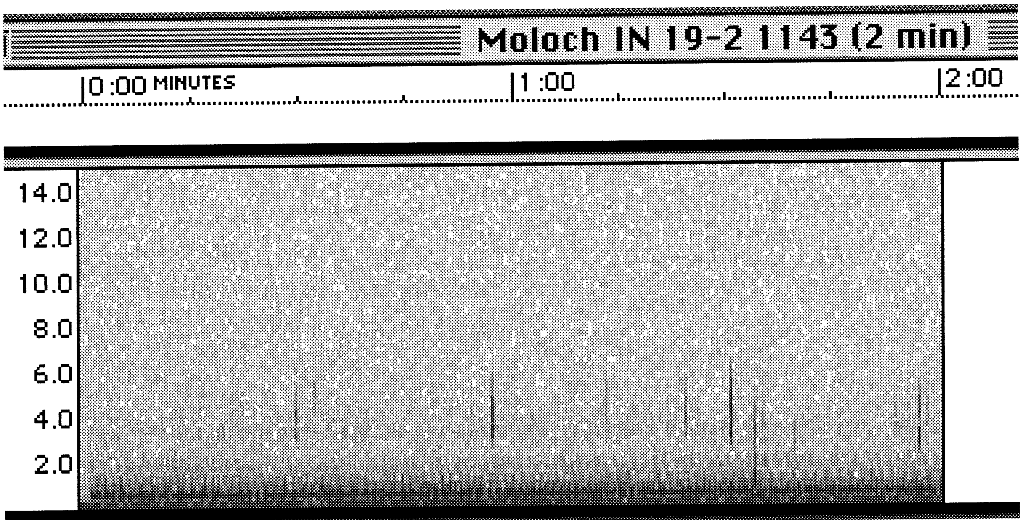


Same as above with frequency range 0-6 kHz. Arrow points to tweek. Beeps at 4 kHz.

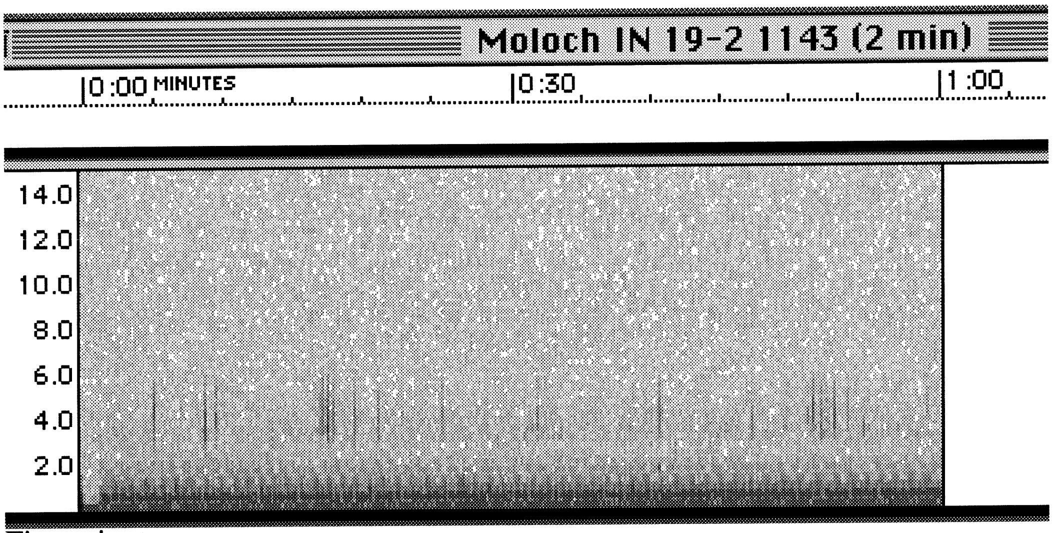
Pass 19-2

<u>Bob Moloch - 9</u>

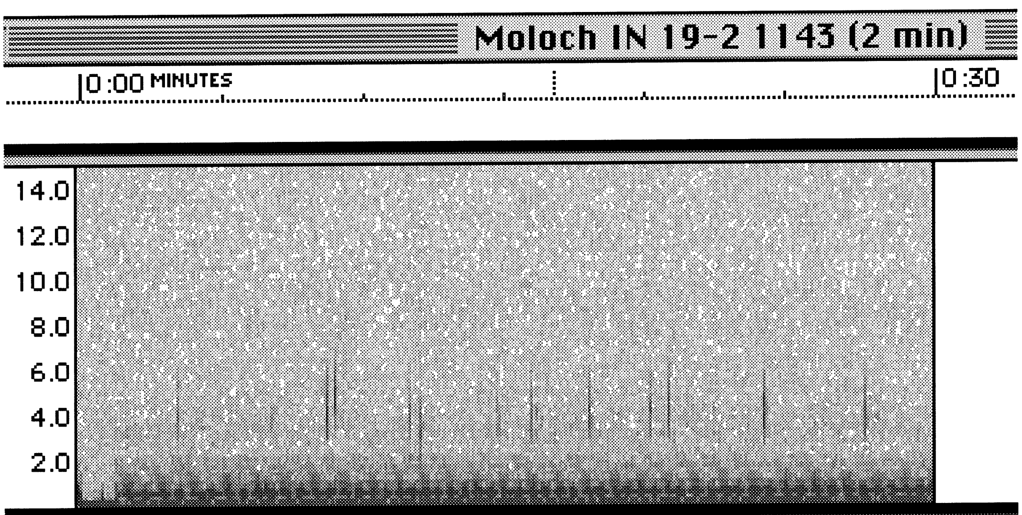
Bob is at Eastern Elementary School in Greentown, IN. For the November observation, he used two receivers: one RS4 that he built and another RS4 which was a loaner from INSPIRE. Helping him in these observations were Brooke Harding (2 sessions), Nick Barrett, Ashleigh Mahor (2), Zach Bagley and Suzie Thiele. These young people all did a very good job with voice introductions and time marks.



Moloch IN 19-2 Entire file: 0-15 kHz. Very quiet.



First minute.



First 30 seconds.

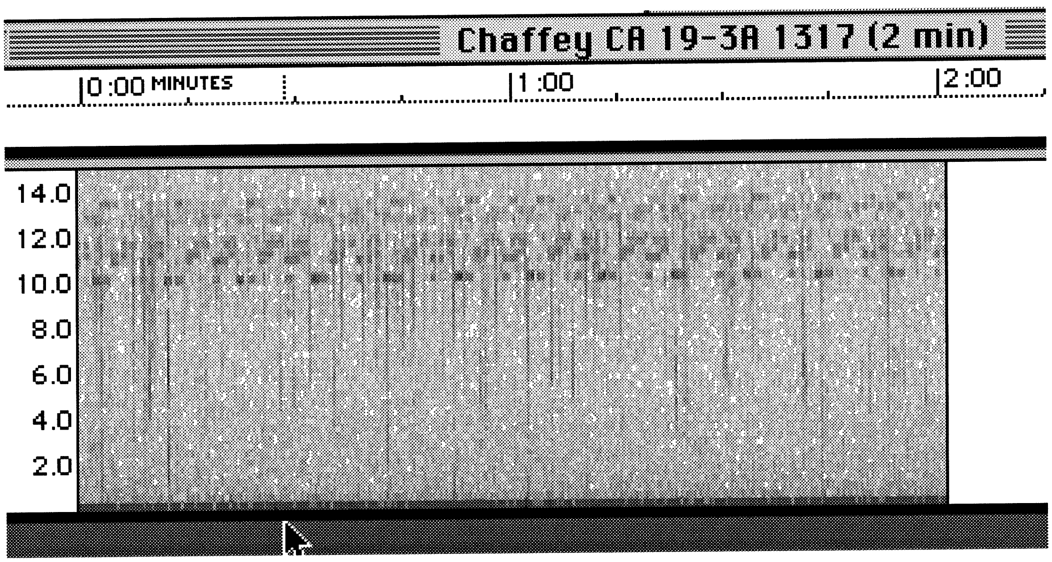
Pass 19-3

Bill Pine - 6

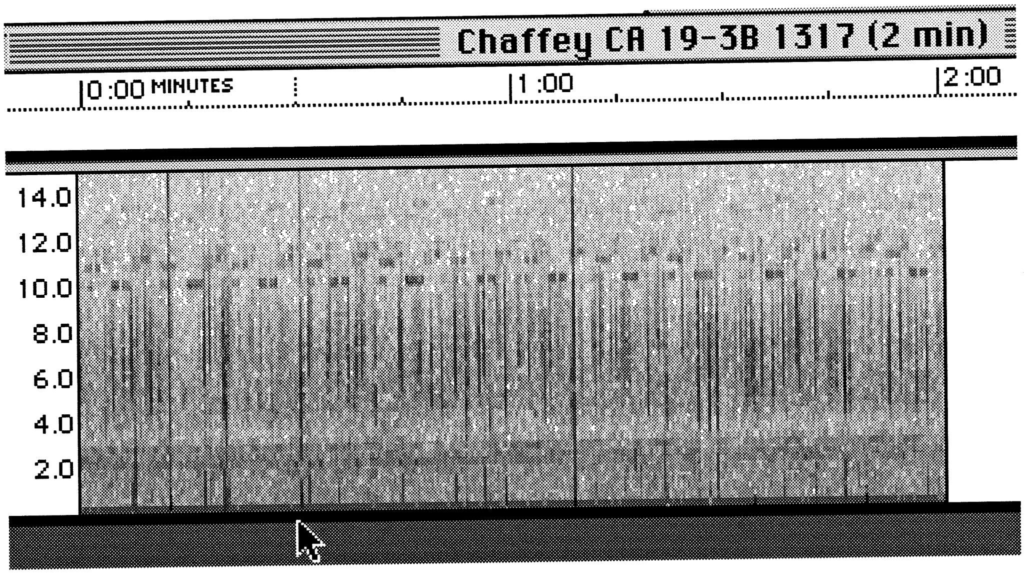
The Chaffey High School INSPIRE Team recorded passes 19-3, 19-7, 25-3 and 25-7. Personnel included:

Pass 19-3	Pass 19-7	Pass 25-3	Pass 25-7
Pilar Brito	Julie Ballinger	Pilar Brito	Richard Ruvalcaba
Laura Deem	Sammi Garratt	Chris Cowart	Carlos Uribe
Ransom Hicks	Lena Lopez	Sammi Garratt	
Phi Le	Jason St. Clair	Jason St. Clair	
Desh Mallik		Han Mi Yang	
Richard Ruvalcaba			

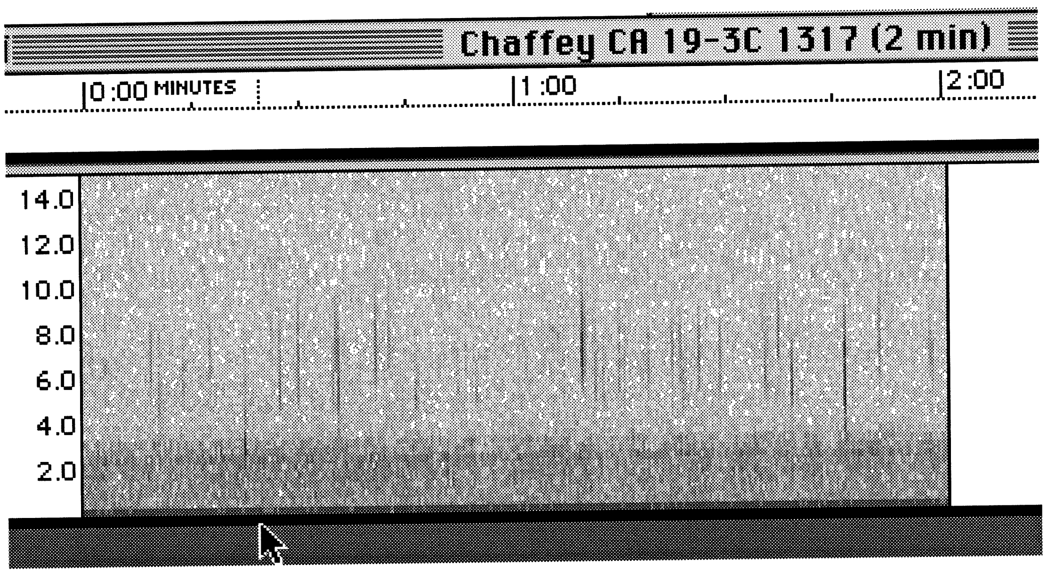
The weather for Pass 19-3 was cool, calm and overcast. High clouds prevented sighting of MIR, though the position of the sun was good for visual observation. We set up three receivers: A is an ACTIVE B-field receiver with a 1-meter square loop antenna; B and C are INSPIRE RS4 receivers with 2-meter whip antennas. As you can see from the following, recordings from supposedly identical receivers do not always yield identical results.



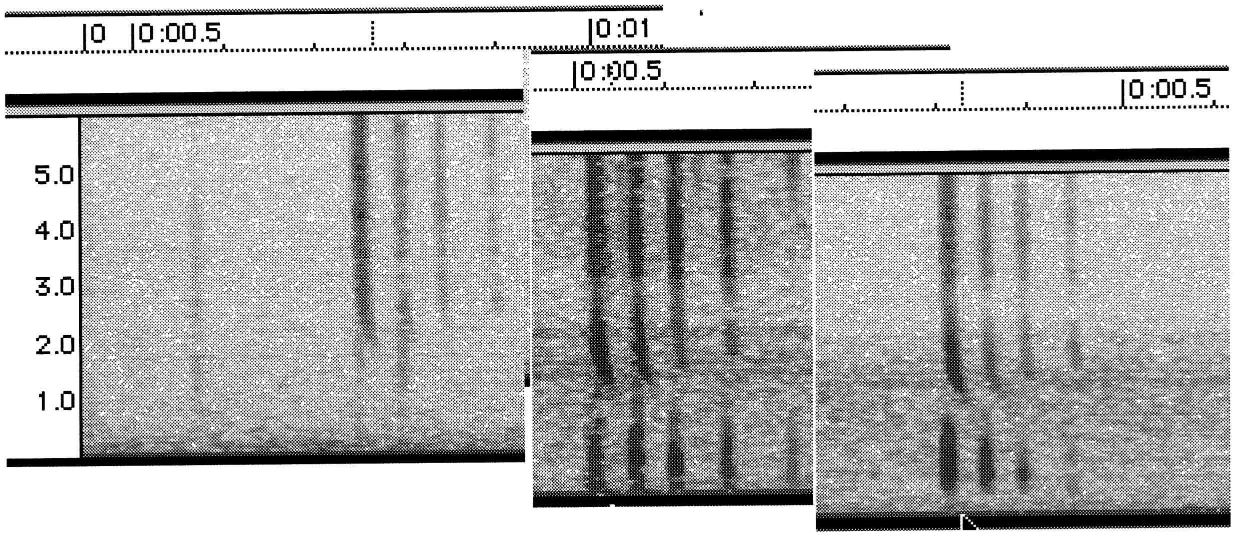
Chaffey CA 19-3A Entire file: 0-15 kHz. Note strong OMEGA (a characteristic of the B-field unit). The arrow points to a tweek that is heard, but not visible in this view.



Cbhaffey CA 19-3B. Entire file: 0-15 kHz. Note OMEGA. Arrow points to tweek.

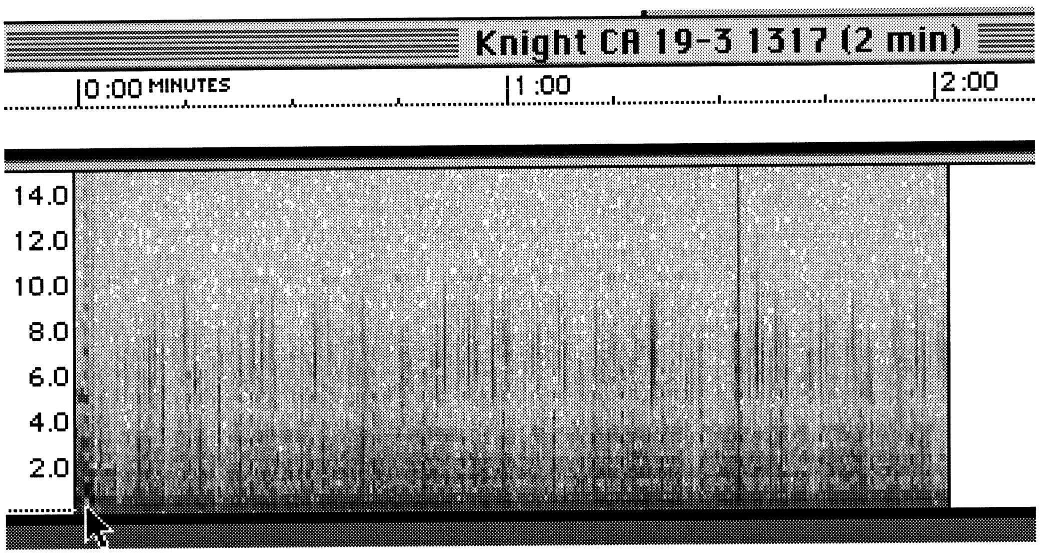


Chaffey CA 19-3C. Entire file: 0-15 kHz. Note absence of OMEGA. This unit is much less sensitive. The arrow points to the tweek.

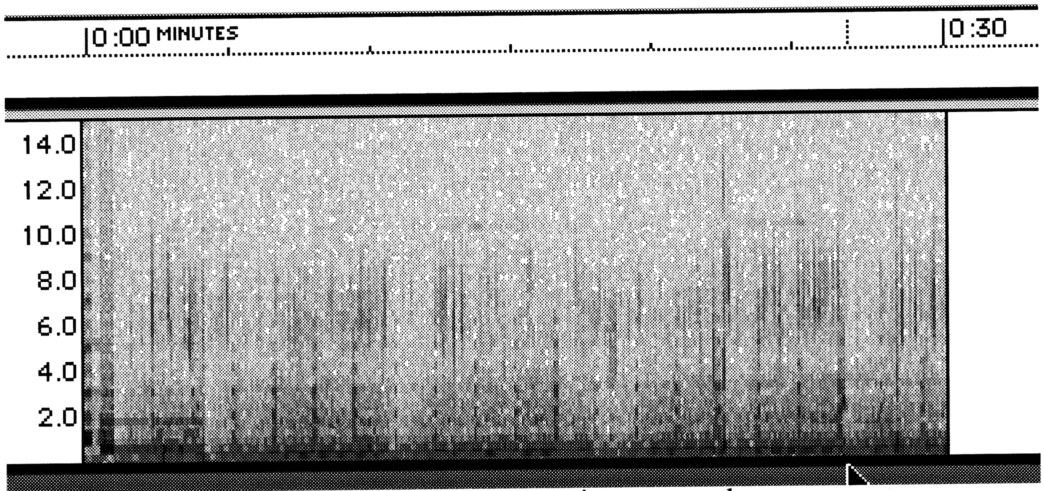


At this scale, the tweek is seen to be a burst of four. From left to right: receiver A, B, C.

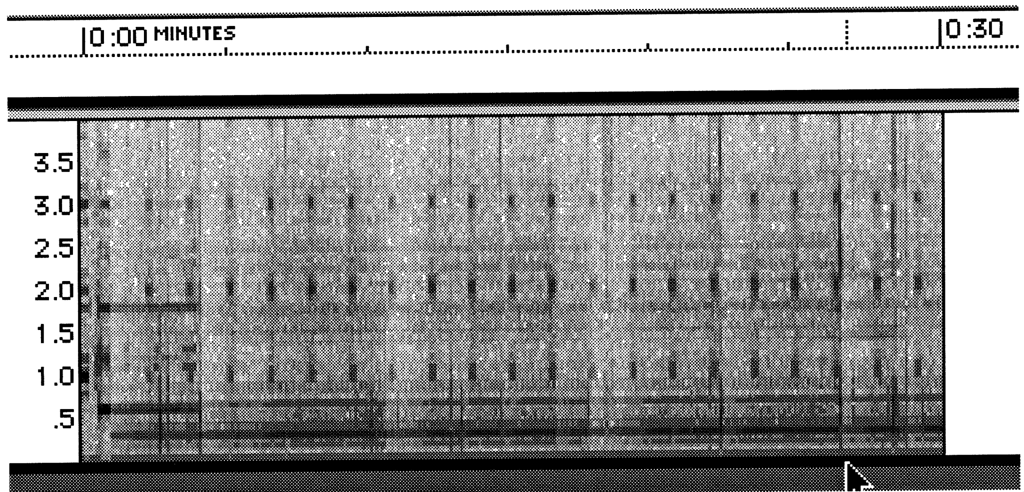
The same tweek burst was caught by the Sonoma Valley High School Team. They also had clear skies and were able to visually track MIR across the sky.



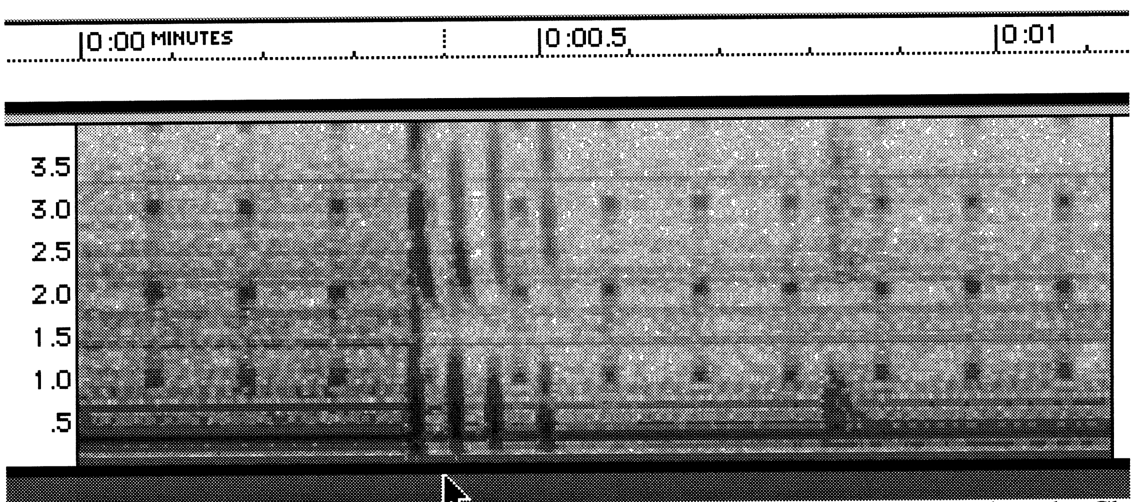
Knight CA 19-3 Entire file: 0-15 kHz. The arrow points to the 1317 WWV tone.



Knight CA 19-3 First 30 seconds. Arrow points to tweek.



First 30 seconds. 0-4 kHz. The series of signals at 1, 2 and 3 kHz are from a LORAN transmitter. This is heard as a "clacking" sound. Arrow points to the tweek.



One second centered on the tweek. 0-4 kHz. Note the similarity to that found on the Chaffey tapes recorded almost 1000 kilometers south. Note also the detail of the LORAN signal.

Pass 19-4

Dean Knight - 7

Dean and his Sonoma Valley High School students observe from a site in Jack London State Park in Glen Ellen, CA. The SVHS Team recorded Passes 19-3, 19-4 and 25-3. In addition to Dean, personnel included:

Pass 19-3, 19-4

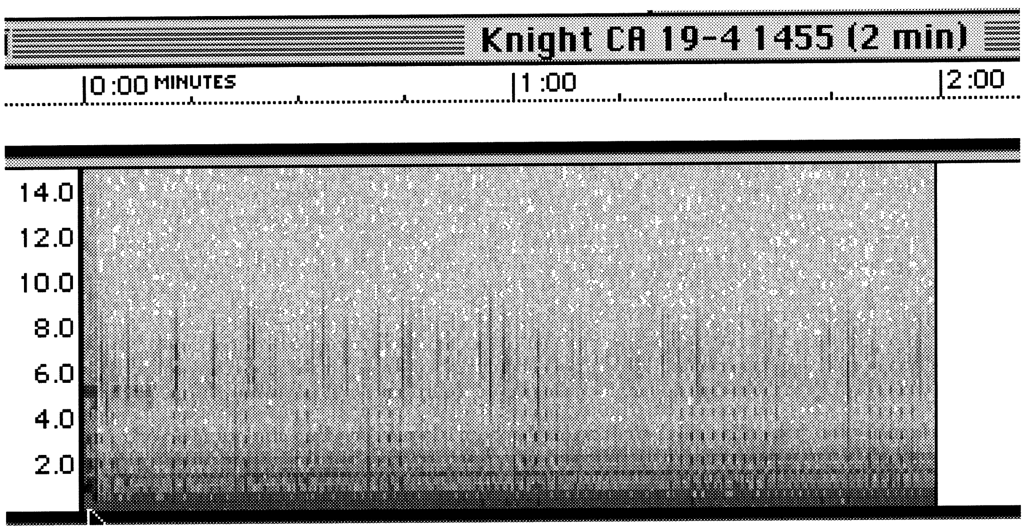
Genie Brewer
William Buckley
Katie Estudillo
Lori Hensic
Scott Jensen
Kevin Jordan
Erica Krauthamer
Linsay MacDonald
Forrest Martens
Eric Phillips
Jason Reed
Casey Wooden

Pass 25-3

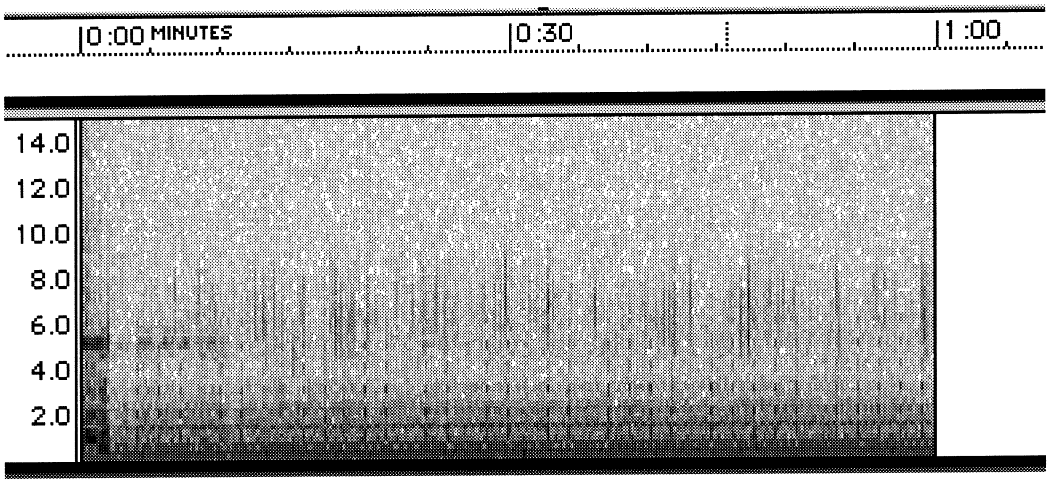
Tony Adams
Genie Brewer
Jan Bozorgzadegan
Meegan Bozorgzadegan
Meetja Bozorgzadegan
Jean Campbell
Jordan Drake
Katie Estudillo
Dan Fairon
Alison Finley
Howdy Goudy
Stuart Hammond
Scott Jensen
Kevin Jordan

Pass 25-3 (cont.)

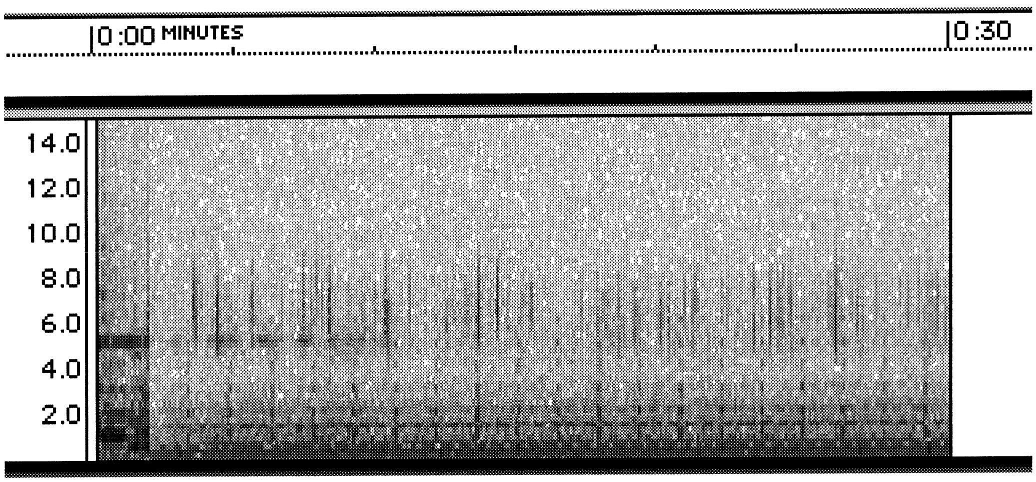
Claudia Kelly
Kati Kelly
Gabe Krauss
Julianne Krauss
Joel Kuschner
Ed Lee
Forrest Martens
Ali Mujic
Kate Neusterman
Abby Swann
Kauren Wayson
Seth Whitely
Casey Wooden



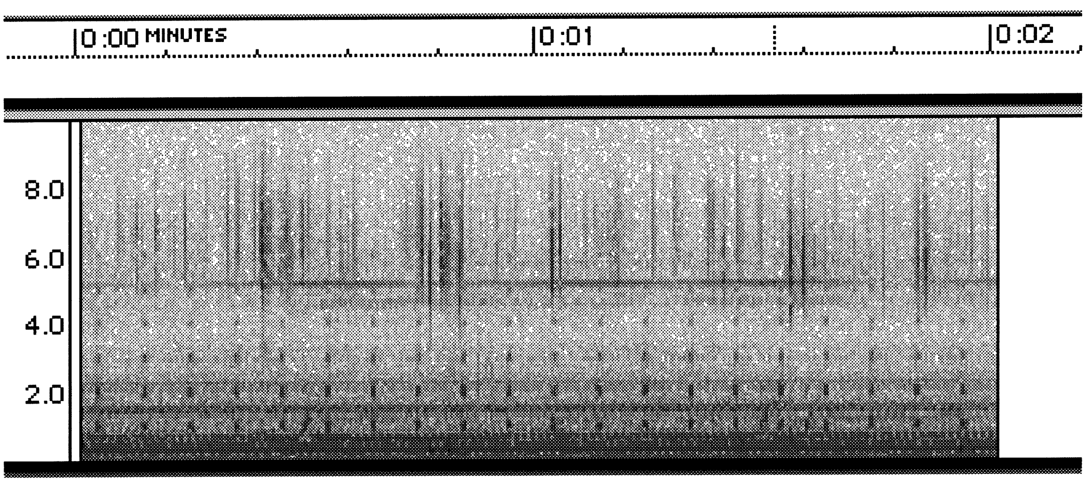
Knight CA 19-4 Entire file: 0-15 kHz



Knight CA 19-4 First minute: 0-15 kHz



First 30 seconds. Note something appears at about 5 kHz.

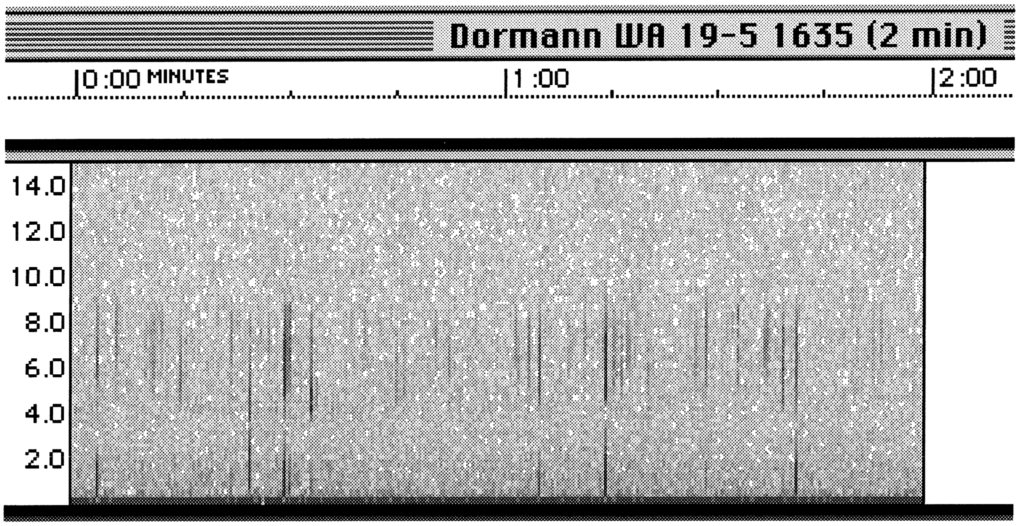


Two seconds from above. LORAN appears at 1,2,3,4, and 5 kHz.

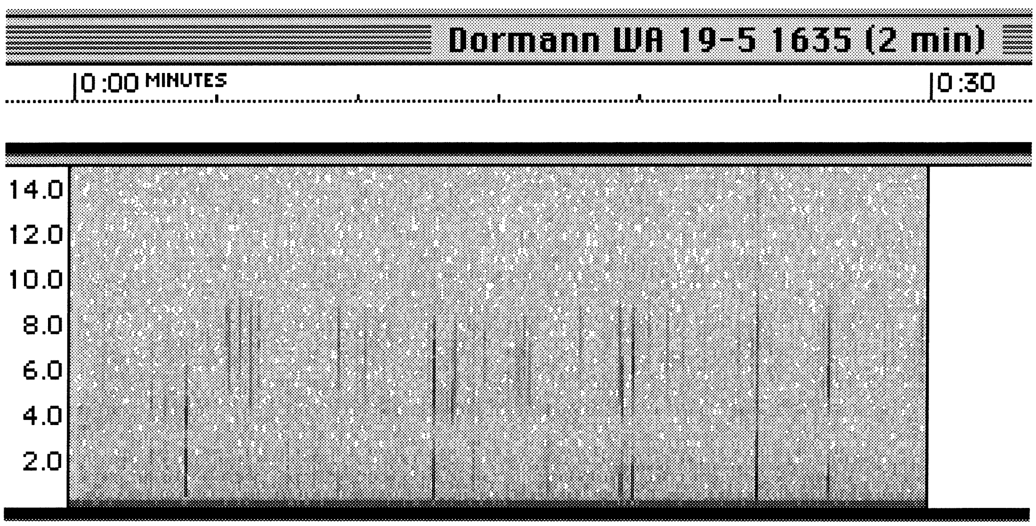
Pass 19-5

<u>Mike Dormann - 8</u>

Mike is a recently retired Cogswell College professor in Seattle, WA. He sent an interesting note about his data site: "Cranberry Marsh is located in the heart of the PNW (Pacific NorthWest - ed.) mushroom collecting region, and there have been murders over mushrooms. My wife is afraid for my safety when I go there. I leave for recording as late as I can and stay only long enough to do the recordings. You can hear my nervousness in my voice during voice comments."

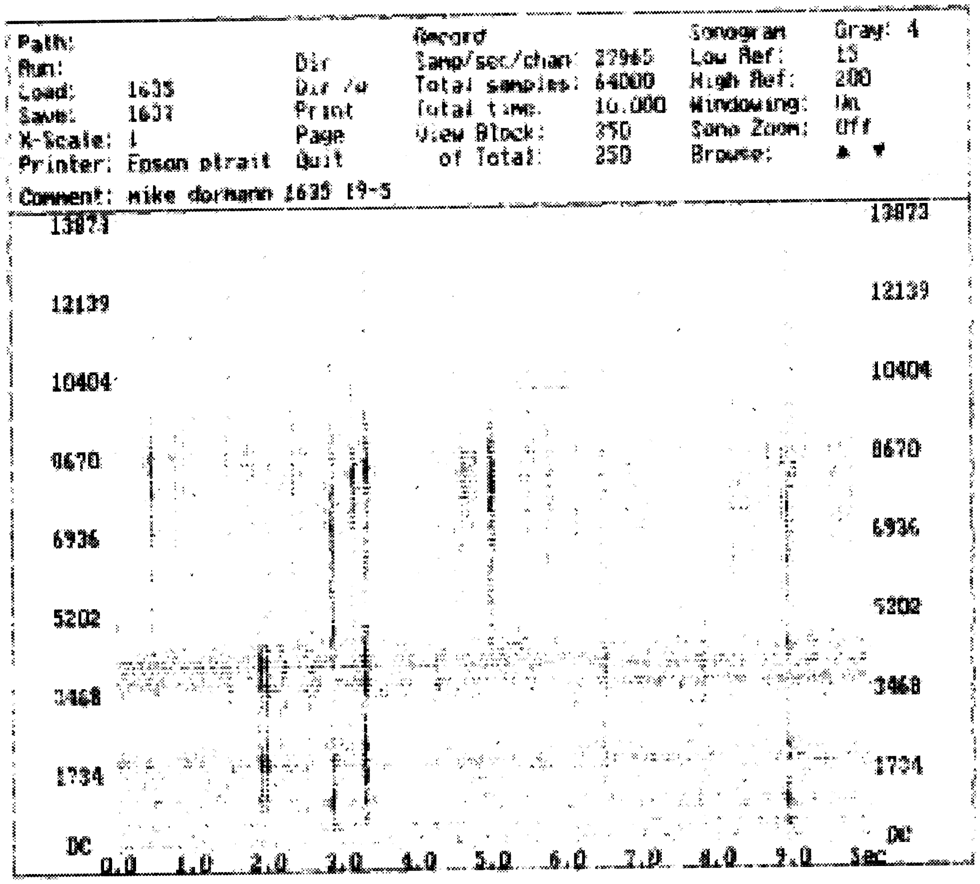


Dormann WA 19-5 Entire file: 0-15 kHz. Very quiet.



First 30 seconds. Note the absence of OMEGA.

Mike has done some data reduction on his own. He enclosed a hard copy of a spectrogram created using the Baker 12-bit board. The interval shown starts at 1635 UT.

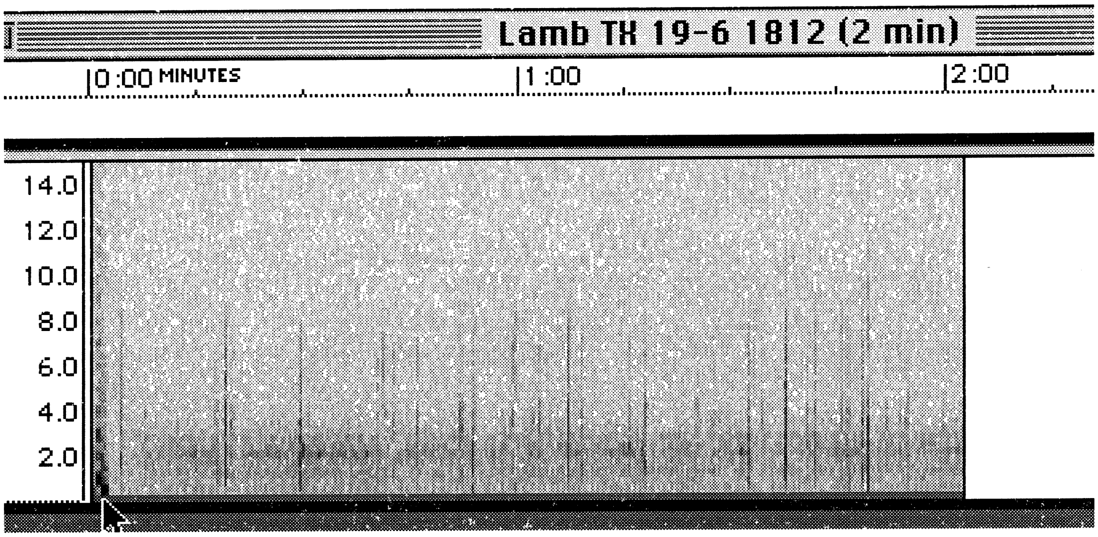


Note the faint OMEGA signal between 5 and 6 seconds.
That signal was not observed on the spectrograph created by SoundEdit.
Detection is more difficult on the SoundEdit spectrograph since it depicts a 30 second interval.

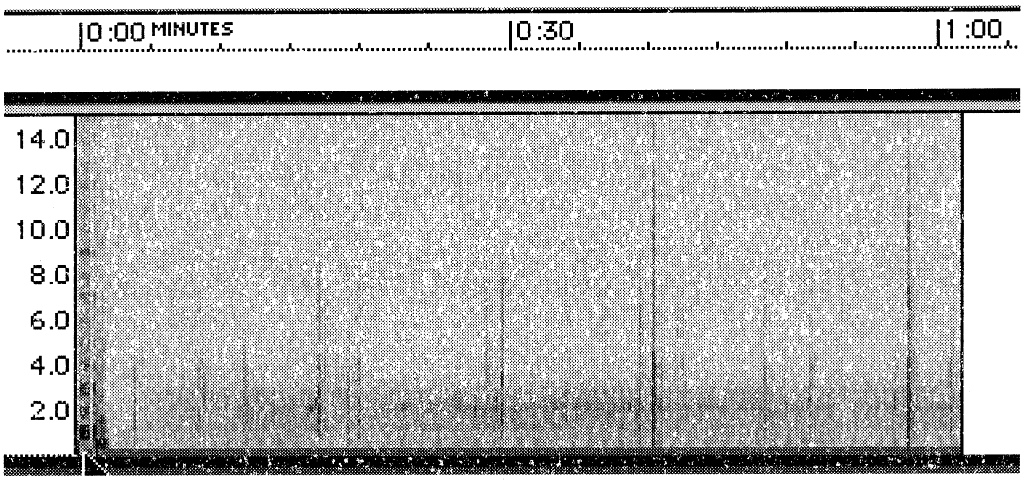
Pass 19-6

John Lamb, Jr. - 6

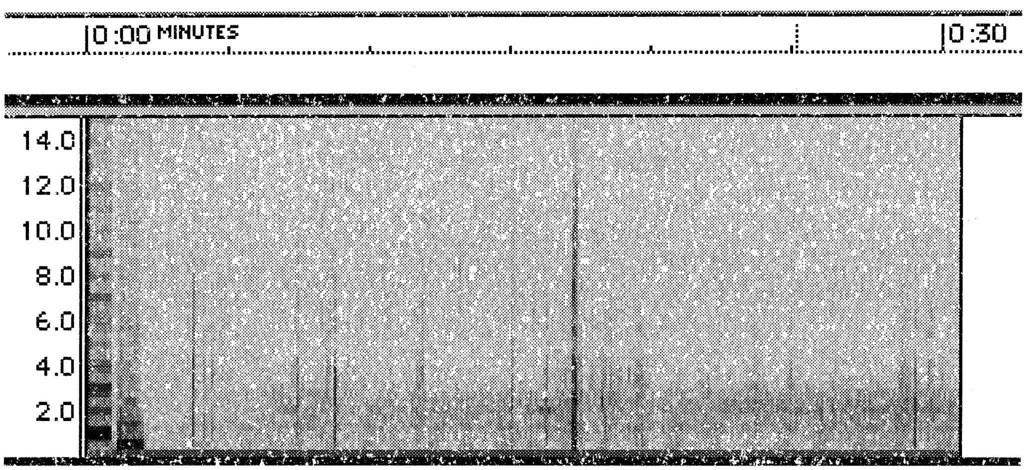
Jack is a professor at East Texas State University and a long time INSPIRE observer and correspondent. Jack was assisted in his recording sessions by Matt Haley, his grandson.



Lamb TX 19-6 Entire file: 0-15 kHz Very quiet.

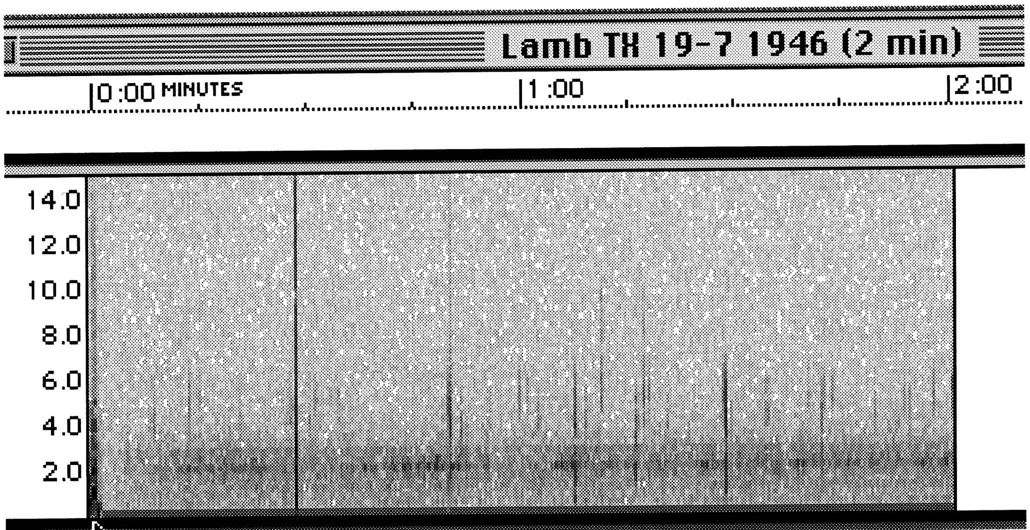


First minute. Arrow points to WWV tone at 1812 UT.

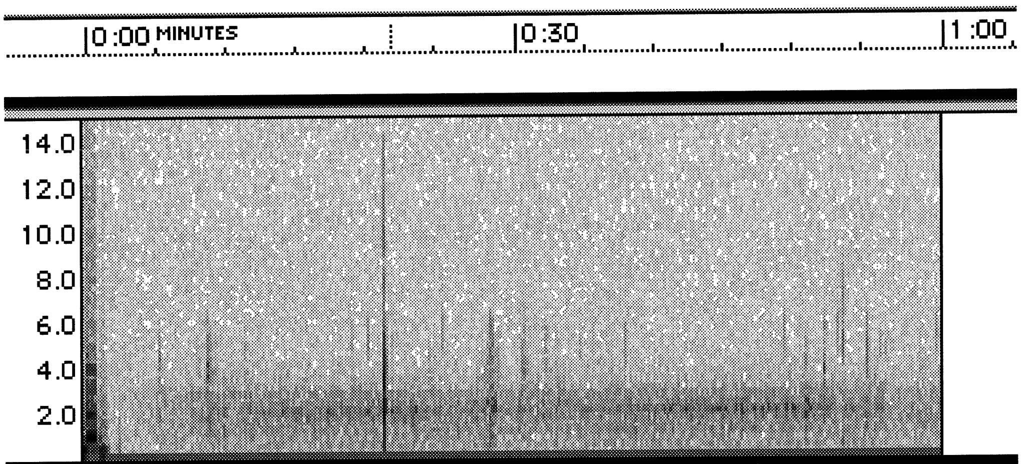


First 30 seconds. Light sferics, no hum, no OMEGA.

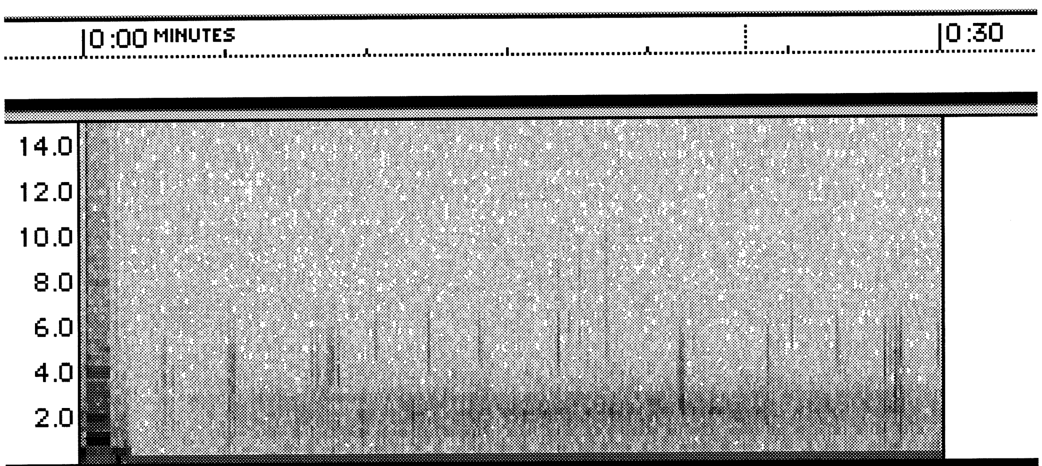
Pass 19-7



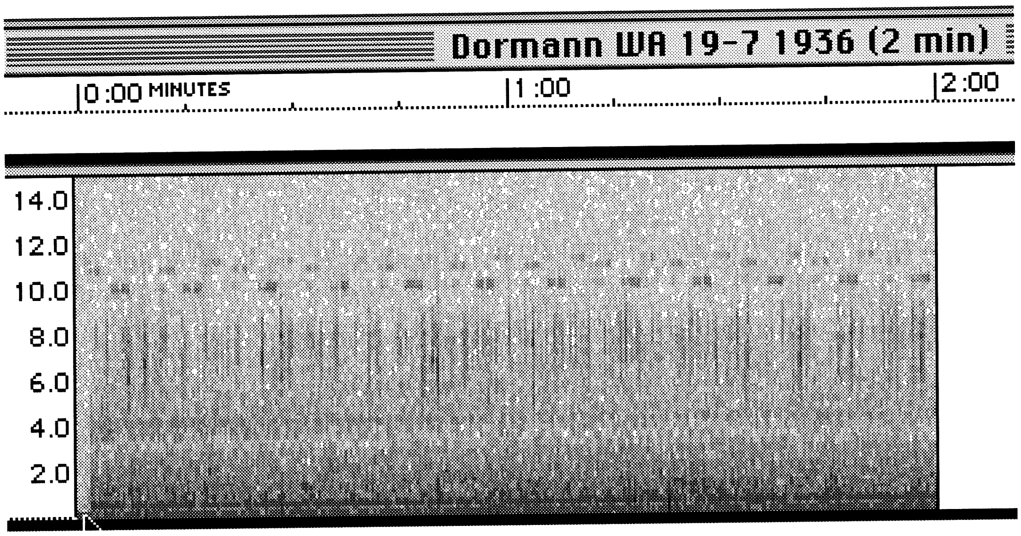
Lamb TX 19-7 Entire file: 0-15 kHz Light sferics.



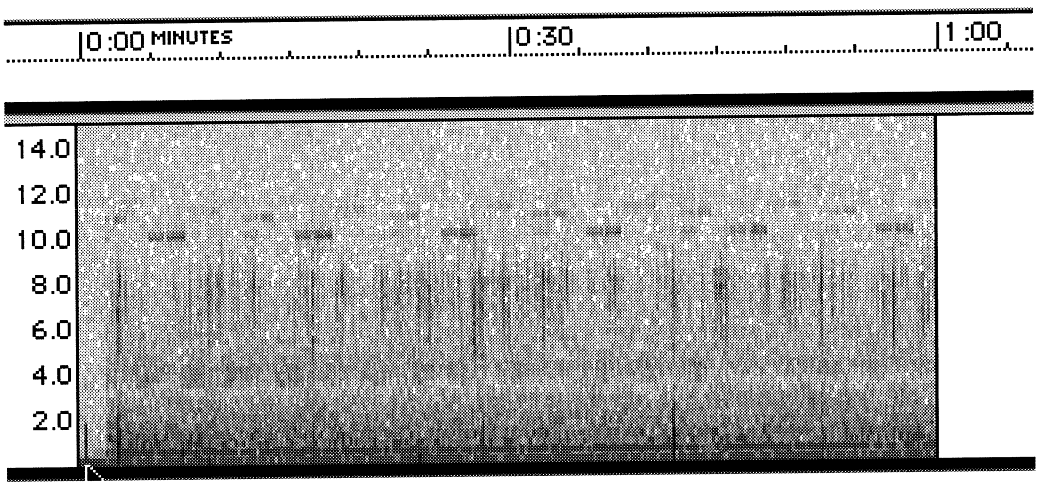
First minute.



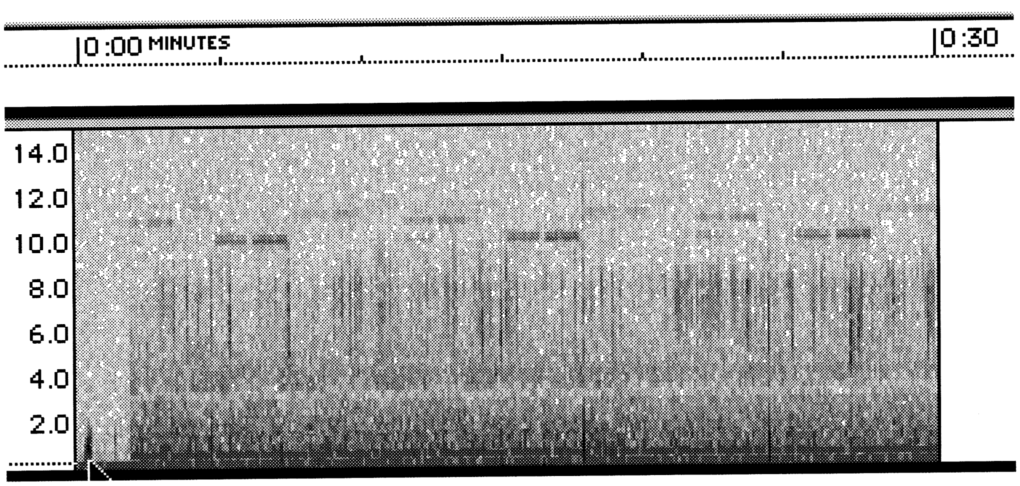
First 30 seconds. Very quiet.



Dormann WA 19-6 Entire file: 0-15 kHz. Note OMRGA, light sferics.



First minute.



First 30 seconds. Three OMEGA stations present. At 10.2 kHz, the dark pair are Hawaii (left) and North Dakota, the faint one to the left of the pair is Australia. Light sferics.

November 25

Since ISTOCHNIK operated on schedule on the November 25, the analysis procedure for searching for the 1 kilohertz signal was used. One change was that the operating period for ISTOCHNIK was reduced to two minutes. Also, as explained before, the adjusted start time was used. The analysis procedure was:

1. Make a 3-minute sound file of the last three minutes of the recording interval, including the last time mark.

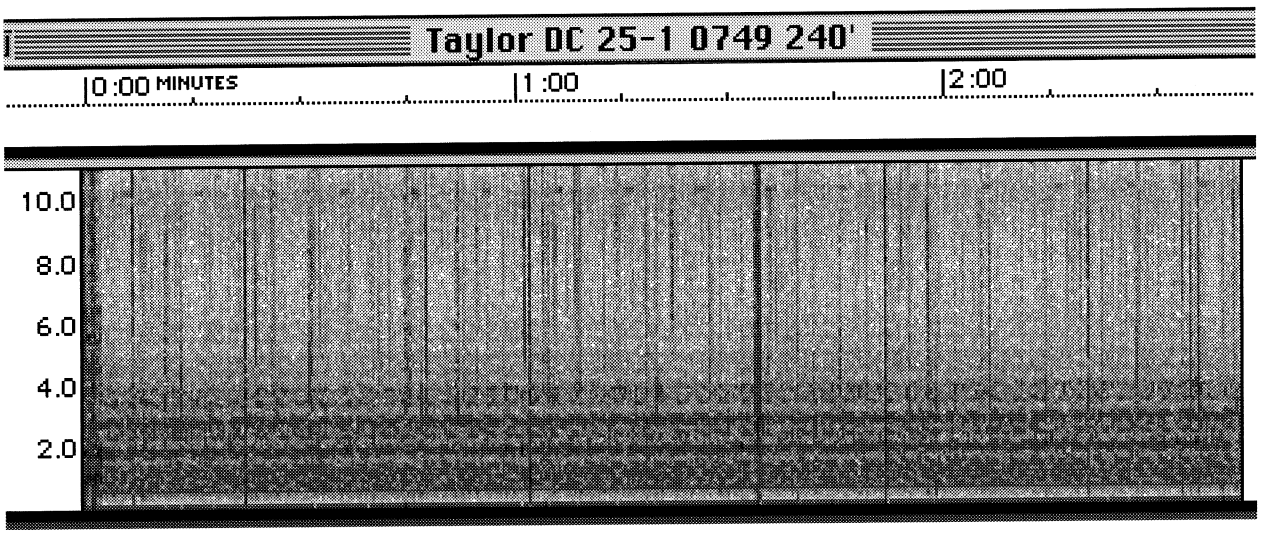
2. Make a spectrograph of the entire file using a frequency range of 0-15 kilohertz.

3. Make addtional spectrographs of parts of the file using frequency ranges chosen for ease in detecting a 1 kHz signal.

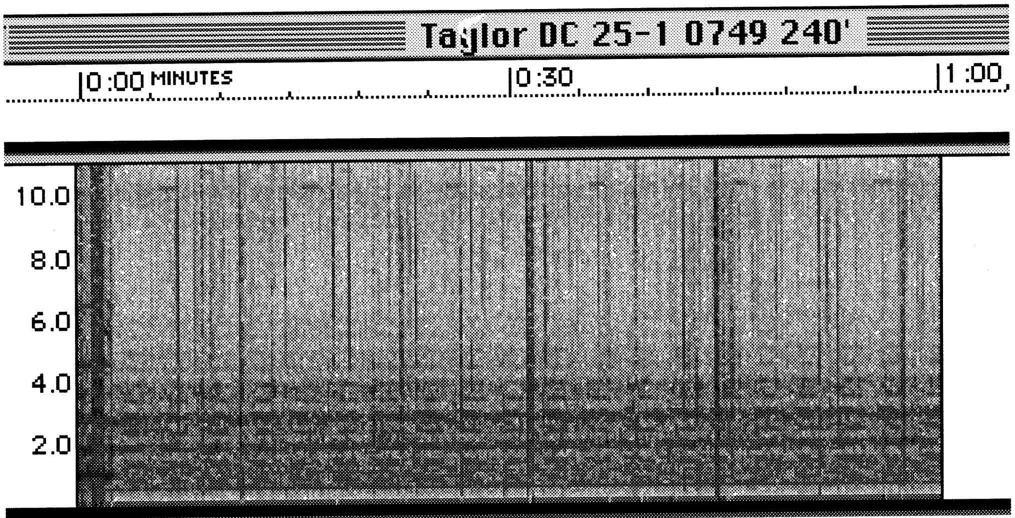
Pass 25-1

Bill Taylor - 10

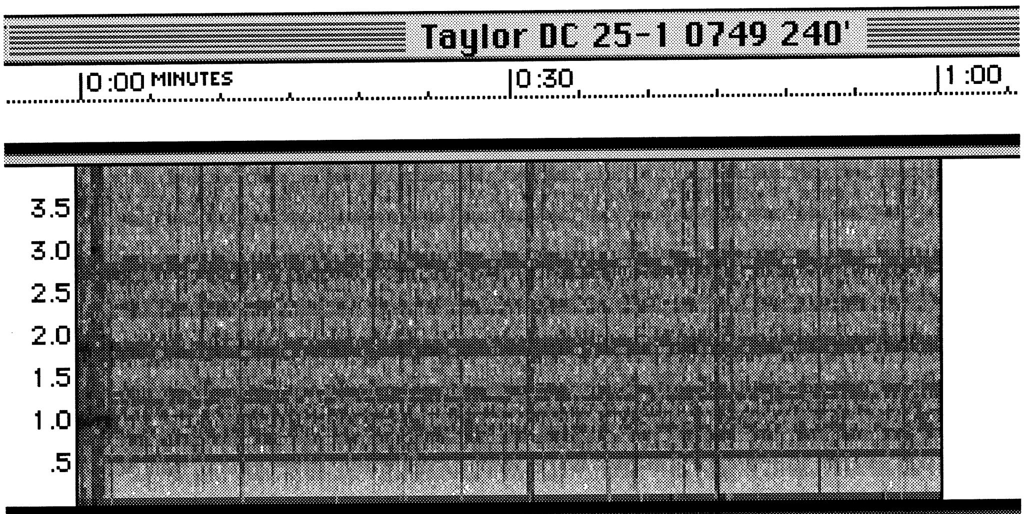
Bill observes from Hains Point, which extends into the Potomac River in Washington, DC. It is surprising how quiet this site is considering the nearby city, complete with National Airport directly across the river.



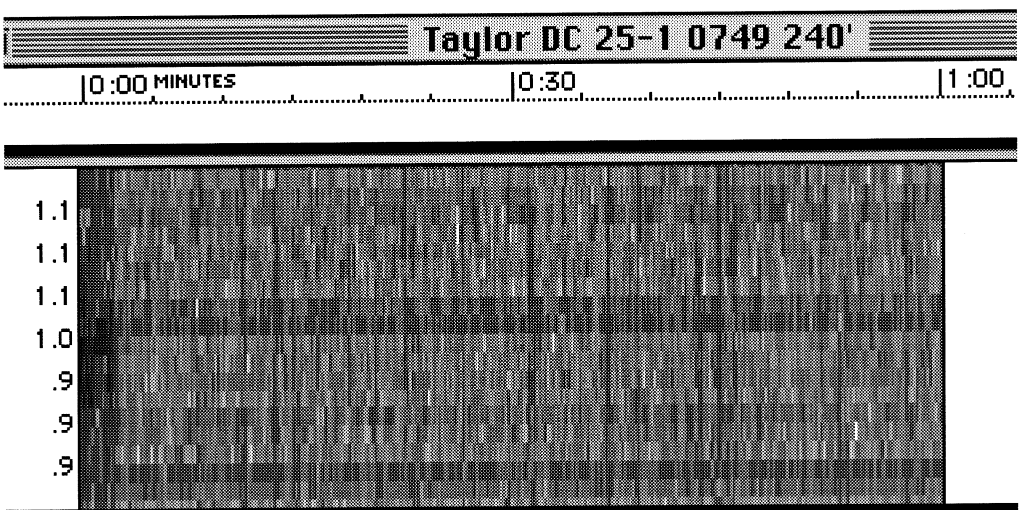
Entire file. 0-11 kHz Note OMEGA. Horizontal bands of hum.



First minute of 25-1. OMEGA present.



First minute. 0-4 kHz.

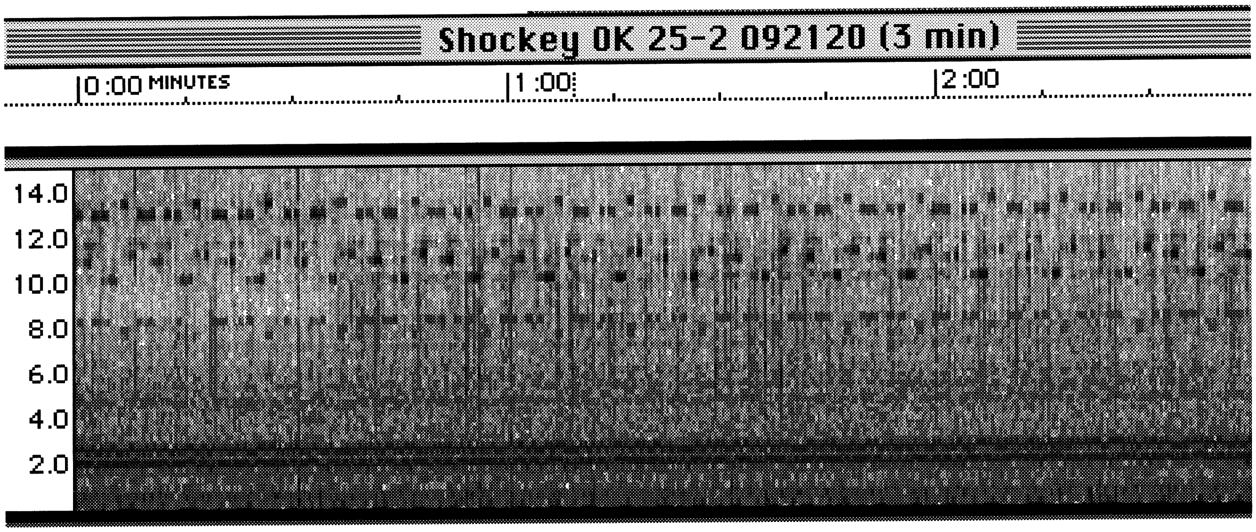


First minute. 800-1200 Hz. No intermittent signal at 1 kHz,

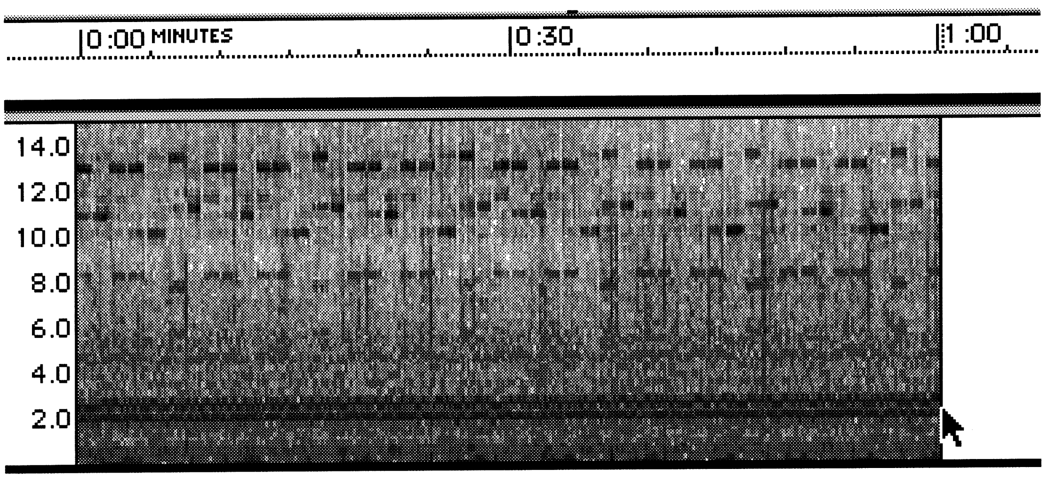
Pass 25-2

Don Shockey - 3

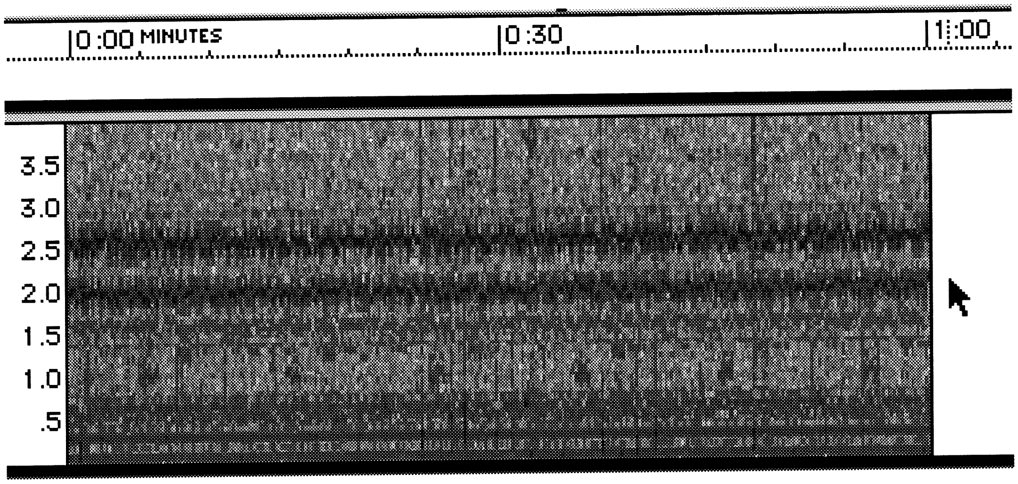
Don makes his observations near Oklahoma City, OK. His attempt to record Pass 19-2 was sabotaged by equipment failure. Equipment that checked out fine before the trip failed at the critical moment. He was successful for Pass 25-2. Don uses a WR3 receiver which is very sensitive. Spectrographs of Don's data show strong OMEGA and much manmade noise. The 1 kilohertz region is relatively free of manmade signals.



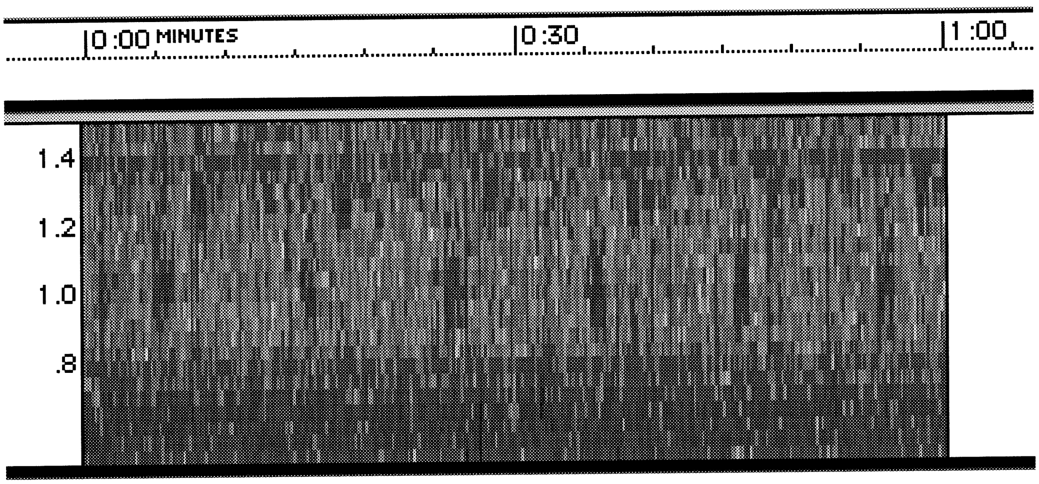
Shockey OK 25-2 Entire file: 0-15 kHz



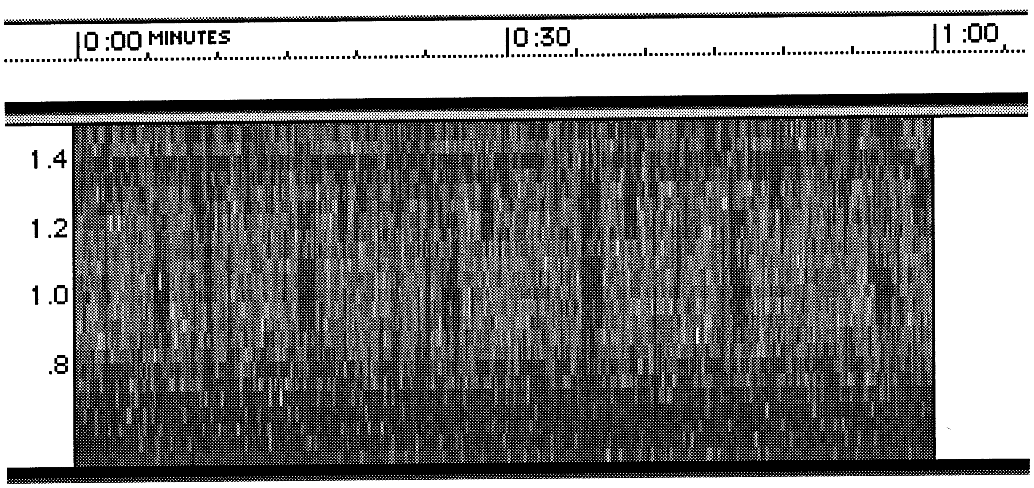
First minute. Arrow points to horizontal hum band.



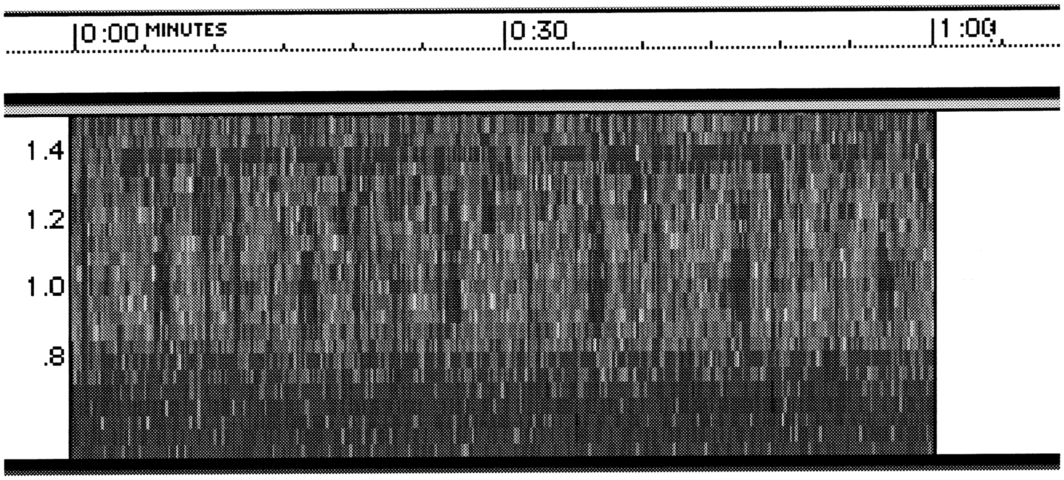
First minute. Arrow points to hum band. Note the periodic marks at 1 kHz every 10 seconds.



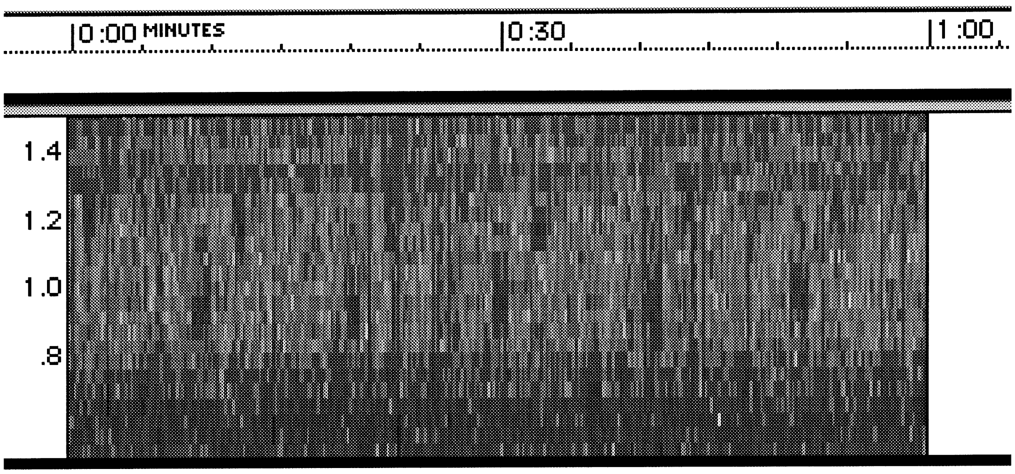
First minute. 500-1500 Hz. Note the signals at 1 kHz.



Second minute. The signal at 1 kHz is a short signal with a period of 10 seconds. The signal from ISTOCHNIK should be on for 10 seconds, then off for 10 seconds.

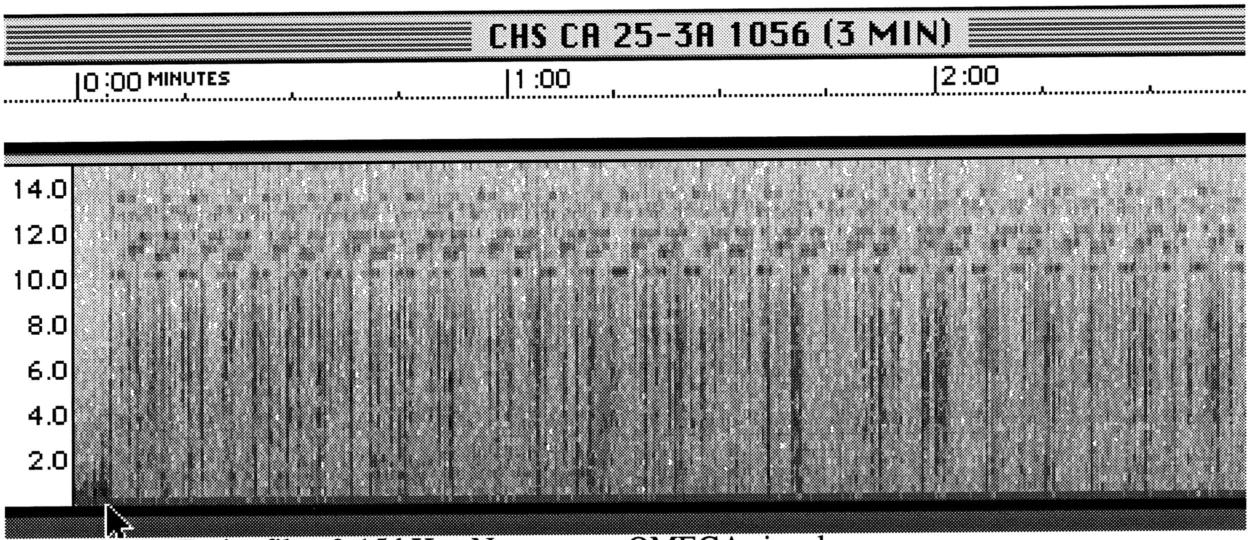


Shockey OK 25-2 Third minute. 500-1500 Hz. Intermittent 1 kHz present.

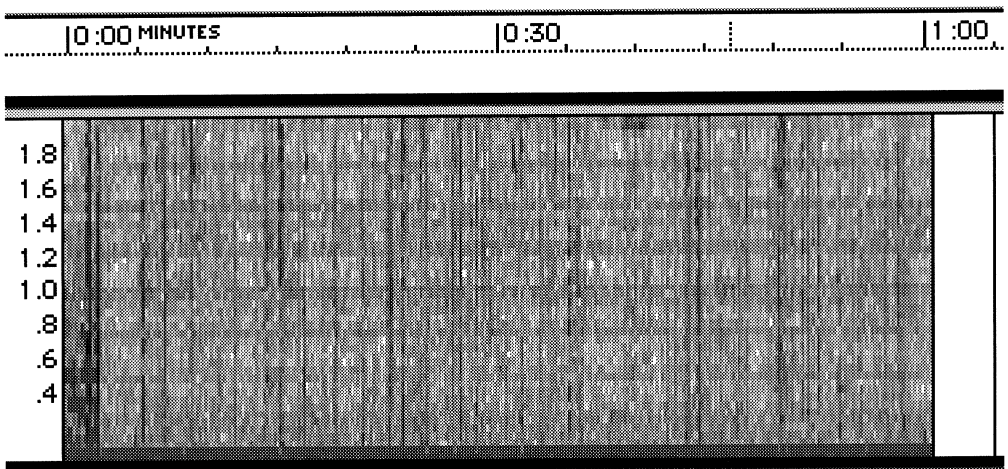


A file was made for a 5 minute interval prior to the arrival of MIR. This is a 1 minute portion of that file. The 1 kHz intermittent signal is present, so it could not originate from MIR. The signal is probably a radar beam sweeping across the receiver.

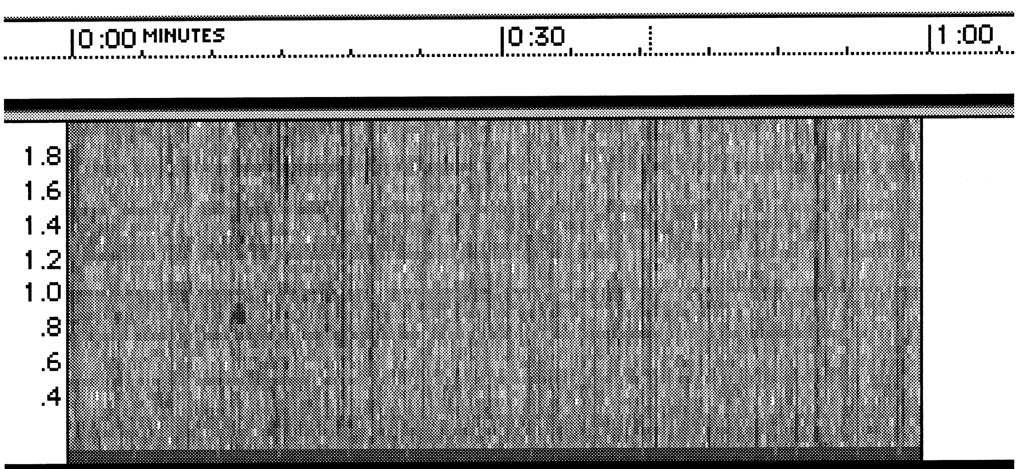
Pass 25-3



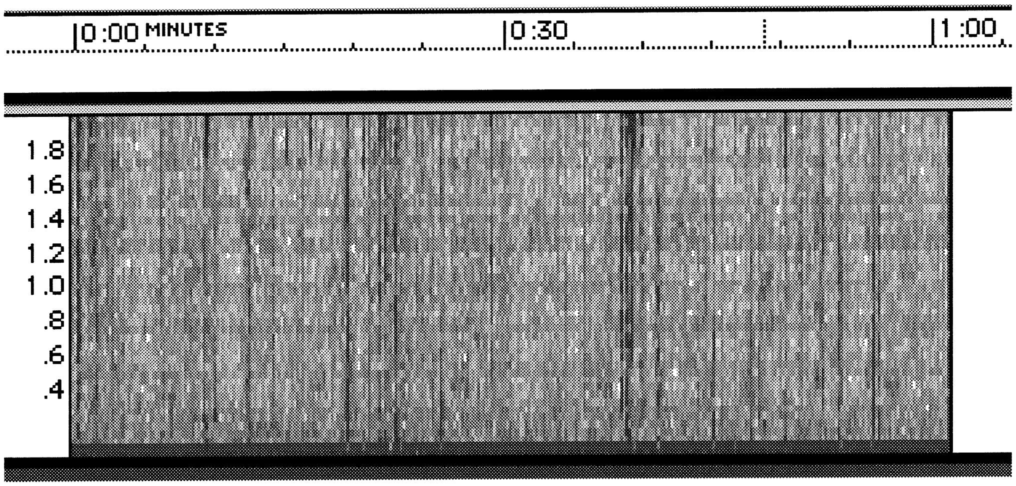
CHS 25-3A Entire file: 0-15 kHz. Note strong OMEGA signal.



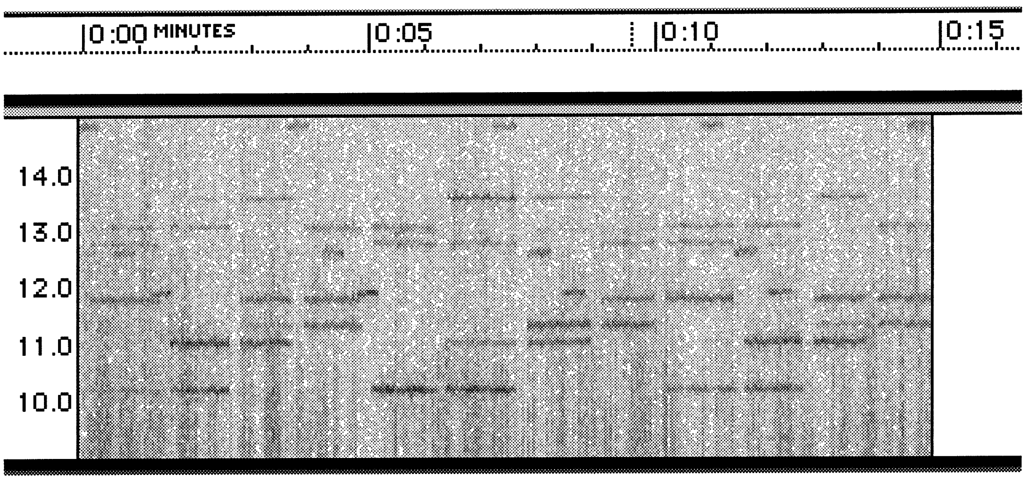
First minute. 0-2 kHz. No 1 kHz signal present.



Second minute. 0-2 kHz. Still no 1 kHz present.

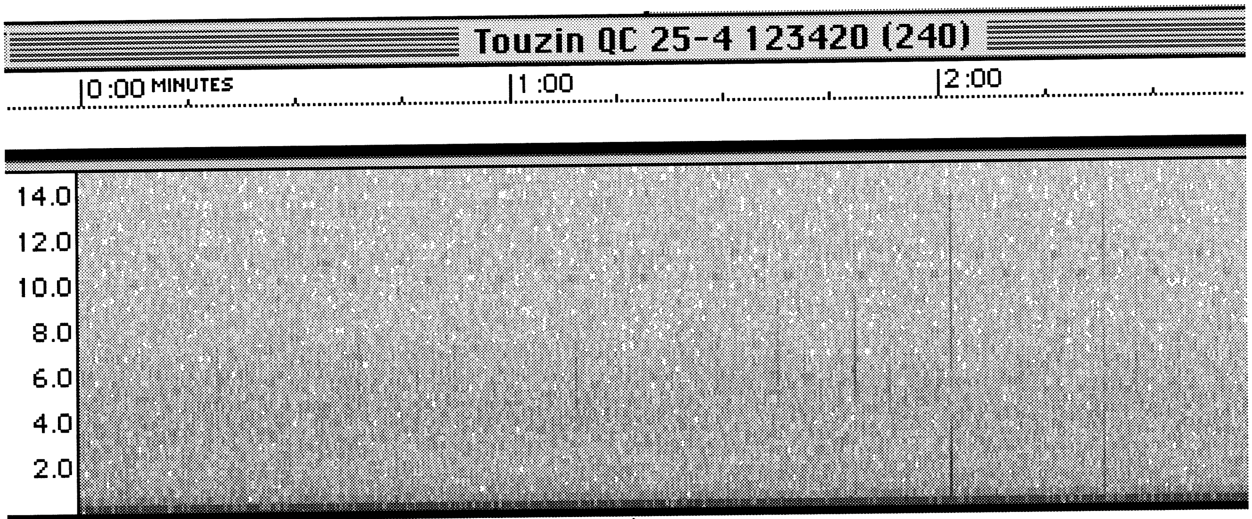


CHS 25-3A Third minute: 0-2 kHz. No 1 kHz present.

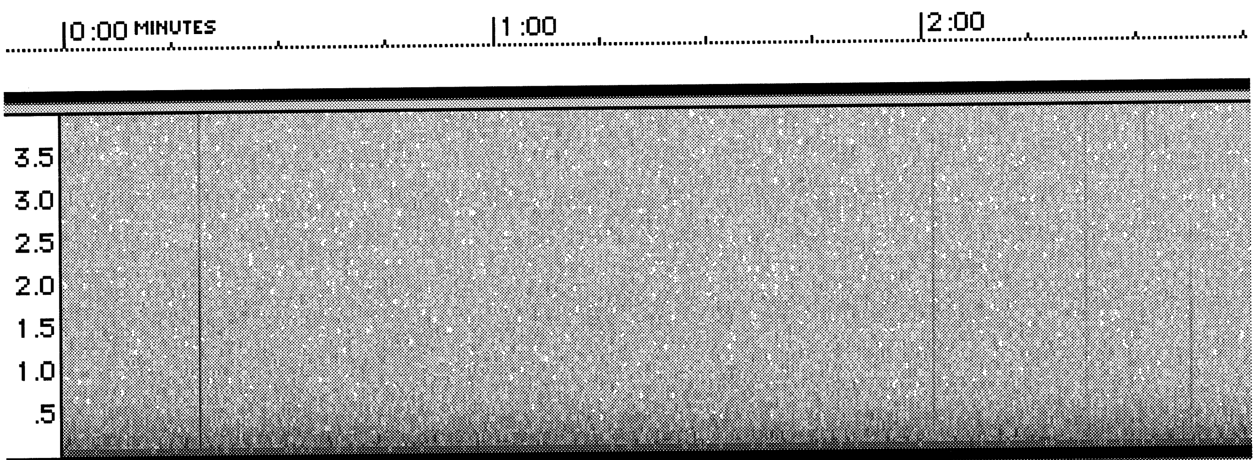


This is a closeup of OMEGA during a 15 second interval of 25-3. Fifteeen seconds is 1.5 cycles. Examine the 10.2 kHz line and you will see 4 dashes. Each is from a different OMEGA station. The dark pair between 5 and 7 seconds are from Hawaii (left) and North Dakota (right). The faint pair at about 0.5 to 2.5 seconds are from Australia (left) and Japan (right). Dashes from these two stations also appear from about 10.5 to 12.5 seconds. Dashes above the 10.2 kHz level are other transmissions from the four stations. Each station has a unique sequence of frequencies and durations for a total of four tones in each pattern.

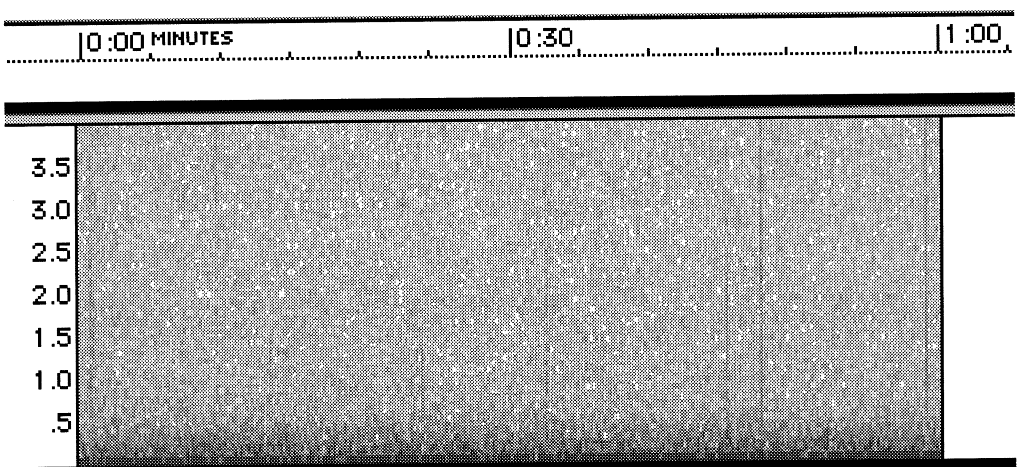
Pass 25-4



Touzin QC 25-4 Entire file: 0-15 kHz. Very quiet.



Entire file: 0-4 kHz

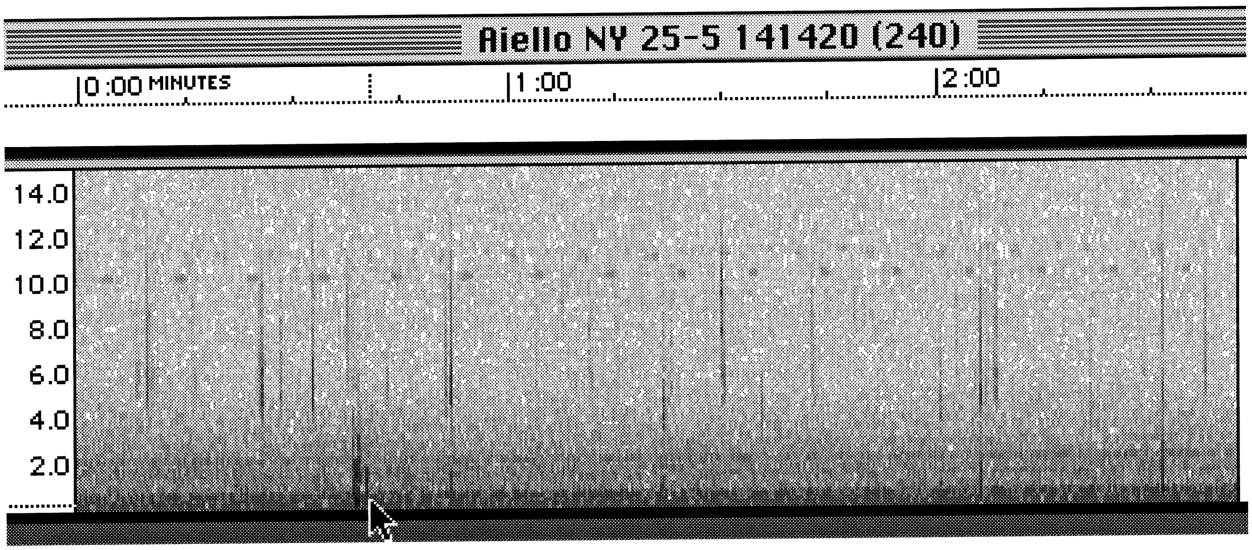


First 30 seconds: 0-4 kHz

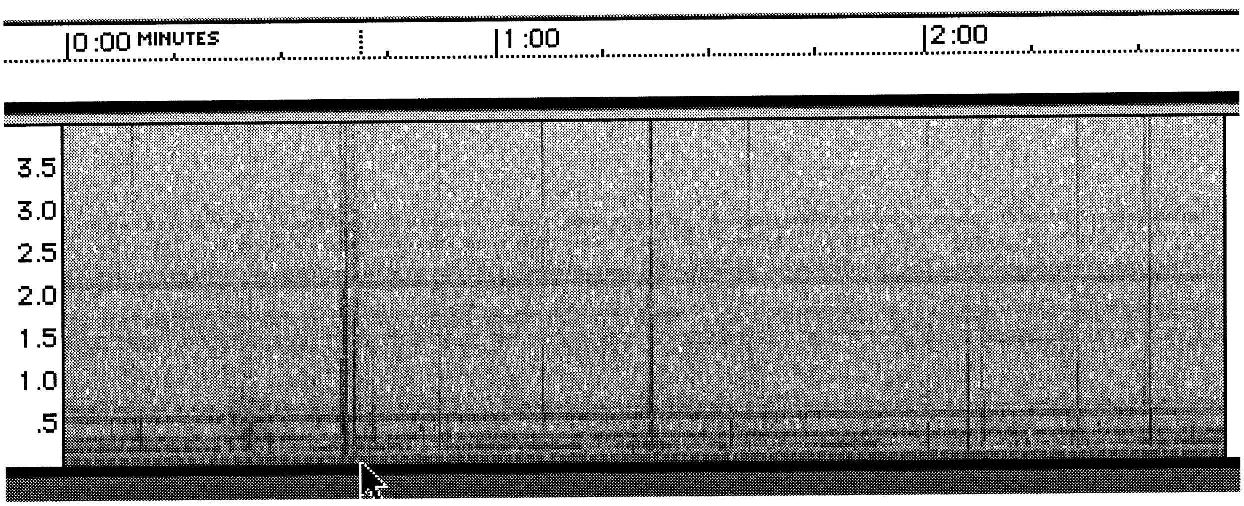
Pass 25-5

Mike Aiello - 4

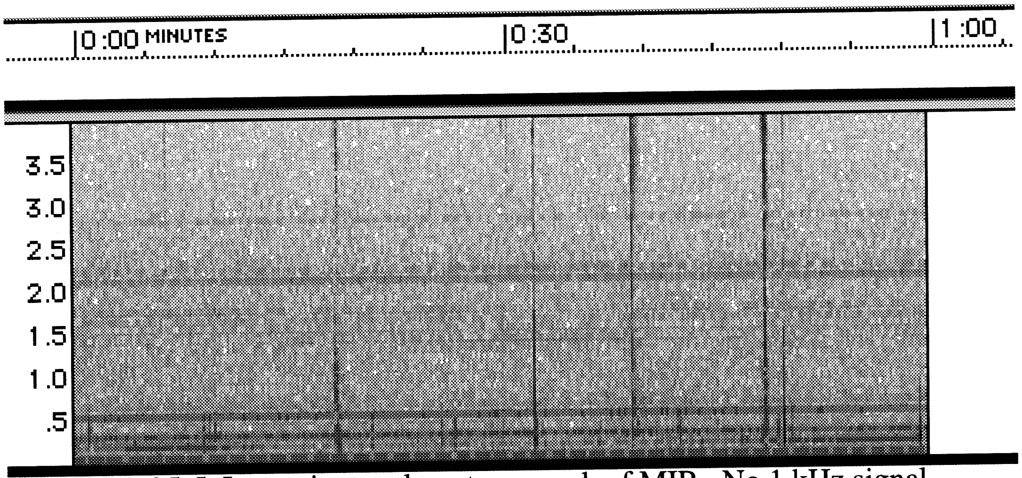
Mike makes observations from a turnout overlooking the Hudson River. He reports a quiet session, which is consistent with the observations made by Jean-Claude Touzin on the prior orbit.



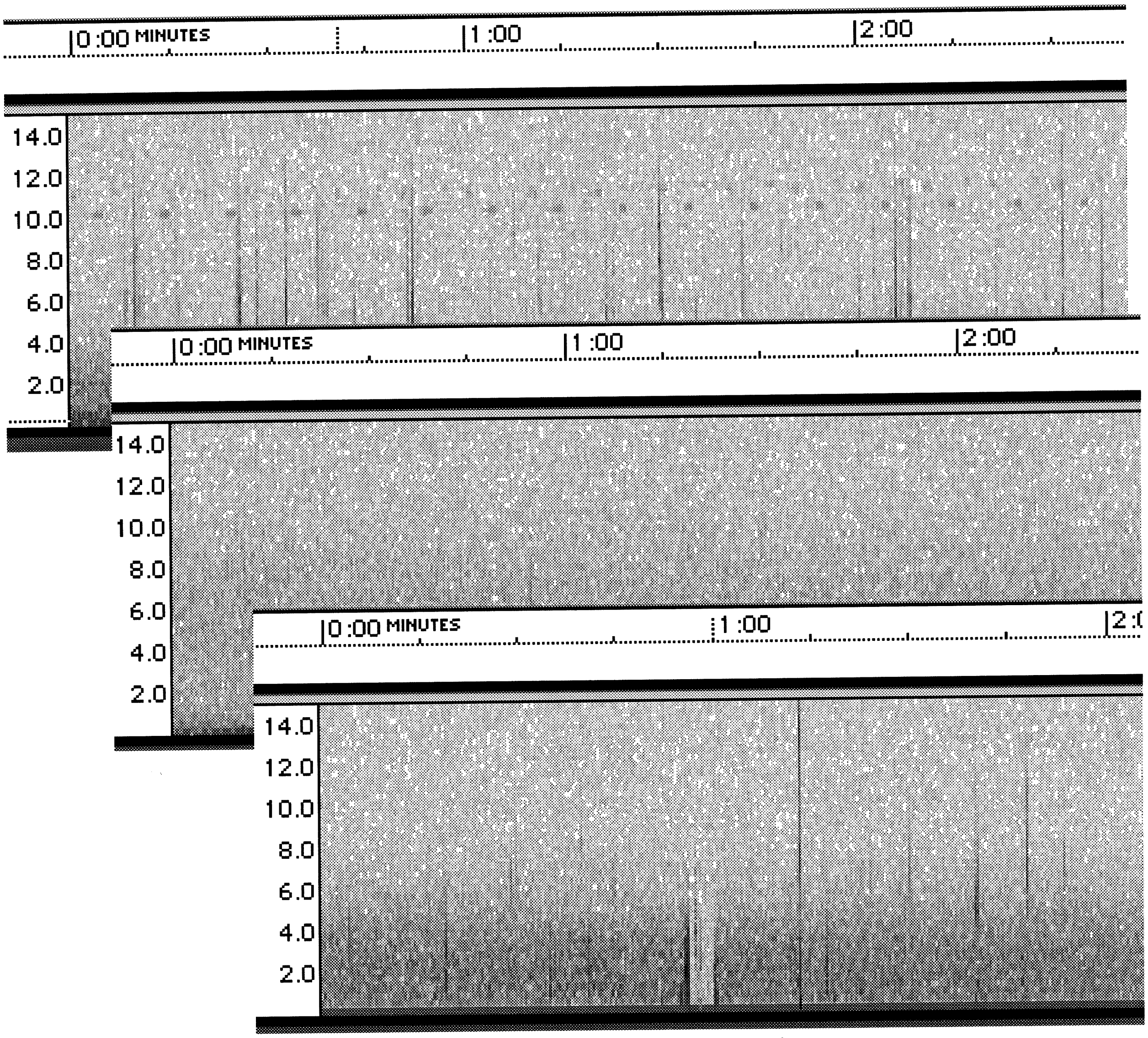
Aiello NY 25-5 Entire file: 0-15 kHz. Arrow points to "mark" at 1415 UT. Note OMEGA and light sferics.



Entire file: 0-4 kHz. Arrow points to "mark".

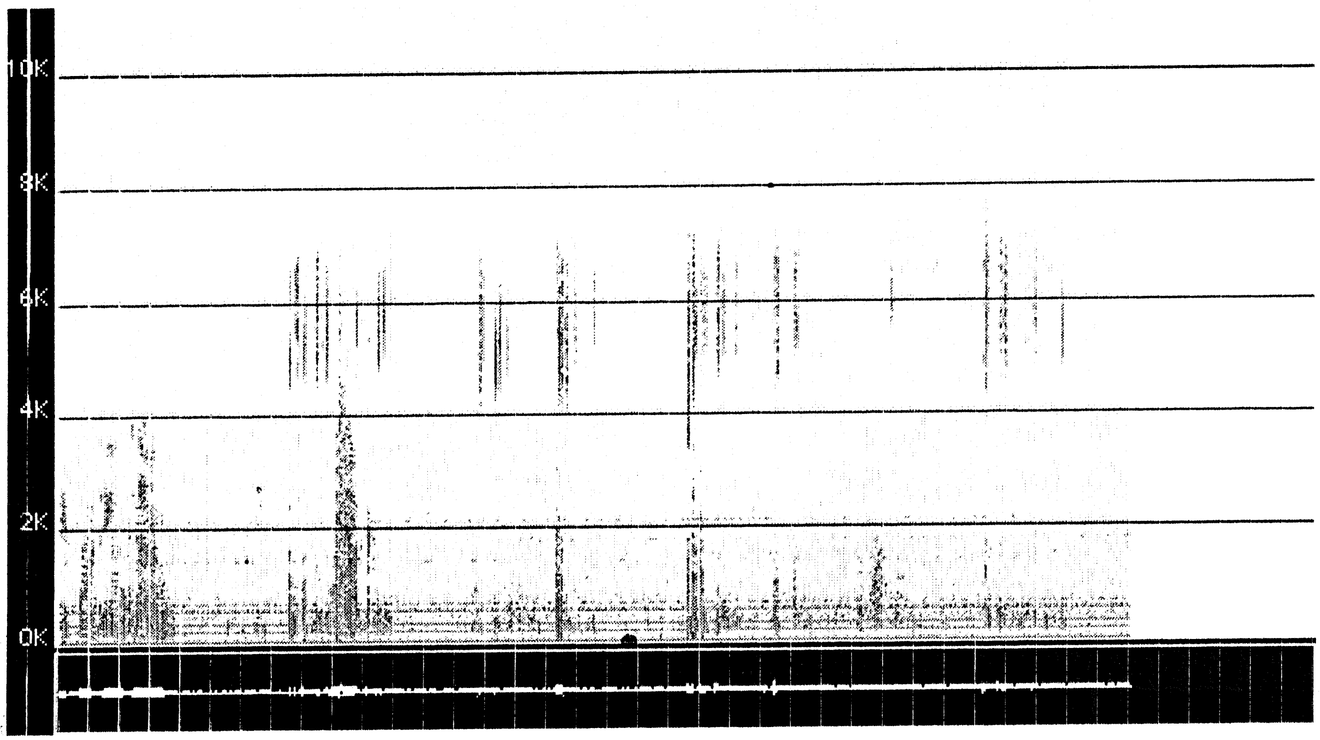


Aiello NY 25-5 Last minute; closest approach of MIR. No 1 kHz signal.



Pass 25-5 as seen by Aiello NY, Touzin QC and Davis NY. All quiet.

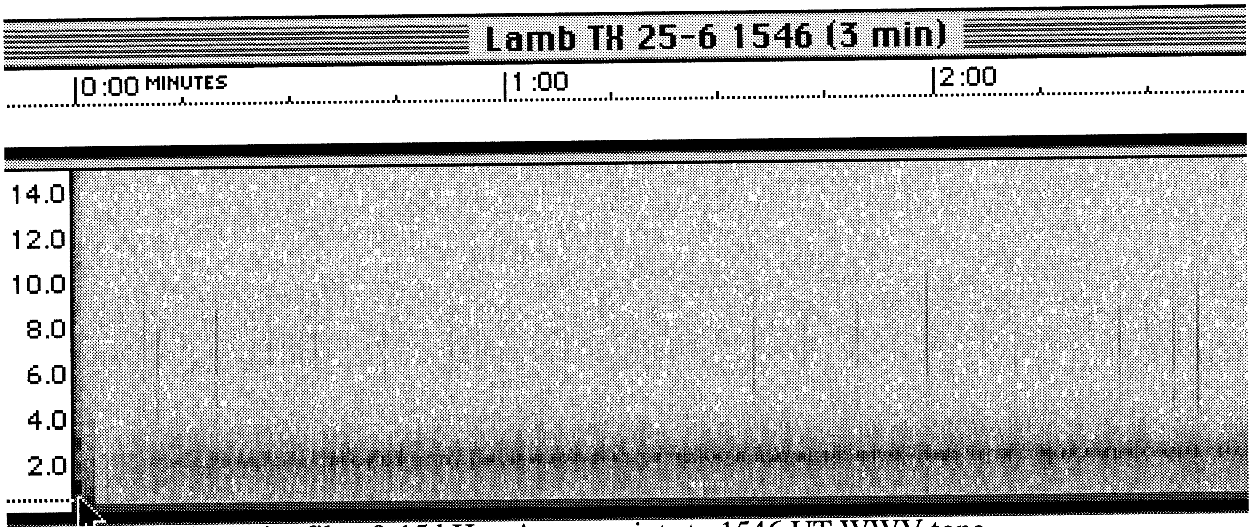
Mike Aiello also made some spectrographs of his data. Since he was unaware of the shift in operations time, he made spectrographs during the originally planned times. It is not possible to compare directly his spectrographs with those made by the INSPIRE analyst, but his spectrographs show a relatively quiet interval which is consistent with the results shown here. Below is one of his spectrographs.



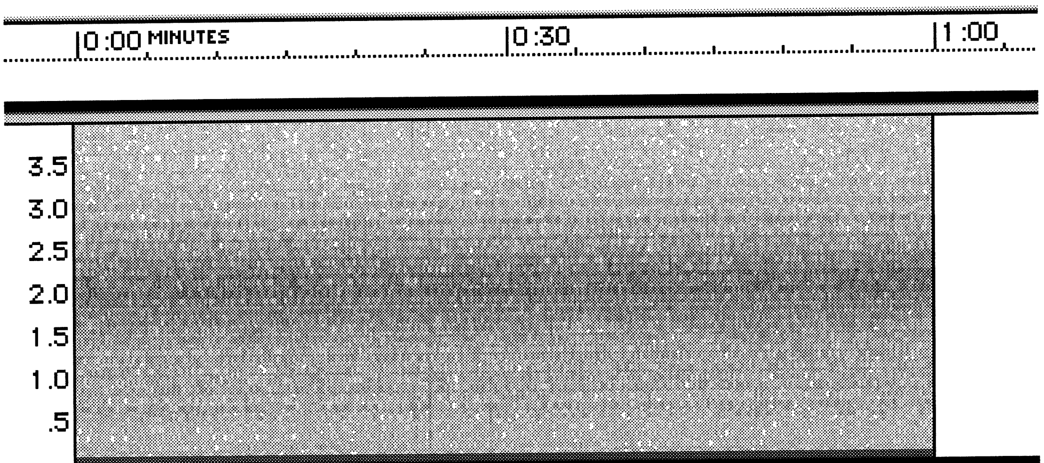
UT 1410 ----- MARK!

The start of this spectrograph is a voiceprint of Mike's time mark at 1410. What follows is the first few seconds after the mark. Notice light sferics, but no OMEGA on this view.

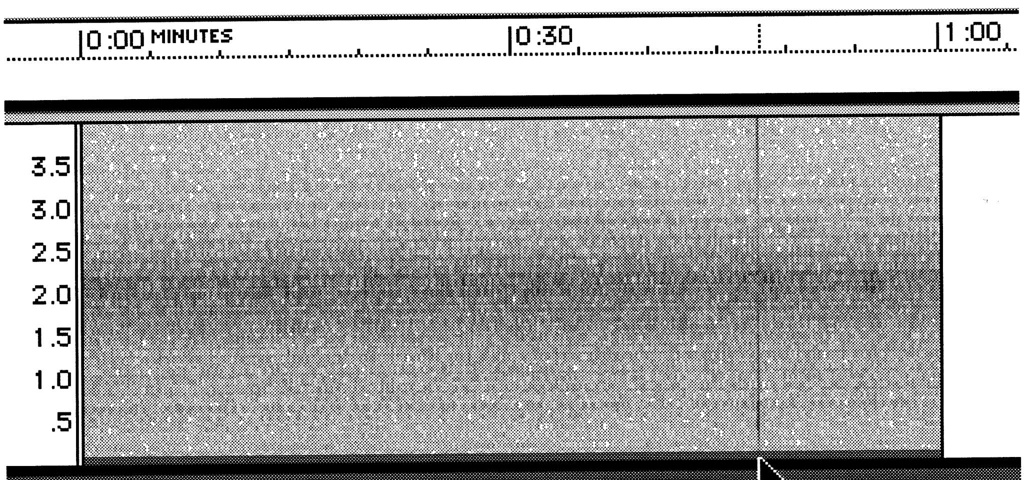
Pass 25-6



Lamb TX 25-6 Entire file: 0-15 kHz. Arrow points to 1546 UT WWV tone.

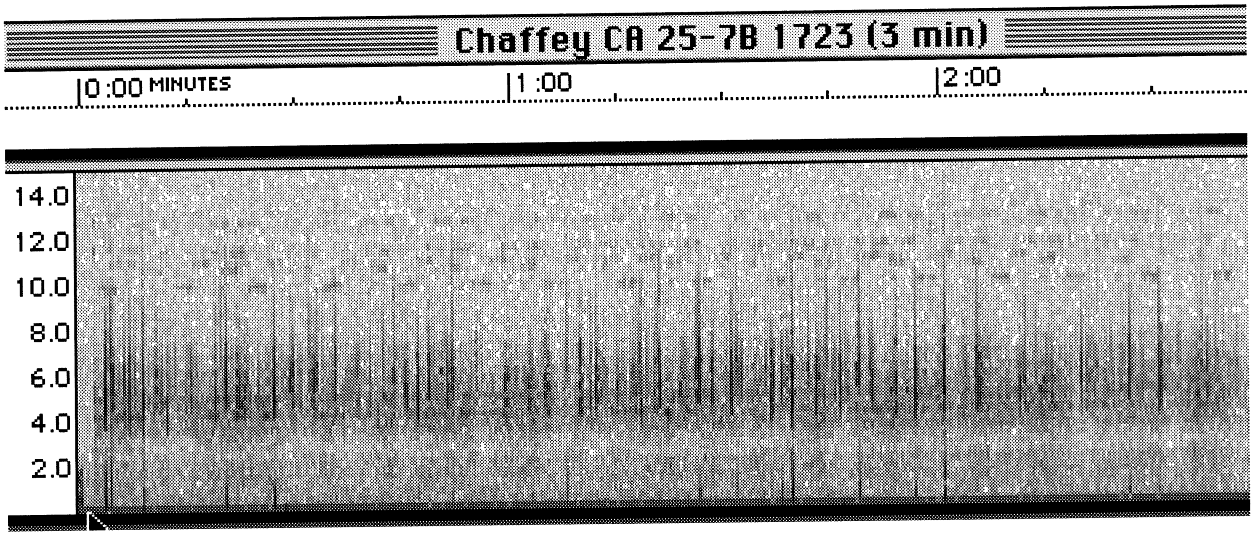


One minute - 15:46:30 - 15:47:30 0-4 kHz. No 1 kHz signal.

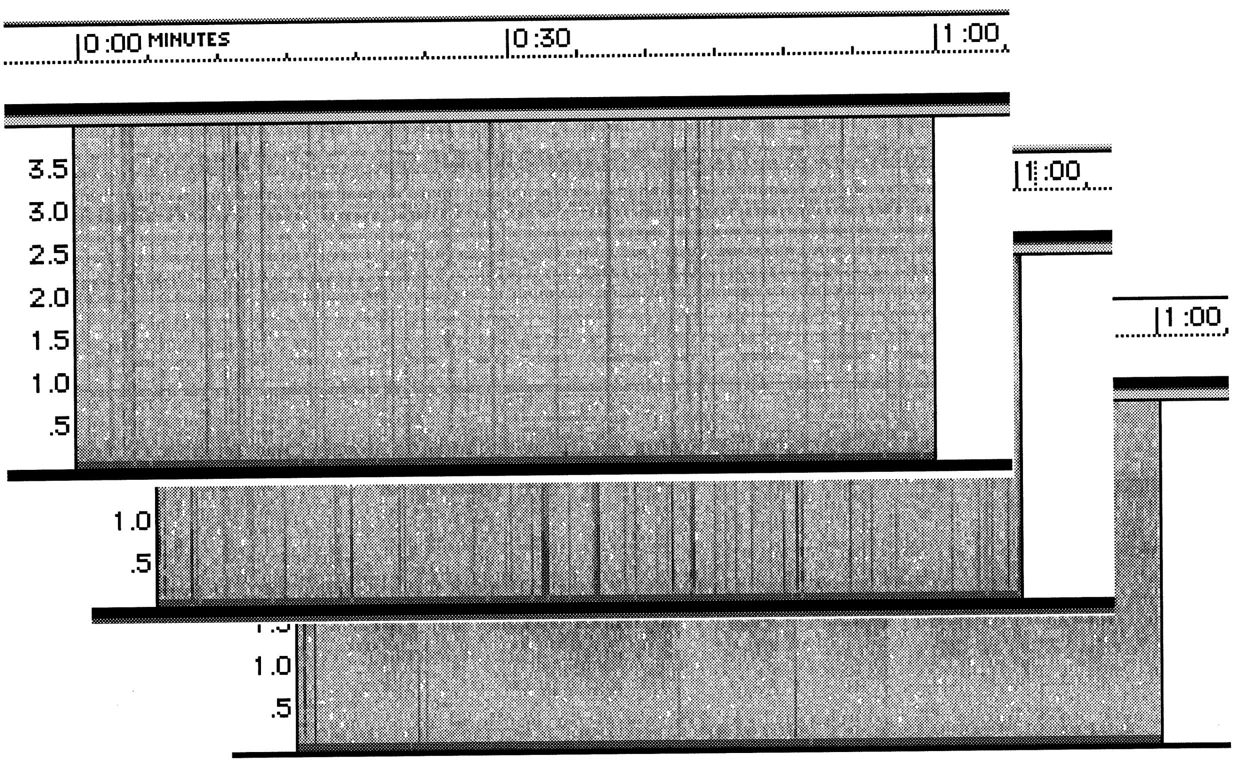


Next minute. 15:47:30 - 15:48:30 0-4 kHz Arrow points to sferic.

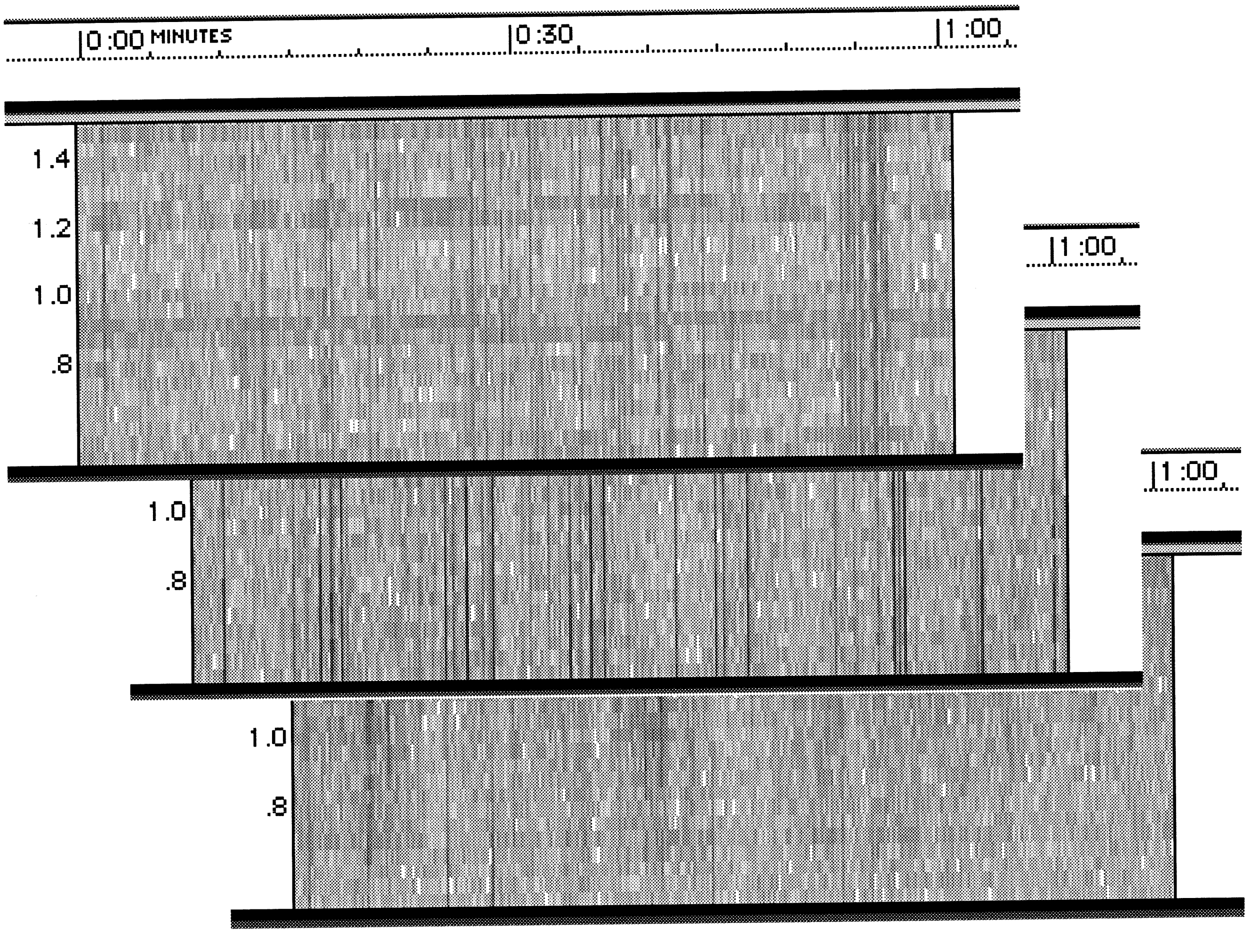
Pass 25-7



CHS CA 25-7B Entire file: 0-15 kHz. Note OMEGA.



From left-top to right-bottom: Receiver A, B, C. The first minute of the 25-5 files from the three receivers operated by Chaffey High School. 0-4 kHz. No 1 kHz signal is observed.



From left-top to right-bottom: Receiver A, B, C. The first minute of the 25-7 files from the three receivers operated by Chaffey High School. 500-1500 Hz. No 1 kHz signal is observed.

INTMINS-November/95 was our first regularly scheduled series of observations. Future plans include twice-annual observations the last two weekends of November and April. For the first series, INSPIRE was able to put in the field a total of 15 teams. These teams recorded a total of 37 data tapes of the 16 passes. This is certainly a good start. In addition to the numbers, the quality of data recording is improving as observers gain experience. Of course, we hope to detect the VLF signal from ISTOCHNIK, but if we are unable to do so it may be because it is not possible to detect the signal due to its low level compared to the natural background.

I want to thank all observers for their pioneering efforts. We have an excellent nucleus of scientists who are willing to contribute their time and energy to what we all feel is a worthwhile project.

However our effort turns out, we are participating in a scientific investigation looking for answers that are not known at this time. That is an exciting proposition and it is one worthy of our participation. There is a lot going around now about learning science by "doing". However that may translate in the classroom, there is not doubt (as we huddle beside our receivers as MIR passes over) that we <u>are</u> doing!

Special Observations Data Analysis Report

By Bill Pine
Chaffey High School
Ontario, CA

Introduction

From December 1994 through September 1995 a series of coordinated observations was conducted. Coordinated observations consist of observers following a preset schedule to record natural radio emissions. The purposes of these observations were:

1. To record interesting natural radio signals at widely diverse geographic locations and to compare the results.

2. To offer an opportunity for new observers to get involved.

3. To gain practice and experience operating field setups in accordance with specified procedures and following a specified schedule.

These objectives were all met, but to varying degrees. The first objective is the most interesting scientifically, but, due to its reliance on randomly occurring natural radio signals, probably the most difficult to achieve.

The Story of "Big W"

In the spring of 1992, in conjunction with the SEPAC mission flown on the Space Shuttle Atlantis (STS-45), a coordinated observation schedule was followed. In this case, observations were scheduled in the early morning hours to increase the chance of whistlers being recorded. Since natural radio is essentially random in nature (as is lightning), whether interesting signals are recorded or not depends largely on luck.

Several of the mornings were quiet with a few sferics, but not much else. One morning, however, was different. Many whistlers were heard. One particularly strong whistlers was found on tapes of more than a dozen observers spread across the entire continental US. This whistler was christened "Big W" by Mike Mideke, the data analyst. An incomplete search of the literature turns up no other report of the simultaneous recording of a whistler by more that two or three observers.

No signal as dramatic as "Big W" was detected during the special observations, but some interesting observations were made nonetheless.

The Schedule

The dates for the special observations were chosen to be weekend days close to the solstices and equinoxes. The original plan was to record two one-hour sessions on each day with all observers recording simultaneously following the same Universal Time (UT) schedule. Halfway through, this was modified to two half-hour sessions per day.

Date	First Session (UT)	Second Session (UT)
December 28, 1994	1800-1900	2200-2300
March 18, 1995	1800-1900	2200-2300
June 24, 1995	1800-1830	0000-0030 (6/25/1995)
September 23, 1995	1800-1830	0000-0039 (9/24/1995)

The Observers

Data was received from the following observers:

Dr. Jack Lamb	Commerce	TX
Don Shockey	Oklahoma City	OK
Jean-Claude Touzin	St. Vital	QC, CANADA
Stephen G. Davis	Fort Edward	NY
Bill Pine	Ontario	CA
Bill Minton	San Antonio	TX
Eric Mildebrath	St. Cloud	MN
Brian Page	Lawrenceville	GA
Philip Hartzell	Aurora	NE

The following table shows the data tapes received for each date.

	12/94	3/95	6/95	9/95
Lamb	X		X	
Schockey	X			
Touzin	X		X	X
Davis	X	X	X	X
Pine	X			X
Minton		X		
Mildebrath		X		
Page		X		X
Hartzell		X	X	

Data Analysis Procedure

After monitoring all of the tapes each quarter it was determined that no major events occurred during the observations. A procedure had to be devised for analysis of the data. Somewhat arbitrarily, two-minute intervals starting with a time mark were selected. This interval was then examined on all of the tapes. The following table shows the time intervals selected for each date.

Date	Interval (UT)	Interval (UT)
12/94	1810-1812 2210-2212	1840-1842 2240-2242
3/95	1810-1812 2210-2212	1840-1842 2240-2242
6/95	1810-1812	0010-0012
9/95	1810-1812	0010-0012

The procedure used was:

1. For each interval, a sound file was made of the two minutes. The filename format is:

NAME ST MONTH/YEAR START TIME-STOP TIME

Example: Lamb TX 12/94 1810-1812

To reduce file size, a sampling rate of 22 kHz was selected. The higher rate of 44 kHz requires 5 megabytes of disk space per minute of sound file! (My 2-gig hard drive fills up all the time!) The lower rate cuts the file size in half, but also limits the frequency stored to 11 kHz, which is half the sampling rate. This limitation means that all frequencies in the OMEGA sequences will not be included. Since the base frequency for all OMEGA stations is 10.2 kHz, which is included, OMEGA signals can still be used for time synchronization.

2. A spectrograph is made of the entire 2-minute file. From this view, the general propagation and natural conditions can be assessed and compared.

3. A spectrograph is made of the first minute of the interval. While the filename does not change, the time scale at the top of the image will change to indicate the shorter interval.

4. A spectrograph is made of the first 30 seconds. Again the time scale will change. This view allows for detailed comparison of the spectrographs.

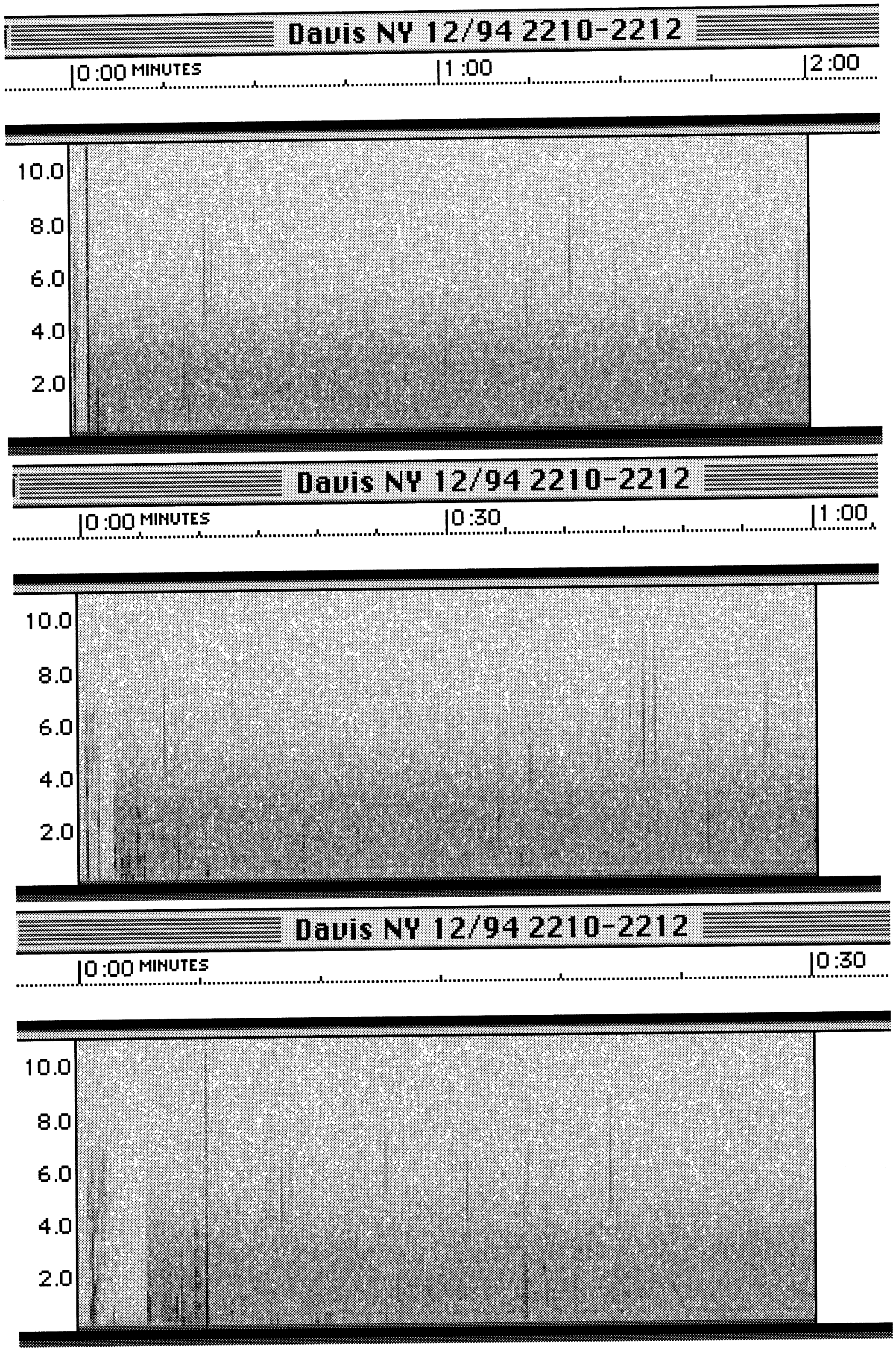
5. Further spectrographs are made of any interesting sferics, tweeks or bursts and an effort is made to find the same signals on other tapes.

The Data

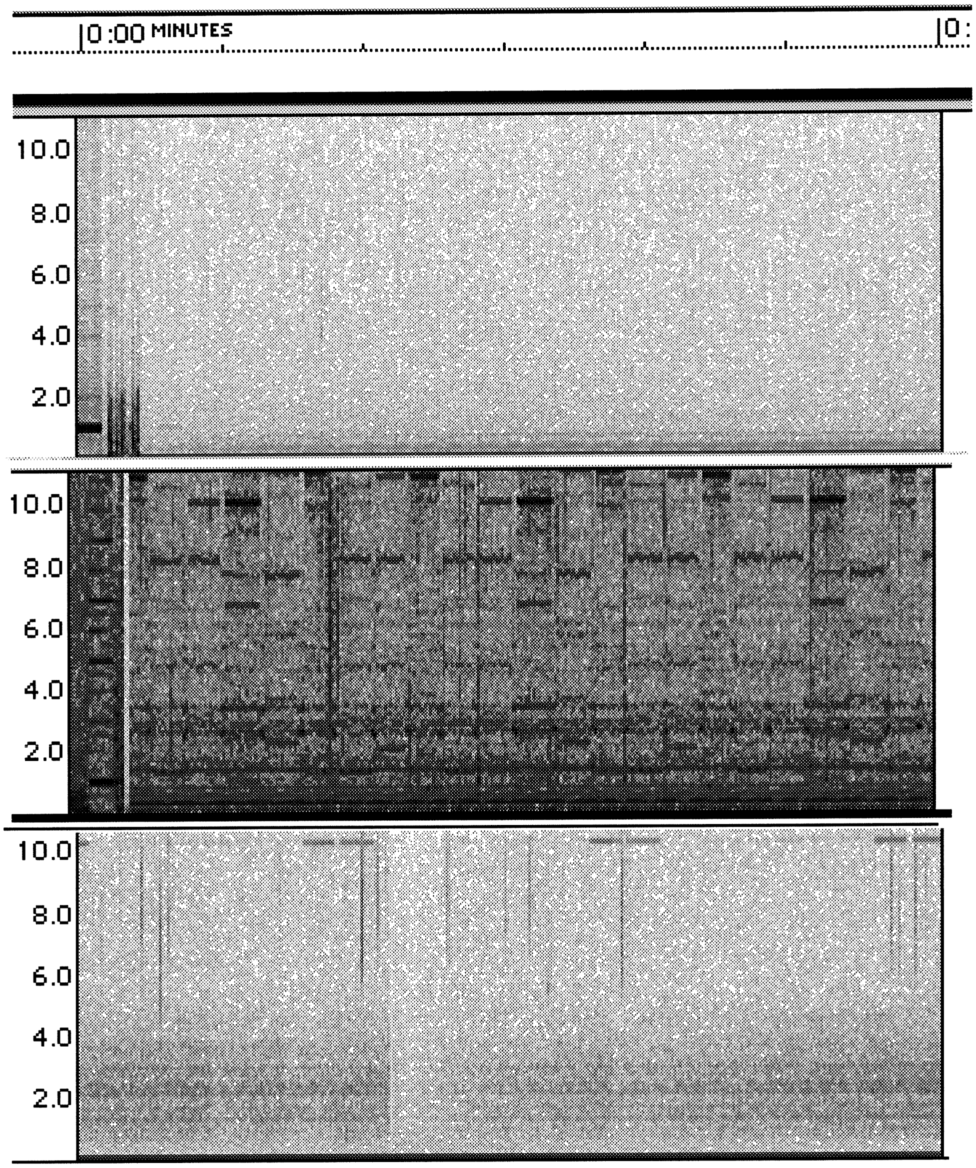
<u>December 28, 1994</u>

As luck would have it, this was one of the quietest day I have ever observed. Both sferic density (number of pops per unit time) and sferic intensity (strength of the individual pops) were unusually low.

All observers reported the same quiet levels. The following spectrographs are from Steve Davis' tapes.



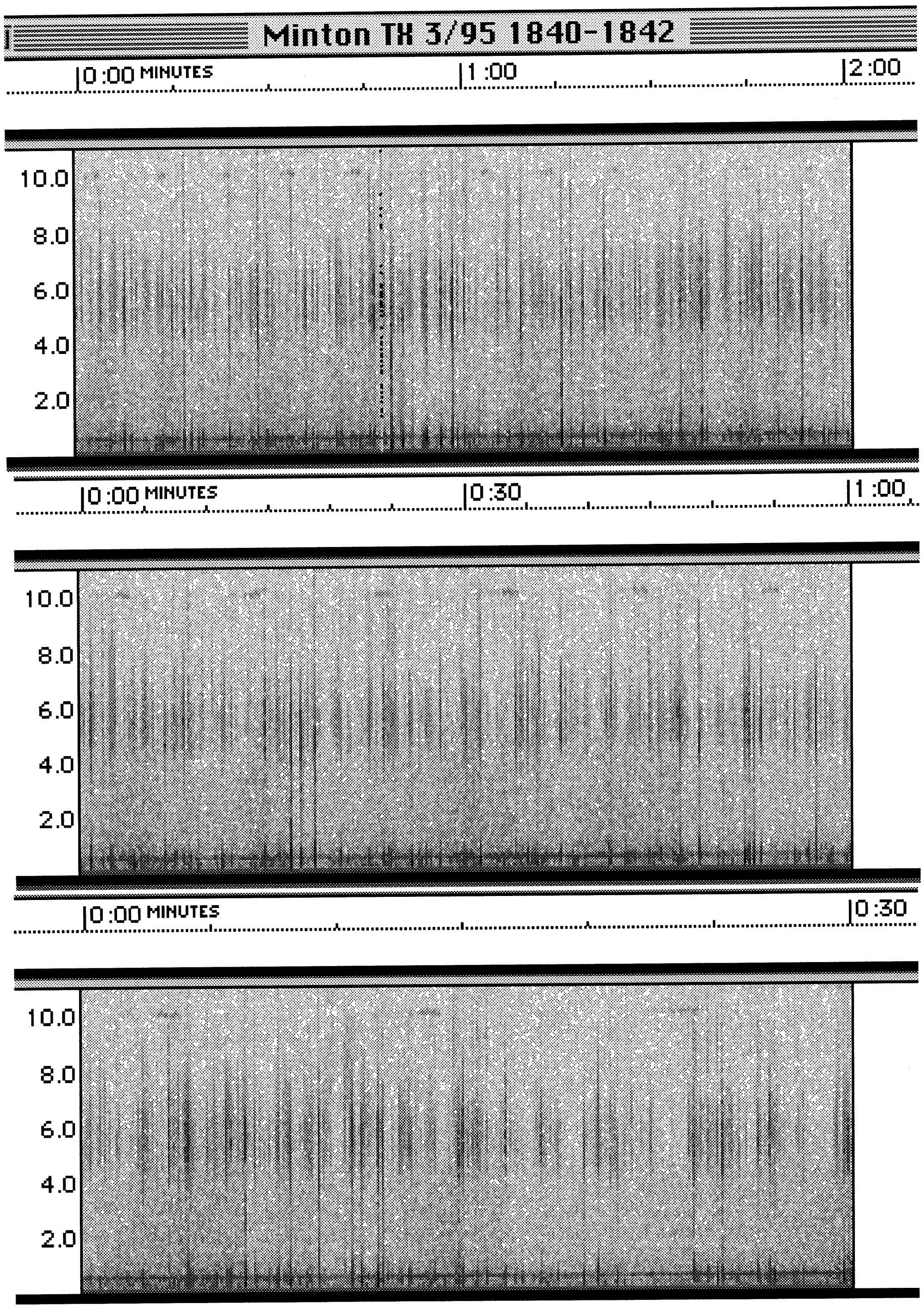
Stephen Davis NY 12/94 2210-2212 No OMEGA, few sferics. Voiceprint "mark" at start.



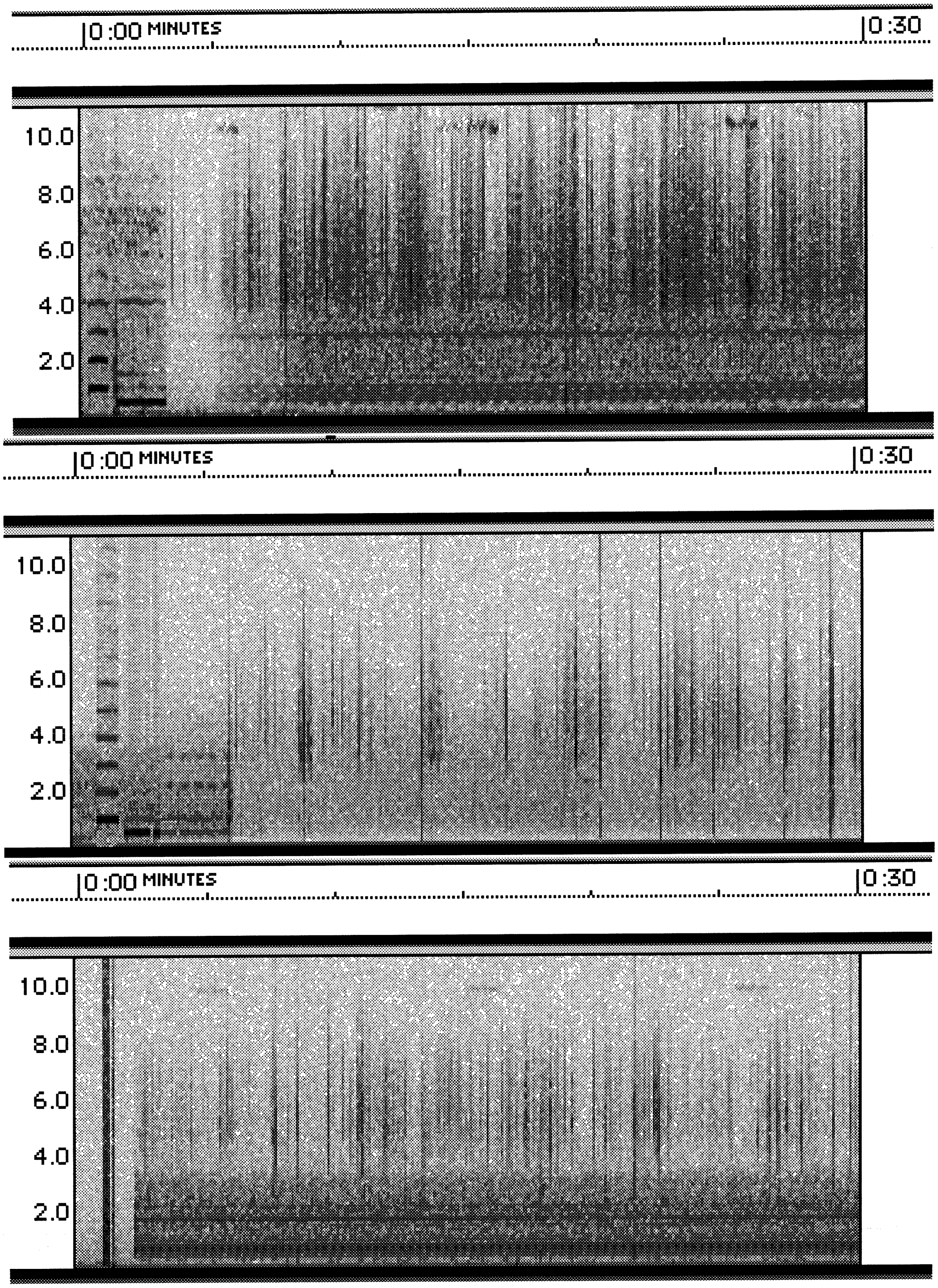
From the top: Lamb TX, Shockey OK, Pine CA
No OMEGA present on Lamb TX. The high noise level on Shockey OK is largely the result of his supersensitive WR3 receiver. Strong OMEGA also shows up as dashes at frequencies below 10 kHz as the result of "aliasing", which is an artifact of the sampling and digitization process. The dark dash at 10.2 kHz is North Dakota, the dash to the left of that is Hawaii. Those same two OMEGA stations show up in Pine CA but at almost equal darkness. (The OMEGA dashes are not well aligned in this figure.)

March 18, 1995

This session provided more action. The sferic level was up and some tweeks were recorded.



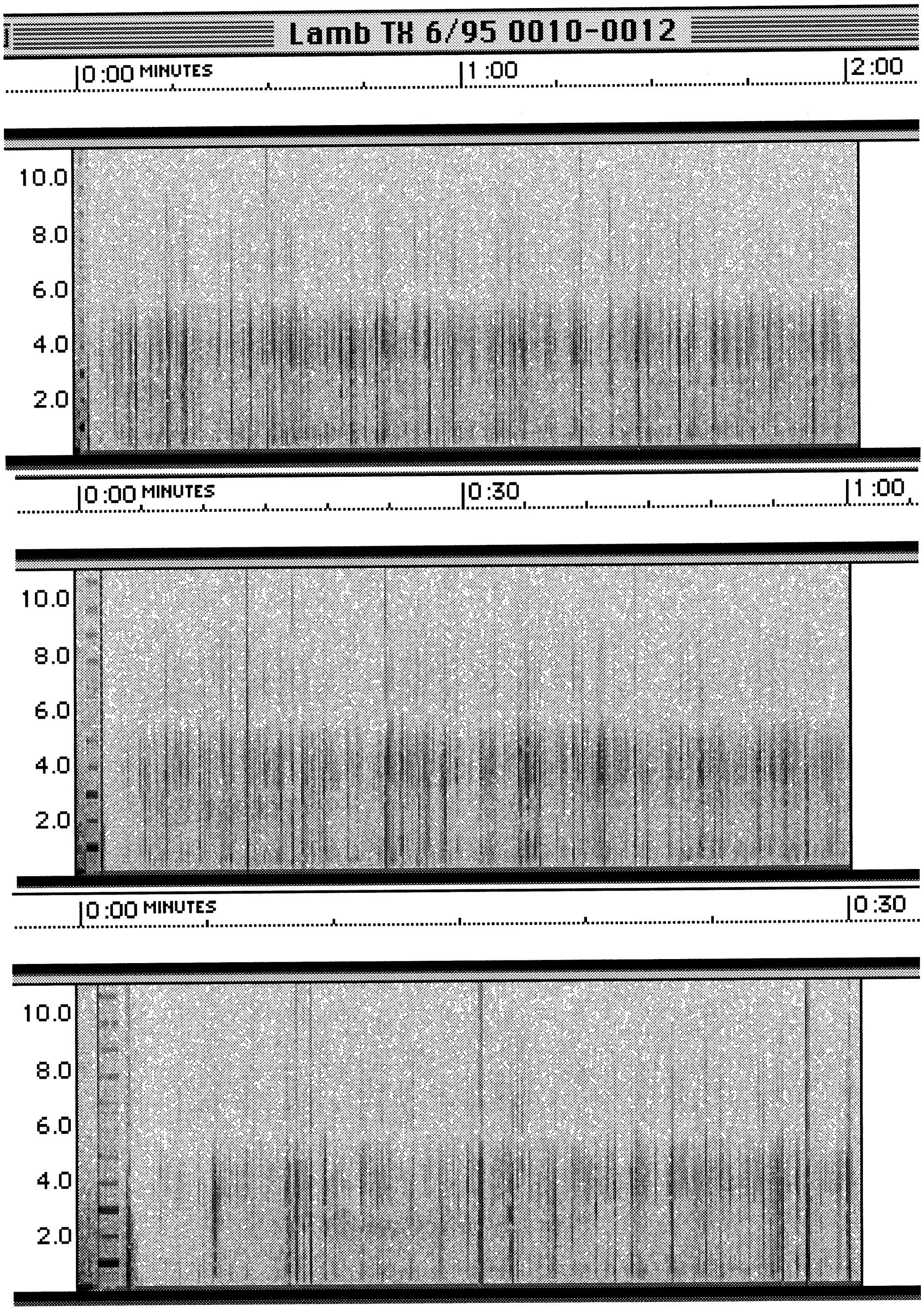
Minton TX 3/95 1840-1842 OMEGA: ND strong, HI weak. Sferics: medium density.



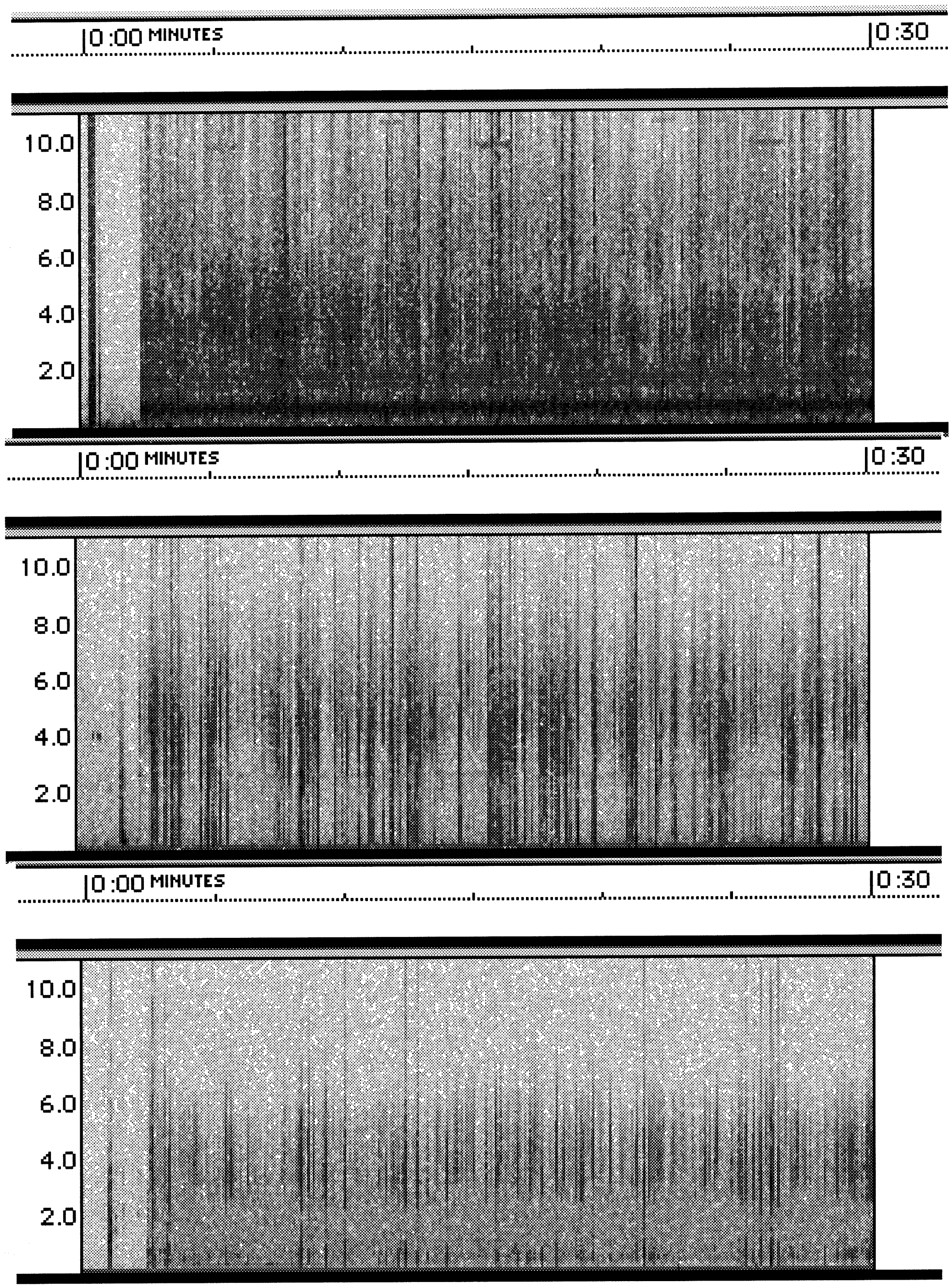
From the top: Mildebrath MN, Page GA, Hartzell NE
3/95 2240-2242 First 30 seconds.
WWV tones lined up on the top two and aligned with the word "mark" on the bottom one.
OMEGA appears on all three, though it is faint on Page GA.
Very similar sferic levels on all three spectrographs (and on Minton TX at 1840)

June 24, 1995

Fewer observers were able to cover this session. There was a high sferic density.



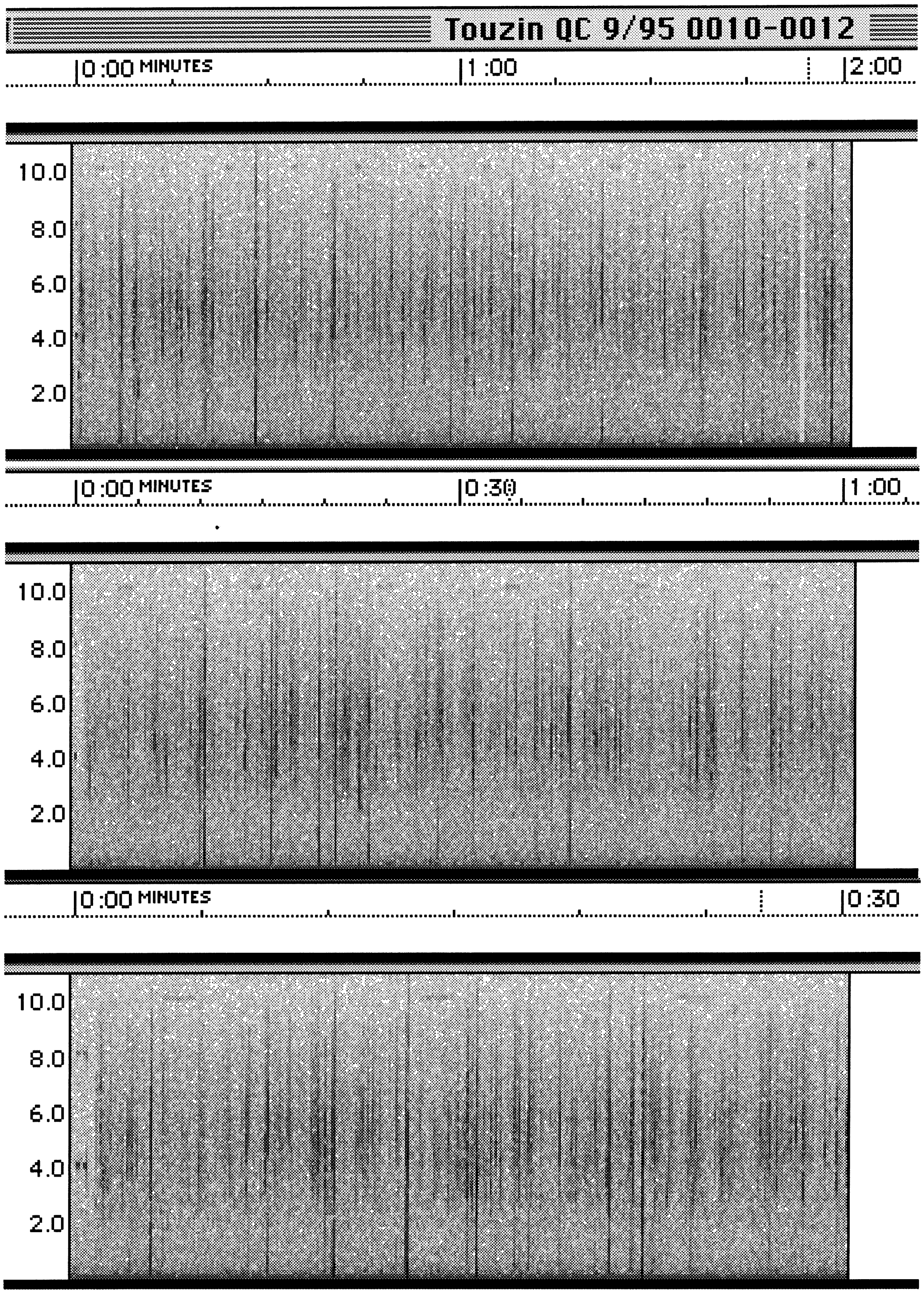
Lamb TX 6/95 0010-0012. No OMEGA. WWV tone at start. Medium to heavy sferics.



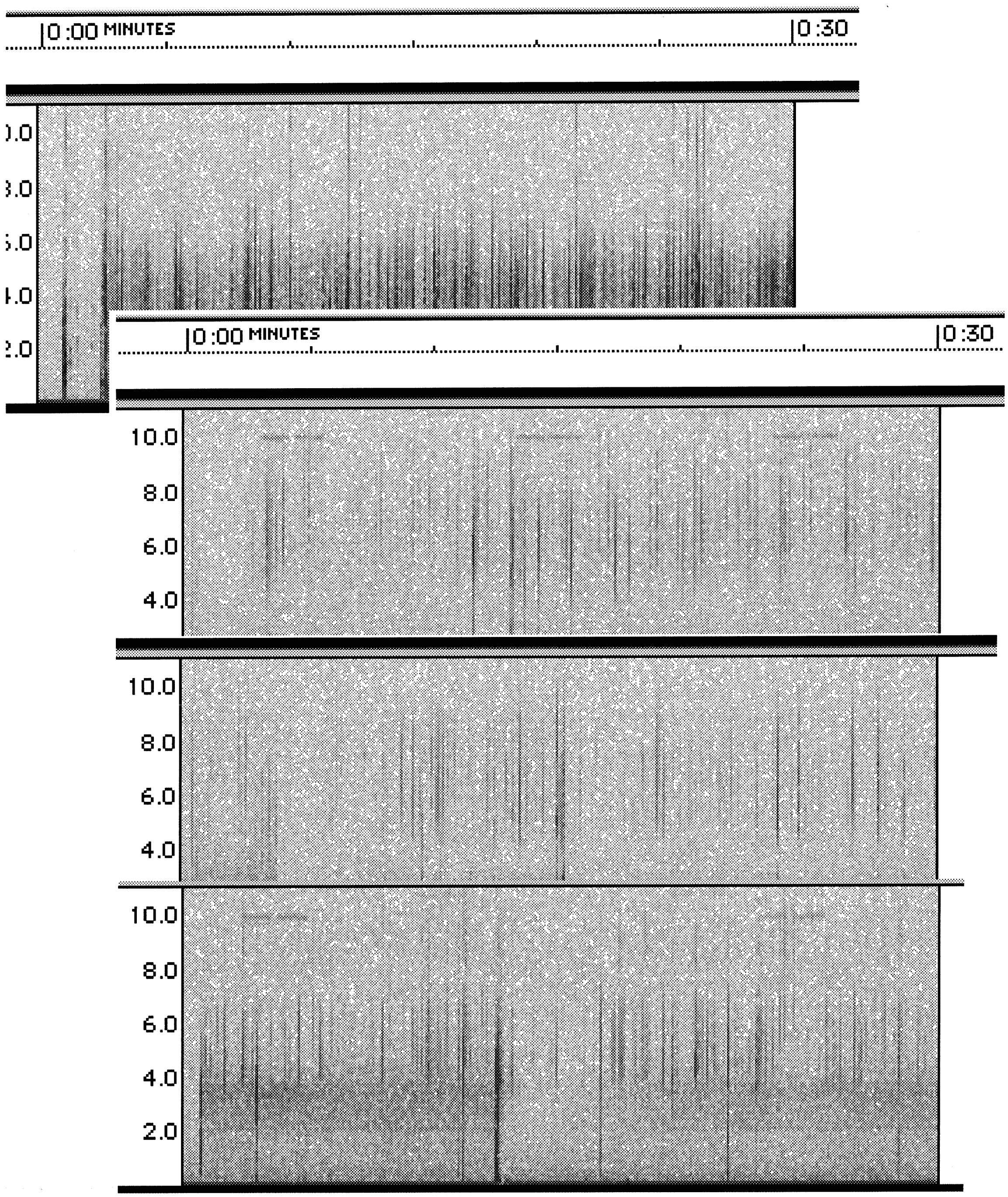
From the top: Hartzell NE, Touzin QC, Davis NY
Voice "marks" on the top and bottom; a time "beep" at about 4 kHz in the middle.
Hartzell NE has the ND OMEGA station; no OMEGA on the other two.
Similar sferic densities, but stronger sferics in NE (and a more sensitive receiver).

September 23, 1995

This session was noisy in the east, but quieter in the west.



Touzin QC 9/95 0010-0012 Time beeps at 4 kHz at the start. Heavy sferics. OMEGA present (ND).



From the top: Davis NY, Chaffey CA Receiver A, B, C

Heavier sferics in NY and QC. OMEGA appears on Chaffey receivers A and C. Receiver A is a B-field receiver and is very sensitive to OMEGA; receivers B and C are RS4 E-field receivers, B is less sensitive.

Another series of coordinated observations may be planned in the future.

Data Log Cover Sheet (reproduce as necessary)

INSPIRE Observer Team ____________________________ Receiver ________

Operation ________________

Date _____________ Tape Start Time (UT) ____________

****

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 ____________________________ WWV 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)

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	______
______	______	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	______