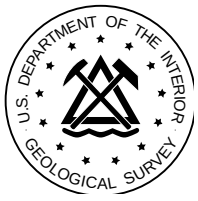
U. S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY



DENSE THREE-DIMENSIONAL ARRAY NEAR GARNI, ARMENIA AS PART OF THE JOINT EURASIAN SEISMIC STUDIES PROGRAM

(OBJECTIVES, ARRAY DESIGN, ARCHIVED DATA, AND PRELIMINARY WAVE-SLOWNESS ANALYSIS)

edited by

Gary Glassmoyer
and
Roger D. Borcherdt

OPEN-FILE REPORT 93-216

This report is preliminary and has not been reviewed for conformity with U. S. Geological Survey editorial standards. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U. S. Government.

Menlo Park, California
February 1993

DENSE THREE-DIMENSIONAL ARRAY NEAR GARNI, ARMENIA AS PART OF THE JOINT EURASIAN SEISMIC STUDIES PROGRAM

(Objectives, Array Design, Archived Data, and Preliminary Wave-Slowness Analysis)

CONTENTS

PAGE	CHAPTER	TITLE
1	I	Summary and Objectives for a Dense Three-Dimensional Array near Garni, Armenia
4	II	Site Selection, Array Design, and Recording Instrumentation for the Dense Three-Dimensional Array near Garni, Armenia
17	III	Digital GEOS Data from Garni, Armenia as Archived on Optical Disk
47		Plots of GEOS records for events at five or more sensor locations from 26 June 1990 through 10 August 1992
334	IV	A PC-Based Seismic System for Armenia
338		Plots of PC-XDETECT records from 21 September 1990 through 01 January 1991
416	V	Near-Surface Measurements of P- and S-Wave Velocities from the Dense Three-Dimensional Array near Garni, Armenia
433		Wave-slowness contour plots for selected events
450	REFERENCES	

CHAPTER I

Summary and Objectives
for
a Dense Three-Dimensional Array near
Garni, Armenia

J. Filson, R. D. Borcherdt, W. H. K. Lee, E. Cranswick,
C. Dietel, E. Sembera, J. Mori, and J. Sena
(U. S. Geological Survey)

L. Hakhverdian, R. Amirbekian, V. Aharonian, K. Safarian, H. Galagian, and G. Apoian
(Yerevan Seismic Station)

R. Banfill
(Small Systems Support, Big Water, Utah)

INTRODUCTION

Within two weeks following a major earthquake in December 1988 a team of seismologists and engineers from the United States went to Armenia to investigate the cause and effects of that tragic event. A modest but sustained cooperative effort between seismologists in Armenia and in the U. S. Geological Survey (USGS) has grown from that initial post-earthquake investigation. In 1989 the USGS began to participate in what is now called the Joint Seismic Program (JSP) between the United States and what was then the Union of Soviet Socialist Republics (USSR). This program is led on the U. S. side by the Incorporated Research Institutions for Seismology (IRIS) and on the Soviet side by the Institute of Physics of the Earth. In 1989 the Soviet side suggested that among other things the JSP project should include detailed studies of the seismicity of certain earthquake-prone areas of the Soviet Union. Kirgizia and Armenia were offered as places where arrays of seismometers could be installed for this purpose. As a participant in theJSP and as the organizer of the post-earthquake investigation in Armenia, the USGS was chosen to take up the array work in Armenia.

OBJECTIVES

During the 1988 post-earthquake investigation Armenian colleagues suggested that a portable seismic station be installed at a geophysical observatory near Garni, about 20 km east of the capital, Yerevan (Figure 2-3). A trip to this site revealed a two-story building with a horizontal tunnel, or adit, running from the basement about 200 meters into the hill behind the building. This tunnel had been constructed for the purpose of obtaining geophysical observations relevant to earthquake prediction. The tunnel was lined with concrete and had several small rooms with piers suitable for seismic recording (Figure 2-5). The tunnel is described in more detail in the next chapter.

Given this excellent facility and the charge from the Joint Seismic Program, a USGS team went to Armenia in June 1990 with the purpose of installing a dense seismometer array in and around this tunnel. Other than taking advantage of an exceptional site, the scientific justification for the array can be seen in Figure 2-4. The Garni site lies on the northern edge of a long, steep valley that runs northeast-southwest opening to the southwest onto the larger and broader valley of the Araks River about 10 km south of Yerevan. There is concern that the topography of the narrow valley near Garni is controlled by an active fault. A Roman temple at Garni was destroyed by a “great” earthquake in 1679. If the valley follows the course of an active fault, then this fault represents a considerable hazard to Yerevan, a city of 1.2 million people, with construction of the type that was destroyed in Spitak and Leninakan in 1988 killing over 25,000 people. The purpose of the array is to detect and locate if possible any local seismicity associated with a larger pattern of strain release along this fault. Of course a wider microearthquake network would have been more suitable for this task, but was not considered possible given the time allowed and the funds provided.

The recording scheme is built around the General Earthquake Observtion Systems (GEOS) developed and described by Borcherdt *et. al.* (1985). A PC-based system developed by W. H. K. Lee is also used for recording-backup and display of the data. The seismometers used are 1 Hz Mark Products L-4Cs deployed in three-component sets. The fact that the tunnel is set into a hill provided the opportunity to establish sites on the hill above the tunnel and thus provide a three dimensional array geometry. The GEOS and PC recorders were set up in the observatory building with cable

connections to the seismometer sites. The total aperture of the array is less than 1 km. More detailed descriptions of the array geometry and recording system specifications are given in the next chapter.

(The array deployment was completed within a two-week period during June 1990. Anyone who has ever participated in a similar exercise in a foreign country will appreciate the difficulties endured and the problems that had to be met and overcome. A full description of the effort will probably be wasted on anyone who has not. However, it must be said that the task could not have been completed without the help of Armenian colleagues and their families. We slept in an abandoned dormitory with no running water or other facilities. Our food was bought, cooked, and served by the wives and friends of the Armenians working with us on the project. Our Armenian colleagues carried gear, dug pits, pulled cable, mixed concrete, and generally shared in all of the labor intensive activities.)

SUMMARY

Since the installation of the dense array nearly one thousand events have been recorded at one or more of the array sites. The array has operated since July 1990 with some gaps in recording caused by strains on the infrastructure of Armenia due to the breakup of the Soviet Union and military actions resulting from disputes with Azerbaijan over contested territory. This report documents the recordings of the array and shows examples of the types of events that are available for study. Data from the array has been placed on optical disks and is available on these disks from the USGS and also through the IRIS Data Management Center in Seattle, Washington. Data from the array has proven amenable to three-dimensional analysis as described in Chapter V. The analysis of the local seismicity is not yet complete. It is clear that there is considerable local activity, occurring at times of day random enough that it cannot be due to blasting. Accurate location of these events with an array this small remains a problem of study.

CHAPTER II

Site Selection, Array Design, and Recording Instrumentation for the Dense Three-Dimensional Array near Garni, Armenia

R. D. Borcherdt, J. Filson, W. H. K. Lee, E. Cranswick,
C. Dietel, G. Glassmoyer, E. Sembera, and J. Mori
(U. S. Geological Survey)

L. Hakhverdian, R. Amirbekian, V. Aharonian, K. Safarian, H. Galagian, and G. Apoian
(Yerevan Seismic Station)

R. Banfill
(Small Systems Support, Big Water, Utah)

SUMMARY

Scientific objectives and logistic constraints were primary considerations in site selection and design of the dense three-dimensional array near Garni, Armenia. Principle scientific objectives concerned the need for high-frequency discrimination studies and the need to monitor seismicity for improved seismic hazard analyses for the capitol city of Yerevan with a population of 1.2 million. Principle logistic constraints concerned availability of supplies, fuel, transportation resources and site security. Instrumentation selection was based on availability of resources, familiarity, and reliability.

SITE SELECTION

The site selected for array installation was developed for geophysical monitoring purposes in the 1970s as a cooperative effort involving the USSR and Armenian Academies of Science. The facility is known as the Garni Observatory. Logistic difficulties concerned with availability of transportation vehicles and fuel were considered sufficient to preclude establishment of isolated multiple monitoring stations that might require regular visits for power maintenance.

Garni is located approximately 20 kilometers east of the capitol city of Yerevan in a moderately remote region. The location relative to other landmarks is shown at different map scales in Figures 2-1, 2-2, 2-3 and 2-4. The observatory site is located at the base of a large hill which in turn forms the boundary for a small valley used for minor agricultural farming. The area near the observatory is used primarily for the grazing of a small dairy herd.

The site consists of an elaborate two-dimensional horizontal tunnel complex (Figure 2-5) leading from the basement of the two-story observatory building (Figure 2-7), and about four hectares of property. The site is under the jurisdiction of local cooperating scientific officials and is relatively secure from vandalism. The extensive two-dimensional tunnel configuration at the observatory provided a unique opportunity to establish an array to serve as both a three-dimensional array for high-frequency discrimination studies and as an array to assist in monitoring seismicity for improved seismic hazard analyses for Yerevan.

Seismic studies conducted at this site as part of the joint U. S. - U. S. S. R. cooperative studies following the devastating earthquakes of December 7, 1988 (Borcherdt *et al.*, 1989), showed that the site is relatively well isolated from local cultural noise sources.

ARRAY DESIGN

The array design was developed to incorporate the two-dimensional configuration of the tunnel as shown in Figure 2-5. Using the length of the shortest arm of the tunnel as the minimum dimension of the array (~60 m), the array was designed within geometric constraints of the tunnel and available cable to resemble a nested tripartite configuration. The array is centered on a tetrahedron, consisting of sites G1A, G1B, G2B and G4A, with minimum distances between sensors being roughly 60 meters. Three-component sensors are located in a nested configuration with spacings of about 60, 120, 200, and 480 meters. The final vertical and horizontal apertures of the array are 87 and 823 meters,

respectively. The final configuration of the array as defined by the locations of the three-component sensors is shown in Figure 2-6.

To increase the aperture of the array the initial design included an additional three sites located at distances of about 1.5 km from the center of the array. The lack of appropriate housing in the area and scarcity of available resources led to the establishment of sites G6A and G7A. The first subsequent revisit of the site a few months later showed that continued maintenance of sites G6A and G7A was also an extreme imposition on local resources. As a result these stations were withdrawn from the array.

INSTRUMENTATION

Sensors -- Three single-component velocity transducers (1 Hz, Mark Products L-4C) oriented vertical, north-south, and east-west (refer to Table 2-1 for actual sensor orientations and positions) were emplaced at each of the array nodes indicated in Figure 2-6. Each of the sensors was emplaced on a concrete pad (~ 0.5 x 0.8 x 0.1 m) prepared at each site with leveling platforms and housings (Figures 2-9 and 2-10) according to specifications used for emplacement of sensors in the Central California Network. Sensor signals were transmitted over cables to a central recording area located in a secure room (Figure 2-8) on the second floor of the observatory building (Figure 2-7). It was necessary to use locally available unshielded cable for location G4B, because one large reel of shielded U. S. supplied cable was lost in shipping.

Recording Instrumentation -- Array recording capabilities were designed to permit on-site data playback and analysis capability by local scientists and technicians. They were designed to provide redundancy in recording, playback, and event-timing capabilities. IBM compatible personal computers (PCs) were selected because of their wide availability and the local inaccessibility to other types of computer hardware. Subsequent array operation confirmed this conclusion and showed that even the replacement of common components such as hard disks was beyond the capacity of local resources.

The array was designed so that seismic-event signals are recorded simultaneously at 200 samples per second (sps) both in 16-bit digital format using GEOS and in 12-bit digital format using a PC. Two sets of three-component signals are recorded on each six-channel GEOS recorder. In addition, each set of six analog sensor signals upon being amplified and filtered for anti-aliasing by GEOS is multiplexed and recorded on the PC. Detailed performance specifications of the GEOS and the personal computer system are provided by Borcherdt *et al*. (1985), and Lee *et al*. (1988), respectively.

Timing -- Timing for the array was also designed to include redundancy. A master Omega receiver was used to establish absolute time for a master clock. In order to optimize relative timing each GEOS in the Garni Observatory was linked so as to synchronize and determine clock skew measurements with respect to the time pulse of the same master clock. The GEOS permits the clock skew measurements to be written to tape at operator selected time intervals. As an additional constraint to improve relative accuracy, the array was designed such that all signals for each event were digitized by a single analog-to-digital converter and recorded on the PC. In addition, special Omega receiver boards were designed that would have permited each GEOS to independently synchronize to Omega. Nominal GEOS clock drift rates are less than 80 milliseconds per day.

Power -- To accommodate frequent power outages and variations in voltage levels, power was supplied through an uninterrupted power supply to the PC and through batteries for the GEOS. Ungrounded power lines in the Observatory required that special provisions be implemented to minimize electronic noise pick-up on signal cables. Electronic noise was a special problem for location G4B connected via unshielded cable and was most apparent at night, when electrical lights were being used. Power outages proved to be sufficiently severe so as to eventually damage PC hard disks and reduce on-site playback capabilities.

Data Playback -- To facilitate on-site data playback, GEOS hardware and software capabilities were augmented to permit data playback via PC. Capabilities were developed for the simultaneous archival of both GEOS and PC data using two PCs networked via LANtastic. One PC is used as a data acquisition system and the other as a data playback, archival, and analysis system. Software was developed for automatic data archival using a simple multi-tasking environment. PC-compatible optical disks were selected as the medium for data archival.

Previously developed GEOS playback software (RDGEOS) used on Digital Electronic Corporation mini-computers was converted for operation on PCs (PCGEOS). GEOS software was developed to permit each GEOS unit to serve as a field playback unit via RS-232 into the portable field PCs.

Table 2-1. Sensor Locations and Orientations

Station	Relative Position (meters from tunnel door)			Component Orientation (degrees clockwise from north)	
	North	East	Down	5 ("N")	6 ("E")
G1A	185.3	8.1	-0.7	2	92
G1B	180.0	53.0	-0.7	2	92
G2A	56.6	3.9	-0.1	2	92
G2B	125.1	-2.1	-0.7	2	92
G3A	4.8	0.9	0.0	2	92
G3B	100.4	1.4	-39.4	5	95
G4A	185.3	8.1	-60.5	5	95
G4B	384.5	16.7	-87.8	5	95
G5A	-37.0	-189.8	13.5	5	95
G5B	-63.7	167.0	-0.8	5	95
G6A	-332.7	-386.6	31.0	5	95
G7A	-159.5	344.7	12.1	5	95

Positions were determined assuming the tunnel is aligned 2.5 degrees east of north. Tunnel sensors were aligned with the tunnel axis. Surface sensors were aligned with magnetic north. Component 4 ("Vertical") is oriented with positive up. Location and orientation information was not recorded for preliminary stations GAA, GAB, GBA, GCA, GCB, GDA or GDB.

Figure 2-1. World view centered on Garni, Armenia.

Figure 2-2. Armenia and surrounding countries with bodies of water, political boundaries, major highways, selected cities, and the locations of the Spitak and Georgia Earthquakes on a half-degree latitude - longitude grid.

Figure 2-3. Northern Armenia with bodies of water, political boundaries, major highways, selected cities, Mount Ararat, and the epicenter of the 1988 Spitak Earthquake.

Scale 1:250,000; elevations in feet; from Defense Mapping Agency - Tactical Pilotage Chart F-4C, edition 4.

Figure 2-4. Map of the Garni - Yerevan region of Armenia. Circle marks Garni Observatory.

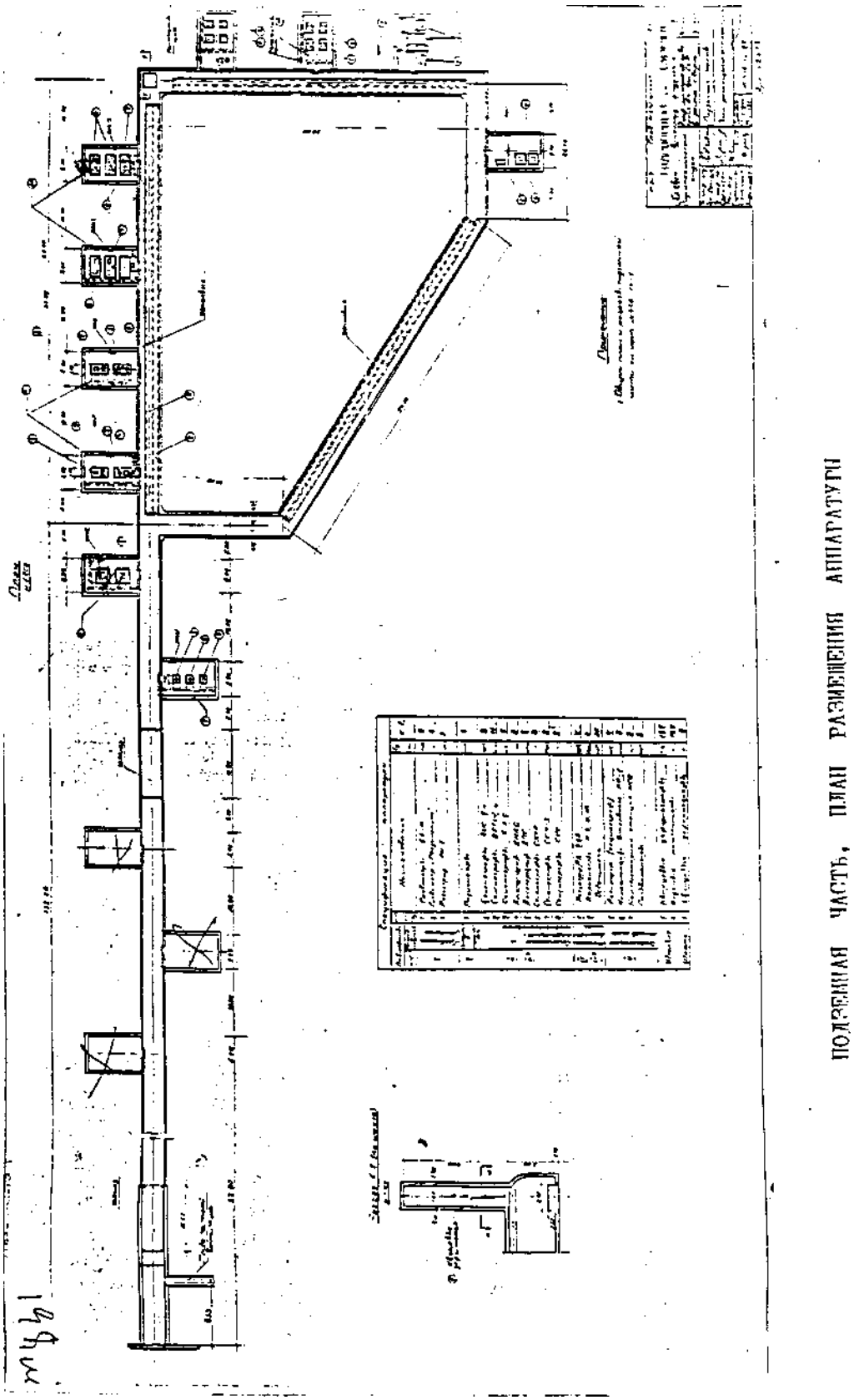


Figure 2-5. Plan view of the Garni Observatory Tunnel.

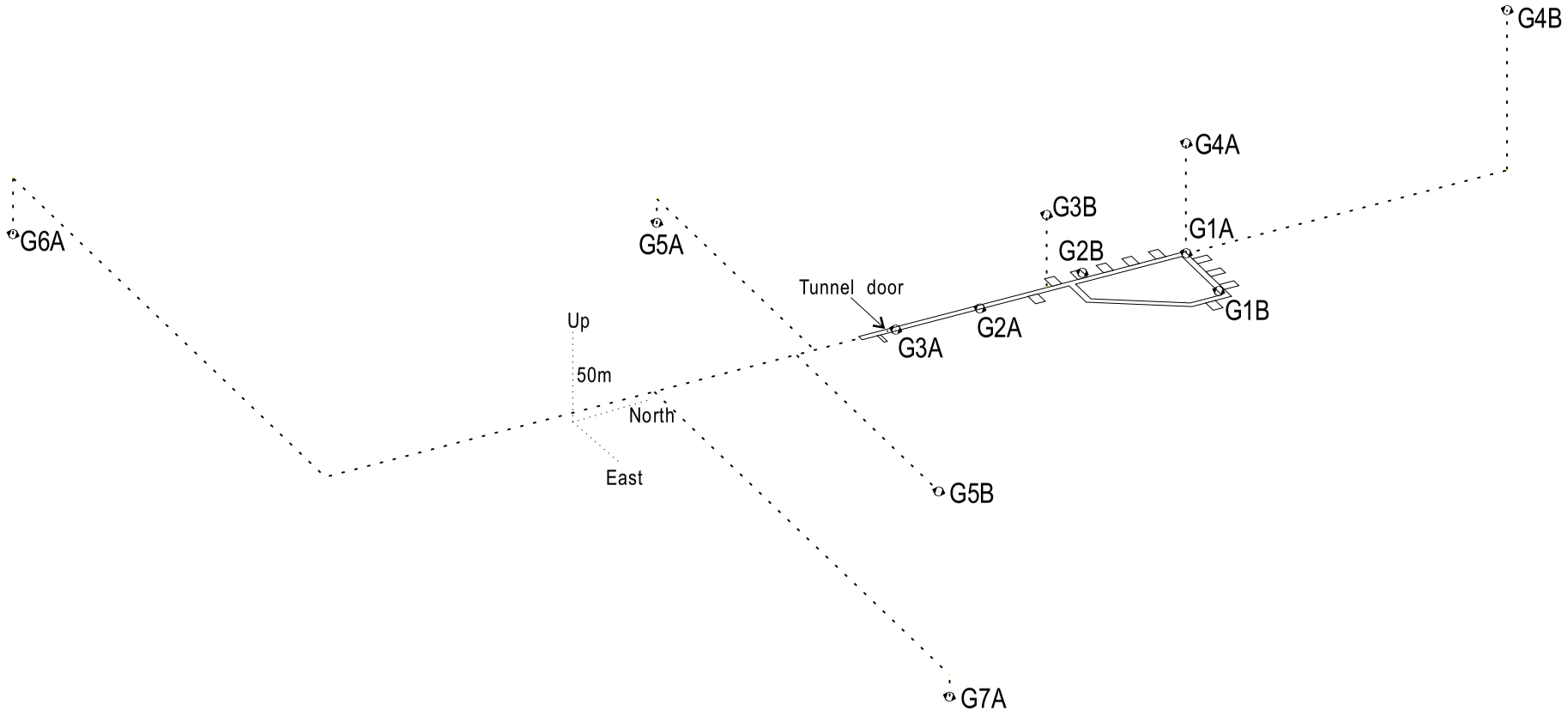


Figure 2-6. Oblique view of sensor locations with respect to the Garni Observatory Tunnel. Dashed lines indicate vertical, parallel to, and perpendicular to the tunnel axis. The tunnel door, which is the origin of the coordinate system used in Table 2-1, is at the small dot indicated by the arrow.

Figure 2-7. Two-story building at Garni Observatory.

Figure 2-8. Playback room at Garni Observatory.

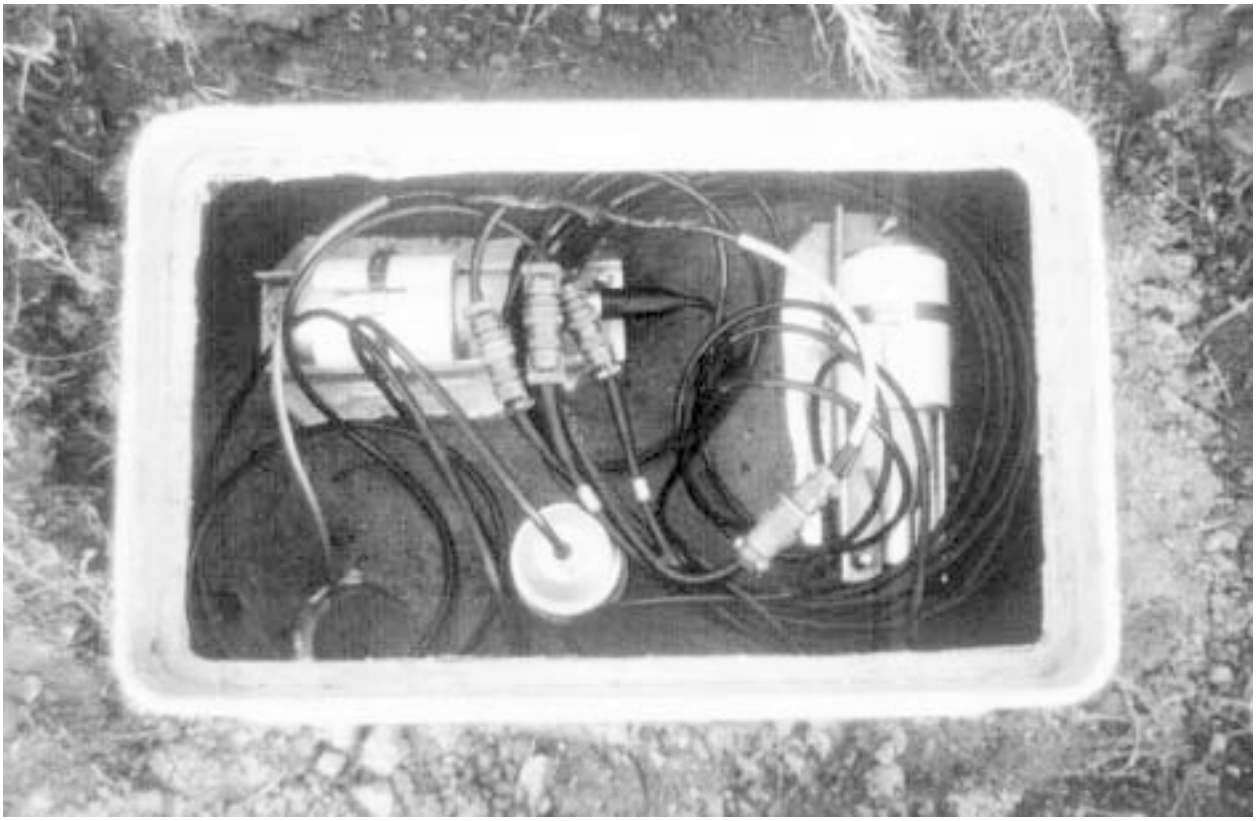


Figure 2-9. Three components of sensor deployment.

Figure 2-10. Sensor housing at a surface site.

CHAPTER III

Digital GEOS Data from Garni, Armenia as Archived on Optical Disk

G. Glassmoyer
(U. S. Geological Survey)

PROCESSING

As of this writing 245 GEOS tape cartridges from the Garni Array, representing the time period 26 June 1990 through 10 August 1992, have been played back at the National Strong Motion Data Center.

The playback procedure involves demultiplexing of the data on tape cartridge using the computer programs RDGEOS on a DEC VAX computer or PCGEOS on an IBM-compatible PC. These programs write separate time-series files to disk for each channel recorded on GEOS, plus a time-stamp file that contains the start times of each (0.42 second) block of data recorded on the GEOS.

Format

The format used for the digital data is a block-binary file consisting of two header blocks (512 bytes each), one 2-byte integer, the other 4-byte real, followed by the data as 2-byte integers. Integer and real values are stored in the format used by DEC PDP and VAX computers. 2-byte integer values are stored as low-byte-first, high-byte-second signed integers in two's-complement form. 4-byte real values are stored as high-word-first, low-word-second. The integers are in the same format as used by PCs, however the real values are not the same format as PC real values. Programs RECSEC or VECTOR, written by E. Cranswick and R. Banfill, can be used to read the data on a PC.

Filenames on the VAX are constructed from the station name and the start-of-record time. Characters 1-3 are the day-of-year (001-366), characters 4-5 the hour (00-23), characters 6-7 the minute (00-59), and character 8 represents the second (A-T, where A=0-2, B=3-5, ..., T=57-59). Character 9 is the component (4 is vertical, 5 and 6 are horizontal). The suffix is the station name. On the PC and the optical disk one less character is available for the filename so the hour is represented by a letter from A to X.

Fixes

Normally the GEOS can be relied upon to write to tape cartridge the complete recording sufficiently well to be read and accurately interpreted by the demultiplexing programs. It has been a recognized phenomenon that the GEOS instruments may occasionally fail in part or whole to write an accurate tape. These types of failures occurred in several forms in this study. In the case of data that can still be read by the programs, these failures can be grouped into two types: bit errors and block errors.

An exact correction can usually be made for bit errors. These are what are often referred to as “glitches.” The symptom is an occasional data value that is a large power of two different from the preceding and subsequent data values. The cause typically is memory board failures, but can also be in the analog-to-digital circuit. The computer program BITFIX is used to find and correct bit errors whenever the bit errors are sufficiently large compared to the true rate of change between data values.

Block errors usually cannot be fully corrected. These are instances where the data block to be written to GEOS tape cartridge either is not written, or that which is written is corrupt. During playback the demultiplexing program (RDGEOS or PCGEOS) attempts to identify missing data blocks by examining the data-block time stamps. When these are identified, the null data value (integer header offset 3 of Table 3-1a) is written to the data file in place of the missing data. The G5 recordings have several instances of these data gaps.

If the first data block of an event is corrupt, then the files created for that event will initially be given a name that does not indicate the true time of that event. Such files may also contain initial meaningless data. Such files are easily recognized by the program CHKTIME which compares the start-of-block time stamps, as written to the time-stamp files, to their expected time values. Start-of-record times have been corrected for these files using the program CHGTIME.

In addition to allowing files to be given the correct start times, the program CHKTIME, reading the time-stamp files, also verifies the integrity of timing within the recordings. By this means several recordings have been found to have faulty internal timing. The cause of these failings is not always certain, but often is the result of reading a corrupt data block in the midst of an event. Recordings that contain internal timing errors have been corrected to the degree possible by using null values to mark those samples where no data are available, or by removing extra null values that the demultiplexing programs may have mistakenly added. These corrections are made using the editing capability of the programs RAWRI2 and RAWWI2.

Recording parameters are stored in the two header blocks described in Table 3-1. The most critical values are shown in boldface. Many of these such as amplifier gain (see log-files in Figure 3-1) are derived from the GEOS cartridge. Other parameters such as station location or sensor orientation are added from the parameter list file GARNI.AHC. While usually accurate, there are instances where the polarity may be opposite from that which is indicated for vertical components. A careful evaluation of each clock correction in the manner described in the log-file section later should be made if these are important to a study.

PLOTS OF SELECTED EVENTS

Plots are included for those seismic events that were recorded at five or more three-component stations. These events are listed in Table 3-2, where the second-code of the filename is used to indicate those stations that recorded an event. The plots have been prepared using E. Cranswick's RECSEC program. They show each trace at equal amplitude, bundled by three-component station, for a duration proportional to the number of stations recording the event (5 seconds per station). The time (nominally UTC) of the first sample in each plot is indicated in large numbers on the right-hand side of the plot page. This is given as year (less 1900), day-of-year, hour, minute, second, and millisecond. The time scale at the top of the plot page is in seconds. Indicators on the right-hand side identify the individual trace. For example, G5B.V2 is station G5B's 2nd velocity channel - the first channel is up, the second is nominally north, and the third is nominally east. See Table 2-1 for actual horizontal orientations indicated for components 5 (=.V2) and 6 (=.V3). Numbers on the left-hand side of each trace indicate the maximum absolute value in digital counts through the end of the plotted portion of each trace (32767 is full-scale).

ORGANIZATION OF OPTICAL DISK

Two IBM-3363 write-once-read-many (WORM) optical disks have been prepared containing calibration records and seismic triggers as listed in Table 3-3. One disk contains the 1990 data and the other contains the data from 1991 through 10 August 1992. Data are organized into subdirectories by day-of-year of event. These subdirectories are within parent directories by year. Log-files created

by the demultiplexing programs from each tape are included in the LOG directory on the 1991-1992 disk. Also included are ORDARR files for use by the Cranswick and Banfill (WFPS) processing programs for each year. The WHERE list of Table 3-3 is also provided as text files for each year. Seismic triggers were selected by visual inspection and may still include such events as aircraft triggers or other signals that appear as possibly of seismic origin.

LOG-FILES

Four examples of log-files are provided in Figures 3-1a through 3-1d. These show most of the useful types of information that can be read from a log-file.

LOG28.G3 (Figure 3-1a) is a typical log-file from the program RDGEOS. The first line indicates the date and time the program was run and the program name and version. The log-file number (28) is added after the RDGEOS program has completed its operation, so it does not appear on this line which shows simply LOG.G3. Following is the channel/component naming description. The default refers to the log file itself as well as to the time-stamp files. Channel 1 data is component 4 of data for G3A, *etc*. The next lines indicate the tape/experiment number, location number, GEOS unit serial number, and the year. If any of these parameters change during the tape, such as the year, a new indication is made.

In the next line file numbers include all files be they data or clock files as counted by the demultiplexing program (RDGEOS). The event numbers (Evt) are data files as counted by the GEOS. The type can be a trigger, continuous record, manual record, sensor calibration, amplifier calibration, or a clock file. Clock files can be master-clock synchronization (synch), manual synch, WWVB synch, WWVB synch failures (VB Synch TMO), or WWVB corrections. The time indicated for data files is of the first sample, as measured by the internal GEOS clock and is shown as day-of-year, hour, minute, second, and millisecond. The time standard can be none, manual, WWVB, or external. For the Garni data the time standard shown in this column is probably not reliable. An indication of none means that the clock has not been set and shows the elapsed time since the GEOS was turned on (starting day 001). Manual (MAN.) would indicate an operator set the clock by hand, such as by reading the time off of a watch. WWVB would indicate the clock was set by interpreting a WWVB time code. External (EXT.) is the only time standard that properly should have been used in this data set, and indicates that the internal GEOS clock was set by an external clock. The clock correction (Corr) as it is stored in the data files is shown in seconds that should be subtracted from the internal GEOS time to get the corrected time. See the later clock-correction example for a more complete discussion. DR100 name is a generic representation of the the names of the data files as they would be stored on a VAX. Duration is an estimate of the length of the recording in minutes and seconds. Srate is the sampling rate in samples per second. Pre-event is the length of time in seconds of GEOS blocks that were filled before the active block of the tape turn-on decision. Volts is the recorder battery voltage at the time of a trigger.

The last four columns refer to parameters of the trigger algorithm. Trg ch is the trigger channel. STA is the short-term-average interval in seconds. LTA is the effective length of the long-term-average interval in seconds. Ratio is the threshold triggering level by which the short-term-average must exceed the long-term-average in order to trigger. Ratio is expressed in Fortran notation of 2 raised to a power. Motion type, amplifier gain, and anti-aliasing filter frequency are shown for each channel.

Examples

File 1 of G3 tape number 28 is a sensor calibration. It was recorded on GEOS unit number 5 beginning in the year 1991, day-of-year 121, hour 14, minute 47, second 27.382 according to the internal GEOS clock that was set by a master-clock. The clock correction stored for this record is 0.000 seconds. Channel 1 is ground-motion velocity recorded with 54 "decibels" (more accurately 2**(54/6) = 512 x) gain using a 7-pole, 50-hertz anti-aliasing filter, and given the filename 1211447J4.G3A (121O47J4.G3A on the PC optical disk). It was sampled at 1200 samples per second and is a little less than 37 seconds long. Battery voltage is not reported for calibrations.

File 2 is an amplifier calibration. The notation about 506 null values refers to this file; in ampliflier calibrations, however, it is due to a minor bug in the GEOS, and the data is complete without the nulls which have since been removed. In other data files each 506 null values represent a lost data block with the data value of -32768 being used in the place of the lost samples.

File 7 is a triggered event. The GEOS was set to trigger by comparing for channel 1 the short-term-average of 0.4 seconds data to 8 (= 2**3) times the long-term-average representing 20 seconds of data. The batteries providing power to the GEOS were at 26.66 volts. Optimum battery voltage is about 24 to 28 volts.

File 3 is a failure to read a WWVB time code. It should not have been set to try since no WWVB-encoded time-code was available.

File 4 is the all-important clock correction! Eight attempts are made by the GEOS to read the one-second pulse of an external signal. This need not be a WWVB signal. As measured by the internal GEOS clock these pulses were detected 1, 0, 0, 0, 1, 0, 0, and 0 milliseconds after the second so the internal and external clocks are in near-perfect agreement.

File 13 is also a clock correction. At its time the internal GEOS clock is 4 milliseconds fast relative to the external clock. For data files that follow the clock correction is recorded in the header as 0.004 seconds.

Clock-Correction Example

File 9 is a triggered recording of a magnitude 5.1 aftershock of the Ratchi, Georgia Earthquake. To get the best estimate of a clock correction for this event it is necessary to interpolate between two clock corrections. Using 0.25 milliseconds (the mean of the eight clock-correction measurements) from file 4 (121:14:56:44) and 4.00 milliseconds from file 13 (122:02:57:52) one can get by linear interpolation 3.5 milliseconds as a clock correction at 122:01:26:00. This 3.5 milliseconds would be subtracted from the 122:01:26:00.618 start-of-record time to get the external clock referenced time of 122:01:26:00.6145.

When similar calculations are made for units G1, G2 and G4 their clock corrections are found to be -0.7, -7.0, and 16.2 milliseconds, respectively, and their externally referenced start-of-record times are ...:01.8837, ...:01.0980, and ...:01.5068. All units are using the same external clock signal, a master clock, so relative times have thus been determined.

The absolute time could then also be determined since there is data in Table 3-4 indicating when the master clock was set to Omega-time. The master clock appears to have been synched to Omega sometime between 116:09:13 and 116:21:14. Later it was found to need adjusting by -5 milliseconds sometime between 125:23:47 and 126:08:05. The minimum estimate of drift for the master clock may be made by assuming the master clock was synched at 116:21:14 and was found to need an

adjustment of -4.5 milliseconds at 126:08:05. The maximum estimate of drift for the master clock may be made by assuming the master clock was synched at 116:09:13 and was found to need an adjustment of -5.5 milliseconds at 125:23:47. This yields a range of -2.5 to -3.2 milliseconds, averaging to -2.8 milliseconds. This master-clock correction should be added to the previously calculated relative clock corrections to get absolute clock corrections. Thus respectively for G1, G2, G3 and G4 the best absolute clock corrections would be -0.0035, -0.0098, 0.0007 and 0.0134 seconds to be subtracted from GEOS start-of-record times. These are different from the values -0.002, -0.006, 0.000 and 0.011 seconds that are stored by default in the headers. All clock corrections stored on the optical disks are the inaccurate default values. The destinctions are small in this case but may approach one full second during intervals when clock synchs are infrequent.

Under ideal circumstances, such as in this example, relative clock corrections could at best be accurate to 1 to 2 milliseconds and absolute clock corrections to 2 to 4 milliseconds. During the Spring of 1991 clock corrections were usually well recorded on all GEOSs. At other times, however, at least one recorder may have been misprogrammed, permitting only partial recovery of relative times. Also, the recording of master-clock resynchs (Table 3-4) was inconsistant, thus limiting the opportunities for the recovery of absolute time.

Other Examples

Following file 14 is a page break.

At the end of the log-file is the line indicating the number of files processed.

LOG03.G1 (Figure 3-1b) is a short example from the PCGEOS program, version 04.07.

The first 2 files on this tape are corrupted clock files. The first 6 words (cells) stored in each block are the start time for that block. PCGEOS attempted to search ahead in the files for intact time information, but found none, so these files were skipped.

The first file from this tape was corrupted. PCGEOS used default header information from file G1.GHD in the “grand-parent” directory for the file(s) it encountered before finding the readable header information in file 4 of this tape. The default header information uses serial number 99 and voltage equal to 20.00 as flags that the header information did not come from the tape.

File 5 is a master-clock synch. At 183:08:26 the GEOS internal clock was set to match the external clock. The remaining information on this line is not reliable.

LOG22.G1 (Figure 3-1c) begins with a master-clock synch, shows a faulty serial number and indicates an operator-initiated (continuous) recording.

LOG06.G2 (Figure 3-1d) begins with clock information extracted from the header of the first trigger. PCGEOS will use this information, which is from the last clock correction on the previous tape, as a starting point for the default value of the clock correction. There is a risk that this value can be very out-of-date and inaccurate (as it may be here). The other examples did not have this either because they were from RDGEOS, had a corrupted header, or began with a clock file.

Not shown is an example which ends with Physical End of Tape indicating that the tape was read all the way through instead of just to the end-of-tape mark. This would be the case for 100% full tapes.

KNOWN EVENTS

153 of the included events have been identified in the National Earthquake Information Center (NEIC) catalog. These are listed in Table 3-5 by date, Table 3-6 by distance, and Table 3-7 by magnitude. Body-wave magnitudes are used unless otherwise indicated. A travel-time plot of the larger events is shown in Figure 3-2.

Table 3-1a. GEOS Header Descriptions (2-Byte Integer).

Offset	Description (Units)	Value as Used in this Report
1	Number of extra integer header records (record size=512 bytes)	0
2	Number of ASCII header records	0
3	**'Undefined' integer value [INULL]**	**-32768**
4	Data type (positive=real, negative=integer, absolute value=number of bytes per sample)	-2
5	If =1 then (*) parameters are defined	1
10	**Event year**	
11	**Event day of year**	
12	**Hour of event**	
13	**Minute of event**	
14	**Second of event**	
15	**Millisecond of event**	
16	Microsecond of event	0
17	Sample number of first tickmark	unused
18	Detection amplitude of tickmark	unused
19	Number of tickmarks detected	unused
20	Serial number of recording unit	
21	Event sequence number	
27	First active channel number recorded on unit	
28	Actual channel number as recorded on unit	
29	Total number of channels recorded on unit	
30	Total number of components recorded for station I.D.	3
31	**Number of data records that follow**	
32	**Index of last sample in last record**	
33	Record size (bytes)	512
34	Playback program (1=RDGeos, 2=AfTape, 3=ANZA, 4=PCGEOS, 5=CrTape)	
35	Playback program version number	
36	Playback program ' sub-version' number	
37	Recorder type (1=GEOS, 2=DR100, 3=Reftek 72-04, 4=Tustin A/D, 5=Synthetic)	1
38	Recorder version number	1
39	Recorder ' sub-version' number (GEOS software number)	uncertain
40	Sensor unit serial number	unreported
41	**(*) Vertical orientation (degrees from up)**	
42	**(*) Horizontal orientation (degrees clockwise from north)**	
43-49	[ASCII] Sensor model (7A2)	unused
50	Location number	
51	Experiment number (tape number)	
52	Trigger algorithm type (1=STA/LTA)	
53	Trigger STA (tenths of seconds)	
54	Trigger LTA (seconds)	
55	Trigger ratio STA/LTA (power of two)	
56	Trigger component number	
57	Pre-event memory size (tenths of seconds)	
58	Post-trigger duration (seconds)	unreported
101	(*) Bugger processing history	unused
208	Directory number (study I.D. number)	unused
209	Sub-directory number (tape-set number)	unused
210-216	[ASCII] Filename (7A2)	
217-219	[ASCII] Study name (3A2)	unused
252	GEOS clock type (0=None, 1=WWVB, 2=External(master), 3=Manual)	
253	GEOS event type (0=Continuous, 1=Trigger, 2=Preset, 3=Calibration, 4=Amplifier calibration, 5=Sensor calibration)	
254	**Motion unit (1=Acceleration in cm/s^2, 2=Velocity in cm/s, 3=Displacement in cm, 50=Volumetric micro-strain)**	**2**
255	Component number (1-3:acceleration, 4-6:velocity, 7-9:displacement; 1,4,7:vertical)	
256	Number of samples in event (only valid when I031 $\leq$ 128)	

Table 3-1b. GEOS Header Descriptions (4-Byte Real).

Offset	Description (Units)	Value as Used in this Report
1	Number of extra real header records	0.
2	'Undefined' real value [RNULL]	1.7E38
5	**Sample rate (samples per second)**	**200.**
6	**(*) Component sample lag (seconds)**	
39	(*) [ASCII] Transducer type (1A4)	VEL
40	(*) Latitude (degrees north)	40.134
41	Local coordinate x (meters north)	
42	(*) Longitude (degrees east)	44.724
43	Local coordinate y (meters east)	
44	(*) Elevation (meters above sea-level)	1460.
45	Local coordinate z (meters down)	
46	**(*) Digitizing constant (counts/volt)**	**3276.8**
47	**(*) Anti-alias filter corner frequency (hertz)**	**50.**
48	**(*) Poles of anti-alias filter (roll-off=6dB/pole)**	**7.**
49	**(*) Transducer natural frequency (hertz)**	**1.**
50	**(*) Transducer damping coefficient**	**0.8**
51	**(*) Coil constant (volts/motion-unit)**	**1.**
52	**(*) Amplifier gain (dB)**	
60	**(*) Clock correction (seconds; subtract from event time to get true time)**	**uncertain**
61	Elapsed time since last update of clock correction (seconds)	uncertain
62	Recorder battery voltage (volts)	
63	Desired trigger ratio STA/LTA	unused
64	Actual value of STA at trigger	unused
65	Actual value of LTA at trigger	unused
66	Maximum value of STA/LTA during event	unused

Table 3-2a. Listing of events recorded at 5 or more stations.

EVENT	G1	G2	G3	G4	G5	G7
			Jul 1990			
1811602	R	R			R	
1821226	K	K	k		K	
1841647	G	G		G	G	
1850235	G	G	G	G	G	
1850700	N	O		N	N	
1850817	G		H	H	G	
1851021	K		K	K		
1851206	K	K		K		
1871129	E	E	E	E	E	
1871224			G	G	G	
1871936	C		G	G		
1880740	T		T	T	T	
1890310	R		R	R		
1891450	H		I	I	H	
1900855	D		D	D		
1910900	G		G	G		
1911254	G		H	I		
1930900	N	N	N	N	N	m
1930917	S	S	T	S	S	s
1931442	N	N	N	N	N	n
1931516	D	D	D	D	D	d
1940828	F		F	F	F	
1941043	S		S	S		
1941425	D		D	D	D	
1941516	E		E	E	E	
1950605	K		K	K	K	
1950735	Q		Q	Q	Q	
1951541			S	S	S	
1951627	N		N	O		
1970737	P	P	Q	Q	Q	
1970937	K	K	K	K		
1971155		E	E	E	54O	
1971159	T	T	A	A	A	
1971245	R	R	R	R		
1980403	O	O	O			
1980958	O	O		P	P	
1981146	M		M	L	L	
1981656	N		N	N	O	
1990827			H	H	H	
2010321	H	H		H	H	
2040815	P			Q	P	
2041224	A	A	A	A	A	
2041445	M	M	M	M	M	
2041527	H	I	I	I	I	
2042055	O		P	Q	O	
2051003	A			A	A	
2060741	N			N	N	
2061111	R	R		A	S	
2070658	P	P		P	P	
2070900	G	G		G	G	
2080532	J		J	J	J	
2081256	P	P	P	P	P	
2090058	H		I		H	
2110845	C	C	C	C	C	
2110920	P		N	N		
2111303	A		A	B	B	

EVENT	G1	G2	G3	G4	G5	G7
			Aug 1990			
2130726	A		B	B	A	
2130820	E	E	E	E	E	
2132218	M		M	M	M	
2140718	B	B	B	C	C	
2140734	A			A	A	
2140911	P		P	P	P	
2141214	R		Q	15H	R	
2150742	N	N	N	N		
2150856	P		P	Q	P	
2151131		J		I	J	
2201500	H	H	H	H	H	g
2220908	T		A	A		
2221157	N		N	O		
2221246	D		D	D		
2221555	L	L	L	L	L	l
2240029	L		L	L		
2242144	E		F		F	
2250620	A		B	B		
2250702	R	R	R	R	R	r
2252211	K	L	L	L	L	
2271313	P		P		P	
2280209	I		I	I	I	
2280506	M	N	M	N		
2280717	M		M	M		
2281147	F		F	F		
2302317	F		F	F	F	
2311829			P	Q	Q	
2312043	L	M	L	M	L	
2312140			E	E	E	
2320915	P		P	P	P	
2321127	H	I	I	I	I	
2321221	N		O	P	N	
2321236	E		E	E		
2330348	T		A		S	
2330728			N	N	N	
2331234	C		D	D		
2331507	F		F	G		
2351124			P	P	P	
2351827	P	P	Q	Q	Q	p
2352152	B	B	B	B	B	
2370705	P	P	P	P	P	
2371600	H	H	H	H	H	
2390142	K	K	K	K	K	
2390856	P	P	P	Q	P	
2391048	B	B	B	B	B	
2391108	L	L	L	L	L	
2391229	M	M			M	
2400335	M		M	N	M	
2400557	M		M	M	M	
2411109	N		O	O		
2411253	G		G	G		

EVENT	G1	G2	G3	G4	G5	G7
			Sep 1990			
2472255	P	P	P	P	P	
2510854	O	O	O	O	O	
2511938	D	E		D	D	
2531053	G	G			G	
2540703	E	E	E		E	
2601137	S	T	S	S	T	
2601347	R	R	R	R		
			Oct 1990			
2831211		P	P	P	P	
2831217		S	S	S	S	
2880749	T	S	T		T	
2881842	O	O	P	P	O	
2911121	R	R	R	R	R	
2921401	E	E	E	E	E	
3000549	C	B	B	C	B	
3021252	N		N	O	N	
3030913	P		P	P	P	
3030932	R		R		Q	
			Nov 1990			
3121935	I	I	I	J		
3200659	S		S	S	R	
3201500	L	L	L	L	L	
3251224	E	E	E	E	E	
3261136	M	M	M	M	M	
3310805	I	I	I		I	
3330518	F	F	F		F	
			Dec 1990			
3450823	J	I	J	J	I	
3460809	K		K	K		
3461153	J	I	J		J	
3490939	B	B	B	C		
3491038	J	J	J	J	J	
3491541	D	D	D	D	D	
3501546	A	A	A	A	A	
3510116	T	T	T	T	T	
3541304	B	B	B	B	B	
3572129		E	E	E	E	
3591320		T	T	T		
3601029		J	J	J	J	
3611328		I	I		H	
3620405		H	H		H	

Capital letter indicates both stations A & B. Lower case letter indicates station A only.
In 1971154O.G5 the event signal arrived during a sensor calibration.

Table 3-2b. Listing of events recorded at 5 or more stations.

EVENT	G1	G2	G3	G4	G5
		Jan 1991			
0011919		P	O		O
0070103		I	I	I	
0070435		M	M	M	M
0070615		T	T	T	
0070937		N	N	N	
0110604	K	K	K	K	
0312308	C	C	C	C	
		Feb 1991			
0321241	R	R	R		
		Mar 1991			
0801040	N	N	N		
0841345			T	t	T
0841353	N	N	N	n	N
0851132	T			t	T
0851150	K	K	K	k	K
0861351	R	R	R	r	
0862217	Q	Q		q	
		Apr 1991			
0930131	K	K		k	
0940453	T	T		t	
0950912	F	G	F	g	
1010949		T	T	t	
1011023	E	E	E	e	
1040819	N	N	N	n	
1050813	R	R		r	
1051053	K	K		k	
1061256	A	A	A	a	
1071050	L	L	L	l	
1081030	O	O	O	o	
1091355	T	T	T	a	
1170332	B	B		b	
1190913	G	G		g	G
1191105		A		a	A
1191110		P		p	P
1191151		O		o	O

EVENT	G1	G2	G3	G4	G5
		May 1991			
1211146	J	J		j	
1211246	L	L		l	
1211357	A	A		a	
1212319		O	O	o	
1220126	A	A	A	a	
1220218	K	K	K	k	
1220229		L	L	l	
1220343	C	C	C	c	
1220431	M	L	L	m	
1220754	B	B	B	b	
1220901	C	C	C	c	
1220945	F	G	G	g	
1221158	D	D	D	d	
1221206	Q	R		q	
1230609		E	E	E	
1230613		L	L	L	
1230927		28A	O	O	
1232020	G	F	F	G	
1232341		N	N	N	
1240454		F	G	F	
1241330	E	E	E	E	
1241533		Q	Q	Q	
1251146	I	J		I	
1260755	K	K	K	K	
1261243	N	O	N	N	
1270902	B	B	B	A	
1270914	K	K	K	K	
1271324	F	F	F	F	
1280845	A	B	B	B	
1281213	K	K	L	L	
1300125		S	S	S	
1302052	T	A	T	T	
1310558	C	C	C		
1310633	P	P	P		
1330829	R	R	R		
1340937	A	A	A		
1341238	C	C	C		
1350839	B	B	B		
1351242	O	O	O	O	
1351429	I	I	J	I	
1361148	G	G		G	G
1501038	E	E	E	E	
1510919	M		M	M	
1511228	H	H		H	

EVENT	G1	G2	G3	G4	G5
		Jun 1991			
1541022	R	R	S	S	
1541031	O	O	P	O	
1541046	F	F	F	F	
1541144	E	E		E	
1550055	K	K	K	K	
1550114	F	F	F	F	
1550642	C	C	C	C	
1550708	L	L	L	L	
1571348	P	P	P	P	
1590112	E	E	E	E	
1592107	L	L	M	M	
1621053	O	O	O	O	
1631518	N	O	O	O	
1640433	G	G	G	G	
1640603	R	R		R	
1641137	L	L	L	L	
1660059	R	R	R	R	
1660250	J	J	I	J	
1660258	Q	Q	Q		
1670453	T	T	T		
1681239	C	D		C	
1681349	H	H	H	H	
1700640	Q	R	R	R	
1721154	L	L	L		
1721202	S	S	S	S	
1721443	A	A	A	A	
1730543	E	E	E	E	
1760754	H	H		H	
1781409	D	D	D	D	
		Jul 1991			
1841301	E	E	F	E	
1850627	D	D	D	D	
1851449	O	O	O	O	
1870748	R		R	R	
1950913	O		O	O	
1961300	S		S	S	
2021851	I		I	I	
		Nov 1991			
3052110	C	C	C		
3121119	P	P	P		
3160812	G	G	G		
3162036	I	J	I		
3321721	J	K	K		
		Dec 1991			
3420103	C	C	C		
3471910	M	M	M		
3501949	R	R	R		

Capital letter indicates both stations A & B. Lower case letter indicates station A only.

Table 3-2c. Listing of events recorded at 5 or more stations.

EVENT	G1	G2	G3	G4	G5		
		Feb	**1992**				
0340623	M	M	M				
0411512	I	I	I				
0501109	T	T	T				
0562202	J	J	J				
		Mar	**1992**				
0621241	A	A	A				
0871921	P	P	P				
		Apr	**1992**				
0950217	H	G	H				
0961014	O	O	O				
0971048	K	L	K				
0992221	D	D	D				
0992252	R	Q	Q				
1061504	O	O	O				
1150712	G	G	H				
1171316	P	P	P				
1190844	J	J	J				
		May	**1992**				
1260622	D	D	D				
1261953	G	F	F				
1281916	F	F	F				
1331659	C	C	C				
1360812	Q	P	P				
1411225	L	L	L				

Capital letter indicates both stations A & B. Lower case letter indicates station A only.

Table 3-3a. Listing of all included records (events, calibrations, and noise tests).

EVENT	G1	G2	G3	G4	G5	G7	GA	GB	GC	GD
1780731							G			
1780732							C			
1781338							S			
1781356							A	a		
1790322							D	d		
1791622										N
1792335										A
1800007										K
1800147										S
1801230										S
1810343										N
1810815			T							
1810816			P							
1810906					L					07G
1811034	G									
1811035	C									
1811214		C								
1811602	R	R			R					
1811636	B									
1821138	P									
1821139	L									
1821219	B									
1821219	R									
1821226	K	K	k		K					
1821238		P								
1821239		K								
1821301		F								
1821302		B								
1821721	E									
1822118	F	G								
1830616			B							
1830616			R							
1830808					C					
1830808					S					
1830847	N									
1830957	K									
1831221	F									
1831225	I									
1840721				R						
1840722				N						
1841207				E						
1841208				A						
1841647	G	G		G	G					
1850133		C			C					
1850235	G	G	G	G	G					
1850700	N	O		N	N					
1850817	G		H	H	G					
1851021	K		K	K						
1851108					J					
1851109					F					
1851206	K	K		K						
1860508		A								
1860508		Q								
1860833		S								
1860918			B							
1860918			R							
1861011			E							
1861057		I	L							
1870512	Q									
1870725	R									
1870726	N									
1871129	E	E	E	E	E					
1871224			G	G	G					
1871234						c				
1871234						s				
1871936	C		G	G						
1872240	A									
1880147	E									
1880740	T		T	T	T					

EVENT	G1	G2	G3	G4	G5	G7
1881350	N					
1890310	R		R	R		
1891450	H		I	I	H	
1900743			L	L		
1900855	D		D	D		
1901518	J		K			
1910900	G		G	G		
1911254	G		H	I		
1920437	O					
1920712						s
1920713						o
1920805	A					
1920805	Q					
1920854					A	
1920854					Q	
1920904			H			
1920905			D			
1922359	T					
1930900	N	N	N	N	N	m
1930917	S	S	T	S	S	s
1930923			D			
1931442	N	N	N	N	N	n
1931516	D	D	D	D	D	d
1931638	O					
1932058	T					
1932155	B					
1940343			H			
1940522				I		
1940523				E		
1940828	F		F	F	F	
1940836					C	
1941043	S		S	S		
1941251	Q					
1941425	D		D	D	D	
1941433	G					
1941516	E		E	E	E	
1950605	K		K	K	K	
1950735	Q		Q	Q	Q	
1951021	S					
1951541			S	S	S	
1951627	N		N	O		
1970538			R			
1970539			N			
1970545					J	
1970546					E	
1970549				A		
1970549				Q		
1970552				S		
1970553				O		
1970627	N					
1970628	J					
1970633	C					
1970633	S					
1970649		F				
1970650		B				
1970737	P	P	Q	Q	Q	
1970835	E			E		
1970937	K	K	K	K		
1971047						c
1971154					O	
1971155		E	E	E		
1971155					K	
1971159	T	T	A	A	A	
1971245	R	R	R	R		
1971342	G	G				
1971956	J					
1980403	O	O	O			
1980958	O	O		P	P	
1981134	K	N				

EVENT	G1	G2	G3	G4	G5	G7
1981146	M		M	L	L	
1981149	B					
1981204				Q		
1981656	N		N	N	O	
1982125	R					
1990003	M					
1990811	H			H		
1990827			H	H	H	
1991007			C			
1991132	K					
1991306				K		
2000237			K	K		
2000540			S			
2000541			O			
2000549					N	
2000550					J	
2000843						q
2000844						m
2010321	H	H		H	H	
2011731	I				I	
2022233	P				P	
2022305	H				H	
2030242	L					
2030947	J					
2031131	F					
2040815	P			Q	P	
2041113		K				
2041114		G				
2041224	A	A	A	A	A	
2041445	M	M	M	M	M	
2041527	H	I	I	I	I	
2042055	O		P	Q	O	
2051003	A			A	A	
2051040					H	
2051041					D	
2060638				O		
2060741	N			N	N	
2060916						t
2060917						p
2061015		H				
2061016		D				
2061108		09B		Q		
2061111	R	R		A	S	
2061451	P				O	
2070558		K				
2070559		G				
2070658	P	P		P	P	
2070900	G	G		G	G	
2070917	F				E	
2071030				H		
2080532	J		J	J	J	
2080656	B		C			
2081149						r
2081150						n
2081256	P	P	P	P	P	
2081325	Q		Q			
2082307	I				I	
2090058	H		I		H	
2091131					N	
2091132					I	
2091922					F	
2100329	M					
2100634	G					
2100635	C					
2102138	E				E	
2110845	C	C	C	C	C	
2110920	P		N	N		
2111303	A		A	B	B	

Capital letter indicates both stations A & B. Lower case letter indicates station A only.

Table 3-3b. Listing of all included records (events, calibrations, and noise tests).

EVENT	G1	G2	G3	G4	G5	G7	EVENT	G1	G2	G3	G4	G5	G7	EVENT	G1	G2	G3	G4	G5	EVENT	G1	G2	G3	G4	G5
2120625	R		R				2272319	P						2400557	M		M	M	M	2610818	Q	Q	Q	Q	Q
2121143	T		T				2280058	K						2401235	Q					2610825	Q	Q	Q	P	P
2130555			M				2280209	I		I	I	I		2410717			K	K		2610832	Q	Q	P	P	P
2130556			I				2280506	M	N	M	N			2411109	N		O	O		2621235			H		
2130726	A		B	B	A		2280717	M		M	M			2411253	G		G	G		2641000			G		
2130820	E	E	E	E	E		2280751	O		O				2412053	M					2641101			A	A	
2131835	G						2280752			E				2421110				N		2641708			H		
2132218	M		M	M	M		2280938			P	P			2421111				J		2650246			L	L	
2132304	B						2281047	T						2421116					A	2651531		E			
2140317	G				F		2281147	F		F	F			2421116					P	2651531		T			
2140718	B	B	B	C	C		2301902	E						2421159		I				2651910		I			
2140734	A			A	A		2302317	F		F	F	F		2421200		E				2651911		E			
2140911	P		P	P	P		2310730			D				2421206	Q					2761059	T				
2140920	G						2310730			T				2421207	M					2761100	P				
2141214	R		Q	15H	R		2310858	P						2440743	Q		Q	Q		2780757			B		B
2141653	J						2310859	L						2460245	I					2810456			M		L
2141713	O				P		2310950						k	2460814	I					2810924		M			
2142118	E				F		2310951						g	2461013			F			2810925		I			
2142125	F						2311829			P	Q	Q		2461159	Q		Q	Q		2821046			C		
2150742	N	N	N	N			2312043	L	M	L	M	L		2462203	L					2831051			R		
2150856	P		P	Q	P		2312140			E	E	E		2470031	J					2831211		P	P	P	P
2150921	D						2312315			E		E		2470731	H		H	H		2831217		S	S	S	S
2151126				L			2320014	E				F		2470900					T	2831909			J		J
2151131		J		I	J		2320915	P		P	P	P		2470901					P	2851232			K		K
2151133				I			2321127	H	I	I	I	I		2471225		B				2861637	N				
2152129					N		2321221	N		O	P	N		2471225		Q				2861638	J				
2170753					H		2321236	E		E	E			2472255	P	P	P	P	P	2871808	A				
2170754					D		2330117	B				B		2481201			B			2871808	P				
2170811		F					2330348	T		A		S		2481201			R			2871917	N				
2170812		B					2330728			N	N	N		2481302				L		2871918	I				
2170819	B						2331234	C		D	D			2491050				S	S	2880749	T	S	T		T
2170819	Q						2331507	F		F	G			2491126				I		2881842	O	O	P	P	O
2170936						d	2332135					T		2491155					M	2911121	R	R	R	R	R
2170936						t	2340051					E		2491212	B				S	2921052	I				
2180205	Q				Q		2340705			C		C		2491225				E	E	2921401	E	E	E	E	E
2180716	F			F			2340718			F		F		2500019	L				L	2980458	M			N	
2180846	H			H			2340753			H		H		2500903	D					2991049					M
2181126	G						2340909			P				2510854	O	O	O	O	O	3000549	C	B	B	C	B
2190033	J				J		2350851					C		2511938	D	E		D	D	3021252	N		N	O	N
2191020	A			A			2350851					S		2520224	B					3030913	P		P	P	P
2201000				F			2350917		O					2530705	G				G	3030932	R		R		Q
2201001				B			2350918		K					2531053	G	G			G	3041220			B		
2201500	H	H	H	H	H	g	2350922		D					2540703	E	E	E		E	3091218	T		T		
2211305			C	C			2350922		T					2540849	Q					3100712		T			
2220237			B	B			2350925		A					2540850	M					3121935	I	I	I	J	
2220814			J				2350929				H	H		2560641			S		S	3161234	G		G		
2220908	T		A	A			2350929				O	O		2561113			J			3180629	M				
2221044	F						2350935	C						2561113					K	3180630	I				
2221157	N		N	O			2350935	S						2561113				Q		3200659	S		S	S	R
2221246	D		D	D			2350952						f	2561114			F			3200709	Q			Q	
2221555	L	L	L	L	L	l	2350953						b	2561114					G	3201500	L	L	L	L	L
2221556	S						2351124			P	P	P		2561114				M		3210756	S				
2222118	S						2351827	P	P	Q	Q	Q	p	2561119				C		3210757	O				
2240029	L		L	L			2352141					S		2561119				S		3240804					K
2242144	E		F		F		2352152	B	B	B	B	B		2572046					C	3240805					G
2250547	B						2360156	G						2600518				A		3242020			S		
2250547	R						2370705	P	P	P	P	P		2600518			G			3242021			O		
2250620	A		B	B			2371349	T						2600518				Q		3251224	E	E	E	E	E
2250702	R	R	R	R	R	r	2371600	H	H	H	H	H		2600519			B			3261136	M	M	M	M	M
2251056	K			K			2381234				G			2600533				T		3301221			O		
2252211	K	L	L	L	L		2390142	K	K	K	K	K		2600534				O		3310805	I	I	I		I
2260055	L			O			2390737			B				2600536			C			3330518	F	F	F		F
2260949				C			2390737			Q				2600536			R			3331036		B	B		
2260949				S			2390856	P	P	P	Q	P		2600537		A				3341206	S	S			
2261055	G						2391048	B	B	B	B	B		2600537		Q				3370827			L		L
2261523	S						2391108	L	L	L	L	L		2600806			L		L	3421143	J				
2262035	S						2391229	M	M			M		2601137	S	T	S	S	T	3440947			L		
2271036			H				2392130	T				T		2601208	M	M				3450823	J	I	J	J	I
2271313	P		P		P		2400335	M		M	N	M		2601347	R	R	R	R		3450948			M		

Capital letter indicates both stations A & B. Lower case letter indicates station A only.

Table 3-3c. Listing of all included records (events, calibrations, and noise tests).

EVENT	G1	G2	G3	G4	G5	EVENT	G1	G2	G3	G4	G5	EVENT	G1	G2	G3	G4	G5	EVENT	G1	G2	G3	G4	G5
3460809	K		K	K		0370714			H			1190913	G	G		g	G	1261241				G	
3461153	J	I	J		J	0370715			D			1191053		F		f		1261243	N	O	N	N	
3490939	B	B	B	C		0421318					I	1191105		A		a	A	1270857	A			A	
3491038	J	J	J	J	J	0511321			N			1191110		P		p	P	1270902	B	B	B	A	
3491541	D	D	D	D	D	0520814					Q	1191151		O		o	O	1270914	K	K	K	K	
3501546	A	A	A	A	A	0520815					M	1191200					J	1271017				J	
3502105			O			0550631					M	1191443					N	1271324	F	F	F	F	
3510116	T	T	T	T	T	0550743					T	1191823					Q	1280845	A	B	B	B	
3511742			R			0570730					F	1191831					F	1281057	M				
3520626		T				0591144					K	1210905				A		1281110	G	G			
3520627		P				0591230					N	1210905				P		1281213	K	K	L	L	
3520636			O			0611027					I	1210914		J				1300125		S	S	S	
3520637			K			0731053					H	1210915		F				1302031			H	H	
3541304	B	B	B	B	B	0731110		Q	Q		N	1210918	I					1302052	T	A	T	T	
3541940			Q			0800747	L					1210919	E					1302055		C			
3551143			B			0800748	H					1211146	J	J		j		1310457	O	O			
3572129		E	E	E	E	0800934	P		P			1211246	L	L		l		1310458	G				
3590826			A			0801040	N	N	N			1211357	A	A		a		1310558	C	C	C		
3591107		M				0811404			N	N		1211447			J			1310633	P	P	P		
3591320		T	T	T		0821025	E					1211448			F			1330829	R	R	R		
3600628				I		0841345			T	T	T	1212319		O	O	o		1340937	A	A	A		
3600629				E		0841353	N	N	N	N	N	1220126	A	A	A	a		1340939			G		
3601029		J	J	J	J	0851132	T			T	T	1220208			F			1341155	F	G			
3611328		I	I		H	0851150	K	K	K	K	K	1220218	K	K	K	k		1341238	C	C	C		
3620405		H	H		H	0851424	M	M				1220229		L	L	l		1350839	B	B	B		
3620945			K			0860910	M					1220343	C	C	C	c		1350852	J				
3621212		S				0860911	I					1220431	M	L	L	m		1350853	F				
3631154		C	C			0861351	R	R	R	R		1220754	B	B	B	b		1350859		B			
3632200			B		B	0862217	Q	Q		Q		1220901	C	C	C	c		1350907			H		
0010817			K			0871139				R		1220945	F	G	G	g		1350908			D		
0011919		P	O		O	0881328		A		B		1220948	F					1351242	O	O	O	O	
0040823					S	0881423		O		O		1221042	Q			q		1351429	I	I	J	I	
0040824					O	0900730				G		1221124	O					1361148	G	G		G	G
0070103		I	I	I		0910906				B		1221125	K					1380322	P				
0070435		M	M	M	M	0910913			Q			1221131		I				1400802	E				
0070615		T	T	T		0910914			M			1221132		E				1411738	J				J
0070817			A			0910916	J					1221134	M					1412019	G				G
0070937		N	N	N		0910917	F					1221137				J		1412345					E
0081055			Q	Q		0910923		H				1221138				F		1420151	N				N
0090811			T			0910924		C				1221158	D	D	D	d		1420822	F				
0090812			P			0930131	K	K		k		1221206	Q	R		q		1440800	B				
0090817			Q			0940453	T	T		t		1221242			K			1440843	I				
0090818			M			0940902	M			m		1221243			F			1441104	O				
0090825	I					0941339			M			1230609		E	E	E		1461429	M				
0090826	E					0950912	F	G	F	g		1230613		L	L	L		1470341	D				
0101528			S			0950922			N			1230927			O	O		1470649	D				
0110604	K	K	K	K		1010949		T	T	t		1230928		A				1500725				M	
0112102			S	S		1011023	E	E	E	e		1231140				H		1500726				I	
0131532		H				1020312			B			1232020	G	F	F	G		1500734			D		
0131533		D				1040819	N	N	N	n		1232341		N	N	N		1500734			T		
0140850			T			1050813	R	R		r		1240454			F	G	F	1500744		N			
0211126			F			1051053	K	K		k		1241330	E	E	E	E		1500745		J			
0261701			B			1061256	A	A	A	a		1241509		P				1500750	D				
0280632	K					1071050	L	L	L	l		1241510		L				1500750	T				
0280633	G					1081030	O	O	O	o		1241520				O		1500758	O				
0291120			E			1091355	T	T	T	a		1241521				K		1500759	K				
0291139			R			1122309			B			1241533		Q	Q	Q		1501038	E	E	E	E	
0291744			A			1130933			D			1250515		I		I		1510919	M		M	M	
0292000			F			1160851			K			1250708				L		1511228	H	H		H	
0300435			J			1160852			F			1250709				C		1541022	R	R	S	S	
0311207		H	H			1160857		I				1250750			I			1541031	O	O	P	O	
0312308	C	C	C	C		1160858		E				1250751			E			1541046	F	F	F	F	
0320535		P	Q			1160902	J					1250908	Q			R		1541144	E	E		E	
0321024	O		O			1160903	F					1251146	I	J		I		1550055	K	K	K	K	
0321241	R	R	R			1160914					K	1252007			R	R		1550114	F	F	F	F	
0360438			J			1160915					G	1260755	K	K	K	K		1550642	C	C	C	C	
0370210			A			1170332	B	B		b		1260806	N					1550708	L	L	L	L	
0370707					M	1181402	A					1260807	J					1550851				S	
0370708					I	1190857					K							1550852				O	

Capital letter indicates both stations A & B. Lower case letter indicates station A only.

Table 3-3d. Listing of all included records (events, calibrations, and noise tests).

EVENT	G1	G2	G3	G4	G5	EVENT	G1	G2	G3	G4	G5	EVENT	G1	G2	G3	G4	G5	EVENT	G1	G2	G3	G4	G5
1550855		N				1890623			L			2730540				H		3370753			Q		
1550856		J				1890624			H			2740812				K		3370754			L		
1550857	J					1890629		J				2761424			T	T		3371054		Q			
1550858	F					1890630		F				2761504			Q	Q		3381301		K	K		
1561113				A		1891036				J		2790140				K		3391111		D			
1570855	M		M			1891037				F		2790147			D	D		3400740		L			
1571348	P	P	P	P		1940553	Q			R		2790150			E			3411210		I			
1590112	E	E	E	E		1941406	O					2790326				L		3411427		H			
1590113			O			1941407	K					2790415				C		3420103	C	C	C		
1592107	L	L	M	M		1950913	O		O	O		2800746				L		3420757		L			
1592110	F					1951547	F			F		2800747				H		3450707		O			
1621053	O	O	O	O		1961021					I	2800750			I			3450708		K			
1621322	K					1961022					E	2800751			E			3451444		B			
1630635			M			1961300	S		S	S		2800915				L		3451506		G			
1630636			I			1962046			B	B		2810342			H			3470556		T			
1630816	I			I		1970404	M					2821019				D		3471910	M	M	M		
1631518	N	O	O	O		1970453	T			T		2821019				T		3472006		M			
1640433	G	G	G	G		1991102			L			2830245			D			3472009		Q			
1640603	R	R		R		1991102				T		2830929		M				3501543		G	I		
1641137	L	L	L	L		1991103			H			2830930		H				3501949	R	R	R		
1650837	H	H				1991103				P		2840959		J				3501959		J	K		
1660059	R	R	R	R		1991311				C		2841000		F				3511149		T			
1660250	J	J	I	J		2021851	I		I	I		2900841			L			3530145		C			
1660258	Q	Q	Q			2041954			K	K		2900842			H			3540615	S	S			
1660626	I	I				2050324			F	F		2900900				K		3540847		B			
1660720	K					2051156			S	S		2900901				F		3560854		N			
1661200	K					2060452			S	S		2900919		I				3571321		L			
1661556	J	J				2061130			O	O		2900920		D				3601147		G			
1670453	T	T	T			2150927			C	C		2961003			I			3610917		C			
1671107			I			2180920				Q		2961004			D			3630052		L			
1671356			O			2181553			S			2981151				Q		0022221	P	P			
1680305			F			2220858			M	N		2981152				M		0022222	F	G			
1681038				M		2221046				F		3021201	B					0022235		Q			
1681039				I		2221048			P	Q		3021201	R					0030028		Q			
1681043			I			2221054				P		3021238		T				0030040		L			
1681044			E			2221109			A	A		3021239		P				0030446		L			
1681048		J				2221123			K	K		3051350		F	F			0060152		B			
1681049		F				2261255			K			3051431		E				0070140	G				
1681053	I					2270330			K			3052110	C	C	C			0070544	C				
1681054	E					2320851			H			3060945		Q				0070614	H				
1681239	C	D		C		2331202			K			3081040		T	A			0331138	I				
1681349	H	H	H	H		2371023				S		3091231		C	D			0331139	E				
1700640	Q	R	R	R		2371024				O		3121004		S	S			0331147		T			
1701242				L		2371032			M			3121119	P	P	P			0331148		P			
1701308	K					2371033			I			3130453		L	L			0331335			T		
1710750	N			N		2371039		M				3141020		D	D			0331336			P		
1711219	Q			Q		2371040		I				3160812	G	G	G			0340027		B	B		
1711336	N			N		2371045	M					3162036	I	J	I			0340623	M	M	M		
1721154	L	L	L			2371046	H					3171119		H				0340627		K	K		
1721202	S	S	S	S		2381228			R	R		3171124		E				0350831		S	S		
1721443	A	A	A	A		2401047			M	N		3220624		C				0350837		B	B		
1730543	E	E	E	E		2401148				R		3231004		K	K			0350928		L	L		
1750728	I					2411238				H		3251250		M				0351100		A	A		
1750729	E					2420838				N		3290720		N				0351210		I	I		
1760754	H	H		H		2430933				O		3290721		J				0360921		H			
1761250				A		2442049				H		3301213		A				0361322		S	T		
1781409	D	D	D	D		2451040			M	M		3301255		B	B			0410401		K	K		
1790710				K		2470914				F		3311142			G			0411512	I	I	I		
1790711				G		2481213			F	F		3321721	J	K	K			0452032		E			
1812010			B	B		2481923			R	R		3331219			S			0461253	O	O			
1820716		M				2502346				N		3331241		Q				0461331	I	I			
1820717		I				2502347				J		3331242		N				0461338	K	J			
1831052				A		2511019				N		3331323		N	N			0461518	M	M			
1841301	E	E	F	E		2532203			H	I		3340401		I				0480551	L				
1850627	D	D	D	D		2671737		A				3340848		P	P			0490140	B				
1850851	L					2680311				K		3341309		C				0500807		N			
1851449	O	O	O	O		2680312				G		3350918		L				0500808		I			
1870748	R		R	R		2710527				B		3361220		I	I			0501109	T	T	T		
						2710602				H								0501446		E			

Capital letter indicates both stations A & B. Lower case letter indicates station A only.

Table 3-3e. Listing of all included records (events, calibrations, and noise tests).

EVENT	G1	G2	G3	G4	G5	EVENT	G1	G2	G3	G4	G5		
0510103		D				1201501		L					
0510816		F				1211148		H					
0511143		P				1212351			I				
0511240		T				1221212		L					
0511333		M				1260551	Q						
0511720		I	J			1260552	M						
0520037		H				1260604		R					
0520145		D	D			1260605		N					
0541104		Q				1260622	D	D	D				
0541204		R				1261110		O					
0542350		D				1261953	G	F	F				
0560751		K				1271241		J					
0560755		K				1281039		T	S				
0561444		H				1281916	F	F	F				
0562202	J	J	J			1310409		K	K				
0570128		M				1330718			J				
0570351		M				1331659	C	C	C				
0570934		E	E			1340629			R				
0571107		R				1340630			N				
0590903		Q				1341447		F	F				
0610914		P	Q			1350323		D	D				
0620606		Q				1360812	Q	P	P				
0621241	A	A	A			1381001		I	I				
0630137		F				1381027		M	N				
0650330	P	P				1401228		L	L				
0670937	D		D			1411220		T	T				
0672128	O					1411225	L	L	L				
0731719	O					1421123			N				
0841029	J					1471858	E		D				
0841030	F					1480803			F				
0841034		B				1490801	K		K				
0841034		R				1531113			F				
0841040			I			1791349		R					
0841041			E			1791350		N					
0851051		C				1791450	P						
0851152	R					1791451	L						
0860233		J	K			1950617	I						
0861039		B				1950713	Q						
0871921	P	P	P			2200627	T						
0880546		Q	Q			2201426				Q			
0911020		Q	Q			2201427				M			
0920826		A				2211425	D		D				
0950217	H	G	H			2230736					K		
0950505		L				2230737					F		
0951228		M	M			2231347				B			
0961014	O	O	O										
0971048	K	L	K										
0992119			R										
0992221	D	D	D										
0992238		G	H										
0992252	R	Q	Q										
0992307		K											
0992332		C											
1010801			M										
1010802			I										
1010802		M											
1010803		I											
1051350		K											
1060920		R											
1061227		B	B										
1061504	O	O	O										
1081146		A	A										
1121124		P											
1130305		B											
1131226		K											
1150712	G	G	H										
1171316	P	P	P										
1190844	J	J	J										
1201057		M	M										

Capital letter indicates both stations A & B. Lower case letter indicates station A only.

Table 3-4. Estimated or Reported 1991 Master-Clock Resynchs.

Time Range day hr mn	day hr mn	Estimated Change (ms)
084 05 35	084 07 08	-8
086 08 54	086 09 10	-7
091 03 48	091 06 58	-4
095 08 34	095 09 40	-2
098 12 34	098 15 44	-6
108 06 54	108 10 04	-13
116 09 13	116 21 14	-8
125 23 47	126 08 05	-5
149 22 05	150 07 57	-39
153 20 21	154 08 22	-6
160 21 29	161 09 30	-12
169 23 07	170 11 08	-5
175 04 33	175 07 28	-6
176 07 41	176 19 42	-5

Time day hr mn	Before (ms)	After (ms)	Change (ms)
283 19 12	3.3	0.1	-3.2
284 19 48	4.4	-0.1	-4.5
290 06 58	11.0	-0.1	-11.1
294 06 45	8.0	-0.1	-8.1
298 07 20	5.0	0.1	-4.9
301 07 07	5.6	-0.4	-6.0
303 06 50	4.2	-0.2	-4.4
309 07 11	7.3	-0.1	-7.4
310 07 00	2.3	-0.4	-2.7
311 10 00	2.0	-0.4	-2.4
316 07 11	6.0	0.4	-5.6

Table 3-5a. NEIC Parameters of Identified Events Sorted by Date.

Date	D.o.Y.	Hr	Mn	Sec		Latitude deg.		Longitude deg.		Depth km		Mag	Azi deg.	Epicentral Distance km	Epicentral Distance deg.	Travel Time m:ss	Phase	Region	
28 - JUN - 90	(179)	03:	20:	35.0		37 .085	N	49 .642	E	10	G	4.8	307	545	4.90	1:36	P	CASPIAN SEA	
28 - JUN - 90	(179)	03:	42:	01.9	*	37 .079	N	50 .147	E	10	G	4.7	304	581	5.22	1:39	P	CASPIAN SEA	
01 - JUL - 90	(182)	12:	24:	57.2		37 .181	N	49 .885	E	10	G	4.8	305	555	4.99	1:35	P	CASPIAN SEA	
01 - JUL - 90	(182)	17:	19:	44.1		37 .280	N	48 .818	E	10	G	4.6	310	476	4.28	1:30	P	CASPIAN SEA	
01 - JUL - 90	(182)	21:	16:	48.3		37 .285	N	48 .820	E	10	G	4.7	310	476	4.28	1:29	P	CASPIAN SEA	
04 - JUL - 90	(185)	02:	24:	41.9		25 .372	N	124 .473	E	133		5.6	256	7392	66.47	10:38	P	NORTHEAST OF TAIWAN	
06 - JUL - 90	(187)	05:	02:	27.9		45 .371	N	150 .170	E	42	D	5.7	226	7961	71.59	11:22	P	KURIL ISLANDS	
06 - JUL - 90	(187)	19:	34:	52.4		36 .861	N	49 .303	E	35	D	5.3	311	540	4.85	1:16	Pn	WESTERN IRAN	
09 - JUL - 90	(190)	15:	11:	20.3		5 .395	N	31 .654	E	13	G	6.4	22	4078	36.67	7:09	P	SUDAN	<MW>
11 - JUL - 90	(192)	04:	36:	08.6	*	37 .015	N	49 .530	E	33	N	4.5	308	543	4.88	1:35	P	CASPIAN SEA	
13 - JUL - 90	(194)	14:	20:	43.4		36 .415	N	70 .789	E	217	D	5.6	272	2304	20.72	4:28	P	HINDU KUSH REGION	
14 - JUL - 90	(195)	05:	54:	25.4		0 .003	N	17 .376	W	11	G	6.4	71	7676	69.03	11:07	P	NORTH OF ASCENCION ISLAND	<Msz>
14 - JUL - 90	(195)	07:	24:	39.6		0 .074	S	17 .523	W	12	G	5.8	71	7694	69.19	11:10	P	NORTH OF ASCENCION ISLAND	
16 - JUL - 90	(197)	07:	26:	34.6		15 .679	N	121 .172	E	25	D	7.9	266	7752	69.71	11:12	P	LUZON, PHILIPPINE ISLANDS	<MW>
16 - JUL - 90	(197)	13:	31:	13.2		16 .285	N	120 .457	E	13	D	5.7	266	7650	68.79	11:04	P	LUZON, PHILIPPINE ISLANDS	<Msz>
16 - JUL - 90	(197)	19:	45:	25.1		16 .365	N	120 .546	E	33	N	5.4	266	7652	68.81	11:04	P	LUZON, PHILIPPINE ISLANDS	
17 - JUL - 90	(198)	04:	02:	09.2		37 .137	N	49 .979	E	33	N	4.6	304	565	5.08	1:35	P	CASPIAN SEA	
17 - JUL - 90	(198)	21:	14:	43.8		16 .495	N	120 .981	E	23	G	6.7	266	7680	69.07	11:09	P	LUZON, PHILIPPINE ISLANDS	<MW>
18 - JUL - 90	(199)	08:	00:	12.8		16 .511	N	121 .007	E	14	G	5.8	266	7681	69.08	11:10	P	LUZON, PHILIPPINE ISLANDS	
18 - JUL - 90	(199)	11:	29:	24.9		36 .990	N	29 .595	E	17	D	5.2	80	1359	12.22	3:07	P	TURKEY	
20 - JUL - 90	(201)	17:	30:	36.2	?	42 .10	N	46 .77	E	33	N	4.2	217	278	2.50	0:50	P	EASTERN CAUCASUS	
22 - JUL - 90	(203)	09:	26:	14.6		23 .622	S	179 .893	W	531	G	5.9	260	15477	139.18	21:14	SKP	SOUTH OF FIJI ISLANDS	
22 - JUL - 90	(203)	11:	20:	09.6		16 .532	N	121 .045	E	33	N	5.3	266	7683	69.09	11:07	P	LUZON, PHILIPPINE ISLANDS	
23 - JUL - 90	(204)	20:	54:	56.6		42 .719	N	45 .947	E	33	N	4.8	199	305	2.74	0:47	Pn	EASTERN CAUCASUS	
26 - JUL - 90	(207)	06:	53:	56.3		27 .247	N	65 .508	E	19	G	5.8	300	2388	21.47	4:51	P	PAKISTAN	<2 events>
27 - JUL - 90	(208)	05:	31:	00.1		37 .318	N	49 .585	E	10	G	4.8	305	525	4.72	1:29	P	CASPIAN SEA	
27 - JUL - 90	(208)	12:	37:	59.5		15 .355	S	167 .464	E	126	G	7.5	261	13866	124.70	18:48	PKP	VANUATU ISLANDS	<MW;2 events>
02 - AUG - 90	(214)	17:	12:	48.5	*	38 .540	N	48 .186	E	33	N	4.2	300	346	3.12	0:56	P	N.W. IRAN-USSR BORDER REGION	
02 - AUG - 90	(214)	21:	17:	18.7	*	38 .398	N	48 .228	E	33	N	4.1	301	358	3.22	0:55	P	N.W. IRAN-USSR BORDER REGION	
03 - AUG - 90	(215)	09:	15:	06.1		47 .963	N	84 .961	E	33	G	6.1	241	3291	29.59	6:05	P	KAZAKH-XINJIANG BORDER REGION	<MW>
10 - AUG - 90	(222)	15:	44:	31.3		0 .333	N	126 .175	E	53		6.4	275	9258	83.25	12:25	P	MOLUCCA PASSAGE	<MW>
10 - AUG - 90	(222)	21:	11:	49.0		6 .572	N	60 .240	E	10	G	5.5	333	4040	36.33	7:07	P	CARLSBERG RIDGE	
12 - AUG - 90	(224)	21:	25:	21.9		19 .435	S	169 .132	E	140	G	6.3	263	14283	128.44	18:52	PKP	VANUATU ISLANDS	<2 events>
13 - AUG - 90	(225)	06:	18:	25.1		36 .663	N	49 .884	E	35	*	4.6	309	592	5.33	1:37	P	WESTERN IRAN	
14 - AUG - 90	(226)	00:	50:	39.2		27 .024	N	65 .969	E	21	D	5.2	300	2438	21.93	4:56	P	PAKISTAN	
14 - AUG - 90	(226)	15:	13:	28.6		35 .432	N	35 .648	W	10	G	6.0	114	6833	61.45	10:27	P	NORTH ATLANTIC RIDGE	<Msz>
15 - AUG - 90	(227)	23:	08:	56.0		43 .757	N	143 .297	E	162	D	5.4	230	7637	68.68	10:51	P	HOKKAIDO, JAPAN REGION	
16 - AUG - 90	(228)	04:	59:	57.6		41 .564	N	88 .770	E	0	G	6.2	253	3668	32.98	6:39	P	SOUTHERN XINJIANG, CHINA	
20 - AUG - 90	(232)	12:	20:	11.0	*	36 .956	N	49 .720	E	33	N	4.8	308	560	5.03	1:30	P	WESTERN IRAN	
21 - AUG - 90	(233)	03:	47:	26.2		37 .309	N	49 .685	E	10	G	4.8	305	533	4.79	1:30	P	CASPIAN SEA	
22 - AUG - 90	(234)	07:	51:	49.5	*	37 .056	N	49 .327	E	10	G	4.3	309	526	4.73	1:33	P	CASPIAN SEA	
25 - AUG - 90	(237)	15:	47:	53.8		0 .525	N	126 .084	E	11	G	6.5	275	9236	83.06	12:29	P	MOLUCCA PASSAGE	<MW>
29 - AUG - 90	(241)	20:	44:	23.0		11 .791	N	95 .034	E	25	D	5.2	288	5830	52.43	9:15	P	ANDAMAN ISLANDS REGION	
03 - SEP - 90	(246)	02:	40:	59.1		36 .409	N	70 .671	E	202	D	4.9	272	2294	20.63	4:27	P	HINDU KUSH REGION	
07 - SEP - 90	(250)	00:	12:	26.2		5 .443	N	31 .686	E	10	G	5.2	22	4072	36.62	7:09	P	SUDAN	
08 - SEP - 90	(251)	19:	33:	18.8		27 .500	N	66 .092	E	28	*	5.5	299	2412	21.69	4:52	P	PAKISTAN	
09 - SEP - 90	(252)	02:	14:	51.0		56 .654	N	34 .395	W	10	G	5.4	137	5765	51.84	9:14	P	NORTH ATLANTIC OCEAN	
14 - SEP - 90	(257)	20:	40:	18.3		13 .382	N	51 .456	E	10	G	5.4	346	3046	27.39	5:50	P	EASTERN GULF OF ADEN	
17 - SEP - 90	(260)	11:	57:	24.1		5 .917	S	103 .796	E	59	D	5.7	296	7902	71.06	11:14	P	SOUTHERN SUMATERA	
22 - SEP - 90	(265)	02:	46:	01.2	*	42 .538	N	46 .449	E	33	N	4.3	208	304	2.73	0:34	P	EASTERN CAUCASUS	
24 - SEP - 90	(267)	06:	35:	13.9	*	38 .253	N	47 .951	E	10	G	4.6	306	348	3.13		P	NORTHWESTERN IRAN	<PC only>
25 - OCT - 90	(298)	04:	52:	06.0	*	76 .243	N	8 .409	E	10	G	4.6	167	4382	39.41	?7:47	P	SVALBARD REGION	<within coda>
25 - OCT - 90	(298)	04:	53:	59.9		35 .121	N	70 .486	E	114	G	6.0	276	2327	20.93	4:38	P	HINDU KUSH REGION	
12 - NOV - 90	(316)	12:	28:	51.5		42 .959	N	78 .071	E	19	G	6.3	252	2774	24.95	5:28	P	ALMA-ATA REGION	<MW>
16 - DEC - 90	(350)	15:	45:	40.7		41 .361	N	43 .715	E	33	N	5.2	148	161	1.45	0:21	P	TURKEY-USSR BORDER REGION	
23 - DEC - 90	(357)	21:	28:	50.7	*	42 .115	N	44 .356	E	33	N	4.1	172	222	2.00	0:23	P	WESTERN CAUCASUS	
27 - DEC - 90	(361)	13:	26:	57.1		36 .539	N	48 .907	E	10	G	4.7	316	541	4.87	1:26	P	NORTHWESTERN IRAN	
28 - DEC - 90	(362)	04:	03:	53.6		37 .106	N	49 .227	E	10	G	5.0	309	516	4.64	1:29	P	CASPIAN SEA	

Table 3-5b. NEIC Parameters of Identified Events Sorted by Date.

Date	D.o.Y.	Hr	Mn	Sec		Latitude deg.		Longitude deg.		Depth km		Mag	Azi deg.	Epicentral Distance km	Distance deg.	Travel m:ss	Phase	Region	
01 - JAN - 91	(001)	19:	18:	56.4		39 .822	N	48 .439	E	61	D	4.9	275	318	2.86	0:48	P	N.W. IRAN-USSR BORDER REGION	
31 - JAN - 91	(031)	23:	03:	33.6		35 .993	N	70 .423	E	142	G	6.7	273	2288	20.57	4:31	P	HINDU KUSH REGION	<MW>
26 - FEB - 91	(057)	07:	25:	47.2		40 .186	N	13 .822	E	401		5.5	100	2613	23.49	4:30	P	TYRRHENIAN SEA	
27 - MAR - 91	(086)	22:	17:	55.0		40 .443	N	45 .443	E	33	N	4.3	240	70	0.63	-0:08	P	EASTERN CAUCASUS	<early>
14 - APR - 91	(104)	08:	08:	55.7		27 .155	N	127 .419	E	83	G	6.2	253	7519	67.62	10:45	P	RYUKYU ISLANDS	
15 - APR - 91	(105)	10:	48:	59.3		36 .340	N	71 .358	E	124	D	5.3	272	2355	21.18	4:30	P	AFGHANISTAN-USSR BORDER REGION	
27 - APR - 91	(117)	03:	31:	58.5	*	40 .093	N	43 .719	E	10	G	4.2	87	86	0.77	0:07	P	TURKEY-USSR BORDER REGION	
29 - APR - 91	(119)	09:	12:	48.1		42 .453	N	43 .673	E	17	G	7.2	162	272	2.45	0:29	P	WESTERN CAUCASUS	<MW>
29 - APR - 91	(119)	10:	52:	42.2		42 .712	N	44 .102	E	10	G	4.6	170	291	2.62	0:32	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	11:	04:	28.9	*	42 .510	N	43 .816	E	10	G	4.3	164	275	2.47	0:35	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	11:	10:	11.9		42 .584	N	43 .904	E	10	G	4.7	166	281	2.53	0:35	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	11:	51:	10.3		42 .572	N	43 .816	E	10	G	4.9	165	281	2.53	0:34	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	11:	59:	54.8		42 .625	N	43 .962	E	10	G	4.5	167	284	2.56	0:34	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	14:	43:	06.3		42 .515	N	43 .937	E	10	G	5.4	166	273	2.45	0:35	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	18:	23:	15.2		42 .583	N	43 .764	E	10	G	5.5	164	284	2.55	0:35	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	18:	30:	41.5		42 .503	N	43 .899	E	14	G	6.0	166	272	2.45	0:36	P	WESTERN CAUCASUS	<Msz>
01 - MAY - 91	(121)	23:	19:	11.8	*	42 .719	N	44 .053	E	10	G	4.1	169	293	2.63	0:29	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	01:	25:	30.1		42 .541	N	43 .960	E	10	G	5.1	167	275	2.47	0:32	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	02:	07:	31.6	?	41 .34	N	45 .17	E	10	G	4.3	196	139	1.25	0:45	P	EASTERN CAUCASUS	
02 - MAY - 91	(122)	02:	18:	00.1	*	42 .211	N	43 .906	E	10	G	4.1	164	241	2.17	0:32	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	03:	42:	26.1	*	42 .608	N	43 .477	E	10	G	4.0	160	294	2.64	0:42	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	04:	30:	53.9	*	42 .481	N	43 .201	E	10	G	3.9	155	290	2.61	0:41	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	09:	00:	35.2	*	42 .704	N	43 .692	E	10	G	4.1	164	298	2.68	0:33	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	09:	44:	41.4		42 .507	N	43 .507	E	10	G	4.5	159	283	2.54	0:36	P	WESTERN CAUCASUS	
03 - MAY - 91	(123)	06:	08:	37.1		42 .482	N	43 .363	E	10	G	4.6	157	285	2.56	0:37	P	WESTERN CAUCASUS	
03 - MAY - 91	(123)	06:	12:	54.2	?	41 .93	N	43 .80	E	33	N	4.2	159	214	1.93	0:41	P	TURKEY-USSR BORDER REGION	
03 - MAY - 91	(123)	20:	19:	38.8		42 .683	N	43 .247	E	10	G	5.3	157	309	2.78	0:38	P	WESTERN CAUCASUS	
03 - MAY - 91	(123)	23:	41:	01.8		42 .647	N	43 .263	E	11	D	5.2	157	305	2.74	0:39	P	WESTERN CAUCASUS	
04 - MAY - 91	(124)	04:	53:	35.6	?	42 .15	N	43 .51	E	10	G	4.2	156	246	2.21	0:41	P	WESTERN CAUCASUS	
07 - MAY - 91	(127)	09:	01:	23.6	*	42 .606	N	43 .125	E	10	G	4.2	155	306	2.75	0:38	P	WESTERN CAUCASUS	
10 - MAY - 91	(130)	01:	25:	15.6		42 .496	N	43 .153	E	10	G	4.6	154	294	2.64	0:40	P	WESTERN CAUCASUS	
10 - MAY - 91	(130)	20:	30:	45.3		42 .627	N	43 .449	E	28	D	4.4	159	297	2.67	0:35	P	WESTERN CAUCASUS	
10 - MAY - 91	(130)	20:	52:	27.3		42 .534	N	43 .986	E	10	G	4.7	167	274	2.46	0:32	P	WESTERN CAUCASUS	
14 - MAY - 91	(134)	09:	36:	25.4	*	42 .609	N	43 .579	E	10	G	3.8	161	291	2.62	0:37	P	WESTERN CAUCASUS	
15 - MAY - 91	(135)	14:	28:	50.1		42 .565	N	43 .349	E	14	D	4.9	157	294	2.64	0:36	P	WESTERN CAUCASUS	
21 - MAY - 91	(141)	17:	37:	38.8		42 .867	N	48 .028	E	10	G	5.0	221	410	3.69	0:49	P	CASPIAN SEA	
24 - MAY - 91	(144)	07:	59:	38.8	*	42 .679	N	42 .908	E	10	G	3.9	152	321	2.89	0:26	P	WESTERN CAUCASUS	
27 - MAY - 91	(147)	03:	40:	45.5	?	42 .34	N	45 .86	E	10	G	3.7	201	263	2.37	0:26	P	EASTERN CAUCASUS	
03 - JUN - 91	(154)	10:	22:	40.4		40 .048	N	42 .859	E	28	D	5.0	87	159	1.43	0:13	P	TURKEY	
04 - JUN - 91	(155)	00:	55:	16.3		40 .600	N	42 .989	E	10	G	3.7	110	156	1.40	0:16	P	TURKEY	
08 - JUN - 91	(159)	01:	12:	01.8	*	41 .005	N	43 .563	E	33	N	4.2	135	138	1.24	0:12	P	TURKEY-USSR BORDER REGION	
15 - JUN - 91	(166)	00:	59:	20.3		42 .461	N	44 .009	E	9	G	6.3	167	266	2.39	0:33	P	WESTERN CAUCASUS	<MW;2 events>
16 - JUN - 91	(167)	11:	07:	10.6		39 .984	N	42 .875	E	26	D	4.6	85	158	1.42	0:15	P	TURKEY	
17 - JUN - 91	(168)	03:	04:	45.5	*	42 .252	N	44 .222	E	10	G	4.4	170	239	2.15	0:32	P	WESTERN CAUCASUS	
19 - JUN - 91	(170)	06:	40:	28.9		40 .282	N	42 .971	E	33	N	4.6	97	150	1.35	0:21	P	TURKEY	
30 - JUN - 91	(181)	20:	09:	18.3		42 .424	N	43 .688	E	10	G	4.5	162	269	2.42	0:47	P	WESTERN CAUCASUS	
04 - JUL - 91	(185)	06:	26:	31.8		42 .387	N	44 .116	E	20	D	5.0	169	256	2.30	0:39	P	WESTERN CAUCASUS	
14 - JUL - 91	(195)	09:	09:	11.9		36 .334	N	71 .119	E	213	G	6.4	272	2335	21.00	4:32	P	AFGHANISTAN-USSR BORDER REGION	
10 - AUG - 91	(222)	08:	57:	51.8	*	40 .052	N	42 .153	E	10	G	4.4	88	219	1.97	0:46	P	TURKEY	
20 - AUG - 91	(232)	08:	46:	40.5		37 .646	N	72 .150	E	135	D	5.2	268	2380	21.40	4:43	P	TAJIK SSR	
05 - SEP - 91	(248)	19:	23:	04.8		38 .847	N	41 .417	E	10	G	4.3	64	318	2.86	0:48	P	TURKEY	
08 - SEP - 91	(251)	10:	14:	58.8		36 .264	N	71 .324	E	133		5.0	272	2355	21.17	4:43	P	AFGHANISTAN-TAJIKISTAN BORD REG	
06 - OCT - 91	(279)	01:	46:	47.5		41 .096	N	43 .409	E	18	D	5.0	134	154	1.39	0:24	P	GEORGIA-ARMENIA-TURKEY BORD REG	
08 - OCT - 91	(281)	03:	31:	15.6		45 .587	N	149 .049	E	146	D	6.0	226	7878	70.84	11:07	P	KURIL ISLANDS	
10 - OCT - 91	(283)	02:	44:	49.6		41 .399	N	43 .259	E	10	G	4.4	139	187	1.68	0:21	P	GEORGIA-ARMENIA-TURKEY BORD REG	
12 - NOV - 91	(316)	20:	35:	59.6	*	39 .306	N	44 .936	E	33	N	4.3	349	94	0.84	0:26	P	ARMENIA-AZERBAIJAN-IRAN BORD REG	
13 - NOV - 91	(317)	11:	12:	13.2		8 .361	N	126 .371	E	36	G	6.6	269	8701	78.24	12:01	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
21 - NOV - 91	(325)	12:	38:	28.5		5 .782	N	126 .832	E	73	G	6.1	271	8923	80.24	12:10	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
28 - NOV - 91	(332)	17:	19:	55.5		36 .924	N	49 .603	E	16	D	5.6	309	554	4.99	1:34	P	WESTERN IRAN	

Table 3-5c. NEIC Parameters of Identified Events Sorted by Date.

Date	D.o.Y.	Hr	Mn	Sec		Latitude deg.		Longitude deg.		Depth km		Mag	Azi deg.	Epicentral Distance km	Epicentral Distance deg.	Travel m:ss	Phase	Region	
01 - DEC - 91	(335)	09:	17:	27.0		36 .373	N	45 .036	E	35	*	4.7	356	419	3.77	1:08	P	IRAN-IRAQ BORDER REGION	
07 - DEC - 91	(341)	11:	59:	00.9		45 .475	N	151 .391	E	50	D	6.0	225	8027	72.19	11:25	P	KURIL ISLANDS	<MW>
07 - DEC - 91	(341)	14:	22:	32.2		25 .191	N	62 .974	E	30	D	5.2	309	2374	21.35	4:51	P	SOUTHWESTERN PAKISTAN	
08 - DEC - 91	(342)	01:	02:	06.2	*	38 .335	N	48 .151	E	33	N	3.8	303	357	3.21	1:02	P	ARMENIA-AZERBAIJAN-IRAN BORD REG	
13 - DEC - 91	(347)	05:	45:	29.0		45 .567	N	151 .530	E	26	G	6.0	225	8029	72.20	11:30	P	KURIL ISLANDS	<2 events>
13 - DEC - 91	(347)	18:	59:	06.5		45 .521	N	151 .707	E	19	G	6.5	225	8043	72.33	11:32	P	KURIL ISLANDS	<MW>
13 - DEC - 91	(347)	19:	55:	09.5		45 .435	N	151 .270	E	48	D	6.4	225	8023	72.15	11:29	P	KURIL ISLANDS	<MW>
13 - DEC - 91	(347)	19:	58:	18.5		45 .439	N	151 .427	E	20	G	6.4	225	8032	72.23	11:32	P	KURIL ISLANDS	<Msz>
19 - DEC - 91	(353)	01:	33:	40.4		45 .253	N	151 .176	E	27	G	6.6	225	8030	72.21	11:28	P	KURIL ISLANDS	<MW>
20 - DEC - 91	(354)	08:	35:	37.3		45 .133	N	151 .248	E	48	D	6.0	225	8043	72.33	11:28	P	KURIL ISLANDS	<MW>
22 - DEC - 91	(356)	08:	43:	13.4		45 .533	N	151 .021	E	25	D	7.5	225	8001	71.95	11:28	P	KURIL ISLANDS	<MW>
23 - DEC - 91	(357)	13:	10:	04.9		45 .854	N	151 .962	E	24	D	6.0	224	8034	72.25	11:30	P	KURIL ISLANDS	
26 - DEC - 91	(360)	11:	35:	56.2		54 .382	N	162 .521	E	29	D	5.5	213	7957	71.55	11:24	P	NEAR EAST COAST OF KAMCHATKA	
27 - DEC - 91	(361)	09:	09:	37.5		51 .019	N	98 .150	E	14	D	6.5	235	4229	38.03	7:31	P	RUSSIA-MONGOLIA BORDER REGION	<MW*>
15 - FEB - 92	(046)	12:	52:	51.7	*	42 .803	N	46 .524	E	15	D	4.9	206	332	2.99	0:52	P	EASTERN CAUCASUS	
15 - FEB - 92	(046)	13:	30:	32.0	*	42 .462	N	46 .493	E	33	N	4.0	209	298	2.68	0:54	P	EASTERN CAUCASUS	
15 - FEB - 92	(046)	13:	37:	40.1		42 .934	N	46 .548	E	33	N	4.2	205	346	3.11	0:49	P	EASTERN CAUCASUS	
15 - FEB - 92	(046)	15:	18:	04.2	*	41 .434	N	46 .184	E	33	N	4.2	220	190	1.71	0:34	P	EASTERN CAUCASUS	
18 - FEB - 92	(049)	01:	39:	40.9	*	41 .477	N	43 .464	E	33	N	4.5	145	183	1.65	0:24	P	GEORGIA-ARMENIA-TURKEY BORD REG	
23 - FEB - 92	(054)	12:	03:	11.7	*	36 .391	N	49 .179	E	10	G	4.5	316	569	5.12	1:41	P	WESTERN IRAN	
26 - FEB - 92	(057)	03:	45:	19.7		11 .803	N	57 .764	E	10	G	5.8	334	3400	30.58	6:18	P	ARABIAN SEA	
02 - MAR - 92	(062)	12:	29:	40.2		52 .884	N	159 .997	E	44	D	6.9	215	7952	71.51	11:22	P	NEAR EAST COAST OF KAMCHATKA	<MW>
03 - MAR - 92	(063)	01:	18:	32.7		14 .265	S	167 .106	E	159	D	5.9	260	13761	123.75	18:44	PKP	VANUATU ISLANDS	<MW>
05 - MAR - 92	(065)	03:	30:	16.1		38 .263	N	44 .974	E	33	N	4.4	354	209	1.88	0:31	P	TURKEY-IRAN BORDER REGION	
13 - MAR - 92	(073)	17:	18:	40.1		39 .706	N	39 .570	E	28	D	7.1	85	442	3.98	1:04	P	TURKEY	<MW>
27 - MAR - 92	(087)	19:	21:	04.6		42 .456	N	43 .715	E	33	N	5.0	162	272	2.44	0:42	P	NORTHWESTERN CAUCASUS	
22 - APR - 92	(113)	03:	03:	47.6	*	39 .557	N	39 .557	E	10	G	4.5	83	446	4.01	1:17	P	TURKEY	
24 - APR - 92	(115)	07:	07:	25.1		27 .552	N	66 .057	E	33	N	6.1	299	2406	21.63	4:55	P	PAKISTAN	<MW>
26 - APR - 92	(117)	13:	15:	51.2	*	37 .663	N	47 .104	E	33	N	3.8	322	343	3.09	0:56	P	NORTHWESTERN IRAN	
30 - APR - 92	(121)	11:	44:	38.6		35 .070	N	26 .709	E	17	D	5.7	76	1680	15.11	3:44	P	CRETE	
07 - MAY - 92	(128)	19:	15:	02.3		38 .677	N	40 .130	E	10	G	5.0	69	427	3.84	1:15	P	TURKEY	
10 - MAY - 92	(131)	04:	04:	32.8		37 .193	N	72 .936	E	33	N	5.9	269	2461	22.13	4:59	P	TAJIKISTAN	<MW>
15 - MAY - 92	(136)	08:	08:	02.9		41 .003	N	72 .409	E	48	*	6.2	259	2331	20.96	4:44	P	KYRGYZSTAN	<Msz>
17 - MAY - 92	(138)	09:	49:	18.7		7 .260	N	126 .753	E	33	N	7.2	270	8811	79.24	12:07	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
17 - MAY - 92	(138)	10:	15:	31.2		7 .169	N	126 .861	E	33	N	7.3	270	8827	79.38	12:08	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
20 - MAY - 92	(141)	12:	20:	35.0		33 .324	N	71 .271	E	33	N	6.0	279	2473	22.24	5:00	P	PAKISTAN	
10 - AUG - 92	(223)	13:	42:	34.9		36 .053	N	69 .706	E	111	D	5.3	274	2225	20.01	4:30	P	HINDU KUSH REGION, AFGHANISTAN	

Table 3-6a. NEIC Parameters of Identified Events Sorted by Distance.

Date	D.o.Y.	Hr	Mn	Sec		Latitude deg.		Longitude deg.		Depth km	Mag	Azi deg.	Epicentral Distance km	Epicentral Distance deg.	Travel m:ss	Phase	Region	
27 - MAR - 91	(086)	22:	17:	55.0		40 .443	N	45 .443	E	33 N	4.3	240	70	0.63	-0:08	P	EASTERN CAUCASUS	<early>
27 - APR - 91	(117)	03:	31:	58.5	*	40 .093	N	43 .719	E	10 G	4.2	87	86	0.77	0:07	P	TURKEY-USSR BORDER REGION	
12 - NOV - 91	(316)	20:	35:	59.6	*	39 .306	N	44 .936	E	33 N	4.3	349	94	0.84	0:26	P	ARMENIA-AZERBAIJAN-IRAN BORD REG	
08 - JUN - 91	(159)	01:	12:	01.8	*	41 .005	N	43 .563	E	33 N	4.2	135	138	1.24	0:12	P	TURKEY-USSR BORDER REGION	
02 - MAY - 91	(122)	02:	07:	31.6	?	41 .34	N	45 .17	E	10 G	4.3	196	139	1.25	0:45	P	EASTERN CAUCASUS	
19 - JUN - 91	(170)	06:	40:	28.9		40 .282	N	42 .971	E	33 N	4.6	97	150	1.35	0:21	P	TURKEY	
06 - OCT - 91	(279)	01:	46:	47.5		41 .096	N	43 .409	E	18 D	5.0	134	154	1.39	0:24	P	GEORGIA-ARMENIA-TURKEY BORD REG	
04 - JUN - 91	(155)	00:	55:	16.3		40 .600	N	42 .989	E	10 G	3.7	110	156	1.40	0:16	P	TURKEY	
16 - JUN - 91	(167)	11:	07:	10.6		39 .984	N	42 .875	E	26 D	4.6	85	158	1.42	0:15	P	TURKEY	
03 - JUN - 91	(154)	10:	22:	40.4		40 .048	N	42 .859	E	28 D	5.0	87	159	1.43	0:13	P	TURKEY	
16 - DEC - 90	(350)	15:	45:	40.7		41 .361	N	43 .715	E	33 N	5.2	148	161	1.45	0:21	P	TURKEY-USSR BORDER REGION	
18 - FEB - 92	(049)	01:	39:	40.9	*	41 .477	N	43 .464	E	33 N	4.5	145	183	1.65	0:24	P	GEORGIA-ARMENIA-TURKEY BORD REG	
10 - OCT - 91	(283)	02:	44:	49.6		41 .399	N	43 .259	E	10 G	4.4	139	187	1.68	0:21	P	GEORGIA-ARMENIA-TURKEY BORD REG	
15 - FEB - 92	(046)	15:	18:	04.2	*	41 .434	N	46 .184	E	33 N	4.2	220	190	1.71	0:34	P	EASTERN CAUCASUS	
05 - MAR - 92	(065)	03:	30:	16.1		38 .263	N	44 .974	E	33 N	4.4	354	209	1.88	0:31	P	TURKEY-IRAN BORDER REGION	
03 - MAY - 91	(123)	06:	12:	54.2	?	41 .93	N	43 .80	E	33 N	4.2	159	214	1.93	0:41	P	TURKEY-USSR BORDER REGION	
10 - AUG - 91	(222)	08:	57:	51.8	*	40 .052	N	42 .153	E	10 G	4.4	88	219	1.97	0:46	P	TURKEY	
23 - DEC - 90	(357)	21:	28:	50.7	*	42 .115	N	44 .356	E	33 N	4.1	172	222	2.00	0:23	P	WESTERN CAUCASUS	
17 - JUN - 91	(168)	03:	04:	45.5	*	42 .252	N	44 .222	E	10 G	4.4	170	239	2.15	0:32	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	02:	18:	00.1	*	42 .211	N	43 .906	E	10 G	4.1	164	241	2.17	0:32	P	WESTERN CAUCASUS	
04 - MAY - 91	(124)	04:	53:	35.6	?	42 .15	N	43 .51	E	10 G	4.2	156	246	2.21	0:41	P	WESTERN CAUCASUS	
04 - JUL - 91	(185)	06:	26:	31.8		42 .387	N	44 .116	E	20 D	5.0	169	256	2.30	0:39	P	WESTERN CAUCASUS	
27 - MAY - 91	(147)	03:	40:	45.5	?	42 .34	N	45 .86	E	10 G	3.7	201	263	2.37	0:26	P	EASTERN CAUCASUS	
15 - JUN - 91	(166)	00:	59:	20.3		42 .461	N	44 .009	E	9 G	6.3	167	266	2.39	0:33	P	WESTERN CAUCASUS	<MW;2 events>
30 - JUN - 91	(181)	20:	09:	18.3		42 .424	N	43 .688	E	10 G	4.5	162	269	2.42	0:47	P	WESTERN CAUCASUS	
27 - MAR - 92	(087)	19:	21:	04.6		42 .456	N	43 .715	E	33 N	5.0	162	272	2.44	0:42	P	NORTHWESTERN CAUCASUS	
29 - APR - 91	(119)	18:	30:	41.5		42 .503	N	43 .899	E	14 G	6.0	166	272	2.45	0:36	P	WESTERN CAUCASUS	<Msz>
29 - APR - 91	(119)	09:	12:	48.1		42 .453	N	43 .673	E	17 G	7.2	162	272	2.45	0:29	P	WESTERN CAUCASUS	<MW>
29 - APR - 91	(119)	14:	43:	06.3		42 .515	N	43 .937	E	10 G	5.4	166	273	2.45	0:35	P	WESTERN CAUCASUS	
10 - MAY - 91	(130)	20:	52:	27.3		42 .534	N	43 .986	E	10 G	4.7	167	274	2.46	0:32	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	11:	04:	28.9	*	42 .510	N	43 .816	E	10 G	4.3	164	275	2.47	0:35	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	01:	25:	30.1		42 .541	N	43 .960	E	10 G	5.1	167	275	2.47	0:32	P	WESTERN CAUCASUS	
20 - JUL - 90	(201)	17:	30:	36.2	?	42 .10	N	46 .77	E	33 N	4.2	217	278	2.50	0:50	P	EASTERN CAUCASUS	
29 - APR - 91	(119)	11:	10:	11.9		42 .584	N	43 .904	E	10 G	4.7	166	281	2.53	0:35	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	11:	51:	10.3		42 .572	N	43 .816	E	10 G	4.9	165	281	2.53	0:34	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	09:	44:	41.4		42 .507	N	43 .507	E	10 G	4.5	159	283	2.54	0:36	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	18:	23:	15.2		42 .583	N	43 .764	E	10 G	5.5	164	284	2.55	0:35	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	11:	59:	54.8		42 .625	N	43 .962	E	10 G	4.5	167	284	2.56	0:34	P	WESTERN CAUCASUS	
03 - MAY - 91	(123)	06:	08:	37.1		42 .482	N	43 .363	E	10 G	4.6	157	285	2.56	0:37	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	04:	30:	53.9	*	42 .481	N	43 .201	E	10 G	3.9	155	290	2.61	0:41	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	10:	52:	42.2		42 .712	N	44 .102	E	10 G	4.6	170	291	2.62	0:32	P	WESTERN CAUCASUS	
14 - MAY - 91	(134)	09:	36:	25.4	*	42 .609	N	43 .579	E	10 G	3.8	161	291	2.62	0:37	P	WESTERN CAUCASUS	
01 - MAY - 91	(121)	23:	19:	11.8	*	42 .719	N	44 .053	E	10 G	4.1	169	293	2.63	0:29	P	WESTERN CAUCASUS	
10 - MAY - 91	(130)	01:	25:	15.6		42 .496	N	43 .153	E	10 G	4.6	154	294	2.64	0:40	P	WESTERN CAUCASUS	
15 - MAY - 91	(135)	14:	28:	50.1		42 .565	N	43 .349	E	14 D	4.9	157	294	2.64	0:36	P	WESTERN CAUCASUS	
02 - MAY - 91	(122)	03:	42:	26.1	*	42 .608	N	43 .477	E	10 G	4.0	160	294	2.64	0:42	P	WESTERN CAUCASUS	
10 - MAY - 91	(130)	20:	30:	45.3		42 .627	N	43 .449	E	28 D	4.4	159	297	2.67	0:35	P	WESTERN CAUCASUS	
15 - FEB - 92	(046)	13:	30:	32.0	*	42 .462	N	46 .493	E	33 N	4.0	209	298	2.68	0:54	P	EASTERN CAUCASUS	
02 - MAY - 91	(122)	09:	00:	35.2	*	42 .704	N	43 .692	E	10 G	4.1	164	298	2.68	0:33	P	WESTERN CAUCASUS	
22 - SEP - 90	(265)	02:	46:	01.2	*	42 .538	N	46 .449	E	33 N	4.3	208	304	2.73	0:34	P	EASTERN CAUCASUS	
03 - MAY - 91	(123)	23:	41:	01.8		42 .647	N	43 .263	E	11 D	5.2	157	305	2.74	0:39	P	WESTERN CAUCASUS	
23 - JUL - 90	(204)	20:	54:	56.6		42 .719	N	45 .947	E	33 N	4.8	199	305	2.74	0:47	Pn	EASTERN CAUCASUS	
07 - MAY - 91	(127)	09:	01:	23.6	*	42 .606	N	43 .125	E	10 G	4.2	155	306	2.75	0:38	P	WESTERN CAUCASUS	
03 - MAY - 91	(123)	20:	19:	38.8		42 .683	N	43 .247	E	10 G	5.3	157	309	2.78	0:38	P	WESTERN CAUCASUS	
05 - SEP - 91	(248)	19:	23:	04.8		38 .847	N	41 .417	E	10 G	4.3	64	318	2.86	0:48	P	TURKEY	
01 - JAN - 91	(001)	19:	18:	56.4		39 .822	N	48 .439	E	61 D	4.9	275	318	2.86	0:48	P	N.W. IRAN-USSR BORDER REGION	
24 - MAY - 91	(144)	07:	59:	38.8	*	42 .679	N	42 .908	E	10 G	3.9	152	321	2.89	0:26	P	WESTERN CAUCASUS	
15 - FEB - 92	(046)	12:	52:	51.7	*	42 .803	N	46 .524	E	15 D	4.9	206	332	2.99	0:52	P	EASTERN CAUCASUS	

Table 3-6b. NEIC Parameters of Identified Events Sorted by Distance.

Date	D.o.Y.	Hr	Mn	Sec		Latitude deg.		Longitude deg.		Depth km	Mag	Azi deg.	Epicentral Distance km	Epicentral Distance deg.	Travel m:ss	Phase	Region	
26 - APR - 92	(117)	13:	15:	51.2	*	37 .663	N	47 .104	E	33 N	3.8	322	343	3.09	0:56	P	NORTHWESTERN IRAN	
15 - FEB - 92	(046)	13:	37:	40.1		42 .934	N	46 .548	E	33 N	4.2	205	346	3.11	0:49	P	EASTERN CAUCASUS	
02 - AUG - 90	(214)	17:	12:	48.5	*	38 .540	N	48 .186	E	33 N	4.2	300	346	3.12	0:56	P	N.W. IRAN-USSR BORDER REGION	
24 - SEP - 90	(267)	06:	35:	13.9	*	38 .253	N	47 .951	E	10 G	4.6	306	348	3.13		P	NORTHWESTERN IRAN	<PC only>
08 - DEC - 91	(342)	01:	02:	06.2	*	38 .335	N	48 .151	E	33 N	3.8	303	357	3.21	1:02	P	ARMENIA-AZERBAIJAN-IRAN BORD REG	
02 - AUG - 90	(214)	21:	17:	18.7	*	38 .398	N	48 .228	E	33 N	4.1	301	358	3.22	0:55	P	N.W. IRAN-USSR BORDER REGION	
21 - MAY - 91	(141)	17:	37:	38.8		42 .867	N	48 .028	E	10 G	5.0	221	410	3.69	0:49	P	CASPIAN SEA	
01 - DEC - 91	(335)	09:	17:	27.0		36 .373	N	45 .036	E	35 *	4.7	356	419	3.77	1:08	P	IRAN-IRAQ BORDER REGION	
07 - MAY - 92	(128)	19:	15:	02.3		38 .677	N	40 .130	E	10 G	5.0	69	427	3.84	1:15	P	TURKEY	
13 - MAR - 92	(073)	17:	18:	40.1		39 .706	N	39 .570	E	28 D	7.1	85	442	3.98	1:04	P	TURKEY	<MW>
22 - APR - 92	(113)	03:	03:	47.6	*	39 .557	N	39 .557	E	10 G	4.5	83	446	4.01	1:17	P	TURKEY	
01 - JUL - 90	(182)	21:	16:	48.3		37 .285	N	48 .820	E	10 G	4.7	310	476	4.28	1:29	P	CASPIAN SEA	
01 - JUL - 90	(182)	17:	19:	44.1		37 .280	N	48 .818	E	10 G	4.6	310	476	4.28	1:30	P	CASPIAN SEA	
28 - DEC - 90	(362)	04:	03:	53.6		37 .106	N	49 .227	E	10 G	5.0	309	516	4.64	1:29	P	CASPIAN SEA	
27 - JUL - 90	(208)	05:	31:	00.1		37 .318	N	49 .585	E	10 G	4.8	305	525	4.72	1:29	P	CASPIAN SEA	
22 - AUG - 90	(234)	07:	51:	49.5	*	37 .056	N	49 .327	E	10 G	4.3	309	526	4.73	1:33	P	CASPIAN SEA	
21 - AUG - 90	(233)	03:	47:	26.2		37 .309	N	49 .685	E	10 G	4.8	305	533	4.79	1:30	P	CASPIAN SEA	
06 - JUL - 90	(187)	19:	34:	52.4		36 .861	N	49 .303	E	35 D	5.3	311	540	4.85	1:16	Pn	WESTERN IRAN	
27 - DEC - 90	(361)	13:	26:	57.1		36 .539	N	48 .907	E	10 G	4.7	316	541	4.87	1:26	P	NORTHWESTERN IRAN	
11 - JUL - 90	(192)	04:	36:	08.6	*	37 .015	N	49 .530	E	33 N	4.5	308	543	4.88	1:35	P	CASPIAN SEA	
28 - JUN - 90	(179)	03:	20:	35.0		37 .085	N	49 .642	E	10 G	4.8	307	545	4.90	1:36	P	CASPIAN SEA	
28 - NOV - 91	(332)	17:	19:	55.5		36 .924	N	49 .603	E	16 D	5.6	309	554	4.99	1:34	P	WESTERN IRAN	
01 - JUL - 90	(182)	12:	24:	57.2		37 .181	N	49 .885	E	10 G	4.8	305	555	4.99	1:35	P	CASPIAN SEA	
20 - AUG - 90	(232)	12:	20:	11.0	*	36 .956	N	49 .720	E	33 N	4.8	308	560	5.03	1:30	P	WESTERN IRAN	
17 - JUL - 90	(198)	04:	02:	09.2		37 .137	N	49 .979	E	33 N	4.6	304	565	5.08	1:35	P	CASPIAN SEA	
23 - FEB - 92	(054)	12:	03:	11.7	*	36 .391	N	49 .179	E	10 G	4.5	316	569	5.12	1:41	P	WESTERN IRAN	
28 - JUN - 90	(179)	03:	42:	01.9	*	37 .079	N	50 .147	E	10 G	4.7	304	581	5.22	1:39	P	CASPIAN SEA	
13 - AUG - 90	(225)	06:	18:	25.1		36 .663	N	49 .884	E	35 *	4.6	309	592	5.33	1:37	P	WESTERN IRAN	
18 - JUL - 90	(199)	11:	29:	24.9		36 .990	N	29 .595	E	17 D	5.2	80	1359	12.22	3:07	P	TURKEY	
30 - APR - 92	(121)	11:	44:	38.6		35 .070	N	26 .709	E	17 D	5.7	76	1680	15.11	3:44	P	CRETE	
10 - AUG - 92	(223)	13:	42:	34.9		36 .053	N	69 .706	E	111 D	5.3	274	2225	20.01	4:30	P	HINDU KUSH REGION, AFGHANISTAN	
31 - JAN - 91	(031)	23:	03:	33.6		35 .993	N	70 .423	E	142 G	6.7	273	2288	20.57	4:31	P	HINDU KUSH REGION	<MW>
03 - SEP - 90	(246)	02:	40:	59.1		36 .409	N	70 .671	E	202 D	4.9	272	2294	20.63	4:27	P	HINDU KUSH REGION	
13 - JUL - 90	(194)	14:	20:	43.4		36 .415	N	70 .789	E	217 D	5.6	272	2304	20.72	4:28	P	HINDU KUSH REGION	
25 - OCT - 90	(298)	04:	53:	59.9		35 .121	N	70 .486	E	114 G	6.0	276	2327	20.93	4:38	P	HINDU KUSH REGION	
15 - MAY - 92	(136)	08:	08:	02.9		41 .003	N	72 .409	E	48 *	6.2	259	2331	20.96	4:44	P	KYRGYZSTAN	<Msz>
14 - JUL - 91	(195)	09:	09:	11.9		36 .334	N	71 .119	E	213 G	6.4	272	2335	21.00	4:32	P	AFGHANISTAN-USSR BORDER REGION	
08 - SEP - 91	(251)	10:	14:	58.8		36 .264	N	71 .324	E	133	5.0	272	2355	21.17	4:43	P	AFGHANISTAN-TAJIKISTAN BORD REG	
15 - APR - 91	(105)	10:	48:	59.3		36 .340	N	71 .358	E	124 D	5.3	272	2355	21.18	4:30	P	AFGHANISTAN-USSR BORDER REGION	
07 - DEC - 91	(341)	14:	22:	32.2		25 .191	N	62 .974	E	30 D	5.2	309	2374	21.35	4:51	P	SOUTHWESTERN PAKISTAN	
20 - AUG - 91	(232)	08:	46:	40.5		37 .646	N	72 .150	E	135 D	5.2	268	2380	21.40	4:43	P	TAJIK SSR	
26 - JUL - 90	(207)	06:	53:	56.3		27 .247	N	65 .508	E	19 G	5.8	300	2388	21.47	4:51	P	PAKISTAN	<2 events>
24 - APR - 92	(115)	07:	07:	25.1		27 .552	N	66 .057	E	33 N	6.1	299	2406	21.63	4:55	P	PAKISTAN	<MW>
08 - SEP - 90	(251)	19:	33:	18.8		27 .500	N	66 .092	E	28 *	5.5	299	2412	21.69	4:52	P	PAKISTAN	
14 - AUG - 90	(226)	00:	50:	39.2		27 .024	N	65 .969	E	21 D	5.2	300	2438	21.93	4:56	P	PAKISTAN	
10 - MAY - 92	(131)	04:	04:	32.8		37 .193	N	72 .936	E	33 N	5.9	269	2461	22.13	4:59	P	TAJIKISTAN	<MW>
20 - MAY - 92	(141)	12:	20:	35.0		33 .324	N	71 .271	E	33 N	6.0	279	2473	22.24	5:00	P	PAKISTAN	
26 - FEB - 91	(057)	07:	25:	47.2		40 .186	N	13 .822	E	401	5.5	100	2613	23.49	4:30	P	TYRRHENIAN SEA	
12 - NOV - 90	(316)	12:	28:	51.5		42 .959	N	78 .071	E	19 G	6.3	252	2774	24.95	5:28	P	ALMA-ATA REGION	<MW>
14 - SEP - 90	(257)	20:	40:	18.3		13 .382	N	51 .456	E	10 G	5.4	346	3046	27.39	5:50	P	EASTERN GULF OF ADEN	
03 - AUG - 90	(215)	09:	15:	06.1		47 .963	N	84 .961	E	33 G	6.1	241	3291	29.59	6:05	P	KAZAKH-XINJIANG BORDER REGION	<MW>
26 - FEB - 92	(057)	03:	45:	19.7		11 .803	N	57 .764	E	10 G	5.8	334	3400	30.58	6:18	P	ARABIAN SEA	
16 - AUG - 90	(228)	04:	59:	57.6		41 .564	N	88 .770	E	0 G	6.2	253	3668	32.98	6:39	P	SOUTHERN XINJIANG, CHINA	
10 - AUG - 90	(222)	21:	11:	49.0		6 .572	N	60 .240	E	10 G	5.5	333	4040	36.33	7:07	P	CARLSBERG RIDGE	
07 - SEP - 90	(250)	00:	12:	26.2		5 .443	N	31 .686	E	10 G	5.2	22	4072	36.62	7:09	P	SUDAN	
09 - JUL - 90	(190)	15:	11:	20.3		5 .395	N	31 .654	E	13 G	6.4	22	4078	36.67	7:09	P	SUDAN	<MW>
27 - DEC - 91	(361)	09:	09:	37.5		51 .019	N	98 .150	E	14 D	6.5	235	4229	38.03	7:31	P	RUSSIA-MONGOLIA BORDER REGION	<MW*>
25 - OCT - 90	(298)	04:	52:	06.0	*	76 .243	N	8 .409	E	10 G	4.6	167	4382	39.41	?7:47	P	SVALBARD REGION	<within coda>

Table 3-6c. NEIC Parameters of Identified Events Sorted by Distance.

Date	D.o.Y.	Hr	Mn	Sec	Latitude deg.		Longitude deg.		Depth km		Mag	Azi deg.	Epicentral Distance km	Epicentral Distance deg.	Travel m:ss	Phase	Region	
09 - SEP - 90	(252)	02:	14:	51.0	56 .654	N	34 .395	W	10	G	5.4	137	5765	51.84	9:14	P	NORTH ATLANTIC OCEAN	
29 - AUG - 90	(241)	20:	44:	23.0	11 .791	N	95 .034	E	25	D	5.2	288	5830	52.43	9:15	P	ANDAMAN ISLANDS REGION	
14 - AUG - 90	(226)	15:	13:	28.6	35 .432	N	35 .648	W	10	G	6.0	114	6833	61.45	10:27	P	NORTH ATLANTIC RIDGE	<Msz>
04 - JUL - 90	(185)	02:	24:	41.9	25 .372	N	124 .473	E	133		5.6	256	7392	66.47	10:38	P	NORTHEAST OF TAIWAN	
14 - APR - 91	(104)	08:	08:	55.7	27 .155	N	127 .419	E	83	G	6.2	253	7519	67.62	10:45	P	RYUKYU ISLANDS	
15 - AUG - 90	(227)	23:	08:	56.0	43 .757	N	143 .297	E	162	D	5.4	230	7637	68.68	10:51	P	HOKKAIDO, JAPAN REGION	
16 - JUL - 90	(197)	13:	31:	13.2	16 .285	N	120 .457	E	13	D	5.7	266	7650	68.79	11:04	P	LUZON, PHILIPPINE ISLANDS	<Msz>
16 - JUL - 90	(197)	19:	45:	25.1	16 .365	N	120 .546	E	33	N	5.4	266	7652	68.81	11:04	P	LUZON, PHILIPPINE ISLANDS	
14 - JUL - 90	(195)	05:	54:	25.4	0 .003	N	17 .376	W	11	G	6.4	71	7676	69.03	11:07	P	NORTH OF ASCENCION ISLAND	<Msz>
17 - JUL - 90	(198)	21:	14:	43.8	16 .495	N	120 .981	E	23	G	6.7	266	7680	69.07	11:09	P	LUZON, PHILIPPINE ISLANDS	<MW>
18 - JUL - 90	(199)	08:	00:	12.8	16 .511	N	121 .007	E	14	G	5.8	266	7681	69.08	11:10	P	LUZON, PHILIPPINE ISLANDS	
22 - JUL - 90	(203)	11:	20:	09.6	16 .532	N	121 .045	E	33	N	5.3	266	7683	69.09	11:07	P	LUZON, PHILIPPINE ISLANDS	
14 - JUL - 90	(195)	07:	24:	39.6	0 .074	S	17 .523	W	12	G	5.8	71	7694	69.19	11:10	P	NORTH OF ASCENCION ISLAND	
16 - JUL - 90	(197)	07:	26:	34.6	15 .679	N	121 .172	E	25	D	7.9	266	7752	69.71	11:12	P	LUZON, PHILIPPINE ISLANDS	<MW>
08 - OCT - 91	(281)	03:	31:	15.6	45 .587	N	149 .049	E	146	D	6.0	226	7878	70.84	11:07	P	KURIL ISLANDS	
17 - SEP - 90	(260)	11:	57:	24.1	5 .917	S	103 .796	E	59	D	5.7	296	7902	71.06	11:14	P	SOUTHERN SUMATERA	
02 - MAR - 92	(062)	12:	29:	40.2	52 .884	N	159 .997	E	44	D	6.9	215	7952	71.51	11:22	P	NEAR EAST COAST OF KAMCHATKA	<MW>
26 - DEC - 91	(360)	11:	35:	56.2	54 .382	N	162 .521	E	29	D	5.5	213	7957	71.55	11:24	P	NEAR EAST COAST OF KAMCHATKA	
06 - JUL - 90	(187)	05:	02:	27.9	45 .371	N	150 .170	E	42	D	5.7	226	7961	71.59	11:22	P	KURIL ISLANDS	
22 - DEC - 91	(356)	08:	43:	13.4	45 .533	N	151 .021	E	25	D	7.5	225	8001	71.95	11:28	P	KURIL ISLANDS	<MW>
13 - DEC - 91	(347)	19:	55:	09.5	45 .435	N	151 .270	E	48	D	6.4	225	8023	72.15	11:29	P	KURIL ISLANDS	<MW>
07 - DEC - 91	(341)	11:	59:	00.9	45 .475	N	151 .391	E	50	D	6.0	225	8027	72.19	11:25	P	KURIL ISLANDS	<MW>
13 - DEC - 91	(347)	05:	45:	29.0	45 .567	N	151 .530	E	26	G	6.0	225	8029	72.20	11:30	P	KURIL ISLANDS	<2 events>
19 - DEC - 91	(353)	01:	33:	40.4	45 .253	N	151 .176	E	27	G	6.6	225	8030	72.21	11:28	P	KURIL ISLANDS	<MW>
13 - DEC - 91	(347)	19:	58:	18.5	45 .439	N	151 .427	E	20	G	6.4	225	8032	72.23	11:32	P	KURIL ISLANDS	<Msz>
23 - DEC - 91	(357)	13:	10:	04.9	45 .854	N	151 .962	E	24	D	6.0	224	8034	72.25	11:30	P	KURIL ISLANDS	
13 - DEC - 91	(347)	18:	59:	06.5	45 .521	N	151 .707	E	19	G	6.5	225	8043	72.33	11:32	P	KURIL ISLANDS	<MW>
20 - DEC - 91	(354)	08:	35:	37.3	45 .133	N	151 .248	E	48	D	6.0	225	8043	72.33	11:28	P	KURIL ISLANDS	<MW>
13 - NOV - 91	(317)	11:	12:	13.2	8 .361	N	126 .371	E	36	G	6.6	269	8701	78.24	12:01	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
17 - MAY - 92	(138)	09:	49:	18.7	7 .260	N	126 .753	E	33	N	7.2	270	8811	79.24	12:07	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
17 - MAY - 92	(138)	10:	15:	31.2	7 .169	N	126 .861	E	33	N	7.3	270	8827	79.38	12:08	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
21 - NOV - 91	(325)	12:	38:	28.5	5 .782	N	126 .832	E	73	G	6.1	271	8923	80.24	12:10	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
25 - AUG - 90	(237)	15:	47:	53.8	0 .525	N	126 .084	E	11	G	6.5	275	9236	83.06	12:29	P	MOLUCCA PASSAGE	<MW>
10 - AUG - 90	(222)	15:	44:	31.3	0 .333	N	126 .175	E	53		6.4	275	9258	83.25	12:25	P	MOLUCCA PASSAGE	<MW>
03 - MAR - 92	(063)	01:	18:	32.7	14 .265	S	167 .106	E	159	D	5.9	260	13761	123.75	18:44	PKP	VANUATU ISLANDS	<MW>
27 - JUL - 90	(208)	12:	37:	59.5	15 .355	S	167 .464	E	126	G	7.5	261	13866	124.70	18:48	PKP	VANUATU ISLANDS	<MW;2 events>
12 - AUG - 90	(224)	21:	25:	21.9	19 .435	S	169 .132	E	140	G	6.3	263	14283	128.44	18:52	PKP	VANUATU ISLANDS	<2 events>
22 - JUL - 90	(203)	09:	26:	14.6	23 .622	S	179 .893	W	531	G	5.9	260	15477	139.18	21:14	SKP	SOUTH OF FIJI ISLANDS	

Table 3-7a. NEIC Parameters of Identified Events Sorted by Magnitude.

Date	D.o.Y.	Hr	Mn	Sec	Latitude deg.		Longitude deg.		Depth km		Mag	Azi deg.	Epicentral Distance km	Epicentral Distance deg.	Travel m:ss	Phase	Region	
16 - JUL - 90	(197)	07:	26:	34.6	15 .679	N	121 .172	E	25	D	7.9	266	7752	69.71	11:12	P	LUZON, PHILIPPINE ISLANDS	<MW>
22 - DEC - 91	(356)	08:	43:	13.4	45 .533	N	151 .021	E	25	D	7.5	225	8001	71.95	11:28	P	KURIL ISLANDS	<MW>
27 - JUL - 90	(208)	12:	37:	59.5	15 .355	S	167 .464	E	126	G	7.5	261	13866	124.70	18:48	PKP	VANUATU ISLANDS	<MW;2 events>
17 - MAY - 92	(138)	10:	15:	31.2	7 .169	N	126 .861	E	33	N	7.3	270	8827	79.38	12:08	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
29 - APR - 91	(119)	09:	12:	48.1	42 .453	N	43 .673	E	17	G	7.2	162	272	2.45	0:29	P	WESTERN CAUCASUS	<MW>
17 - MAY - 92	(138)	09:	49:	18.7	7 .260	N	126 .753	E	33	N	7.2	270	8811	79.24	12:07	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
13 - MAR - 92	(073)	17:	18:	40.1	39 .706	N	39 .570	E	28	D	7.1	85	442	3.98	1:04	P	TURKEY	<MW>
02 - MAR - 92	(062)	12:	29:	40.2	52 .884	N	159 .997	E	44	D	6.9	215	7952	71.51	11:22	P	NEAR EAST COAST OF KAMCHATKA	<MW>
31 - JAN - 91	(031)	23:	03:	33.6	35 .993	N	70 .423	E	142	G	6.7	273	2288	20.57	4:31	P	HINDU KUSH REGION	<MW>
17 - JUL - 90	(198)	21:	14:	43.8	16 .495	N	120 .981	E	23	G	6.7	266	7680	69.07	11:09	P	LUZON, PHILIPPINE ISLANDS	<MW>
19 - DEC - 91	(353)	01:	33:	40.4	45 .253	N	151 .176	E	27	G	6.6	225	8030	72.21	11:28	P	KURIL ISLANDS	<MW>
13 - NOV - 91	(317)	11:	12:	13.2	8 .361	N	126 .371	E	36	G	6.6	269	8701	78.24	12:01	P	MINDANAO, PHILIPPINE ISLANDS	<MW>
27 - DEC - 91	(361)	09:	09:	37.5	51 .019	N	98 .150	E	14	D	6.5	235	4229	38.03	7:31	P	RUSSIA-MONGOLIA BORDER REGION	<MW*>
13 - DEC - 91	(347)	18:	59:	06.5	45 .521	N	151 .707	E	19	G	6.5	225	8043	72.33	11:32	P	KURIL ISLANDS	<MW>
25 - AUG - 90	(237)	15:	47:	53.8	0 .525	N	126 .084	E	11	G	6.5	275	9236	83.06	12:29	P	MOLUCCA PASSAGE	<MW>
14 - JUL - 91	(195)	09:	09:	11.9	36 .334	N	71 .119	E	213	G	6.4	272	2335	21.00	4:32	P	AFGHANISTAN-USSR BORDER REGION	
09 - JUL - 90	(190)	15:	11:	20.3	5 .395	N	31 .654	E	13	G	6.4	22	4078	36.67	7:09	P	SUDAN	<MW>
14 - JUL - 90	(195)	05:	54:	25.4	0 .003	N	17 .376	W	11	G	6.4	71	7676	69.03	11:07	P	NORTH OF ASCENCION ISLAND	<Msz>
13 - DEC - 91	(347)	19:	55:	09.5	45 .435	N	151 .270	E	48	D	6.4	225	8023	72.15	11:29	P	KURIL ISLANDS	<MW>
13 - DEC - 91	(347)	19:	58:	18.5	45 .439	N	151 .427	E	20	G	6.4	225	8032	72.23	11:32	P	KURIL ISLANDS	<Msz>
10 - AUG - 90	(222)	15:	44:	31.3	0 .333	N	126 .175	E	53		6.4	275	9258	83.25	12:25	P	MOLUCCA PASSAGE	<MW>
15 - JUN - 91	(166)	00:	59:	20.3	42 .461	N	44 .009	E	9	G	6.3	167	266	2.39	0:33	P	WESTERN CAUCASUS	<MW;2 events>
12 - NOV - 90	(316)	12:	28:	51.5	42 .959	N	78 .071	E	19	G	6.3	252	2774	24.95	5:28	P	ALMA-ATA REGION	<MW>
12 - AUG - 90	(224)	21:	25:	21.9	19 .435	S	169 .132	E	140	G	6.3	263	14283	128.44	18:52	PKP	VANUATU ISLANDS	<2 events>
15 - MAY - 92	(136)	08:	08:	02.9	41 .003	N	72 .409	E	48	*	6.2	259	2331	20.96	4:44	P	KYRGYZSTAN	<Msz>
16 - AUG - 90	(228)	04:	59:	57.6	41 .564	N	88 .770	E	0	G	6.2	253	3668	32.98	6:39	P	SOUTHERN XINJIANG, CHINA	
14 - APR - 91	(104)	08:	08:	55.7	27 .155	N	127 .419	E	83	G	6.2	253	7519	67.62	10:45	P	RYUKYU ISLANDS	
24 - APR - 92	(115)	07:	07:	25.1	27 .552	N	66 .057	E	33	N	6.1	299	2406	21.63	4:55	P	PAKISTAN	<MW>
03 - AUG - 90	(215)	09:	15:	06.1	47 .963	N	84 .961	E	33	G	6.1	241	3291	29.59	6:05	P	KAZAKH-XINJIANG BORDER REGION	<MW>
21 - NOV - 91	(325)	12:	38:	28.5	5 .782	N	126 .832	E	73	G	6.1	271	8923	80.24	12:10	P	MINDANAO, PHILIPPINES ISLANDS	<MW>
29 - APR - 91	(119)	18:	30:	41.5	42 .503	N	43 .899	E	14	G	6.0	166	272	2.45	0:36	P	WESTERN CAUCASUS	<Msz>
25 - OCT - 90	(298)	04:	53:	59.9	35 .121	N	70 .486	E	114	G	6.0	276	2327	20.93	4:38	P	HINDU KUSH REGION	
20 - MAY - 92	(141)	12:	20:	35.0	33 .324	N	71 .271	E	33	N	6.0	279	2473	22.24	5:00	P	PAKISTAN	
14 - AUG - 90	(226)	15:	13:	28.6	35 .432	N	35 .648	W	10	G	6.0	114	6833	61.45	10:27	P	NORTH ATLANTIC RIDGE	<Msz>
08 - OCT - 91	(281)	03:	31:	15.6	45 .587	N	149 .049	E	146	D	6.0	226	7878	70.84	11:07	P	KURIL ISLANDS	
07 - DEC - 91	(341)	11:	59:	00.9	45 .475	N	151 .391	E	50	D	6.0	225	8027	72.19	11:25	P	KURIL ISLANDS	<MW>
13 - DEC - 91	(347)	05:	45:	29.0	45 .567	N	151 .530	E	26	G	6.0	225	8029	72.20	11:30	P	KURIL ISLANDS	<2 events>
23 - DEC - 91	(357)	13:	10:	04.9	45 .854	N	151 .962	E	24	D	6.0	224	8034	72.25	11:30	P	KURIL ISLANDS	
20 - DEC - 91	(354)	08:	35:	37.3	45 .133	N	151 .248	E	48	D	6.0	225	8043	72.33	11:28	P	KURIL ISLANDS	<MW>
10 - MAY - 92	(131)	04:	04:	32.8	37 .193	N	72 .936	E	33	N	5.9	269	2461	22.13	4:59	P	TAJIKISTAN	<MW>
03 - MAR - 92	(063)	01:	18:	32.7	14 .265	S	167 .106	E	159	D	5.9	260	13761	123.75	18:44	PKP	VANUATU ISLANDS	<MW>
22 - JUL - 90	(203)	09:	26:	14.6	23 .622	S	179 .893	W	531	G	5.9	260	15477	139.18	21:14	SKP	SOUTH OF FIJI ISLANDS	
26 - JUL - 90	(207)	06:	53:	56.3	27 .247	N	65 .508	E	19	G	5.8	300	2388	21.47	4:51	P	PAKISTAN	<2 events>
26 - FEB - 92	(057)	03:	45:	19.7	11 .803	N	57 .764	E	10	G	5.8	334	3400	30.58	6:18	P	ARABIAN SEA	
18 - JUL - 90	(199)	08:	00:	12.8	16 .511	N	121 .007	E	14	G	5.8	266	7681	69.08	11:10	P	LUZON, PHILIPPINE ISLANDS	
14 - JUL - 90	(195)	07:	24:	39.6	0 .074	S	17 .523	W	12	G	5.8	71	7694	69.19	11:10	P	NORTH OF ASCENCION ISLAND	
30 - APR - 92	(121)	11:	44:	38.6	35 .070	N	26 .709	E	17	D	5.7	76	1680	15.11	3:44	P	CRETE	
16 - JUL - 90	(197)	13:	31:	13.2	16 .285	N	120 .457	E	13	D	5.7	266	7650	68.79	11:04	P	LUZON, PHILIPPINE ISLANDS	<Msz>
17 - SEP - 90	(260)	11:	57:	24.1	5 .917	S	103 .796	E	59	D	5.7	296	7902	71.06	11:14	P	SOUTHERN SUMATERA	
06 - JUL - 90	(187)	05:	02:	27.9	45 .371	N	150 .170	E	42	D	5.7	226	7961	71.59	11:22	P	KURIL ISLANDS	
28 - NOV - 91	(332)	17:	19:	55.5	36 .924	N	49 .603	E	16	D	5.6	309	554	4.99	1:34	P	WESTERN IRAN	
13 - JUL - 90	(194)	14:	20:	43.4	36 .415	N	70 .789	E	217	D	5.6	272	2304	20.72	4:28	P	HINDU KUSH REGION	
04 - JUL - 90	(185)	02:	24:	41.9	25 .372	N	124 .473	E	133		5.6	256	7392	66.47	10:38	P	NORTHEAST OF TAIWAN	
29 - APR - 91	(119)	18:	23:	15.2	42 .583	N	43 .764	E	10	G	5.5	164	284	2.55	0:35	P	WESTERN CAUCASUS	
08 - SEP - 90	(251)	19:	33:	18.8	27 .500	N	66 .092	E	28	*	5.5	299	2412	21.69	4:52	P	PAKISTAN	
26 - FEB - 91	(057)	07:	25:	47.2	40 .186	N	13 .822	E	401		5.5	100	2613	23.49	4:30	P	TYRRHENIAN SEA	
10 - AUG - 90	(222)	21:	11:	49.0	6 .572	N	60 .240	E	10	G	5.5	333	4040	36.33	7:07	P	CARLSBERG RIDGE	
26 - DEC - 91	(360)	11:	35:	56.2	54 .382	N	162 .521	E	29	D	5.5	213	7957	71.55	11:24	P	NEAR EAST COAST OF KAMCHATKA	

Table 3-7b. NEIC Parameters of Identified Events Sorted by Magnitude.

Date	D.o.Y.	Hr	Mn	Sec		Latitude deg.		Longitude deg.		Depth km		Mag	Azi deg.	Epicentral Distance km	Epicentral Distance deg.	Travel Time m:ss	Phase	Region	
29 - APR - 91	(119)	14:	43:	06.3		42 .515	N	43 .937	E	10	G	5.4	166	273	2.45	0:35	P	WESTERN CAUCASUS	
14 - SEP - 90	(257)	20:	40:	18.3		13 .382	N	51 .456	E	10	G	5.4	346	3046	27.39	5:50	P	EASTERN GULF OF ADEN	
09 - SEP - 90	(252)	02:	14:	51.0		56 .654	N	34 .395	W	10	G	5.4	137	5765	51.84	9:14	P	NORTH ATLANTIC OCEAN	
15 - AUG - 90	(227)	23:	08:	56.0		43 .757	N	143 .297	E	162	D	5.4	230	7637	68.68	10:51	P	HOKKAIDO, JAPAN REGION	
16 - JUL - 90	(197)	19:	45:	25.1		16 .365	N	120 .546	E	33	N	5.4	266	7652	68.81	11:04	P	LUZON, PHILIPPINE ISLANDS	
03 - MAY - 91	(123)	20:	19:	38.8		42 .683	N	43 .247	E	10	G	5.3	157	309	2.78	0:38	P	WESTERN CAUCASUS	
06 - JUL - 90	(187)	19:	34:	52.4		36 .861	N	49 .303	E	35	D	5.3	311	540	4.85	1:16	Pn	WESTERN IRAN	
10 - AUG - 92	(223)	13:	42:	34.9		36 .053	N	69 .706	E	111	D	5.3	274	2225	20.01	4:30	P	HINDU KUSH REGION, AFGHANISTAN	
15 - APR - 91	(105)	10:	48:	59.3		36 .340	N	71 .358	E	124	D	5.3	272	2355	21.18	4:30	P	AFGHANISTAN-USSR BORDER REGION	
22 - JUL - 90	(203)	11:	20:	09.6		16 .532	N	121 .045	E	33	N	5.3	266	7683	69.09	11:07	P	LUZON, PHILIPPINE ISLANDS	
16 - DEC - 90	(350)	15:	45:	40.7		41 .361	N	43 .715	E	33	N	5.2	148	161	1.45	0:21	P	TURKEY-USSR BORDER REGION	
03 - MAY - 91	(123)	23:	41:	01.8		42 .647	N	43 .263	E	11	D	5.2	157	305	2.74	0:39	P	WESTERN CAUCASUS	
18 - JUL - 90	(199)	11:	29:	24.9		36 .990	N	29 .595	E	17	D	5.2	80	1359	12.22	3:07	P	TURKEY	
07 - DEC - 91	(341)	14:	22:	32.2		25 .191	N	62 .974	E	30	D	5.2	309	2374	21.35	4:51	P	SOUTHWESTERN PAKISTAN	
20 - AUG - 91	(232)	08:	46:	40.5		37 .646	N	72 .150	E	135	D	5.2	268	2380	21.40	4:43	P	TAJIK SSR	
14 - AUG - 90	(226)	00:	50:	39.2		27 .024	N	65 .969	E	21	D	5.2	300	2438	21.93	4:56	P	PAKISTAN	
07 - SEP - 90	(250)	00:	12:	26.2		5 .443	N	31 .686	E	10	G	5.2	22	4072	36.62	7:09	P	SUDAN	
29 - AUG - 90	(241)	20:	44:	23.0		11 .791	N	95 .034	E	25	D	5.2	288	5830	52.43	9:15	P	ANDAMAN ISLANDS REGION	
02 - MAY - 91	(122)	01:	25:	30.1		42 .541	N	43 .960	E	10	G	5.1	167	275	2.47	0:32	P	WESTERN CAUCASUS	
06 - OCT - 91	(279)	01:	46:	47.5		41 .096	N	43 .409	E	18	D	5.0	134	154	1.39	0:24	P	GEORGIA-ARMENIA-TURKEY BORD REG	
03 - JUN - 91	(154)	10:	22:	40.4		40 .048	N	42 .859	E	28	D	5.0	87	159	1.43	0:13	P	TURKEY	
04 - JUL - 91	(185)	06:	26:	31.8		42 .387	N	44 .116	E	20	D	5.0	169	256	2.30	0:39	P	WESTERN CAUCASUS	
27 - MAR - 92	(087)	19:	21:	04.6		42 .456	N	43 .715	E	33	N	5.0	162	272	2.44	0:42	P	NORTHWESTERN CAUCASUS	
21 - MAY - 91	(141)	17:	37:	38.8		42 .867	N	48 .028	E	10	G	5.0	221	410	3.69	0:49	P	CASPIAN SEA	
07 - MAY - 92	(128)	19:	15:	02.3		38 .677	N	40 .130	E	10	G	5.0	69	427	3.84	1:15	P	TURKEY	
28 - DEC - 90	(362)	04:	03:	53.6		37 .106	N	49 .227	E	10	G	5.0	309	516	4.64	1:29	P	CASPIAN SEA	
08 - SEP - 91	(251)	10:	14:	58.8		36 .264	N	71 .324	E	133		5.0	272	2355	21.17	4:43	P	AFGHANISTAN-TAJIKISTAN BORD REG	
29 - APR - 91	(119)	11:	51:	10.3		42 .572	N	43 .816	E	10	G	4.9	165	281	2.53	0:34	P	WESTERN CAUCASUS	
15 - MAY - 91	(135)	14:	28:	50.1		42 .565	N	43 .349	E	14	D	4.9	157	294	2.64	0:36	P	WESTERN CAUCASUS	
01 - JAN - 91	(001)	19:	18:	56.4		39 .822	N	48 .439	E	61	D	4.9	275	318	2.86	0:48	P	N.W. IRAN-USSR BORDER REGION	
15 - FEB - 92	(046)	12:	52:	51.7	*	42 .803	N	46 .524	E	15	D	4.9	206	332	2.99	0:52	P	EASTERN CAUCASUS	
03 - SEP - 90	(246)	02:	40:	59.1		36 .409	N	70 .671	E	202	D	4.9	272	2294	20.63	4:27	P	HINDU KUSH REGION	
23 - JUL - 90	(204)	20:	54:	56.6		42 .719	N	45 .947	E	33	N	4.8	199	305	2.74	0:47	Pn	EASTERN CAUCASUS	
27 - JUL - 90	(208)	05:	31:	00.1		37 .318	N	49 .585	E	10	G	4.8	305	525	4.72	1:29	P	CASPIAN SEA	
21 - AUG - 90	(233)	03:	47:	26.2		37 .309	N	49 .685	E	10	G	4.8	305	533	4.79	1:30	P	CASPIAN SEA	
28 - JUN - 90	(179)	03:	20:	35.0		37 .085	N	49 .642	E	10	G	4.8	307	545	4.90	1:36	P	CASPIAN SEA	
01 - JUL - 90	(182)	12:	24:	57.2		37 .181	N	49 .885	E	10	G	4.8	305	555	4.99	1:35	P	CASPIAN SEA	
20 - AUG - 90	(232)	12:	20:	11.0	*	36 .956	N	49 .720	E	33	N	4.8	308	560	5.03	1:30	P	WESTERN IRAN	
10 - MAY - 91	(130)	20:	52:	27.3		42 .534	N	43 .986	E	10	G	4.7	167	274	2.46	0:32	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	11:	10:	11.9		42 .584	N	43 .904	E	10	G	4.7	166	281	2.53	0:35	P	WESTERN CAUCASUS	
01 - DEC - 91	(335)	09:	17:	27.0		36 .373	N	45 .036	E	35	*	4.7	356	419	3.77	1:08	P	IRAN-IRAQ BORDER REGION	
01 - JUL - 90	(182)	21:	16:	48.3		37 .285	N	48 .820	E	10	G	4.7	310	476	4.28	1:29	P	CASPIAN SEA	
27 - DEC - 90	(361)	13:	26:	57.1		36 .539	N	48 .907	E	10	G	4.7	316	541	4.87	1:26	P	NORTHWESTERN IRAN	
28 - JUN - 90	(179)	03:	42:	01.9	*	37 .079	N	50 .147	E	10	G	4.7	304	581	5.22	1:39	P	CASPIAN SEA	
19 - JUN - 91	(170)	06:	40:	28.9		40 .282	N	42 .971	E	33	N	4.6	97	150	1.35	0:21	P	TURKEY	
16 - JUN - 91	(167)	11:	07:	10.6		39 .984	N	42 .875	E	26	D	4.6	85	158	1.42	0:15	P	TURKEY	
03 - MAY - 91	(123)	06:	08:	37.1		42 .482	N	43 .363	E	10	G	4.6	157	285	2.56	0:37	P	WESTERN CAUCASUS	
29 - APR - 91	(119)	10:	52:	42.2		42 .712	N	44 .102	E	10	G	4.6	170	291	2.62	0:32	P	WESTERN CAUCASUS	
10 - MAY - 91	(130)	01:	25:	15.6		42 .496	N	43 .153	E	10	G	4.6	154	294	2.64	0:40	P	WESTERN CAUCASUS	
24 - SEP - 90	(267)	06:	35:	13.9	*	38 .253	N	47 .951	E	10	G	4.6	306	348	3.13		P	NORTHWESTERN IRAN	<PC only>
01 - JUL - 90	(182)	17:	19:	44.1		37 .280	N	48 .818	E	10	G	4.6	310	476	4.28	1:30	P	CASPIAN SEA	
17 - JUL - 90	(198)	04:	02:	09.2		37 .137	N	49 .979	E	33	N	4.6	304	565	5.08	1:35	P	CASPIAN SEA	
13 - AUG - 90	(225)	06:	18:	25.1		36 .663	N	49 .884	E	35	*	4.6	309	592	5.33	1:37	P	WESTERN IRAN	
25 - OCT - 90	(298)	04:	52:	06.0	*	76 .243	N	8 .409	E	10	G	4.6	167	4382	39.41	?7:47	P	SVALBARD REGION	<within coda>

Table 3-7c. NEIC Parameters of Identified Events Sorted by Magnitude.

Date	D.o.Y.	Hr	Mn	Sec		Latitude deg.		Longitude deg.		Depth km	Mag	Azi deg.	Epicentral Distance km	Epicentral Distance deg.	Travel m:ss	Phase	Region
18 - FEB - 92	(049)	01:	39:	40.9	*	41 .477	N	43 .464	E	33 N	4.5	145	183	1.65	0:24	P	GEORGIA-ARMENIA-TURKEY BORD REG
30 - JUN - 91	(181)	20:	09:	18.3		42 .424	N	43 .688	E	10 G	4.5	162	269	2.42	0:47	P	WESTERN CAUCASUS
02 - MAY - 91	(122)	09:	44:	41.4		42 .507	N	43 .507	E	10 G	4.5	159	283	2.54	0:36	P	WESTERN CAUCASUS
29 - APR - 91	(119)	11:	59:	54.8		42 .625	N	43 .962	E	10 G	4.5	167	284	2.56	0:34	P	WESTERN CAUCASUS
22 - APR - 92	(113)	03:	03:	47.6	*	39 .557	N	39 .557	E	10 G	4.5	83	446	4.01	1:17	P	TURKEY
11 - JUL - 90	(192)	04:	36:	08.6	*	37 .015	N	49 .530	E	33 N	4.5	308	543	4.88	1:35	P	CASPIAN SEA
23 - FEB - 92	(054)	12:	03:	11.7	*	36 .391	N	49 .179	E	10 G	4.5	316	569	5.12	1:41	P	WESTERN IRAN
10 - OCT - 91	(283)	02:	44:	49.6		41 .399	N	43 .259	E	10 G	4.4	139	187	1.68	0:21	P	GEORGIA-ARMENIA-TURKEY BORD REG
05 - MAR - 92	(065)	03:	30:	16.1		38 .263	N	44 .974	E	33 N	4.4	354	209	1.88	0:31	P	TURKEY-IRAN BORDER REGION
10 - AUG - 91	(222)	08:	57:	51.8	*	40 .052	N	42 .153	E	10 G	4.4	88	219	1.97	0:46	P	TURKEY
17 - JUN - 91	(168)	03:	04:	45.5	*	42 .252	N	44 .222	E	10 G	4.4	170	239	2.15	0:32	P	WESTERN CAUCASUS
10 - MAY - 91	(130)	20:	30:	45.3		42 .627	N	43 .449	E	28 D	4.4	159	297	2.67	0:35	P	WESTERN CAUCASUS
27 - MAR - 91	(086)	22:	17:	55.0		40 .443	N	45 .443	E	33 N	4.3	240	70	0.63	-0:08	P	EASTERN CAUCASUS <early>
12 - NOV - 91	(316)	20:	35:	59.6	*	39 .306	N	44 .936	E	33 N	4.3	349	94	0.84	0:26	P	ARMENIA-AZERBAIJAN-IRAN BORD REG
02 - MAY - 91	(122)	02:	07:	31.6	?	41 .34	N	45 .17	E	10 G	4.3	196	139	1.25	0:45	P	EASTERN CAUCASUS
29 - APR - 91	(119)	11:	04:	28.9	*	42 .510	N	43 .816	E	10 G	4.3	164	275	2.47	0:35	P	WESTERN CAUCASUS
22 - SEP - 90	(265)	02:	46:	01.2	*	42 .538	N	46 .449	E	33 N	4.3	208	304	2.73	0:34	P	EASTERN CAUCASUS
05 - SEP - 91	(248)	19:	23:	04.8		38 .847	N	41 .417	E	10 G	4.3	64	318	2.86	0:48	P	TURKEY
22 - AUG - 90	(234)	07:	51:	49.5	*	37 .056	N	49 .327	E	10 G	4.3	309	526	4.73	1:33	P	CASPIAN SEA
27 - APR - 91	(117)	03:	31:	58.5	*	40 .093	N	43 .719	E	10 G	4.2	87	86	0.77	0:07	P	TURKEY-USSR BORDER REGION
08 - JUN - 91	(159)	01:	12:	01.8	*	41 .005	N	43 .563	E	33 N	4.2	135	138	1.24	0:12	P	TURKEY-USSR BORDER REGION
15 - FEB - 92	(046)	15:	18:	04.2	*	41 .434	N	46 .184	E	33 N	4.2	220	190	1.71	0:34	P	EASTERN CAUCASUS
03 - MAY - 91	(123)	06:	12:	54.2	?	41 .93	N	43 .80	E	33 N	4.2	159	214	1.93	0:41	P	TURKEY-USSR BORDER REGION
04 - MAY - 91	(124)	04:	53:	35.6	?	42 .15	N	43 .51	E	10 G	4.2	156	246	2.21	0:41	P	WESTERN CAUCASUS
20 - JUL - 90	(201)	17:	30:	36.2	?	42 .10	N	46 .77	E	33 N	4.2	217	278	2.50	0:50	P	EASTERN CAUCASUS
07 - MAY - 91	(127)	09:	01:	23.6	*	42 .606	N	43 .125	E	10 G	4.2	155	306	2.75	0:38	P	WESTERN CAUCASUS
15 - FEB - 92	(046)	13:	37:	40.1		42 .934	N	46 .548	E	33 N	4.2	205	346	3.11	0:49	P	EASTERN CAUCASUS
02 - AUG - 90	(214)	17:	12:	48.5	*	38 .540	N	48 .186	E	33 N	4.2	300	346	3.12	0:56	P	N.W. IRAN-USSR BORDER REGION
23 - DEC - 90	(357)	21:	28:	50.7	*	42 .115	N	44 .356	E	33 N	4.1	172	222	2.00	0:23	P	WESTERN CAUCASUS
02 - MAY - 91	(122)	02:	18:	00.1	*	42 .211	N	43 .906	E	10 G	4.1	164	241	2.17	0:32	P	WESTERN CAUCASUS
01 - MAY - 91	(121)	23:	19:	11.8	*	42 .719	N	44 .053	E	10 G	4.1	169	293	2.63	0:29	P	WESTERN CAUCASUS
02 - MAY - 91	(122)	09:	00:	35.2	*	42 .704	N	43 .692	E	10 G	4.1	164	298	2.68	0:33	P	WESTERN CAUCASUS
02 - AUG - 90	(214)	21:	17:	18.7	*	38 .398	N	48 .228	E	33 N	4.1	301	358	3.22	0:55	P	N.W. IRAN-USSR BORDER REGION
02 - MAY - 91	(122)	03:	42:	26.1	*	42 .608	N	43 .477	E	10 G	4.0	160	294	2.64	0:42	P	WESTERN CAUCASUS
15 - FEB - 92	(046)	13:	30:	32.0	*	42 .462	N	46 .493	E	33 N	4.0	209	298	2.68	0:54	P	EASTERN CAUCASUS
02 - MAY - 91	(122)	04:	30:	53.9	*	42 .481	N	43 .201	E	10 G	3.9	155	290	2.61	0:41	P	WESTERN CAUCASUS
24 - MAY - 91	(144)	07:	59:	38.8	*	42 .679	N	42 .908	E	10 G	3.9	152	321	2.89	0:26	P	WESTERN CAUCASUS
14 - MAY - 91	(134)	09:	36:	25.4	*	42 .609	N	43 .579	E	10 G	3.8	161	291	2.62	0:37	P	WESTERN CAUCASUS
26 - APR - 92	(117)	13:	15:	51.2	*	37 .663	N	47 .104	E	33 N	3.8	322	343	3.09	0:56	P	NORTHWESTERN IRAN
08 - DEC - 91	(342)	01:	02:	06.2	*	38 .335	N	48 .151	E	33 N	3.8	303	357	3.21	1:02	P	ARMENIA-AZERBAIJAN-IRAN BORD REG
04 - JUN - 91	(155)	00:	55:	16.3		40 .600	N	42 .989	E	10 G	3.7	110	156	1.40	0:16	P	TURKEY
27 - MAY - 91	(147)	03:	40:	45.5	?	42 .34	N	45 .86	E	10 G	3.7	201	263	2.37	0:26	P	EASTERN CAUCASUS

```
   LOG.G3       3-JUN-92   16:25:19     Rdgeos V10.02: GEOS Tape Log File

  Default  Chan 1  Chan 2  Chan 3  Chan 4  Chan 5  Chan 6
    G3     G3A(4)  G3A(5)  G3A(6)  G3B(4)  G3B(5)  G3B(6)

Experiment    Location    Serial No.    Year
     28           3            5         1991

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio

  1    1  Sensor Cal  121:14:47:27.382 EXT.  0.000 1211447Jn.G3    00:37   1200.     2.06 None
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

 ***  506 null values filled in
  2    2  Amp Calib   121:14:48:15.683 EXT.  0.000 1211448Fn.G3    00:41   1200.     2.06 None
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

File    Clock event   Clock time & Standard     Old Time & Standard                    - - - Internal/External Skew - - -
  3     VB Synch TMO 121:14:55:35.717  NONE
  4     WWVB Corr.   121:14:56:44.000  NONE                          0.001  0.000  0.000  0.000  0.001  0.000  0.000  0.000
                                                                    Mean: 0.000    Std. dev:      1.225  Corr: 0.000
  5     VB Synch TMO 121:18:05:35.750  NONE
  6     VB Synch TMO 121:21:15:35.816  NONE

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio

  7    3  Trigger     121:23:19:44.228 EXT.  0.000 1212319On.G3    00:26   1200.     2.06  26.66    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

File    Clock event   Clock time & Standard     Old Time & Standard                    - - - Internal/External Skew - - -
  8     VB Synch TMO 122:00:25:35.889  NONE

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio

  9    4  Trigger     122:01:26:00.618 EXT.  0.000 1220126An.G3    03:27   1200.     2.06  26.94    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

 10    5  Trigger     122:02:08:17.838 EXT.  0.000 1220208Fn.G3    00:26   1200.     2.06  26.94    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

 11    6  Trigger     122:02:18:31.458 EXT.  0.000 1220218Kn.G3    01:42   1200.     2.06  26.94    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

 12    7  Trigger     122:02:29:34.222 EXT.  0.000 1220229Ln.G3    00:28   1200.     2.06  26.82    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

File    Clock event   Clock time & Standard     Old Time & Standard                    - - - Internal/External Skew - - -
 13     WWVB Corr.   122:02:57:52.004  NONE                           0.004  0.004  0.004  0.004  0.004  0.004  0.004  0.004
                                                                    Mean: 0.004    Std. dev:      0.000  Corr: 0.004
 14     VB Synch TMO 122:03:35:35.959  NONE

   LOG.G3       3-JUN-92   16:25:19     Rdgeos V10.02: GEOS Tape Log File

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio

 15    8  Trigger     122:03:43:07.589 EXT.  0.004 1220343Cn.G3    00:16   1200.     2.06  26.90    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

 16    9  Trigger     122:04:31:33.992 EXT.  0.004 1220431Ln.G3    01:21   1200.     2.06  26.94    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

 17   10  Trigger     122:06:26:54.759 EXT.  0.004 1220626Sn.G3    00:18   1200.     2.06  26.99    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

File    Clock event   Clock time & Standard     Old Time & Standard                    - - - Internal/External Skew - - -
 18     VB Synch TMO 122:06:45:36.042  NONE

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio

 19   11  Trigger     122:07:54:04.183 EXT.  0.004 1220754Bn.G3    00:54   1200.     2.06  26.96    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

 20   12  Trigger     122:09:01:07.788 EXT.  0.004 1220901Cn.G3    02:11   1200.     2.06  26.94    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

 21   13  Trigger     122:09:45:18.411 EXT.  0.004 1220945Gn.G3    02:13   1200.     2.06  26.93    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

File    Clock event   Clock time & Standard     Old Time & Standard                    - - - Internal/External Skew - - -
 22     VB Synch TMO 122:09:55:36.110  NONE

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio

 23   14  Trigger     122:11:58:09.178 EXT.  0.004 1221158Dn.G3    00:35   1200.     2.06  26.94    1     0.4    20.  2**3
                                             Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                             Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

*** No. files processed:   23. ***
```

Figure 3-1a. Log-file of G3 tape #28.

```
   LOG.G1      18-MAR-91   12:52:21     PCGEOS V04.07: GEOS Tape Log File

  Default  Chan 1  Chan 2  Chan 3  Chan 4  Chan 5  Chan 6
    G1     G1A(4)  G1A(5)  G1A(6)  G1B(4)  G1B(5)  G1B(6)

 ** Corrupted first GEOS header.  Use header file —>..\..\G1.GHD
**
 ** 2 time cell errors detected **
 ** Corrupted first GEOS header.  Use header file —>..\..\G1.GHD
**
 ** 1 time cell errors detected **
 ** Corrupted first GEOS header.  Use header file —>..\..\G1.GHD
**
 ** 2 time cell errors detected **

Experiment    Location    Serial No.    Year
      0           0           99         1990

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio
  3    1  Trigger     183:07:50:43.264 WWVB   .000 1830750On.G1    00:16   1200.     2.06  20.00    4      .5    10.  2**3
                                            Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                            Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

Experiment    Location    Serial No.    Year
      0           1           43         1990
  4    2  Trigger     183:08:17:20.104 MAN.   .000 1830817Gn.G1    00:16   1200.     2.06  24.38    1      .4    20.  2**3
                                            Ch 1: VEL, 60 dB,  50 Hz | Ch 2: VEL, 60 dB,  50 Hz | Ch 3: VEL, 60 dB,  50 Hz |
                                            Ch 4: VEL, 60 dB,  50 Hz | Ch 5: VEL, 60 dB,  50 Hz | Ch 6: VEL, 60 dB,  50 Hz |

File    Clock event   Clock time & Standard     Old Time & Standard                  - - - Internal/External Skew - - -
  5     Master Synch 183:08:26:00.000  EXT.     0:00:00:**.007 WWVB      .000   .000   .000   .000   .000   .000   .000   .000
                                                                        Mean:  .000    Std. dev:       .000  Corr:  .000

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio
  6    3  Trigger     183:08:28:23.031 EXT.   .000 1830828Hn.G1    00:24   1200.     2.06  24.30    1      .4    20.  2**3
                                            Ch 1: VEL, 60 dB,  50 Hz | Ch 2: VEL, 60 dB,  50 Hz | Ch 3: VEL, 60 dB,  50 Hz |
                                            Ch 4: VEL, 60 dB,  50 Hz | Ch 5: VEL, 60 dB,  50 Hz | Ch 6: VEL, 60 dB,  50 Hz |
```

Figure 3-1b. Log-file of G1 tape #03.

```
   LOG.G1      02-APR-91   16:57:22     PCGEOS V04.07: GEOS Tape Log File

  Default  Chan 1  Chan 2  Chan 3  Chan 4  Chan 5  Chan 6
    G1     G1A(4)  G1A(5)  G1A(6)  G1B(4)  G1B(5)  G1B(6)


File    Clock event   Clock time & Standard     Old Time & Standard                  - - - Internal/External Skew - - -
  1     Master Synch 261:08:57:00.000  EXT.   ***:**:**:**.000 NONE      .090   .090   .090   .090   .090   .090   .090   .090
                                                                        Mean:  .090    Std. dev:       .000  Corr:  .090
  2     WWVB Corr.   261:08:58:39.000  EXT.                               .000   .000   .000   .000   .000   .000   .000   .000
                                                                        Mean:  .000    Std. dev:       .000  Corr:  .000
  3     WWVB Corr.   261:11:59:47.000  EXT.                               .000   .000   .000   .000   .000   .000   .000   .000
                                                                        Mean:  .000    Std. dev:       .000  Corr:  .000

Experiment    Location    Serial No.    Year
      0           1         3096         1990

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio
  4    1  Continuous  261:12:33:00.878 EXT.   .000 2611233An.G1    00:18   1200.     2.06  26.30
                                            Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                            Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

File    Clock event   Clock time & Standard     Old Time & Standard                  - - - Internal/External Skew - - -
  5     Master Synch 261:14:20:00.000  EXT.     0:00:00:**.003 MAN.      .000   .000   .000   .000   .000   .000   .000   .000
                                                                        Mean:  .000    Std. dev:       .000  Corr:  .000
  6     WWVB Corr.   261:14:22:45.000  EXT.                               .000   .001   .000   .000   .000   .000   .000   .000
                                                                        Mean:  .000    Std. dev:       .935  Corr:  .000
```

Figure 3-1c. Log-file of G1 tape #22.

```
   LOG.G2      04-APR-91   13:04:07     PCGEOS V04.07: GEOS Tape Log File

  Default  Chan 1  Chan 2  Chan 3  Chan 4  Chan 5  Chan 6
    G2     G2A(4)  G2A(5)  G2A(6)  G2B(4)  G2B(5)  G2B(6)


Experiment    Location    Serial No.    Year
      6           2           3          1990                          .002   .999   .999   .999   .999   .999   .999   .999
                                                                        Mean:  .999    Std. dev:      2.806  Corr:  .999

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio
  1    1  Trigger     186:13:27:20.632 EXT.  -.001 1861327Gn.G2    00:16   1200.     2.06  32.75    4      .7    30.  2**3
                                            Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                            Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |
  2    2  Trigger     186:13:43:35.032 EXT.  -.001 1861343Ln.G2    00:19   1200.     2.06  32.75    4      .7    30.  2**3
                                            Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                            Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |

File    Clock event   Clock time & Standard     Old Time & Standard                  - - - Internal/External Skew - - -
  3     VB Skew TMO  186:13:54:29.043  NONE
  4     WWVB Corr.   186:14:20:23.849  NONE                              .849   .849   .849   .849   .849   .849   .849   .849
                                                                        Mean:  .849    Std. dev:       .000  Corr:  .849

File Evt    Type          Time & Standard    Corr   DR100 name   Duration  Srate Pre-event Volts Trg ch   STA    LTA  Ratio
  5    3  Trigger     186:15:04:59.974 EXT.  -.151 1861504Tn.G2    05:42   1200.     2.06  32.75    4      .7    30.  2**3
                                            Ch 1: VEL, 54 dB,  50 Hz | Ch 2: VEL, 54 dB,  50 Hz | Ch 3: VEL, 54 dB,  50 Hz |
                                            Ch 4: VEL, 54 dB,  50 Hz | Ch 5: VEL, 54 dB,  50 Hz | Ch 6: VEL, 54 dB,  50 Hz |
```

Figure 3-1d. Log-file of G2 tape #06.

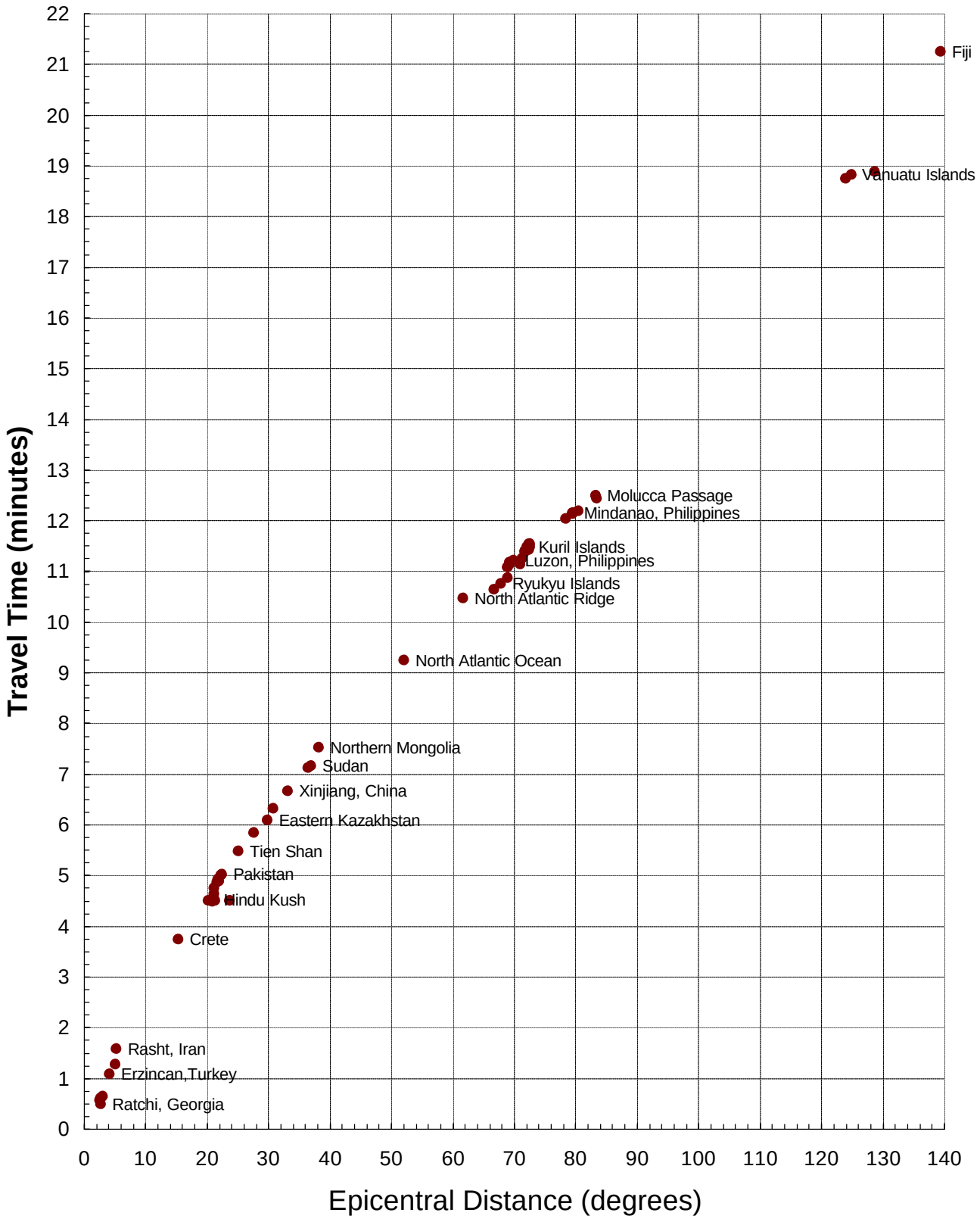
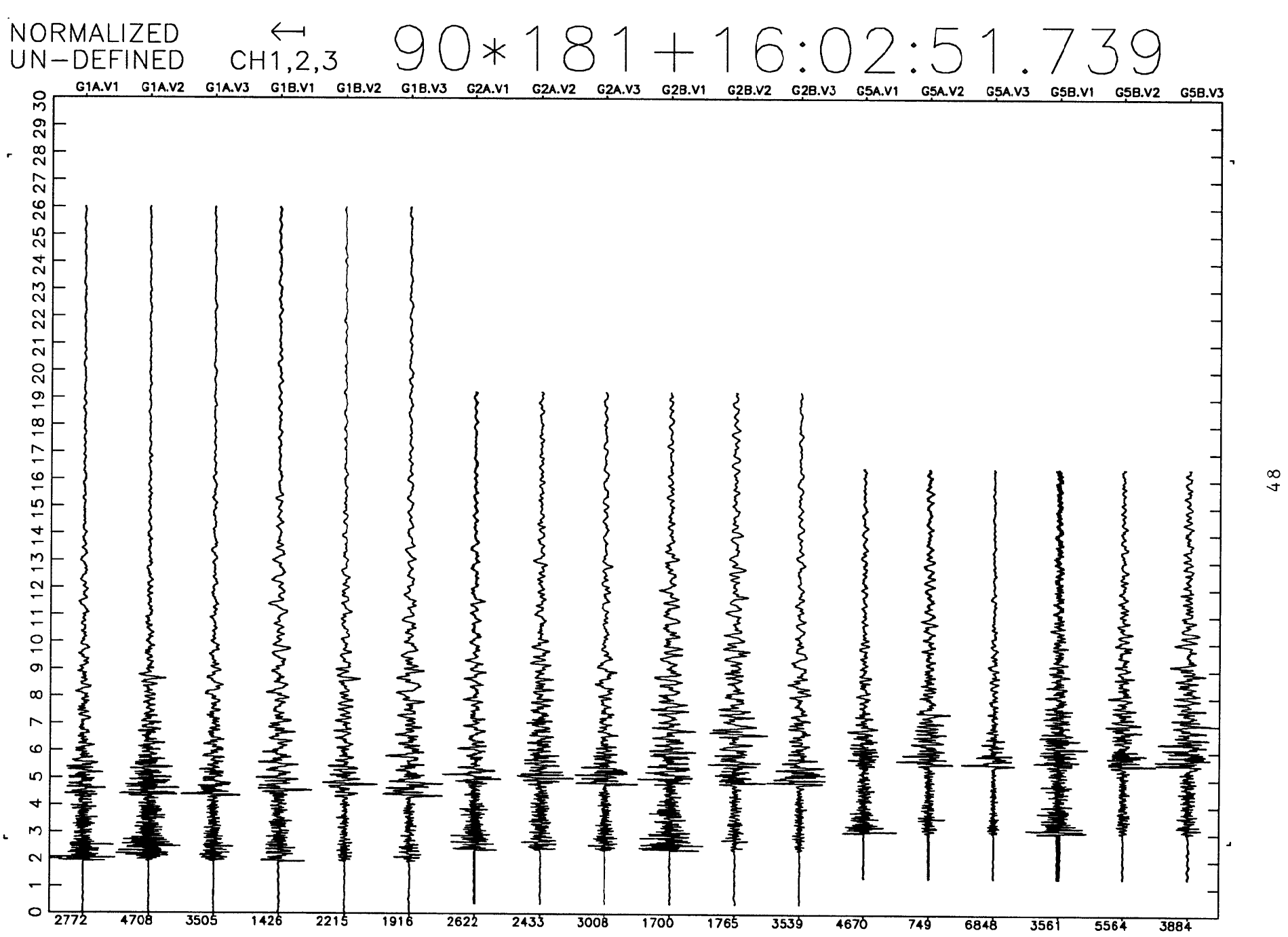


Figure 3-2. Identified Teleseismic Triggers.

Plots of GEOS records for events
at five or more sensor locations
from 26 June 1990 through 10 August 1992


NORMALIZED
UN-DEFINED
CH1,2,3
90*181+16:02:51.739
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
2772
4708
3505
1426
2215
1916
2622
2433
3008
1700
1765
3539
4670
749
6848
3561
5564
3884

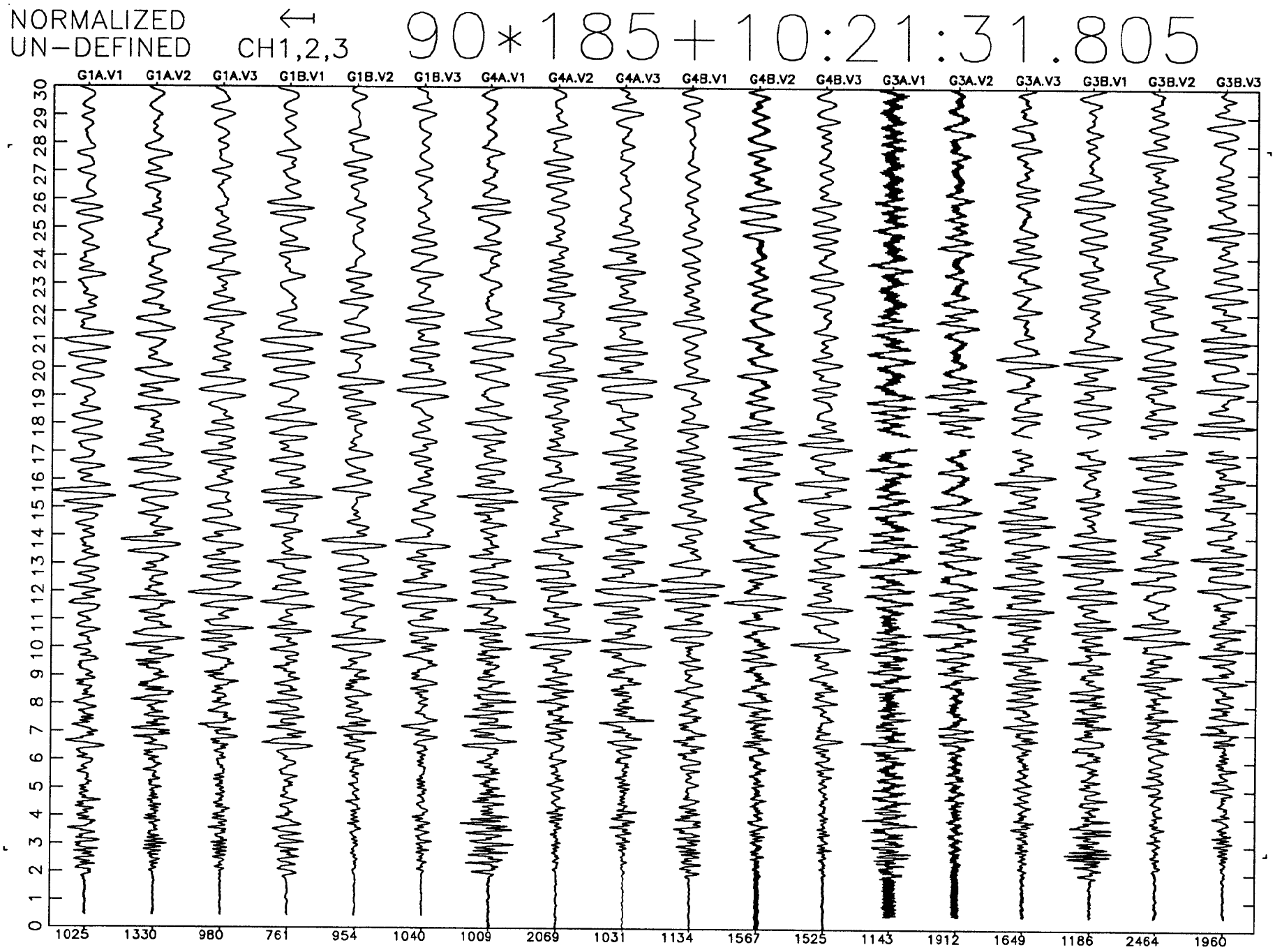
NORMALIZED
UN-DEFINED
CH1,2,3
90*182+12:26:30.709
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
1273 G1A.V1
1904 G1A.V2
991 G1A.V3
1248 G1B.V1
1151 G1B.V2
997 G1B.V3
1460 G2A.V1
1109 G2A.V2
1077 G2A.V3
1339 G2B.V1
1154 G2B.V2
872 G2B.V3
1338 G3A.V1
1064 G3A.V2
896 G3A.V3
1015 G5A.V1
243 G5A.V2
911 G5A.V3
1473 G5B.V1
1034 G5B.V2
1085 G5B.V3

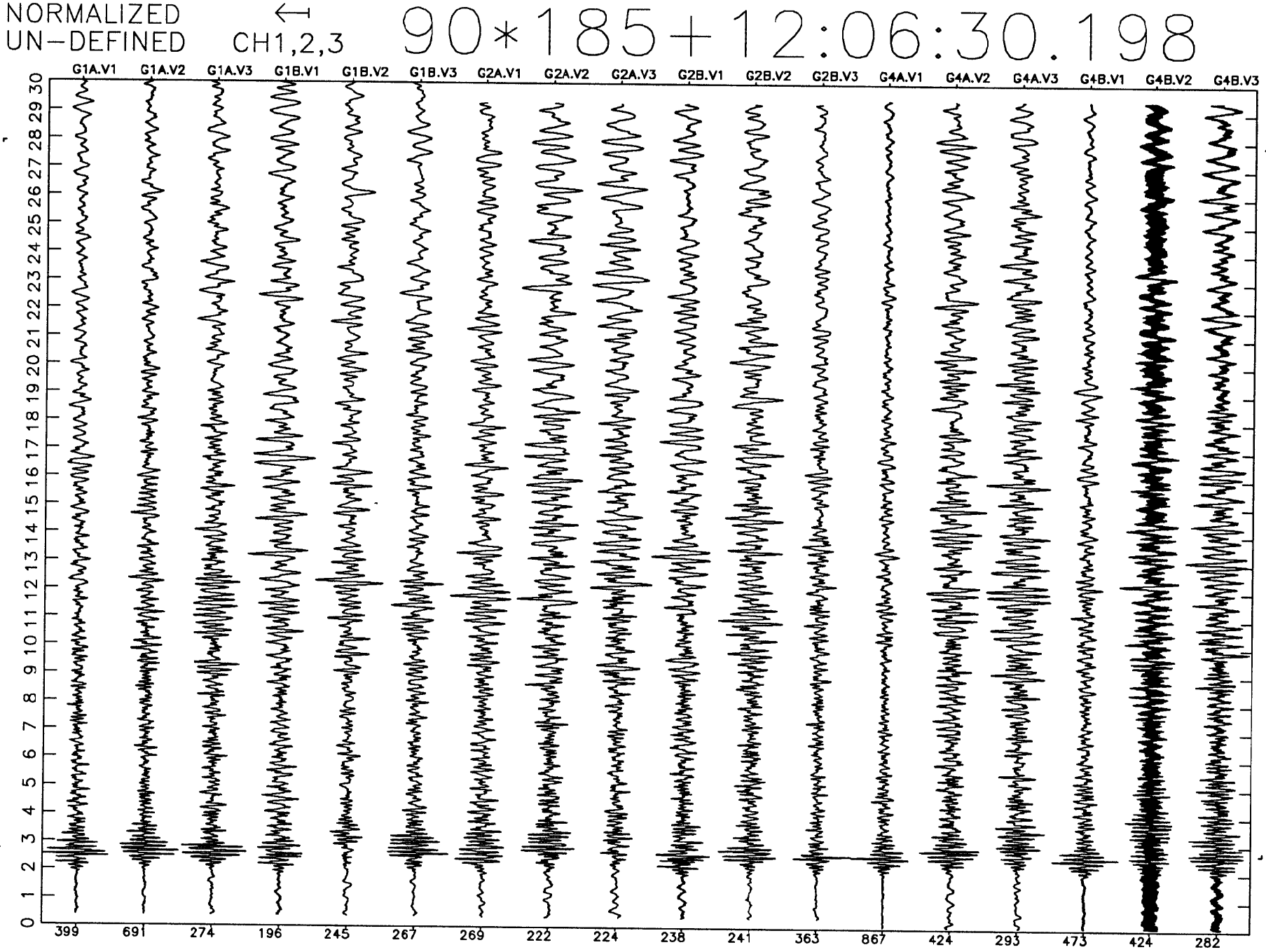
NORMALIZED
UN-DEFINED
CH1,2,3
90*184+16:47:18.114
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
4565
12503
3898
1421
1117
994
5408
2008
1683
4240
1991
1824
4201
3351
1863
3078
3495
1718
4368
677
2852
8978
4060
3275
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*185+02:35:20.253

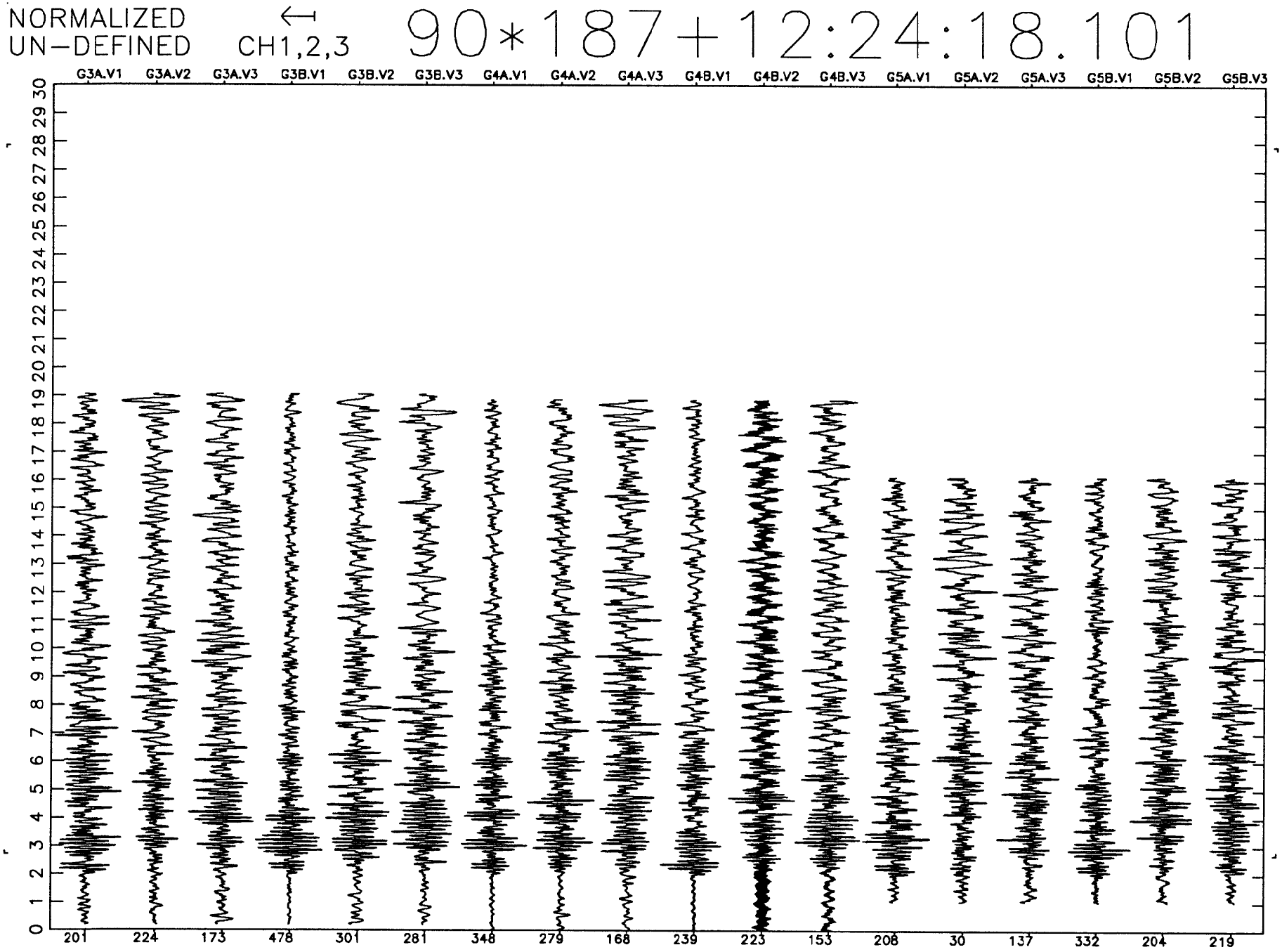
NORMALIZED
UN-DEFINED
CH1,2,3
90*185+07:00:40.795
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1784 G1A.V1
1984 G1A.V2
1363 G1A.V3
1202 G1B.V1
1798 G1B.V2
1000 G1B.V3
1640 G5A.V1
419 G5A.V2
1519 G5A.V3
1274 G5B.V1
2784 G5B.V2
2707 G5B.V3
1470 G4A.V1
2803 G4A.V2
2785 G4A.V3
1196 G4B.V1
1887 G4B.V2
1712 G4B.V3
1607 G2A.V1
2277 G2A.V2
2301 G2A.V3
1380 G2B.V1
1750 G2B.V2
1827 G2B.V3

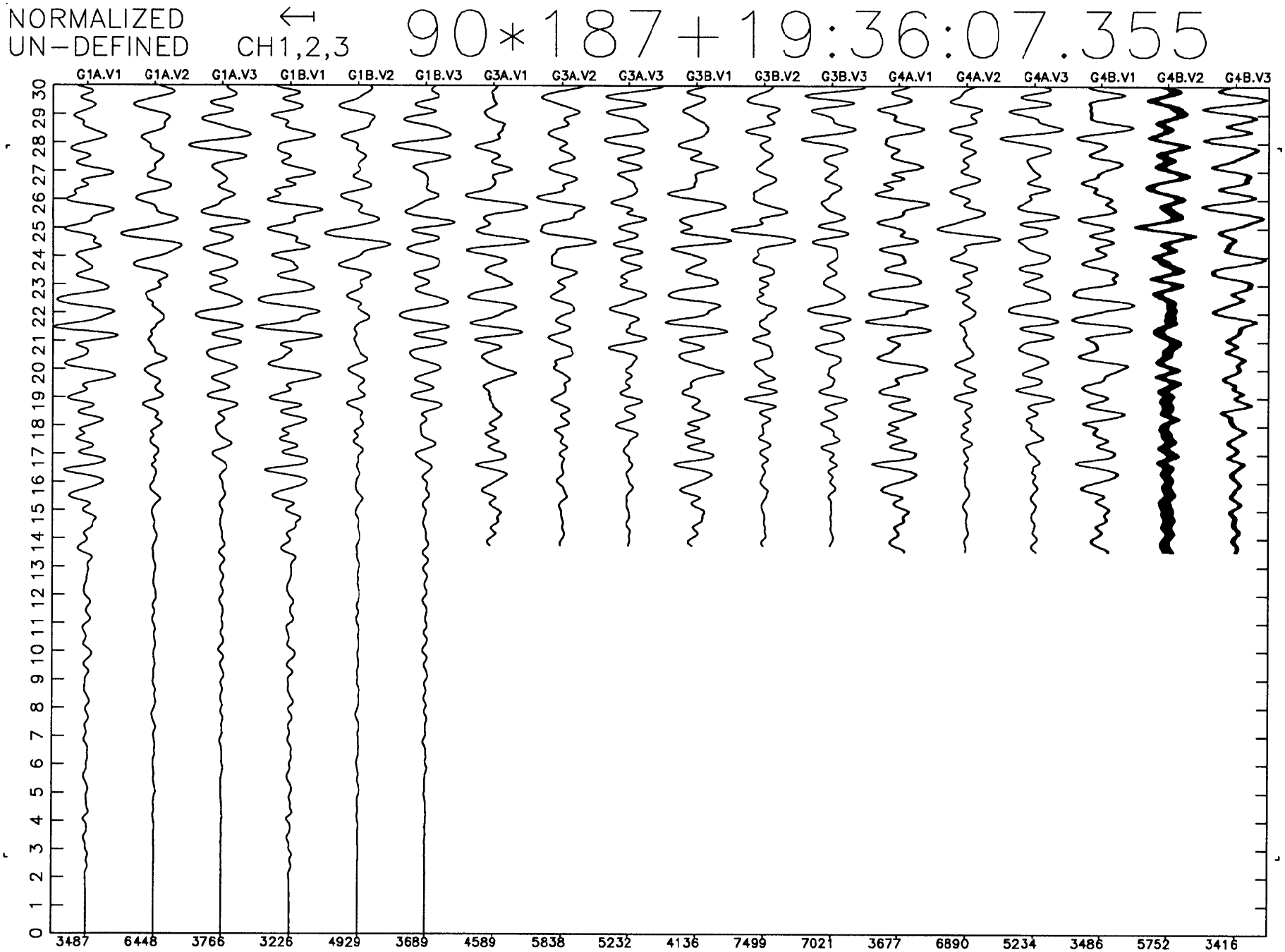
NORMALIZED
UN-DEFINED
CH1,2,3
90*185+08:17:20.543
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
934 G1A.V1
1440 G1A.V2
420 G1A.V3
558 G1B.V1
356 G1B.V2
423 G1B.V3
768 G5A.V1
102 G5A.V2
477 G5A.V3
1305 G5B.V1
1741 G5B.V2
843 G5B.V3
750 G3A.V1
753 G3A.V2
767 G3A.V3
1557 G3B.V1
945 G3B.V2
869 G3B.V3
1202 G4A.V1
733 G4A.V2
1047 G4A.V3
1333 G4B.V1
732 G4B.V2
545 G4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*185+10:21:31.805
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1025
1330
980
761
954
1040
1009
2069
1031
1134
1567
1525
1143
1912
1649
1186
2464
1960

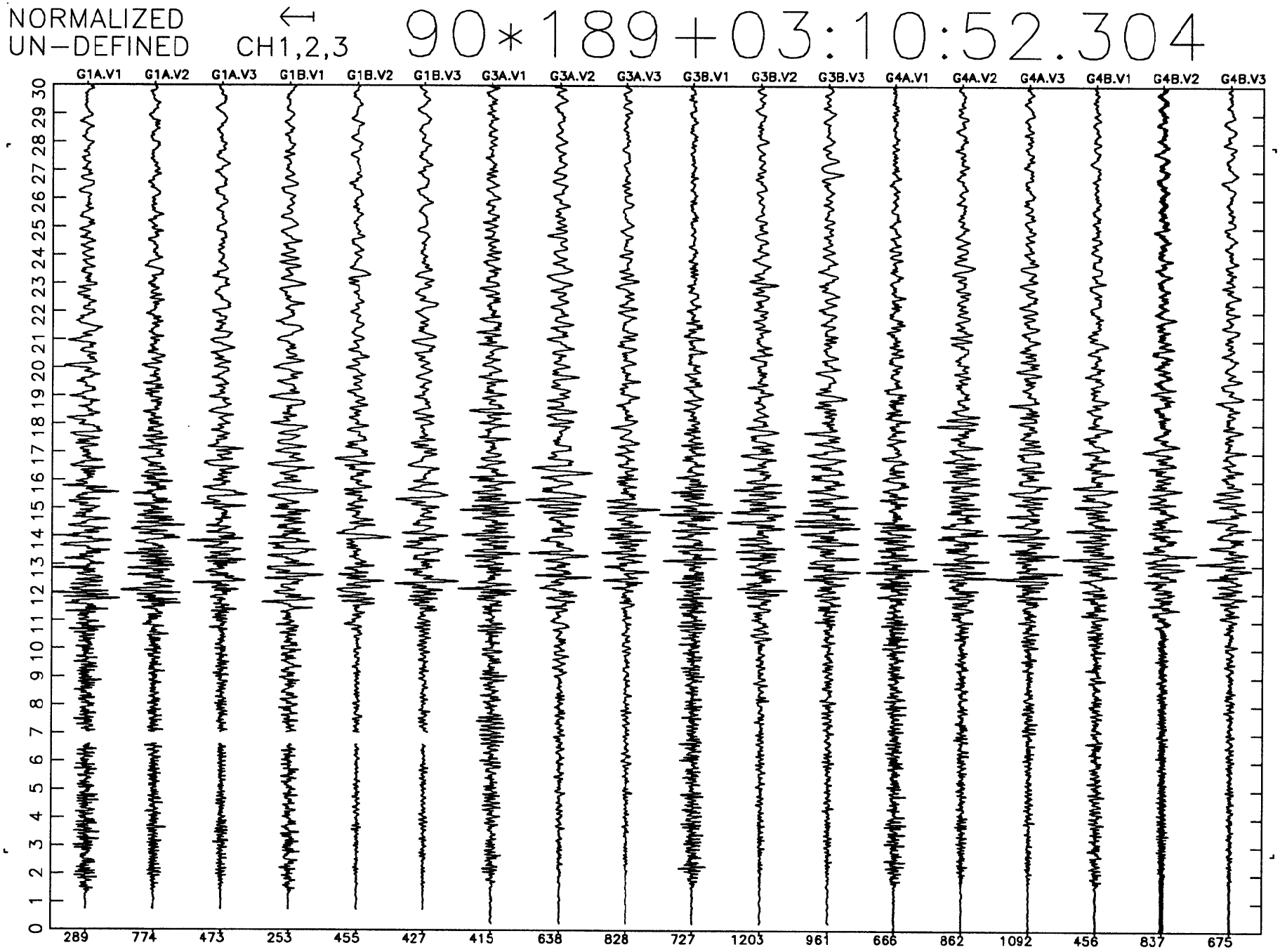

NORMALIZED
UN-DEFINED
CH1,2,3
90*185+12:06:30.198
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
399
691
274
196
245
267
269
222
224
238
241
363
867
424
293
473
424
282

NORMALIZED
UN-DEFINED
CH1,2,3
90*187+11:29:13.276


NORMALIZED
UN-DEFINED
CH1,2,3
90*187+12:24:18.101
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
201
224
173
478
301
281
348
279
168
239
223
153
208
30
137
332
204
219


NORMALIZED
UN-DEFINED
CH1,2,3
90*187+19:36:07.355
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
3487
6448
3766
3226
4929
3689
4589
5838
5232
4136
7499
7021
3677
6890
5234
3486
5752
3416

NORMALIZED
UN-DEFINED
CH1,2,3
90*188+07:40:59.185
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1434 G1A.V1
2542 G1A.V2
1489 G1A.V3
1884 G1B.V1
1791 G1B.V2
1862 G1B.V3
1960 G3A.V1
2844 G3A.V2
2532 G3A.V3
2832 G3B.V1
3716 G3B.V2
4070 G3B.V3
2973 G4A.V1
2972 G4A.V2
3530 G4A.V3
1750 G4B.V1
2095 G4B.V2
1742 G4B.V3
2047 G5A.V1
538 G5A.V2
1774 G5A.V3
2110 G5B.V1
3024 G5B.V2
2930 G5B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*189+03:10:52.304
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
289
774
473
253
455
427
415
638
828
727
1203
961
666
862
1092
456
837
675

NORMALIZED
UN-DEFINED
CH1,2,3
90*189+14:50:22.504
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*190+08:55:09.331
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
226
384
238
245
192
173
379
339
432
541
557
518
407
488
341
269
381
282
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*191+09:00:19.664
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
502 G1A.V1
862 G1A.V2
303 G1A.V3
313 G1B.V1
239 G1B.V2
304 G1B.V3
708 G3A.V1
484 G3A.V2
604 G3A.V3
1165 G3B.V1
709 G3B.V2
597 G3B.V3
1014 G4A.V1
579 G4A.V2
543 G4A.V3
711 G4B.V1
413 G4B.V2
361 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*191+12:54:18.388
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
929
1423
861
812
985
844
943
1657
1044
843
1871
1449
897
1885
1527
1076
1574
1202
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*193+09:00:38.437

NORMALIZED
UN-DEFINED
CH1,2,3
90*193+09:17:55.001

NORMALIZED
UN-DEFINED
CH1,2,3
90*193+14:42:40.496

NORMALIZED
UN-DEFINED
CH1,2,3
90*193+15:16:09.779

NORMALIZED
UN-DEFINED
CH1,2,3
90*194+08:28:17.129
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
499 G1A.V1
828 G1A.V2
589 G1A.V3
491 G1B.V1
527 G1B.V2
559 G1B.V3
640 G3A.V1
1140 G3A.V2
912 G3A.V3
515 G3B.V1
1255 G3B.V2
1227 G3B.V3
571 G4A.V1
920 G4A.V2
1014 G4A.V3
527 G4B.V1
864 G4B.V2
793 G4B.V3
534 G5A.V1
155 G5A.V2
849 G5A.V3
8247 G5B.V1
1047 G5B.V2
868 G5B.V3

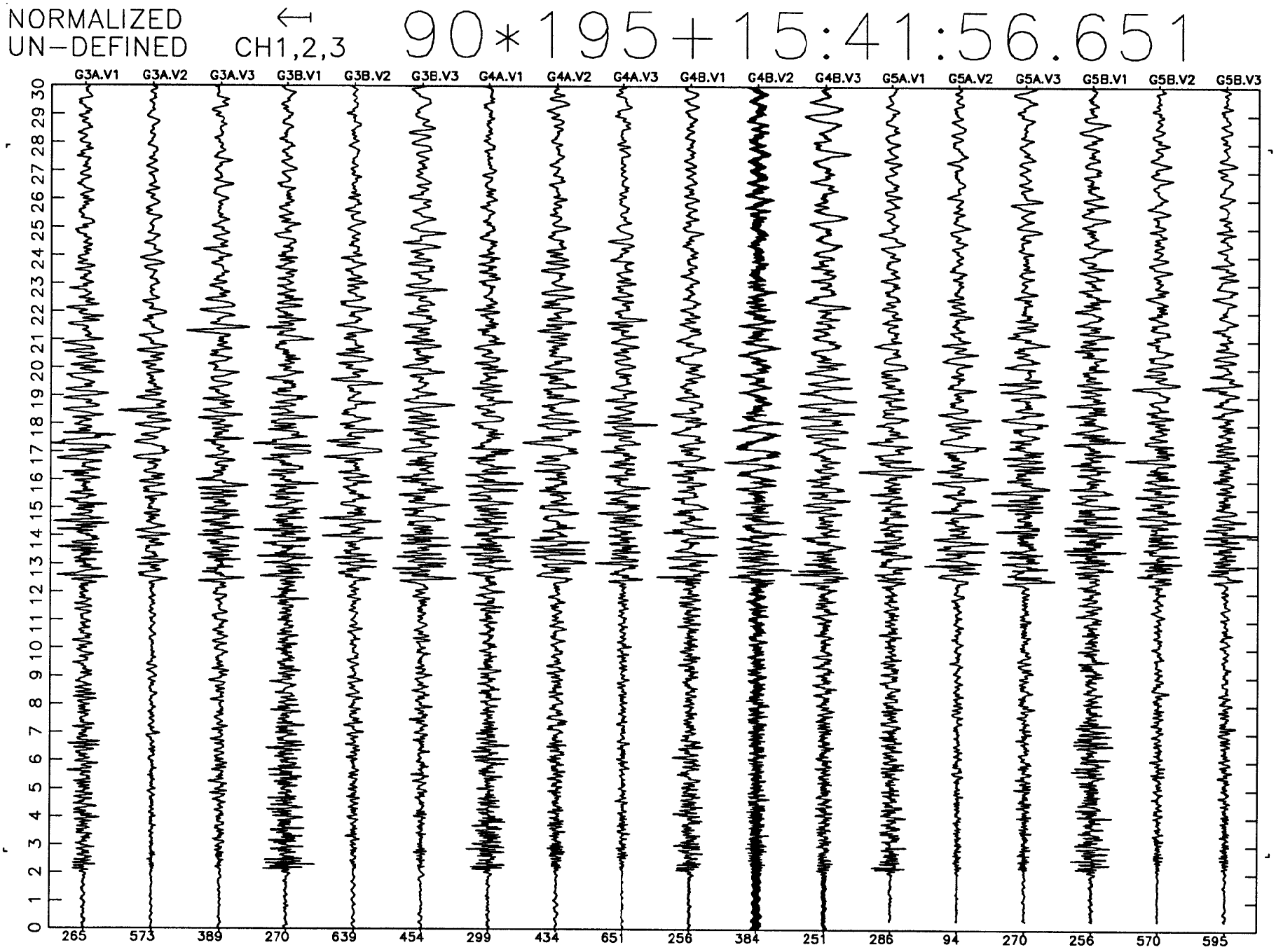
NORMALIZED
UN-DEFINED
CH1,2,3
90*194+10:43:55.312
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
686
1515
745
536
1052
706
635
967
925
656
1699
1389
641
1264
904
622
1221
1033
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

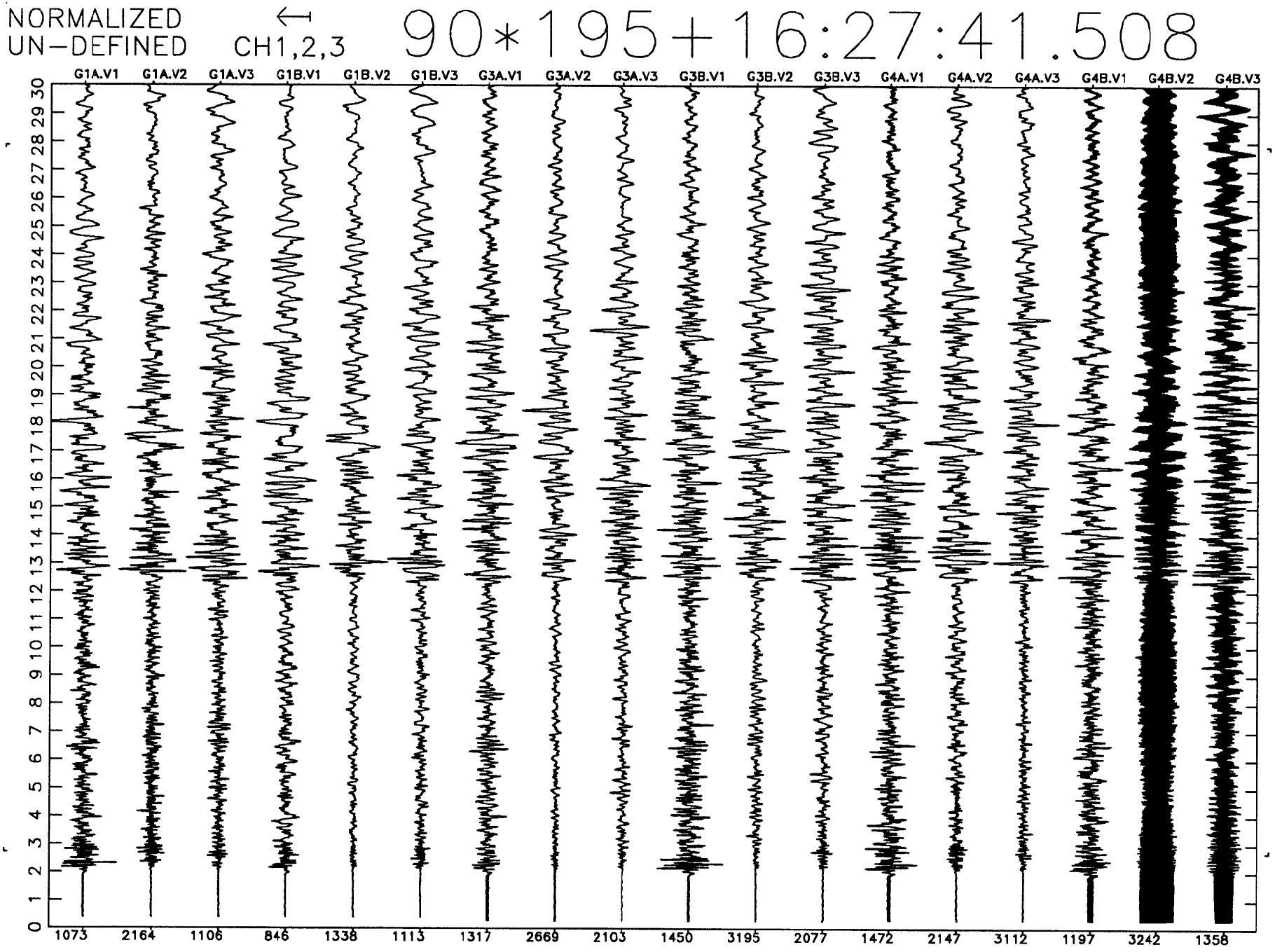
NORMALIZED
UN-DEFINED
CH1,2,3
90*194:25:10.176
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1853 G1A.V1
1982 G1A.V2
1670 G1A.V3
1726 G1B.V1
1374 G1B.V2
1704 G1B.V3
1788 G3A.V1
2084 G3A.V2
1992 G3A.V3
2013 G3B.V1
2473 G3B.V2
2529 G3B.V3
1901 G4A.V1
1902 G4A.V2
2095 G4A.V3
1775 G4B.V1
1971 G4B.V2
1743 G4B.V3
1879 G5A.V1
316 G5A.V2
1337 G5A.V3
1696 G5B.V1
1121 G5B.V2
1521 G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*194+15:16:13.916
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
774 G3A.V1
2254 G3A.V2
1163 G3A.V3
1124 G3B.V1
2823 G3B.V2
1912 G3B.V3
928 G5A.V1
472 G5A.V2
1003 G5A.V3
904 G5B.V1
2235 G5B.V2
1265 G5B.V3
810 G1A.V1
1838 G1A.V2
613 G1A.V3
1023 G1B.V1
1050 G1B.V2
839 G1B.V3
1106 G4A.V1
2124 G4A.V2
1372 G4A.V3
735 G4B.V1
1579 G4B.V2
919 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*195+06:05:32.455
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*195+07:35:48.192
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
C1A.V1
C1A.V2
C1A.V3
C1B.V1
C1B.V2
C1B.V3
C3A.V1
C3A.V2
C3A.V3
C3B.V1
C3B.V2
C3B.V3
C4A.V1
C4A.V2
C4A.V3
C4B.V1
C4B.V2
C4B.V3
C5A.V1
C5A.V2
C5A.V3
C5B.V1
C5B.V2
C5B.V3

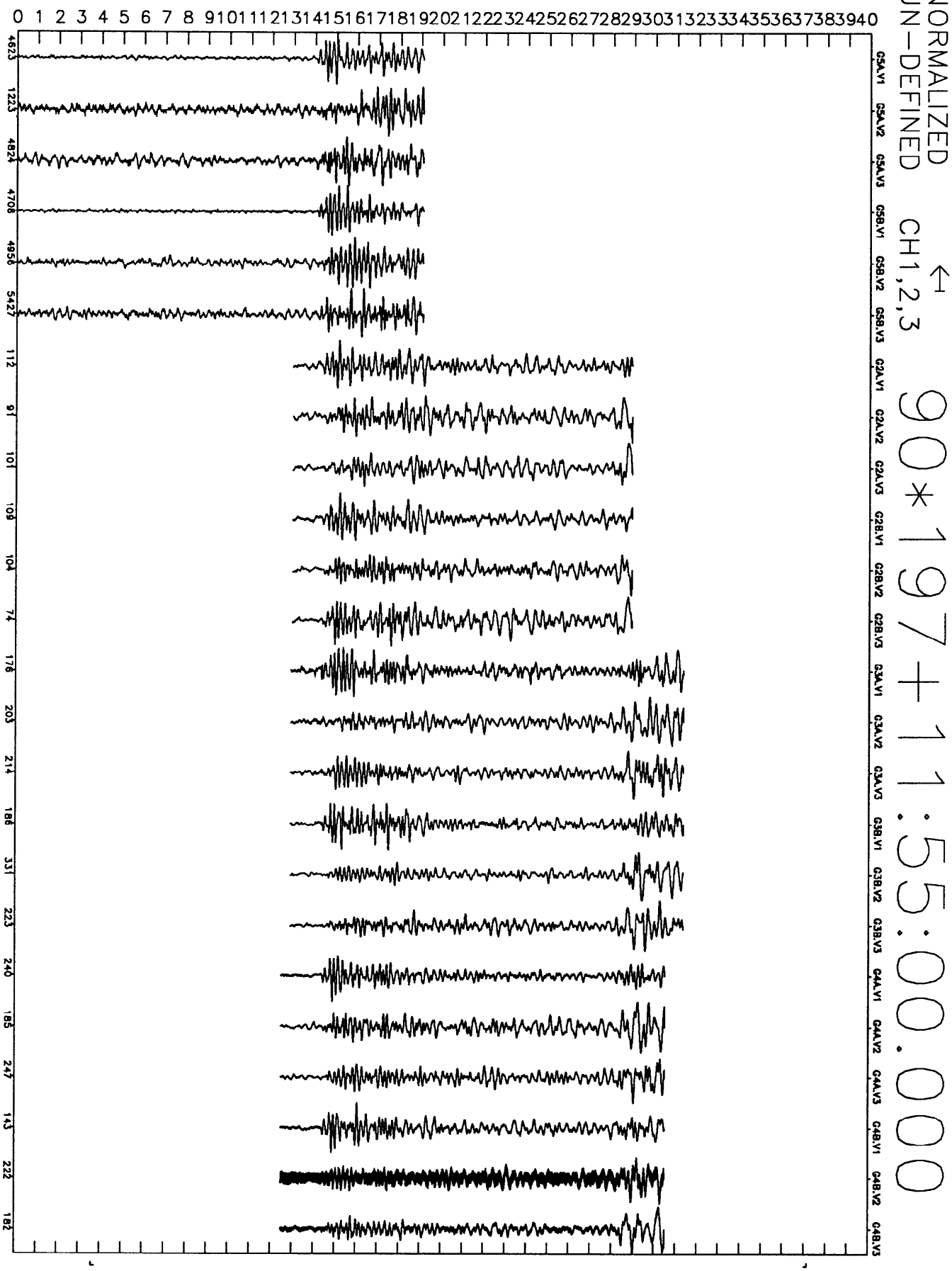

NORMALIZED
UN-DEFINED
CH1,2,3
90*195+15:41:56.651
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
265
573
389
270
639
454
299
434
651
256
384
251
286
94
270
256
570
595


NORMALIZED
UN-DEFINED
CH1,2,3
90*195+16:27:41.508
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1073
2164
1106
846
1338
1113
1317
2669
2103
1450
3195
2077
1472
2147
3112
1197
3242
1358

NORMALIZED
UN-DEFINED
CH1,2,3
90*197+11:59:59.768

NORMALIZED
UN-DEFINED
CH1,2,3
90*197+07:37:46.148

NORMALIZED
UN-DEFINED
CH1,2,3
90*197+09:37:30.233
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
207 G1A.V1
544 G1A.V2
218 G1A.V3
217 G1B.V1
320 G1B.V2
223 G1B.V3
542 G3A.V1
652 G3A.V2
651 G3A.V3
471 G3B.V1
947 G3B.V2
726 G3B.V3
359 G4A.V1
603 G4A.V2
856 G4A.V3
226 G4B.V1
658 G4B.V2
345 G4B.V3
336 G2A.V1
385 G2A.V2
380 G2A.V3
304 G2B.V1
348 G2B.V2
295 G2B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*197+11:55:00.000
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
4623
1223
4824
4708
4956
5427
112
91
101
108
104
74
176
203
214
186
331
223
240
185
247
143
222
182
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*197+12:45:53.288
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
467 G1A.V1
1044 G1A.V2
418 G1A.V3
489 G1B.V1
486 G1B.V2
434 G1B.V3
561 G2A.V1
556 G2A.V2
562 G2A.V3
541 G2B.V1
487 G2B.V2
543 G2B.V3
612 G3A.V1
840 G3A.V2
822 G3A.V3
617 G3B.V1
1235 G3B.V2
1136 G3B.V3
868 G4A.V1
1033 G4A.V2
986 G4A.V3
410 G4B.V1
788 G4B.V2
770 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*198+04:03:44.173
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
288
456
221
263
312
196
357
370
250
294
330
243
392
335
287
322
524
356
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

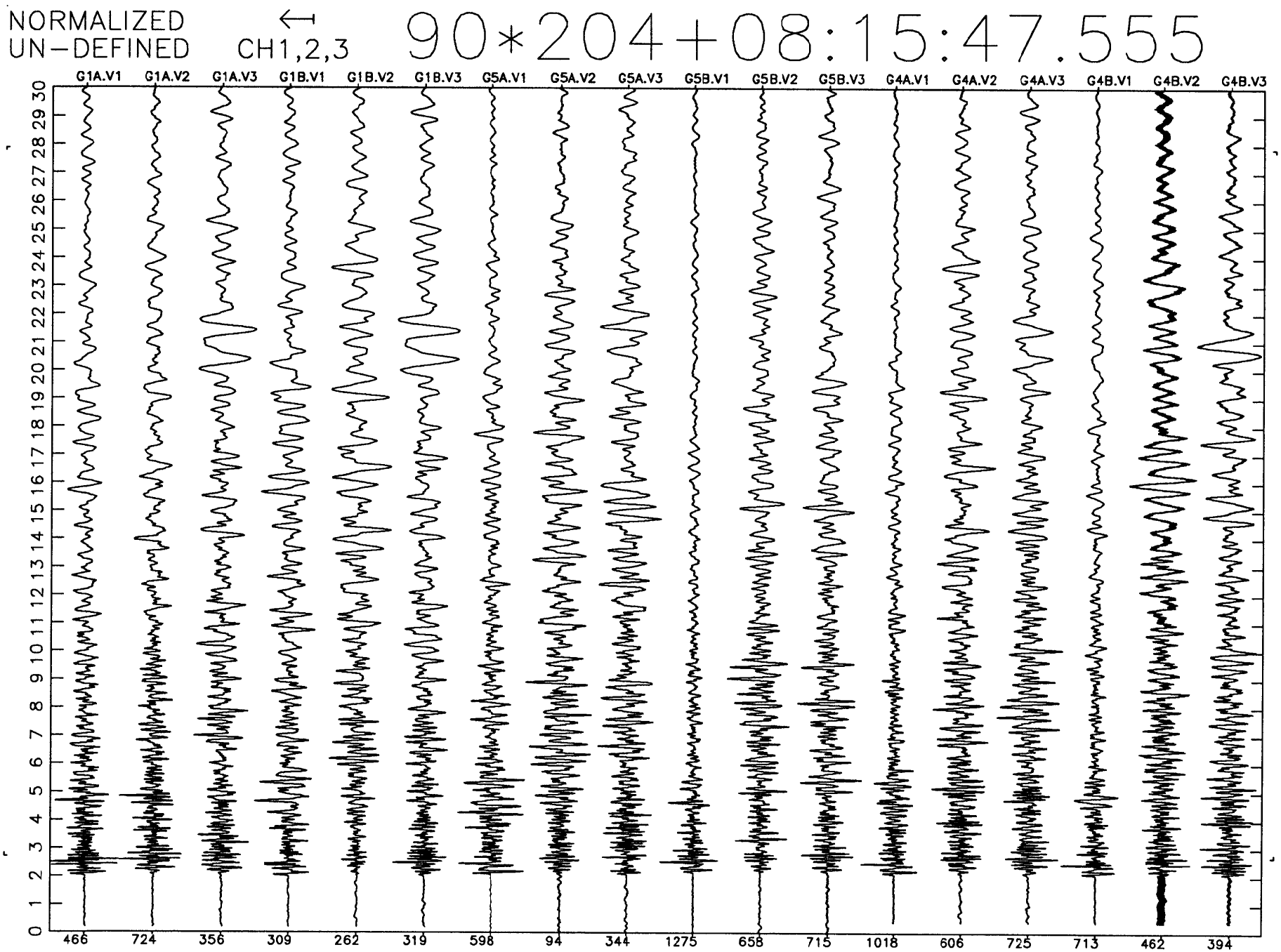
NORMALIZED
UN-DEFINED
CH1,2,3
90*1980:58:44.932
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
358 G1A.V1
464 G1A.V2
335 G1A.V3
375 G1B.V1
276 G1B.V2
203 G1B.V3
525 G2A.V1
368 G2A.V2
256 G2A.V3
448 G2B.V1
301 G2B.V2
300 G2B.V3
638 G4A.V1
404 G4A.V2
532 G4A.V3
405 G4B.V1
391 G4B.V2
336 G4B.V3
668 G5A.V1
78 G5A.V2
293 G5A.V3
587 G5B.V1
481 G5B.V2
636 G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*198+11:46:33.746
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
C4A.V1
C4A.V2
C4A.V3
C4B.V1
C4B.V2
C4B.V3
C5A.V1
C5A.V2
C5A.V3
C5B.V1
C5B.V2
C5B.V3
C1A.V1
C1A.V2
C1A.V3
C1B.V1
C1B.V2
C1B.V3
C3A.V1
C3A.V2
C3A.V3
C3B.V1
C3B.V2
C3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*1980:56:40.635
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
2072 G1A.V1
2648 G1A.V2
2009 G1A.V3
1823 G1B.V1
1844 G1B.V2
1874 G1B.V3
1388 G3A.V1
2311 G3A.V2
2893 G3A.V3
1753 G3B.V1
3737 G3B.V2
3851 G3B.V3
2182 G4A.V1
2711 G4A.V2
2910 G4A.V3
1549 G4B.V1
3536 G4B.V2
2524 G4B.V3
1236 G5A.V1
258 G5A.V2
834 G5A.V3
1217 G5B.V1
1323 G5B.V2
1140 G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*199+08:27:21.038
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
175
101
140
360
200
167
248
147
218
237
151
109
159
21
78
312
163
186
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*201+03:21:21.992
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
444 C2A.V1
209 C2A.V2
280 C2A.V3
386 C2B.V1
326 C2B.V2
208 C2B.V3
576 C5A.V1
102 C5A.V2
324 C5A.V3
676 C5B.V1
452 C5B.V2
401 C5B.V3
350 C1A.V1
654 C1A.V2
248 C1A.V3
224 C1B.V1
119 C1B.V2
136 C1B.V3
598 C4A.V1
460 C4A.V2
499 C4A.V3
274 C4B.V1
252 C4B.V2
161 C4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*204+08:15:47.555
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
466
724
356
309
262
319
598
94
344
1275
658
715
1018
606
725
713
462
394

NORMALIZED
UN-DEFINED
CH1,2,3
90*204+12:24:01.990

NORMALIZED
UN-DEFINED
CH1,2,3
90*204+14:45:36.237

NORMALIZED
UN-DEFINED
CH1,2,3
90*204+15:27:23.723

NORMALIZED
UN-DEFINED
CH1,2,3
90*204+20:55:44.066
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
989 G1A.V1
776 G1A.V2
577 G1A.V3
983 G1B.V1
527 G1B.V2
614 G1B.V3
884 G5A.V1
230 G5A.V2
668 G5A.V3
1034 G5B.V1
1061 G5B.V2
886 G5B.V3
1144 G3A.V1
921 G3A.V2
845 G3A.V3
1253 G3B.V1
1448 G3B.V2
970 G3B.V3
1345 G4A.V1
1003 G4A.V2
867 G4A.V3
1251 G4B.V1
1393 G4B.V2
885 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*205+10:03:01.467
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
251
596
267
251
361
299
422
558
628
358
596
442
334
126
528
404
668
594

NORMALIZED
UN-DEFINED
CH1,2,3
90*206+07:41:40.299
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
448
638
724
438
400
659
533
160
533
745
1100
763
540
848
1422
538
1256
646
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*206+11:13.624
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1205 G1A.V1
1389 G1A.V2
869 G1A.V3
1103 G1B.V1
982 G1B.V2
981 G1B.V3
720 G2A.V1
1119 G2A.V2
1022 G2A.V3
1062 G2B.V1
1046 G2B.V2
1001 G2B.V3
854 G5A.V1
239 G5A.V2
756 G5A.V3
698 G5B.V1
998 G5B.V2
1189 G5B.V3
1221 G4A.V1
1257 G4A.V2
1214 G4A.V3
811 G4B.V1
1114 G4B.V2
1099 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*207+06:58:45.994
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
860 G1A.V1
940 G1A.V2
613 G1A.V3
811 G1B.V1
679 G1B.V2
643 G1B.V3
862 G2A.V1
771 G2A.V2
722 G2A.V3
910 G2B.V1
672 G2B.V2
686 G2B.V3
782 G5A.V1
112 G5A.V2
484 G5A.V3
820 G5B.V1
626 G5B.V2
675 G5B.V3
890 G4A.V1
783 G4A.V2
722 G4A.V3
838 G4B.V1
741 G4B.V2
473 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*207+09:00:18.463
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
862 G1A.V1
1012 G1A.V2
507 G1A.V3
946 G1B.V1
511 G1B.V2
414 G1B.V3
2023 G4A.V1
1123 G4A.V2
1321 G4A.V3
1064 G4B.V1
771 G4B.V2
685 G4B.V3
1684 G5A.V1
179 G5A.V2
637 G5A.V3
1319 G5B.V1
105 G5B.V2
1443 G5B.V3
1068 G2A.V1
682 G2A.V2
694 G2A.V3
1258 G2B.V1
678 G2B.V2
857 G2B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*208+05:32:27.368
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1222 G1A.V1
1352 G1A.V2
872 G1A.V3
1234 G1B.V1
763 G1B.V2
667 G1B.V3
859 G5A.V1
235 G5A.V2
768 G5A.V3
649 G5B.V1
1068 G5B.V2
844 G5B.V3
691 G3A.V1
1207 G3A.V2
968 G3A.V3
1251 G3B.V1
1701 G3B.V2
1434 G3B.V3
1454 G4A.V1
1207 G4A.V2
1155 G4A.V3
1191 G4B.V1
1155 G4B.V2
691 G4B.V3

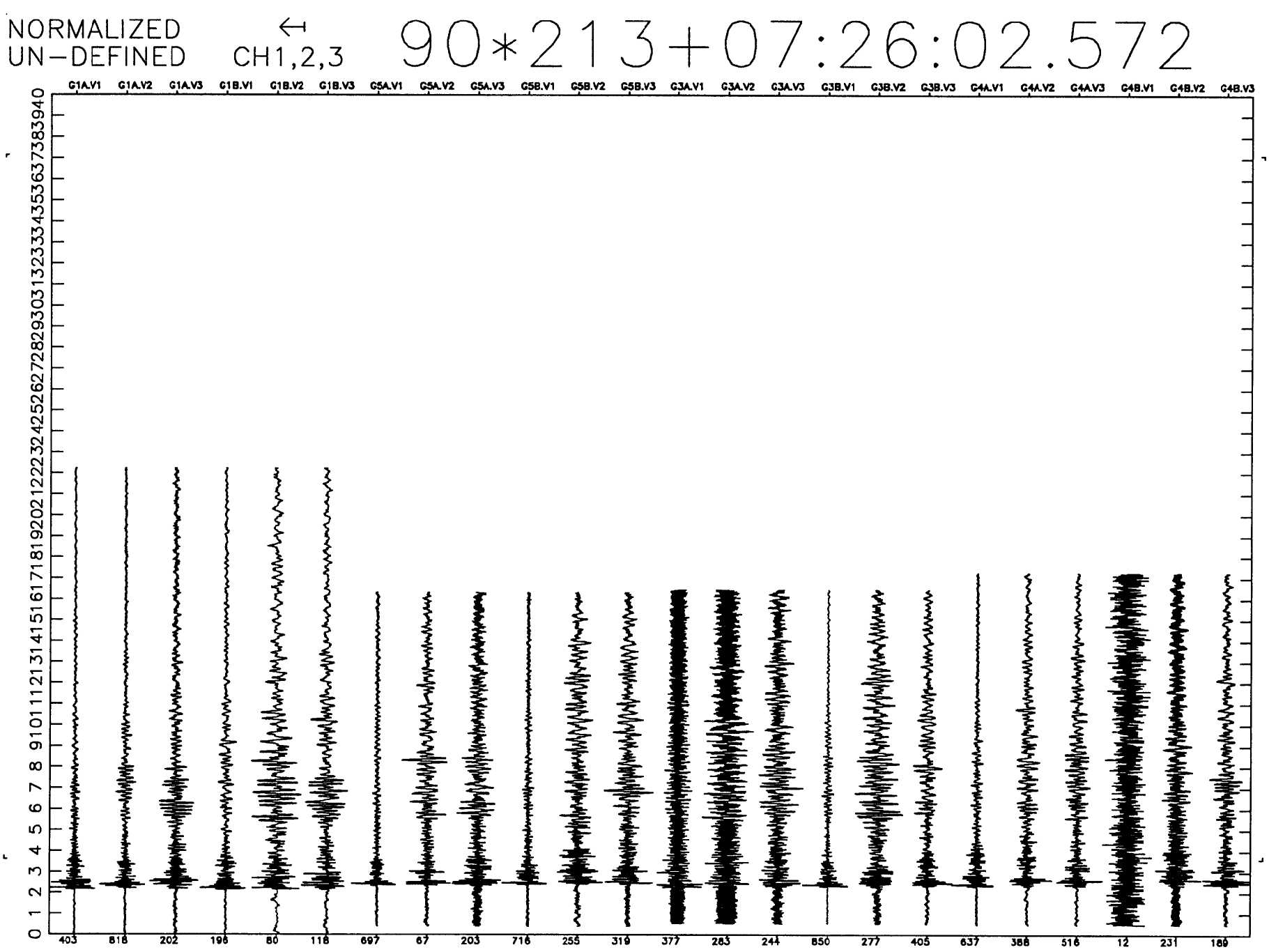
NORMALIZED
UN-DEFINED
CH1,2,3
90*208+12:56:46.055

NORMALIZED
UN-DEFINED
CH1,2,3
90*209+00:58:23.351
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
655 G1A.V1
684 G1A.V2
1606 G1A.V3
537 G1B.V1
514 G1B.V2
1609 G1B.V3
717 G5A.V1
158 G5A.V2
1506 G5A.V3
845 G5B.V1
1006 G5B.V2
1753 G5B.V3
783 G3A.V1
967 G3A.V2
1923 G3A.V3
691 G3B.V1
1318 G3B.V2
2020 G3B.V3

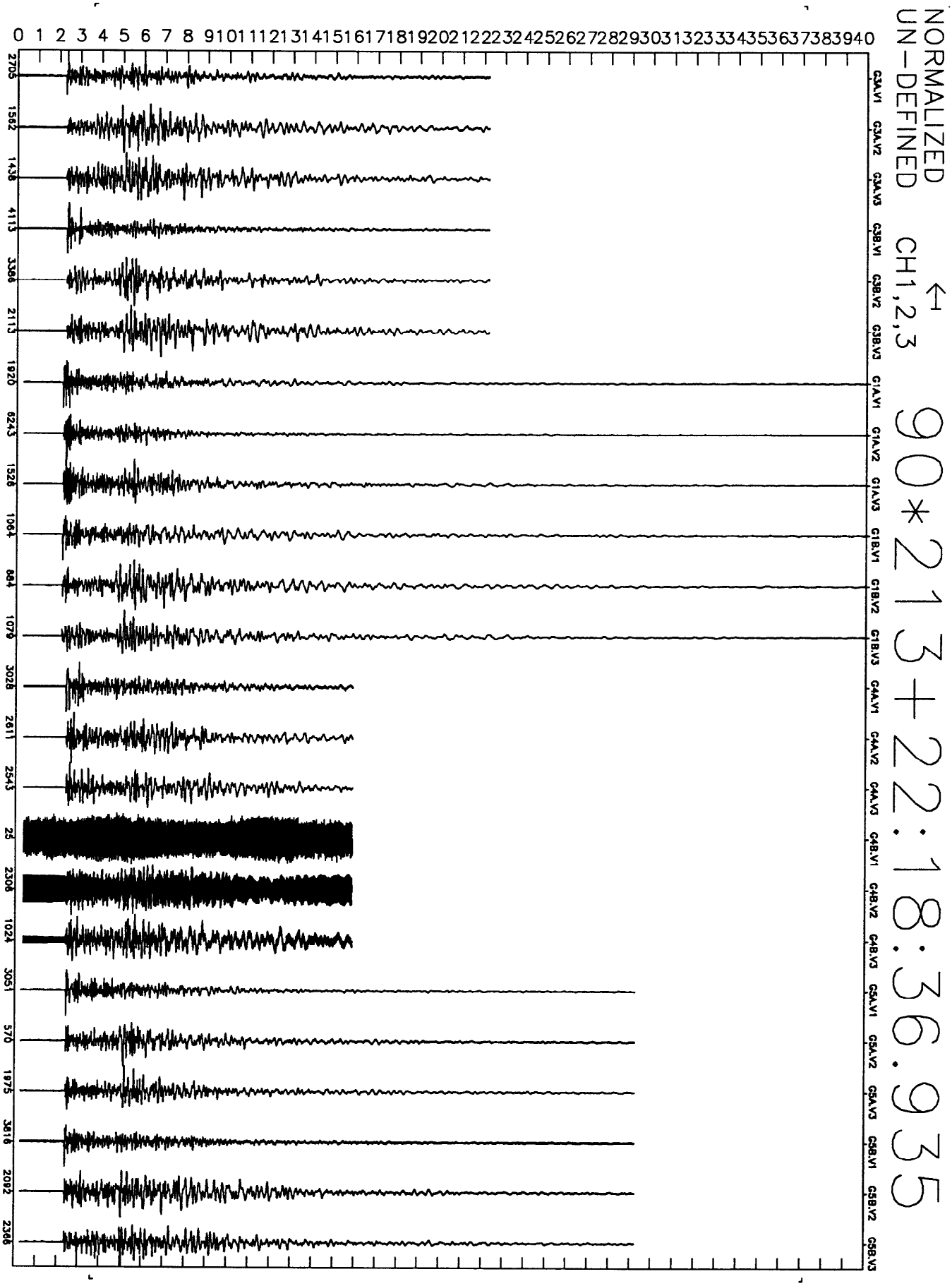
NORMALIZED
UN-DEFINED
CH1,2,3
90*211+08:45:08.078

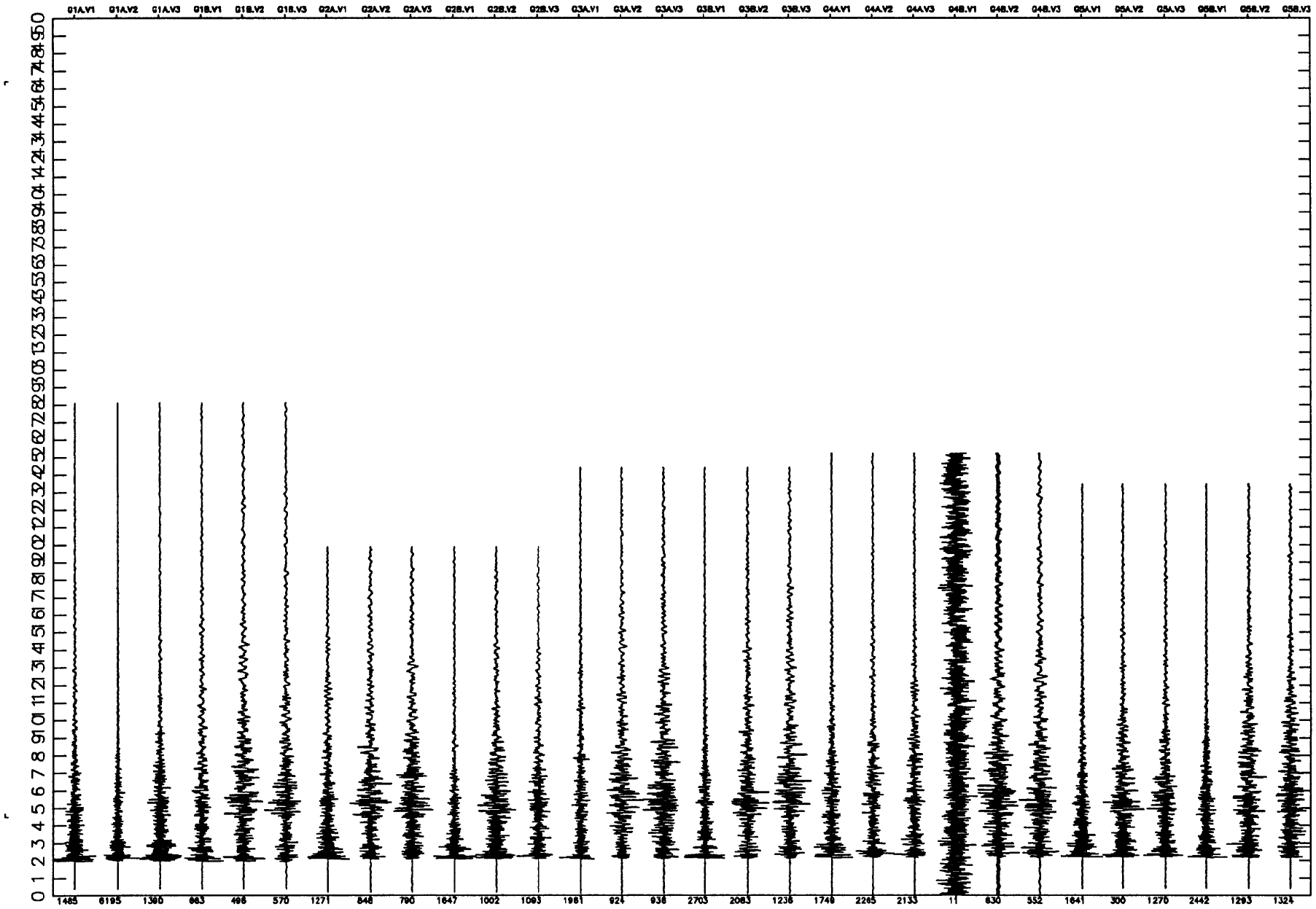
NORMALIZED
UN-DEFINED
CH1,2,3
90*211+09:20:41.260
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
613
728
776
612
1220
1109
538
949
755
540
1005
888
523
1003
472
486
572
486
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*211+13:03:02.796
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
184
220
125
135
50
62
269
96
133
368
239
145
437
149
108
217
146
89
360
21
68
340
137
140
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*213+07:26:02.572
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G5A.V1 G5A.V2 G5A.V3 G5B.V1 G5B.V2 G5B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
403 818 202 196 80 118 697 67 203 716 255 319 377 283 244 850 277 405 637 388 516 12 231 189

NORMALIZED
UN-DEFINED
CH1,2,3
90*213+08:20:13.375


NORMALIZED
UN-DEFINED
CH1,2,3
90*213+22:18:36.935
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
2705
1562
1438
4113
3366
2113
1920
6243
1526
1064
884
1079
3028
2611
2543
23
2306
1024
3051
570
1975
3818
2092
2366
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*214+07:18:05.848
01A.V1 01A.V2 01A.V3 01B.V1 01B.V2 01B.V3 02A.V1 02A.V2 02A.V3 02B.V1 02B.V2 02B.V3 03A.V1 03A.V2 03A.V3 03B.V1 03B.V2 03B.V3 04A.V1 04A.V2 04A.V3 04B.V1 04B.V2 04B.V3 05A.V1 05A.V2 05A.V3 05B.V1 05B.V2 05B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
1485 6195 1360 663 496 570 1271 848 790 1647 1002 1093 1981 924 938 2703 2083 1236 1748 2265 2133 11 630 552 1641 300 1270 2442 1293 1324

NORMALIZED
UN-DEFINED
CH1,2,3
90*214+07:34:02.188
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
272
391
277
271
238
270
323
407
411
10
320
340
281
57
200
272
333
288
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*214+09:11:46.635
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
288 G1A.V1
823 G1A.V2
286 G1A.V3
305 G1B.V1
481 G1B.V2
337 G1B.V3
383 G3A.V1
482 G3A.V2
484 G3A.V3
419 G3B.V1
917 G3B.V2
687 G3B.V3
377 G5A.V1
98 G5A.V2
320 G5A.V3
443 G5B.V1
490 G5B.V2
458 G5B.V3
281 G4A.V1
568 G4A.V2
605 G4A.V3
12 G4B.V1
432 G4B.V2
430 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*214+12:14:51.028
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
523
661
698
485
111
964
331
798
442
343
406
323
485
168
578
451
974
782
173
226
227
12
212
218
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*215+07:42:39.183
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
520 G1A.V1
798 G1A.V2
305 G1A.V3
283 G1B.V1
237 G1B.V2
271 G1B.V3
437 G2A.V1
362 G2A.V2
351 G2A.V3
402 G2B.V1
422 G2B.V2
404 G2B.V3
671 G3A.V1
470 G3A.V2
624 G3A.V3
1092 G3B.V1
835 G3B.V2
575 G3B.V3
1062 G4A.V1
567 G4A.V2
768 G4A.V3
14 G4B.V1
443 G4B.V2
334 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*215+08:56:47.811
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
388 G1A.V1
612 G1A.V2
454 G1A.V3
418 G1B.V1
365 G1B.V2
483 G1B.V3
543 G3A.V1
824 G3A.V2
651 G3A.V3
548 G3B.V1
1538 G3B.V2
1083 G3B.V3
498 G5A.V1
132 G5A.V2
578 G5A.V3
652 G5B.V1
1082 G5B.V2
781 G5B.V3
715 G4A.V1
660 G4A.V2
1229 G4A.V3
12 G4B.V1
703 G4B.V2
610 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*215+11:31:27.078
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
554
717
820
12
605
585
516
120
403
504
709
678
448
538
400
382
454
355
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*220+15:00:20.848

NORMALIZED
UN-DEFINED
CH1,2,3
90*222+09:08:59.943
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
412 G1A.V1
584 G1A.V2
668 G1A.V3
480 G1B.V1
453 G1B.V2
712 G1B.V3
395 G3A.V1
897 G3A.V2
895 G3A.V3
553 G3B.V1
1465 G3B.V2
1322 G3B.V3
583 G4A.V1
917 G4A.V2
1224 G4A.V3
88 G4B.V1
1087 G4B.V2
764 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*22+11:57:41.115
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
94
116
64
99
52
56
178
120
101
202
207
121
265
149
119
65
119
91
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*222+12:46:09.342
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
241
364
282
218
256
264
273
348
391
593
511
397
401
483
386
83
355
343
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*222+15:55:34.412

NORMALIZED
UN-DEFINED
CH1,2,3
90*224+00:29:34.183
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
138
579
338
125
371
330
148
506
408
165
764
310
164
646
199
59
516
175
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*224+21:44:15.008
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
363 G1A.V1
371 G1A.V2
215 G1A.V3
333 G1B.V1
252 G1B.V2
210 G1B.V3
374 G3A.V1
276 G3A.V2
218 G3A.V3
374 G3B.V1
360 G3B.V2
243 G3B.V3
286 G5A.V1
63 G5A.V2
266 G5A.V3
379 G5B.V1
268 G5B.V2
245 G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*225+06:20:02.978
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
510 G1A.V1
650 G1A.V2
416 G1A.V3
479 G1B.V1
449 G1B.V2
450 G1B.V3
535 G3A.V1
574 G3A.V2
451 G3A.V3
596 G3B.V1
775 G3B.V2
697 G3B.V3
557 G4A.V1
615 G4A.V2
636 G4A.V3
14 G4B.V1
454 G4B.V2
405 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*225+07:02:52.542

NORMALIZED
UN-DEFINED
CH1,2,3
90*225+22:11:31.962

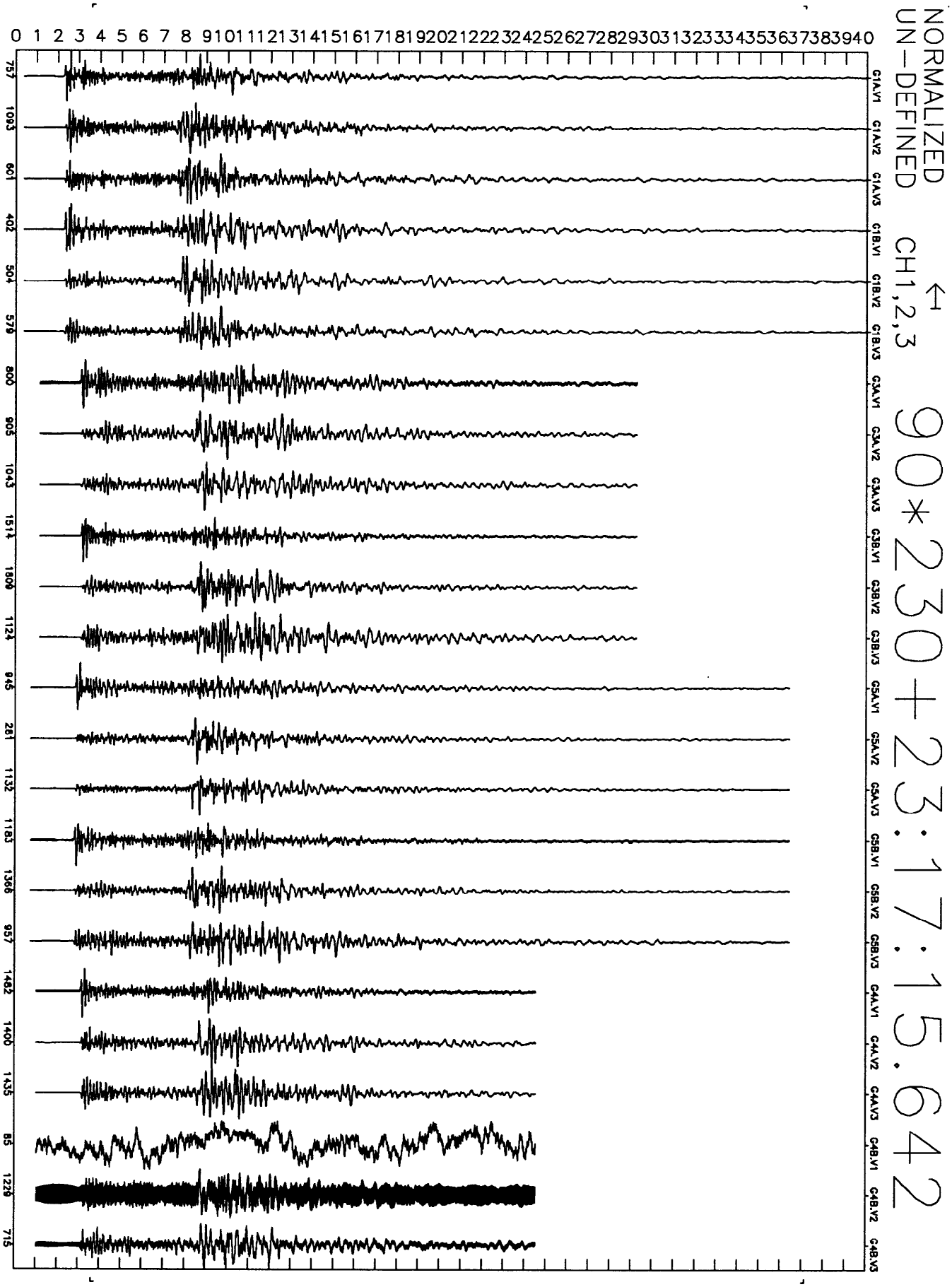
NORMALIZED
UN-DEFINED
CH1,2,3
90*227+13:13:46.638
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
329
644
227
276
269
225
542
542
837
560
779
624
412
118
277
548
476
418
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3

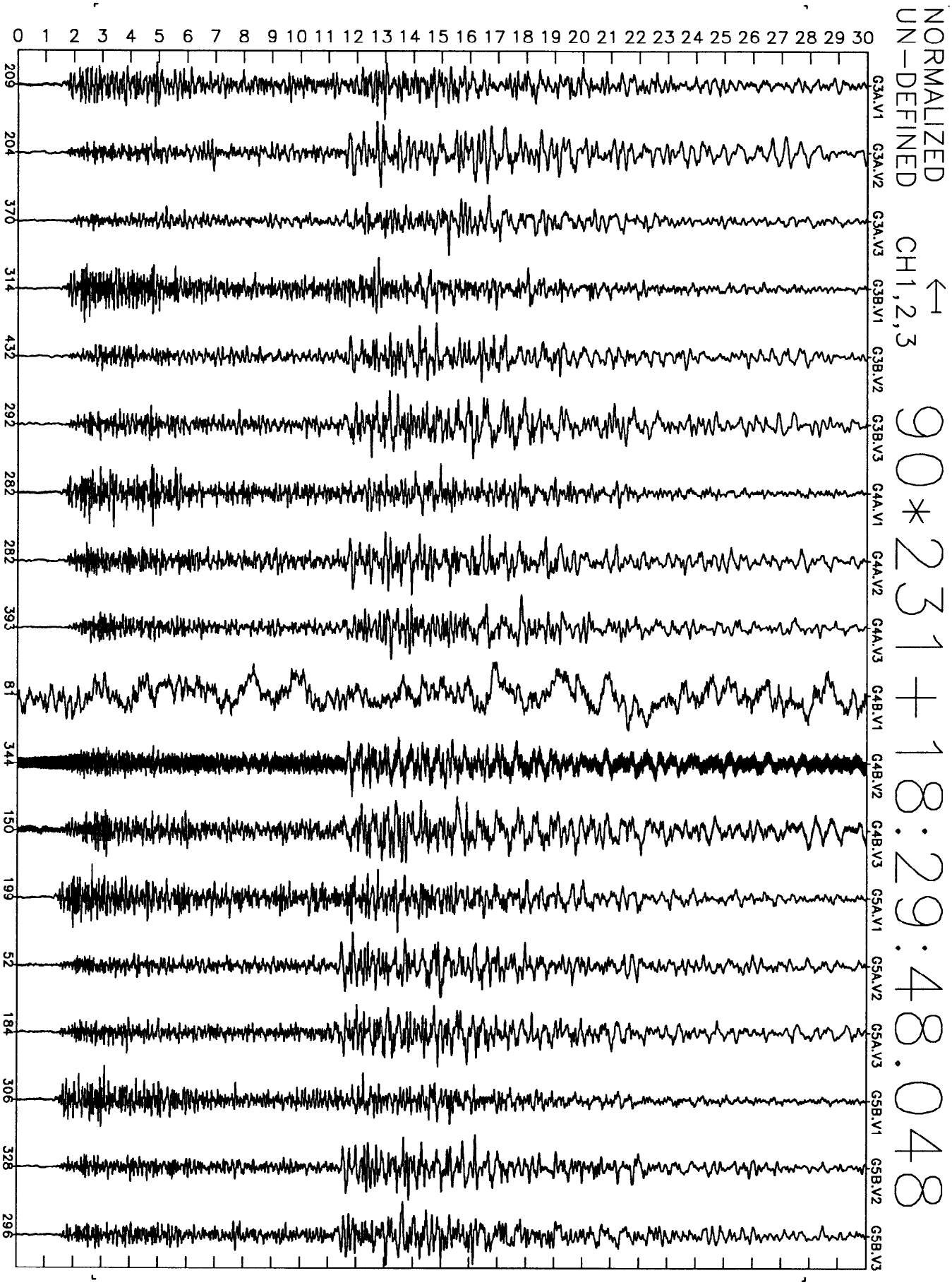
NORMALIZED
UN-DEFINED
CH1,2,3
90*228+02:09:24.372
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
821 G1A.V1
1545 G1A.V2
982 G1A.V3
557 G1B.V1
898 G1B.V2
908 G1B.V3
1081 G3A.V1
1499 G3A.V2
2075 G3A.V3
1208 G3B.V1
3239 G3B.V2
1900 G3B.V3
1033 G5A.V1
395 G5A.V2
1179 G5A.V3
1040 G5B.V1
1874 G5B.V2
1879 G5B.V3
970 G4A.V1
2023 G4A.V2
2153 G4A.V3
327 G4B.V1
2083 G4B.V2
1051 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*228+05:06:38.362
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
255 229 184 248 145 168 244 226 153 300 324 247 267 188 152 270 143 144 299 244 269 95 265 148
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3

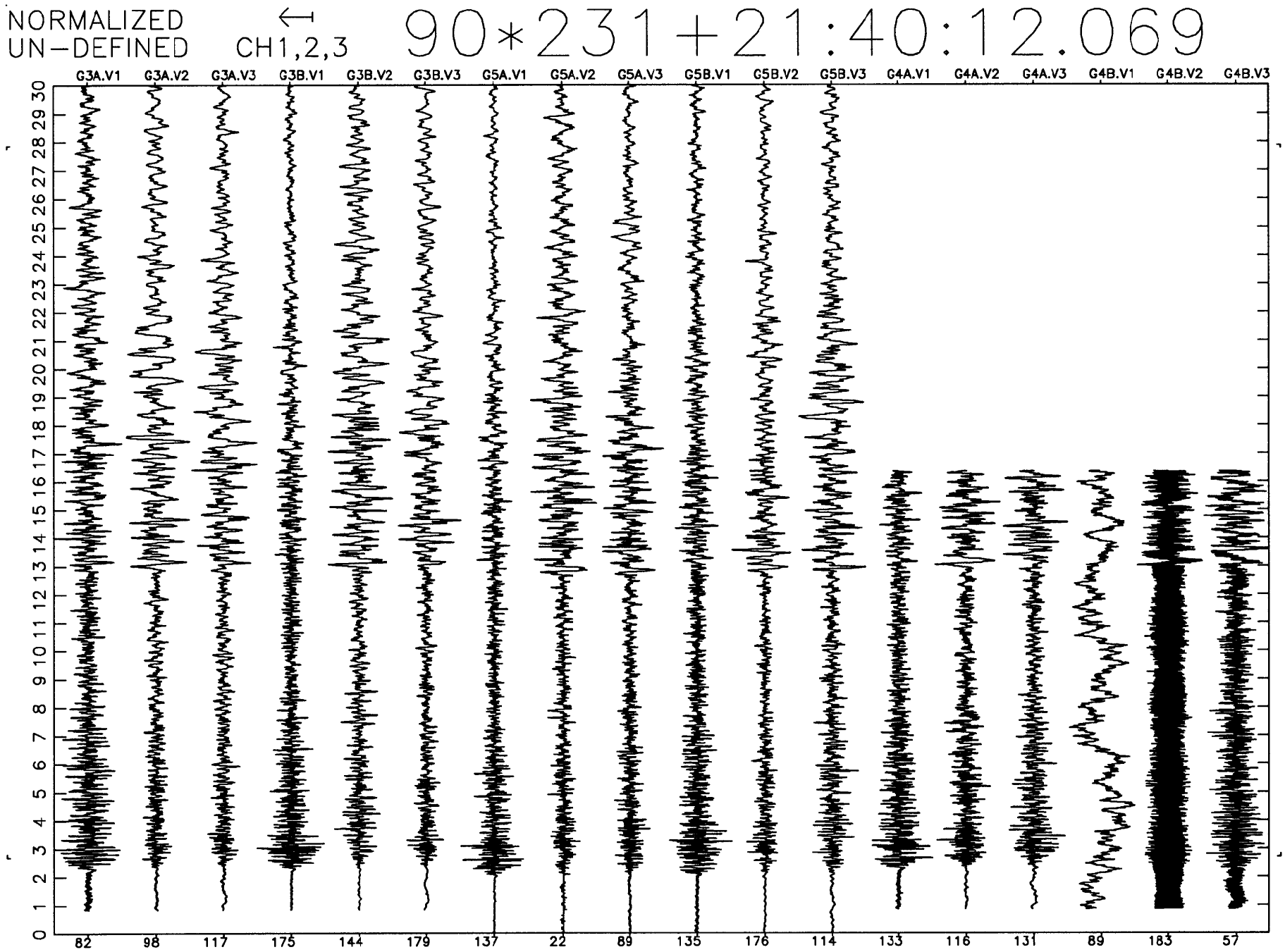
NORMALIZED
UN-DEFINED
CH1,2,3
90*228+07:17:36.992
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
534
960
693
528
618
607
649
1108
1030
590
1291
1232
694
1142
1138
103
998
855
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*228+11:47:16.242
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
320
442
367
342
329
297
415
592
658
412
921
718
410
688
784
106
555
553
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*230+23:17:15.642
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
757 G1A.V1
1093 G1A.V2
601 G1A.V3
402 G1B.V1
504 G1B.V2
579 G1B.V3
800 G3A.V1
905 G3A.V2
1043 G3A.V3
1514 G3B.V1
1509 G3B.V2
1124 G3B.V3
945 G5A.V1
281 G5A.V2
1132 G5A.V3
1183 G5B.V1
1366 G5B.V2
957 G5B.V3
1482 G4A.V1
1400 G4A.V2
1435 G4A.V3
85 G4B.V1
1229 G4B.V2
715 G4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*231+18:29:48.048
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
209 G3A.V1
204 G3A.V2
370 G3A.V3
314 G3B.V1
432 G3B.V2
292 G3B.V3
282 G4A.V1
282 G4A.V2
393 G4A.V3
81 G4B.V1
344 G4B.V2
150 G4B.V3
199 G5A.V1
52 G5A.V2
184 G5A.V3
306 G5B.V1
328 G5B.V2
296 G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*231+20:43:35.275


NORMALIZED
UN-DEFINED
CH1,2,3
90*231+21:40:12.069
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
82 98 117 175 144 179 137 22 89 135 176 114 133 116 131 89 183 57

NORMALIZED
UN-DEFINED
CH1,2,3
90*232+09:15:46.428
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
460 G1A.V1
672 G1A.V2
378 G1A.V3
404 G1B.V1
234 G1B.V2
233 G1B.V3
352 G3A.V1
496 G3A.V2
721 G3A.V3
746 G3B.V1
850 G3B.V2
655 G3B.V3
584 G4A.V1
427 G4A.V2
810 G4A.V3
113 G4B.V1
462 G4B.V2
433 G4B.V3
431 G5A.V1
109 G5A.V2
500 G5A.V3
542 G5B.V1
604 G5B.V2
682 G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*23211:27:24.115

NORMALIZED
UN-DEFINED
CH1,2,3
90*232+12:21:41.218
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
652 G1A.V1
967 G1A.V2
679 G1A.V3
620 G1B.V1
614 G1B.V2
668 G1B.V3
583 G5A.V1
187 G5A.V2
595 G5A.V3
504 G5B.V1
818 G5B.V2
775 G5B.V3
638 G3A.V1
919 G3A.V2
702 G3A.V3
669 G3B.V1
1040 G3B.V2
878 G3B.V3
883 G4A.V1
644 G4A.V2
949 G4A.V3
90 G4B.V1
660 G4B.V2
635 G4B.V3

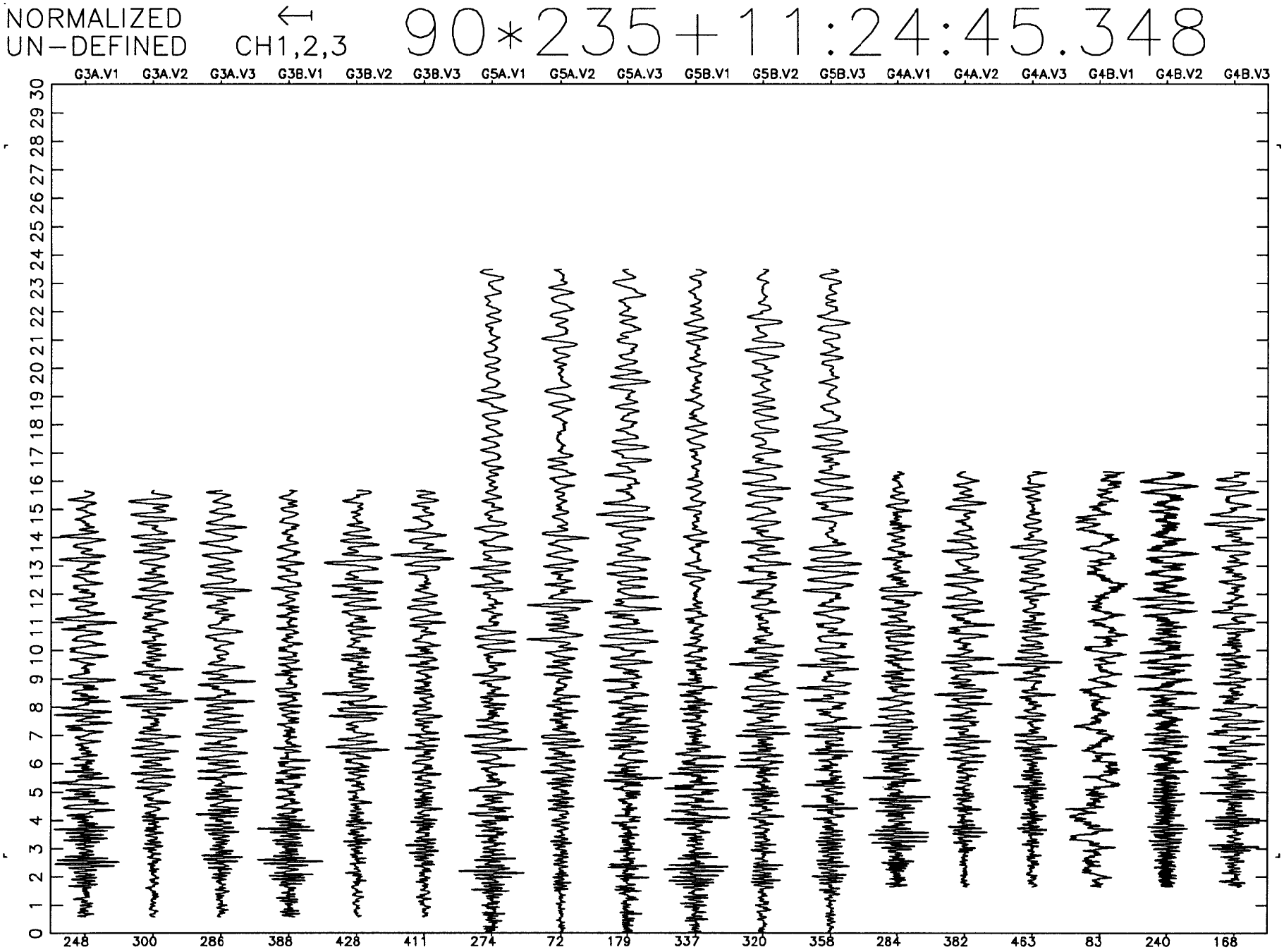
NORMALIZED
UN-DEFINED
CH1,2,3
90*232+12:36:13.139
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
208 G1A.V1
468 G1A.V2
227 G1A.V3
195 G1B.V1
283 G1B.V2
216 G1B.V3
212 G3A.V1
391 G3A.V2
314 G3A.V3
325 G3B.V1
488 G3B.V2
392 G3B.V3
238 G4A.V1
577 G4A.V2
423 G4A.V3
88 G4B.V1
424 G4B.V2
220 G4B.V3

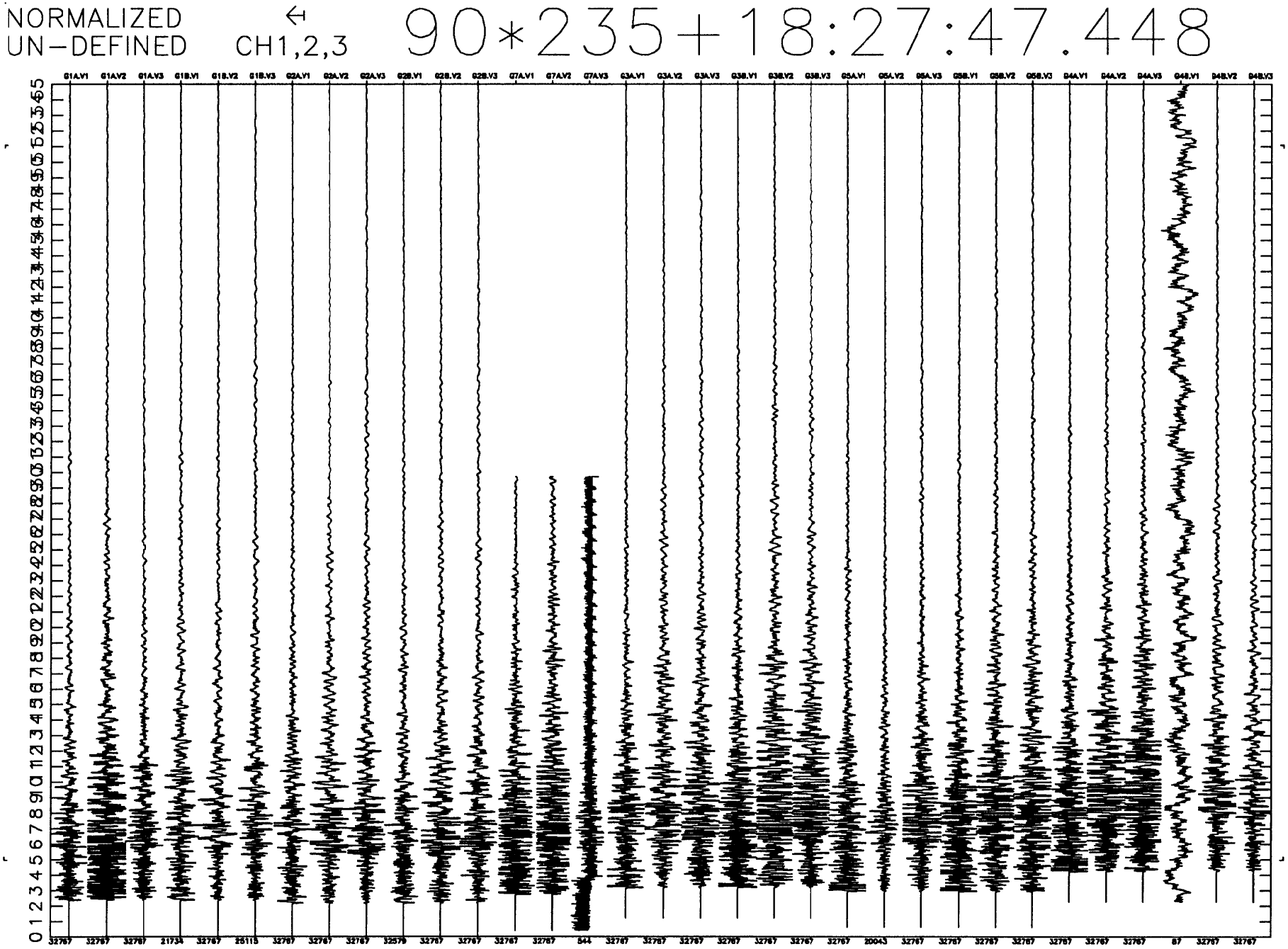
NORMALIZED
UN-DEFINED
CH1,2,3
90*233+03:48:55.989
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1164 G5A.V1
235 G5A.V2
748 G5A.V3
1247 G5B.V1
984 G5B.V2
893 G5B.V3
1036 G1A.V1
1932 G1A.V2
832 G1A.V3
929 G1B.V1
1218 G1B.V2
910 G1B.V3
1324 G3A.V1
1037 G3A.V2
749 G3A.V3
1335 G3B.V1
1611 G3B.V2
958 G3B.V3

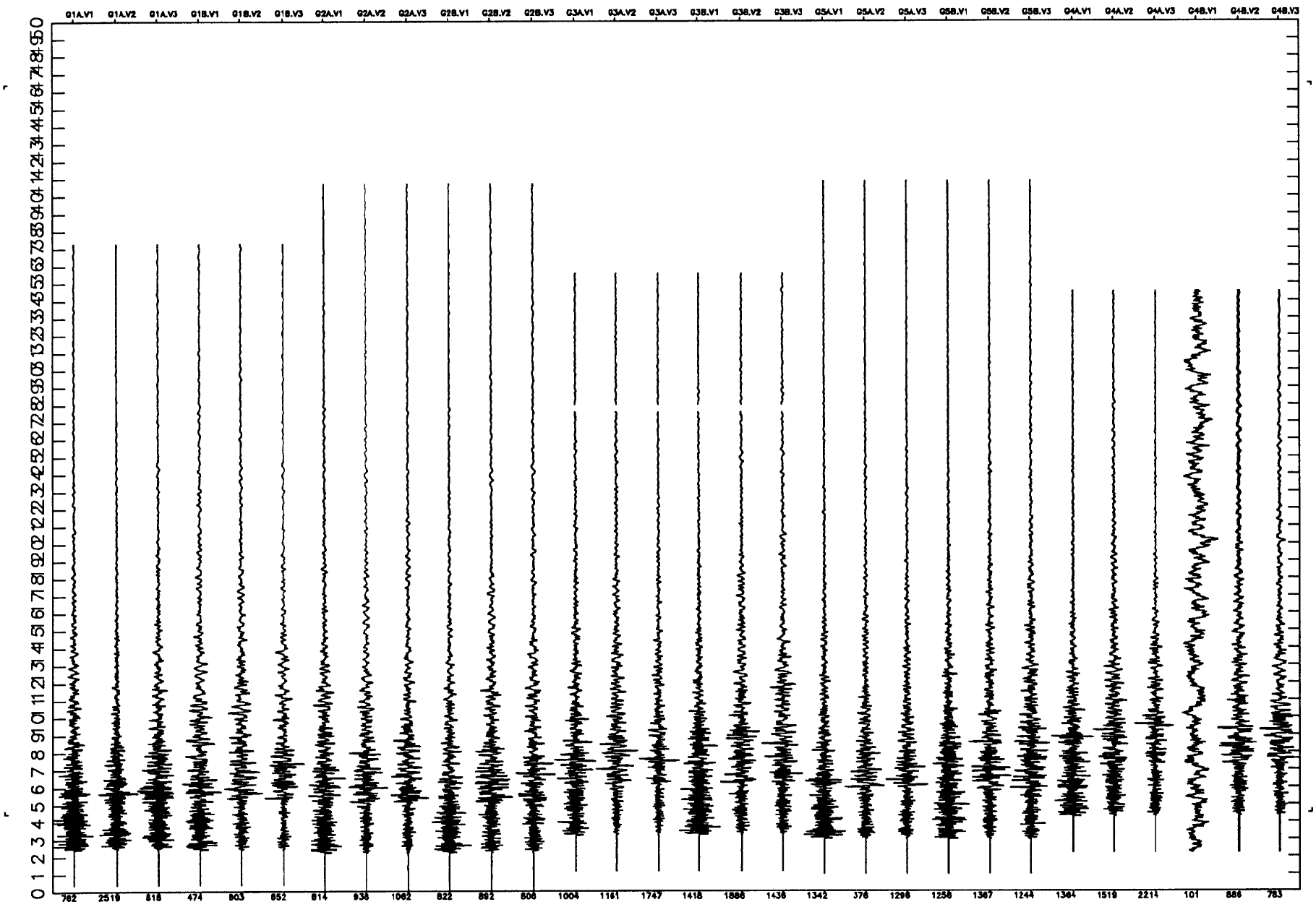
NORMALIZED
UN-DEFINED
CH1,2,3
90*233+07:28:39.805
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
482
55
232
950
441
425
466
266
360
729
430
389
711
414
390
91
283
220
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*233+12:34:08.795
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
472 G1A.V1
640 G1A.V2
342 G1A.V3
426 G1B.V1
444 G1B.V2
320 G1B.V3
294 G3A.V1
527 G3A.V2
419 G3A.V3
347 G3B.V1
677 G3B.V2
474 G3B.V3
455 G4A.V1
543 G4A.V2
378 G4A.V3
73 G4B.V1
469 G4B.V2
460 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*233+15:07:16.726
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
104
131
53
74
56
56
133
122
101
181
201
113
148
144
102
114
159
87
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

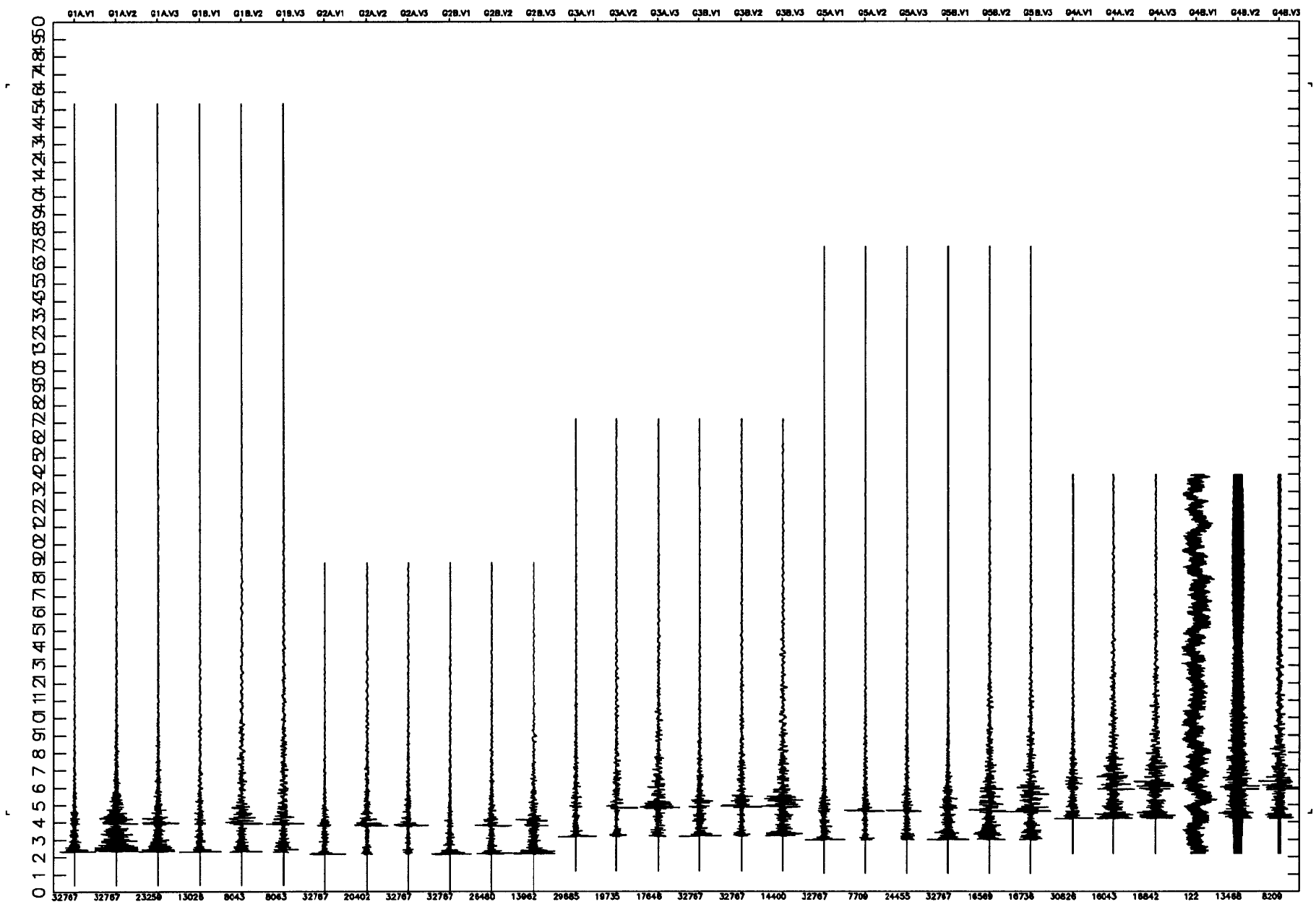

NORMALIZED
UN-DEFINED
CH1,2,3
90*235+11:24:45.348
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
248
300
286
388
428
411
274
72
179
337
320
358
284
382
463
83
240
168


NORMALIZED
UN-DEFINED
CH1,2,3
90*235+18:27:47.448


NORMALIZED
UN-DEFINED
CH1,2,3
90*235+21:52:03.540
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G5A.V1 G5A.V2 G5A.V3 G5B.V1 G5B.V2 G5B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
762 2519 818 474 803 652 814 938 1062 822 892 806 1004 1161 1747 1418 1886 1436 1342 376 1296 1258 1367 1244 1364 1519 2214 101 886 783

NORMALIZED
UN-DEFINED
CH1,2,3
90*237+07:05:45.915

NORMALIZED
UN-DEFINED
CH1,2,3
90*237+16:00:21.772

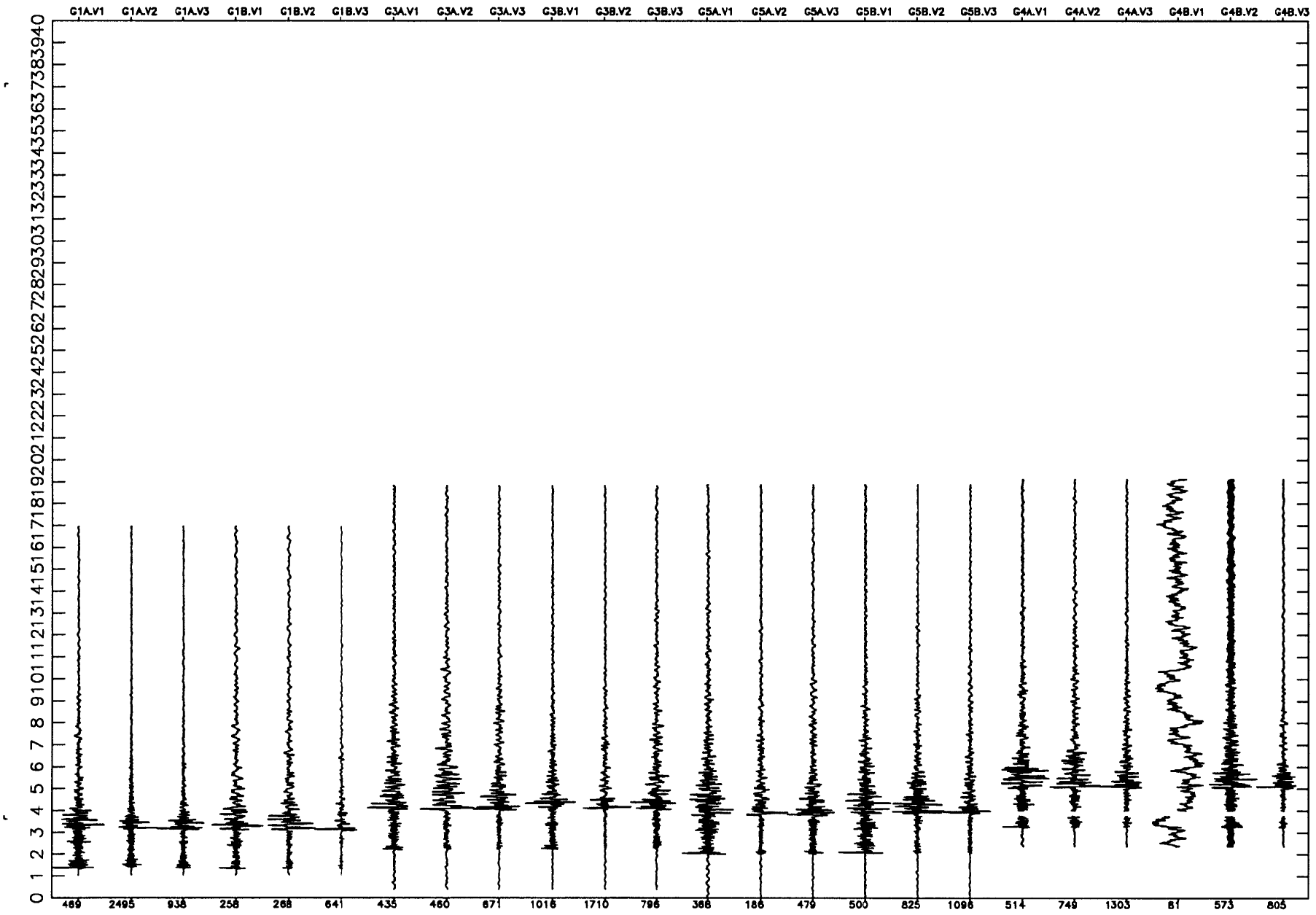

NORMALIZED
UN–DEFINED
CH1,2,3
90*239+01:42:30.248
01A.V1 01A.V2 01A.V3 01B.V1 01B.V2 01B.V3 02A.V1 02A.V2 02A.V3 02B.V1 02B.V2 02B.V3 03A.V1 03A.V2 03A.V3 03B.V1 03B.V2 03B.V3 05A.V1 05A.V2 05A.V3 05B.V1 05B.V2 05B.V3 04A.V1 04A.V2 04A.V3 04B.V1 04B.V2 04B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
32767 32767 23258 13028 8043 8043 32767 20402 32767 32767 26480 13062 29685 19735 17648 32767 32767 14400 32767 7709 24455 32767 16569 16738 30826 16043 16842 122 13488 8209

NORMALIZED
UN-DEFINED
CH1,2,3
90*239+08:56:46.294

NORMALIZED
UN-DEFINED
CH1,2,3
90*239+10:48:02.623

NORMALIZED
UN-DEFINED
CH1,2,3
90*239+11:08:34.423

NORMALIZED
UN-DEFINED
CH1,2,3
90*239+12:29:36.409
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
250
490
240
246
328
208
308
356
283
272
348
264
249
104
239
341
664
490
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*240+03:35:38.069
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G5A.V1 G5A.V2 G5A.V3 G5B.V1 G5B.V2 G5B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
469 2495 938 258 268 641 435 460 671 1016 1710 796 368 186 479 500 825 1098 514 749 1303 81 573 805

NORMALIZED
UN-DEFINED
CH1,2,3
90*240+05:57:36.299
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
970 C1A.V1
2301 C1A.V2
1070 C1A.V3
892 C1B.V1
1522 C1B.V2
1231 C1B.V3
921 C3A.V1
2012 C3A.V2
1498 C3A.V3
953 C3B.V1
1878 C3B.V2
1801 C3B.V3
1108 C4A.V1
2013 C4A.V2
2410 C4A.V3
72 C4B.V1
1530 C4B.V2
1427 C4B.V3
982 C5A.V1
331 C5A.V2
1134 C5A.V3
1075 C5B.V1
1805 C5B.V2
1681 C5B.V3

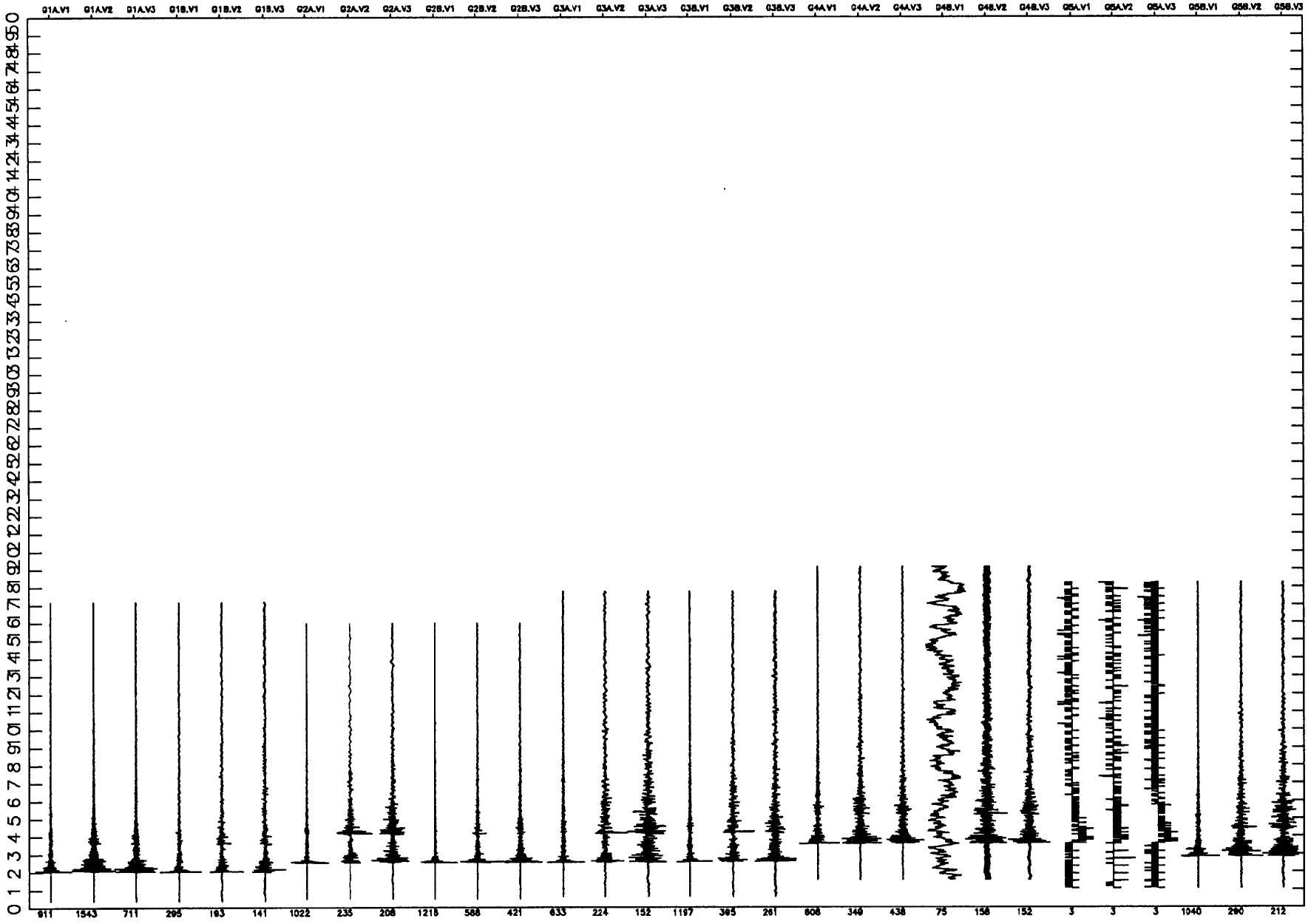
NORMALIZED
UN-DEFINED
CH1,2,3
90*241+11:09:41.995
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
125
178
87
159
80
94
257
148
142
357
310
210
432
219
200
82
180
130

NORMALIZED
UN-DEFINED
CH1,2,3
90*241+12:53:18.843
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
380
674
529
464
402
478
505
1069
899
693
1146
1091
621
812
977
94
783
650
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED

↤ CH1,2,3

90*247+22:55:45.148



NORMALIZED
UN-DEFINED
CH1,2,3
90*251+08:54:42.835

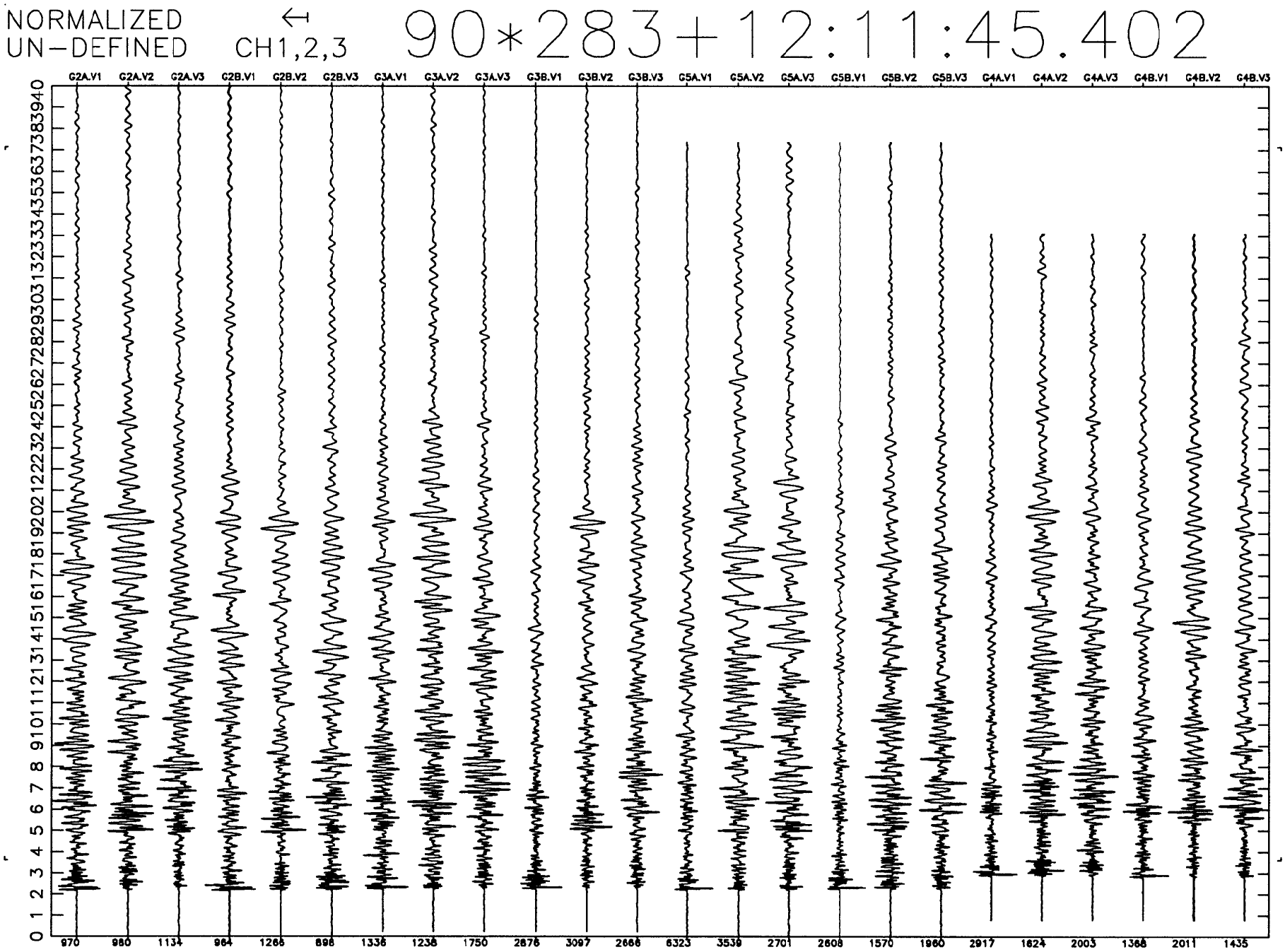
NORMALIZED
UN-DEFINED
CH1,2,3
90*251+19:38:09.278
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*253+10:53:18.435
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
571 G1A.V1
1380 G1A.V2
557 G1A.V3
546 G1B.V1
954 G1B.V2
661 G1B.V3
704 G2A.V1
1105 G2A.V2
693 G2A.V3
671 G2B.V1
960 G2B.V2
769 G2B.V3
800 G5A.V1
212 G5A.V2
750 G5A.V3
494 G5B.V1
840 G5B.V2
1015 G5B.V3

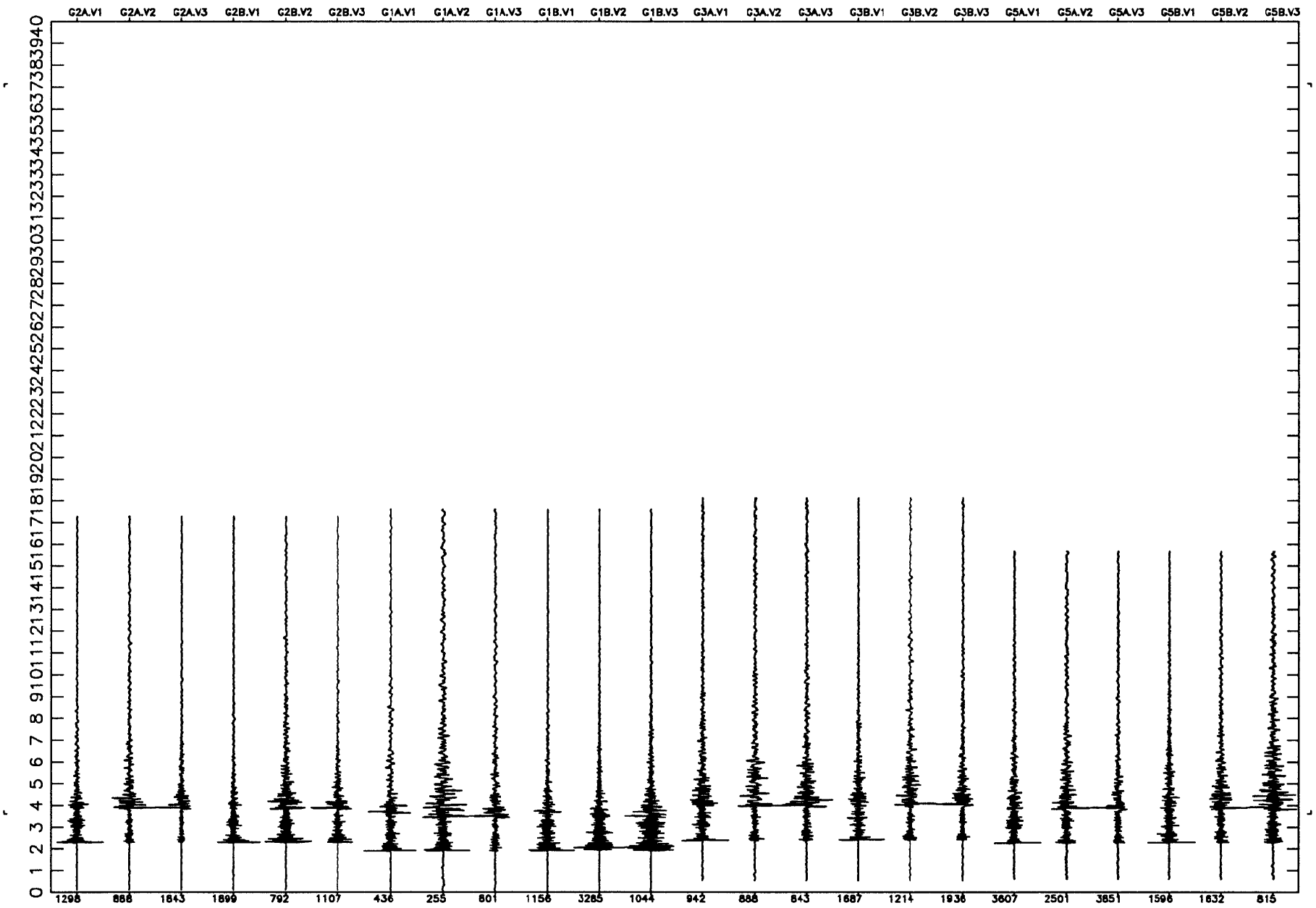
NORMALIZED
UN-DEFINED
CH1,2,3
90*254+07:03:12.155
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
602 G1A.V1
939 G1A.V2
347 G1A.V3
284 G1B.V1
299 G1B.V2
260 G1B.V3
470 G2A.V1
388 G2A.V2
308 G2A.V3
512 G2B.V1
485 G2B.V2
412 G2B.V3
709 G3A.V1
495 G3A.V2
885 G3A.V3
1093 G3B.V1
928 G3B.V2
555 G3B.V3
763 G5A.V1
100 G5A.V2
337 G5A.V3
1364 G5B.V1
582 G5B.V2
603 G5B.V3

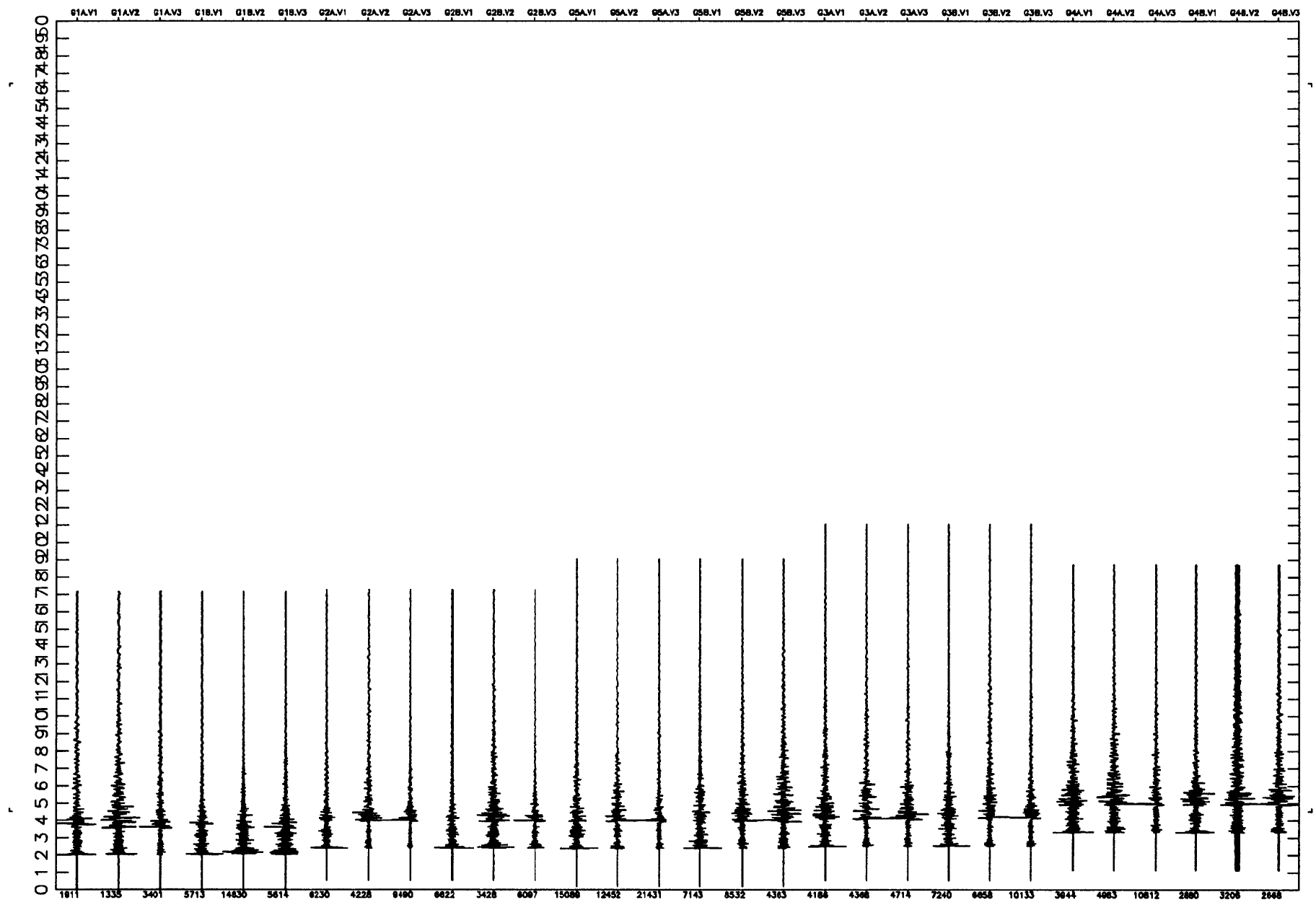
NORMALIZED
UN-DEFINED
CH1,2,3
90*260+11:37:55.011

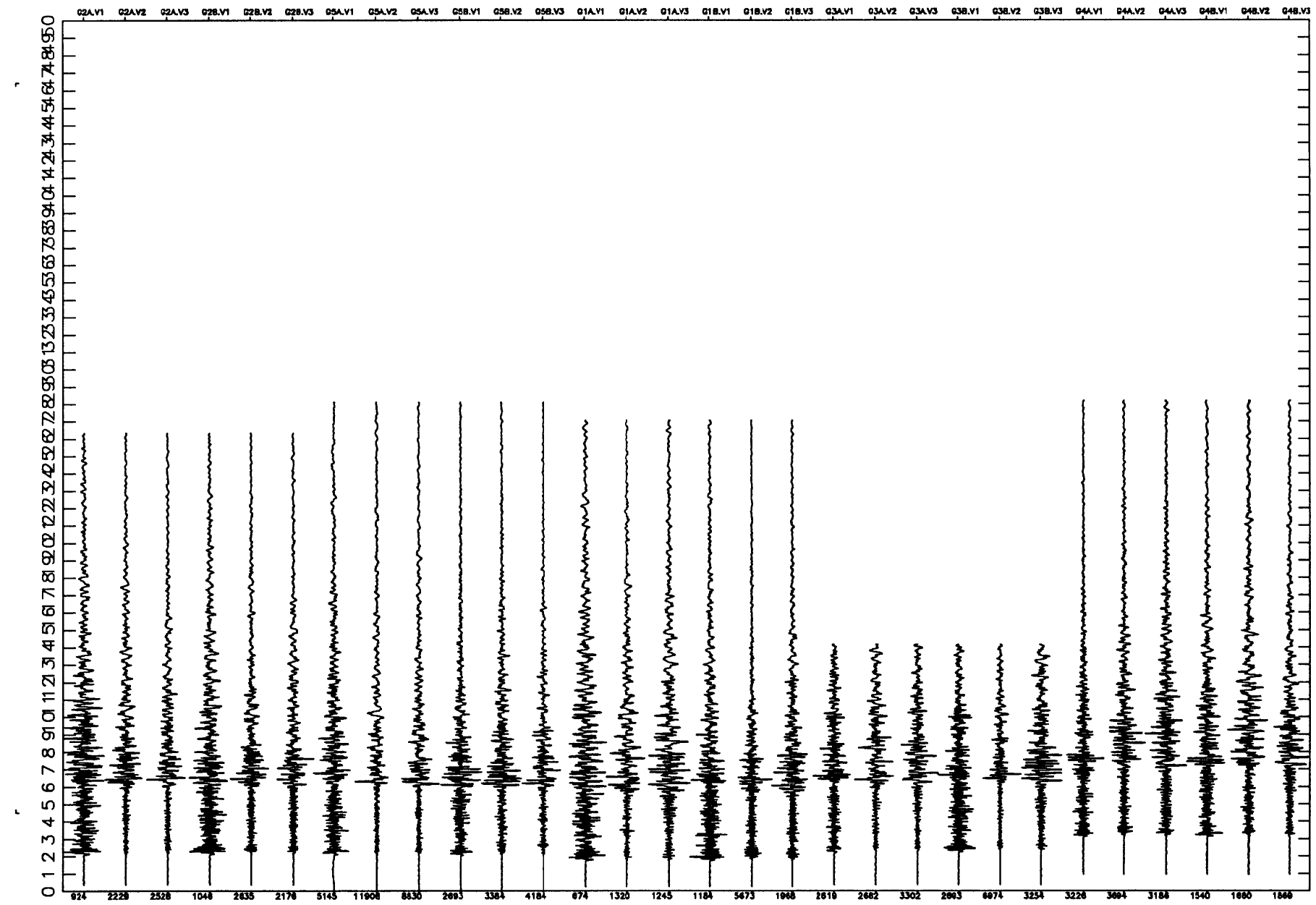
NORMALIZED
UN-DEFINED
CH1,2,3
90*260+13:47:51.678
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
230 G2A.V1
182 G2A.V2
138 G2A.V3
253 G2B.V1
158 G2B.V2
179 G2B.V3
504 G4A.V1
274 G4A.V2
278 G4A.V3
366 G4B.V1
227 G4B.V2
165 G4B.V3
185 G1A.V1
22 G1A.V2
122 G1A.V3
252 G1B.V1
321 G1B.V2
182 G1B.V3
351 G3A.V1
237 G3A.V2
261 G3A.V3
502 G3B.V1
433 G3B.V2
270 G3B.V3

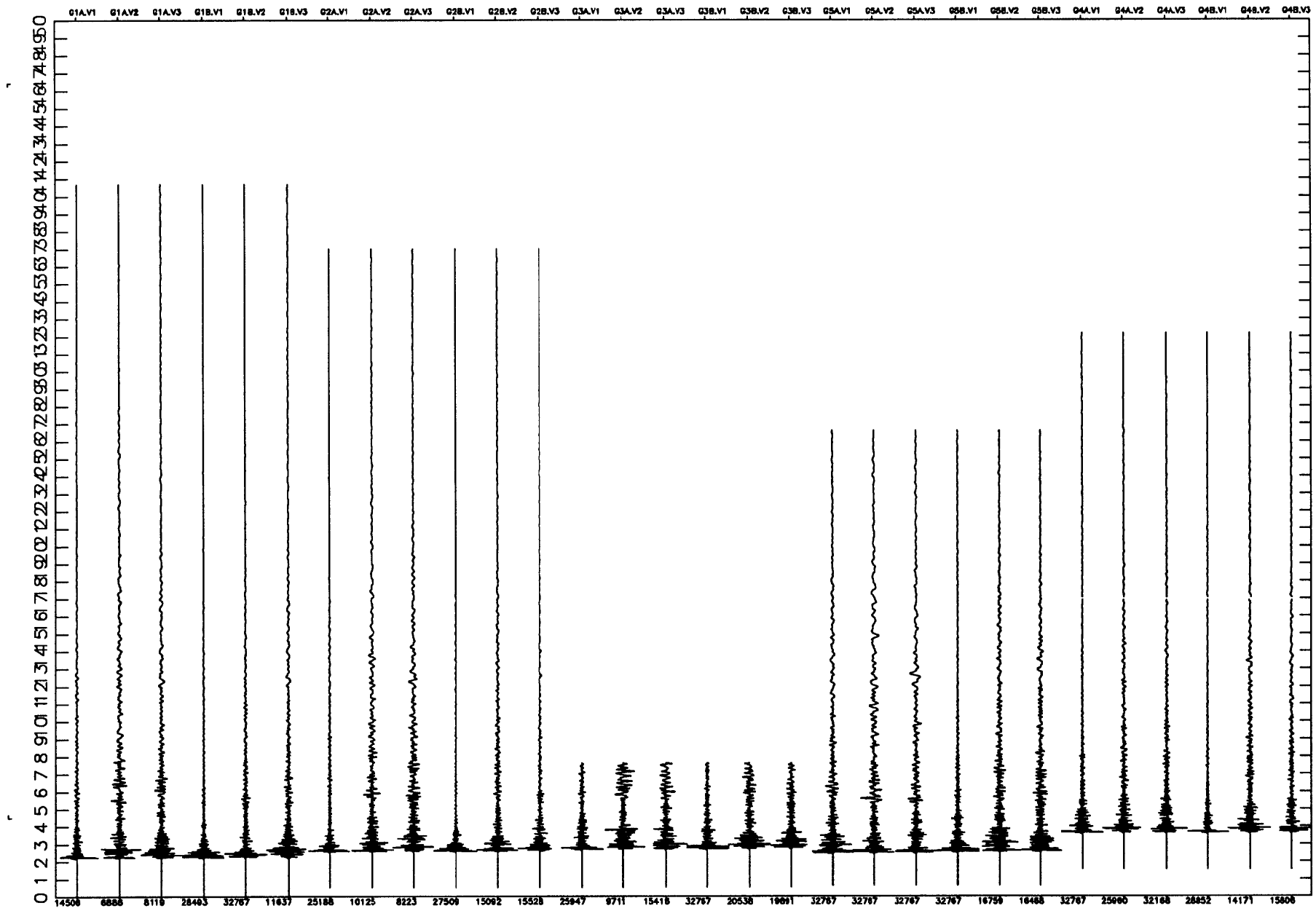

NORMALIZED
UN-DEFINED
CH1,2,3
90*283+12:11:45.402
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
970
980
1134
964
1266
898
1336
1238
1750
2876
3097
2668
6323
3539
2701
2608
1570
1960
2917
1624
2003
1368
2011
1435

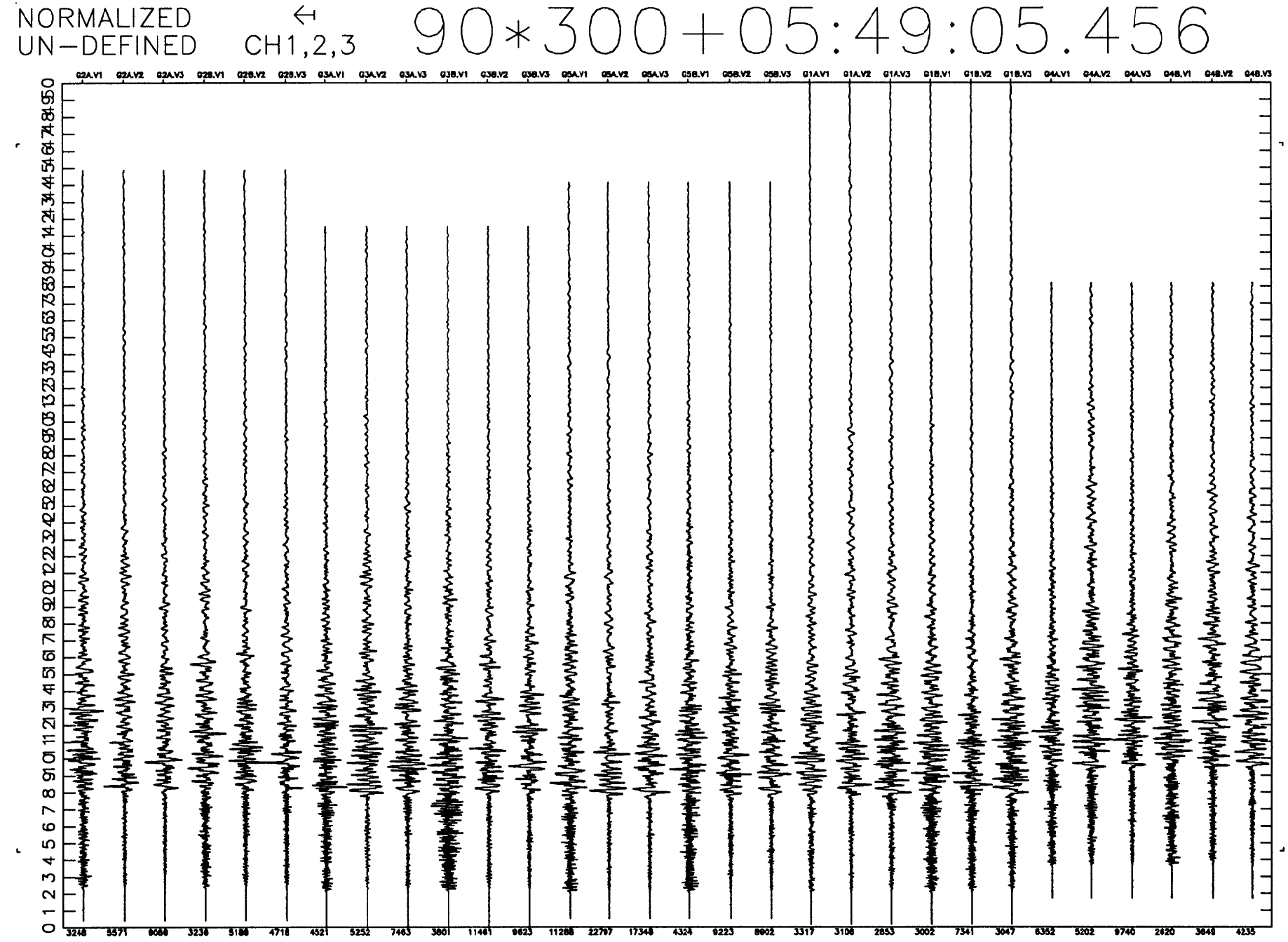
NORMALIZED
UN-DEFINED
CH1,2,3
90*283+12:17:53.967
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1677 G2A.V1
1988 G2A.V2
2478 G2A.V3
1681 G2B.V1
1569 G2B.V2
1628 G2B.V3
1288 G3A.V1
2245 G3A.V2
4446 G3A.V3
2415 G3B.V1
3531 G3B.V2
3284 G3B.V3
2217 G4A.V1
2495 G4A.V2
3786 G4A.V3
1212 G4B.V1
2444 G4B.V2
1999 G4B.V3
3580 G5A.V1
4987 G5A.V2
8950 G5A.V3
1418 G5B.V1
3259 G5B.V2
3497 G5B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
90*288+07:49:56.792
G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G5A.V1 G5A.V2 G5A.V3 G5B.V1 G5B.V2 G5B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1298 888 1843 1899 792 1107 436 255 801 1156 3285 1044 942 888 843 1687 1214 1938 3607 2501 3851 1596 1632 815


NORMALIZED
UN–DEFINED
CH1,2,3
90*288+18:42:44.350


NORMALIZED
UN–DEFINED
CH1,2,3
90*291+11:21:51.575

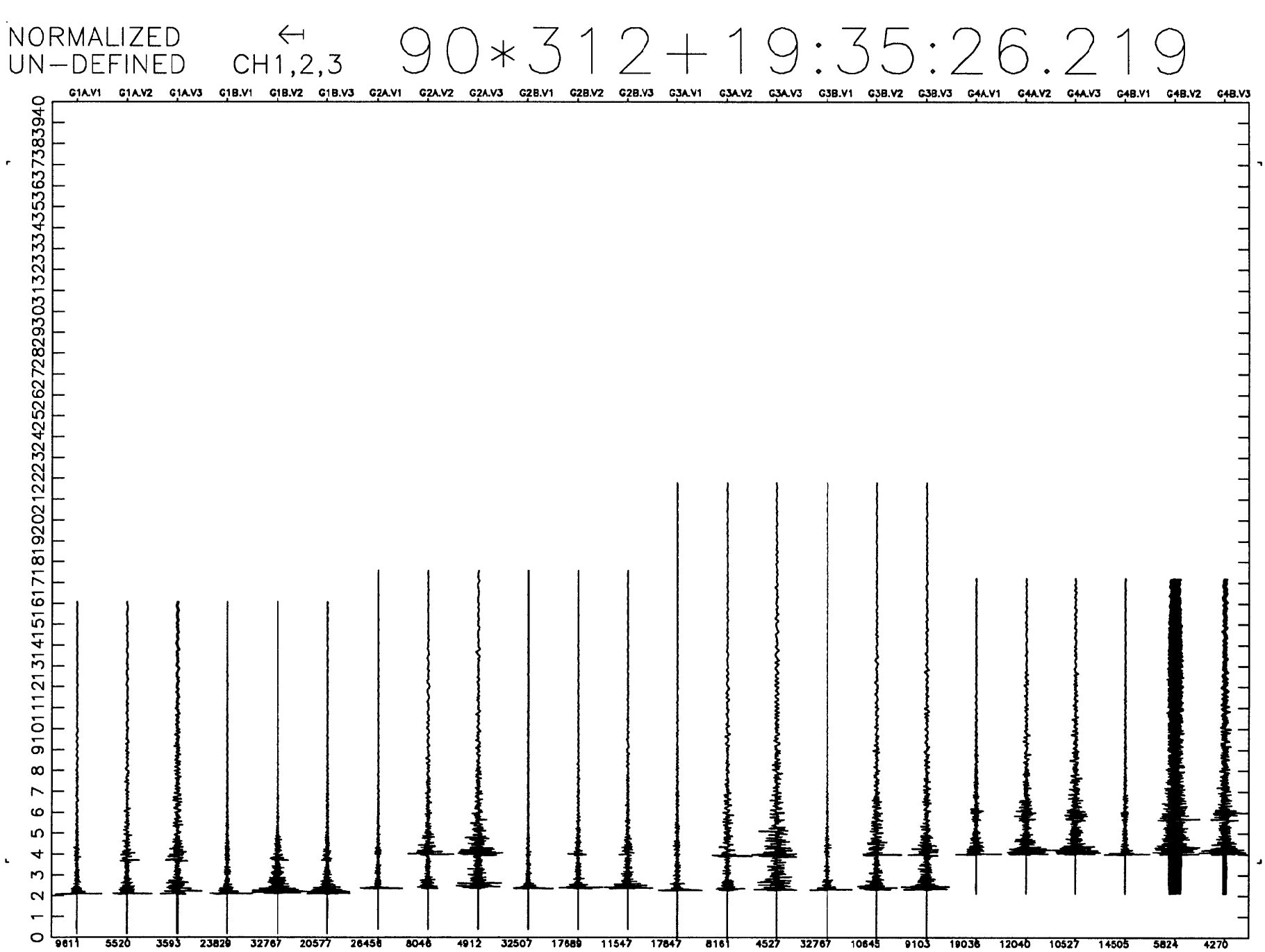

NORMALIZED
UN-DEFINED
CH1,2,3
90*292+14:01:12.680
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G5A.V1 G5A.V2 G5A.V3 G5B.V1 G5B.V2 G5B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
14508 6886 8119 28493 32767 11637 25188 10125 8223 27509 15062 15528 25947 9711 15416 32767 20538 19691 32767 32767 32767 32767 16759 16468 32767 25990 32168 28852 14171 15806

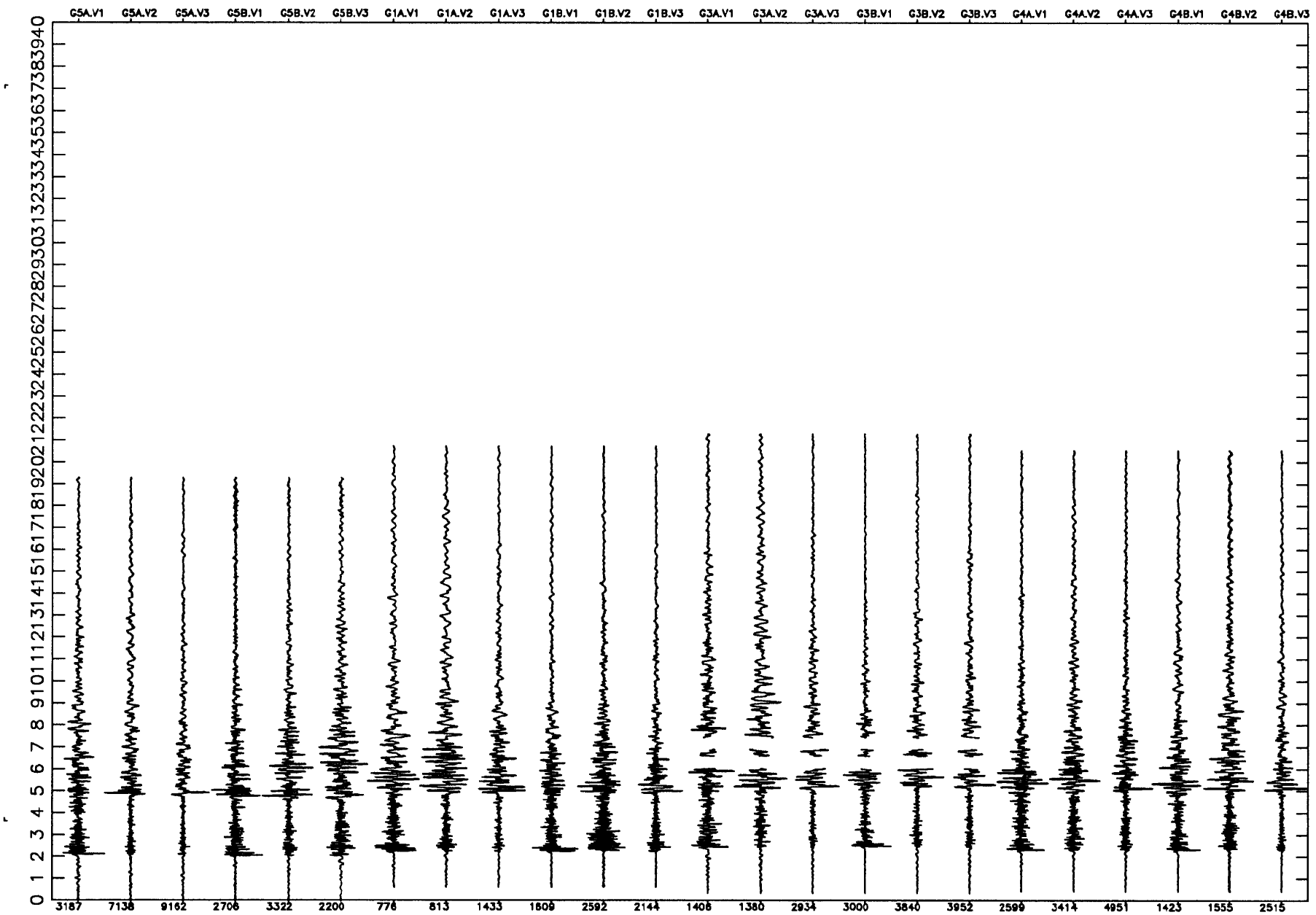

NORMALIZED
UN–DEFINED
CH1,2,3
90*300+05:49:05.456
G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G5A.V1 G5A.V2 G5A.V3 G5B.V1 G5B.V2 G5B.V3 G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
3248 5571 6068 3238 5188 4718 4521 5252 7463 3901 11461 9623 11288 22767 17348 4324 9223 8902 3317 3108 2853 3002 7341 3047 6352 5202 9740 2620 3648 4235

NORMALIZED
UN-DEFINED
CH1,2,3
90*302+12:52:40.896
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1755
596
533
768
318
411
230
136
188
367
491
261
521
304
369
801
575
426
839
317
459
503
271
181
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*303+09:13:44.936
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
402 G1A.V1
524 G1A.V2
428 G1A.V3
401 G1B.V1
849 G1B.V2
459 G1B.V3
824 G3A.V1
1368 G3A.V2
881 G3A.V3
684 G3B.V1
1490 G3B.V2
1278 G3B.V3
1954 G5A.V1
2819 G5A.V2
3474 G5A.V3
743 G5B.V1
1291 G5B.V2
876 G5B.V3
711 G4A.V1
1358 G4A.V2
1077 G4A.V3
518 G4B.V1
904 G4B.V2
682 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*303+09:32:50.779
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
2515
3679
2699
868
1362
1724
681
660
626
705
1208
648
776
923
1327
854
1646
1881
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

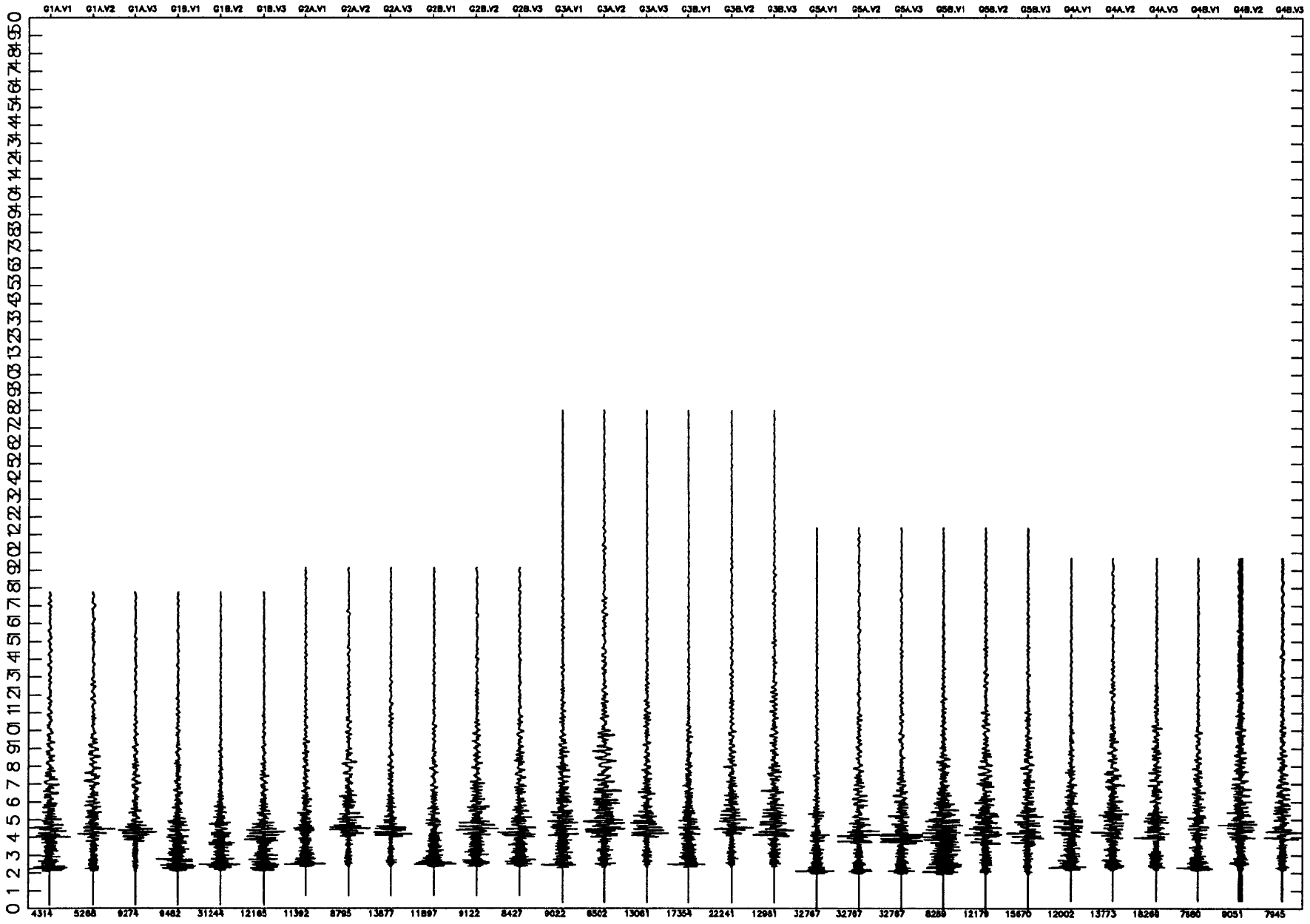

NORMALIZED
UN-DEFINED
CH1,2,3
90*312+19:35:26.219
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
9611 5520 3593 23829 32767 20577 26458 8046 4912 32507 17689 11547 17847 8161 4527 32767 10645 9103 19036 12040 10527 14505 5824 4270


NORMALIZED
UN-DEFINED
CH1,2,3
90*320+06:59:53.375
G5A.V1 G5A.V2 G5A.V3 G5B.V1 G5B.V2 G5B.V3 G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
3187 7138 9162 2706 3322 2200 776 813 1433 1609 2592 2144 1408 1380 2934 3000 3840 3952 2599 3414 4951 1423 1555 2515

NORMALIZED
UN–DEFINED

↤ CH1,2,3

90*320+15:00:33.129



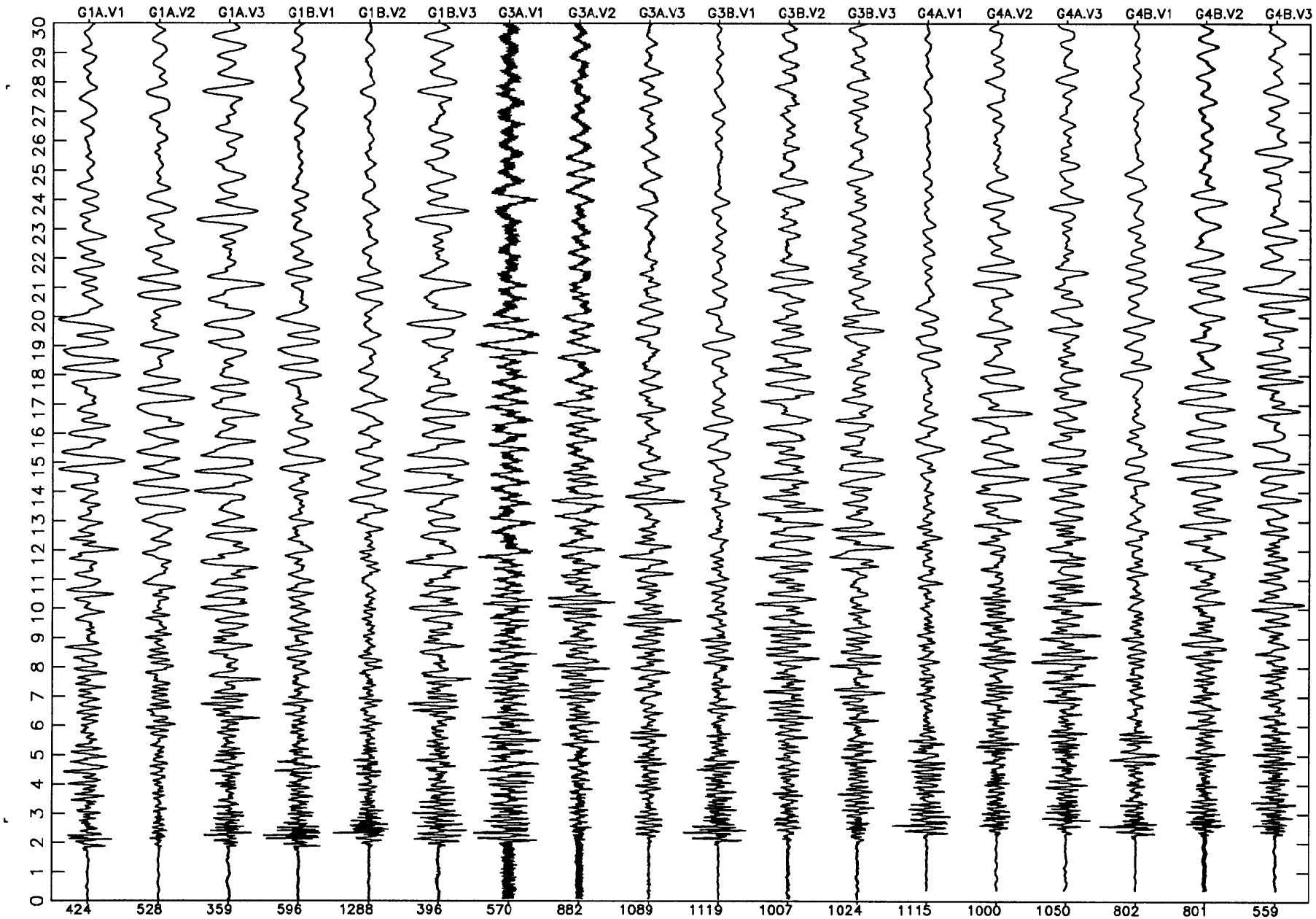
NORMALIZED
UN-DEFINED
CH1,2,3
90*325+12:24:12.104

NORMALIZED
UN-DEFINED
CH1,2,3
90*326+11:36:36.075

NORMALIZED
UN-DEFINED
CH1,2,3
90*331+08:05:24.203
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
242 G1A.V1
257 G1A.V2
360 G1A.V3
430 G1B.V1
695 G1B.V2
354 G1B.V3
347 G2A.V1
345 G2A.V2
336 G2A.V3
390 G2B.V1
368 G2B.V2
353 G2B.V3
477 G3A.V1
356 G3A.V2
604 G3A.V3
798 G3B.V1
656 G3B.V2
532 G3B.V3
554 G5A.V1
458 G5A.V2
306 G5A.V3
940 G5B.V1
554 G5B.V2
540 G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*33+05:18:15.387
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*345+08:23:26.623


NORMALIZED
UN-DEFINED
CH1,2,3
90*346+08:09:30.027
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
424
528
359
596
1288
396
570
882
1089
1119
1007
1024
1115
1000
1050
802
801
559

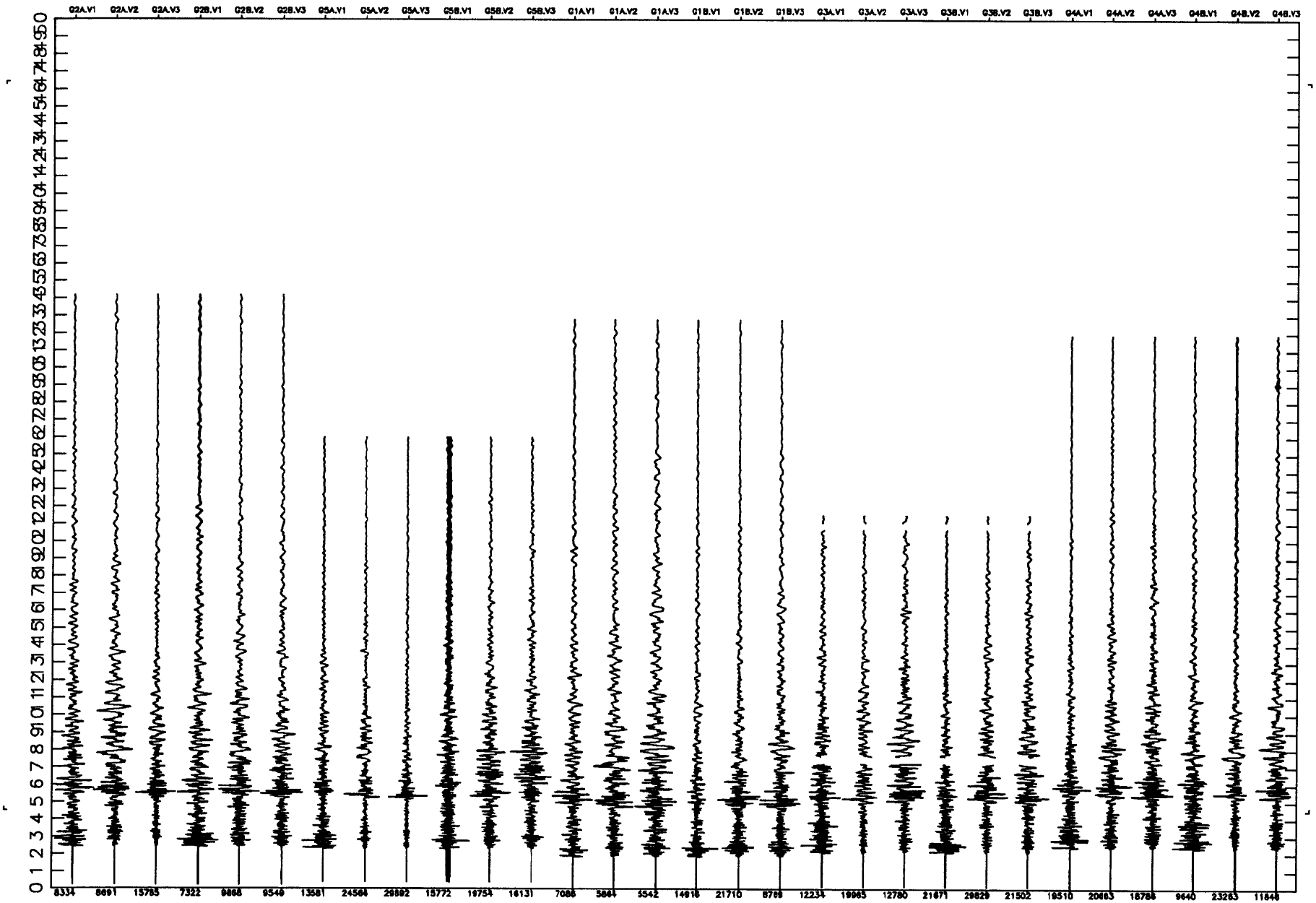
NORMALIZED
UN-DEFINED
CH1,2,3
90*346+11:53:26.684
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1879 G2A.V1
2358 G2A.V2
1762 G2A.V3
1101 G2B.V1
1938 G2B.V2
1399 G2B.V3
808 G1A.V1
1293 G1A.V2
1162 G1A.V3
964 G1B.V1
2087 G1B.V2
1288 G1B.V3
1778 G3A.V1
1953 G3A.V2
2493 G3A.V3
1916 G3B.V1
4947 G3B.V2
3673 G3B.V3
1373 G5A.V1
2733 G5A.V2
1968 G5A.V3
1763 G5B.V1
2526 G5B.V2
2594 G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*349+09:39:04.700
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
882 G1A.V1
986 G1A.V2
905 G1A.V3
830 G1B.V1
1527 G1B.V2
853 G1B.V3
1099 G2A.V1
1430 G2A.V2
1189 G2A.V3
1051 G2B.V1
1061 G2B.V2
1187 G2B.V3
1212 G3A.V1
1651 G3A.V2
1645 G3A.V3
1785 G3B.V1
2543 G3B.V2
2782 G3B.V3
1702 G4A.V1
1598 G4A.V2
1873 G4A.V3
912 G4B.V1
1228 G4B.V2
1234 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
90*349+10:38:28.824

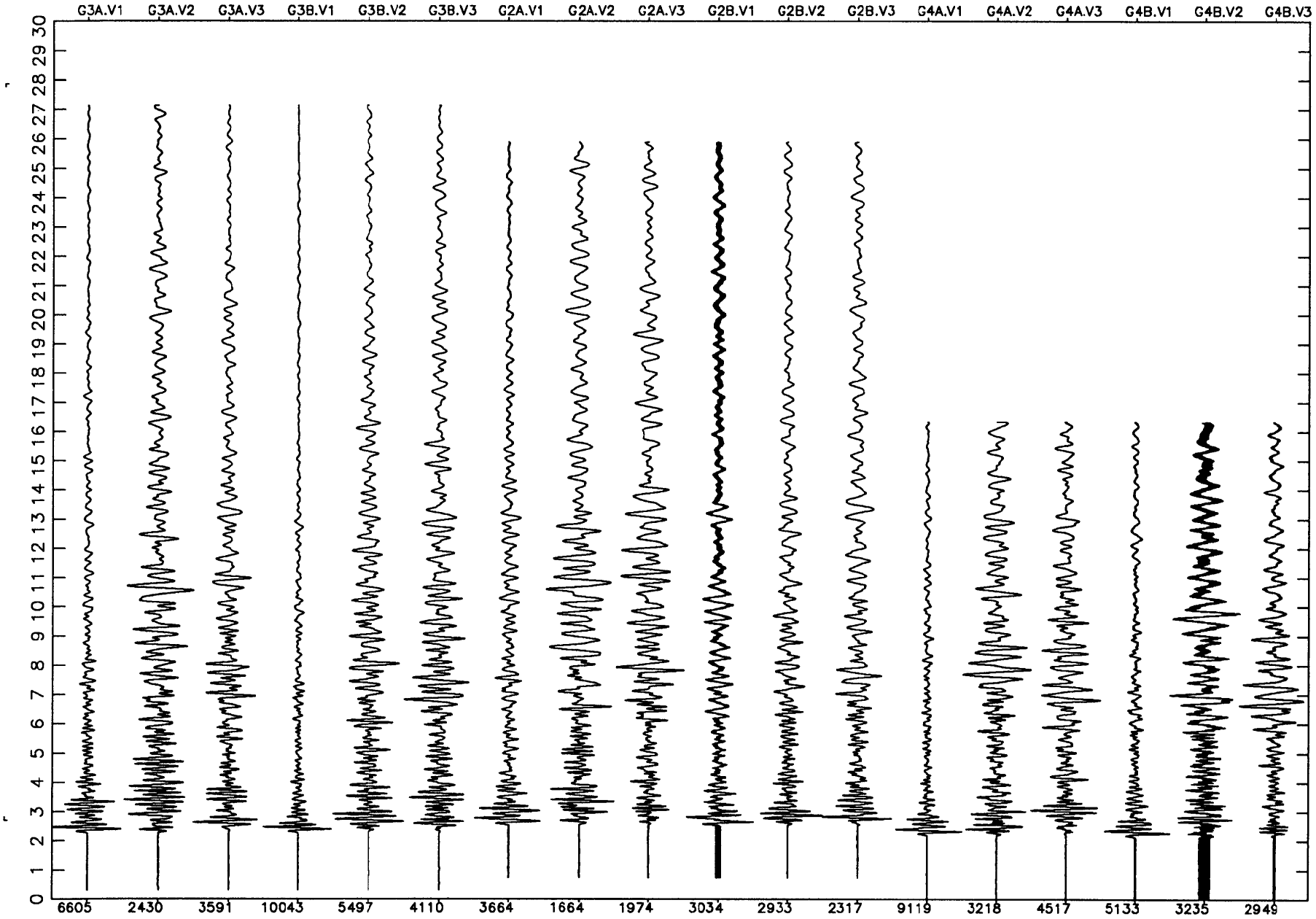
NORMALIZED
UN-DEFINED
CH1,2,3
90*349+15:41:10.064

NORMALIZED
UN-DEFINED
CH1,2,3
90*350+15:46:01.100


NORMALIZED
UN-DEFINED
CH1,2,3
90*351+01:16:57.527
G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G5A.V1 G5A.V2 G5A.V3 G5B.V1 G5B.V2 G5B.V3 G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
8334 8691 15785 7322 9868 9548 13581 24584 29892 15772 19754 16131 7086 5844 5542 14916 21710 8769 12234 19965 12780 21671 29829 21502 19510 20863 18788 9640 23263 11848

NORMALIZED
UN-DEFINED
CH1,2,3
90*354+13:04:04.395

NORMALIZED
UN-DEFINED
CH1,2,3
90*357+21:29:12.134
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
4994 G2A.V1
3728 G2A.V2
4377 G2A.V3
5771 G2B.V1
3306 G2B.V2
3326 G2B.V3
5084 G3A.V1
4158 G3A.V2
4422 G3A.V3
6924 G3B.V1
6320 G3B.V2
7961 G3B.V3
5217 G5A.V1
5485 G5A.V2
3668 G5A.V3
5140 G5B.V1
5003 G5B.V2
4328 G5B.V3
7230 G4A.V1
4791 G4A.V2
4900 G4A.V3
5507 G4B.V1
4188 G4B.V2
3978 G4B.V3

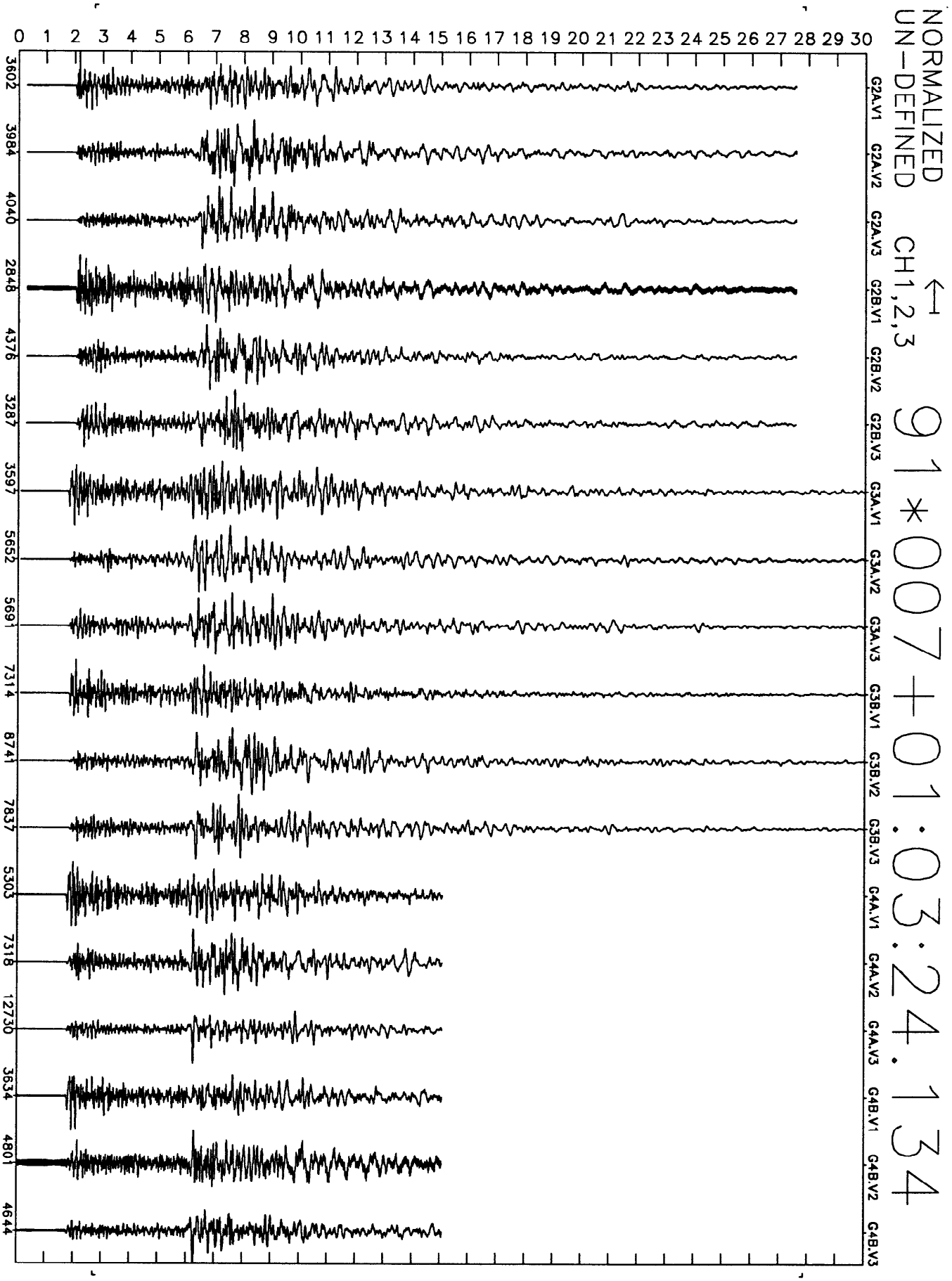

NORMALIZED
UN-DEFINED
CH1,2,3
90*359+13:20:57.597
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
6605
2430
3591
10043
5497
4110
3664
1664
1974
3034
2933
2317
9119
3218
4517
5133
3235
2949

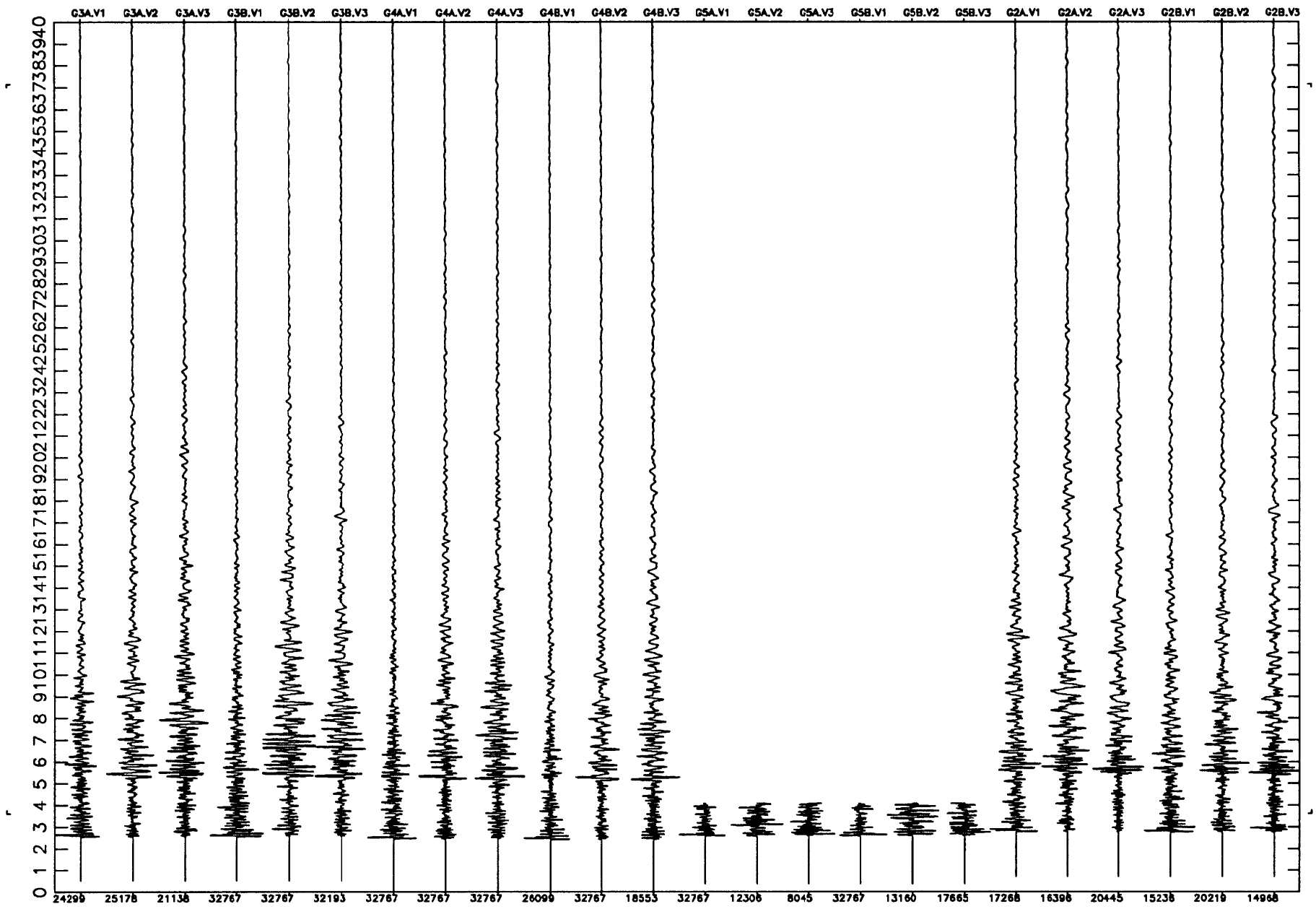
NORMALIZED
UN-DEFINED
CH1,2,3
90*360+10:29:28.947
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1485 G2A.V1
860 G2A.V2
663 G2A.V3
1250 G2B.V1
1133 G2B.V2
1133 G2B.V3
3051 G3A.V1
1308 G3A.V2
1583 G3A.V3
4505 G3B.V1
2120 G3B.V2
1533 G3B.V3
4240 G4A.V1
1593 G4A.V2
2008 G4A.V3
2047 G4B.V1
1780 G4B.V2
1084 G4B.V3
3544 G5A.V1
2208 G5A.V2
1200 G5A.V3
3987 G5B.V1
1854 G5B.V2
1728 G5B.V3

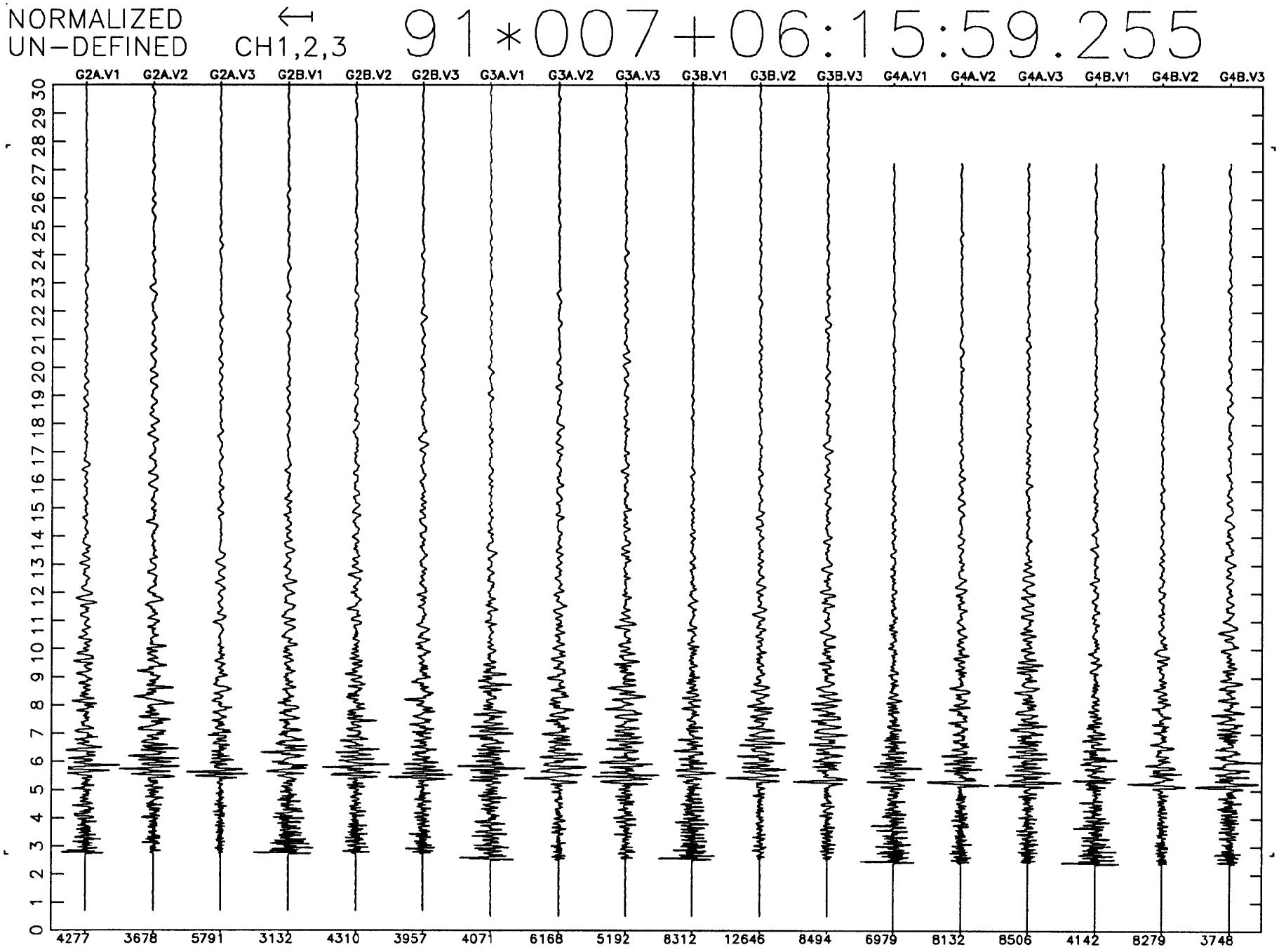
NORMALIZED
UN-DEFINED
CH1,2,3
90*361+13:28:23.558
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1482
2456
1271
1443
1414
1553
1566
1261
1103
1787
1202
1123
1526
1590
1401
1702
1720
1324
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

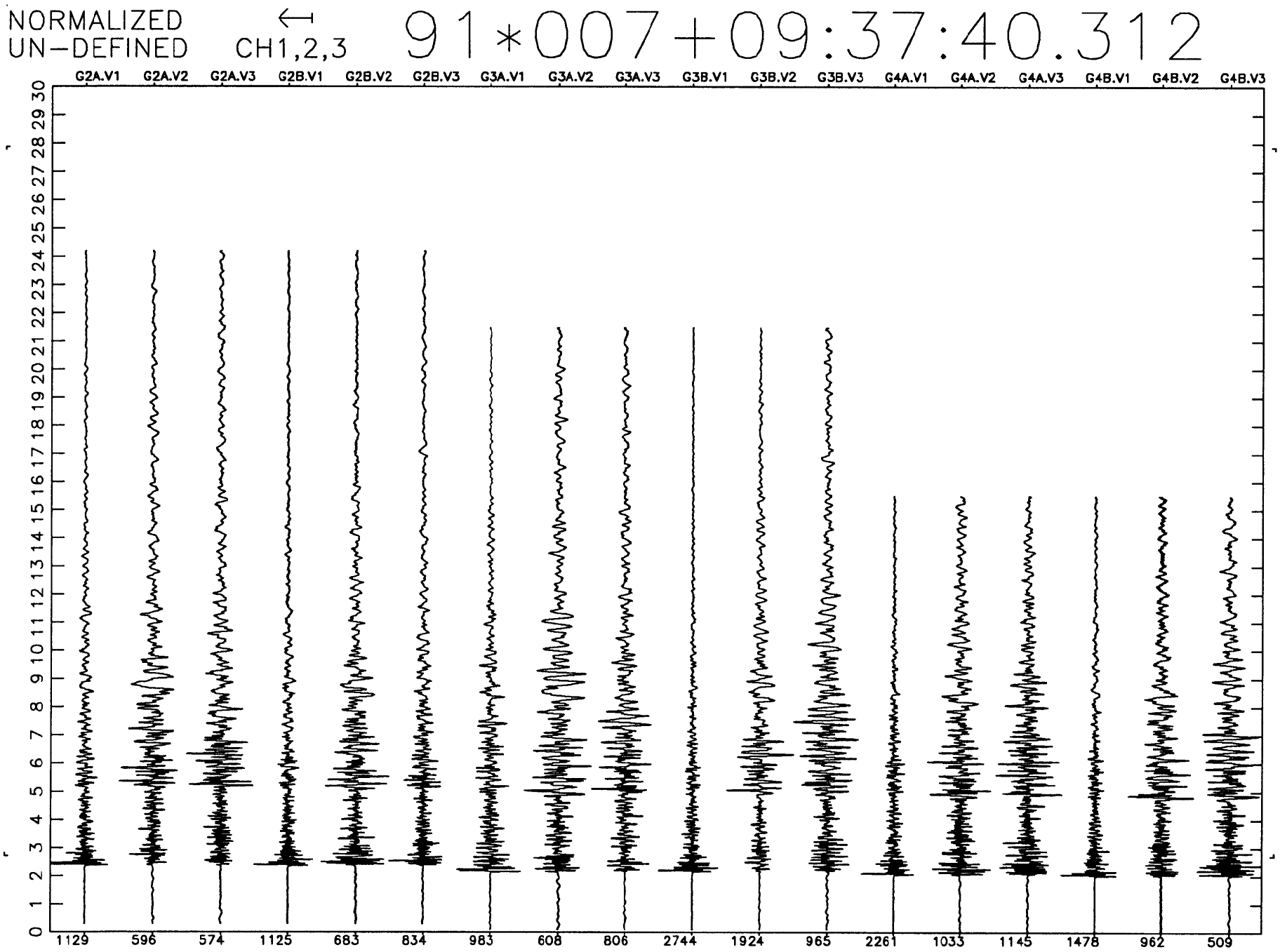
NORMALIZED
UN-DEFINED
CH1,2,3
90*362+04:05:21.634
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
3192
5362
2511
2887
2660
3167
3466
2813
3130
3455
2687
2717
3349
3391
2899
3784
3918
3902
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

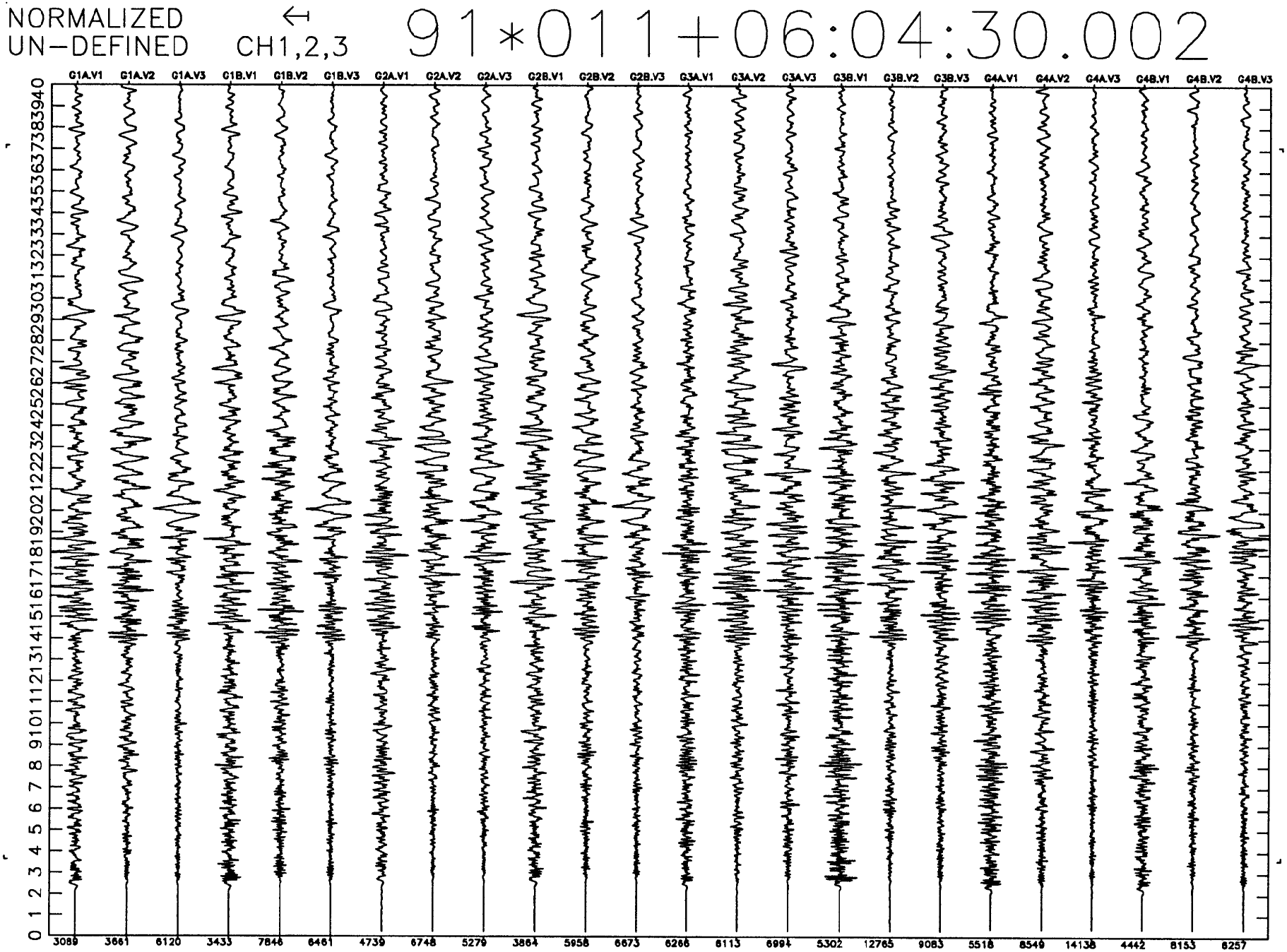
NORMALIZED
UN-DEFINED
CH1,2,3
91*001+19:19:42.837
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
6166 G5A.V1
11068 G5A.V2
5836 G5A.V3
6857 G5B.V1
9564 G5B.V2
7354 G5B.V3
5660 G3A.V1
7465 G3A.V2
6996 G3A.V3
5499 G3B.V1
11235 G3B.V2
10961 G3B.V3
4524 G2A.V1
8671 G2A.V2
6802 G2A.V3
5286 G2B.V1
5426 G2B.V2
6319 G2B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*007+01:03:24.134
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
3602 G2A.V1
3984 G2A.V2
4040 G2A.V3
2848 G2B.V1
4376 G2B.V2
3287 G2B.V3
3597 G3A.V1
5652 G3A.V2
5691 G3A.V3
7314 G3B.V1
8741 G3B.V2
7837 G3B.V3
5303 G4A.V1
7318 G4A.V2
12730 G4A.V3
3634 G4B.V1
4801 G4B.V2
4644 G4B.V3

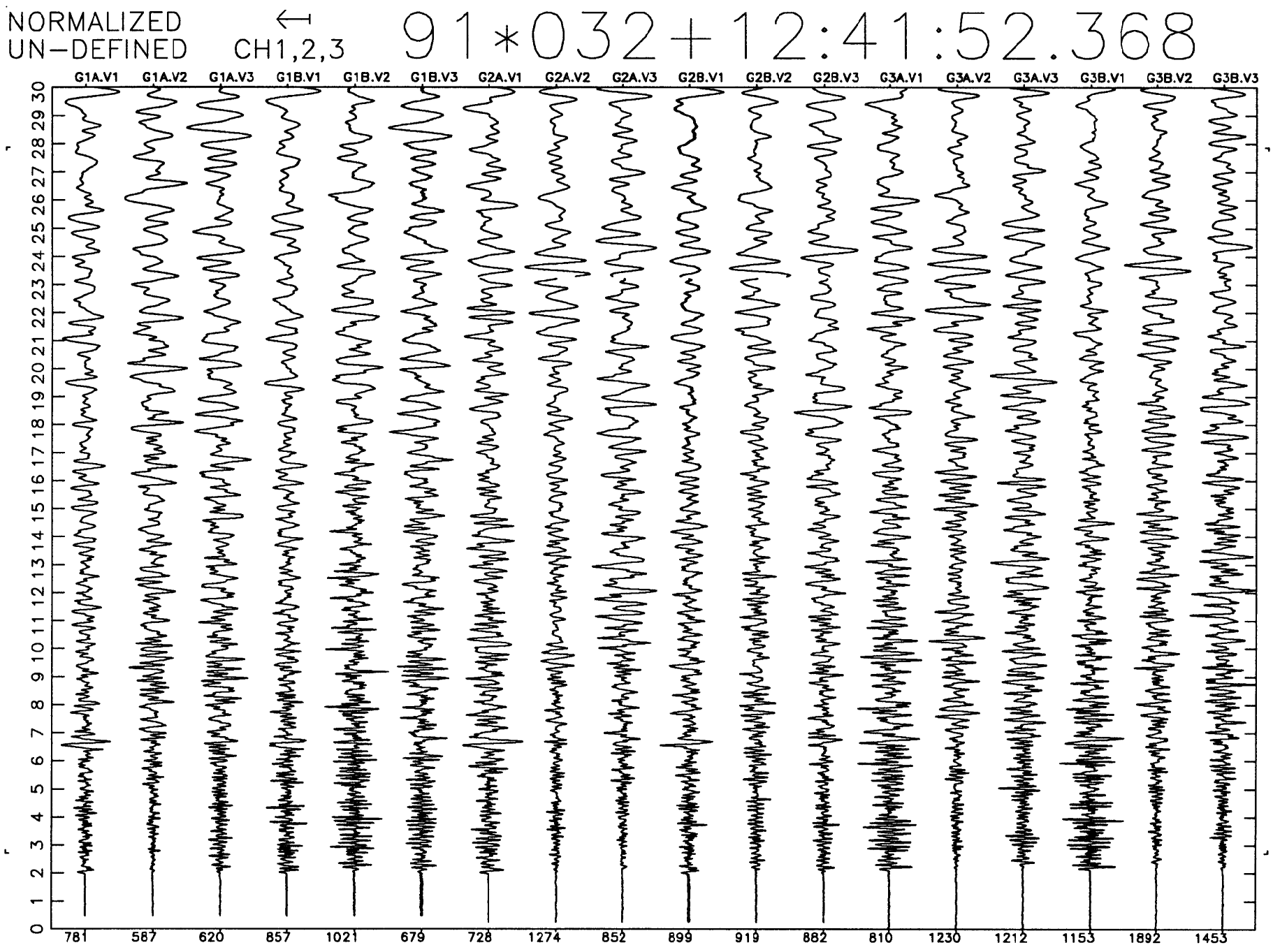

NORMALIZED
UN-DEFINED
CH1,2,3
91*007+04:35:36.452
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
24299 25178 21138 32767 32767 32193 32767 32767 32767 26099 32767 18553 32767 12308 8045 32767 13160 17665 17268 16398 20445 15238 20219 14968

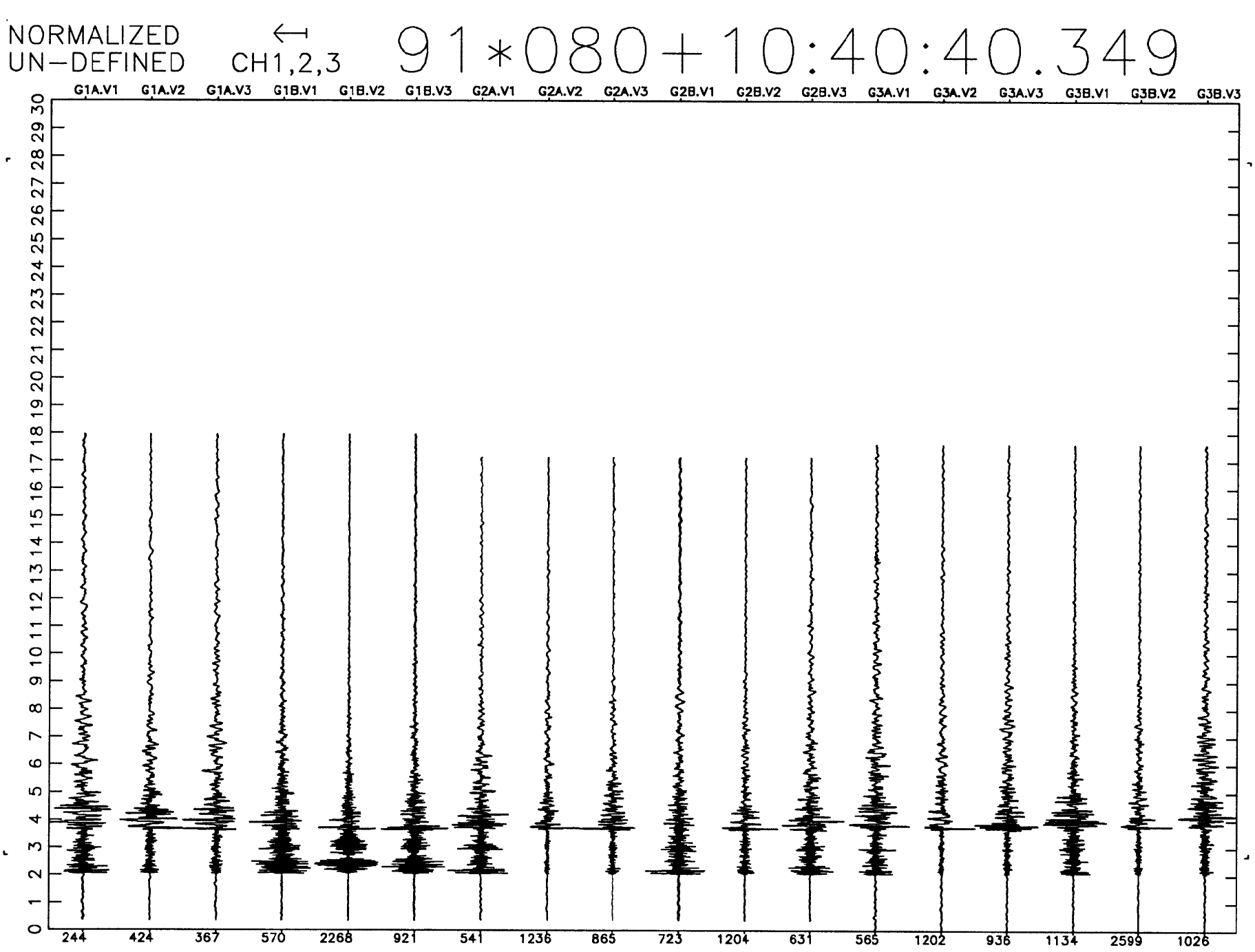

NORMALIZED
UN-DEFINED
CH1,2,3
91*007+06:15:59.255
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
4277
3678
5791
3132
4310
3957
4071
6168
5192
8312
12646
8494
6979
8132
8506
4142
8279
3748


NORMALIZED
UN-DEFINED
CH1,2,3
91*007+09:37:40.312
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1129
596
574
1125
683
834
983
608
806
2744
1924
965
2261
1033
1145
1478
962
509


NORMALIZED
UN-DEFINED
CH1,2,3
91*011+06:04:30.002
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
3089
3661
6120
3433
7846
6461
4739
6748
5279
3864
5958
6673
6266
6113
6994
5302
12765
9083
5518
8549
14138
4442
8153
8257

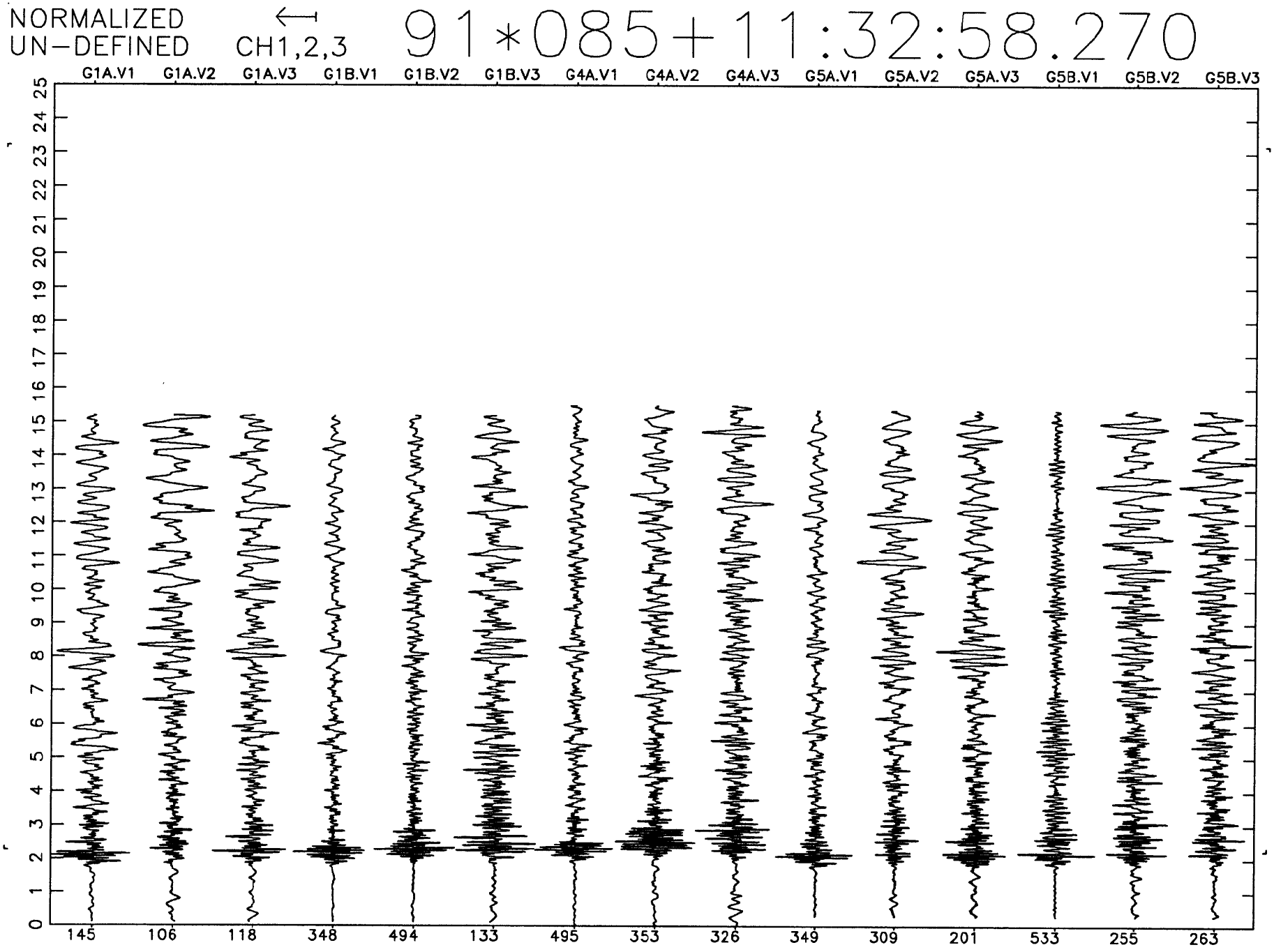
NORMALIZED
UN-DEFINED
CH1,2,3
91*031+23:08:07.130
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
15218 C1A.V1
12058 C1A.V2
8783 C1A.V3
15912 C1B.V1
17502 C1B.V2
8239 C1B.V3
15451 C2A.V1
13835 C2A.V2
10099 C2A.V3
16538 C2B.V1
12977 C2B.V2
10098 C2B.V3
15323 C3A.V1
13099 C3A.V2
10084 C3A.V3
16552 C3B.V1
16808 C3B.V2
12448 C3B.V3
17177 C4A.V1
14080 C4A.V2
12217 C4A.V3
17144 C4B.V1
9420 C4B.V2
10914 C4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*032+12:41:52.368
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
781
587
620
857
1021
679
728
1274
852
899
919
882
810
1230
1212
1153
1892
1453

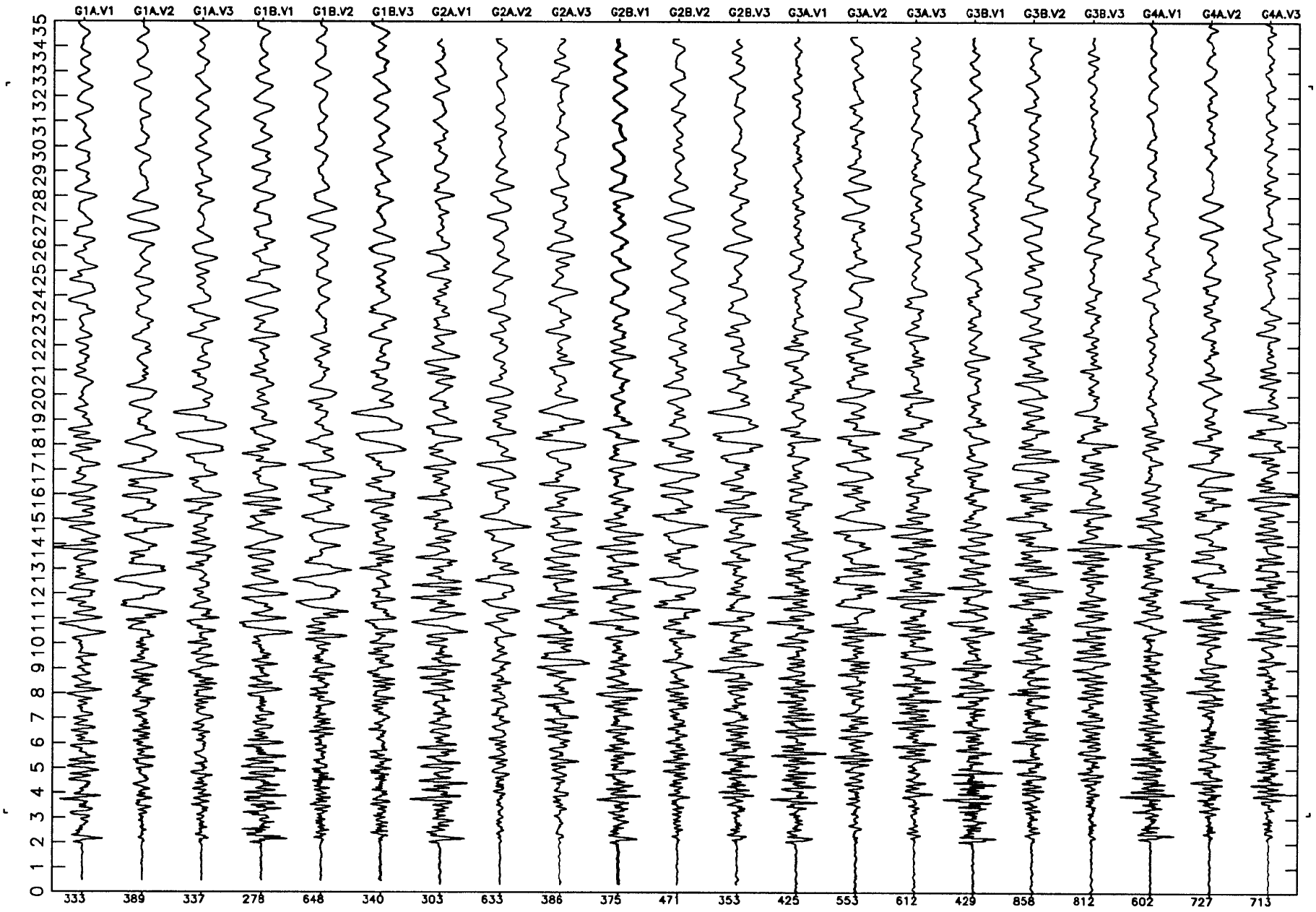

NORMALIZED
UN-DEFINED
CH1,2,3
91*080+10:40:40.349
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
244
424
367
570
2268
921
541
1236
865
723
1204
631
565
1202
936
1134
2599
1026

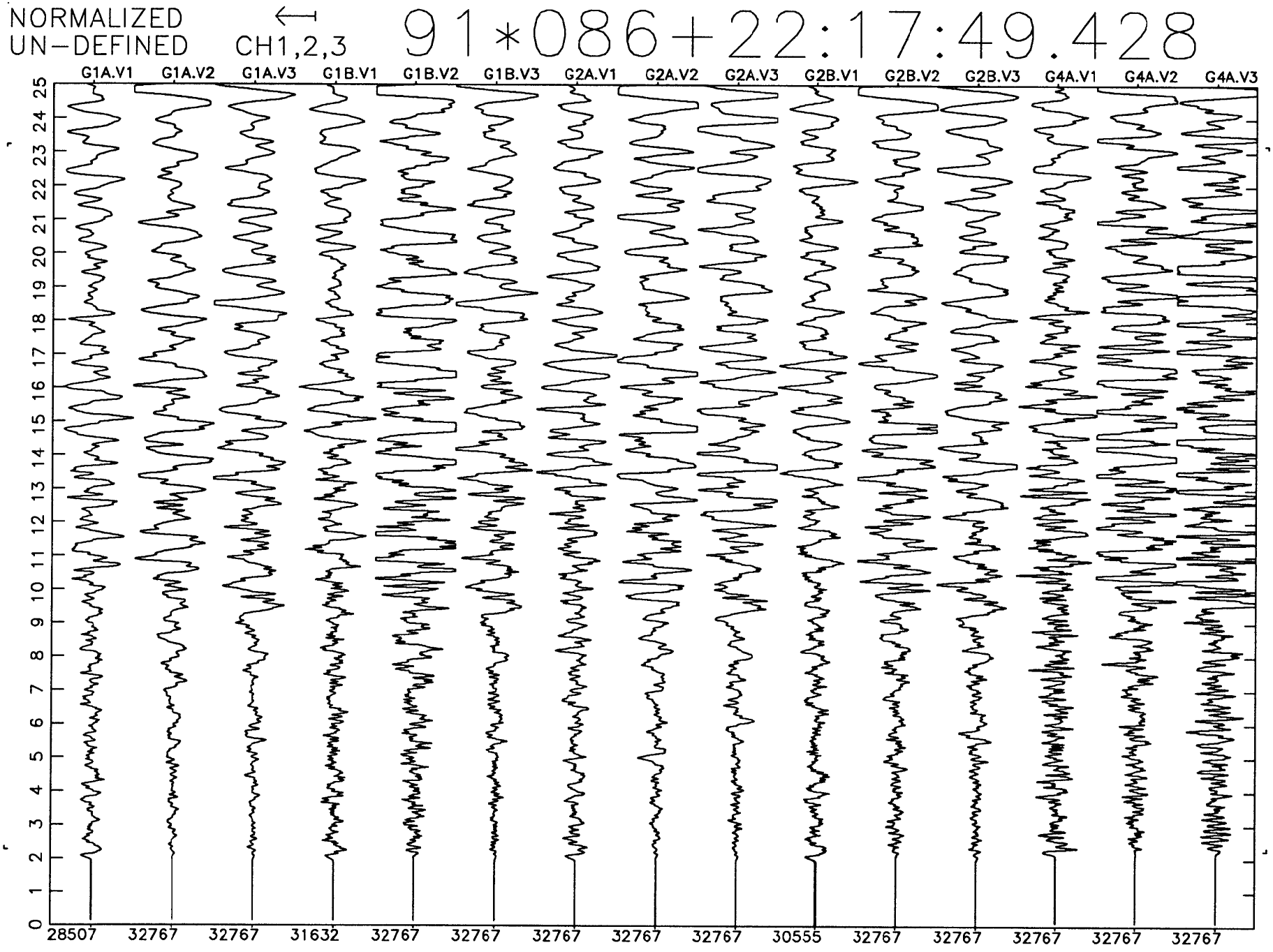
NORMALIZED
UN-DEFINED
CH1,2,3
91*084+13:45:57.324
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
522
603
715
671
1081
770
762
659
909
494
665
423
1225
672
679
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3

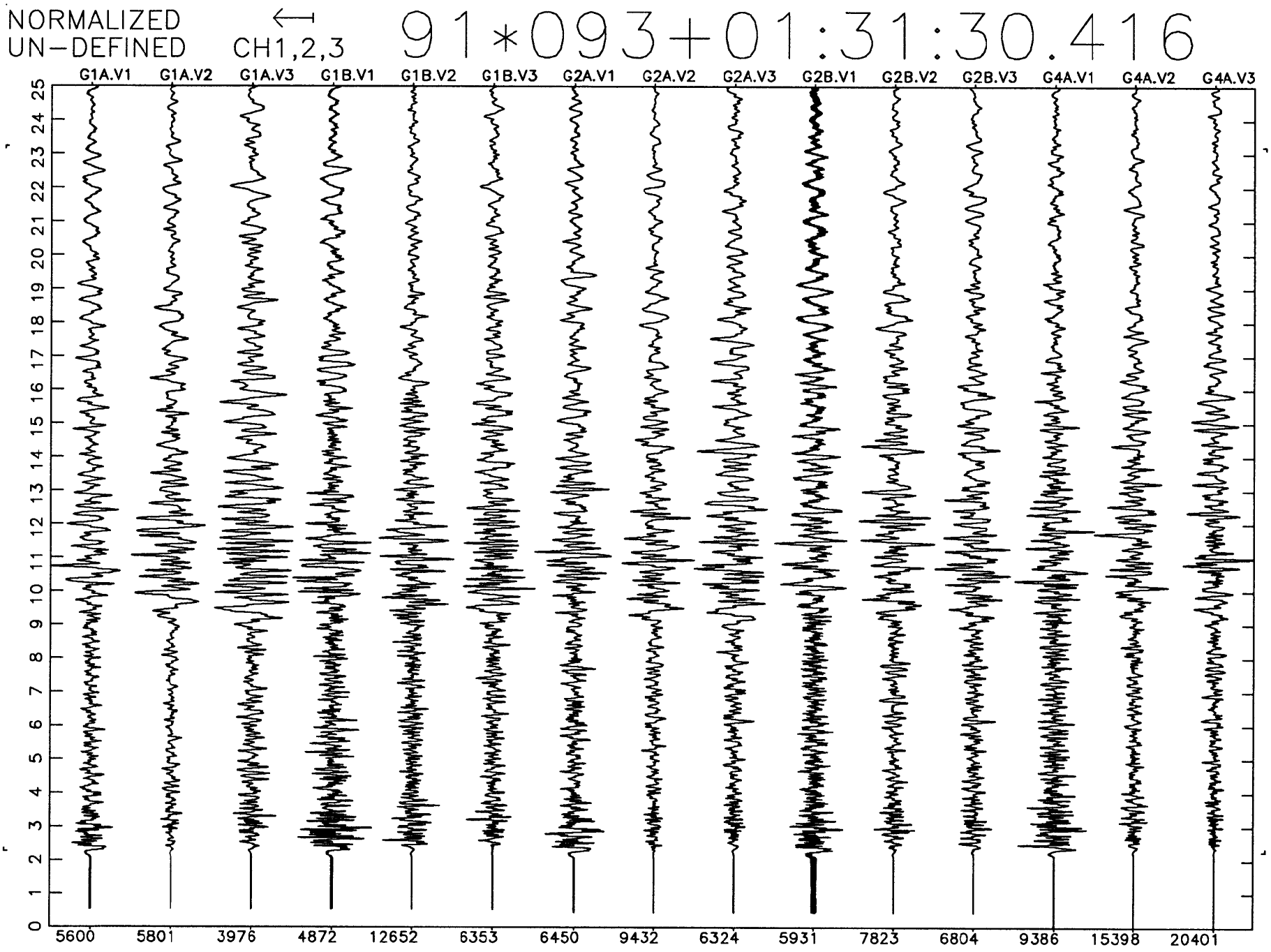
NORMALIZED
UN-DEFINED
CH1,2,3
91*084+13:53:40.192
0 1 2 3 4 5 6 7 8 91 01 11 21 31 41 51 61 71 81 92 02 12 22 32 42 52 62 72 82 93 03 13 23 33 43 53 63 73 83 94 04 14 24 34 44 5
01A.V1
01A.V2
01A.V3
01B.V1
01B.V2
01B.V3
02A.V1
02A.V2
02A.V3
02B.V1
02B.V2
02B.V3
03A.V1
03A.V2
03A.V3
03B.V1
03B.V2
03B.V3
04A.V1
04A.V2
04A.V3
05A.V1
05A.V2
05A.V3
05B.V1
05B.V2
05B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*085+11:32:58.270
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
145
106
118
348
494
133
495
353
326
349
309
201
533
255
263

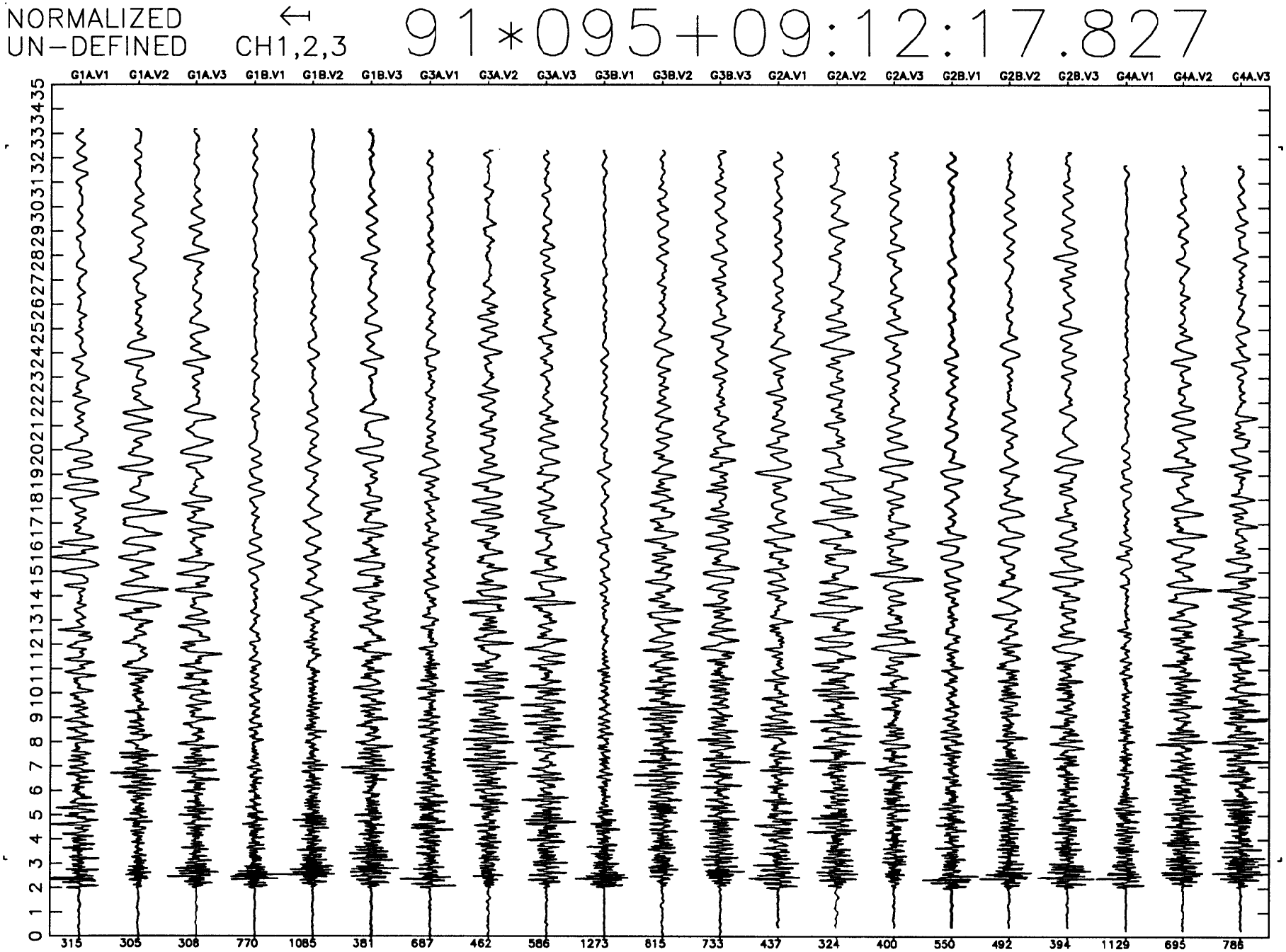
NORMALIZED
UN-DEFINED
CH1,2,3
91*085+11:50:32.471


NORMALIZED
UN-DEFINED
CH1,2,3
91*086+13:51:51.054
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
333
389
337
278
648
340
303
633
386
375
471
353
425
553
612
429
858
812
602
727
713

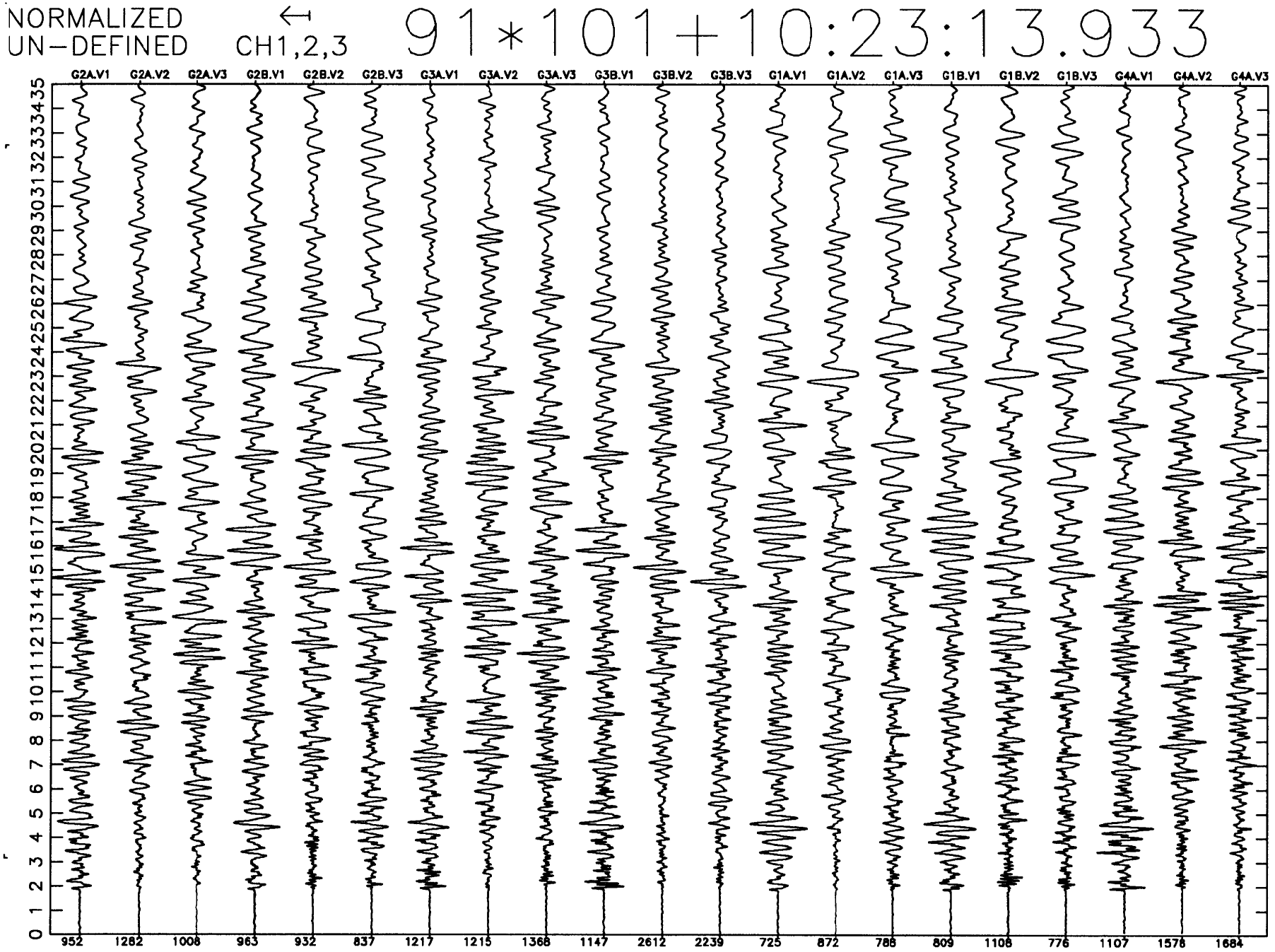

NORMALIZED
UN-DEFINED
CH1,2,3
91*086+22:17:49.428
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
28507
32767
32767
31632
32767
32767
32767
32767
32767
30555
32767
32767
32767
32767
32767

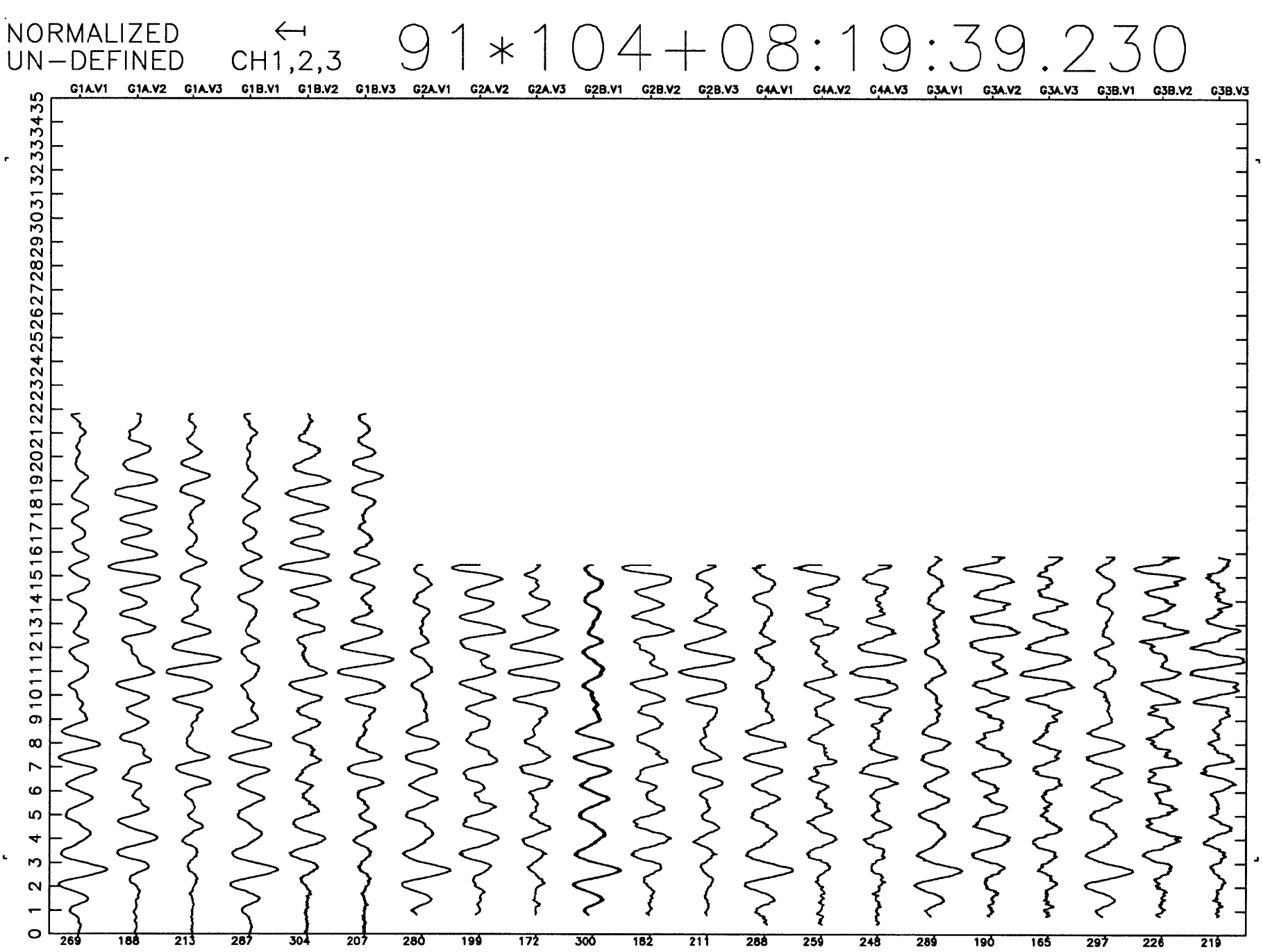

NORMALIZED
UN-DEFINED
CH1,2,3
91*093+01:31:30.416
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
5600
5801
3976
4872
12652
6353
6450
9432
6324
5931
7823
6804
9386
15398
20401

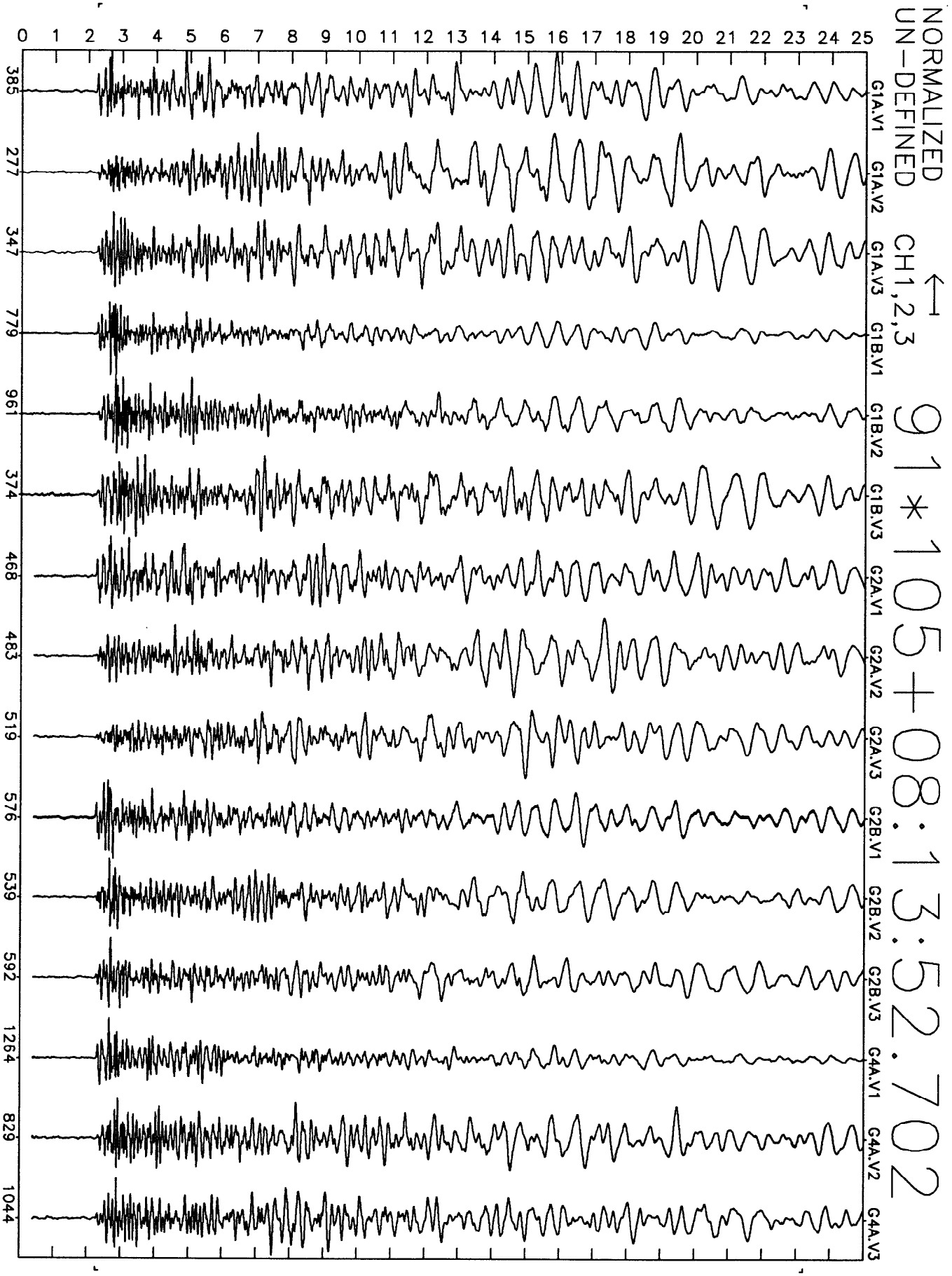
NORMALIZED
UN-DEFINED
CH1,2,3
91*094+04:53:58.178
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
411 G1A.V1
339 G1A.V2
313 G1A.V3
400 G1B.V1
463 G1B.V2
272 G1B.V3
498 G2A.V1
490 G2A.V2
451 G2A.V3
561 G2B.V1
364 G2B.V2
361 G2B.V3
692 G4A.V1
617 G4A.V2
804 G4A.V3

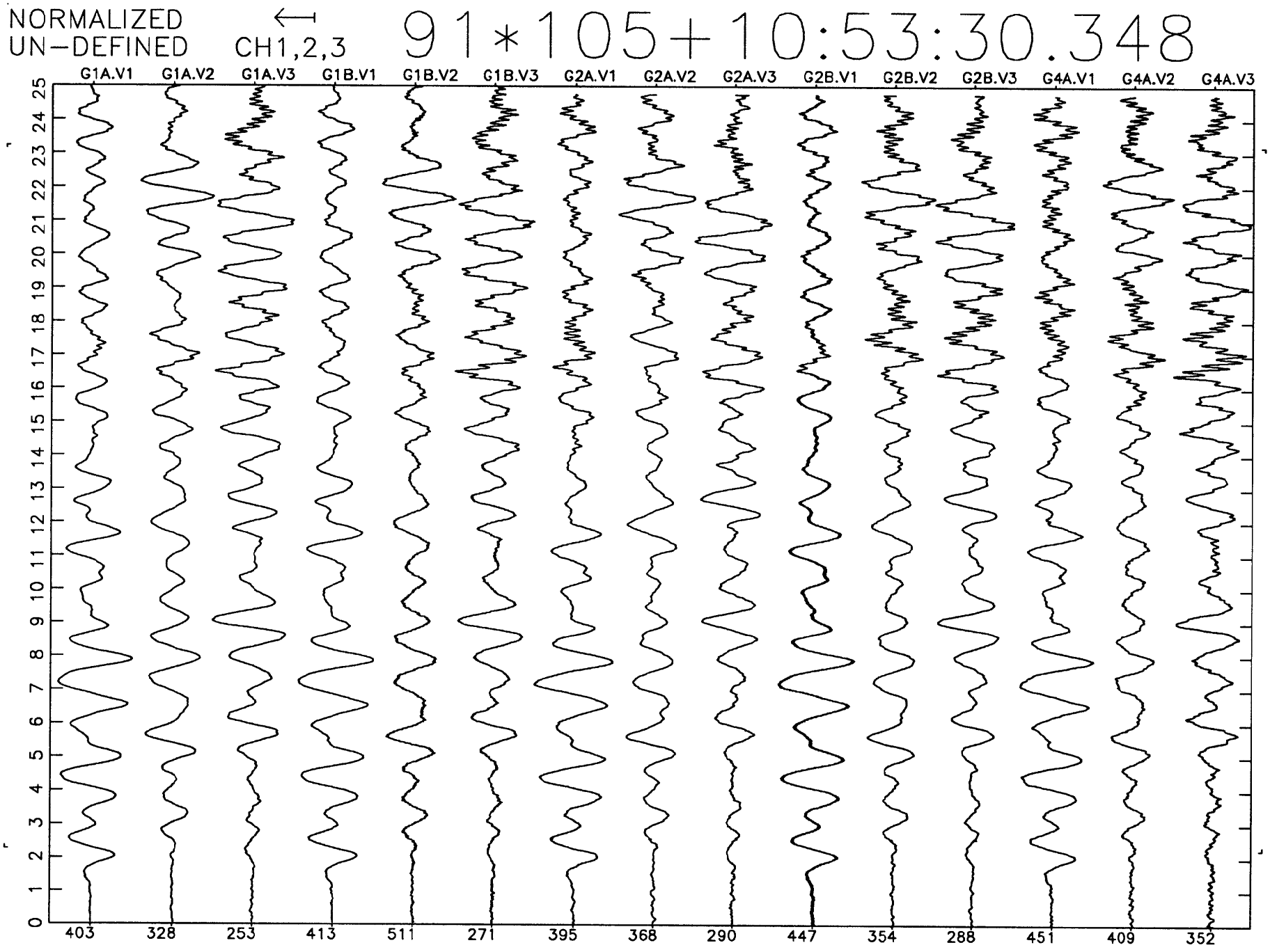

NORMALIZED
UN-DEFINED
CH1,2,3
91*095+09:12:17.827
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
315
305
308
770
1085
381
687
462
586
1273
815
733
437
324
400
550
492
394
1129
695
788

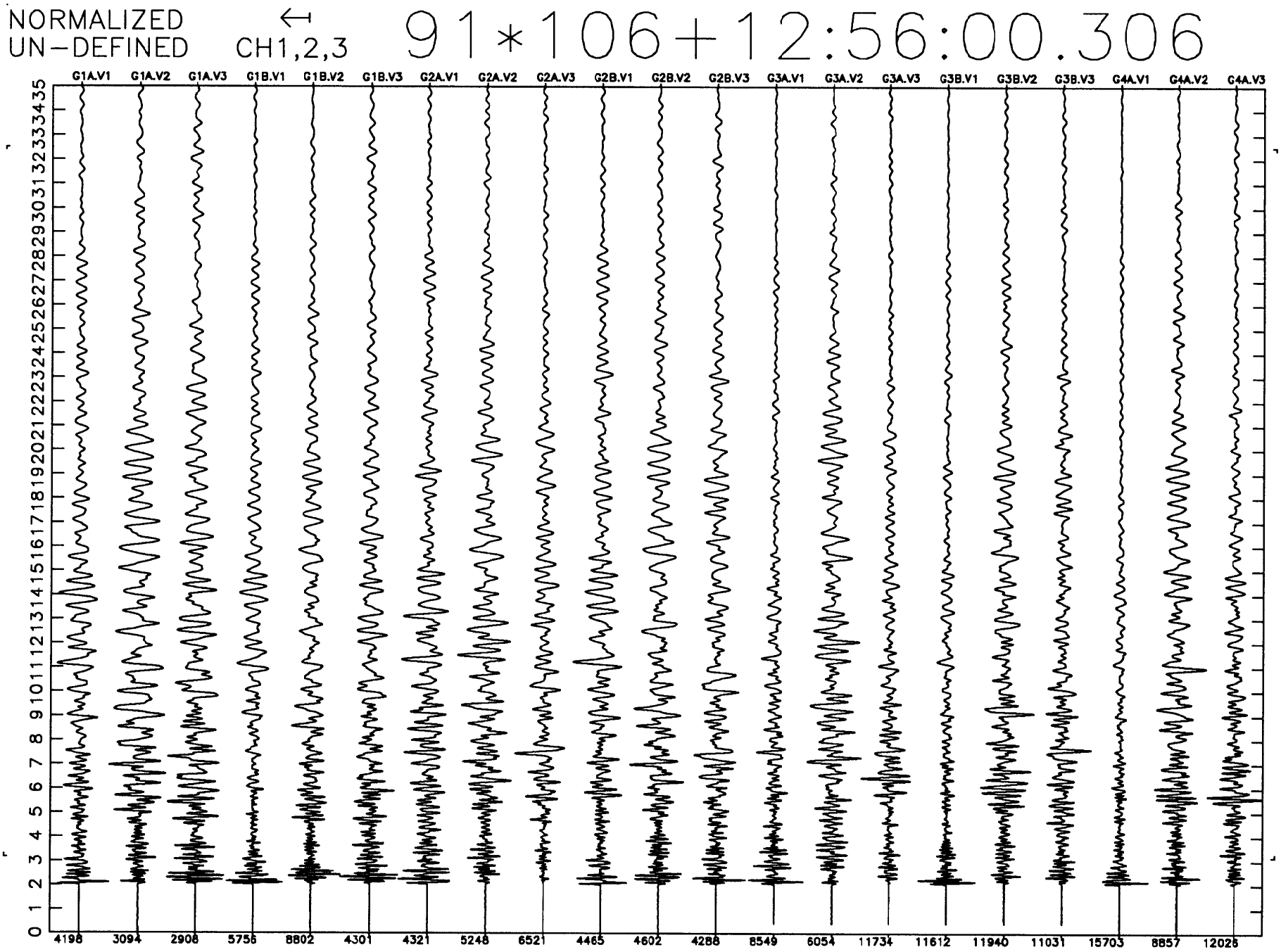
NORMALIZED
UN-DEFINED
CH1,2,3
91*101+09:49:58.629
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
737
442
389
584
406
321
718
622
852
937
966
732
906
761
880
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*101+10:23:13.933
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
952
1282
1008
963
932
837
1217
1215
1368
1147
2612
2239
725
872
788
809
1108
776
1107
1578
1684


NORMALIZED
UN-DEFINED
CH1,2,3
91*104+08:19:39.230
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G4A.V1 G4A.V2 G4A.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
269 188 213 287 304 207 280 199 172 300 182 211 288 259 248 289 190 165 297 226 219

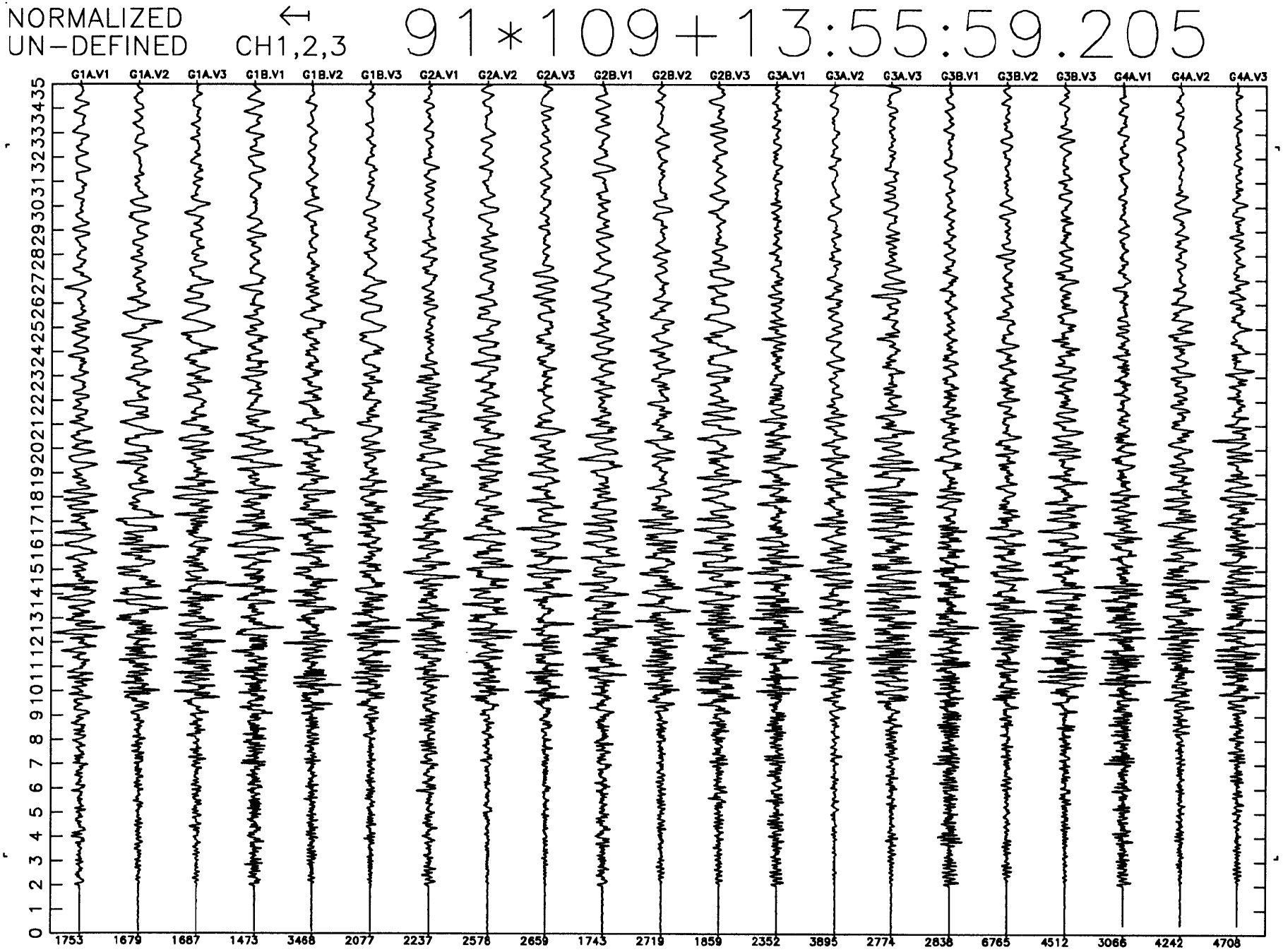

NORMALIZED
UN-DEFINED
CH1,2,3
91*105+08:13:52.702
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
385 G1A.V1
277 G1A.V2
347 G1A.V3
779 G1B.V1
961 G1B.V2
374 G1B.V3
468 G2A.V1
483 G2A.V2
519 G2A.V3
576 G2B.V1
539 G2B.V2
592 G2B.V3
1264 G4A.V1
829 G4A.V2
1044 G4A.V3

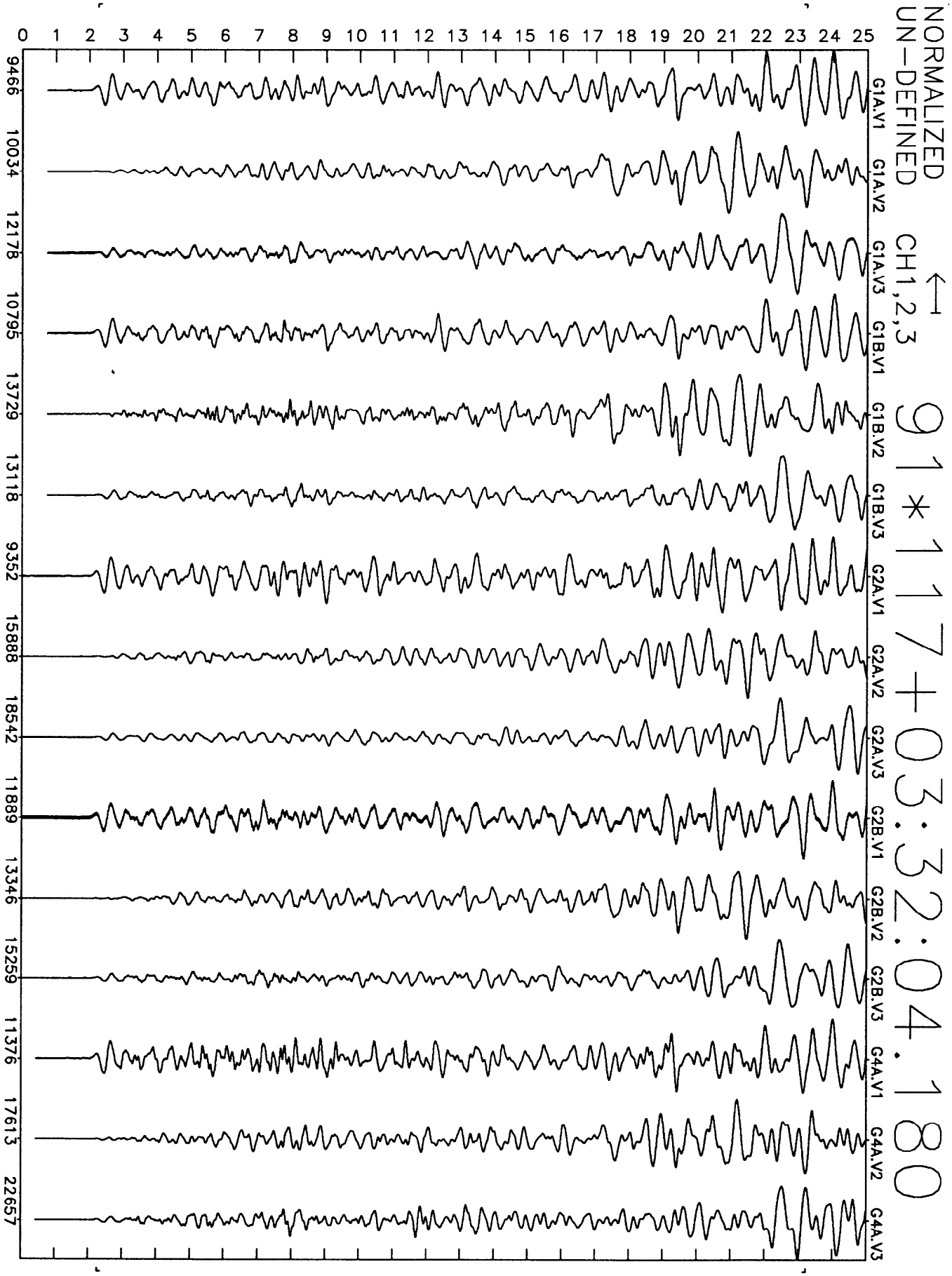

NORMALIZED
UN-DEFINED
CH1,2,3
91*105+10:53:30.348
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
403
328
253
413
511
271
395
368
290
447
354
288
451
409
352

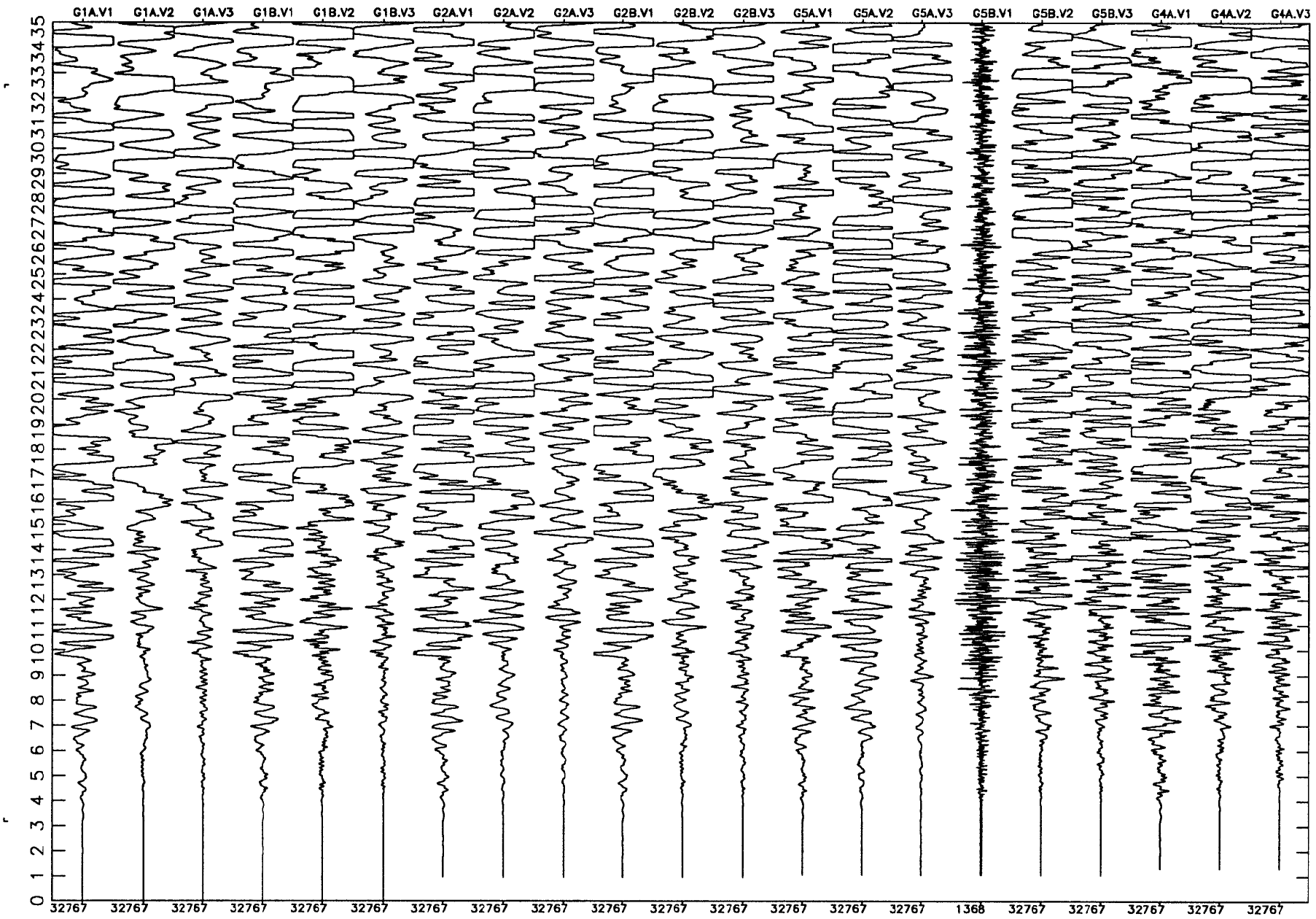

NORMALIZED
UN-DEFINED
CH1,2,3
91*106+12:56:00.306
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
4198
3094
2908
5756
8802
4301
4321
5248
6521
4465
4602
4288
8549
6054
11734
11612
11940
11031
15703
8857
12028

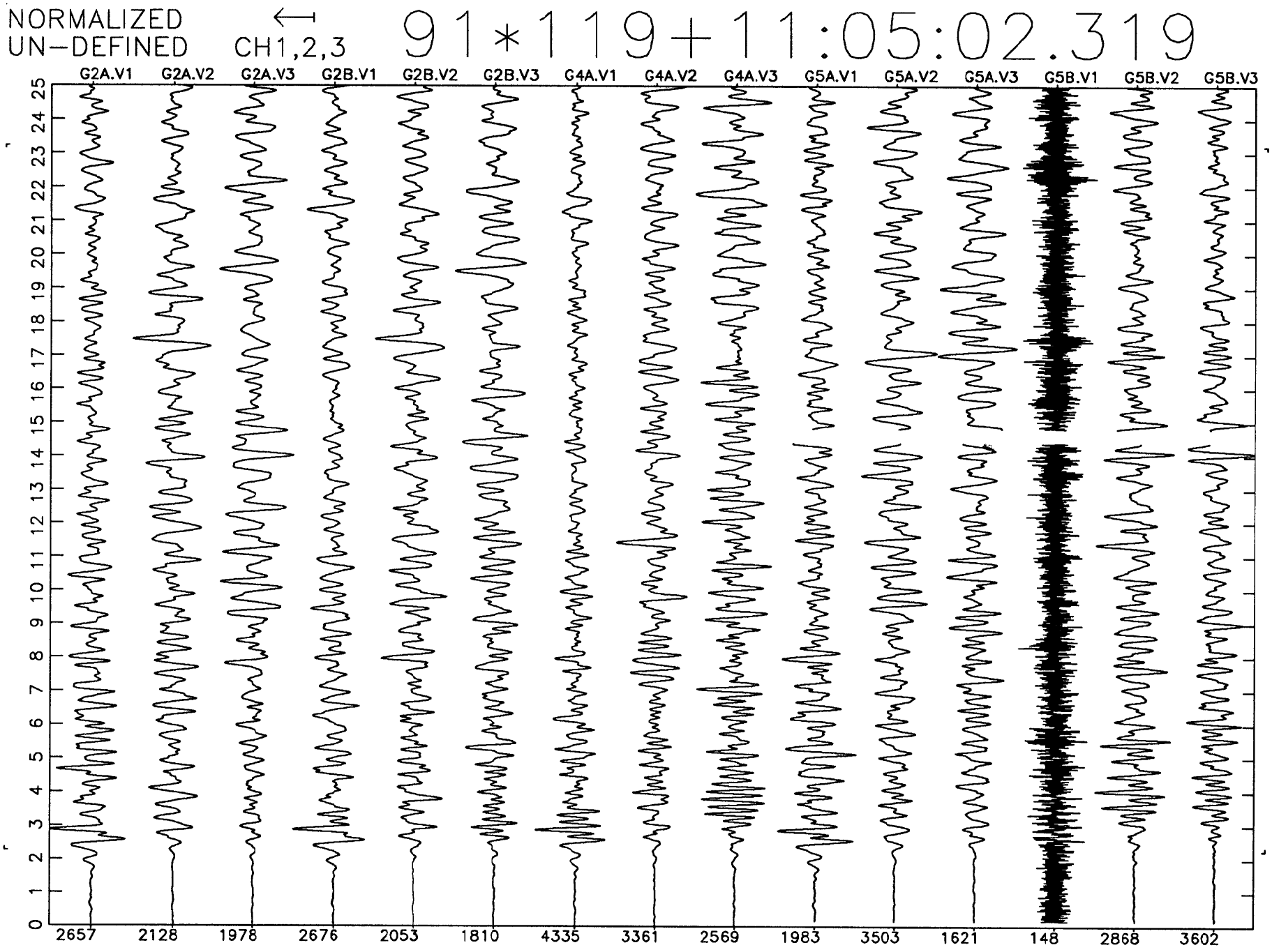
NORMALIZED
UN-DEFINED
CH1,2,3
91*107+10:50:33.849
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
G1A.V1 270
G1A.V2 294
G1A.V3 296
G1B.V1 326
G1B.V2 485
G1B.V3 271
G3A.V1 528
G3A.V2 517
G3A.V3 690
G3B.V1 694
G3B.V2 1086
G3B.V3 784
G2A.V1 408
G2A.V2 479
G2A.V3 375
G2B.V1 394
G2B.V2 391
G2B.V3 306
G4A.V1 754
G4A.V2 722
G4A.V3 983

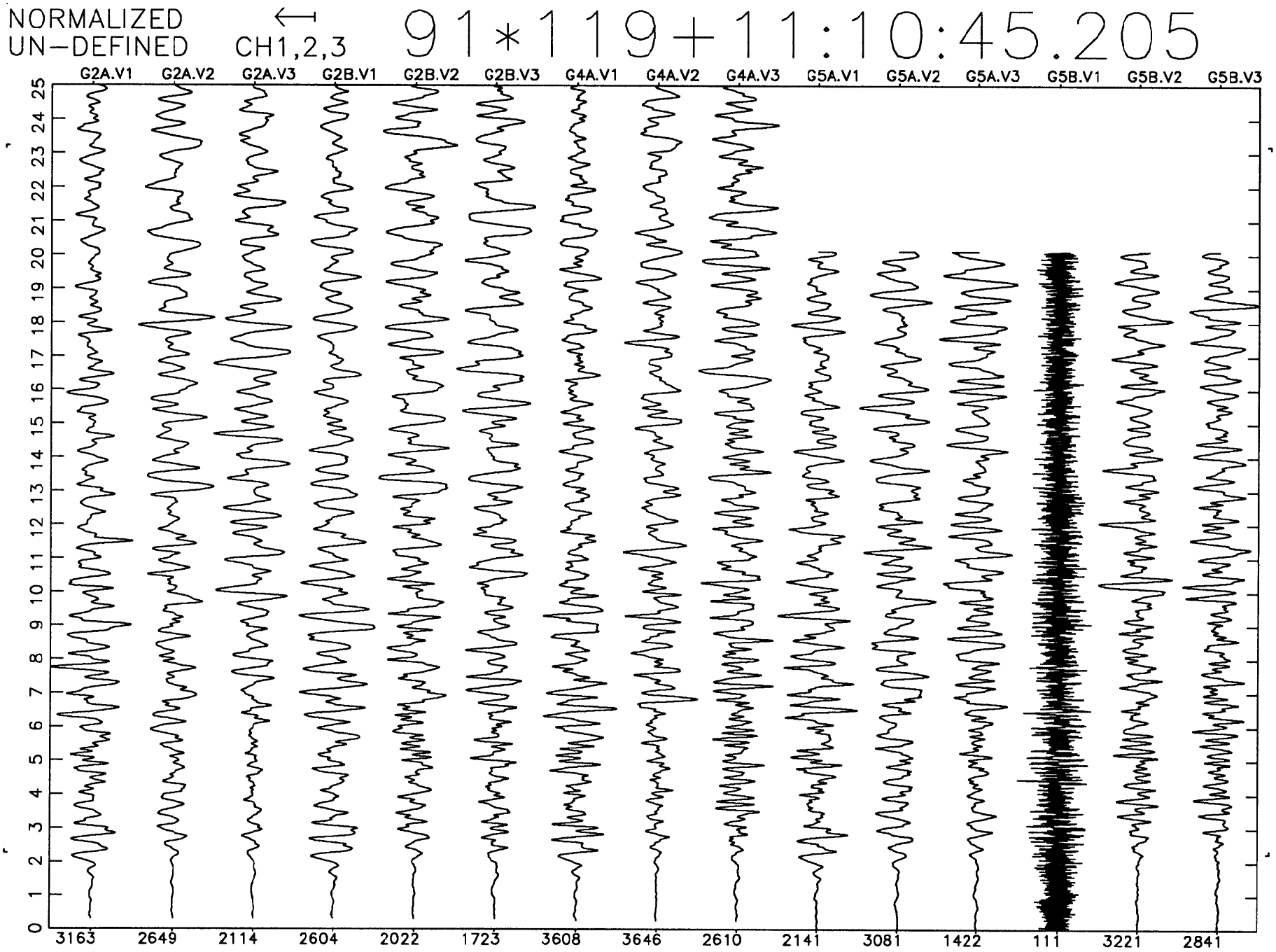
NORMALIZED
UN-DEFINED
CH1,2,3
91*108+10:30:42.298
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
264
261
256
440
692
276
357
320
372
316
321
262
371
389
556
740
570
526
599
628
536
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3

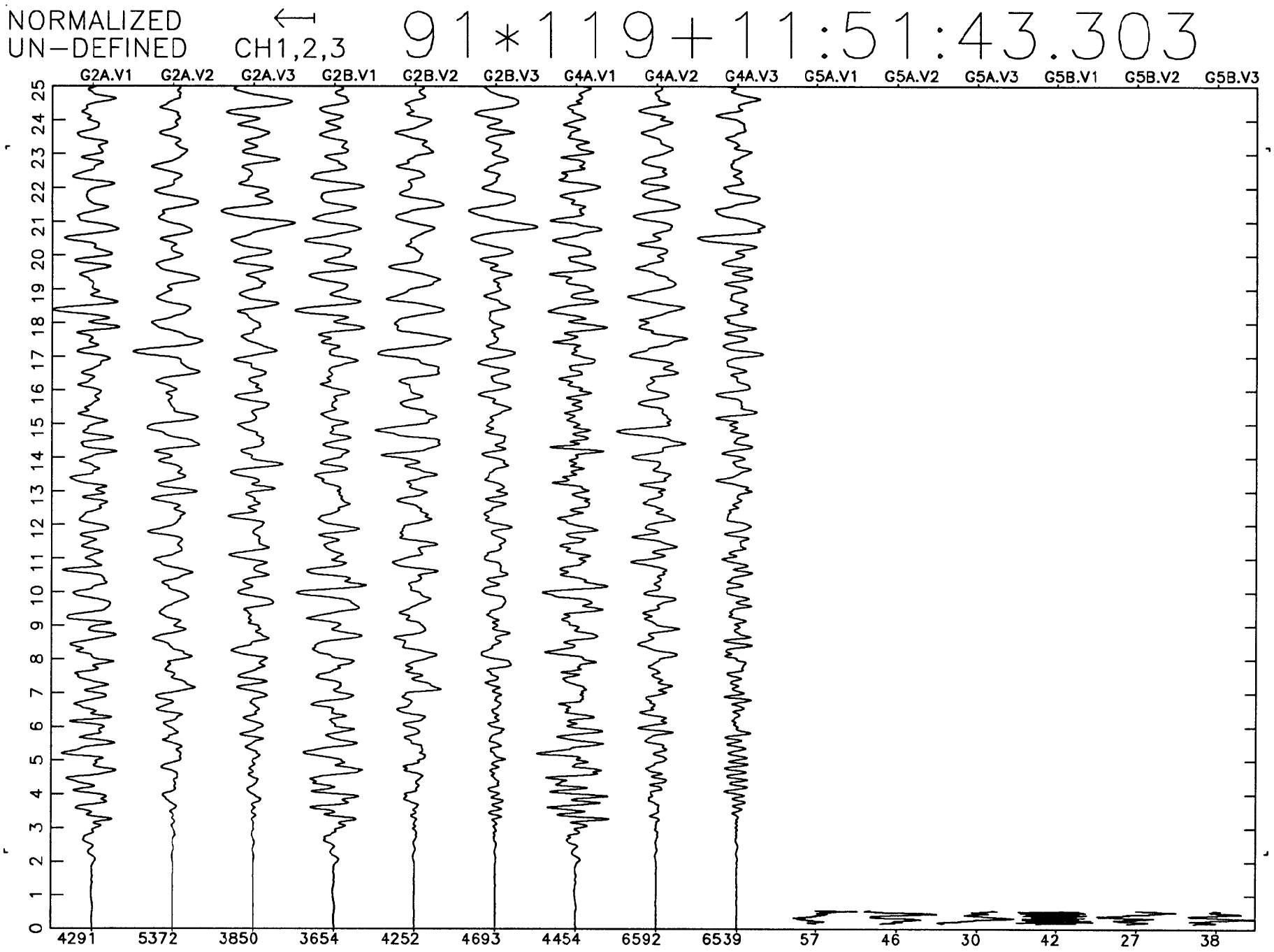

NORMALIZED
UN-DEFINED
CH1,2,3
91*109+13:55:59.205
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
1753
1679
1687
1473
3468
2077
2237
2578
2659
1743
2719
1859
2352
3895
2774
2838
6765
4512
3066
4242
4708

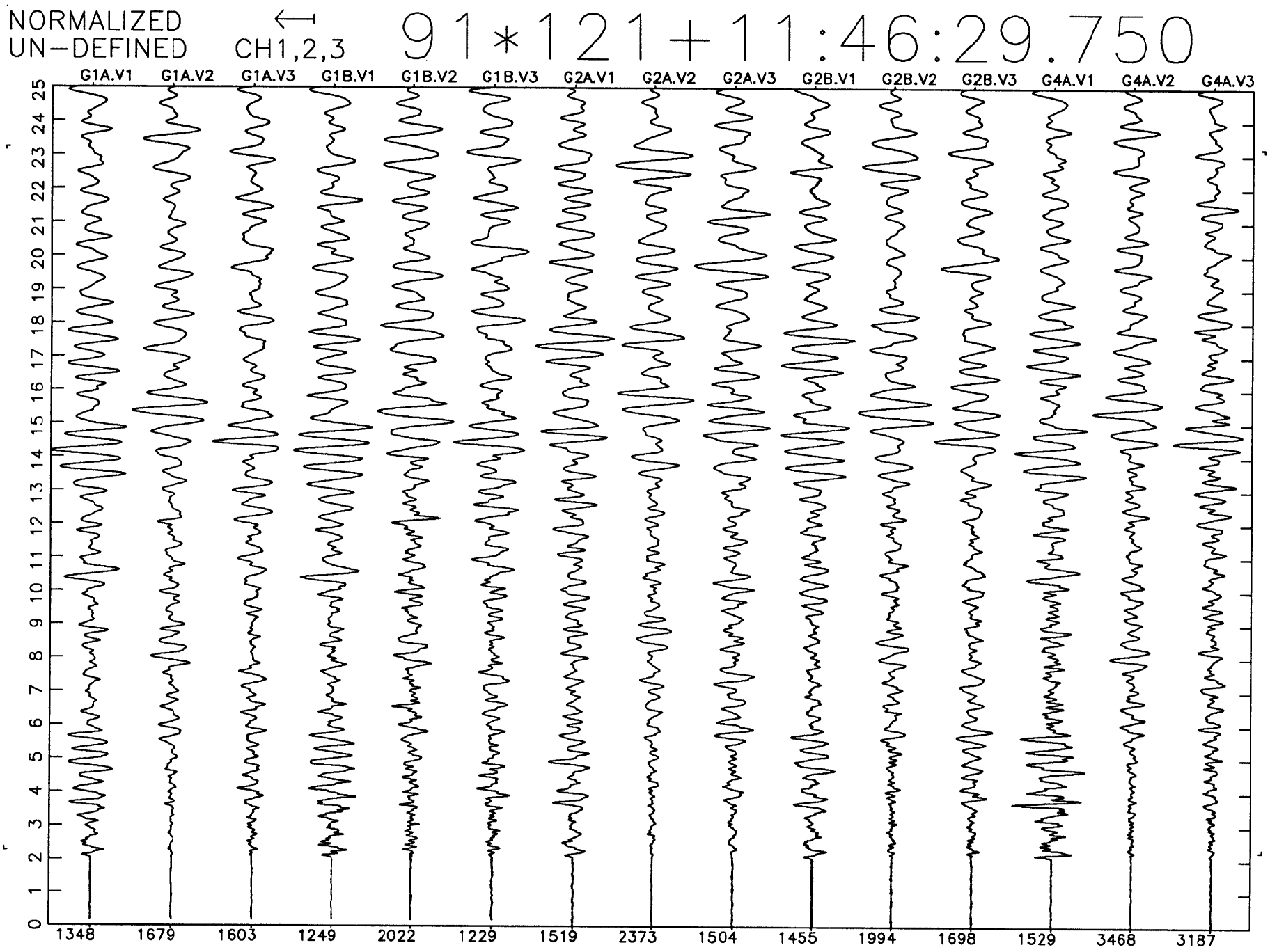

NORMALIZED
UN-DEFINED
CH1,2,3
91*117+03:32:04.180
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
9466 G1A.V1
10034 G1A.V2
12178 G1A.V3
10795 G1B.V1
13729 G1B.V2
13118 G1B.V3
9352 G2A.V1
15888 G2A.V2
18542 G2A.V3
11889 G2B.V1
13346 G2B.V2
15259 G2B.V3
11376 G4A.V1
17613 G4A.V2
22657 G4A.V3

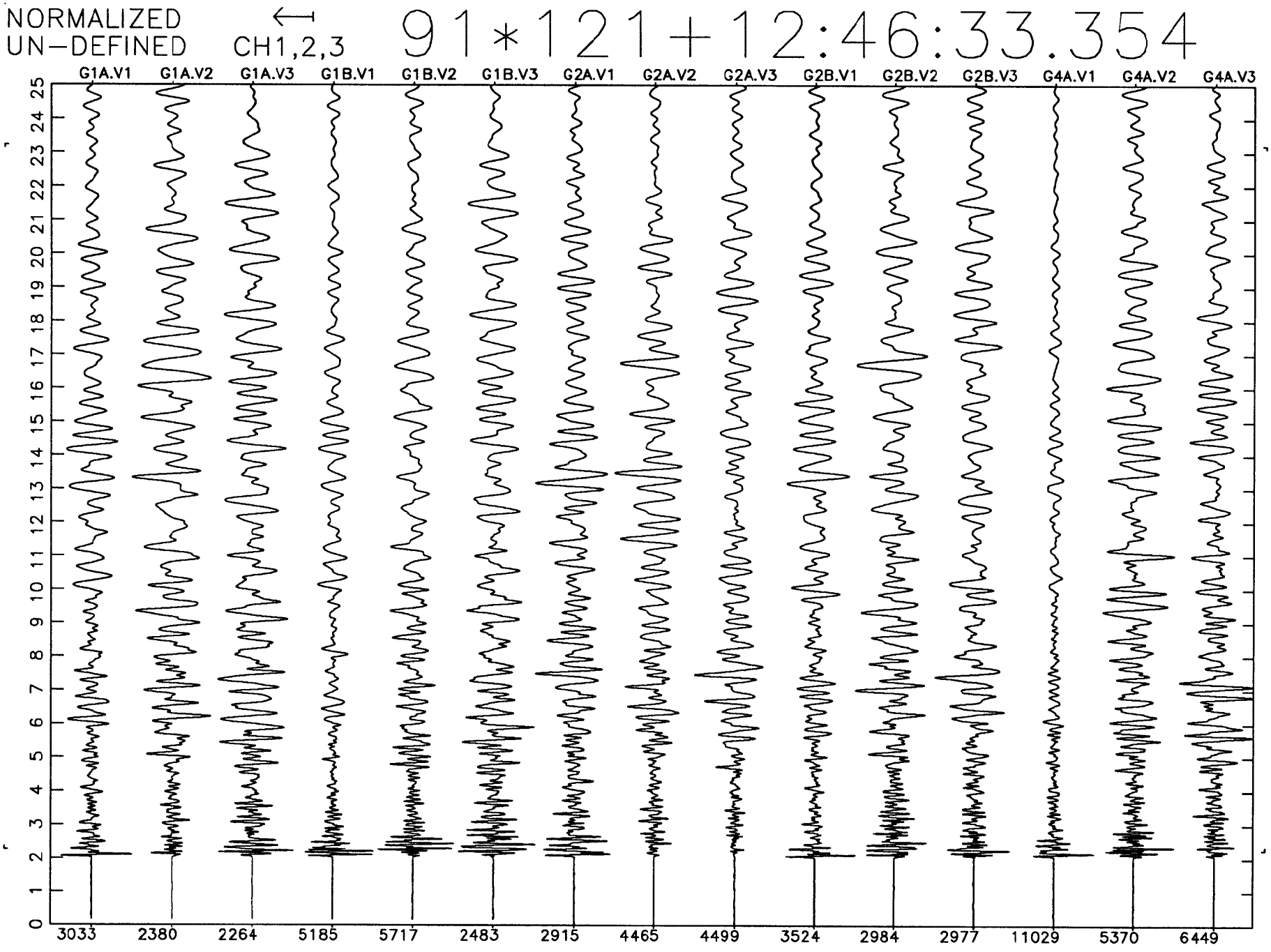

NORMALIZED
UN-DEFINED
CH1,2,3
91*119+09:13:18.637
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
32767 32767 32767 32767 32767 32767 32767 32767 32767 32767 32767 32767 32767 32767 32767 1368 32767 32767 32767 32767 32767

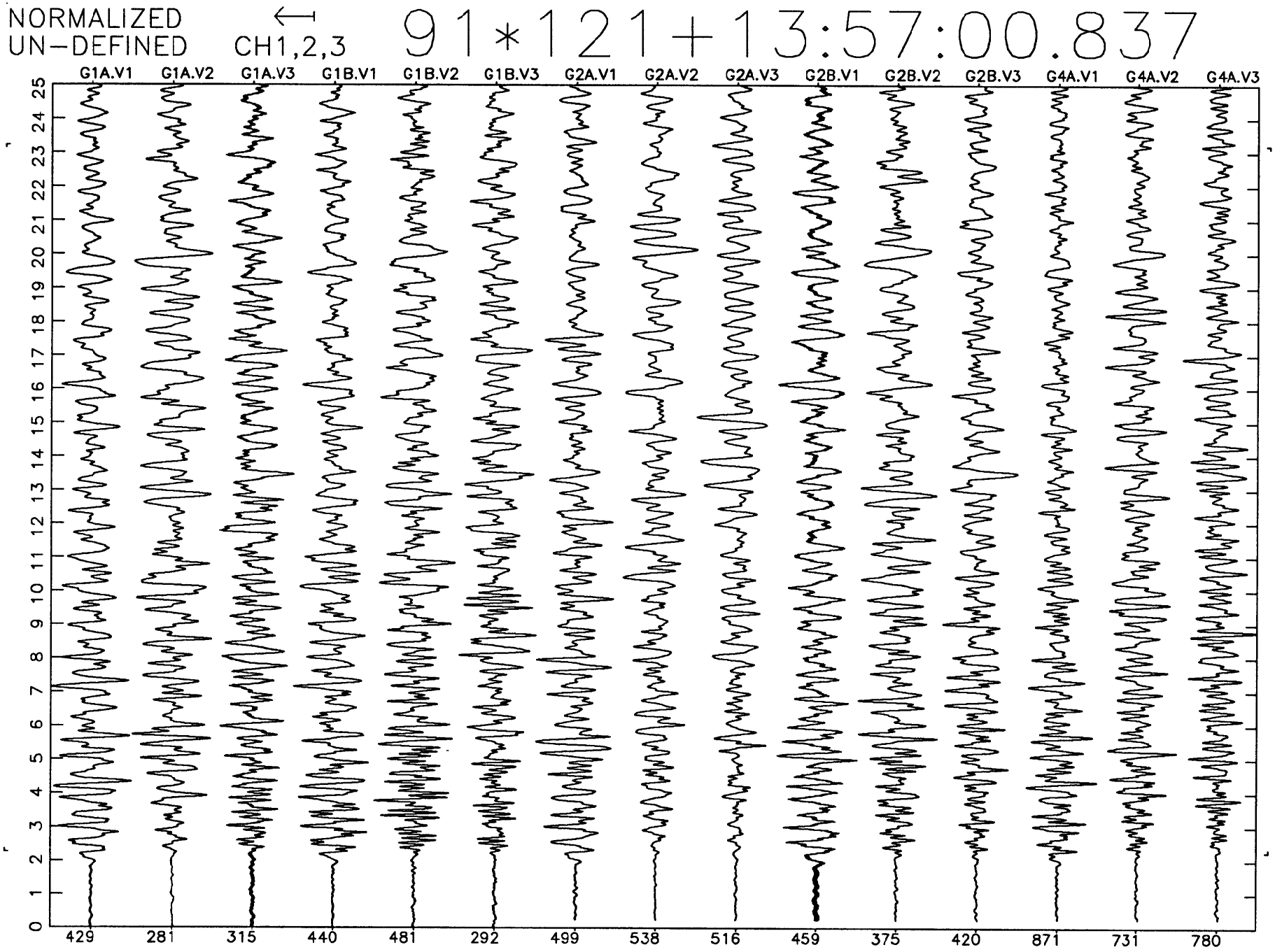

NORMALIZED
UN-DEFINED
CH1,2,3
91*119+11:05:02.319
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
2657
2128
1978
2676
2053
1810
4335
3361
2569
1983
3503
1621
148
2868
3602


NORMALIZED
UN-DEFINED
CH1,2,3
91*119+11:10:45.205
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
3163
2649
2114
2604
2022
1723
3608
3646
2610
2141
3081
1422
111
3221
2841


NORMALIZED
UN-DEFINED
CH1,2,3
91*119+11:51:43.303
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
4291
5372
3850
3654
4252
4693
4454
6592
6539
57
46
30
42
27
38


NORMALIZED
UN-DEFINED
CH1,2,3
91*121+11:46:29.750
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
1348
1679
1603
1249
2022
1229
1519
2373
1504
1455
1994
1698
1529
3468
3187


NORMALIZED
UN-DEFINED
CH1,2,3
91*121+12:46:33.354
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
3033
2380
2264
5185
5717
2483
2915
4465
4499
3524
2984
2977
11029
5370
6449


NORMALIZED
UN-DEFINED
CH1,2,3
91*121+13:57:00.837
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
429
281
315
440
481
292
499
538
516
459
375
420
871
731
780

NORMALIZED
UN-DEFINED
CH1,2,3
91*121+23:19:43.866
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
783
954
1070
1114
775
832
909
1047
1174
934
1577
1631
1204
1064
1209
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3

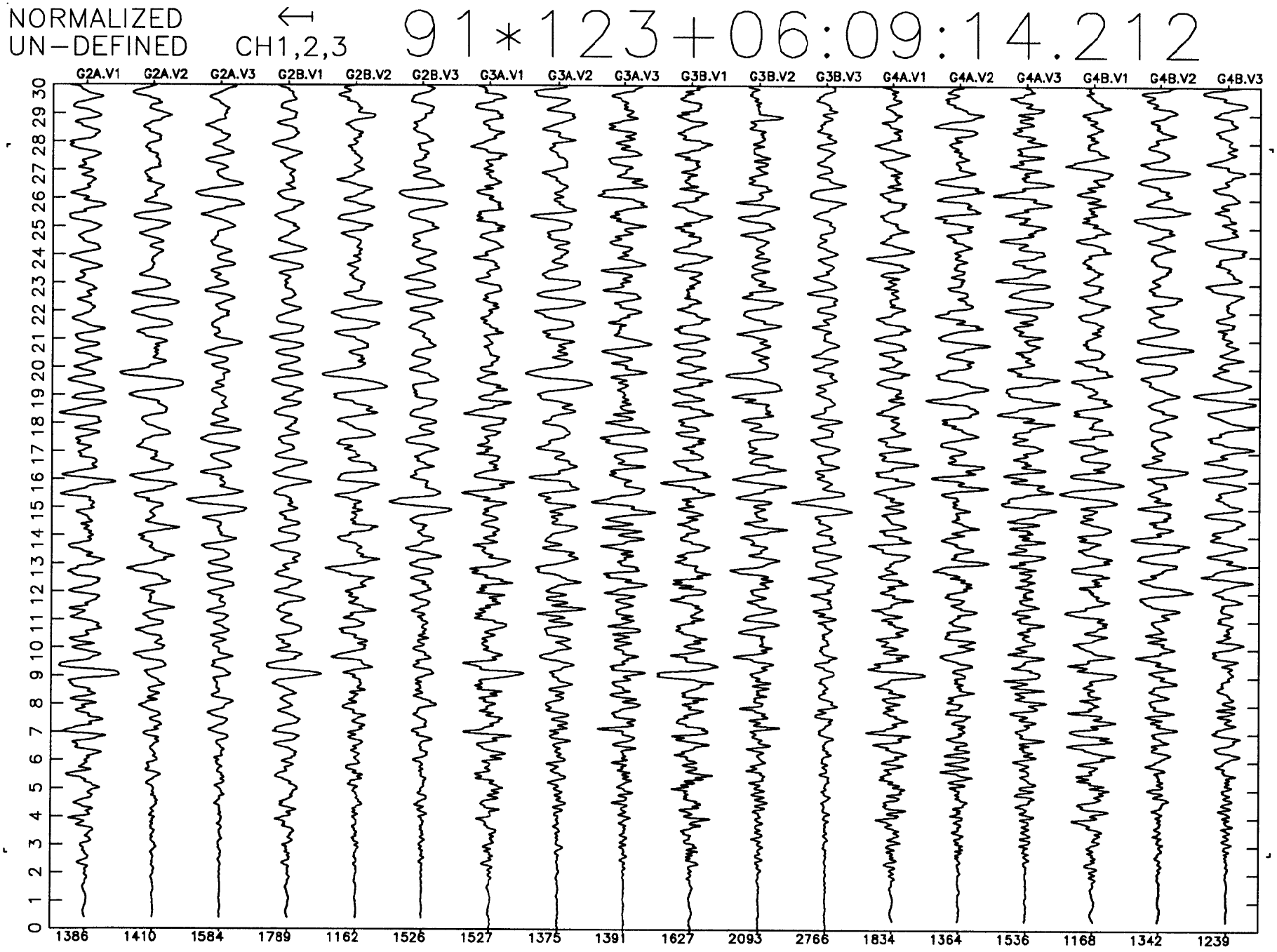
NORMALIZED
UN-DEFINED
CH1,2,3
91*122+01:26:00.618
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
8213 G3A.V1
12797 G3A.V2
8992 G3A.V3
6500 G3B.V1
17927 G3B.V2
10522 G3B.V3
6575 G1A.V1
7462 G1A.V2
8593 G1A.V3
7347 G1B.V1
12735 G1B.V2
9264 G1B.V3
7676 G2A.V1
12211 G2A.V2
8842 G2A.V3
6425 G2B.V1
9060 G2B.V2
7366 G2B.V3
8431 G4A.V1
11946 G4A.V2
11837 G4A.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*122+02:18:31.097
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
900 G1A.V1
936 G1A.V2
1269 G1A.V3
1039 G1B.V1
1325 G1B.V2
1437 G1B.V3
1077 G2A.V1
1056 G2A.V2
1451 G2A.V3
1164 G2B.V1
1051 G2B.V2
1392 G2B.V3
1089 G3A.V1
1318 G3A.V2
2362 G3A.V3
1099 G3B.V1
1981 G3B.V2
2472 G3B.V3
1312 G4A.V1
2064 G4A.V2
2537 G4A.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*122+02:29:33.854
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
464
495
360
445
455
320
491
622
515
413
559
585
495
893
581
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*122+03:43:07.584
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
835
718
745
951
628
573
919
902
726
969
1022
1008
731
488
570
789
756
524
881
832
636

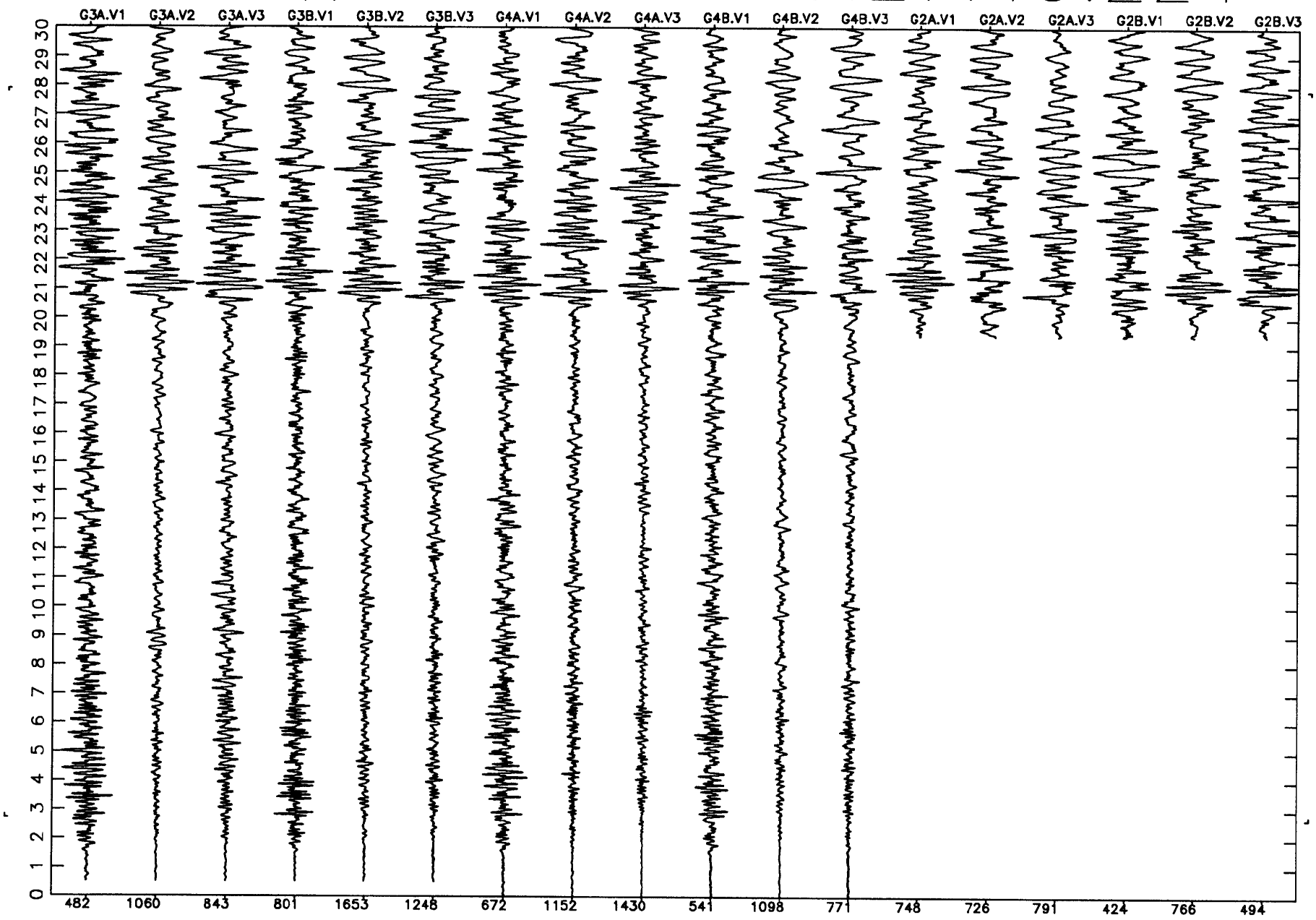
NORMALIZED
UN-DEFINED
CH1,2,3
91*122+04:31:33.987
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
679
620
465
675
812
829
672
575
544
718
460
603
625
400
434
654
621
419
743
723
742
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*123+06:09:14.212
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1386
1410
1584
1789
1162
1526
1527
1375
1391
1627
2093
2766
1834
1364
1536
1168
1342
1239

NORMALIZED
UN-DEFINED
CH1,2,3
91*123+06:13:33.674
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
905
937
724
872
1074
754
816
886
942
923
1831
1443
1039
1366
1184
1036
1048
984
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

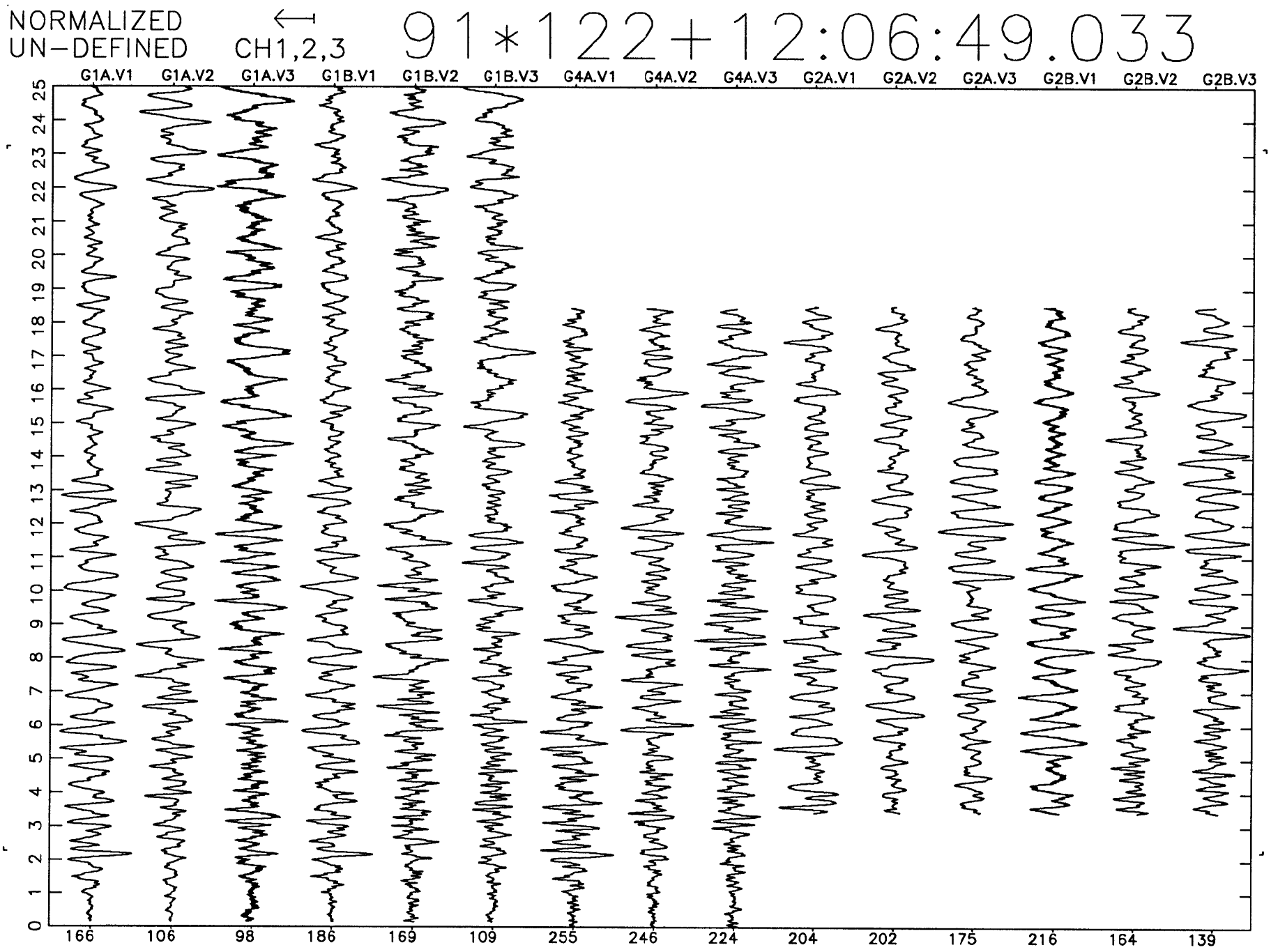
NORMALIZED
UN-DEFINED
CH1,2,3
91*122+07:54:04.178
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
386 G1A.V1
385 G1A.V2
345 G1A.V3
328 G1B.V1
725 G1B.V2
370 G1B.V3
678 G3A.V1
585 G3A.V2
644 G3A.V3
576 G3B.V1
914 G3B.V2
966 G3B.V3
814 G4A.V1
643 G4A.V2
817 G4A.V3
460 G2A.V1
628 G2A.V2
460 G2A.V3
384 G2B.V1
461 G2B.V2
420 G2B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*122+09:01:06.95
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
1249 G1A.V1
962 G1A.V2
820 G1A.V3
1246 G1B.V1
1585 G1B.V2
850 G1B.V3
1547 G2A.V1
1124 G2A.V2
1464 G2A.V3
1554 G2B.V1
1075 G2B.V2
1068 G2B.V3
1597 G3A.V1
1671 G3A.V2
1409 G3A.V3
1861 G3B.V1
1985 G3B.V2
2105 G3B.V3
1869 G4A.V1
1647 G4A.V2
1539 G4A.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*123+09:27:43.224
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
482
1060
843
801
1653
1248
672
1152
1430
541
1098
771
748
726
791
424
766
494

NORMALIZED
UN-DEFINED
CH1,2,3
91*122+09:45:16.733
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
2578 G1A.V1
2492 G1A.V2
1773 G1A.V3
2735 G1B.V1
3044 G1B.V2
2032 G1B.V3
2743 G2A.V1
2786 G2A.V2
2200 G2A.V3
2455 G2B.V1
2665 G2B.V2
2092 G2B.V3
2568 G3A.V1
3135 G3A.V2
3229 G3A.V3
2944 G3B.V1
4609 G3B.V2
3417 G3B.V3
2908 G4A.V1
4120 G4A.V2
2870 G4A.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*12+11:58:09.138
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
304
222
181
295
380
197
277
269
263
306
266
225
288
384
325
363
653
426
457
367
341
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*122+12:06:49.033
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
166
106
98
186
169
109
255
246
224
204
202
175
216
164
139

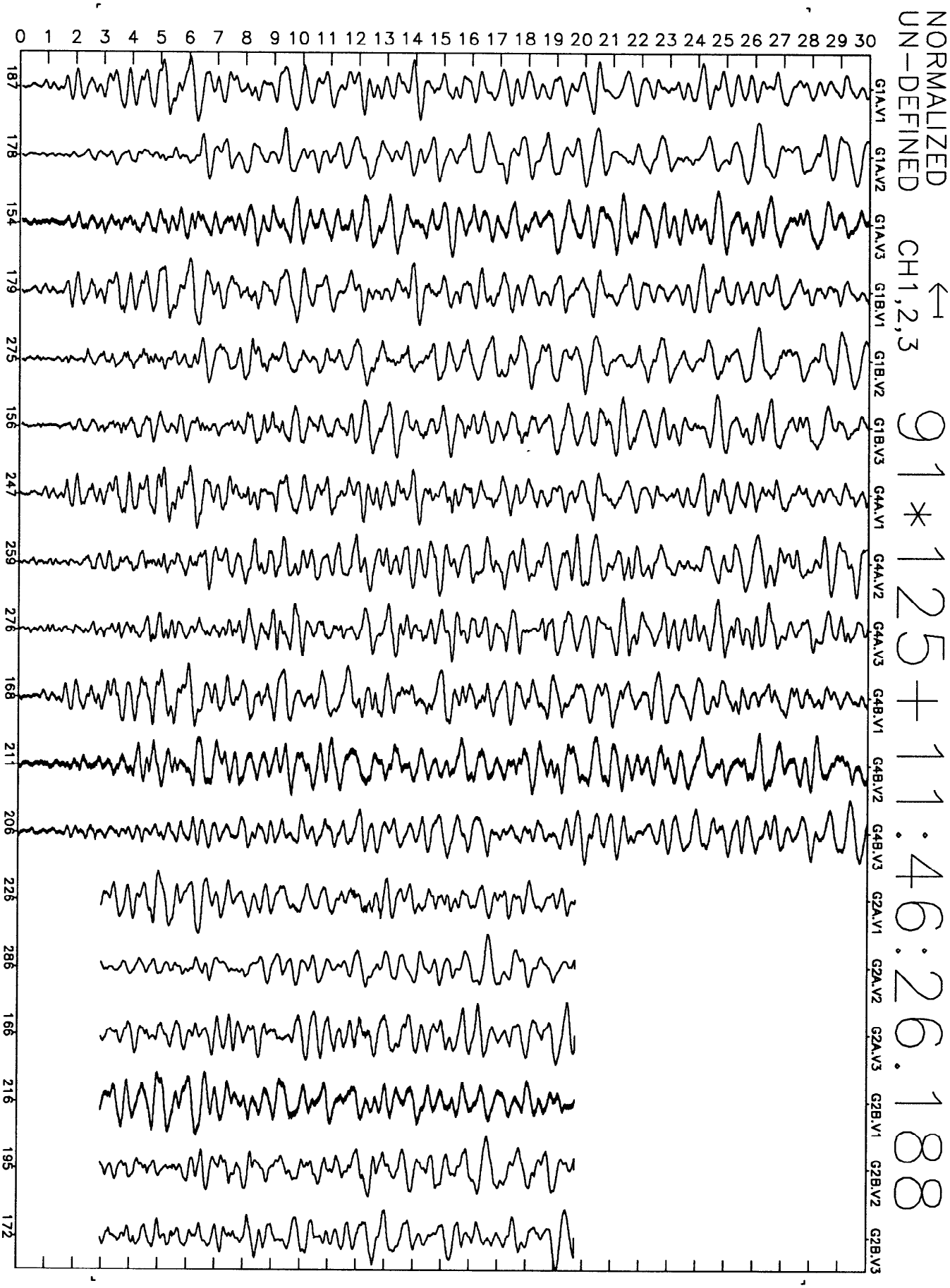
NORMALIZED
UN-DEFINED
CH1,2,3
91*123+20:17.852
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
9061 G2A.V1
12443 G2A.V2
6987 G2A.V3
10337 G2B.V1
12170 G2B.V2
7242 G2B.V3
8452 G3A.V1
11664 G3A.V2
7050 G3A.V3
10780 G3B.V1
16798 G3B.V2
11215 G3B.V3
10208 G4A.V1
12085 G4A.V2
9770 G4A.V3
7123 G4B.V1
11705 G4B.V2
10873 G4B.V3
6926 G1A.V1
8890 G1A.V2
8578 G1A.V3
9695 G1B.V1
12221 G1B.V2
7698 G1B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*123+23:41:40.330
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
6260 G2A.V1
5819 G2A.V2
6788 G2A.V3
6067 G2B.V1
4757 G2B.V2
5153 G2B.V3
7175 G3A.V1
7350 G3A.V2
8048 G3A.V3
6490 G3B.V1
9065 G3B.V2
8592 G3B.V3
8728 G4A.V1
8550 G4A.V2
7046 G4A.V3
5358 G4B.V1
6840 G4B.V2
6125 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*124+04:54:15.435
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
524
590
372
442
493
548
618
784
803
648
744
477
424
646
440
567
817
822
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*124+13:30:12.102
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
387 G1A.V1
490 G1A.V2
513 G1A.V3
340 G1B.V1
852 G1B.V2
431 G1B.V3
622 G2A.V1
819 G2A.V2
496 G2A.V3
484 G2B.V1
429 G2B.V2
592 G2B.V3
462 G3A.V1
663 G3A.V2
551 G3A.V3
782 G3B.V1
865 G3B.V2
960 G3B.V3
644 G4A.V1
1079 G4A.V2
1086 G4A.V3
511 G4B.V1
748 G4B.V2
472 G4B.V3

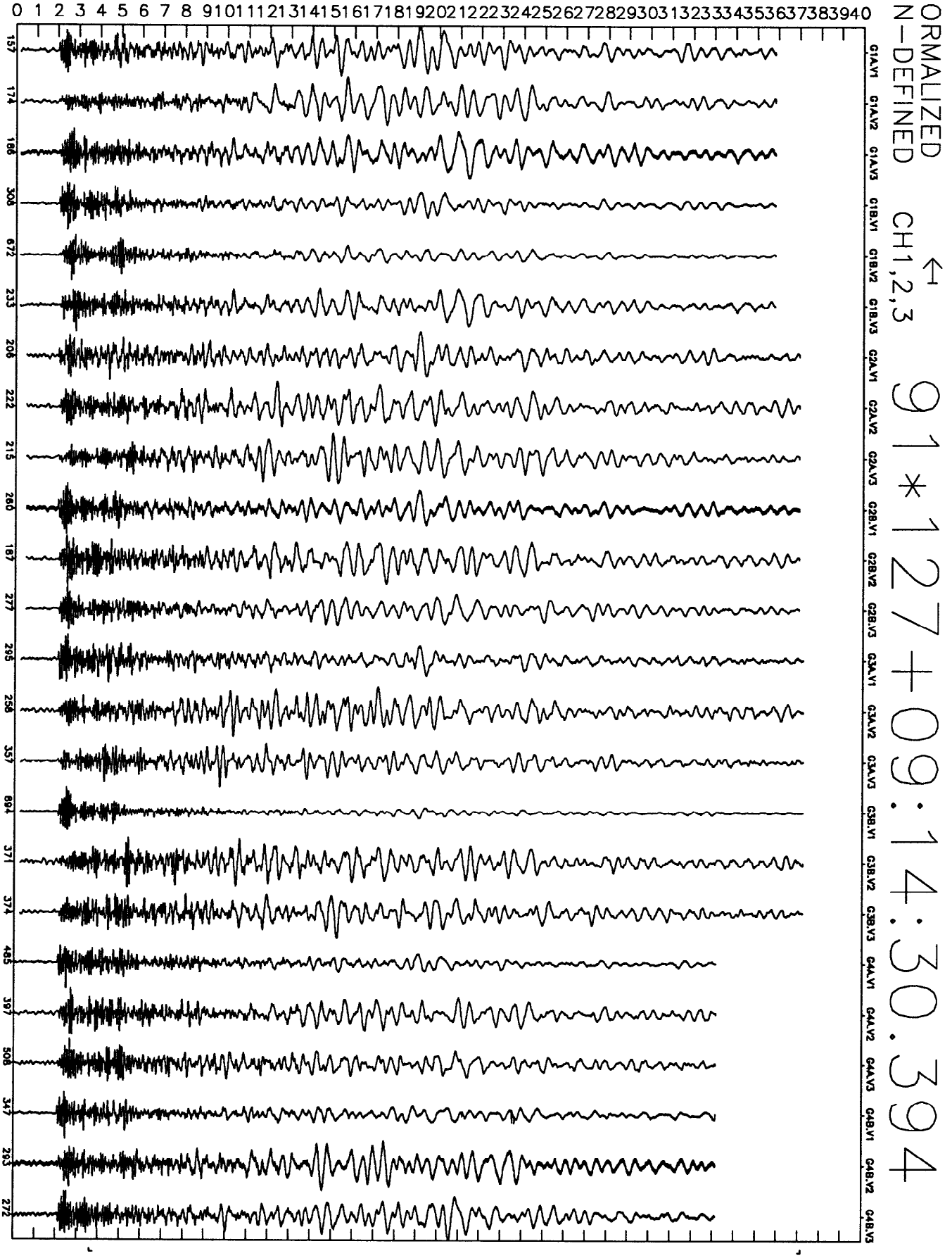
NORMALIZED
UN-DEFINED
CH1,2,3
91*124+15:33:49.523
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
499
360
297
515
336
246
571
403
372
724
620
440
764
457
411
637
437
304
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*125+11:46:26.188
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
187 G1A.V1
178 G1A.V2
154 G1A.V3
179 G1B.V1
275 G1B.V2
156 G1B.V3
247 G4A.V1
259 G4A.V2
276 G4A.V3
168 G4B.V1
211 G4B.V2
206 G4B.V3
226 G2A.V1
286 G2A.V2
166 G2A.V3
216 G2B.V1
195 G2B.V2
172 G2B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*126+07:55:31.699
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
315 G1A.V1
442 G1A.V2
401 G1A.V3
372 G1B.V1
602 G1B.V2
384 G1B.V3
432 G2A.V1
525 G2A.V2
495 G2A.V3
392 G2B.V1
493 G2B.V2
521 G2B.V3
414 G3A.V1
460 G3A.V2
648 G3A.V3
473 G3B.V1
1078 G3B.V2
1039 G3B.V3
406 G4A.V1
863 G4A.V2
706 G4A.V3
322 G4B.V1
571 G4B.V2
630 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*126+12:43:39.486
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
361 G1A.V1
556 G1A.V2
476 G1A.V3
401 G1B.V1
2099 G1B.V2
540 G1B.V3
964 G3A.V1
1374 G3A.V2
1102 G3A.V3
846 G3B.V1
1923 G3B.V2
1590 G3B.V3
954 G4A.V1
1698 G4A.V2
1684 G4A.V3
395 G4B.V1
713 G4B.V2
523 G4B.V3
487 G2A.V1
869 G2A.V2
885 G2A.V3
361 G2B.V1
969 G2B.V2
858 G2B.V3

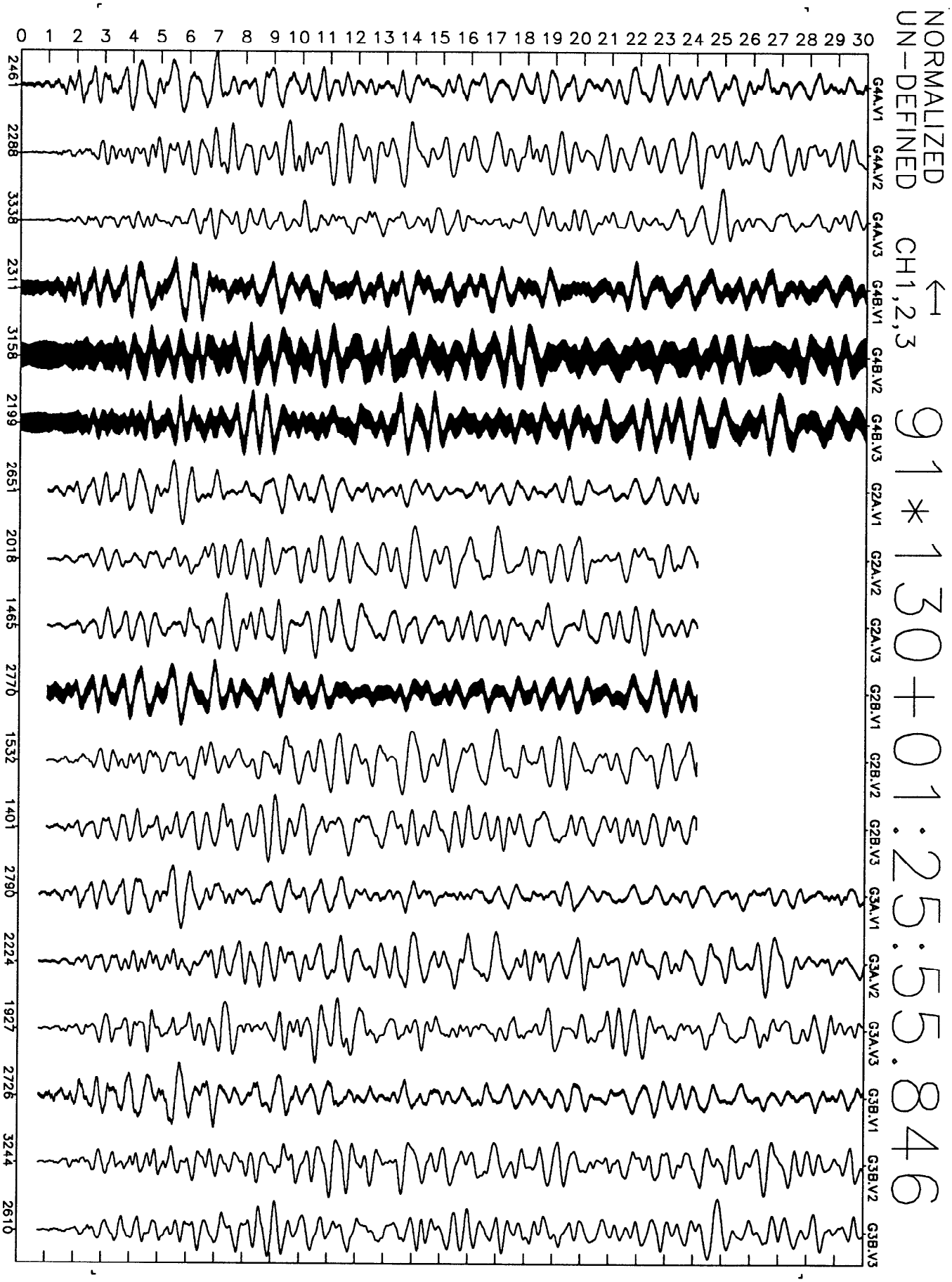
NORMALIZED
UN-DEFINED
CH1,2,3
91*127+09:02:02.794
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
626 G4A.V1
834 G4A.V2
1043 G4A.V3
488 G4B.V1
764 G4B.V2
1298 G4B.V3
450 G1A.V1
476 G1A.V2
572 G1A.V3
501 G1B.V1
754 G1B.V2
579 G1B.V3
578 G2A.V1
788 G2A.V2
557 G2A.V3
515 G2B.V1
702 G2B.V2
878 G2B.V3
495 G3A.V1
899 G3A.V2
986 G3A.V3
573 G3B.V1
1230 G3B.V2
880 G3B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*127+09:14:30.394
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
157 G1A.V1
174 G1A.V2
186 G1A.V3
308 G1B.V1
672 G1B.V2
233 G1B.V3
208 G2A.V1
222 G2A.V2
215 G2A.V3
280 G2B.V1
187 G2B.V2
277 G2B.V3
295 G3A.V1
258 G3A.V2
357 G3A.V3
694 G3B.V1
371 G3B.V2
374 G3B.V3
485 G4A.V1
397 G4A.V2
506 G4A.V3
347 G4B.V1
293 G4B.V2
272 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*127+13:24:17.274
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1099 G1A.V1
794 G1A.V2
994 G1A.V3
1573 G1B.V1
1270 G1B.V2
798 G1B.V3
1573 G2A.V1
1081 G2A.V2
880 G2A.V3
1512 G2B.V1
936 G2B.V2
1056 G2B.V3
2702 G3A.V1
1577 G3A.V2
1509 G3A.V3
3537 G3B.V1
2355 G3B.V2
2357 G3B.V3
3498 G4A.V1
2097 G4A.V2
1992 G4A.V3
1703 G4B.V1
2280 G4B.V2
1803 G4B.V3

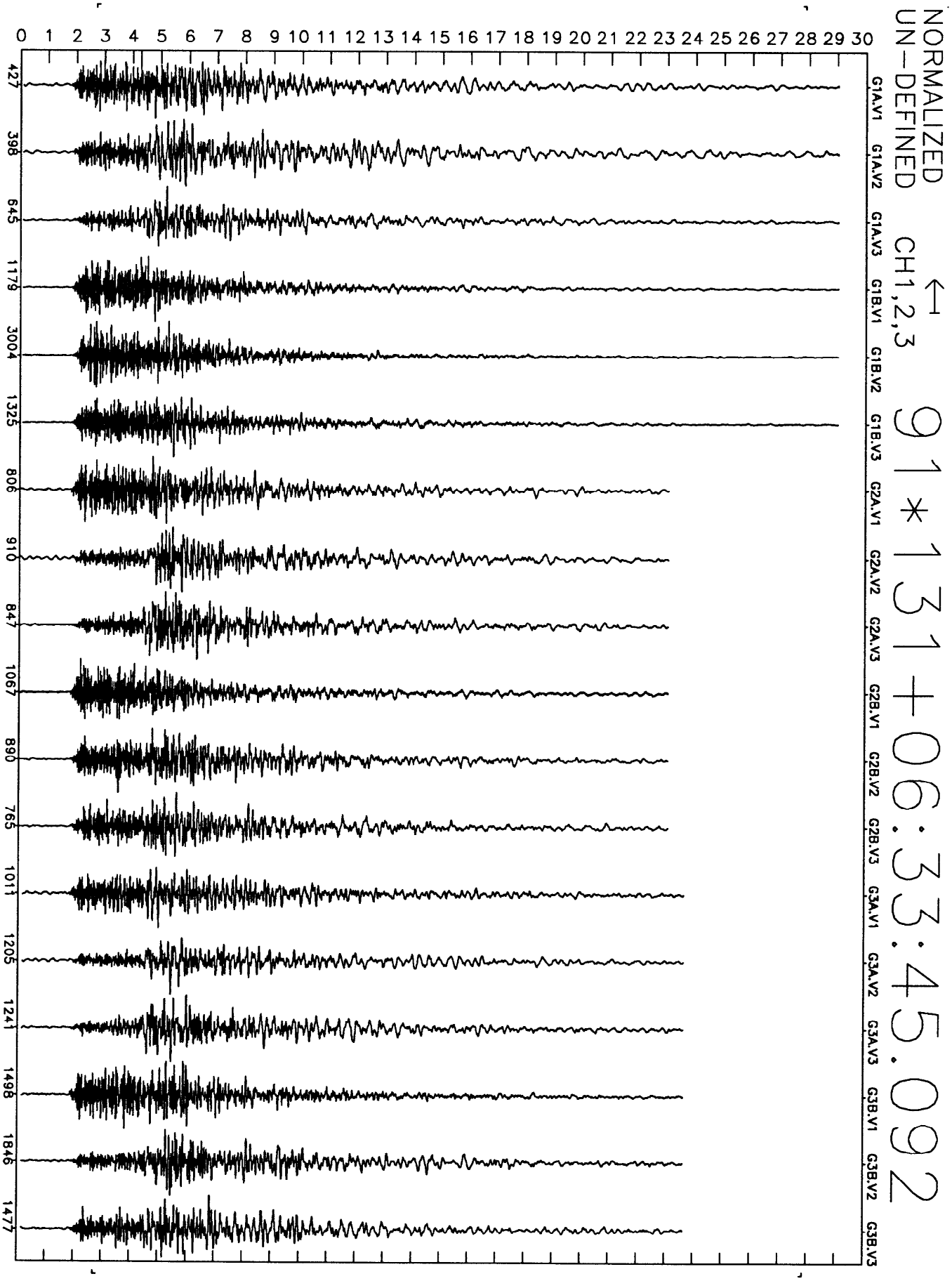
NORMALIZED
UN-DEFINED
CH1,2,3
91*128+08:45:02.777
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
183
104
103
185
186
99
191
169
172
186
191
181
228
223
238
301
420
245
350
229
320
198
214
205
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*128+12:13:32.816
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
533 G1A.V1
717 G1A.V2
491 G1A.V3
655 G1B.V1
1180 G1B.V2
484 G1B.V3
788 G2A.V1
1051 G2A.V2
718 G2A.V3
820 G2B.V1
840 G2B.V2
840 G2B.V3
674 G3A.V1
1028 G3A.V2
755 G3A.V3
878 G3B.V1
1552 G3B.V2
1334 G3B.V3
569 G4A.V1
1183 G4A.V2
628 G4A.V3
628 G4B.V1
772 G4B.V2
490 G4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*130+01:25:55.846
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
2461 G4A.V1
2288 G4A.V2
3338 G4A.V3
2311 G4B.V1
3158 G4B.V2
2199 G4B.V3
2651 G2A.V1
2018 G2A.V2
1465 G2A.V3
2770 G2B.V1
1532 G2B.V2
1401 G2B.V3
2790 G3A.V1
2224 G3A.V2
1927 G3A.V3
2726 G3B.V1
3244 G3B.V2
2610 G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*130+20:52:59.076
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
3260 C1A.V1
3898 C1A.V2
5638 C1A.V3
3230 C1B.V1
5405 C1B.V2
5893 C1B.V3
2968 C3A.V1
6384 C3A.V2
7584 C3A.V3
3923 C3B.V1
7667 C3B.V2
8643 C3B.V3
4641 C4A.V1
8085 C4A.V2
9848 C4A.V3
4101 C4B.V1
5214 C4B.V2
6063 C4B.V3
3391 C2A.V1
4600 C2A.V2
6780 C2A.V3
3973 C2B.V1
4288 C2B.V2
7013 C2B.V3

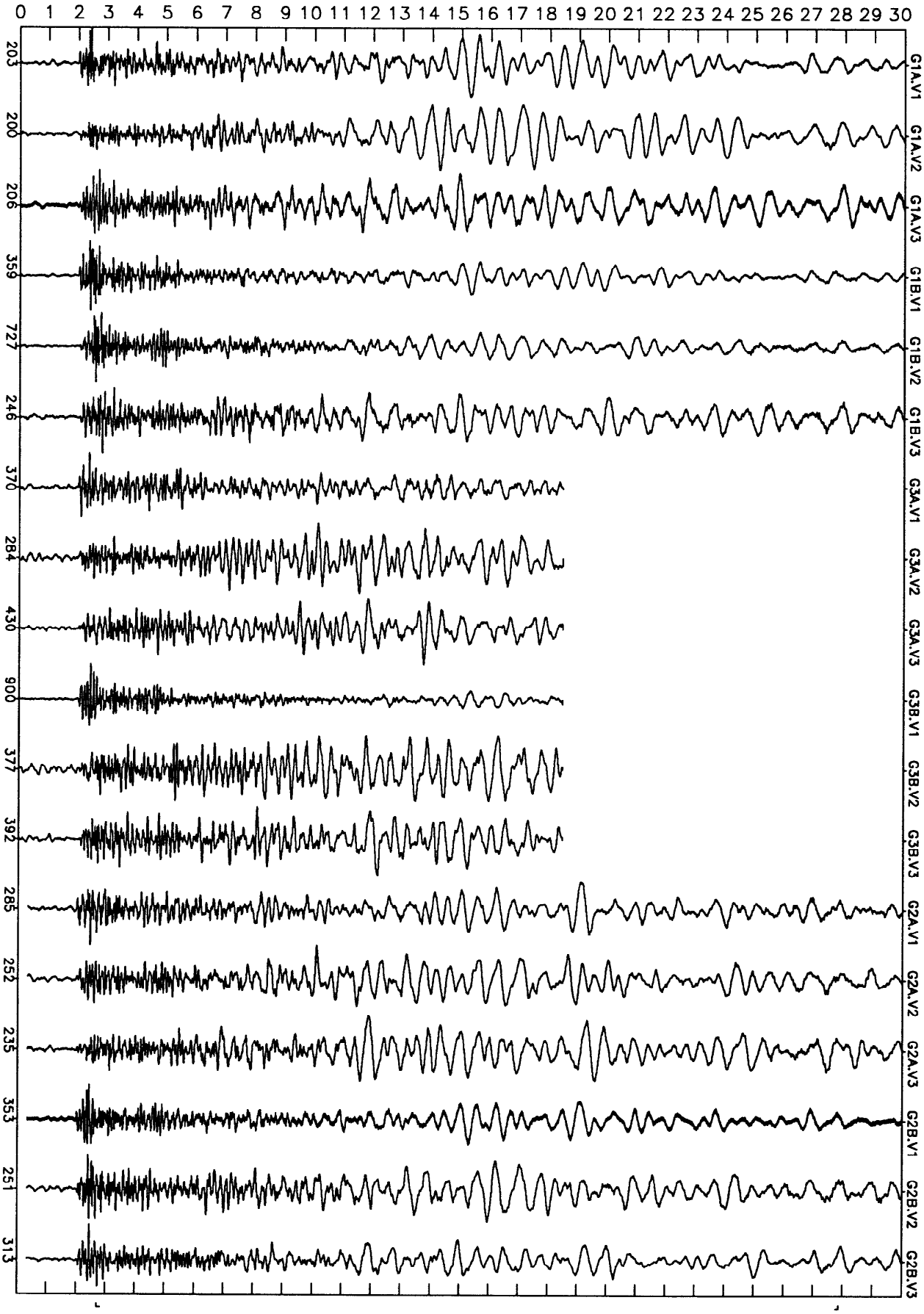
NORMALIZED
UN-DEFINED
CH1,2,3
91*131+05:58:07.289
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
416
270
224
416
414
247
487
391
315
467
278
325
413
424
512
544
598
605
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

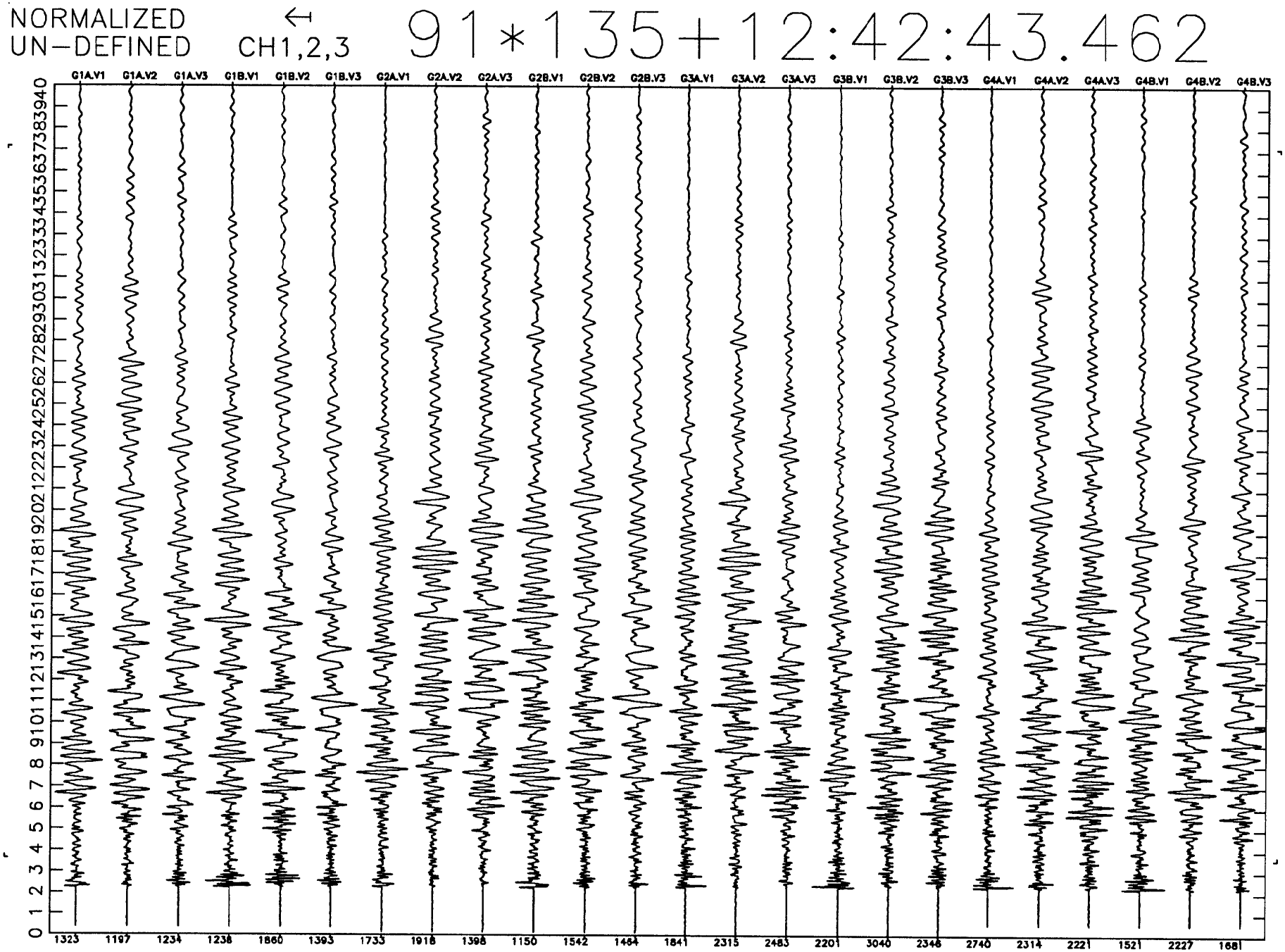

NORMALIZED
UN-DEFINED
CH1,2,3
91*131+06:33:45.092
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
427
398
645
1179
3004
1325
806
910
847
1067
890
765
1011
1205
1241
1498
1846
1477
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*133+08:29:51.263
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
373
604
426
409
973
426
680
755
693
687
737
554
848
940
948
819
1719
1418
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*134+09:37:01.478
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1456
948
932
1532
1248
877
1687
1266
1157
1628
952
1090
1445
1179
1215
1724
2006
1521
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*134+12:38:07.398
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
113
57
76
110
96
69
144
94
89
128
86
97
200
118
130
254
201
149
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

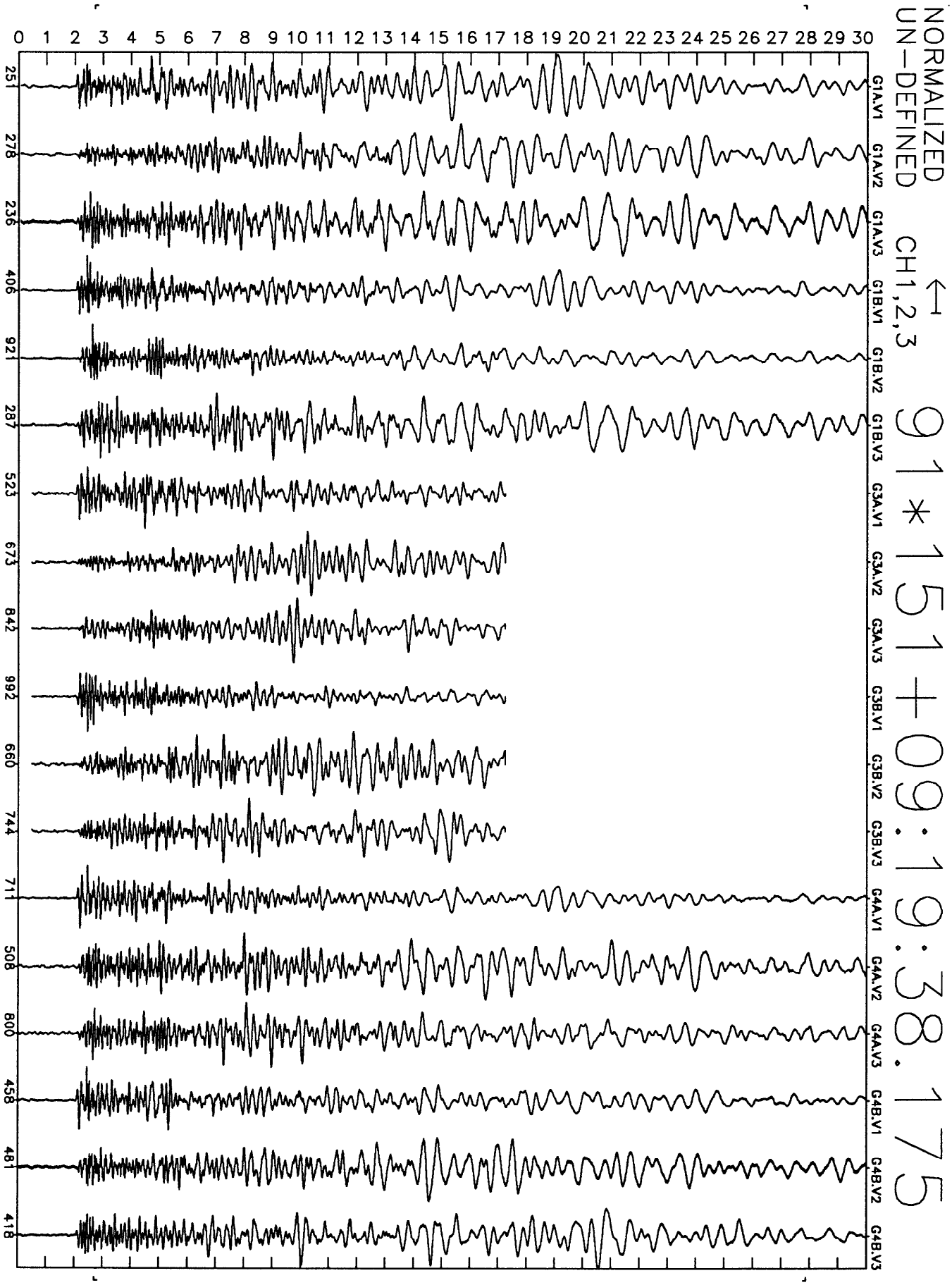

NORMALIZED
UN-DEFINED
CH1,2,3
91*135+08:39:04.778
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
203 G1A.V1
200 G1A.V2
206 G1A.V3
359 G1B.V1
727 G1B.V2
246 G1B.V3
370 G3A.V1
284 G3A.V2
430 G3A.V3
900 G3B.V1
377 G3B.V2
392 G3B.V3
285 G2A.V1
252 G2A.V2
235 G2A.V3
353 G2B.V1
251 G2B.V2
313 G2B.V3

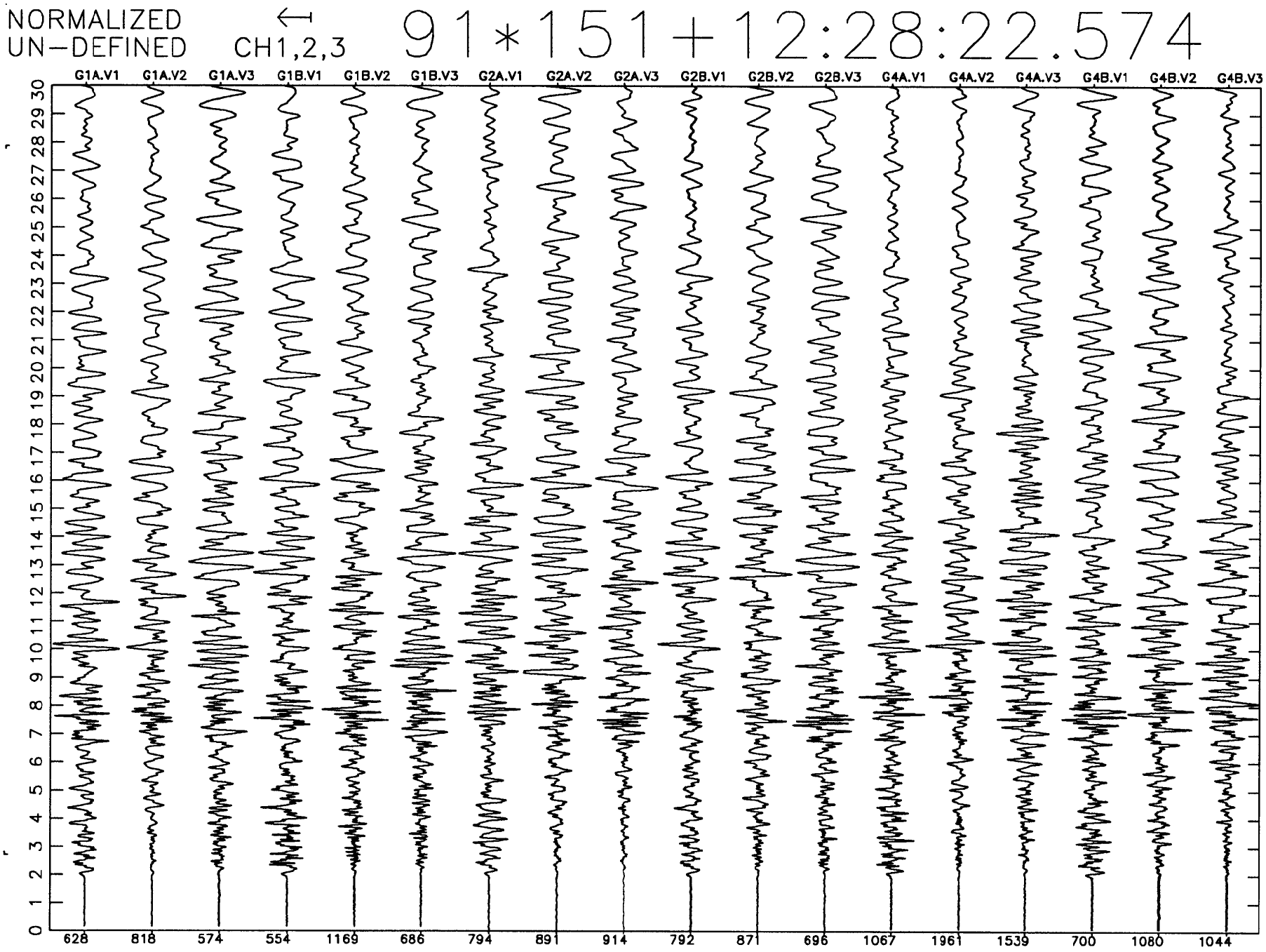

NORMALIZED
UN-DEFINED
CH1,2,3
91*135+12:42:43.462
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1323
1197
1234
1238
1860
1393
1733
1918
1398
1150
1542
1484
1841
2315
2483
2201
3040
2348
2740
2314
2221
1521
2227
1681

NORMALIZED
UN-DEFINED
CH1,2,3
91*135+14:29:26.737
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*136+11:48:20.281
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
407
424
337
432
514
343
477
564
480
417
444
378
912
909
812
648
537
438
561
786
526
181
668
720
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G5A.V1
G5A.V2
G5A.V3
G5B.V1
G5B.V2
G5B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*150+10:38:13.209
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
596 G1A.V1
658 G1A.V2
604 G1A.V3
826 G1B.V1
1177 G1B.V2
702 G1B.V3
663 G2A.V1
1063 G2A.V2
943 G2A.V3
706 G2B.V1
933 G2B.V2
829 G2B.V3
1383 G4A.V1
1302 G4A.V2
1404 G4A.V3
712 G4B.V1
1044 G4B.V2
927 G4B.V3
791 G3A.V1
1128 G3A.V2
1175 G3A.V3
1260 G3B.V1
1901 G3B.V2
1361 G3B.V3

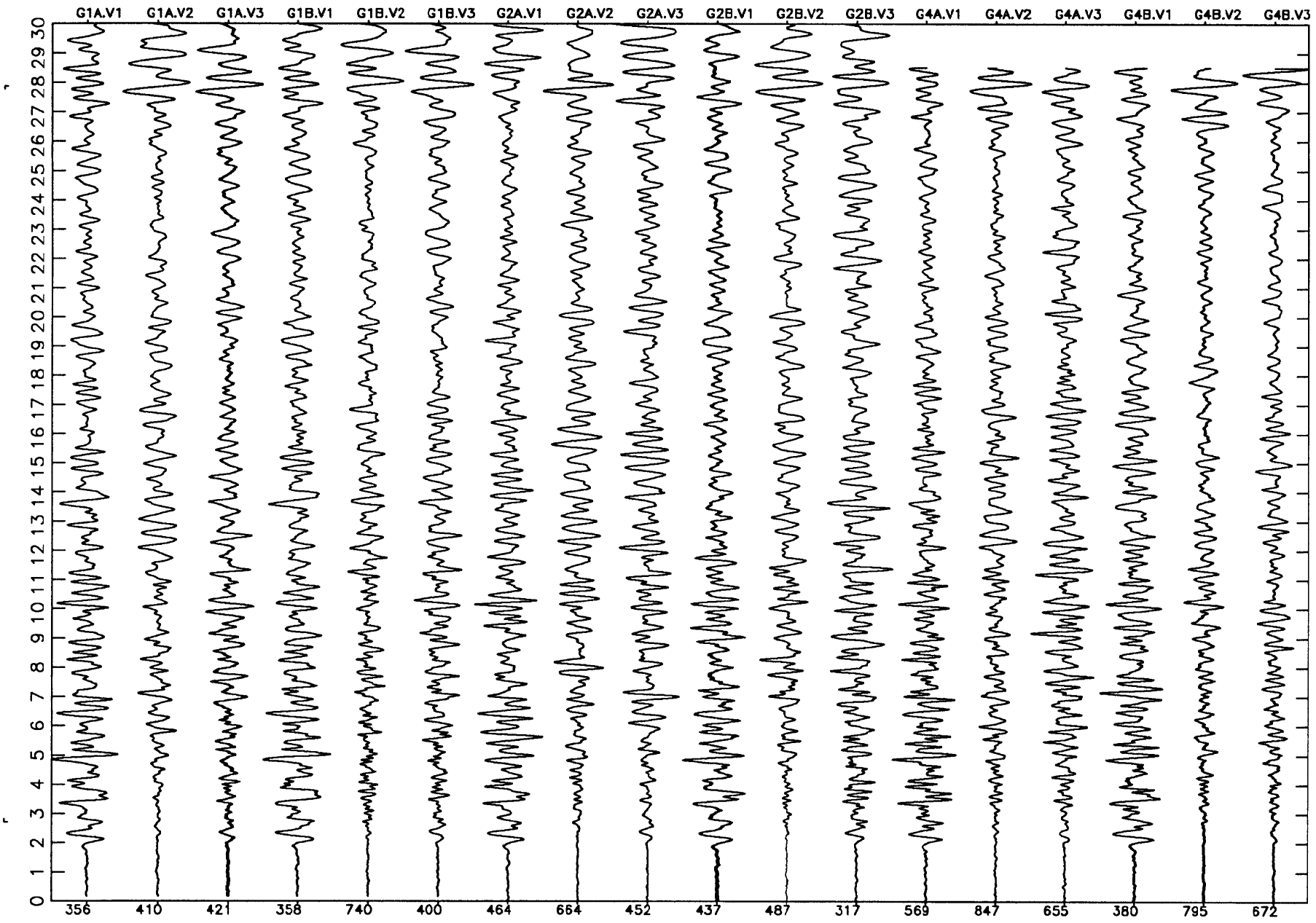

NORMALIZED
UN-DEFINED
CH1,2,3
91*151+09:19:38.175
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
251
278
236
406
921
287
523
673
842
992
660
744
711
508
800
458
481
418
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*151+12:28:22.574
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
628
818
574
554
1169
686
794
891
914
792
871
696
1067
1961
1539
700
1080
1044

NORMALIZED
UN-DEFINED
CH1,2,3
91*154+10:22:53.738
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
16258 G1A.V1
23988 G1A.V2
22882 G1A.V3
16812 G1B.V1
32767 G1B.V2
21368 G1B.V3
15641 G2A.V1
28508 G2A.V2
20118 G2A.V3
17867 G2B.V1
24409 G2B.V2
24320 G2B.V3
16534 G3A.V1
30340 G3A.V2
22195 G3A.V3
17678 G3B.V1
32767 G3B.V2
30839 G3B.V3
17957 G4A.V1
32767 G4A.V2
29793 G4A.V3
14578 G4B.V1
32767 G4B.V2
21078 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*154+10:31:44.037
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
573 C1A.V1
672 C1A.V2
753 C1A.V3
638 C1B.V1
1048 C1B.V2
800 C1B.V3
735 C2A.V1
913 C2A.V2
690 C2A.V3
660 C2B.V1
862 C2B.V2
709 C2B.V3
711 C4A.V1
955 C4A.V2
1164 C4A.V3
657 C4B.V1
962 C4B.V2
723 C4B.V3
716 C3A.V1
716 C3A.V2
758 C3A.V3
752 C3B.V1
1574 C3B.V2
936 C3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*154+10:46:16.537
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
387 G1A.V1
270 G1A.V2
307 G1A.V3
321 G1B.V1
448 G1B.V2
319 G1B.V3
438 G2A.V1
370 G2A.V2
288 G2A.V3
398 G2B.V1
309 G2B.V2
242 G2B.V3
454 G3A.V1
445 G3A.V2
353 G3A.V3
579 G3B.V1
753 G3B.V2
368 G3B.V3
654 G4A.V1
432 G4A.V2
435 G4A.V3
444 G4B.V1
368 G4B.V2
317 G4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*154+11:44:14.400
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
356
410
421
358
740
400
464
664
452
437
487
317
569
847
655
380
795
672

NORMALIZED
UN-DEFINED
CH1,2,3
91*155+00:55:30.573
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
2525
4564
3840
2881
7113
4064
3092
7089
3934
3148
6126
4125
3022
7118
4287
3217
6323
5824
3087
5863
6470
2643
5477
5133
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

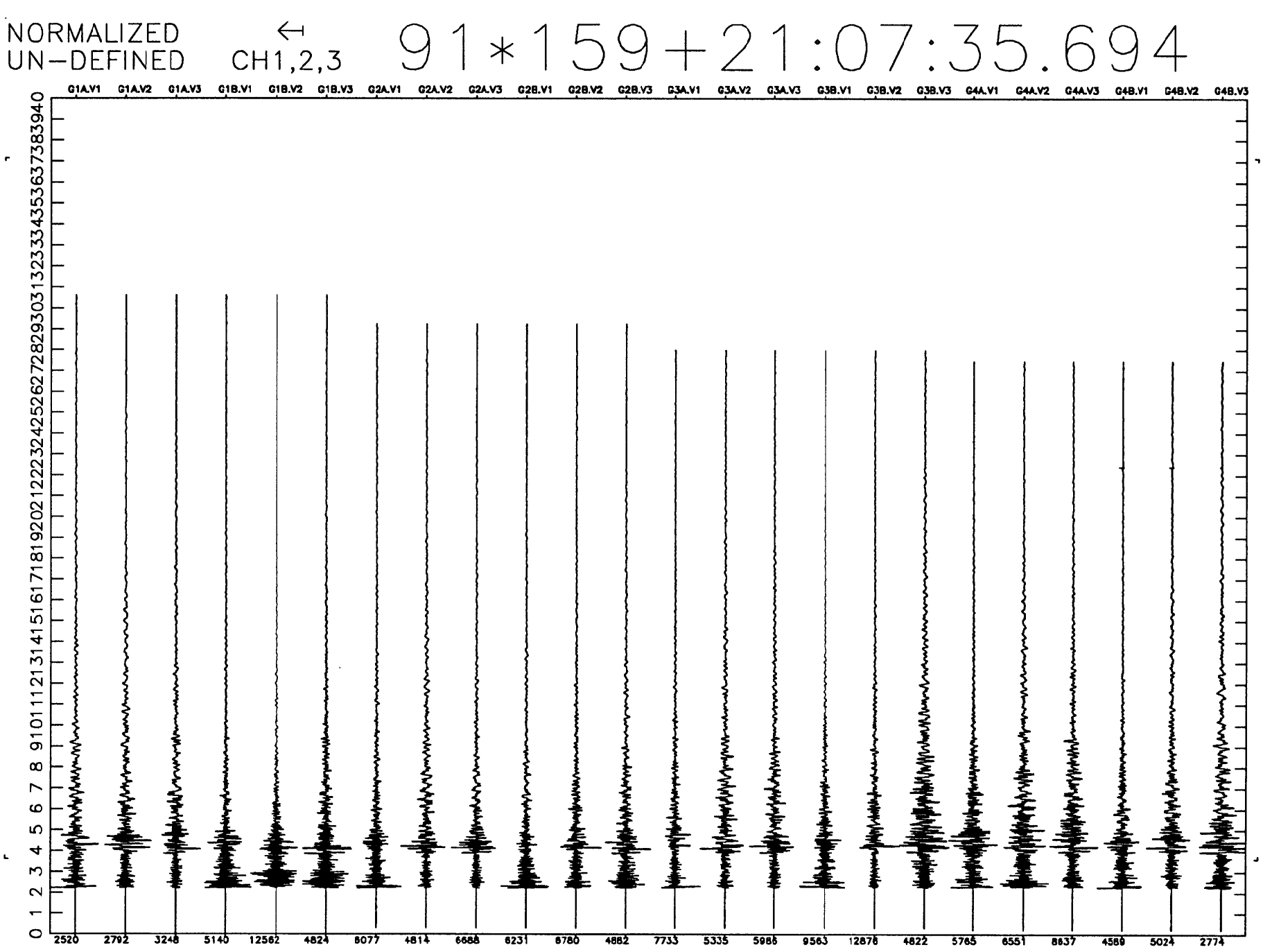
NORMALIZED
UN-DEFINED
CH1,2,3
91*155+01:14:16.840
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1617
1371
1179
1721
1039
1015
1638
1658
1942
1344
1605
1173
1346
656
1295
1471
1198
1098
1642
1540
1153
1743
2260
1878
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*155+06:42:07.737
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
933 G1A.V1
932 1050 G1A.V2
975 G1A.V3
1425 G1B.V1
1086 G1B.V2
1090 G1B.V3
1534 G2A.V1
899 G2A.V2
1032 G2A.V3
1184 G2B.V1
850 G2B.V2
1000 G2B.V3
1614 G3A.V1
1112 G3A.V2
1179 G3A.V3
2309 G3B.V1
1270 G3B.V2
1188 G3B.V3
1593 G4A.V1
1603 G4A.V2
993 G4A.V3
1181 G4B.V1
1040 G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*15+07:08:34.917
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
626 G1A.V1
832 G1A.V2
827 G1A.V3
597 G1B.V1
1215 G1B.V2
823 G1B.V3
756 G2A.V1
1243 G2A.V2
837 G2A.V3
740 G2B.V1
1138 G2B.V2
794 G2B.V3
706 G3A.V1
1070 G3A.V2
1130 G3A.V3
881 G3B.V1
1828 G3B.V2
1238 G3B.V3
880 G4A.V1
1247 G4A.V2
1594 G4A.V3
653 G4B.V1
857 G4B.V2
1074 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*157+13:48:46.332
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
856 G1A.V1
1351 G1A.V2
1570 G1A.V3
840 G1B.V1
1687 G1B.V2
1307 G1B.V3
1234 G2A.V1
1372 G2A.V2
1313 G2A.V3
845 G2B.V1
1422 G2B.V2
1659 G2B.V3
1186 G3A.V1
1863 G3A.V2
2112 G3A.V3
1345 G3B.V1
2519 G3B.V2
2682 G3B.V3
1044 G4A.V1
2622 G4A.V2
2588 G4A.V3
1140 G4B.V1
1748 G4B.V2
1866 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*159+01:12:13.697
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
2762
4208
4629
2775
8234
4643
4029
6746
5060
3271
5407
4717
4108
7044
6505
3650
9063
8157
3344
6561
6527
3475
5814
8077
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

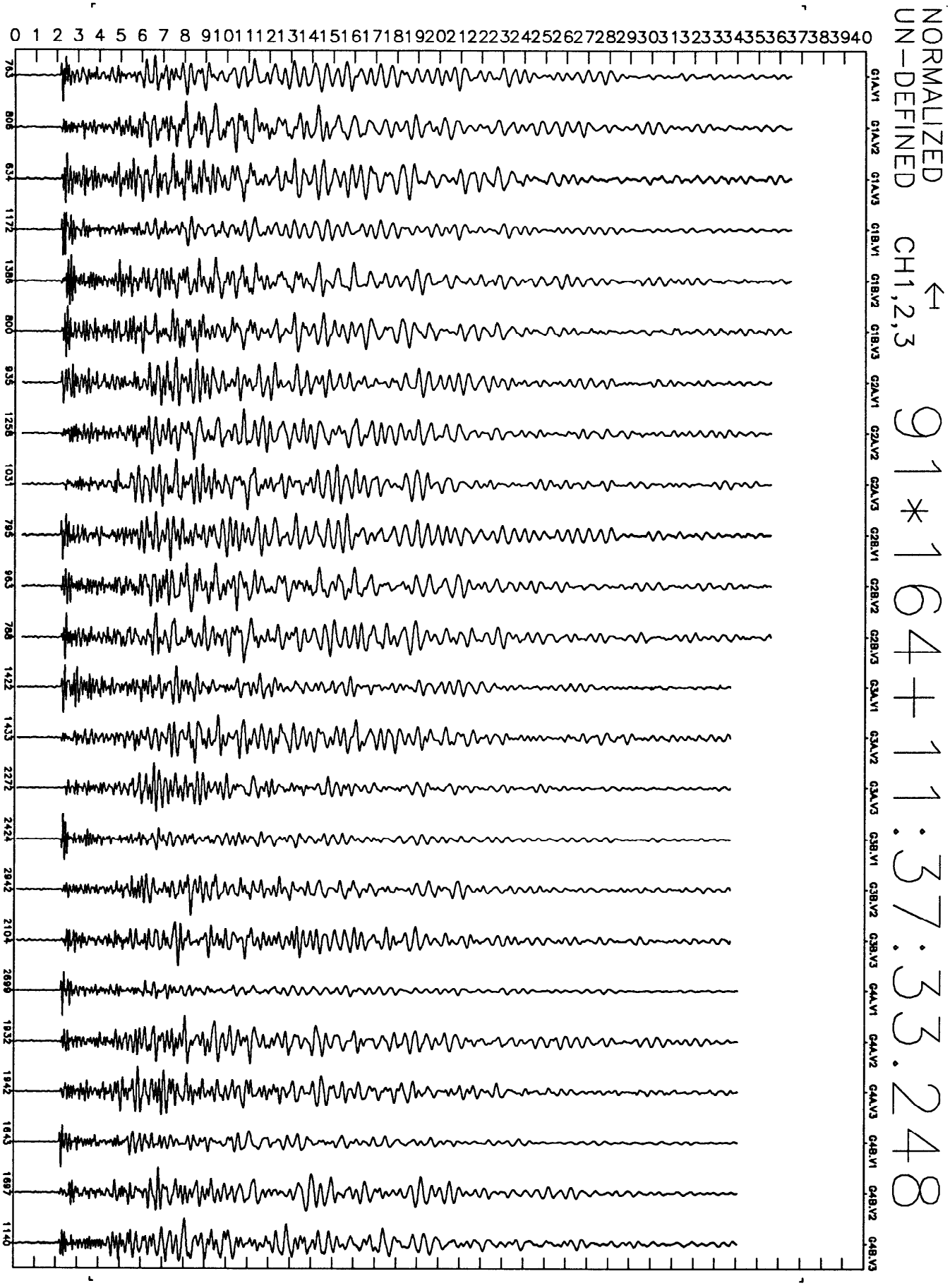

NORMALIZED
UN-DEFINED
CH1,2,3
91*159+21:07:35.694
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
2520 2792 3248 5140 12562 4824 8077 4814 6688 6231 8780 4882 7733 5335 5988 9563 12878 4822 5765 6551 8637 4589 5024 2774

NORMALIZED
UN-DEFINED
CH1,2,3
91*162+10:53:44.425
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1004
1591
1467
1038
2770
1264
1358
2080
1505
1397
1854
1490
1508
2188
1942
1651
3607
2288
1607
2830
2377
1578
2349
1849
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*163+15:18:41.930
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*164+04:33:18.699
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
596 G1A.V1
914 G1A.V2
780 G1A.V3
711 G1B.V1
1480 G1B.V2
874 G1B.V3
1072 G2A.V1
1352 G2A.V2
827 G2A.V3
780 G2B.V1
1117 G2B.V2
900 G2B.V3
998 G3A.V1
1568 G3A.V2
1079 G3A.V3
1028 G3B.V1
1798 G3B.V2
1334 G3B.V3
777 G4A.V1
1638 G4A.V2
1285 G4A.V3
722 G4B.V1
1478 G4B.V2
1008 G4B.V3

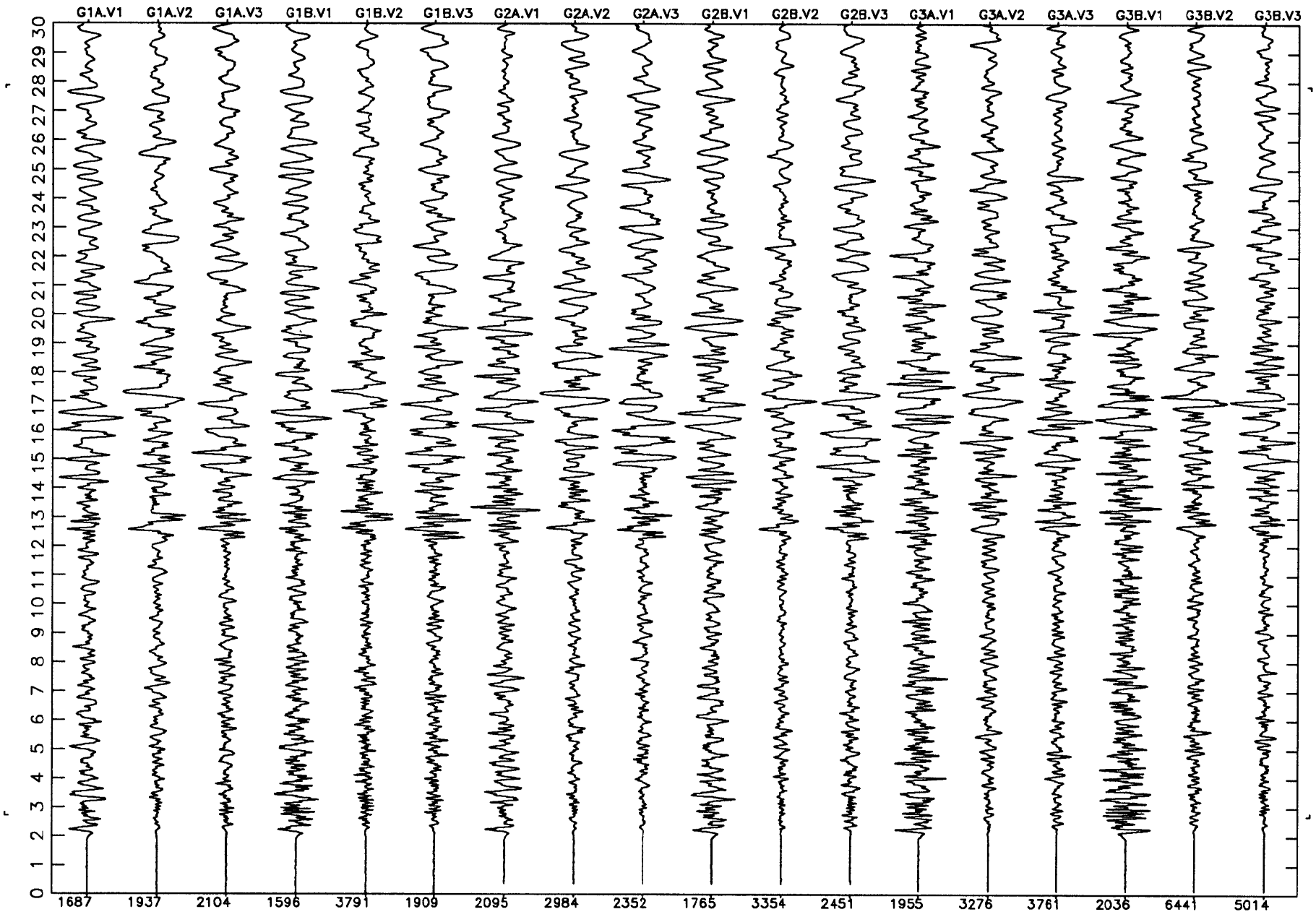
NORMALIZED
UN-DEFINED
CH1,2,3
91*164+06:03:52.163
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
704
691
663
660
1003
679
884
733
820
810
632
700
1008
1418
1049
784
773
900
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*164+11:37:33.248
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
763 G1A.V1
808 G1A.V2
634 G1A.V3
1172 G1B.V1
1388 G1B.V2
800 G1B.V3
935 G2A.V1
1258 G2A.V2
1031 G2A.V3
785 G2B.V1
963 G2B.V2
788 G2B.V3
1422 G3A.V1
1433 G3A.V2
2272 G3A.V3
2424 G3B.V1
2842 G3B.V2
2104 G3B.V3
2699 G4A.V1
1932 G4A.V2
1942 G4A.V3
1643 G4B.V1
1697 G4B.V2
1140 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*166+00:59:51.703
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
32767
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*166+02:50:26.873
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3 G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G4A.V1 G4A.V2 G4A.V3 G4B.V1 G4B.V2 G4B.V3
1135 1277 1331 1585 1882 1376 1050 846 727 1019 1216 882 1175 1035 980 1344 863 753 1510 1910 1632 1198 1163 1120

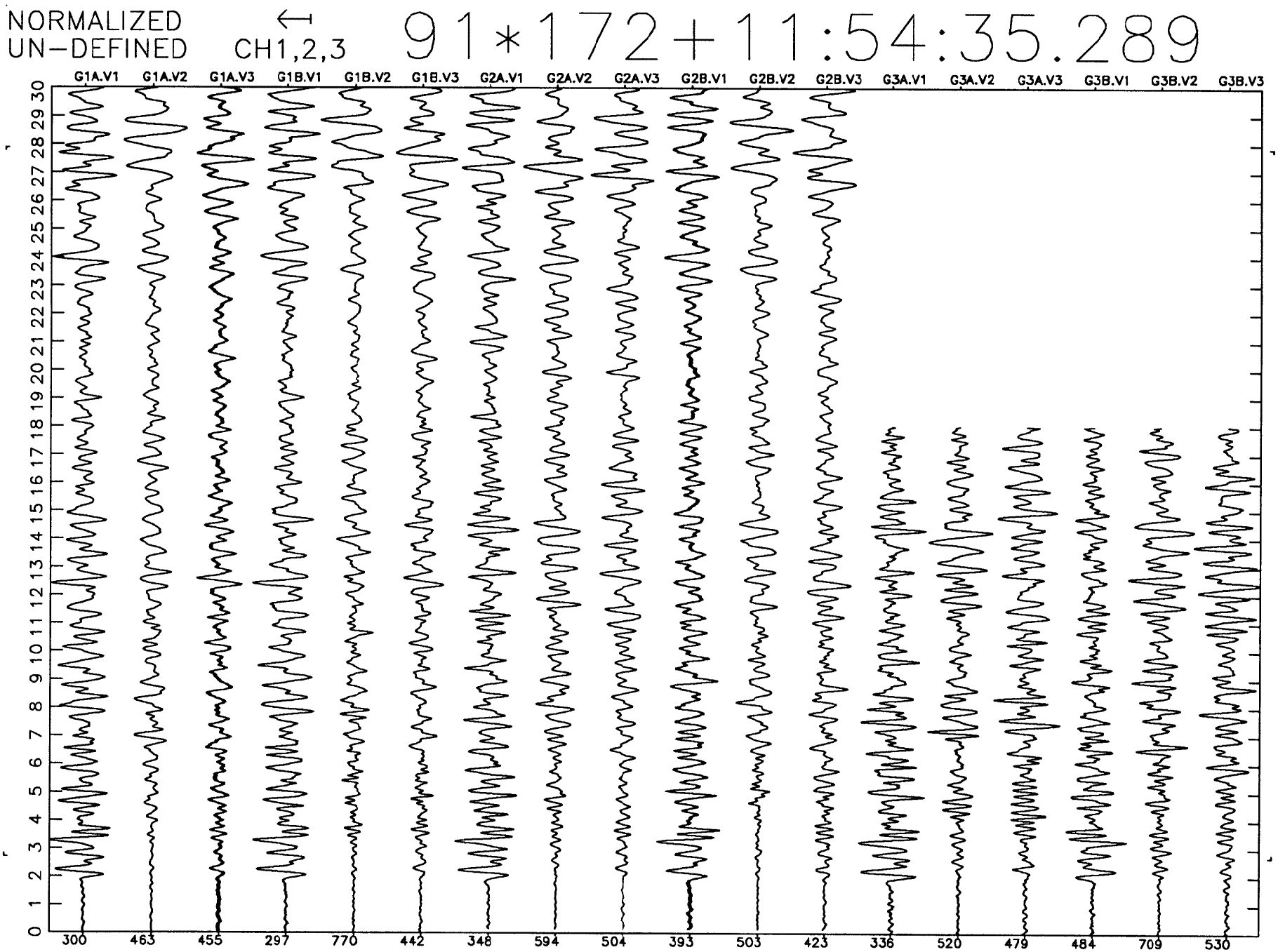
NORMALIZED
UN-DEFINED
CH1,2,3
91*166+02:58:49.058
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
731
674
690
800
1048
587
771
1035
723
809
650
736
808
1102
963
989
1984
1252
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

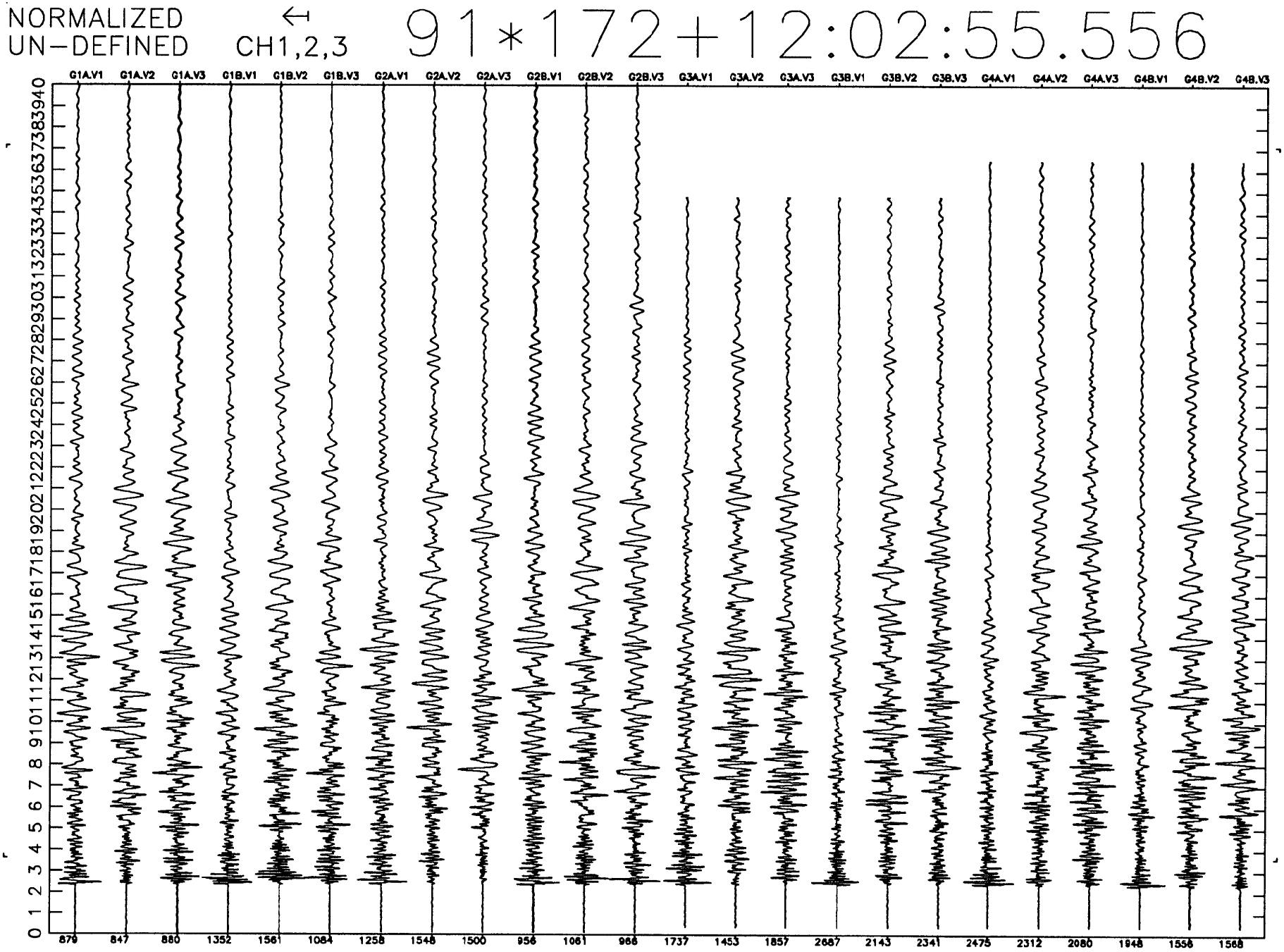

NORMALIZED
UN-DEFINED
CH1,2,3
91*167+04:53:58.872
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1687
1937
2104
1596
3791
1909
2095
2984
2352
1765
3354
2451
1955
3276
3761
2036
6441
5014

NORMALIZED
UN-DEFINED
CH1,2,3
91*168+12:39:08.753
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
506
491
347
528
659
371
591
749
695
488
541
565
548
684
543
675
457
479
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*168+13:49:23.516
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
384 G1A.V1
592 G1A.V2
651 G1A.V3
438 G1B.V1
885 G1B.V2
542 G1B.V3
456 G2A.V1
889 G2A.V2
737 G2A.V3
579 G2B.V1
726 G2B.V2
703 G2B.V3
365 G3A.V1
532 G3A.V2
507 G3A.V3
518 G3B.V1
815 G3B.V2
475 G3B.V3
443 G4A.V1
648 G4A.V2
471 G4A.V3
487 G4B.V1
692 G4B.V2
302 G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*170+06:40:50.550
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
5568 G1A.V1
8836 G1A.V2
6940 G1A.V3
6085 G1B.V1
1405 G1B.V2
7228 G1B.V3
7369 G4A.V1
12843 G4A.V2
10575 G4A.V3
5928 G4B.V1
11590 G4B.V2
12078 G4B.V3
7081 G2A.V1
10030 G2A.V2
10164 G2A.V3
6445 G2B.V1
9485 G2B.V2
7001 G2B.V3
7433 G3A.V1
10484 G3A.V2
12418 G3A.V3
7743 G3B.V1
16252 G3B.V2
12668 G3B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*172+11:54:35.289
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
300
463
455
297
770
442
348
594
504
393
503
423
336
520
479
484
709
530


NORMALIZED
UN-DEFINED
CH1,2,3
91*172+12:02:55.556
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
879
847
880
1352
1561
1084
1258
1548
1500
956
1061
966
1737
1453
1857
2687
2143
2341
2475
2312
2080
1948
1556
1568

NORMALIZED
UN-DEFINED
CH1,2,3
91*172+14:43:01.757
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*173+05:43:14.281
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

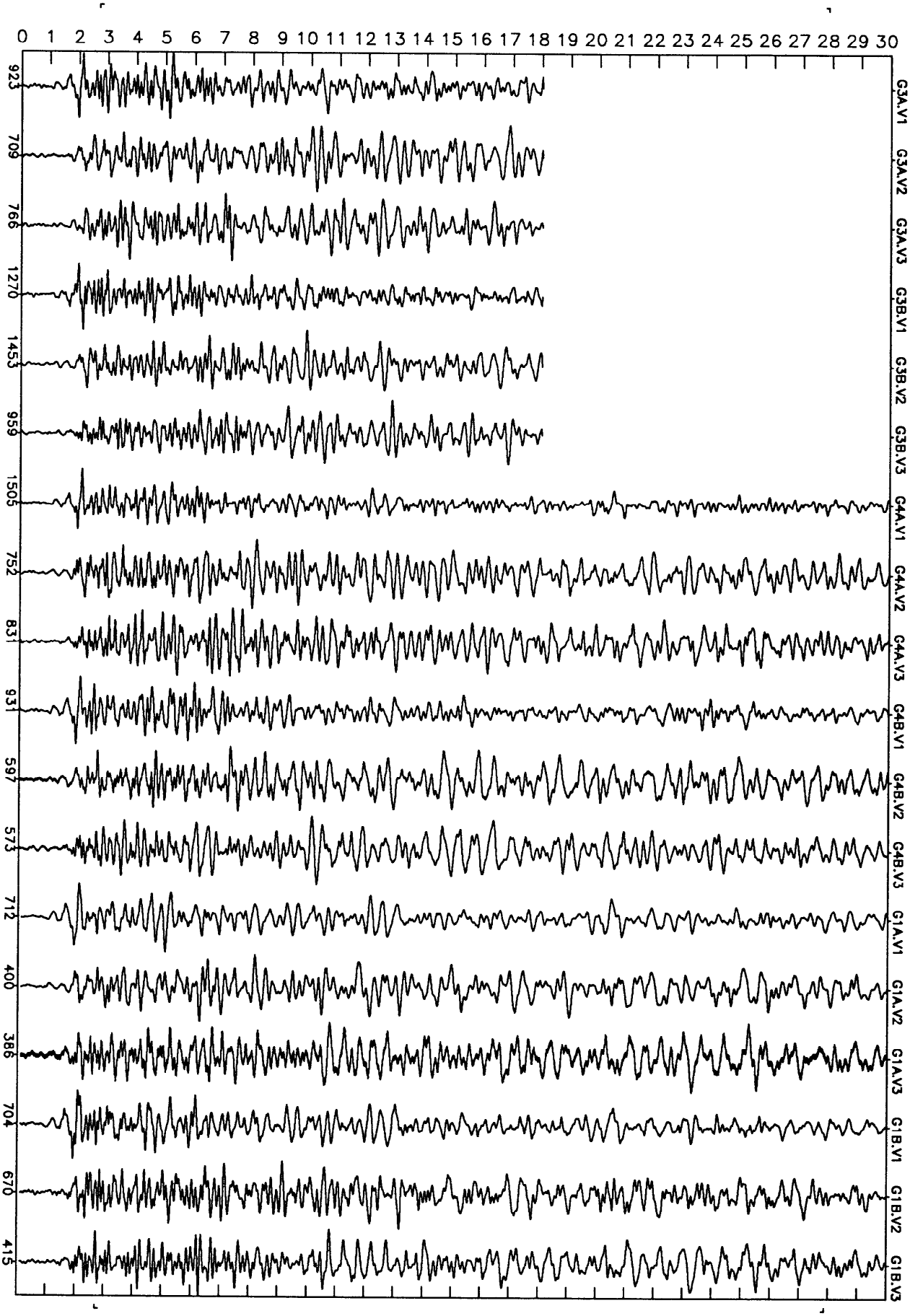
NORMALIZED
UN-DEFINED
CH1,2,3
91*176+07:54:23.637
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
736
735
532
766
1112
526
756
984
524
909
961
580
1100
1605
850
801
1018
813
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*178+14:09:09.098
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
967 G1A.V1
1606 G1A.V2
1487 G1A.V3
1040 G1B.V1
2034 G1B.V2
1457 G1B.V3
1098 G2A.V1
2278 G2A.V2
2016 G2A.V3
1404 G2B.V1
1971 G2B.V2
1653 G2B.V3
1344 G3A.V1
2844 G3A.V2
1995 G3A.V3
1332 G3B.V1
3490 G3B.V2
2456 G3B.V3
1247 G4A.V1
2762 G4A.V2
2844 G4A.V3
918 G4B.V1
1484 G4B.V2
2239 G4B.V3

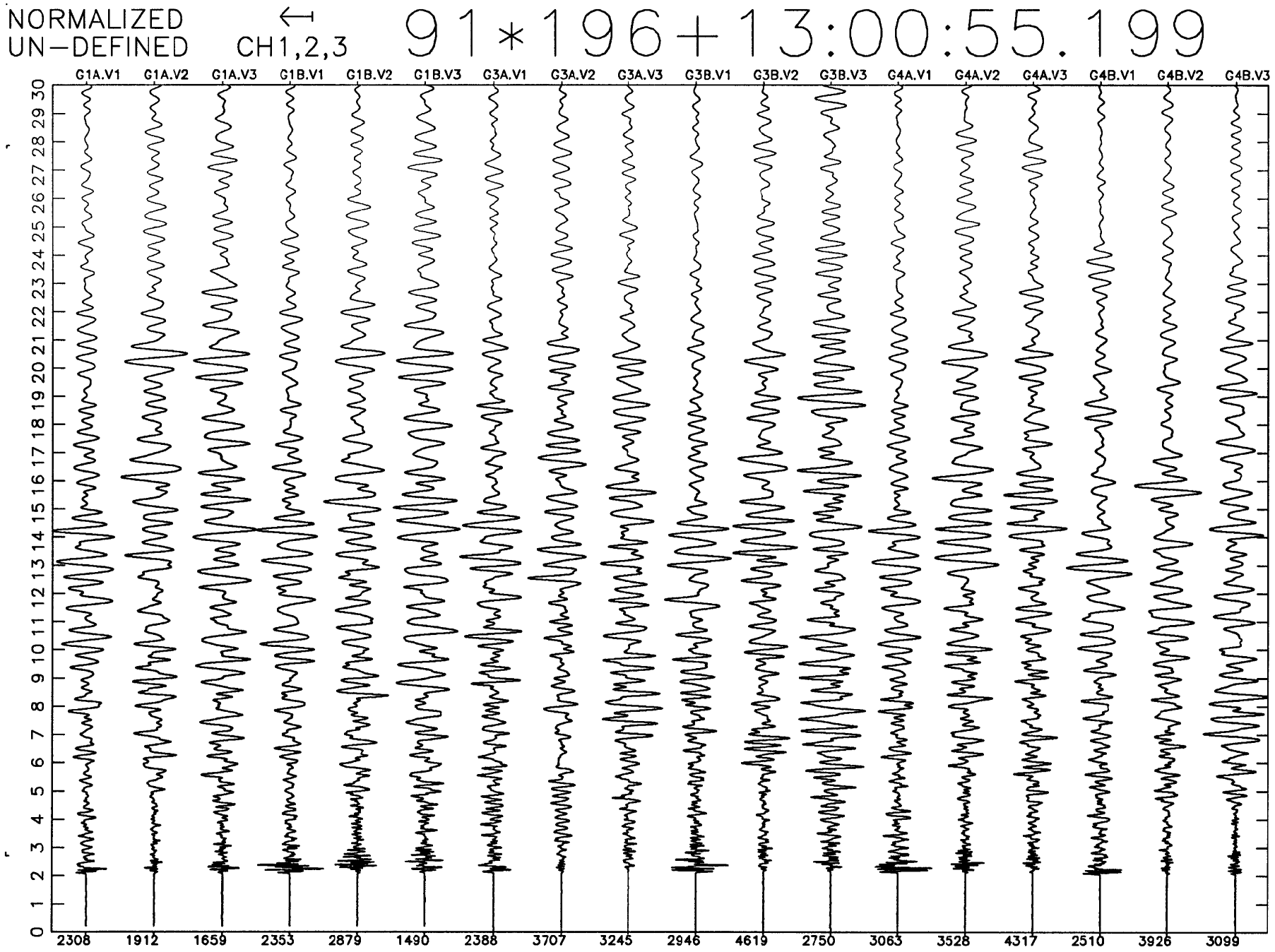
NORMALIZED
UN-DEFINED
CH1,2,3
91*184+13:01:14.385
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
849 C1A.V1
858 C1A.V2
867 C1A.V3
824 C1B.V1
1463 C1B.V2
916 C1B.V3
115 C2A.V1
1323 C2A.V2
1162 C2A.V3
900 C2B.V1
882 C2B.V2
878 C2B.V3
1477 C4A.V1
1393 C4A.V2
1756 C4A.V3
1097 C4B.V1
1451 C4B.V2
1309 C4B.V3
1052 C3A.V1
988 C3A.V2
941 C3A.V3
1235 C3B.V1
1465 C3B.V2
913 C3B.V3

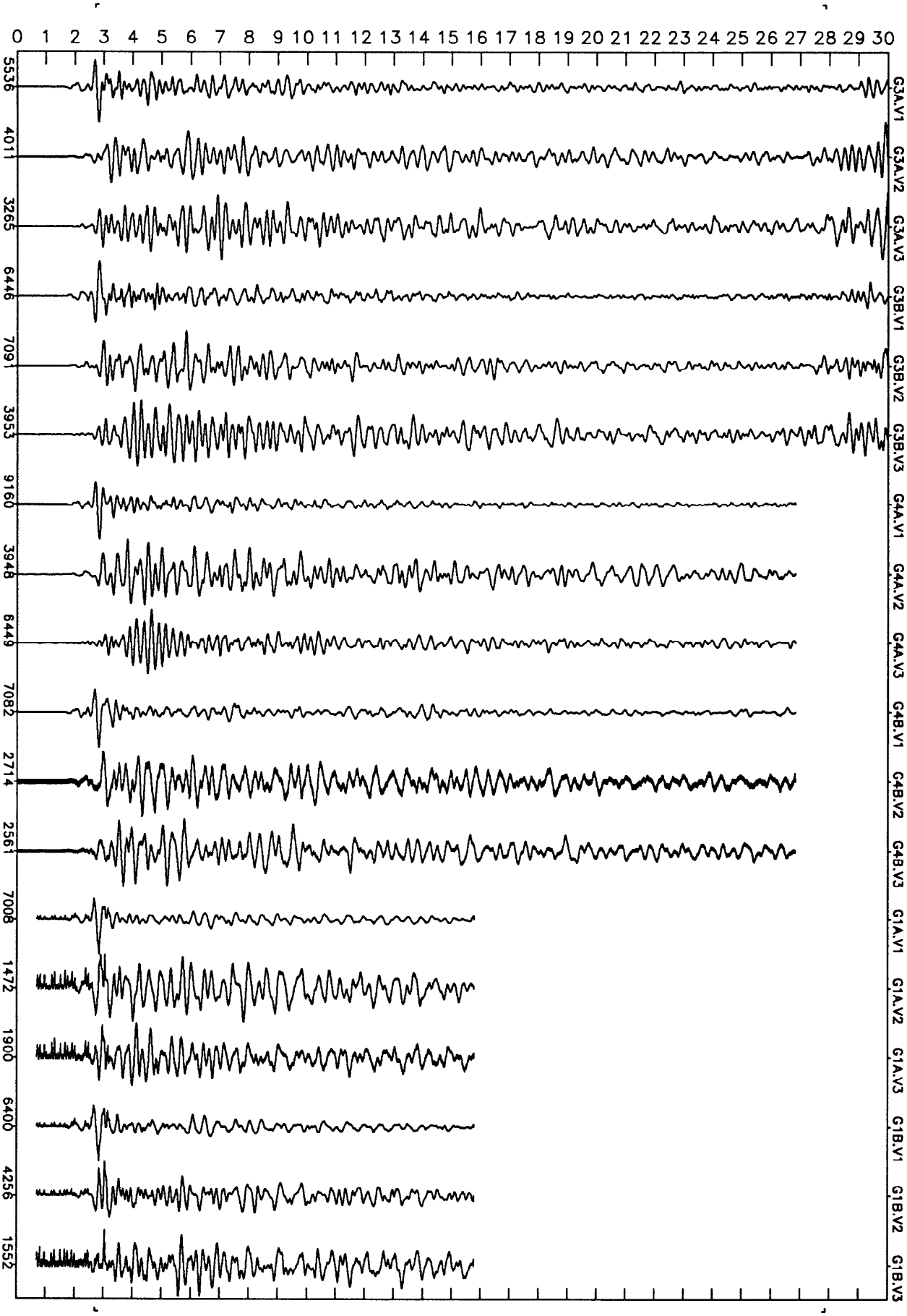
NORMALIZED
UN-DEFINED
CH1,2,3
91*185+06:27:10.440
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
18076 G1A.V1
29078 G1A.V2
23808 G1A.V3
19682 G1B.V1
32767 G1B.V2
25963 G1B.V3
21370 G2A.V1
32767 G2A.V2
31634 G2A.V3
16798 G2B.V1
24470 G2B.V2
29831 G2B.V3
25993 G4A.V1
32767 G4A.V2
32767 G4A.V3
26998 G4B.V1
32767 G4B.V2
31648 G4B.V3
21368 G3A.V1
32767 G3A.V2
32767 G3A.V3
24408 G3B.V1
32767 G3B.V2
32767 G3B.V3

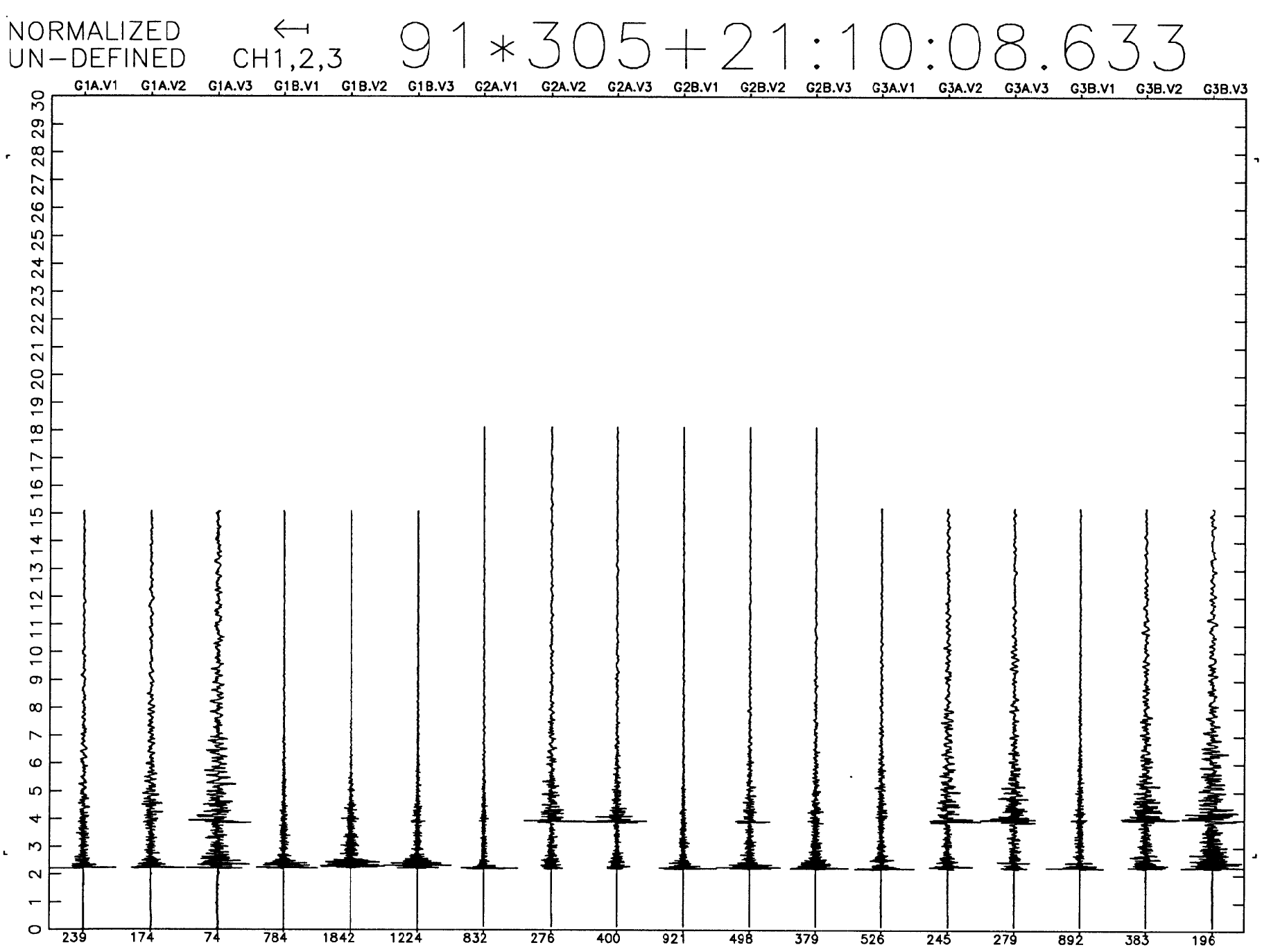
NORMALIZED
UN-DEFINED
CH1,2,3
91*185+14:49:42.579
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
1438
1417
1975
1342
2496
1978
2041
1867
2662
1911
1335
2110
1985
2845
2788
2324
3563
2990
1751
2499
3491
1784
1779
1857
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3


NORMALIZED
UN-DEFINED
↔
CH1,2,3
91*187+07:48:52.822
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
923
709
766
1270
1453
959
1505
752
831
931
597
573
712
400
386
704
670
415
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
91*195+09:13:43.478
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
4920 G1A.V1
3371 G1A.V2
3789 G1A.V3
5114 G1B.V1
4780 G1B.V2
3642 G1B.V3
5095 G3A.V1
3150 G3A.V2
3317 G3A.V3
5641 G3B.V1
3371 G3B.V2
4036 G3B.V3
5249 G4A.V1
3232 G4A.V2
4437 G4A.V3
5387 G4B.V1
2600 G4B.V2
3129 G4B.V3


NORMALIZED
UN–DEFINED
CH1,2,3
91*196+13:00:55.199
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G4A.V1
G4A.V2
G4A.V3
G4B.V1
G4B.V2
G4B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
2308
1912
1659
2353
2879
1490
2388
3707
3245
2946
4619
2750
3063
3528
4317
2510
3926
3099


NORMALIZED
UN-DEFINED
CH1,2,3
91*202+18:51:24.789
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
5536 G3A.V1
4011 G3A.V2
3265 G3A.V3
6446 G3B.V1
7091 G3B.V2
3953 G3B.V3
9160 G4A.V1
3948 G4A.V2
6449 G4A.V3
7082 G4B.V1
2714 G4B.V2
2561 G4B.V3
7008 G1A.V1
1472 G1A.V2
1900 G1A.V3
6400 G1B.V1
4256 G1B.V2
1552 G1B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*305+21:10:08.633
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
239 174 74 784 1842 1224 832 276 400 921 498 379 526 245 279 892 383 196

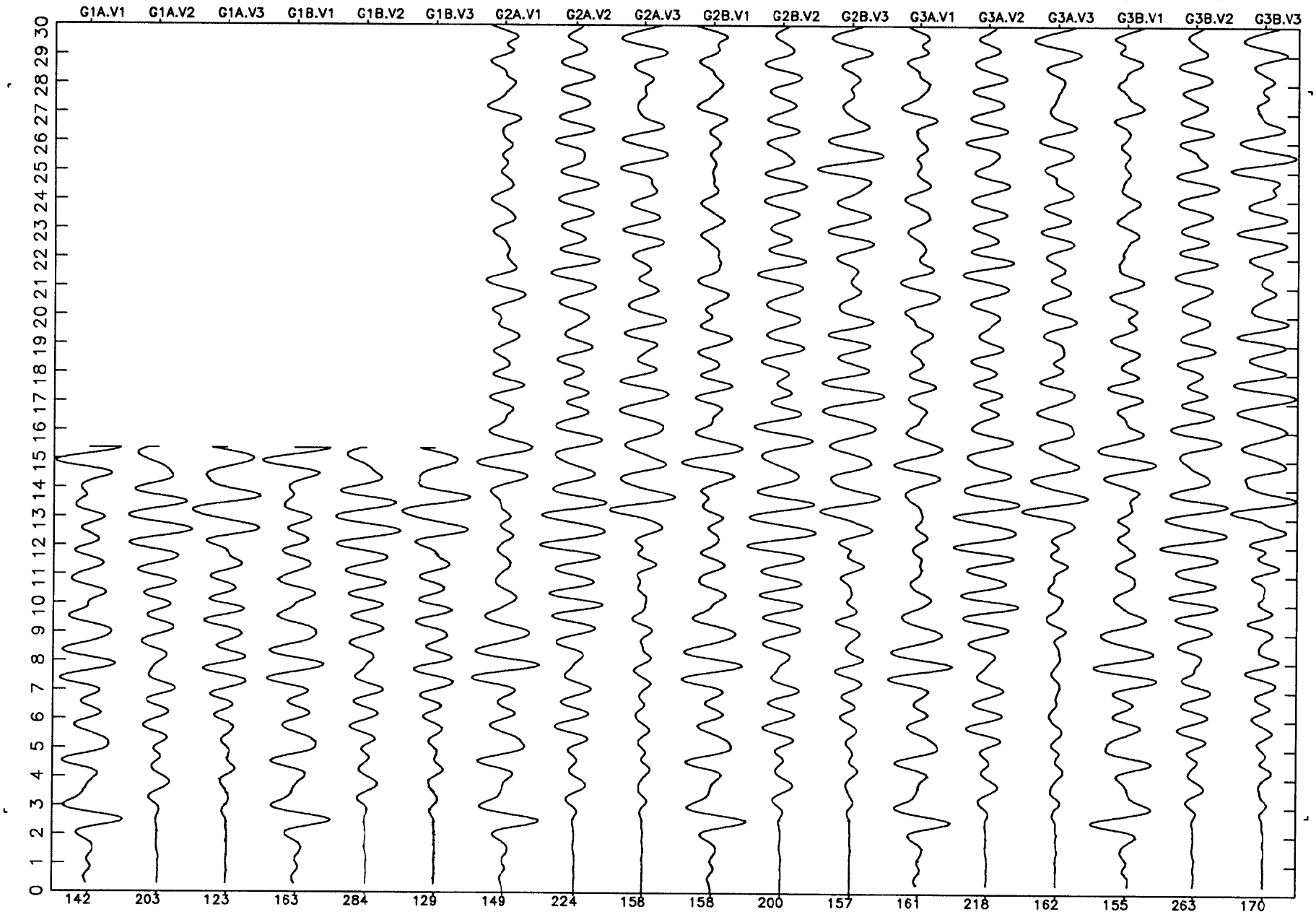
NORMALIZED
UN-DEFINED
← CH1,2,3
91*312+11:19:47.002
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
138
86
137
324
399
174
228
204
142
240
201
234
351
234
331
629
341
299
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

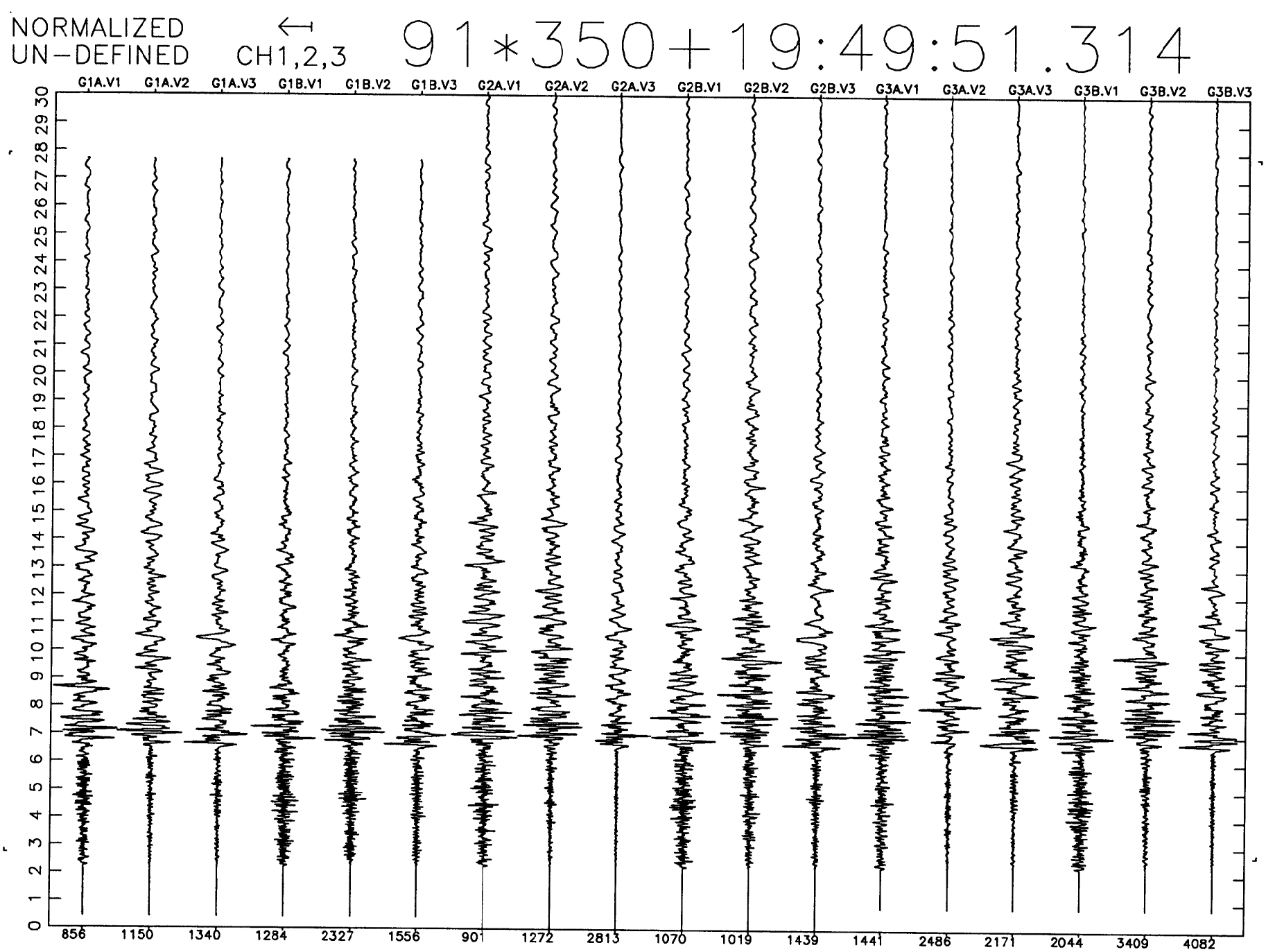
NORMALIZED
UN-DEFINED
CH1,2,3 ←
91*316+08:12:18.815
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1010 G2A.V1
2465 G2A.V2
1532 G2A.V3
1049 G2B.V1
1805 G2B.V2
1344 G2B.V3
1193 G3A.V1
2759 G3A.V2
1698 G3A.V3
1656 G3B.V1
3024 G3B.V2
2293 G3B.V3
901 G1A.V1
1617 G1A.V2
1178 G1A.V3
868 G1B.V1
1814 G1B.V2
1263 G1B.V3

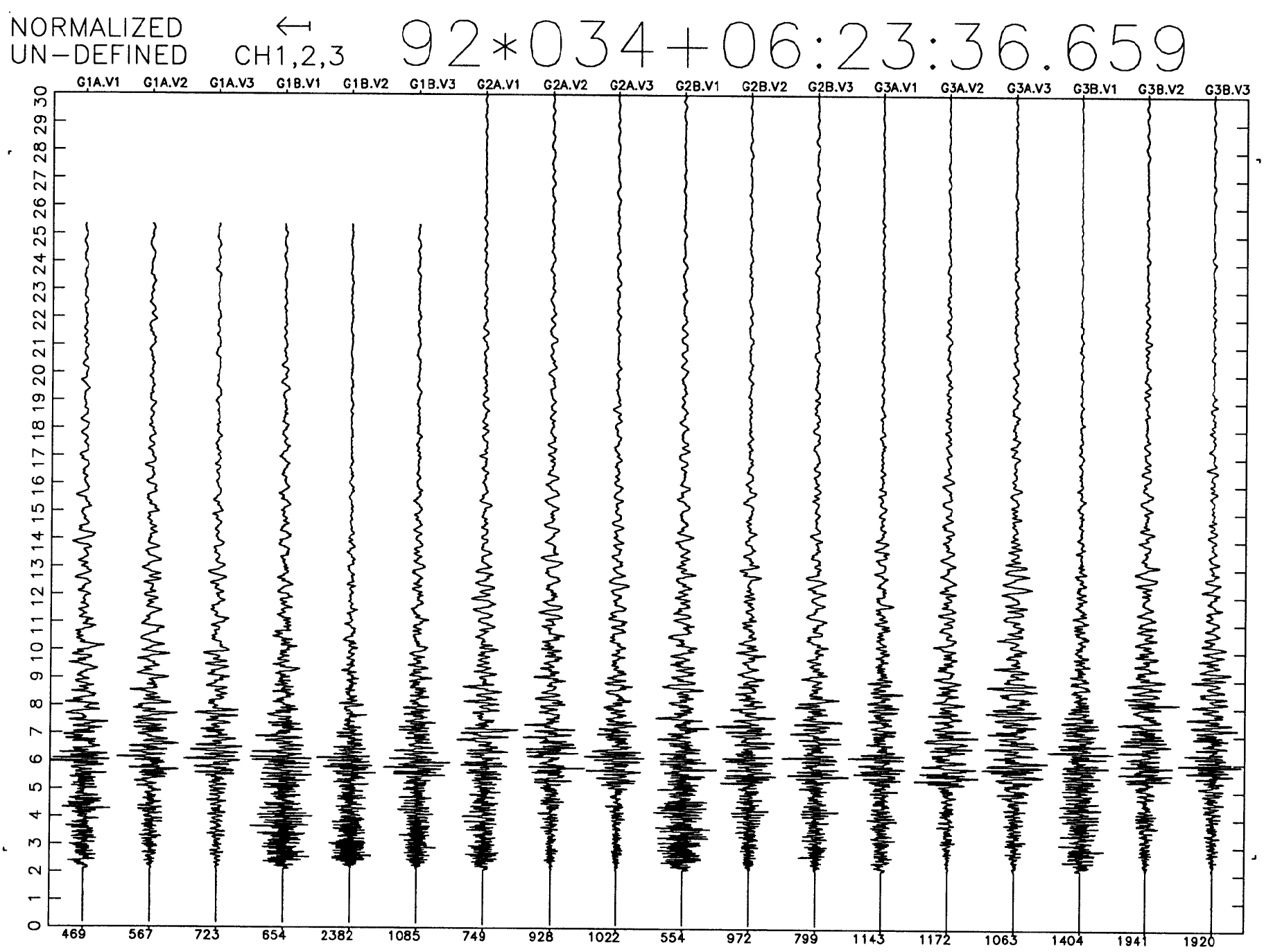
NORMALIZED
UN-DEFINED
CH1,2,3
91*316+20:36:26.603
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
3180 G1A.V1
5733 G1A.V2
3602 G1A.V3
2839 G1B.V1
8246 G1B.V2
3444 G1B.V3
4906 G3A.V1
11320 G3A.V2
6789 G3A.V3
5313 G3B.V1
15066 G3B.V2
9980 G3B.V3
5320 G2A.V1
8274 G2A.V2
4807 G2A.V3
3742 G2B.V1
7168 G2B.V2
4548 G2B.V3

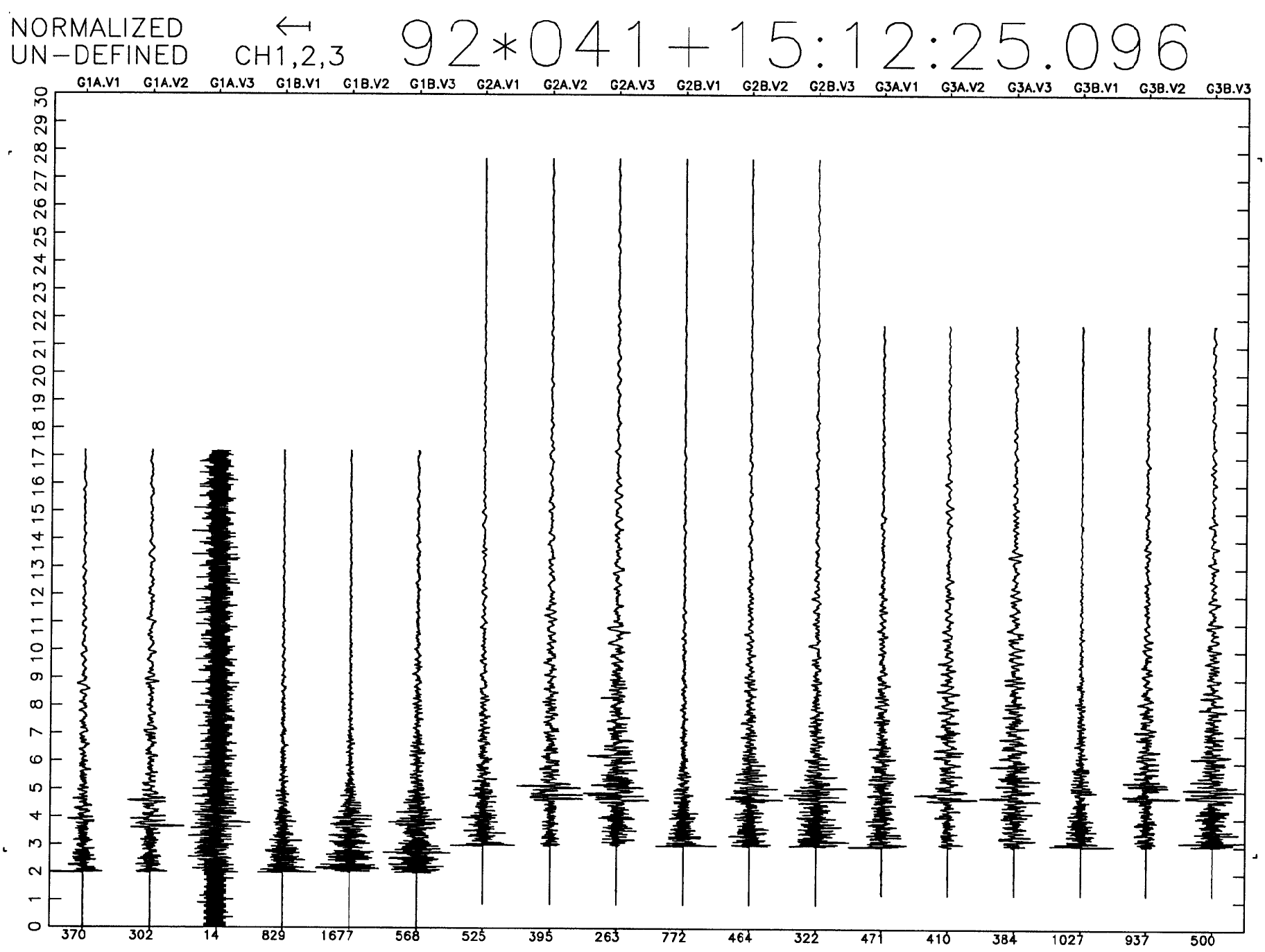
NORMALIZED
UN-DEFINED
CH1,2,3
91*332+17:21:29.013
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1104
1117
1022
1264
1658
977
1163
1462
1377
1277
1208
1077
1190
1350
1603
1290
1717
1450
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

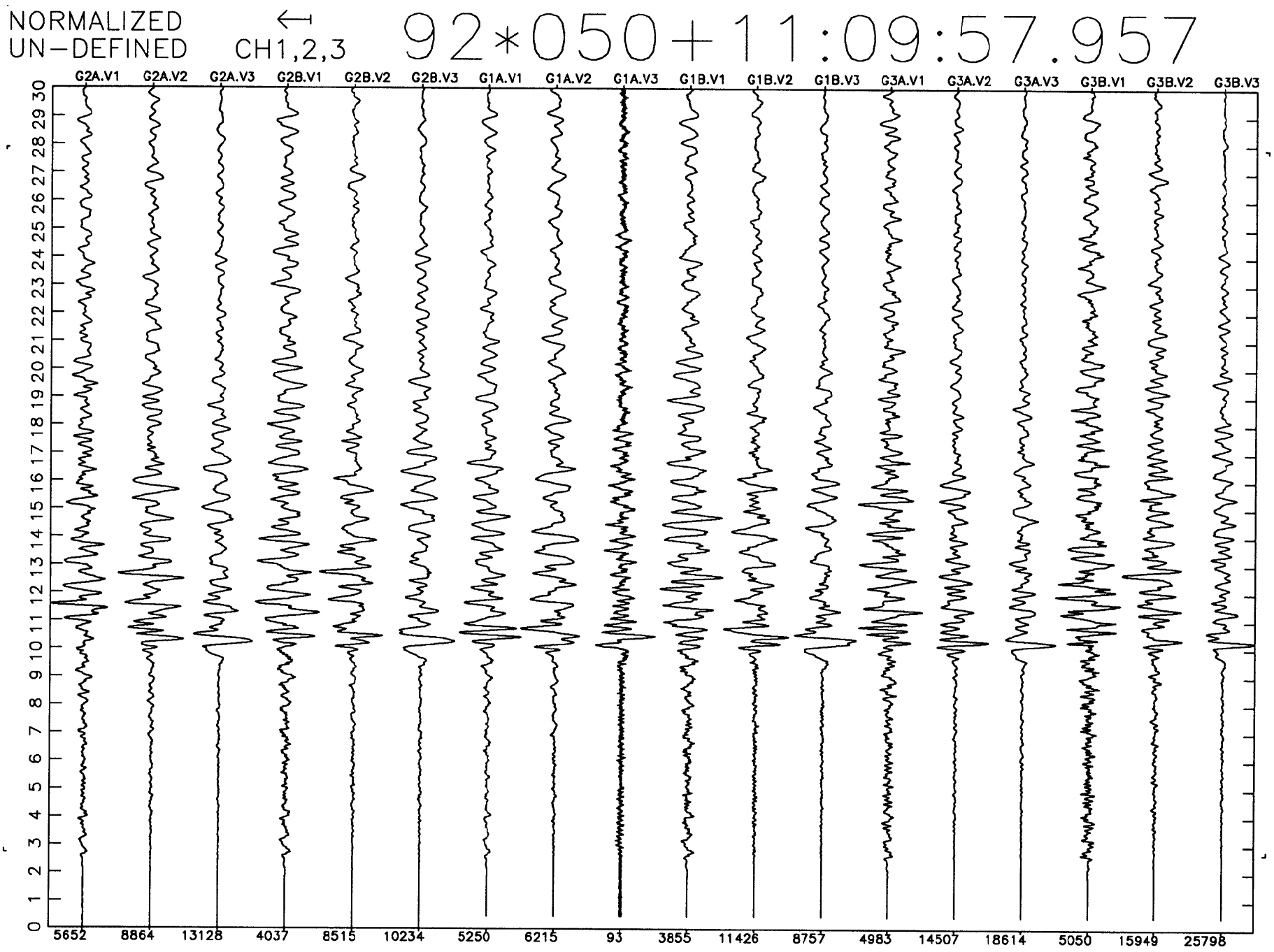
NORMALIZED
UN-DEFINED
CH1,2,3
91*342+01:03:06.453
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
297
195
276
288
356
281
381
310
300
418
282
308
361
289
294
393
522
401
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
91*347+19:10:37.351
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
142
203
123
163
284
129
149
224
158
158
200
157
161
218
162
155
263
170


NORMALIZED
UN-DEFINED
CH1,2,3
91*350+19:49:51.314
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
856
1150
1340
1284
2327
1556
901
1272
2813
1070
1019
1439
1441
2486
2171
2044
3409
4082


NORMALIZED
UN-DEFINED
CH1,2,3
92*034+06:23:36.659
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
469
567
723
654
2382
1085
749
928
1022
554
972
799
1143
1172
1063
1404
1941
1920


NORMALIZED
UN-DEFINED
CH1,2,3
92*041+15:12:25.096
G1A.V1 G1A.V2 G1A.V3 G1B.V1 G1B.V2 G1B.V3 G2A.V1 G2A.V2 G2A.V3 G2B.V1 G2B.V2 G2B.V3 G3A.V1 G3A.V2 G3A.V3 G3B.V1 G3B.V2 G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
370 302 14 829 1677 568 525 395 263 772 464 322 471 410 384 1027 937 500

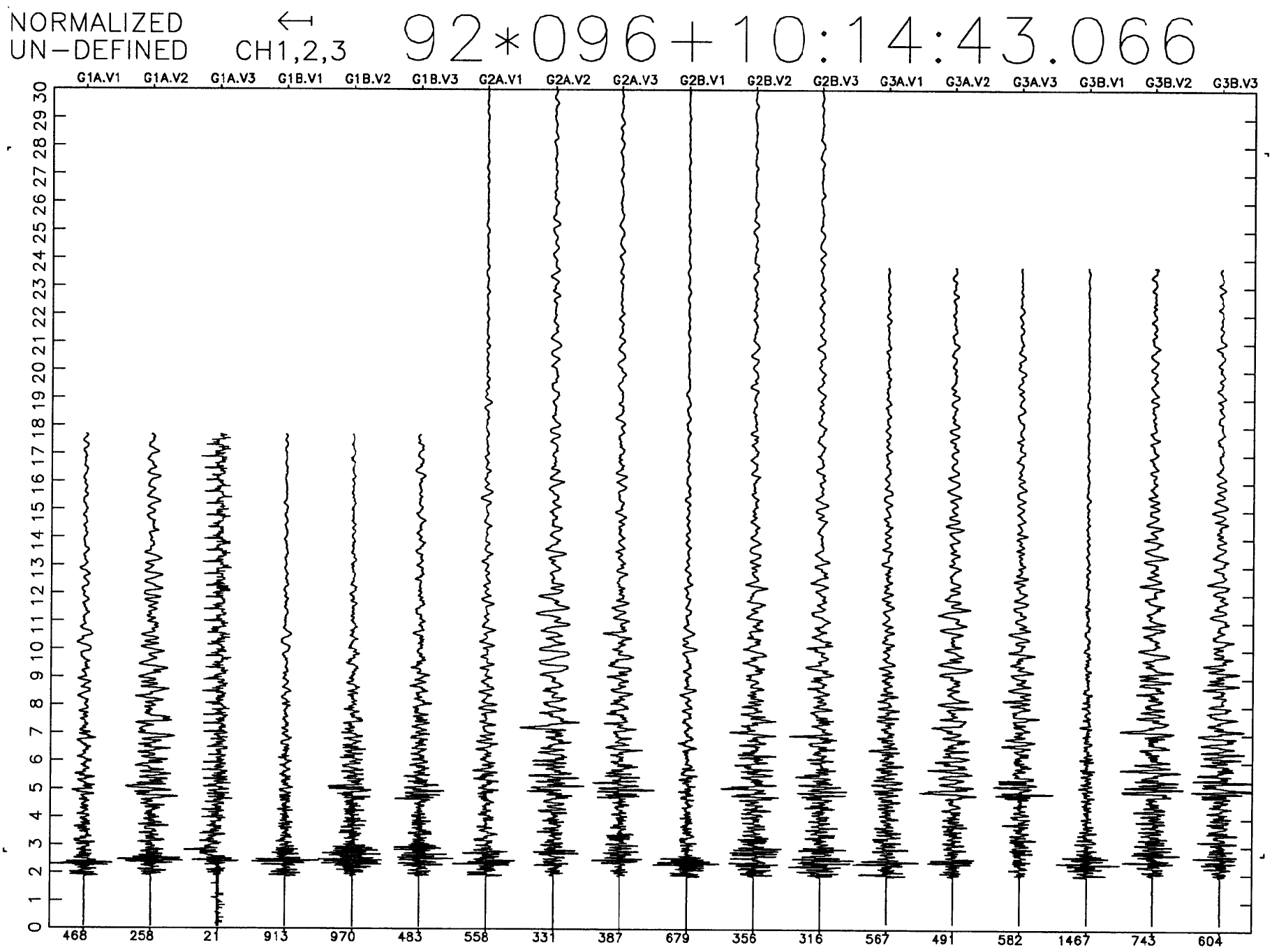

NORMALIZED
UN-DEFINED
CH1,2,3
92*050+11:09:57.957
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
5652
8864
13128
4037
8515
10234
5250
6215
93
3855
11426
8757
4983
14507
18614
5050
15949
25798

NORMALIZED
UN-DEFINED
CH1,2,3
92*056+22:02:27.989
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
324
518
396
276
307
247
305
252
15
278
387
225
310
605
487
369
537
393
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
92*062+12:41:00.724
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
100 G1A.V1
99 G1A.V2
11 G1A.V3
117 G1B.V1
131 G1B.V2
72 G1B.V3
105 G2A.V1
117 G2A.V2
100 G2A.V3
111 G2B.V1
95 G2B.V2
93 G2B.V3
105 G3A.V1
109 G3A.V2
114 G3A.V3
98 G3B.V1
123 G3B.V2
109 G3B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
92*087+19:21:45.586
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
997
1060
203
1126
1669
1309
1210
2003
1634
1212
1359
1463
1143
1744
1827
1387
3209
2154
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

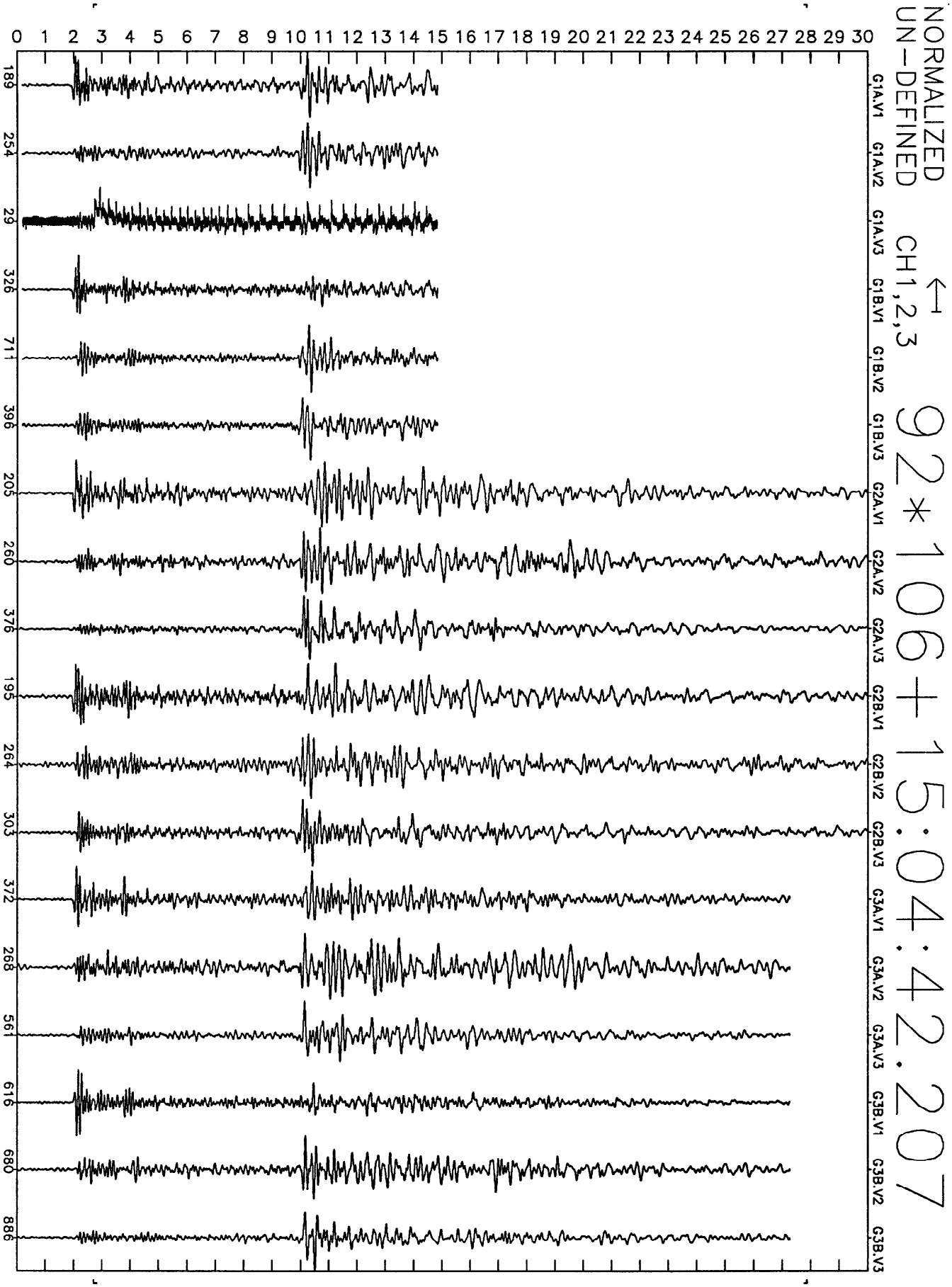
NORMALIZED
UN-DEFINED
CH1,2,3
92*095+02:17:20.757
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
415
409
275
428
288
268
328
209
19
363
342
275
443
399
401
486
575
389
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

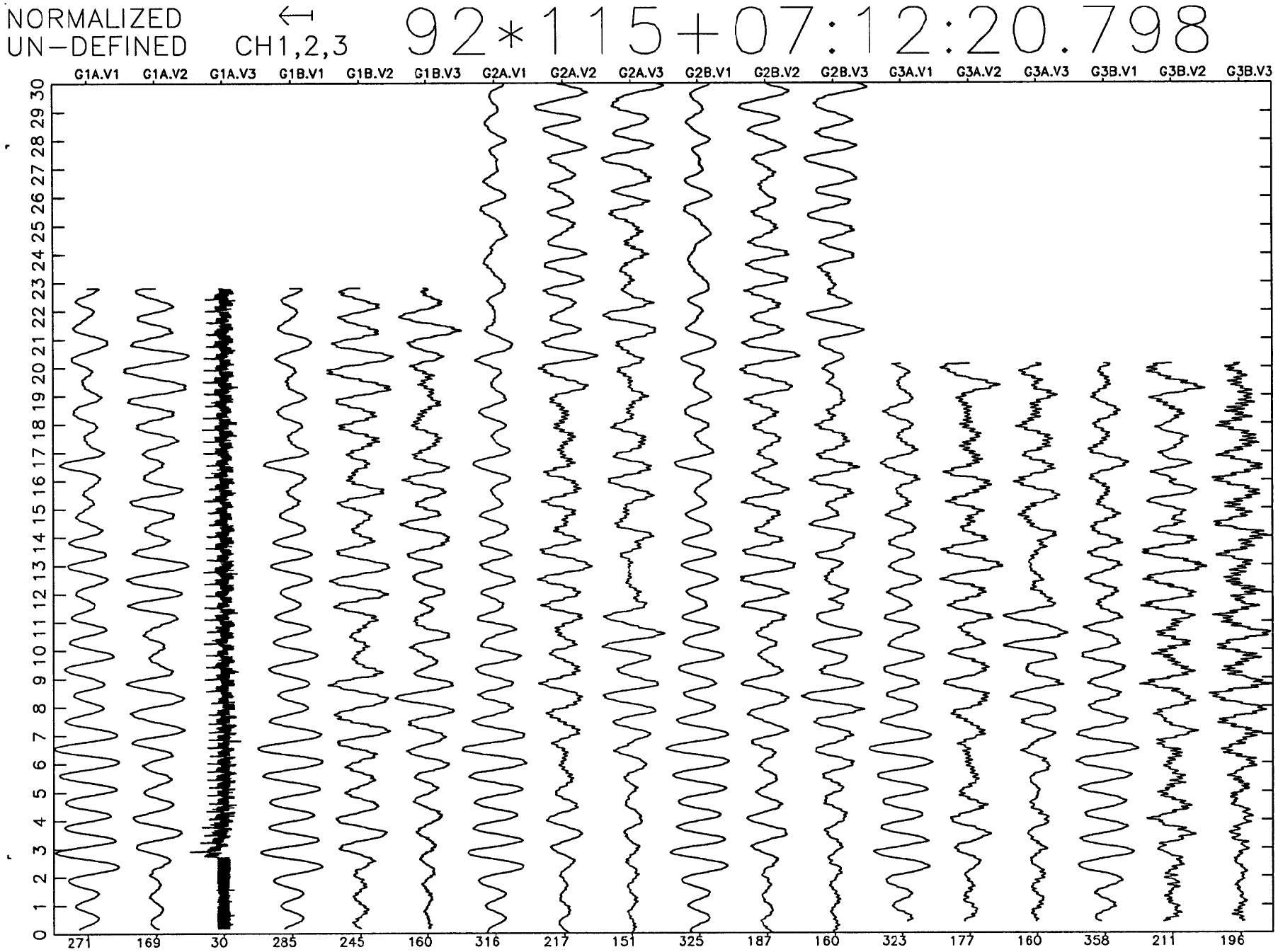

NORMALIZED
UN-DEFINED
CH1,2,3
92*096+10:14:43.066
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
468
258
21
913
970
483
558
331
387
679
356
316
567
491
582
1467
743
604

NORMALIZED
UN-DEFINED
CH1,2,3
92*097+10:48:32.714
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
525 G1A.V1
588 G1A.V2
26 G1A.V3
612 G1B.V1
756 G1B.V2
1067 G1B.V3
578 G3A.V1
903 G3A.V2
1209 G3A.V3
600 G3B.V1
2046 G3B.V2
1810 G3B.V3
624 G2A.V1
898 G2A.V2
1111 G2A.V3
581 G2B.V1
807 G2B.V2
998 G2B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
92*099+22:21:10.162
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
496
646
434
422
538
342
598
768
830
586
1308
931
388
397
23
345
618
359
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3

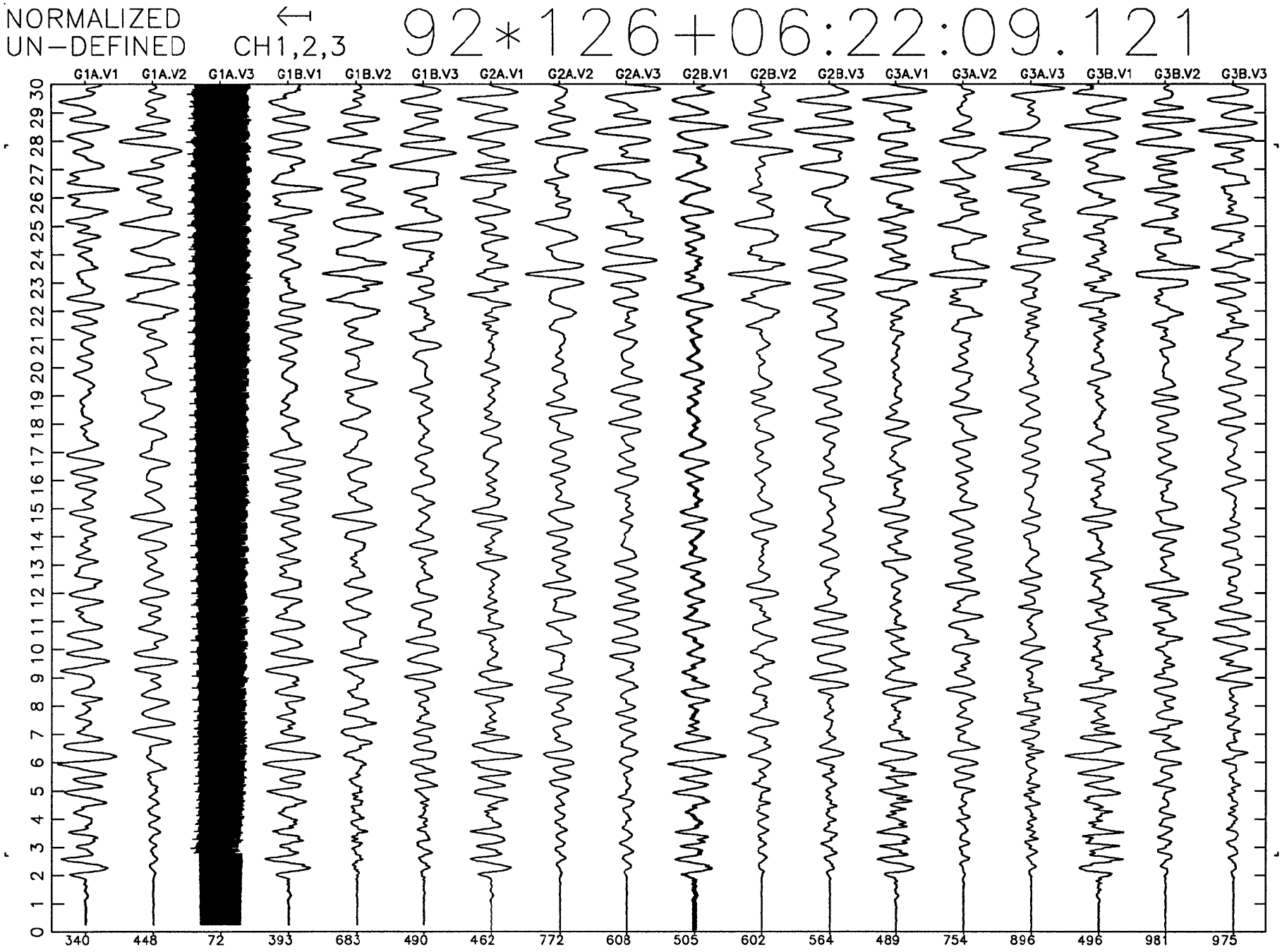
NORMALIZED
UN-DEFINED
CH1,2,3
92*099+22:52:50.564
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
440
486
424
335
505
413
508
737
642
494
1020
968
321
318
29
353
472
318
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3

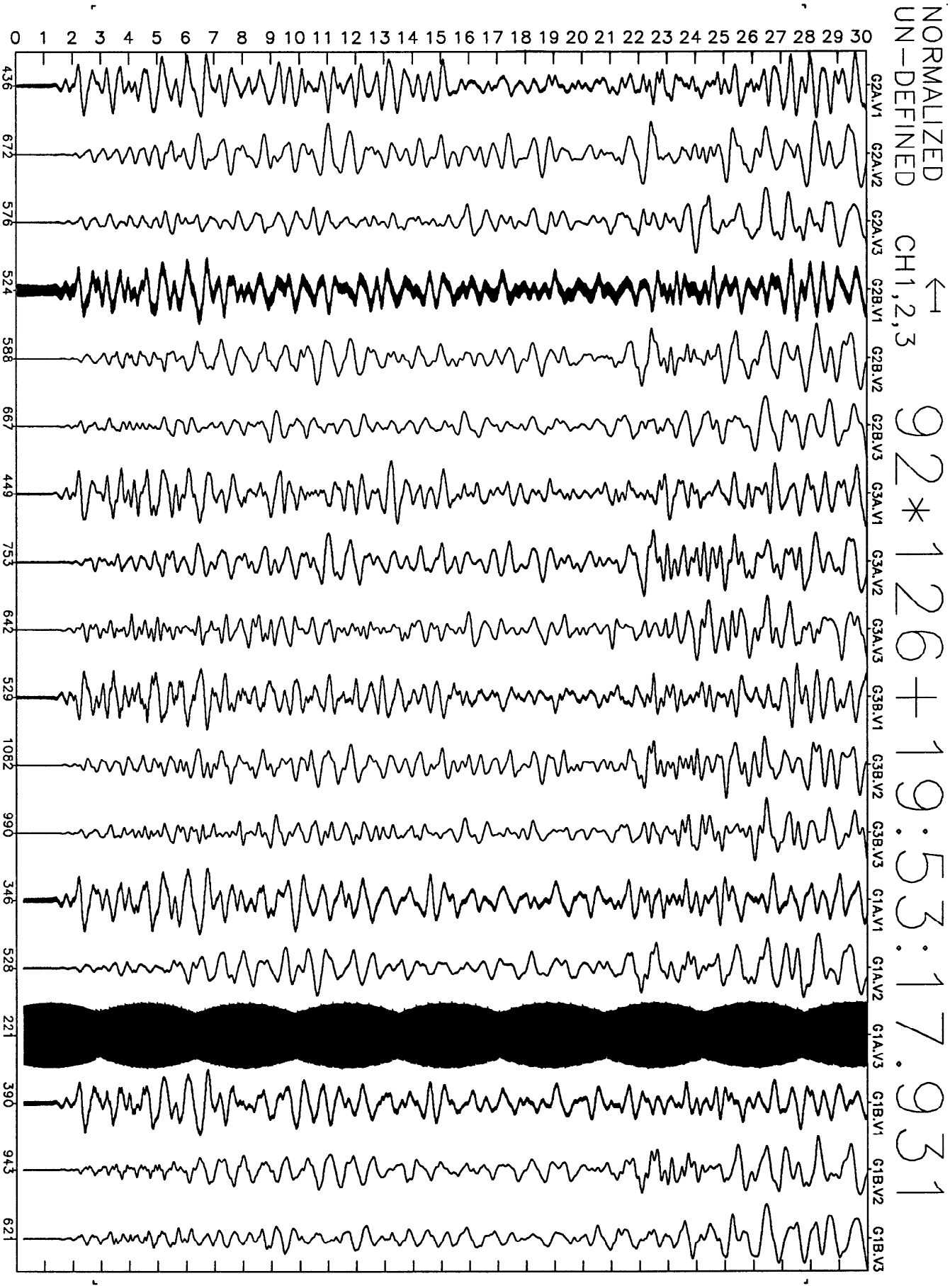

NORMALIZED
UN-DEFINED
92*106+15:04:42.207
CH1,2,3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
189 G1A.V1
254 G1A.V2
29 G1A.V3
326 G1B.V1
711 G1B.V2
396 G1B.V3
205 G2A.V1
260 G2A.V2
376 G2A.V3
195 G2B.V1
264 G2B.V2
303 G2B.V3
372 G3A.V1
268 G3A.V2
561 G3A.V3
616 G3B.V1
680 G3B.V2
886 G3B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
92*115+07:12:20.798
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
271 169 30 285 245 160 316 217 151 325 187 160 323 177 160 358 211 196

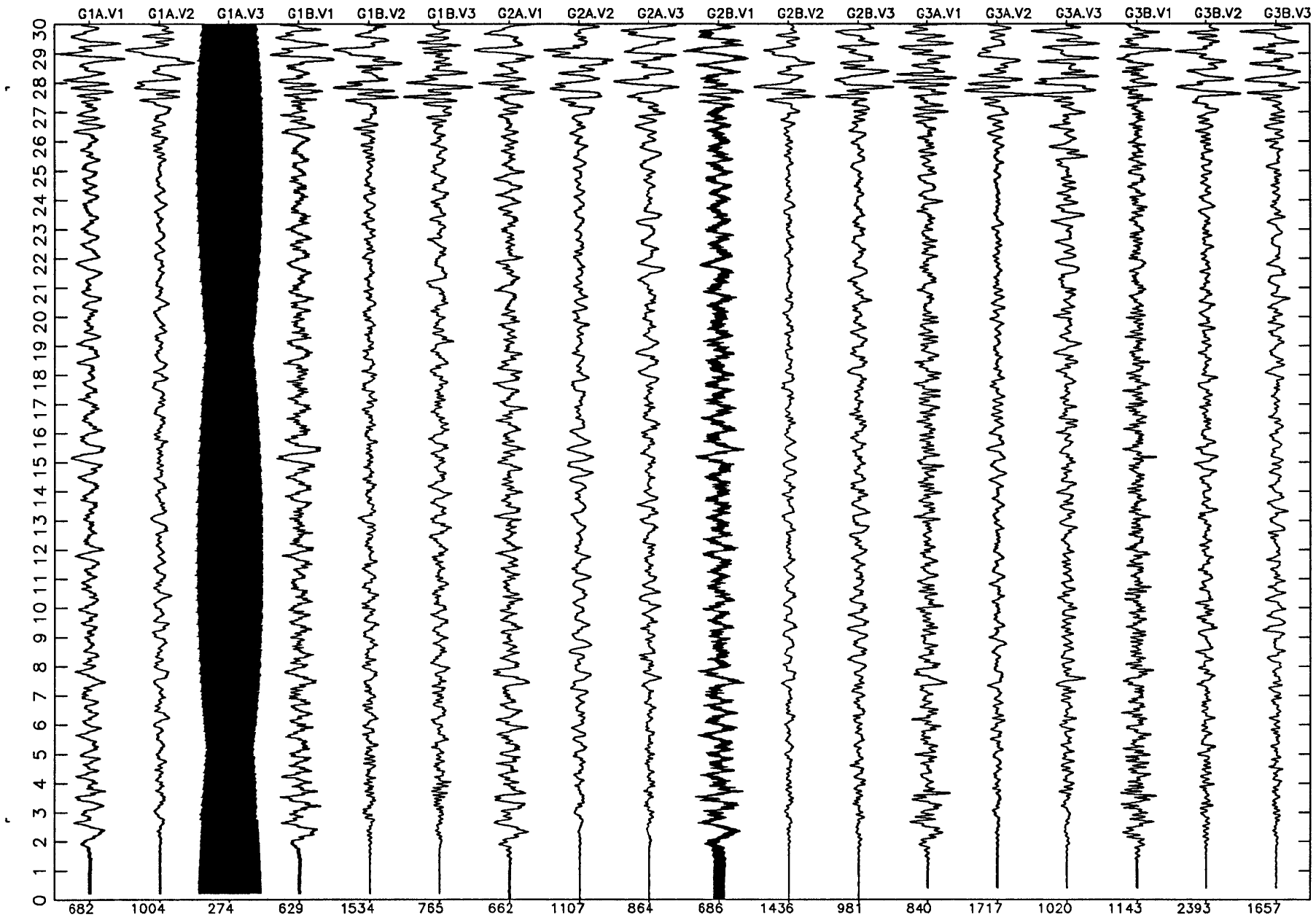
NORMALIZED
UN-DEFINED
92*117+13:16:46.799
CH1,2,3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
301
469
387
298
346
299
280
340
27
285
537
262
307
496
453
329
551
462
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3

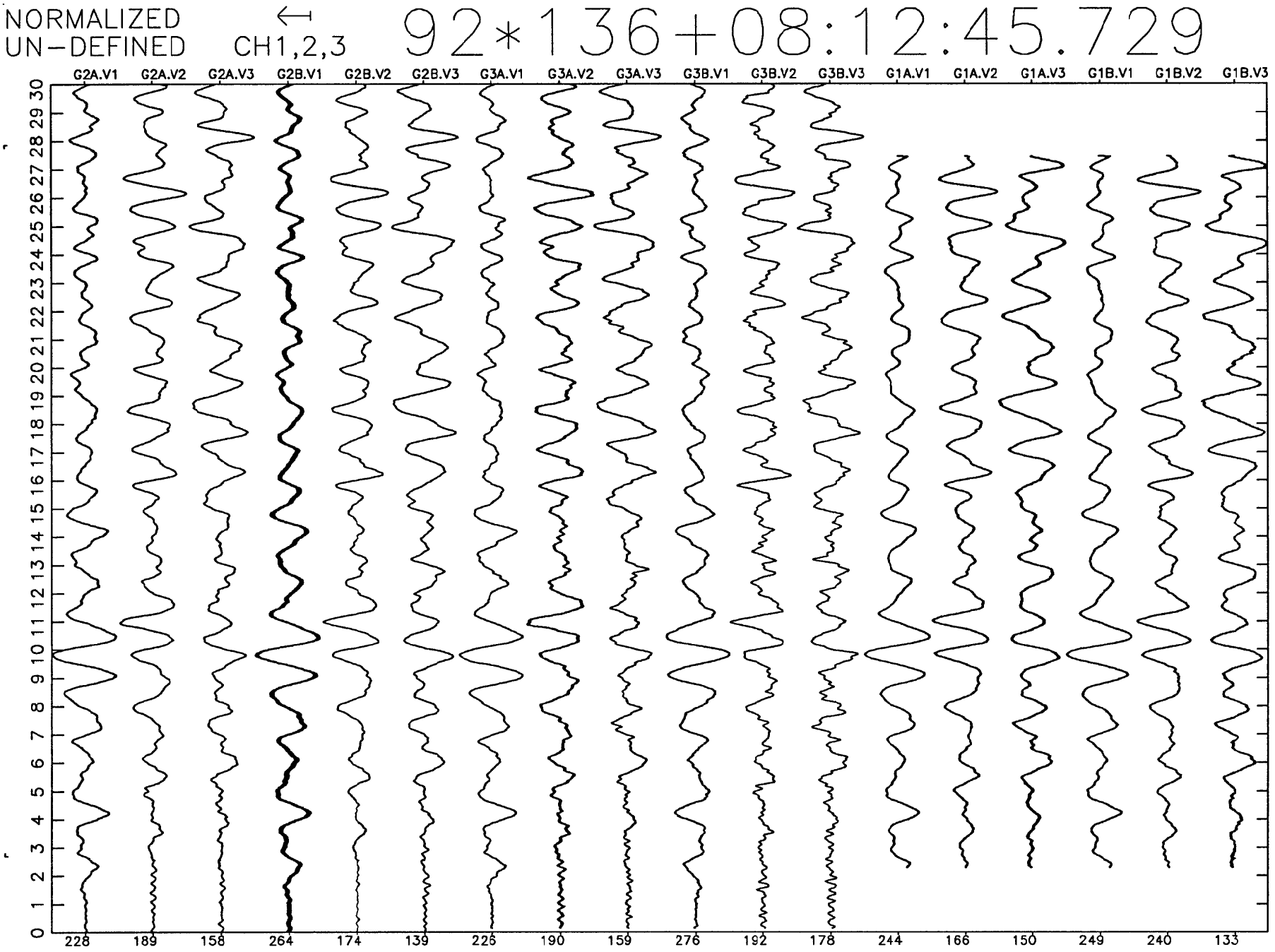
NORMALIZED
UN-DEFINED
92*119+08:44:27.460
CH1,2,3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1336 G2A.V1
1780 G2A.V2
1440 G2A.V3
1076 G2B.V1
1860 G2B.V2
1454 G2B.V3
1212 G3A.V1
1903 G3A.V2
2383 G3A.V3
1252 G3B.V1
3419 G3B.V2
3184 G3B.V3
819 G1A.V1
1470 G1A.V2
31 G1A.V3
817 G1B.V1
2045 G1B.V2
1161 G1B.V3

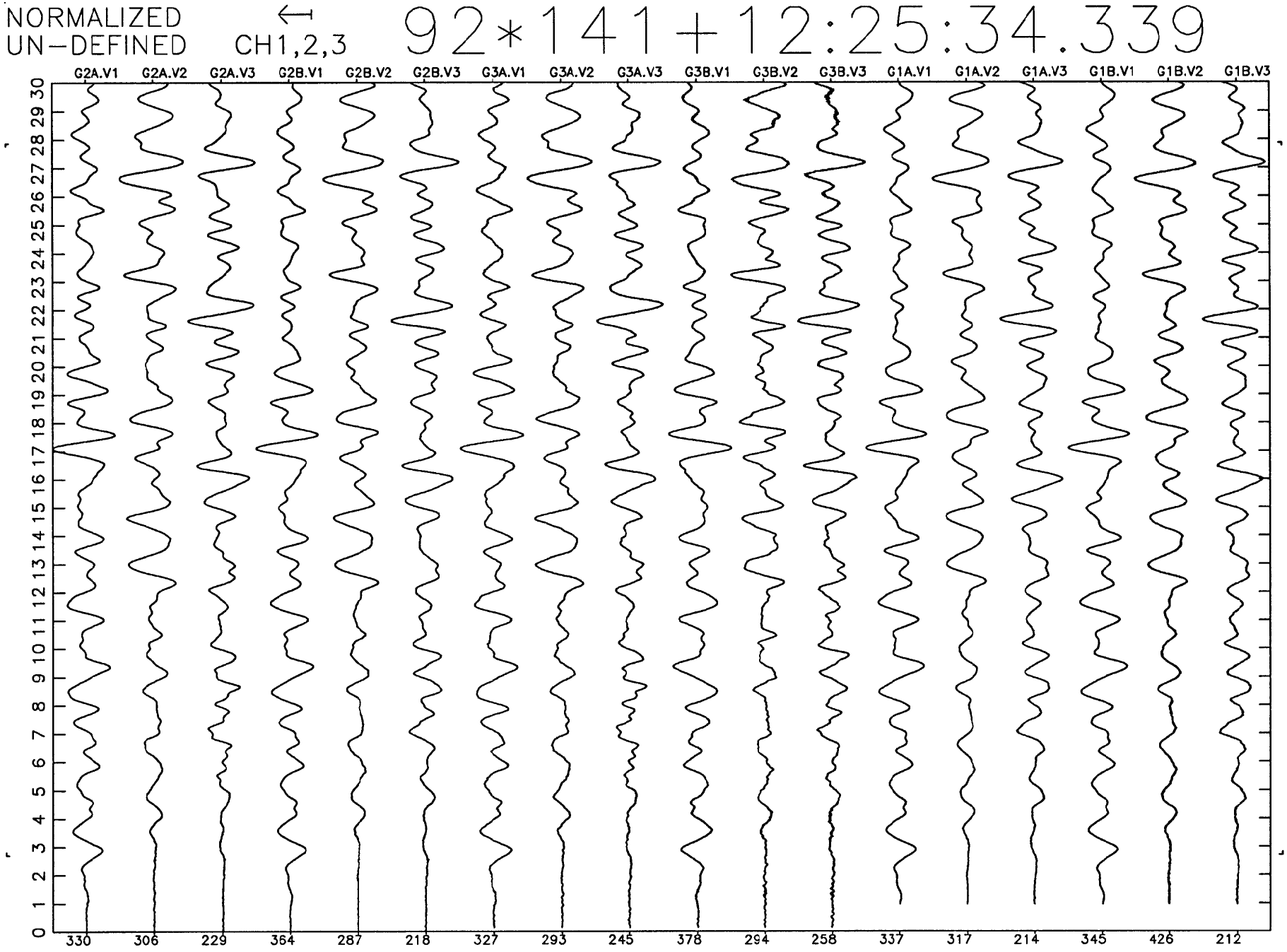

NORMALIZED
UN-DEFINED
CH1,2,3
92*126+06:22:09.121
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
340
448
72
393
683
490
462
772
608
505
602
564
489
754
896
496
981
975


NORMALIZED
UN-DEFINED
CH1,2,3
92*126+19:53:17.931
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
436 G2A.V1
672 G2A.V2
576 G2A.V3
524 G2B.V1
588 G2B.V2
667 G2B.V3
449 G3A.V1
753 G3A.V2
642 G3A.V3
529 G3B.V1
1082 G3B.V2
990 G3B.V3
346 G1A.V1
528 G1A.V2
221 G1A.V3
390 G1B.V1
943 G1B.V2
621 G1B.V3

NORMALIZED
UN-DEFINED
CH1,2,3
92*128+19:16:15.483
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
840
633
223
887
942
939
778
965
772
947
754
919
737
957
793
892
1131
1114
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3


NORMALIZED
UN-DEFINED
CH1,2,3
92*133+16:59:07.323
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
682
1004
274
629
1534
765
662
1107
864
686
1436
981
840
1717
1020
1143
2393
1657


NORMALIZED
UN-DEFINED
CH1,2,3
92*136+08:12:45.729
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
228
189
158
264
174
139
225
190
159
276
192
178
244
166
150
249
240
133


NORMALIZED
UN-DEFINED
CH1,2,3
92*141+12:25:34.339
G2A.V1
G2A.V2
G2A.V3
G2B.V1
G2B.V2
G2B.V3
G3A.V1
G3A.V2
G3A.V3
G3B.V1
G3B.V2
G3B.V3
G1A.V1
G1A.V2
G1A.V3
G1B.V1
G1B.V2
G1B.V3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
330
306
229
364
287
218
327
293
245
378
294
258
337
317
214
345
426
212

CHAPTER IV

A PC-Based Seismic System for Armenia

W. H. K. Lee and E. Cranswick,
(U. S. Geological Survey)

R. Banfill
(Small Systems Support, Big Water, Utah)

INTRODUCTION

Personal-computer-based seismic systems are playing an increasing role in seismic data acquisition and processing. In the past the computer used was usually a mini-computer with specialized hardware and software (costing hundreds of thousands of dollars, and taking several weeks to install). Because personal computers (PCs) are now inexpensive, a PC-based seismic system can be implemented for as little as $5,000 and requires less than one hour to install.

A PC-based seismic system expects multiple channels of analog signals (either hard-wired or telemetered) as inputs. The analog signals are usually a few volts in amplitude (peak-to-peak), and will be digitized at a prescribed sampling rate. The system records the digital data either continuously or by event trigger.

THE PC-QUAKE SYSTEM

The PC-Quake system (Lee, 1989) is a general-purpose seismic system, with the following characteristics:

(1) Uses IBM-compatible 286, 386sx, 386, or 486 PCs with an 8-MHz AT bus.

(2) Uses analog-to-digital (A/D) boards (DT 282x series) made by Data Translation, Inc.

(3) Digitizes 16 analog channels (upgradable to 128 channels) at user selectable rate.

(4) Digitizes up to a few thousand samples per second per channel.

(5) Displays digitized data continuously and in real time.

(6) Saves digitized data continuously or by event triggering.

(7) Automatically picks P-arrivals and locates events.

(8) Offline analysis includes manual picking, filtering, FFT, and coda Q.

(9) Channel to digitize, or display, or trigger is user selectable.

Readers are referred to Lee and Dodge (1992) for more detail.

A PC-BASED SEISMIC SYSTEM FOR ARMENIA

In 1990, a PC-Quake system was implemented in Armenia. This system consists of two identical IBM-compatible 286 PCs with 12-bit, 16-channel A/D boards made by Data Translation. One PC is used for on-line data acquisition and the other PC is used for off-line data processing and analysis. The two PCs are linked by a high-speed local area network (LANtastic kit by Artisoft), and an optical WORM drive (IBM 3363) is used to archive the digitized data on 200-megabyte removable cartridges. The off-line PC also serves as a backup to the on-line unit. A multiplexer could be used to increase the number of channels to a maximum of 256 channels for the 12-bit A/D board (or 64 channels for a 16-bit A/D board).

Table 4-1 lists the events recorded on the PC system from 21 September 1990 through 1 January 1991. For those events simultaneously recorded on the GEOS systems the GEOS event

name is indicated. Magnitudes as found in the USGS's National Earthquake Information Center's (NEIC's) monthly Preliminary Determination of Epicenters, Arefiev *et al*. (1991), or as determined in Chapter V of this report are also provided. Note that PC trigger times are based on the relatively inaccurate PC internal clock that drift by several seconds per day.

Plots of the PC-XDETECT records follow this chapter. Start-of-record times are indicated on the upper left corner of each plot page (*e.g.* 09/21/90 07:15 30.359). The plots show the IRIG time signal, ten vertical components (G1AZ to G5BZ), the horizontal components from G1A and G4A (G1AN, G1AE, G4AN, and G4AE), and the sine-wave trigger signal that is activated by a multi-component algorithm. "N" and "E" components are nominally north and east; refer to Table 2-1 for their true orientations. Peak digital counts and relative component scaling factors are indicated at the left of each trace. The time scale shown at the bottom of the page is in seconds. Long events can appear as multiple records across several pages.

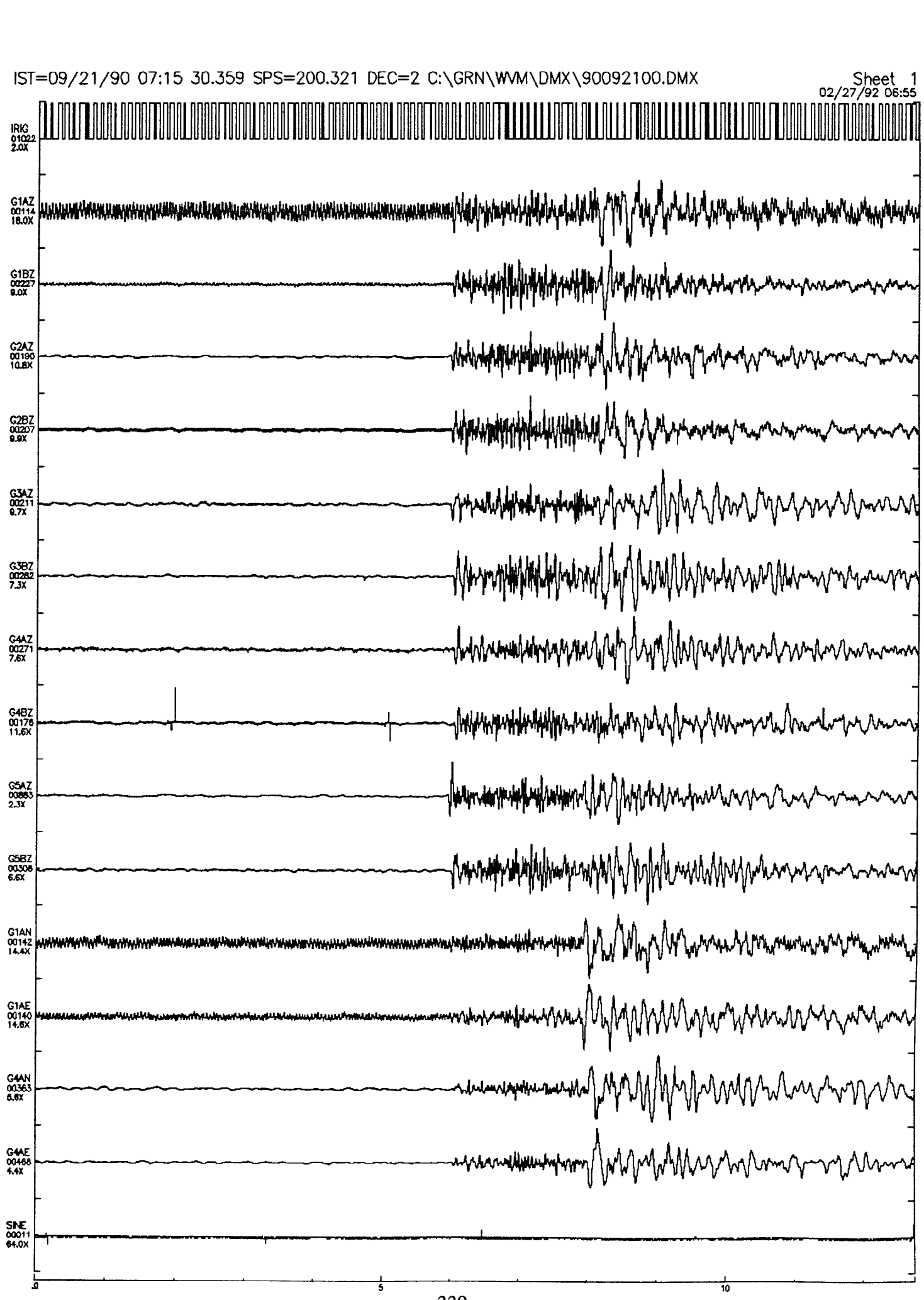
Table 4-1. Events Recorded by the PC-XDETECT System.

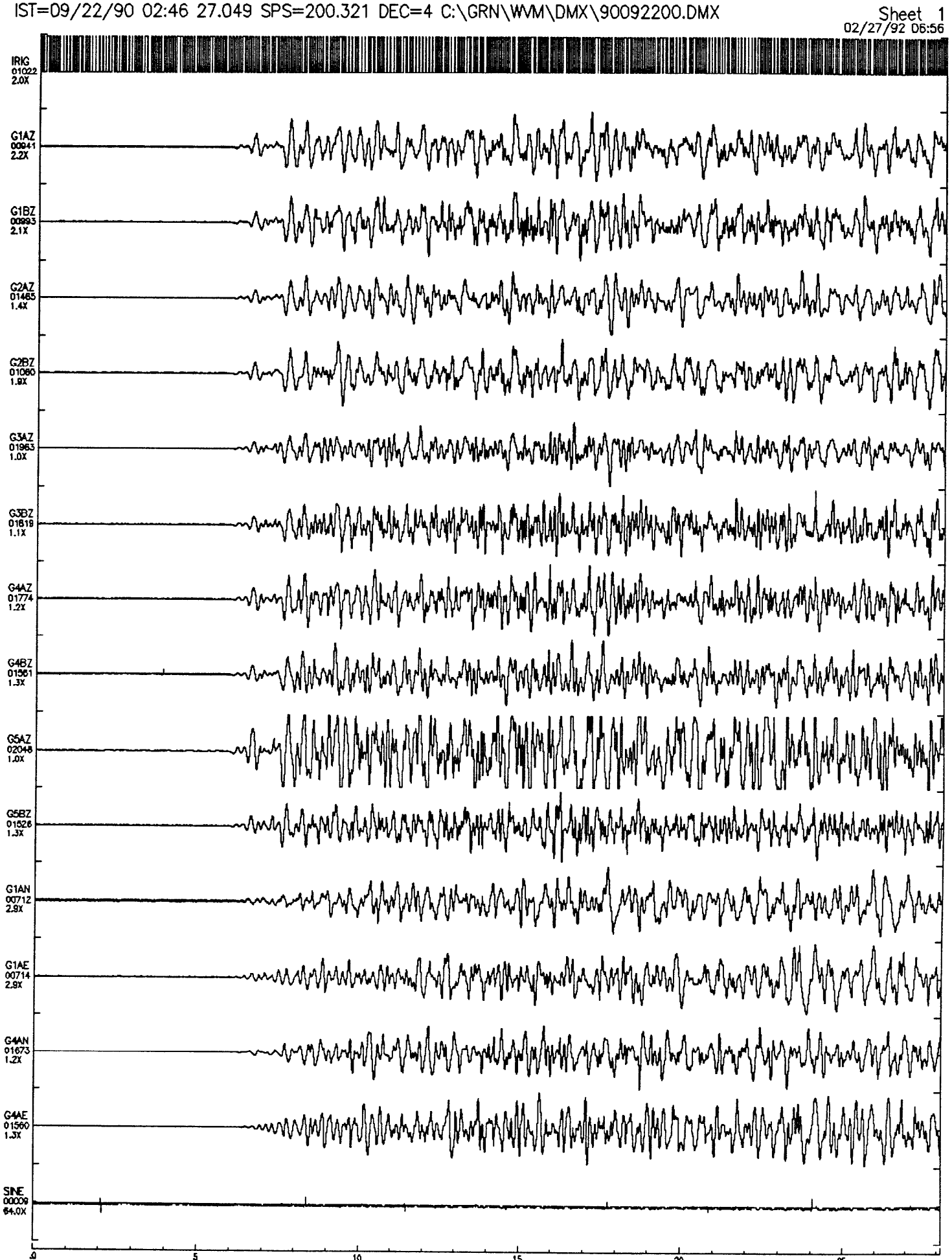
PC Trigger Time				GEOS Event	Magnitude
day	hr	mn	sec	day hr mn	
264	07	15	30.359		1.2
265	02	46	27.049	2650246	4.3
267	06	36	05.487		4.6
278	07	55	09.042	2780757	
282	20	53	57.755		0.8
288	07	46	41.022	2880749	0.9
288	18	39	27.696	2881842	1.7
291	11	18	33.428	2911121	2.3
292	13	57	52.289	2921401	
300	05	44	32.206	3000549	3.0
312	19	29	39.690	3121935	
312	20	37	18.465		1.6
320	06	53	07.991	3200659	1.8
320	07	03	03.516	3200709	1.8
320	14	53	36.909	3201500	2.2
320	14	59	19.400		
325	12	24	02.742	3251224	
345	08	23	13.789	3450823	
349	09	38	49.638	3490939	
349	10	38	12.568	3491038	3.3
349	15	40	52.267	3491541	
350	15	45	43.419	3501546	5.2
351	01	16	40.201	3510116	
351	17	42	49.379	3511742	
354	13	02	22.628	3541304	3.5
357	21	27	09.430	3572129	4.1
359	13	18	53.218	3591320	
360	10	27	22.928	3601029	
363	11	52	03.405	3631154	
001	19	17	34.945	0011919	4.9

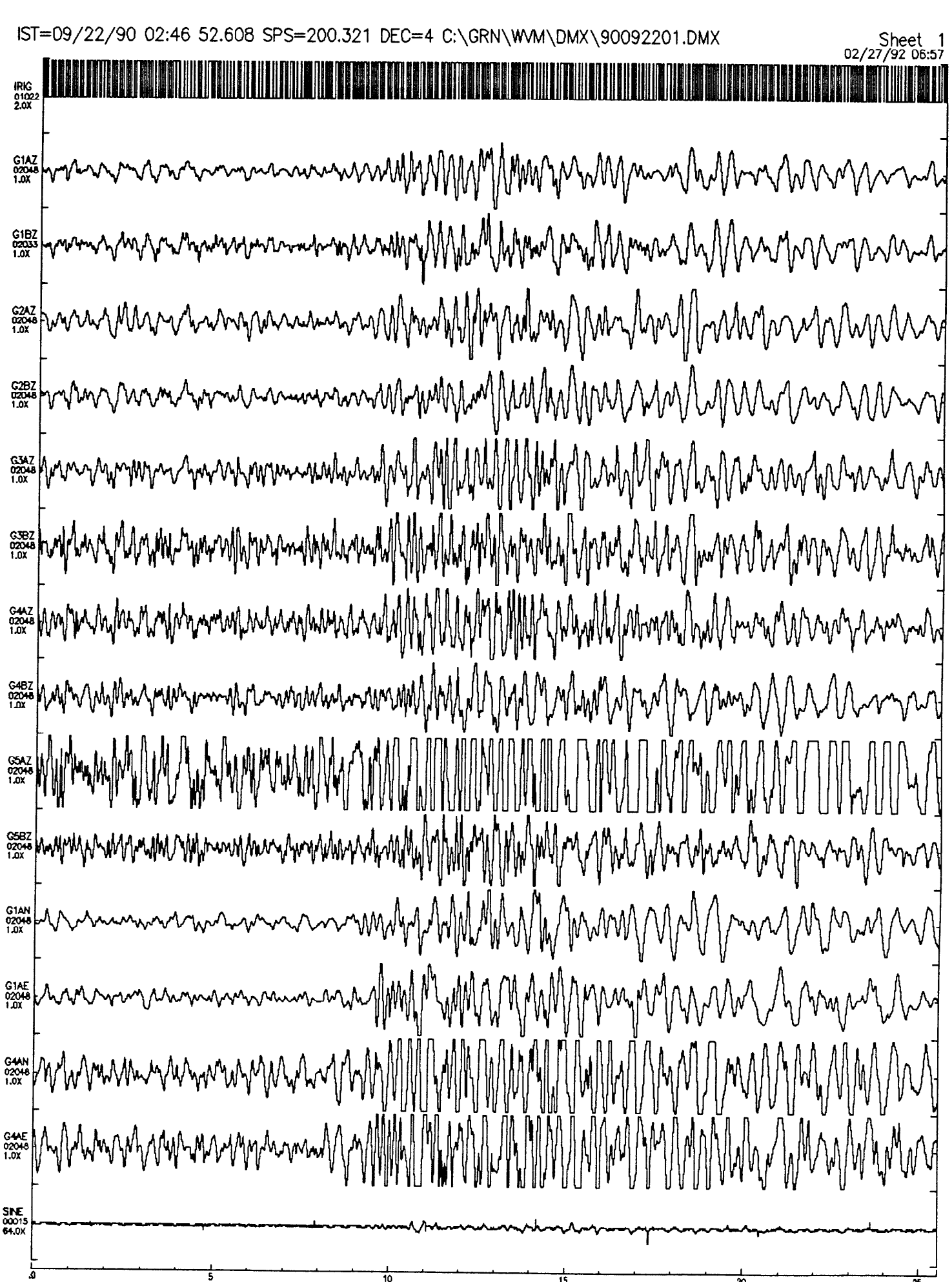
PC trigger times are much less accurate than the GEOS times. Magnitudes above 4 are M_B from NEIC Monthly Listings. Other magnitudes above 3 are from Arefiev *et al.*, 1991. Smaller magnitudes are M_L from Chapter V of this report.

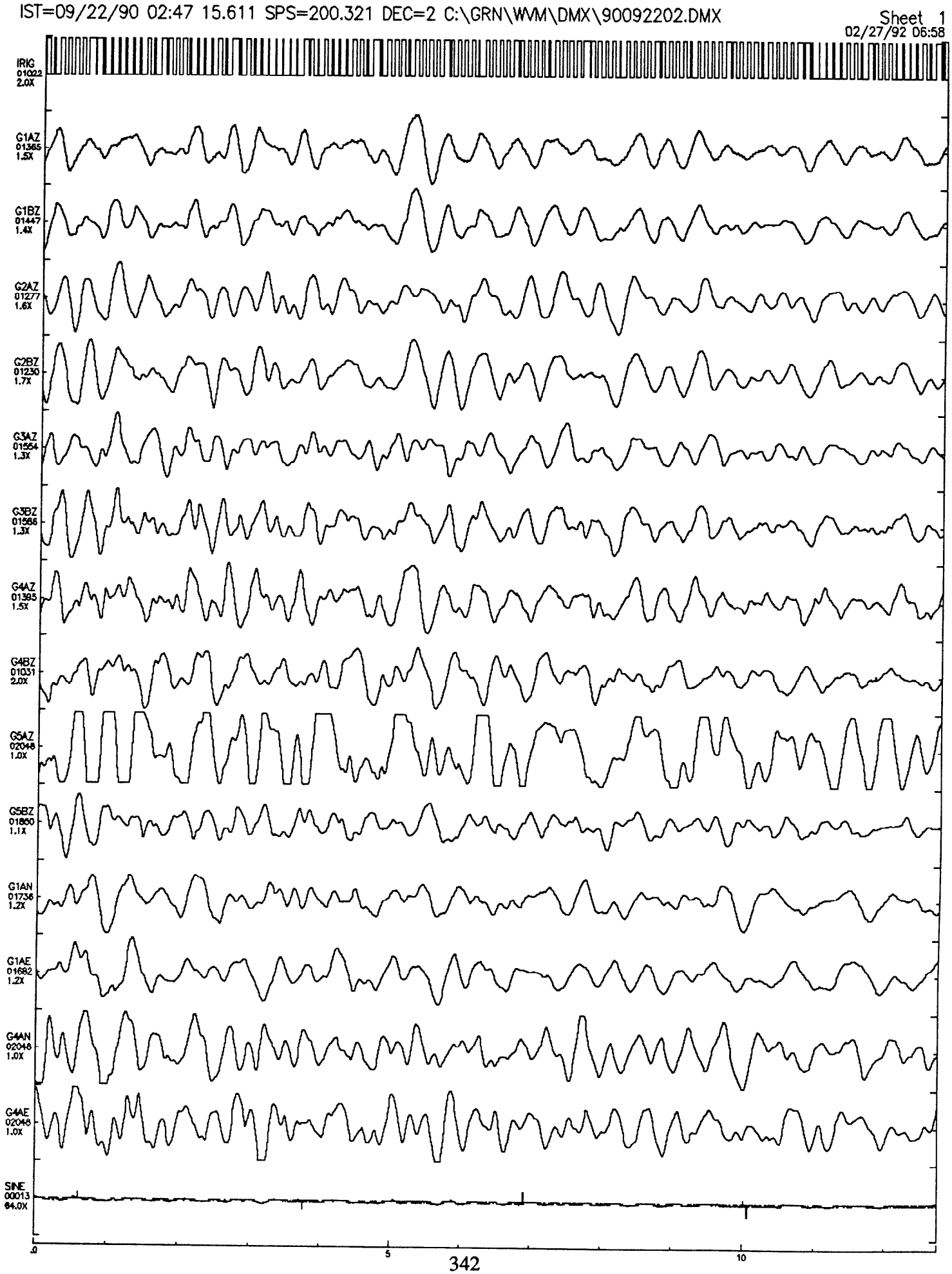
Plots of PC-XDETECT records

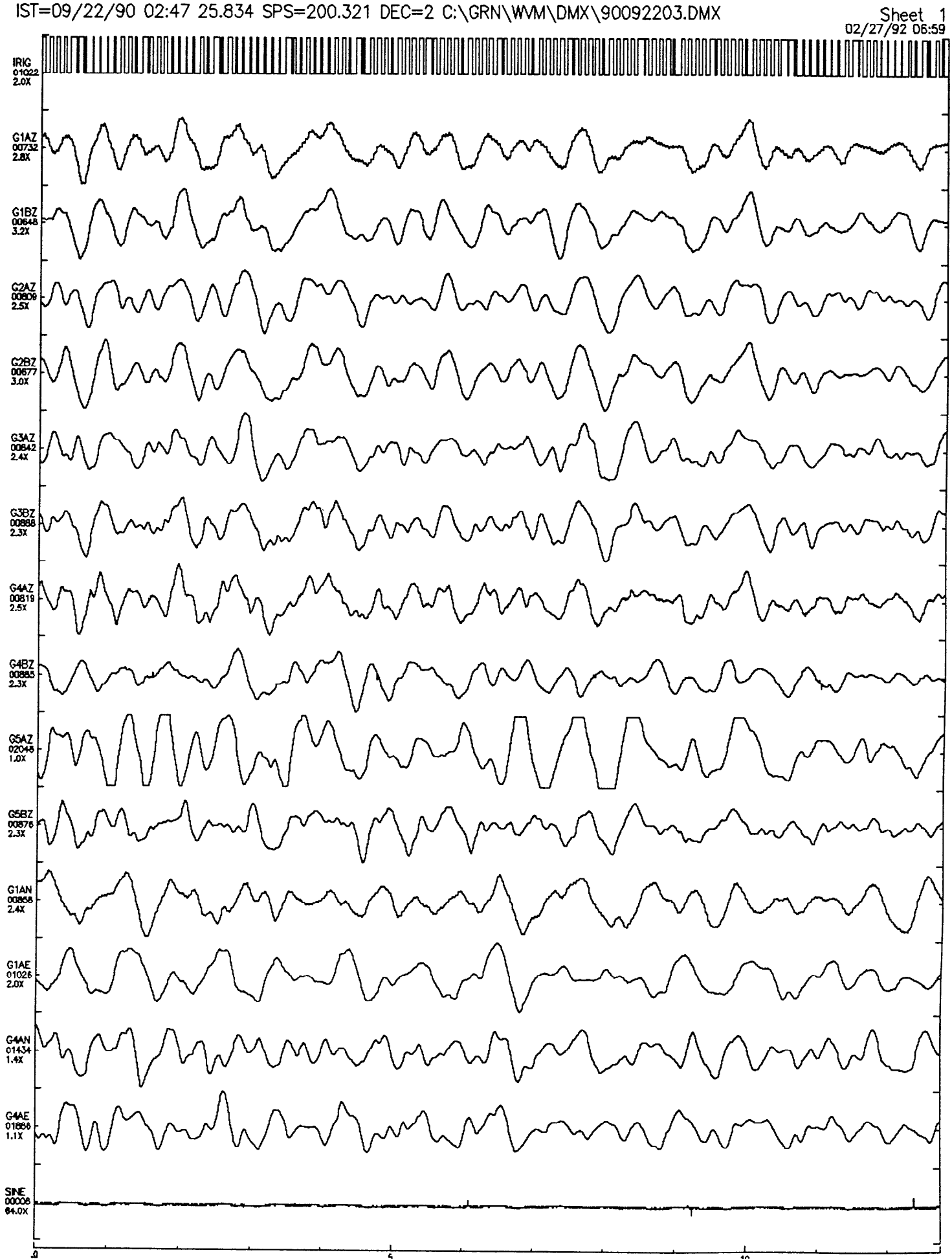
from 21 September 1990 through 01 January 1991

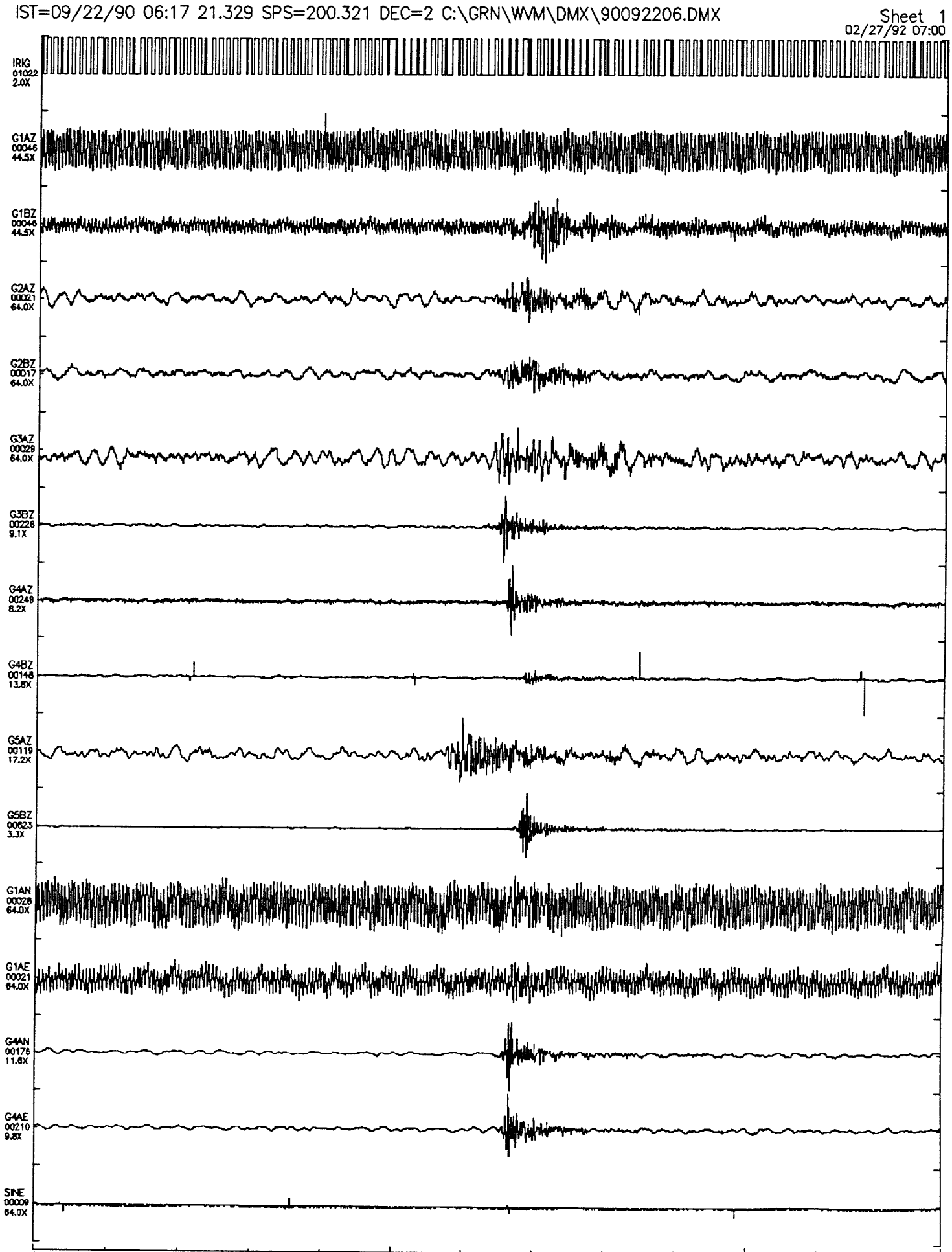

IST=09/21/90 07:15 30.359 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092100.DMX
Sheet 1
02/27/92 06:55
IRIG
01022
2.0X
G1AZ
00114
18.0X
G1BZ
00227
9.0X
G2AZ
00190
10.8X
G2BZ
00207
9.9X
G3AZ
00211
9.7X
G3BZ
00282
7.3X
G4AZ
00271
7.6X
G4BZ
00176
11.6X
G5AZ
00883
2.3X
G5BZ
00306
6.6X
G1AN
00142
14.4X
G1AE
00140
14.6X
G4AN
00363
5.6X
G4AE
00468
4.4X
SINE
00011
64.0X
0
5
10

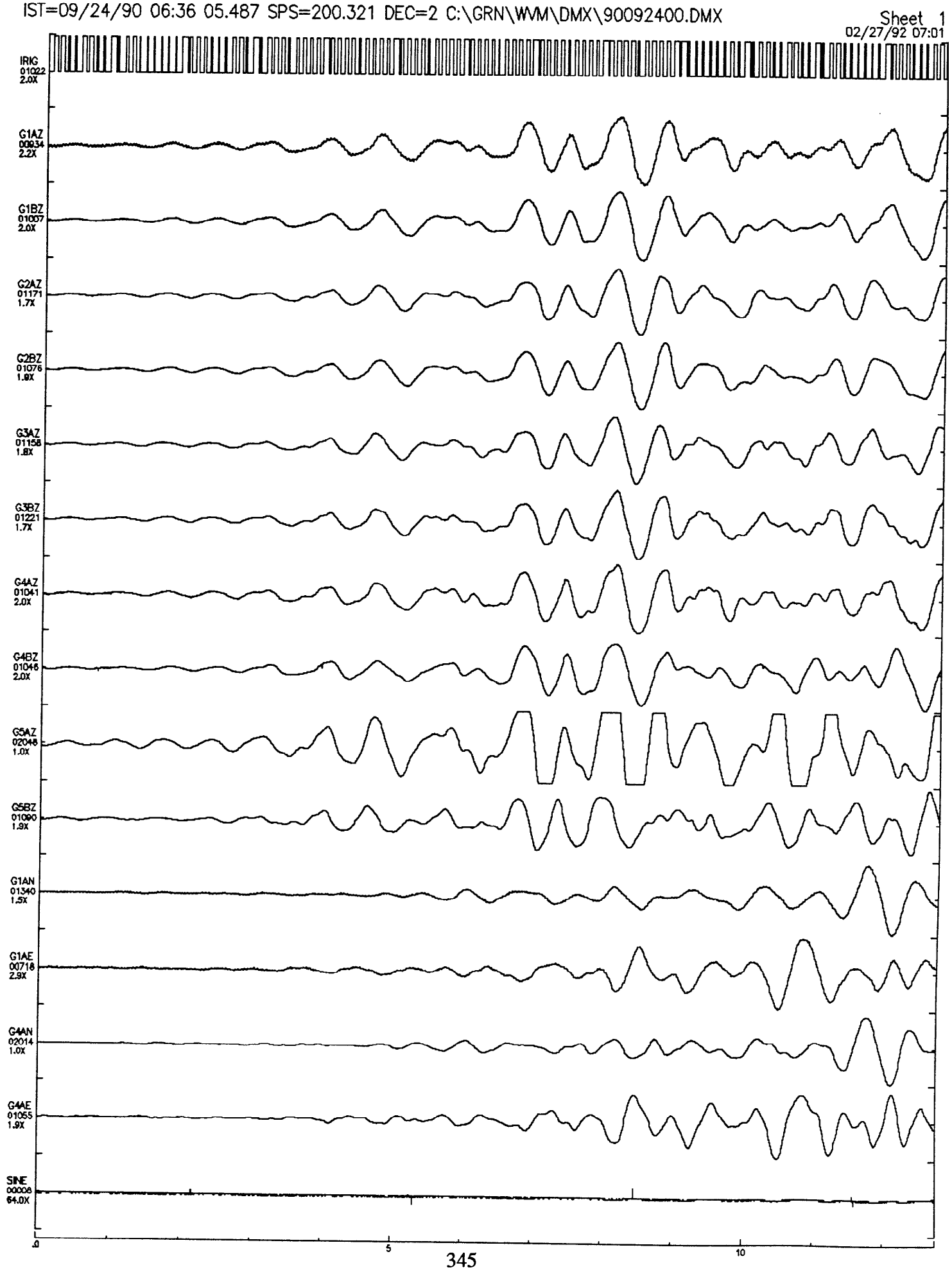

IST=09/22/90 02:46 27.049 SPS=200.321 DEC=4 C:\GRN\WVM\DMX\90092200.DMX
Sheet 1
02/27/92 06:56
IRIG
01022
2.0X
G1AZ
00941
2.2X
G1BZ
00993
2.1X
G2AZ
01465
1.4X
G2BZ
01080
1.9X
G3AZ
01963
1.0X
G3BZ
01619
1.1X
G4AZ
01774
1.2X
G4BZ
01561
1.3X
G5AZ
02048
1.0X
G5BZ
01526
1.3X
G1AN
00712
2.9X
G1AE
00714
2.9X
G4AN
01673
1.2X
G4AE
01560
1.3X
SINE
00009
64.0X
0
5
10
15
20
25

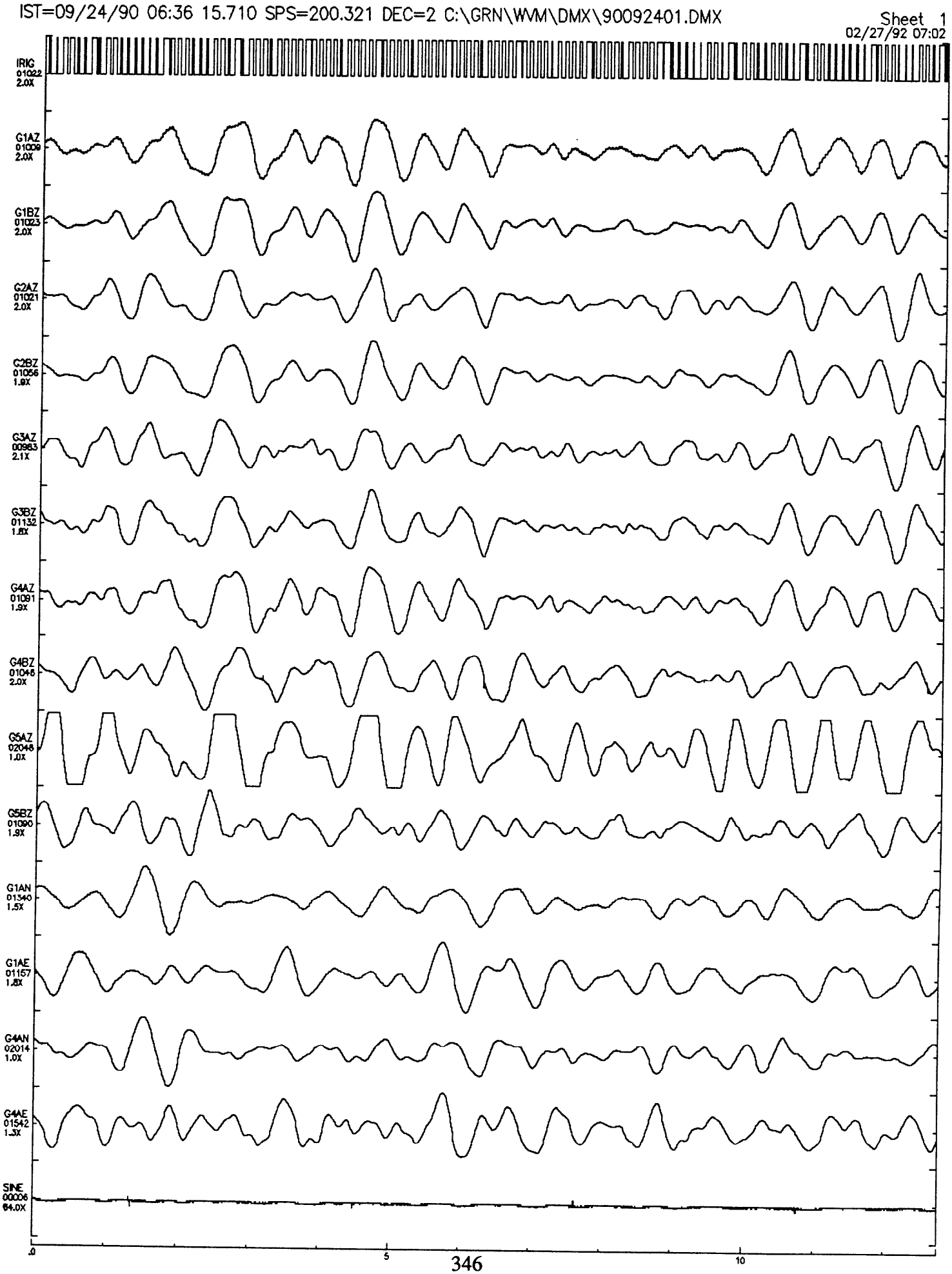

IST=09/22/90 02:46 52.608 SPS=200.321 DEC=4 C:\GRN\WVM\DMX\90092201.DMX
Sheet 1
02/27/92 06:57
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02033
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
00015
64.0X
0
5
10
15
20
25

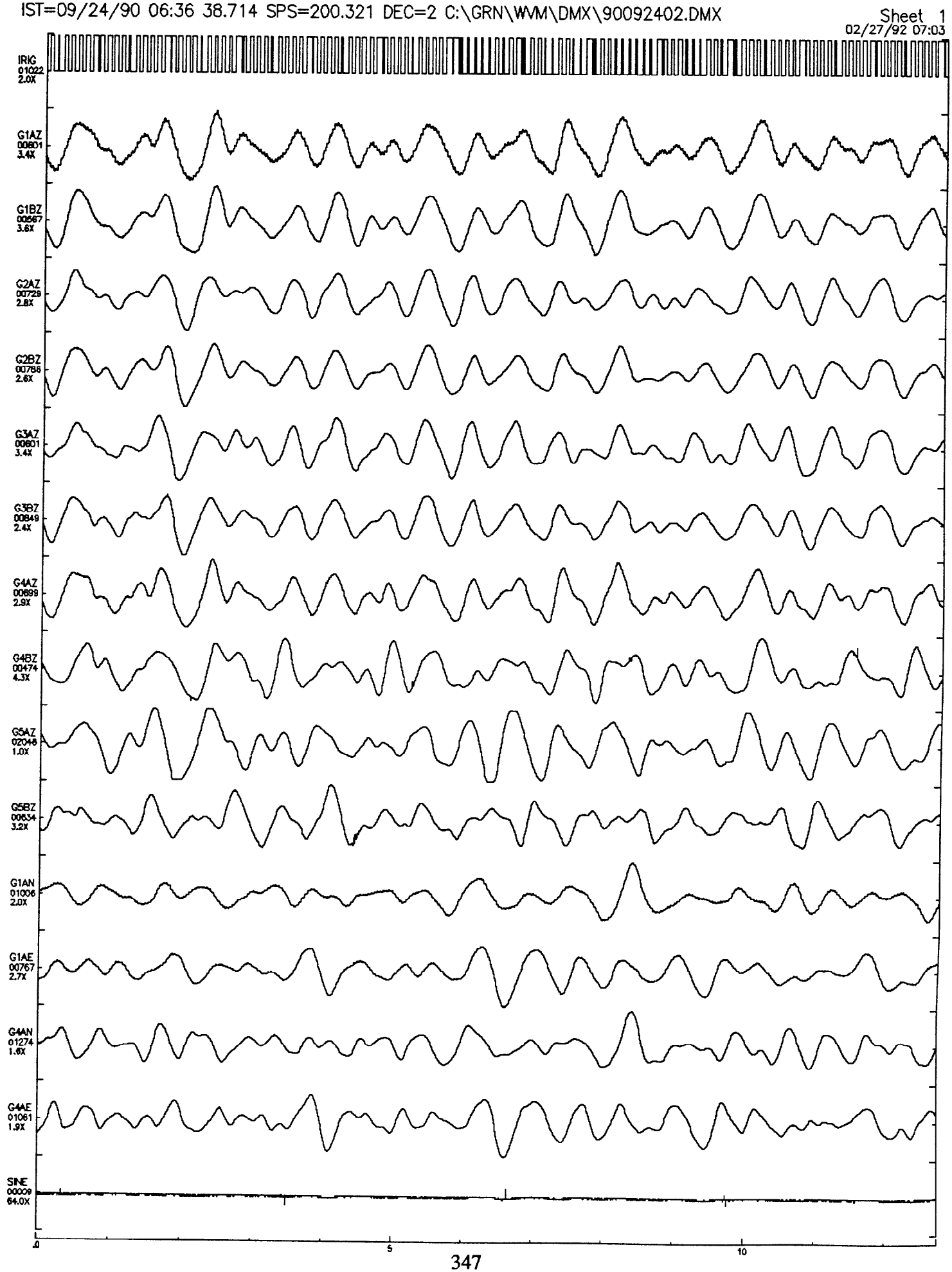

IST=09/22/90 02:47 15.611 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092202.DMX
Sheet 1
02/27/92 06:58
IRIG
01022
2.0X
G1AZ
01365
1.5X
G1BZ
01447
1.4X
G2AZ
01277
1.6X
G2BZ
01230
1.7X
G3AZ
01554
1.3X
G3BZ
01566
1.3X
G4AZ
01395
1.5X
G4BZ
01031
2.0X
G5AZ
02048
1.0X
G5BZ
01860
1.1X
G1AN
01736
1.2X
G1AE
01682
1.2X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
00013
64.0X
0
5
10

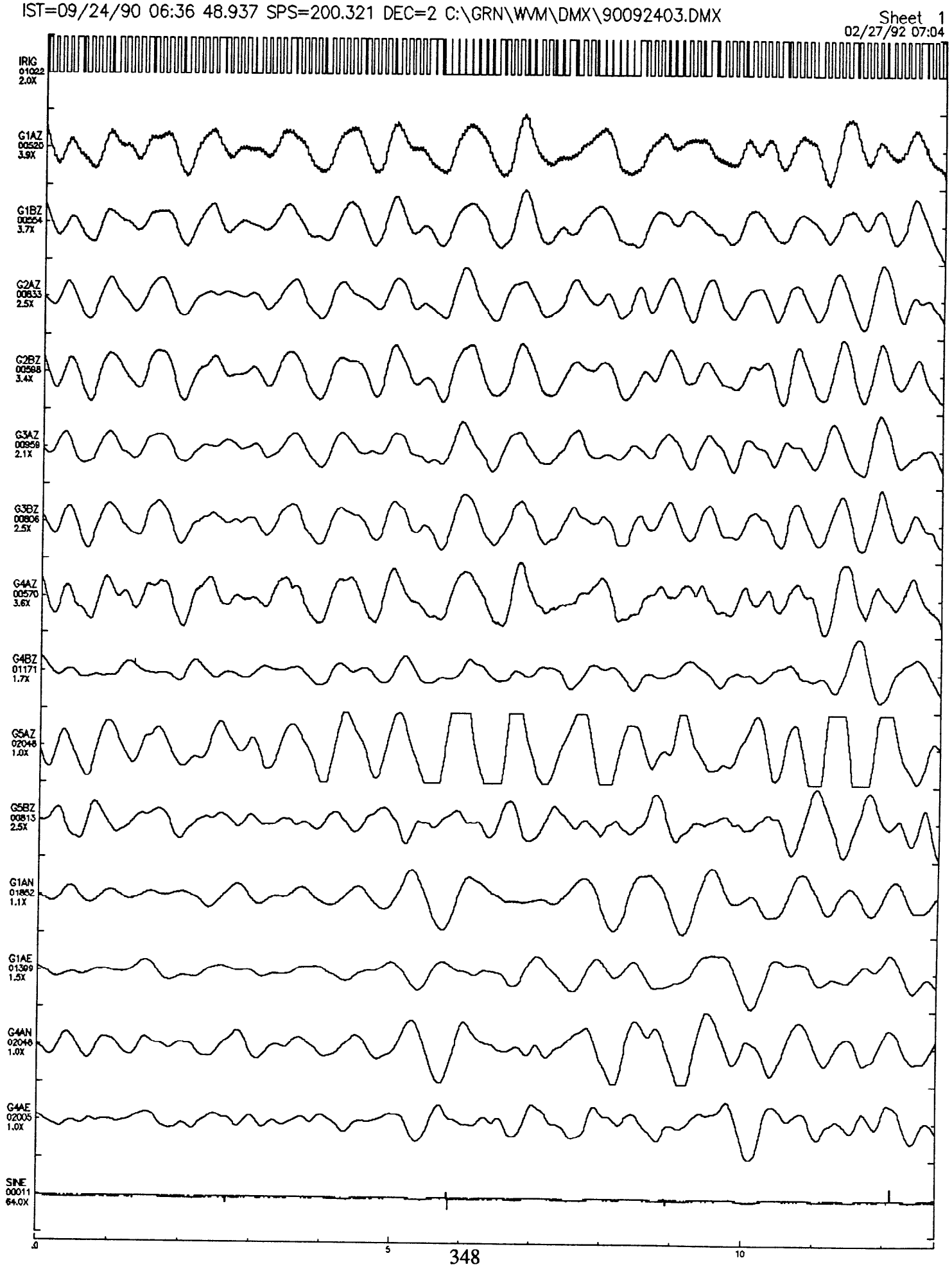

IST=09/22/90 02:47 25.834 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092203.DMX
Sheet 1
02/27/92 06:59
IRIG
01022
2.0X
G1AZ
00732
2.8X
G1BZ
00648
3.2X
G2AZ
00809
2.5X
G2BZ
00677
3.0X
G3AZ
00842
2.4X
G3BZ
00866
2.3X
G4AZ
00819
2.5X
G4BZ
00865
2.3X
G5AZ
02046
1.0X
G5BZ
00876
2.3X
G1AN
00858
2.4X
G1AE
01026
2.0X
G4AN
01434
1.4X
G4AE
01866
1.1X
SINE
00008
64.0X
0
5
10

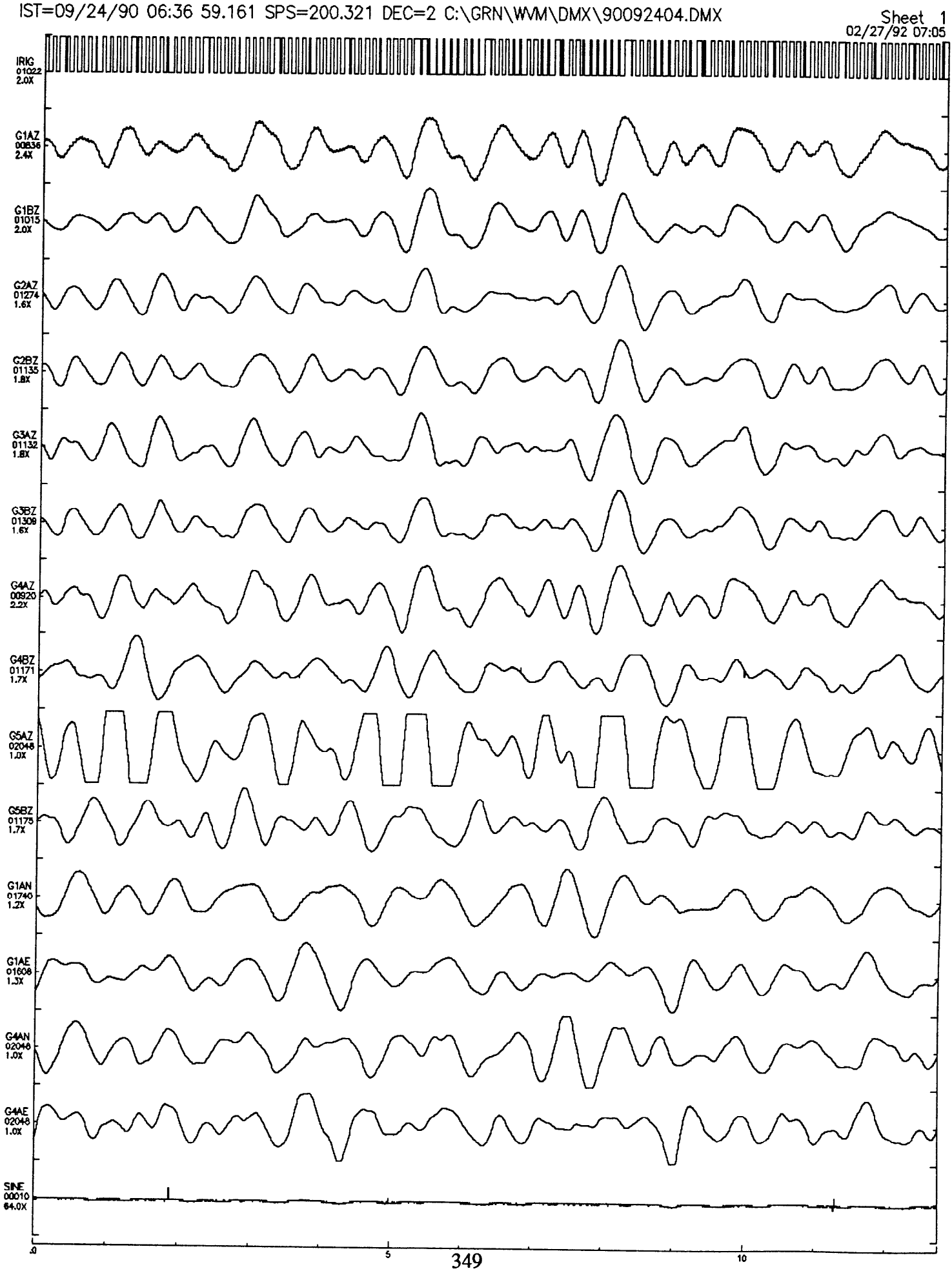

IST=09/22/90 06:17 21.329 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092206.DMX
Sheet 1
02/27/92 07:00
IRIG
01022
2.0X
G1AZ
00048
44.5X
G1BZ
00048
44.5X
G2AZ
00021
64.0X
G2BZ
00017
64.0X
G3AZ
00029
64.0X
G3BZ
00226
9.1X
G4AZ
00249
8.2X
G4BZ
00148
13.6X
G5AZ
00119
17.2X
G5BZ
00623
3.3X
G1AN
00028
64.0X
G1AE
00021
64.0X
G4AN
00176
11.6X
G4AE
00210
9.8X
SINE
00009
64.0X
0
5
10

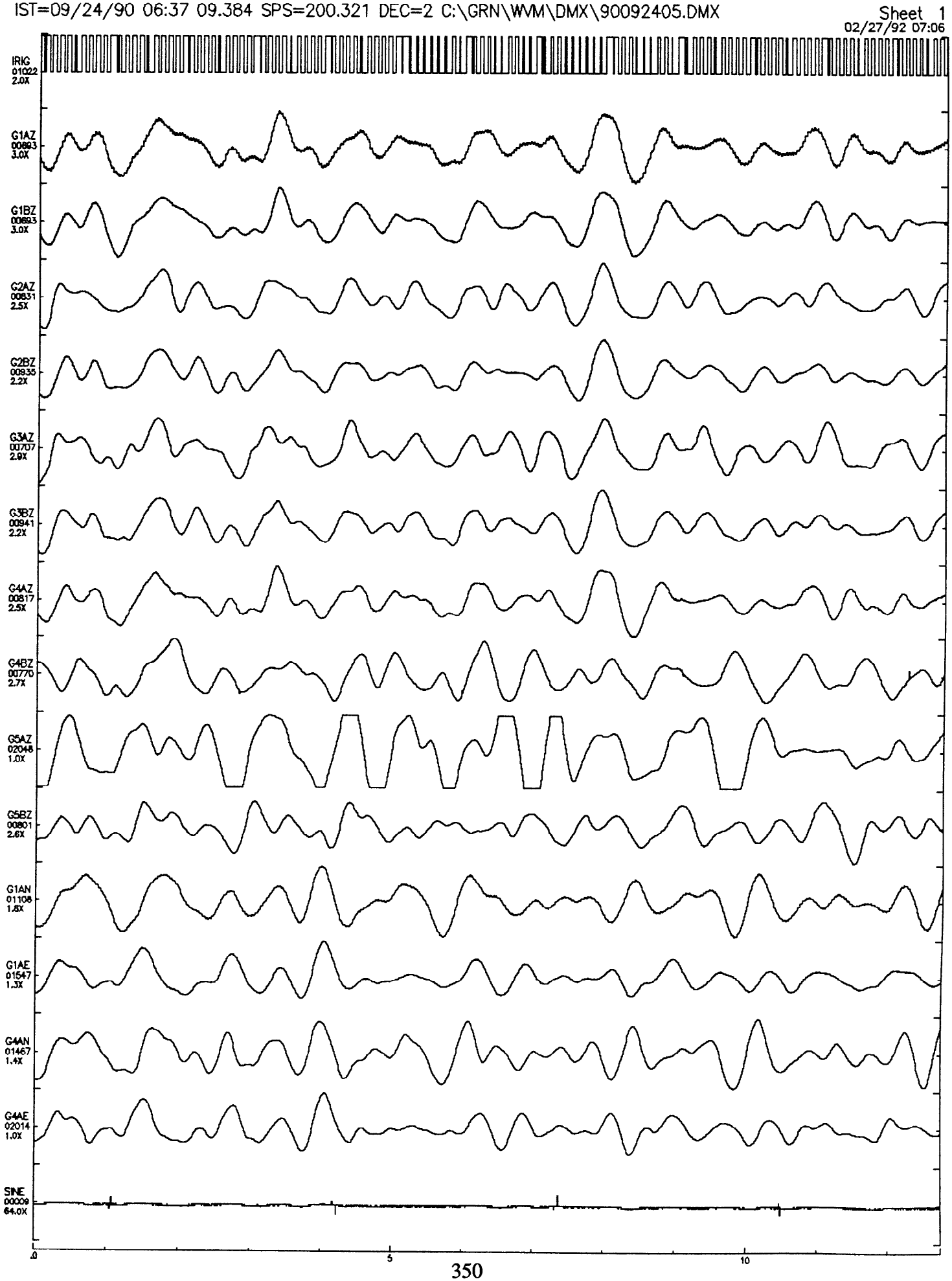

IST=09/24/90 06:36 05.487 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092400.DMX
Sheet 1
02/27/92 07:01
IRIG
01022
2.0X
G1AZ
00934
2.2X
G1BZ
01057
2.0X
G2AZ
01171
1.7X
G2BZ
01076
1.9X
G3AZ
01158
1.8X
G3BZ
01221
1.7X
G4AZ
01041
2.0X
G4BZ
01046
2.0X
G5AZ
02048
1.0X
G5BZ
01090
1.9X
G1AN
01340
1.5X
G1AE
00718
2.9X
G4AN
02014
1.0X
G4AE
01055
1.9X
SINE
00006
64.0X
0
5
10

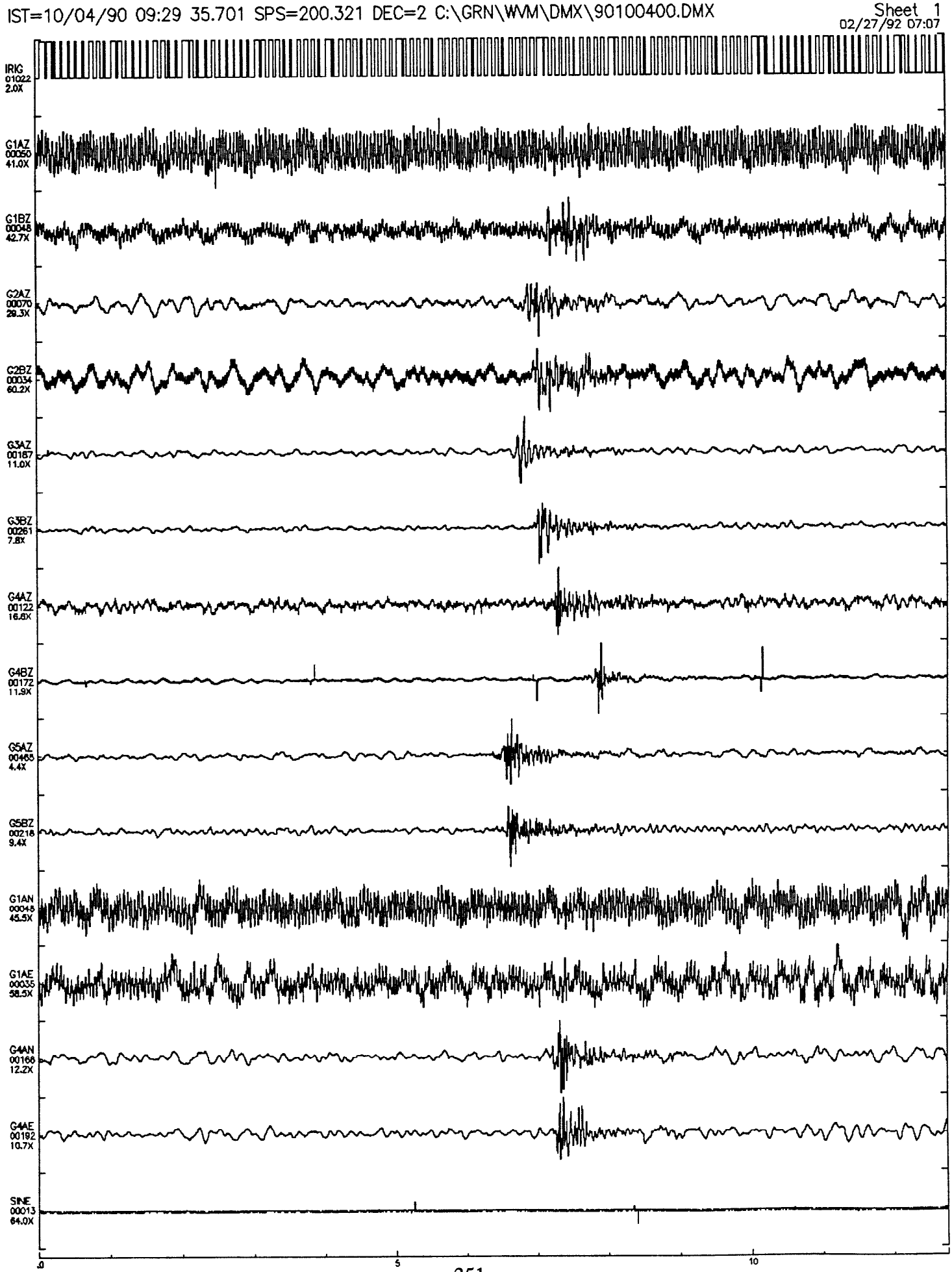

IST=09/24/90 06:36 15.710 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092401.DMX
Sheet 1
02/27/92 07:02
IRIG
01022
2.0X
G1AZ
01009
2.0X
G1BZ
01023
2.0X
G2AZ
01021
2.0X
G2BZ
01056
1.9X
G3AZ
00983
2.1X
G3BZ
01132
1.8X
G4AZ
01091
1.9X
G4BZ
01046
2.0X
G5AZ
02048
1.0X
G5BZ
01090
1.9X
G1AN
01340
1.5X
G1AE
01157
1.8X
G4AN
02014
1.0X
G4AE
01542
1.3X
SINE
00006
64.0X
0
5
10

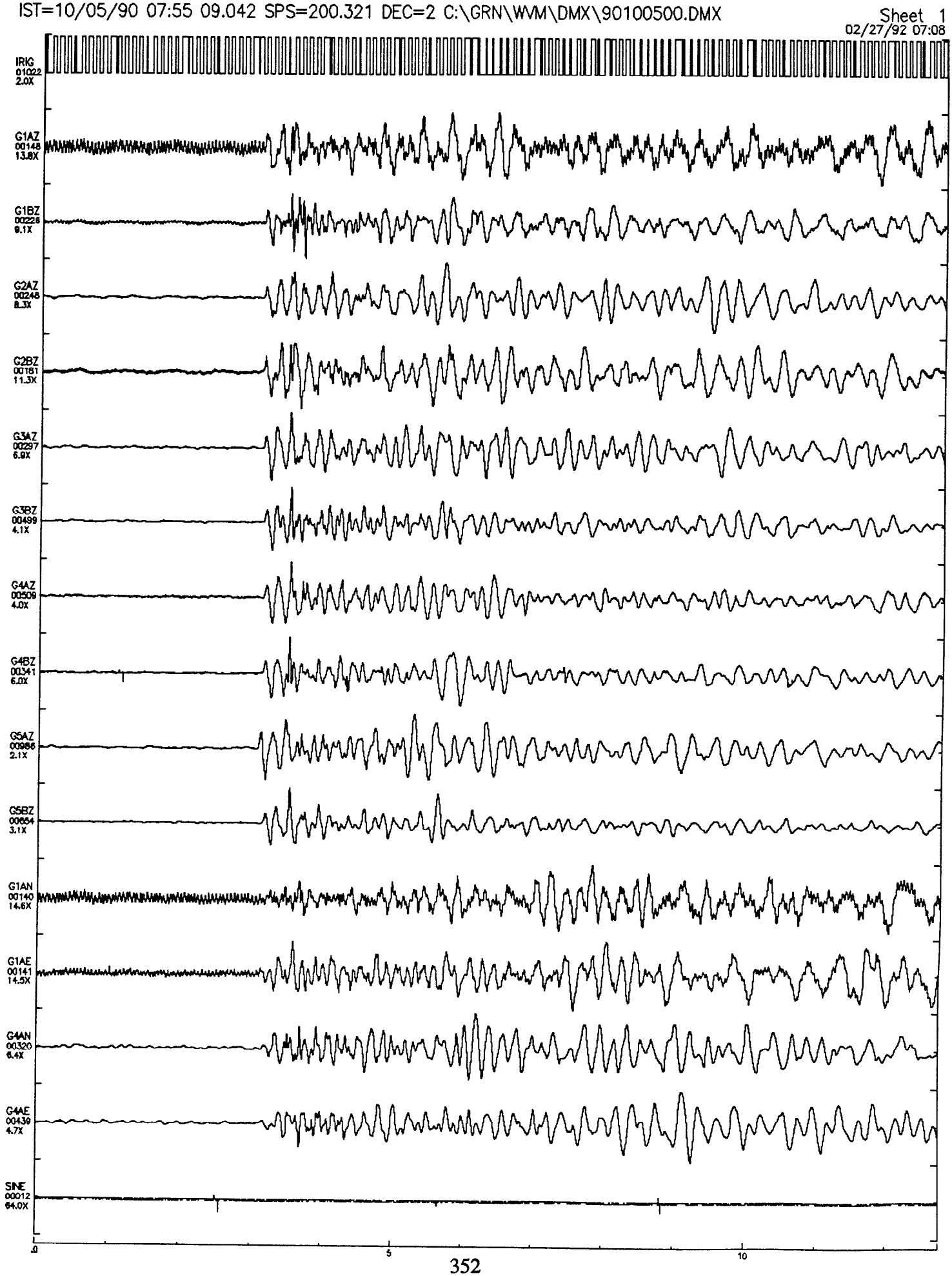

IST=09/24/90 06:36 38.714 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092402.DMX
Sheet 1
02/27/92 07:03
IRIG
01022
2.0X
G1AZ
00601
3.4X
G1BZ
00567
3.6X
G2AZ
00729
2.8X
G2BZ
00786
2.6X
G3AZ
00601
3.4X
G3BZ
00849
2.4X
G4AZ
00699
2.9X
G4BZ
00474
4.3X
G5AZ
02048
1.0X
G5BZ
00634
3.2X
G1AN
01006
2.0X
G1AE
00767
2.7X
G4AN
01274
1.6X
G4AE
01061
1.9X
SINE
00009
64.0X
0
5
10

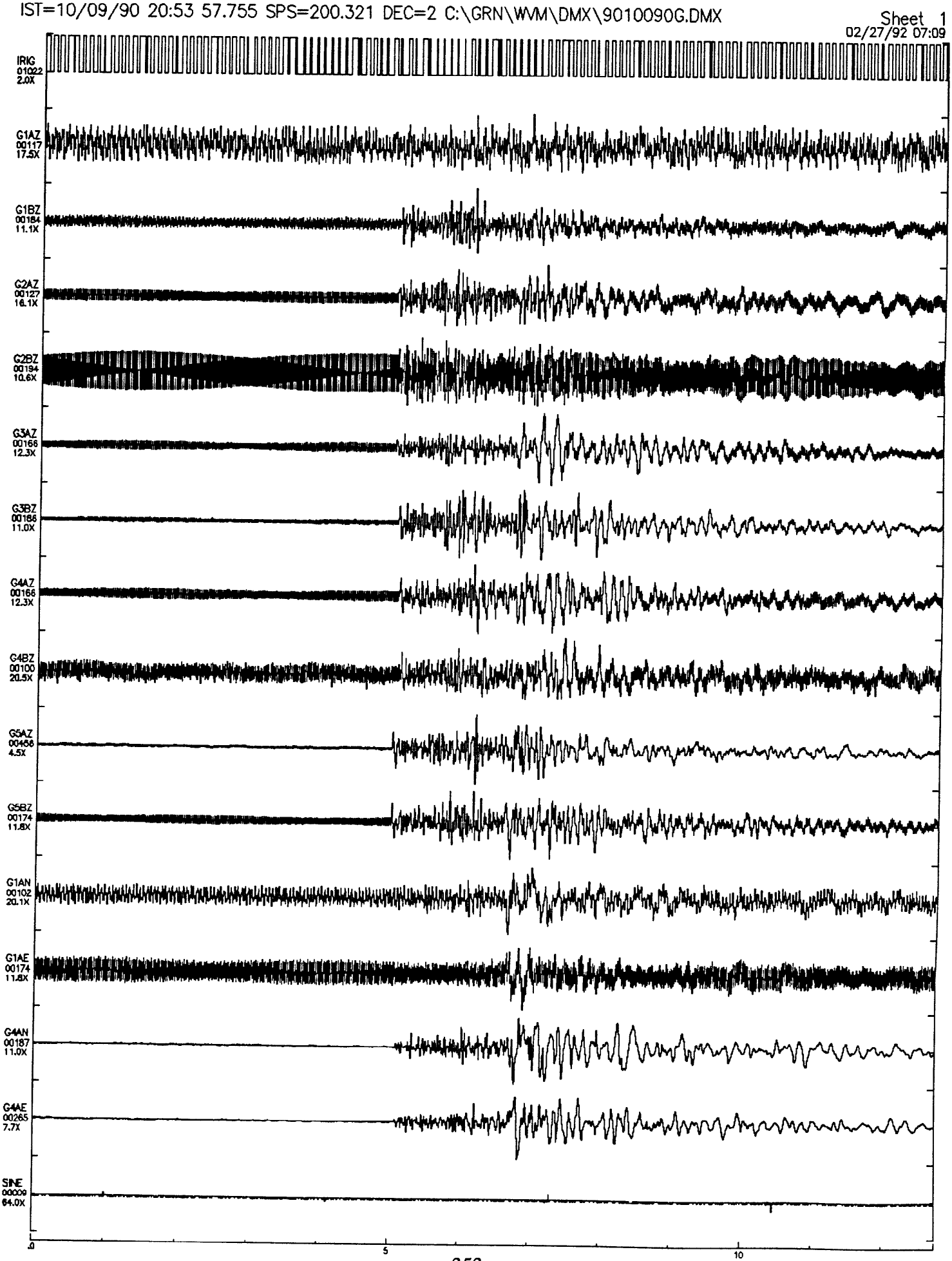

IST=09/24/90 06:36 48.937 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092403.DMX
Sheet 1
02/27/92 07:04
IRIG
01022
2.0X
G1AZ
00520
3.9X
G1BZ
00564
3.7X
G2AZ
00633
2.5X
G2BZ
00588
3.4X
G3AZ
00959
2.1X
G3BZ
00806
2.5X
G4AZ
00570
3.6X
G4BZ
01171
1.7X
G5AZ
02048
1.0X
G5BZ
00813
2.5X
G1AN
01852
1.1X
G1AE
01399
1.5X
G4AN
02048
1.0X
G4AE
02005
1.0X
SINE
00011
64.0X
0
5
10

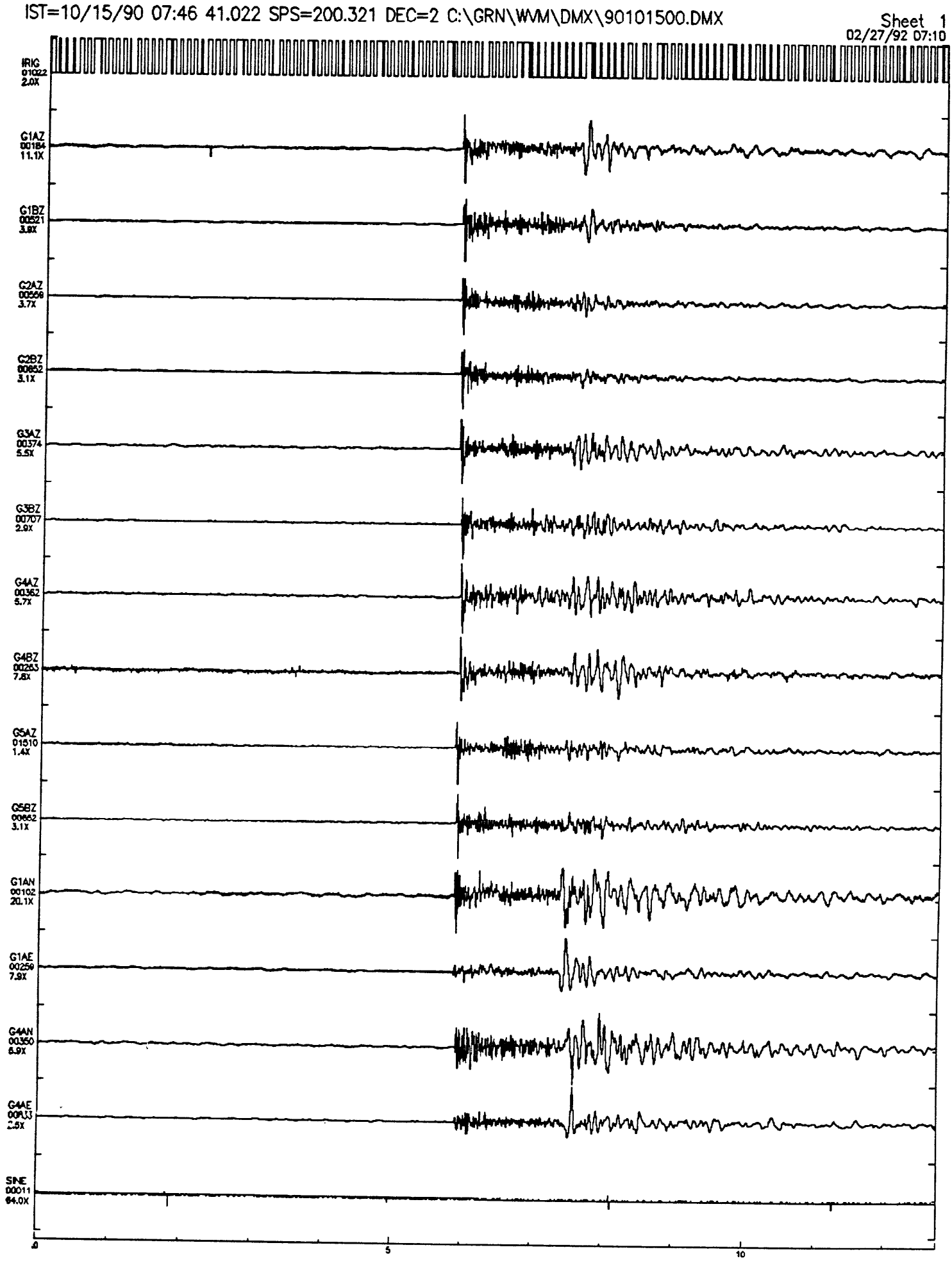

IST=09/24/90 06:36 59.161 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092404.DMX
Sheet 1
02/27/92 07:05
IRIG
01022
2.0X
G1AZ
00836
2.4X
G1BZ
01015
2.0X
G2AZ
01274
1.6X
G2BZ
01135
1.8X
G3AZ
01132
1.8X
G3BZ
01309
1.6X
G4AZ
00920
2.2X
G4BZ
01171
1.7X
G5AZ
02048
1.0X
G5BZ
01175
1.7X
G1AN
01740
1.2X
G1AE
01606
1.3X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
00010
64.0X
0
5
10

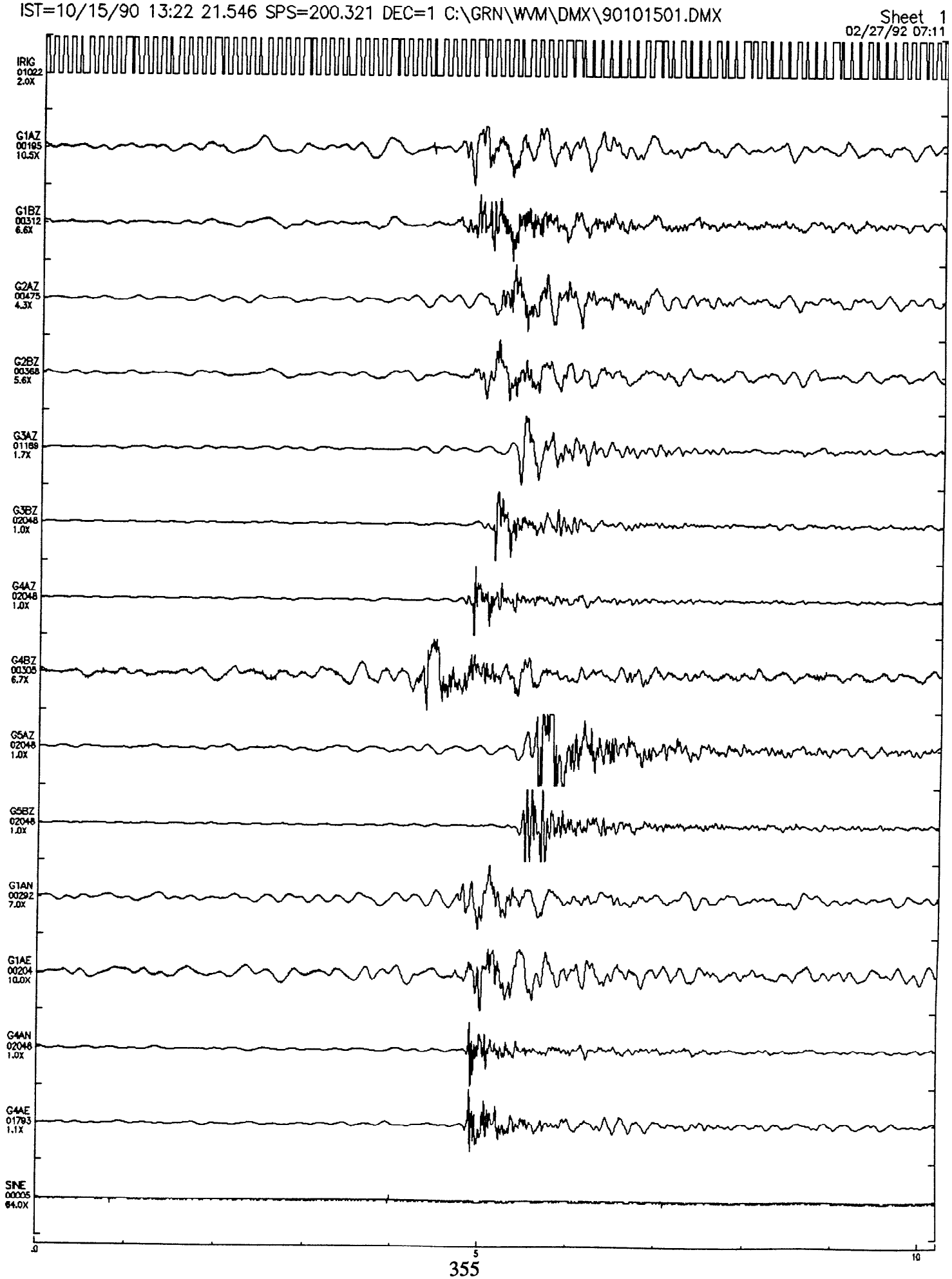

IST=09/24/90 06:37 09.384 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90092405.DMX
Sheet 1
02/27/92 07:06
IRIG
01022
2.0X
G1AZ
00893
3.0X
G1BZ
00893
3.0X
G2AZ
00831
2.5X
G2BZ
00935
2.2X
G3AZ
00707
2.9X
G3BZ
00941
2.2X
G4AZ
00817
2.5X
G4BZ
00770
2.7X
G5AZ
02048
1.0X
G5BZ
00801
2.6X
G1AN
01108
1.8X
G1AE
01547
1.3X
G4AN
01467
1.4X
G4AE
02014
1.0X
SINE
00009
64.0X
0
5
10

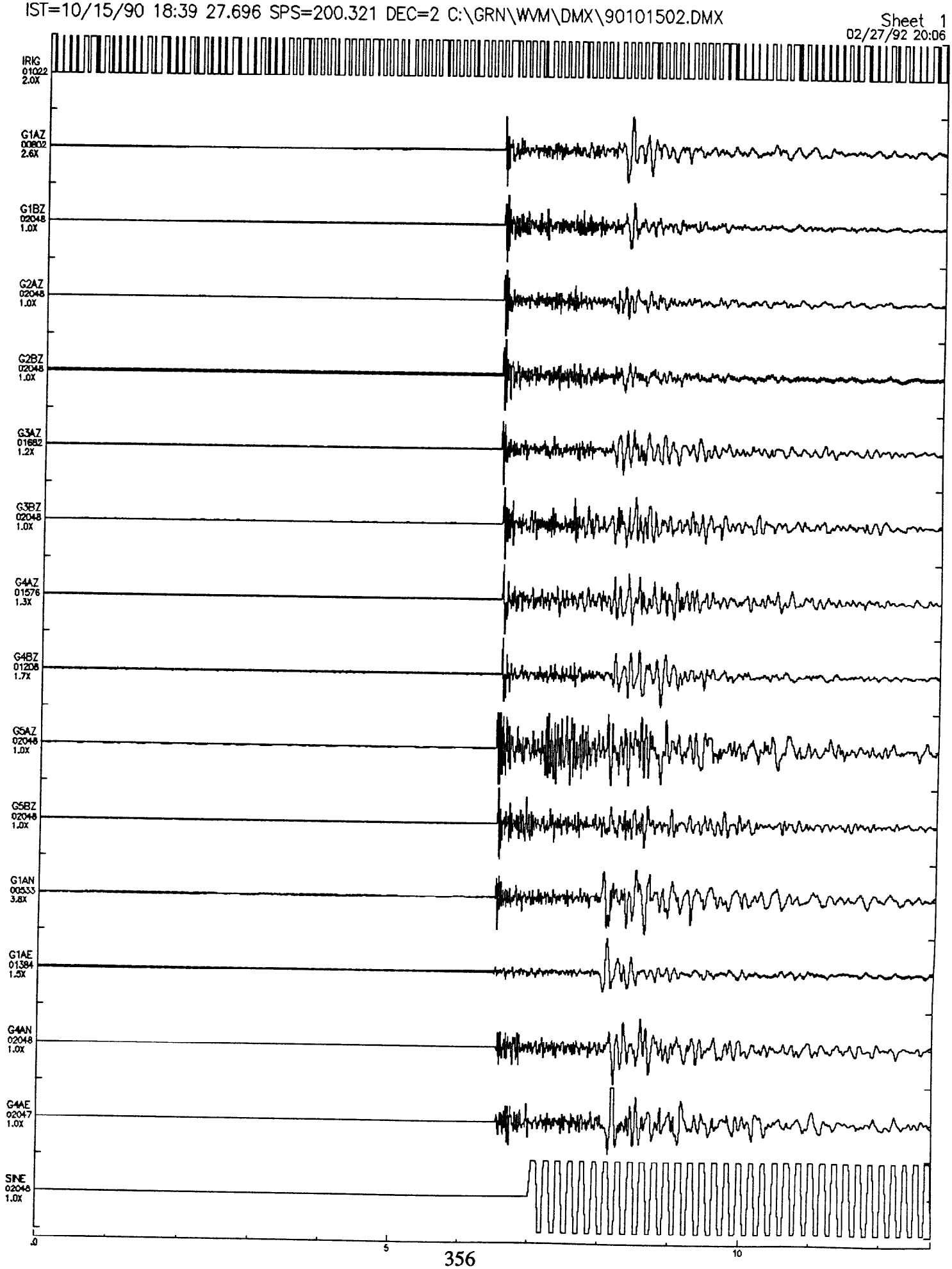

IST=10/04/90 09:29 35.701 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90100400.DMX
Sheet 1
02/27/92 07:07
IRIG
01022
2.0X
G1AZ
00050
41.0X
G1BZ
00048
42.7X
G2AZ
00070
29.3X
G2BZ
00034
60.2X
G3AZ
00187
11.0X
G3BZ
00261
7.8X
G4AZ
00122
16.6X
G4BZ
00172
11.9X
G5AZ
00465
4.4X
G5BZ
00218
9.4X
G1AN
00048
45.5X
G1AE
00035
58.5X
G4AN
00166
12.2X
G4AE
00192
10.7X
SINE
00013
64.0X
0
5
10

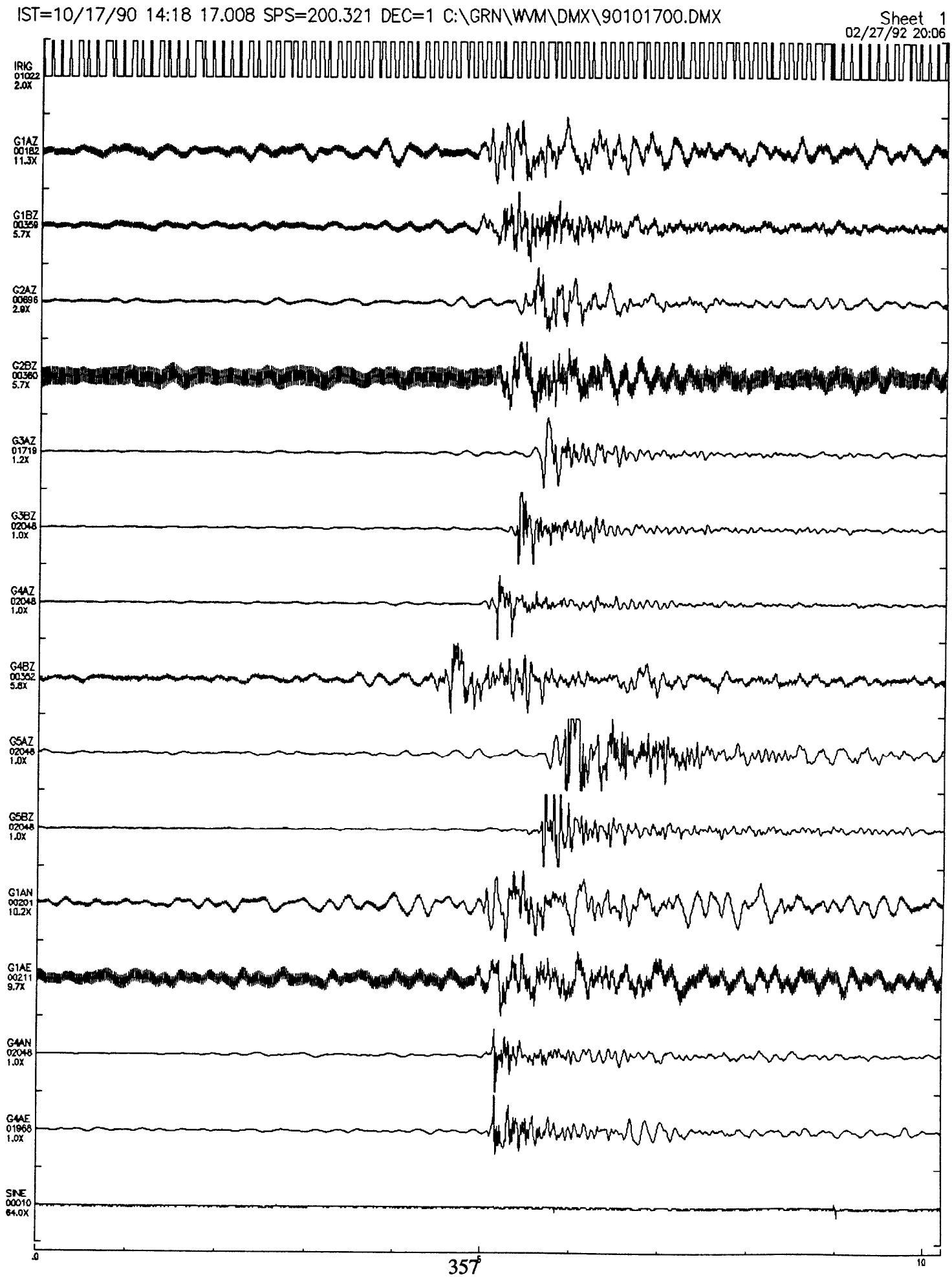

IST=10/05/90 07:55 09.042 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90100500.DMX
Sheet 1
02/27/92 07:08
IRIG
01022
2.0X
G1AZ
00148
13.8X
G1BZ
00228
9.1X
G2AZ
00248
8.3X
G2BZ
00181
11.3X
G3AZ
00297
6.9X
G3BZ
00499
4.1X
G4AZ
00508
4.0X
G4BZ
00341
6.0X
G5AZ
00986
2.1X
G5BZ
00664
3.1X
G1AN
00140
14.6X
G1AE
00141
14.5X
G4AN
00320
6.4X
G4AE
00439
4.7X
SINE
00012
64.0X
0
5
10

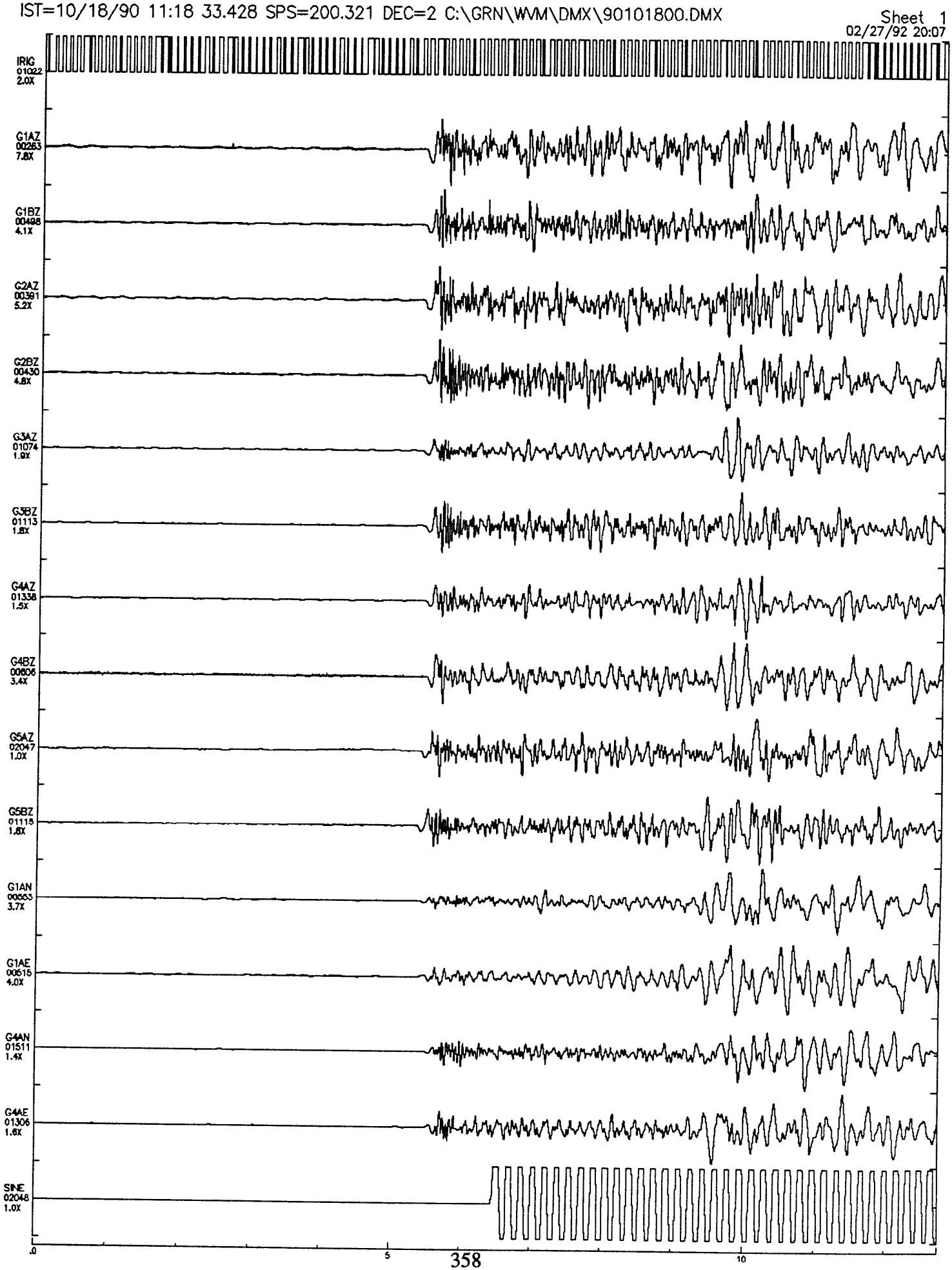

IST=10/09/90 20:53 57.755 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\9010090G.DMX
Sheet 1
02/27/92 07:09
IRIG
01022
2.0X
G1AZ
00117
17.5X
G1BZ
00184
11.1X
G2AZ
00127
16.1X
G2BZ
00194
10.6X
G3AZ
00166
12.3X
G3BZ
00186
11.0X
G4AZ
00166
12.3X
G4BZ
00100
20.5X
G5AZ
00456
4.5X
G5BZ
00174
11.8X
G1AN
00102
20.1X
G1AE
00174
11.8X
G4AN
00187
11.0X
G4AE
00265
7.7X
SINE
00009
64.0X
0
5
10

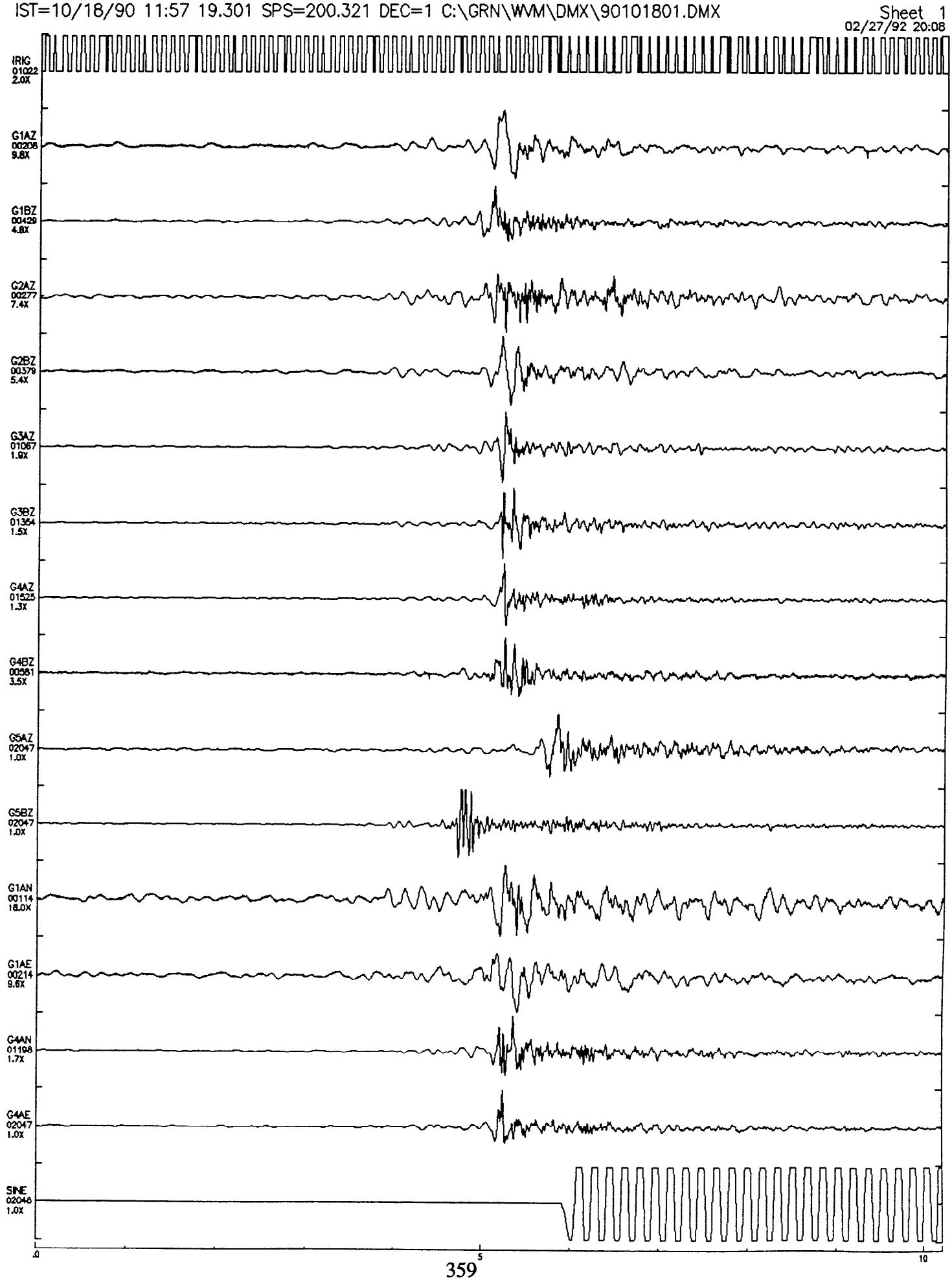

IST=10/15/90 07:46 41.022 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90101500.DMX
Sheet 1
02/27/92 07:10
IRIG
01022
2.0X
G1AZ
001B4
11.1X
G1BZ
00521
3.8X
G2AZ
00568
3.7X
G2BZ
00852
3.1X
G3AZ
00374
5.5X
G3BZ
00707
2.9X
G4AZ
00362
5.7X
G4BZ
00253
7.8X
G5AZ
01510
1.4X
G5BZ
00862
3.1X
G1AN
00102
20.1X
G1AE
00259
7.9X
G4AN
00350
6.9X
G4AE
00133
2.5X
SINE
00011
64.0X
0
5
10

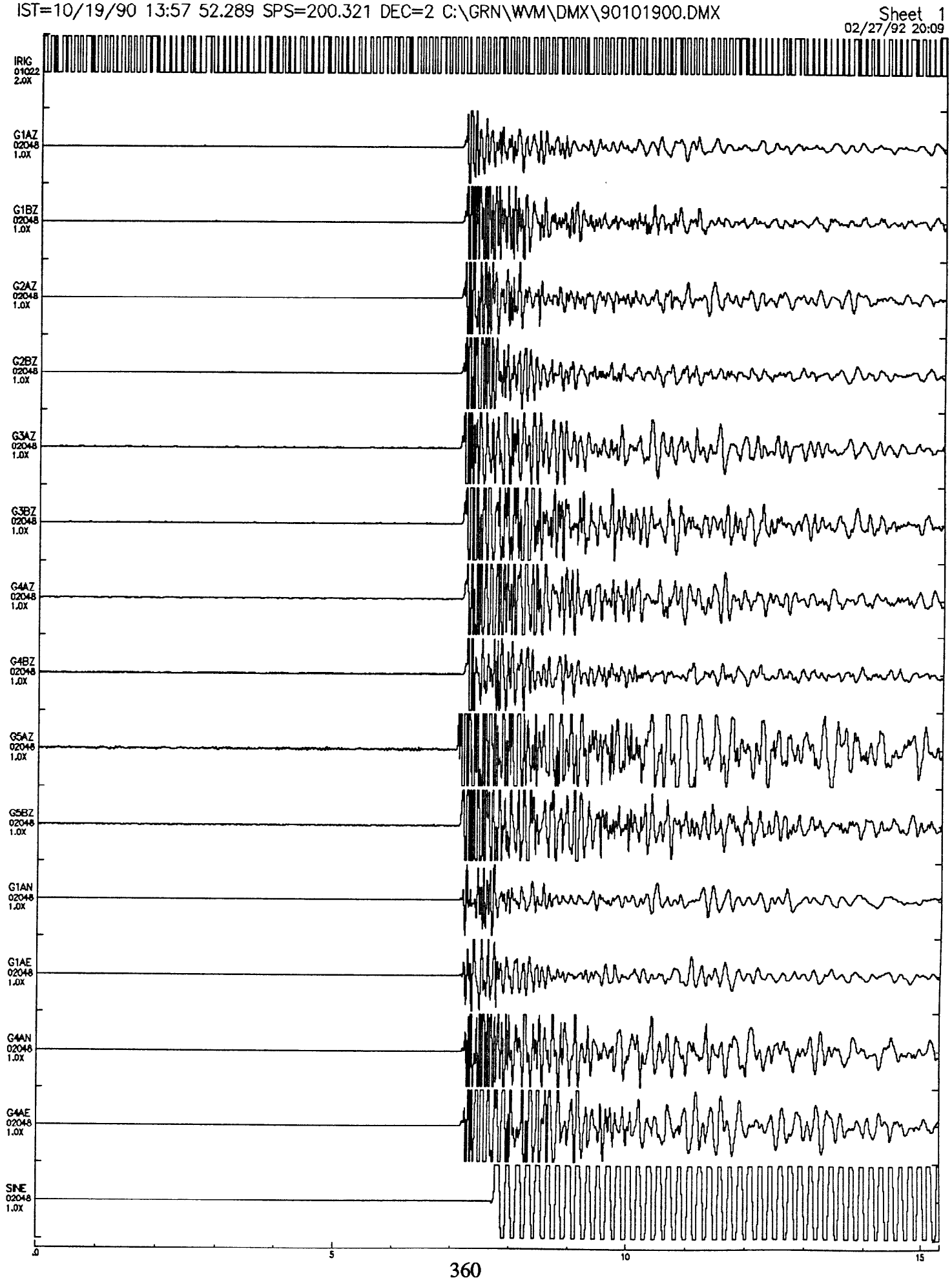

IST=10/15/90 13:22 21.546 SPS=200.321 DEC=1 C:\GRN\WVM\DMX\90101501.DMX
Sheet 1
02/27/92 07:11
IRIG
01022
2.0X
G1AZ
00195
10.5X
G1BZ
00312
6.6X
G2AZ
00475
4.3X
G2BZ
00368
5.6X
G3AZ
01188
1.7X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
00305
6.7X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
00292
7.0X
G1AE
00204
10.0X
G4AN
02048
1.0X
G4AE
01793
1.1X
SINE
00005
64.0X
0
5
10

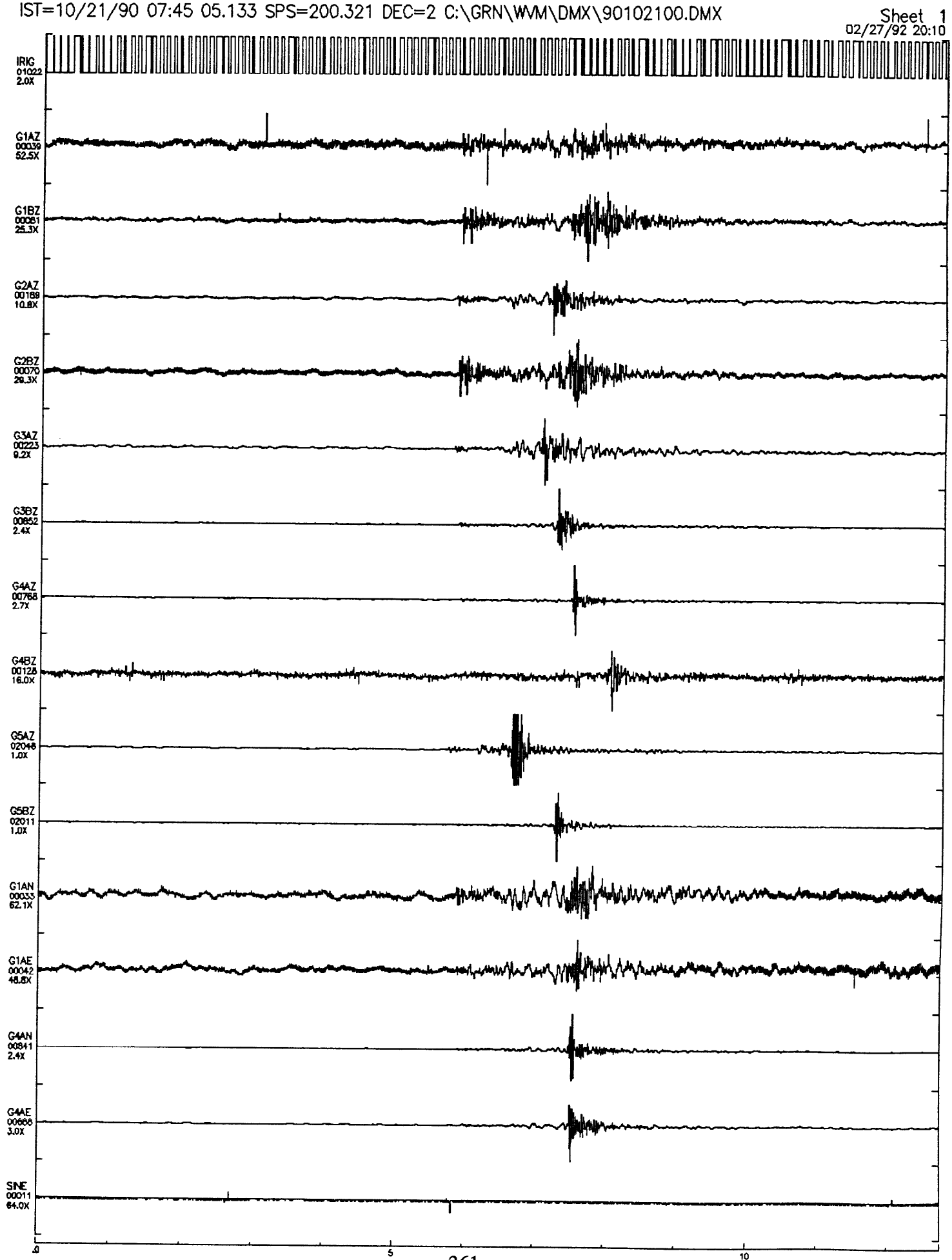

IST=10/15/90 18:39 27.696 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90101502.DMX
Sheet 1
02/27/92 20:06
IRIG
01022
2.0X
G1AZ
00802
2.6X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
01682
1.2X
G3BZ
02048
1.0X
G4AZ
01576
1.3X
G4BZ
01208
1.7X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
00533
3.8X
G1AE
01384
1.5X
G4AN
02048
1.0X
G4AE
02047
1.0X
SINE
02048
1.0X
0
5
10

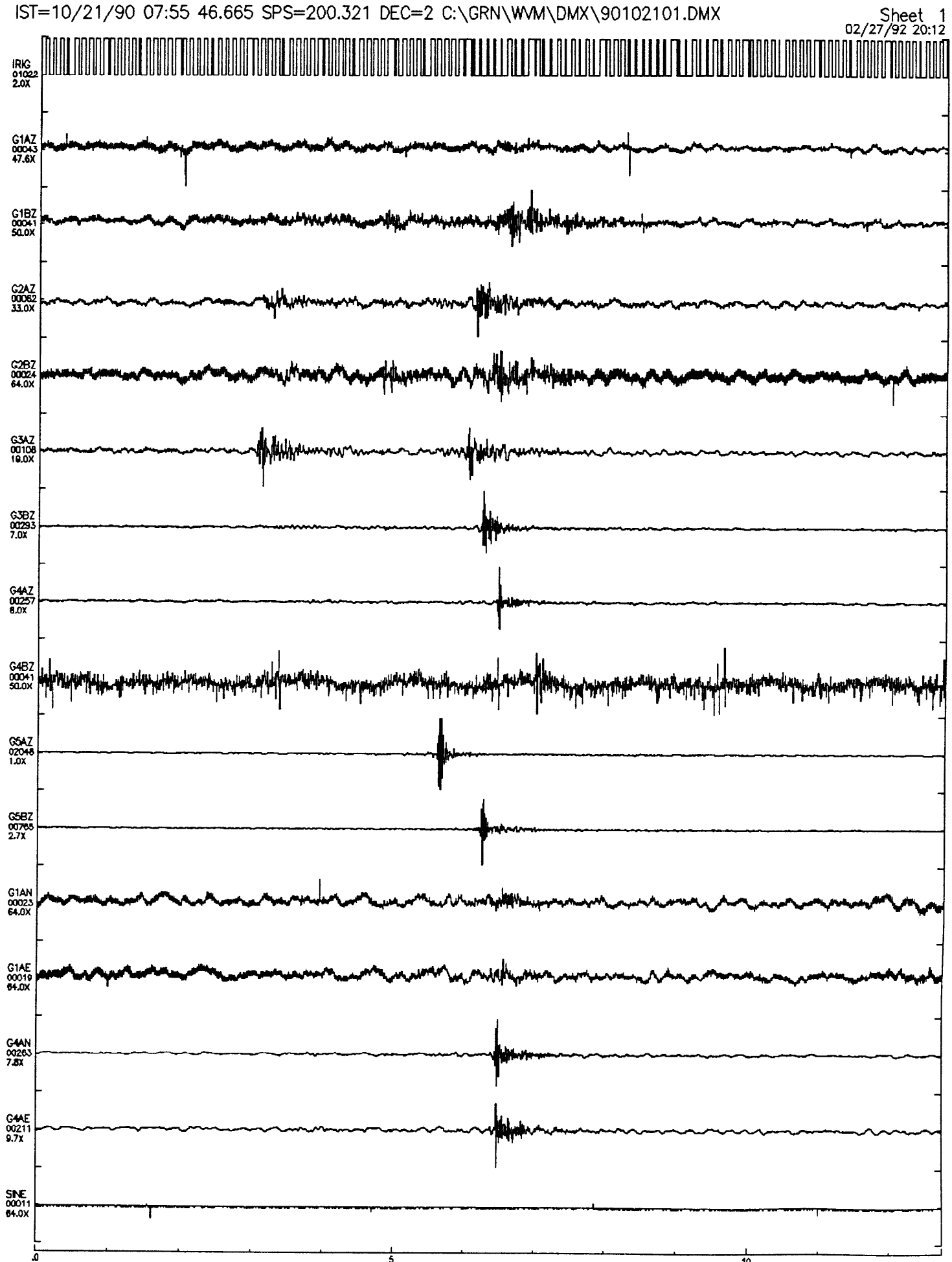

IST=10/17/90 14:18 17.008 SPS=200.321 DEC=1 C:\GRN\WVM\DMX\90101700.DMX
Sheet 1
02/27/92 20:06
IRIG
01022
2.0X
G1AZ
00182
11.3X
G1BZ
00359
5.7X
G2AZ
00696
2.9X
G2BZ
00360
5.7X
G3AZ
01719
1.2X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
00352
5.8X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
00201
10.2X
G1AE
00211
9.7X
G4AN
02048
1.0X
G4AE
01968
1.0X
SINE
00010
64.0X
0
10

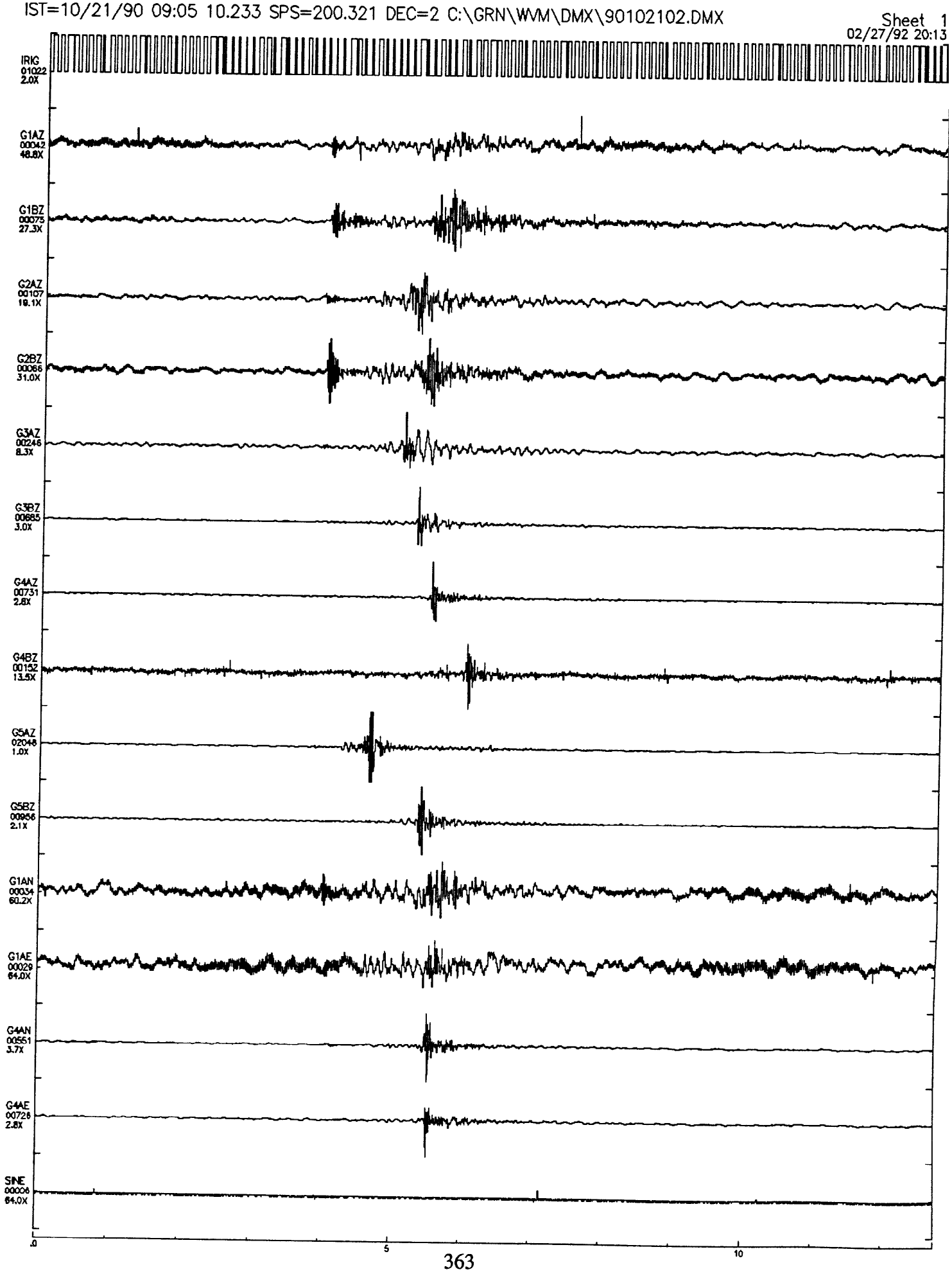

IST=10/18/90 11:18 33.428 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90101800.DMX
Sheet 1
02/27/92 20:07
IRIG
01022
2.0X
G1AZ
00263
7.8X
G1BZ
00498
4.1X
G2AZ
00391
5.2X
G2BZ
00430
4.8X
G3AZ
01074
1.9X
G3BZ
01113
1.8X
G4AZ
01338
1.5X
G4BZ
00606
3.4X
G5AZ
02047
1.0X
G5BZ
01115
1.8X
G1AN
00553
3.7X
G1AE
00615
4.0X
G4AN
01511
1.4X
G4AE
01306
1.6X
SINE
02048
1.0X
.0
5
10

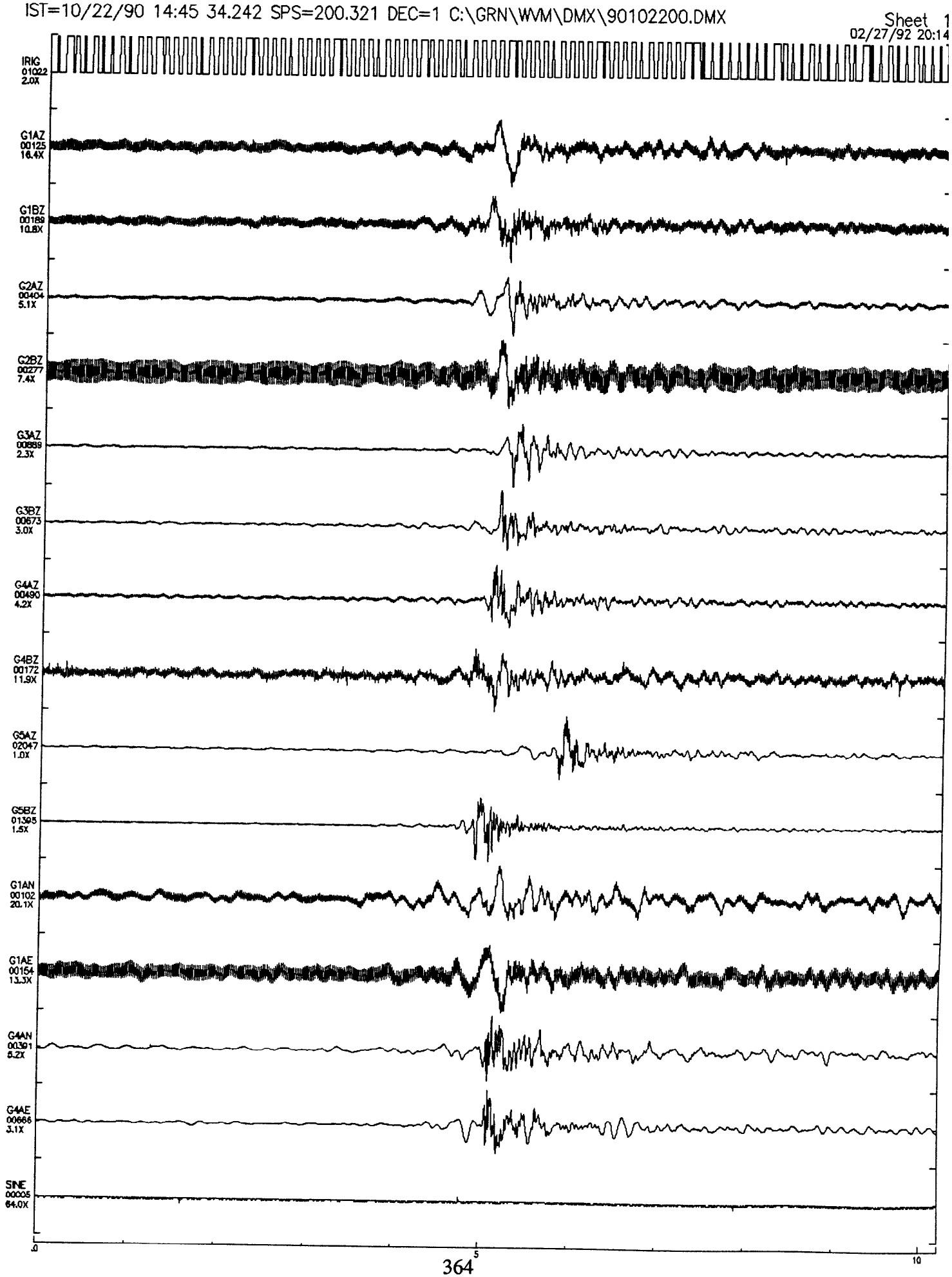

IST=10/18/90 11:57 19.301 SPS=200.321 DEC=1 C:\GRN\WVM\DMX\90101801.DMX
Sheet 1
02/27/92 20:08
IRIG
01022
2.0X
G1AZ
00208
9.8X
G1BZ
00429
4.8X
G2AZ
00277
7.4X
G2BZ
00379
5.4X
G3AZ
01087
1.9X
G3BZ
01354
1.5X
G4AZ
01525
1.3X
G4BZ
00581
3.5X
G5AZ
02047
1.0X
G5BZ
02047
1.0X
G1AN
00114
18.0X
G1AE
00214
9.6X
G4AN
01198
1.7X
G4AE
02047
1.0X
SINE
02048
1.0X
0
5
10

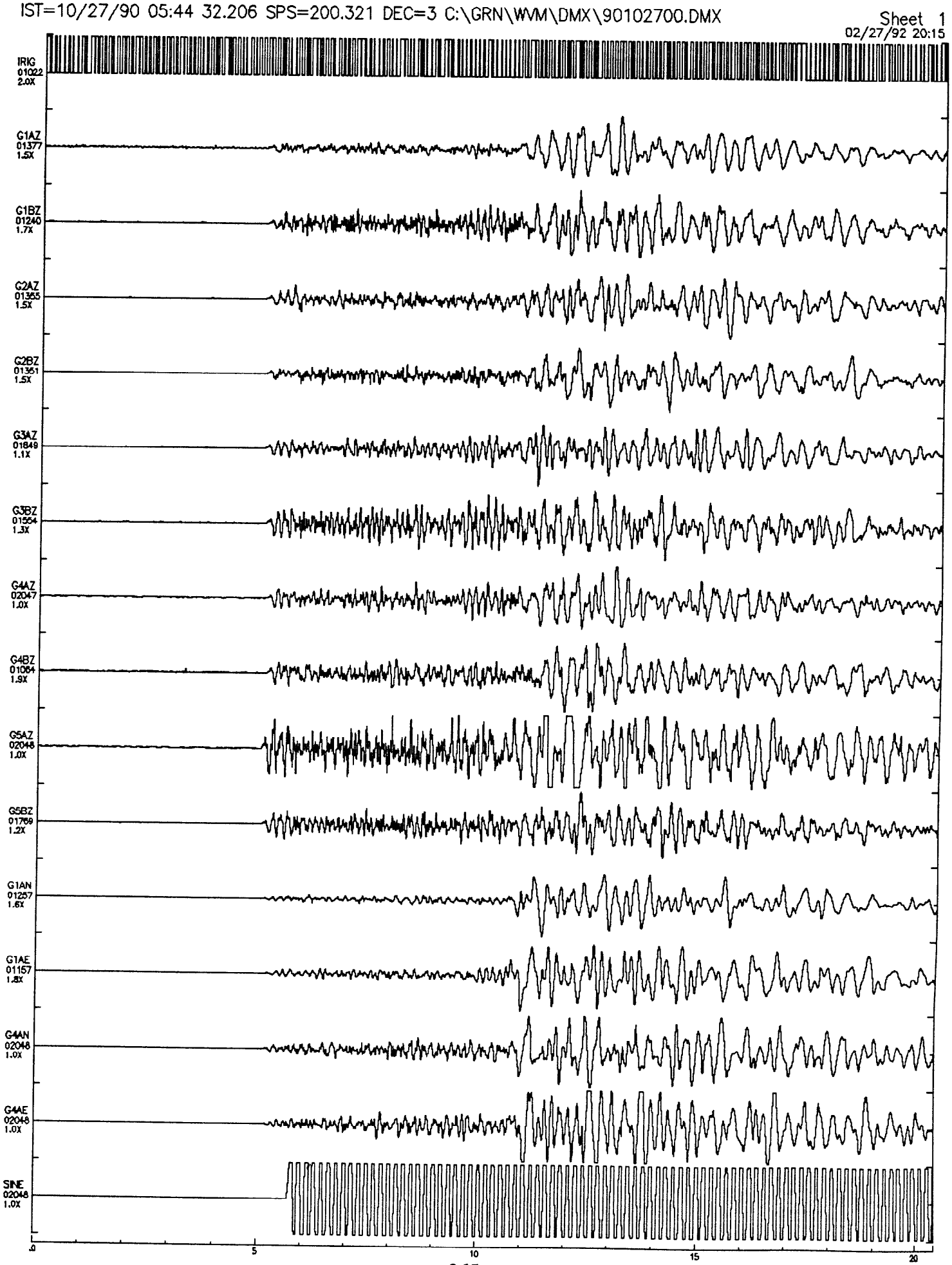

IST=10/19/90 13:57 52.289 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90101900.DMX
Sheet 1
02/27/92 20:09
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10
15

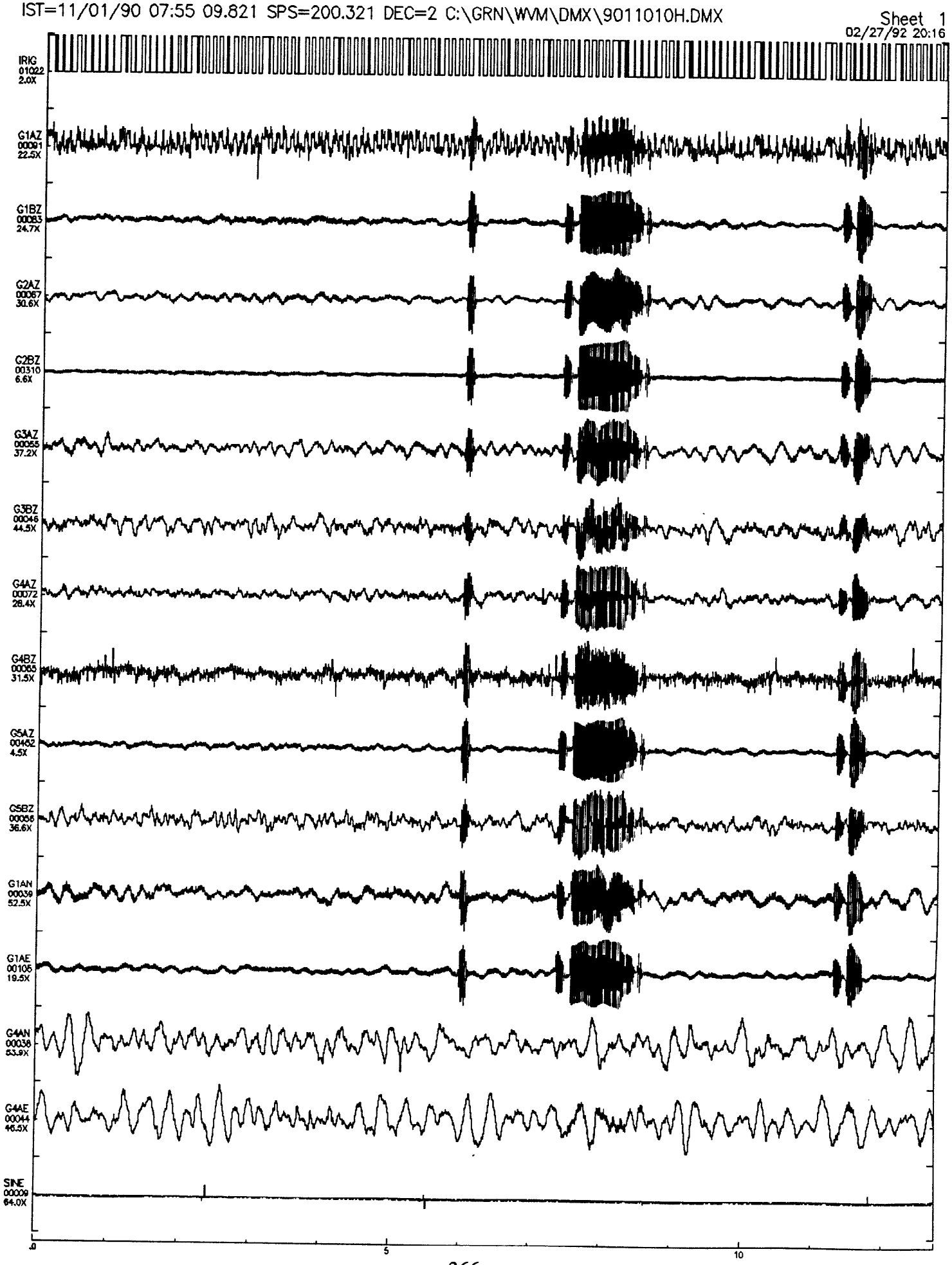

IST=10/21/90 07:45 05.133 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90102100.DMX
Sheet 1
02/27/92 20:10
IRIG
01022
2.0X
G1AZ
00039
52.5X
G1BZ
00081
25.3X
G2AZ
00169
10.8X
G2BZ
00070
28.3X
G3AZ
00223
9.2X
G3BZ
00852
2.4X
G4AZ
00768
2.7X
G4BZ
00128
16.0X
G5AZ
02048
1.0X
G5BZ
02011
1.0X
G1AN
00033
62.1X
G1AE
00042
46.6X
G4AN
00841
2.4X
G4AE
00668
3.0X
SINE
00011
64.0X
0
5
10

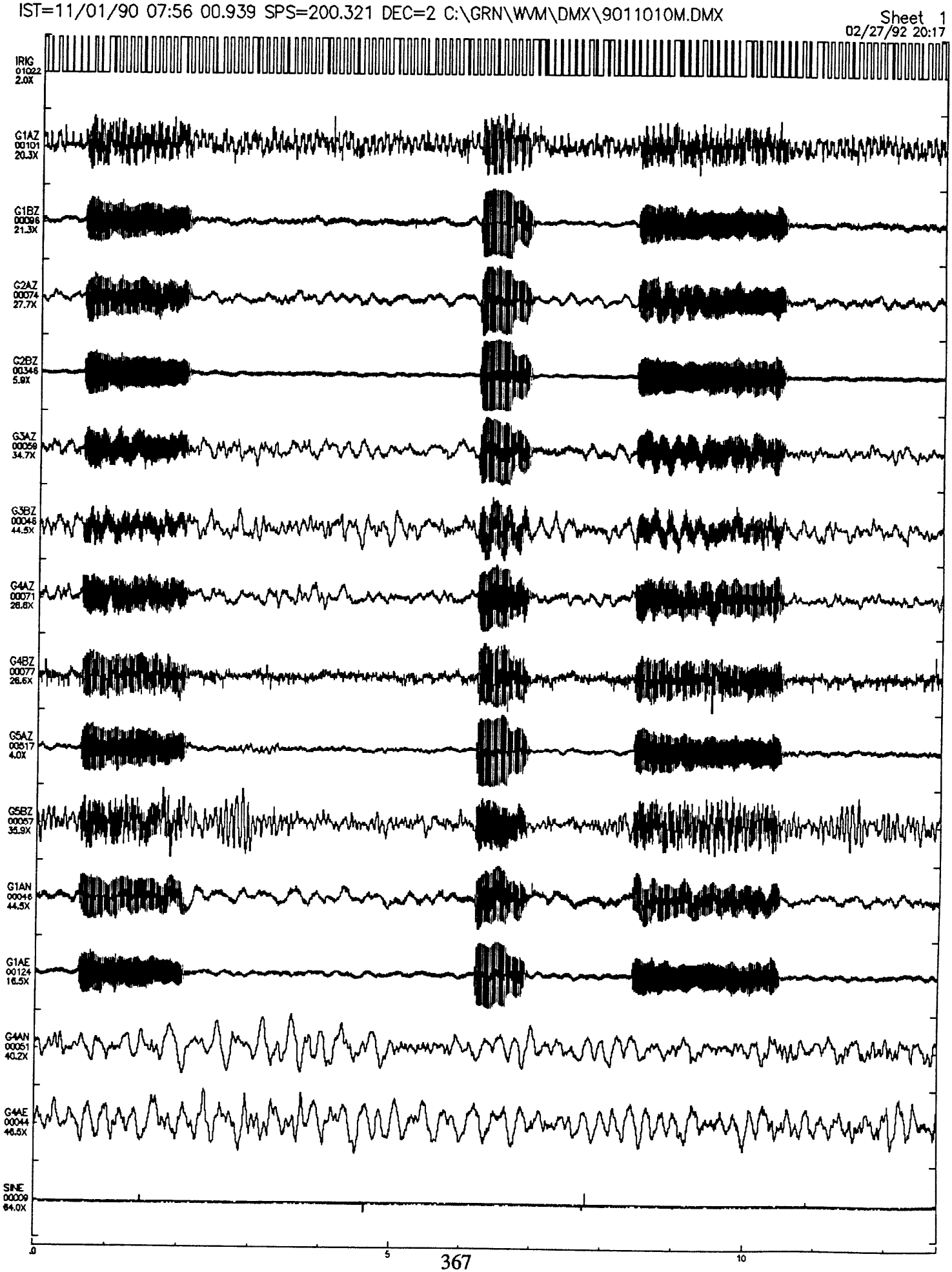

IST=10/21/90 07:55 46.665 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90102101.DMX
Sheet 1
02/27/92 20:12
IRIG
01022
2.0X
G1AZ
00043
47.6X
G1BZ
00041
50.0X
G2AZ
00062
33.0X
G2BZ
00024
64.0X
G3AZ
00108
19.0X
G3BZ
00293
7.0X
G4AZ
00257
8.0X
G4BZ
00041
50.0X
G5AZ
02048
1.0X
G5BZ
00765
2.7X
G1AN
00023
64.0X
G1AE
00019
64.0X
G4AN
00263
7.8X
G4AE
00211
9.7X
SINE
00011
64.0X
0
5
10

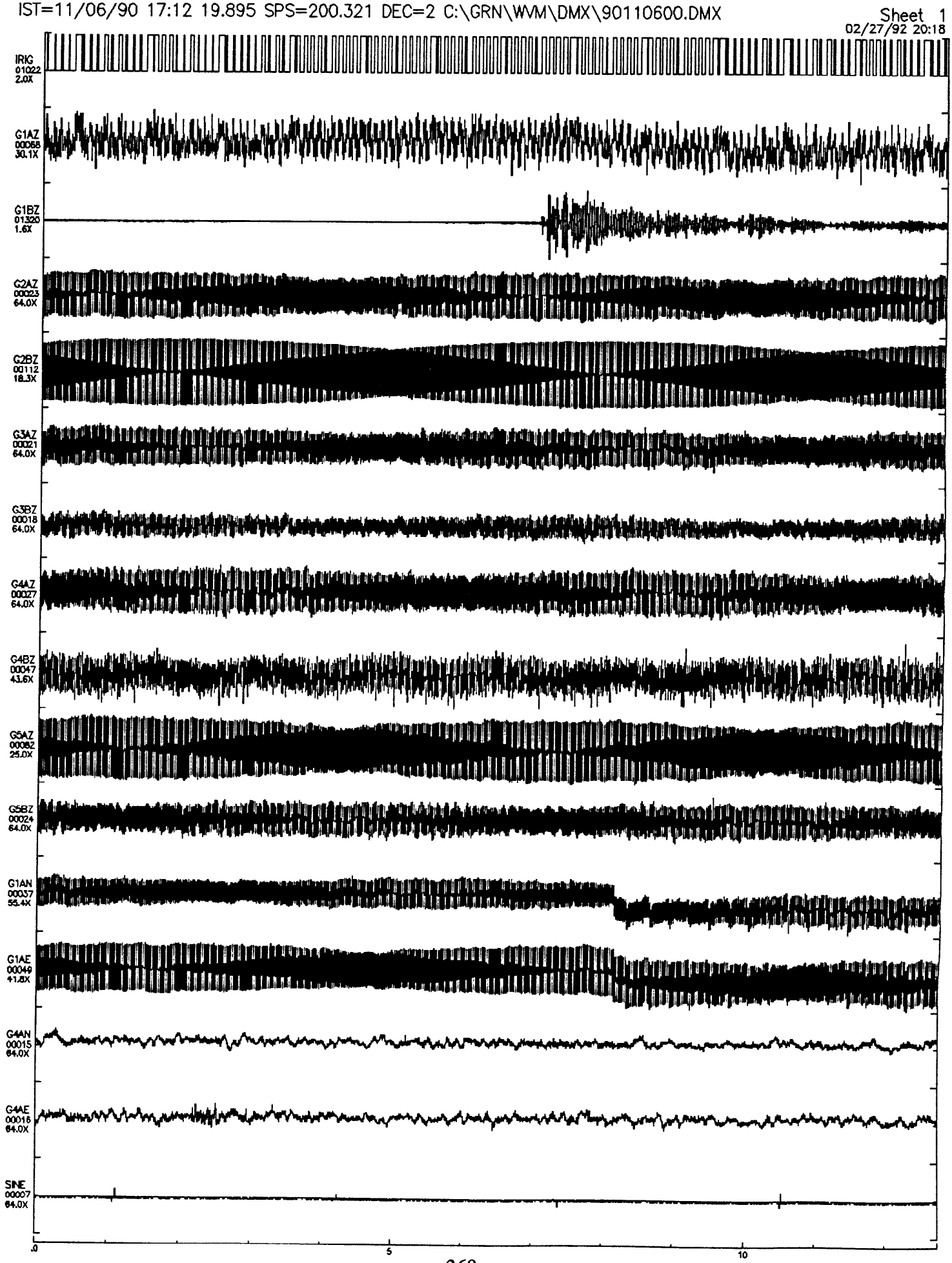

IST=10/21/90 09:05 10.233 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90102102.DMX
Sheet 1
02/27/92 20:13
IRIG
01022
2.0X
G1AZ
00042
48.8X
G1BZ
00075
27.3X
G2AZ
00107
19.1X
G2BZ
00066
31.0X
G3AZ
00246
8.3X
G3BZ
00685
3.0X
G4AZ
00731
2.8X
G4BZ
00152
13.5X
G5AZ
02048
1.0X
G5BZ
00956
2.1X
G1AN
00034
60.2X
G1AE
00029
64.0X
G4AN
00551
3.7X
G4AE
00726
2.8X
SINE
00006
64.0X
0
5
10

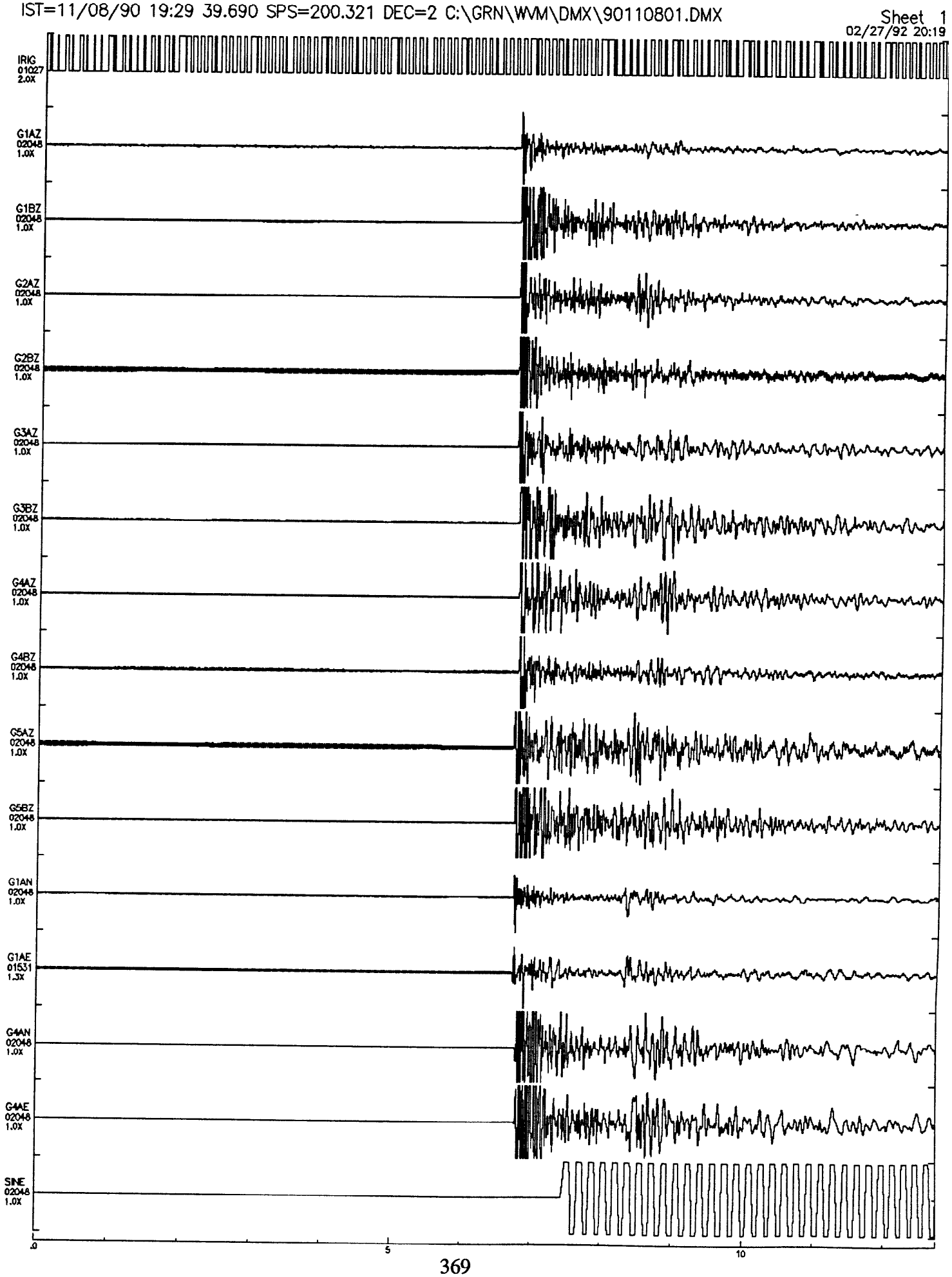

IST=10/22/90 14:45 34.242 SPS=200.321 DEC=1 C:\GRN\WVM\DMX\90102200.DMX
Sheet 1
02/27/92 20:14
IRIG
01022
2.0X
G1AZ
00125
16.4X
G1BZ
00189
10.6X
G2AZ
00404
5.1X
G2BZ
00277
7.4X
G3AZ
00889
2.3X
G3BZ
00673
3.0X
G4AZ
00490
4.2X
G4BZ
00172
11.9X
G5AZ
02047
1.0X
G5BZ
01395
1.5X
G1AN
00102
20.1X
G1AE
00154
13.3X
G4AN
00391
5.2X
G4AE
00666
3.1X
SINE
00005
64.0X
0
5
10

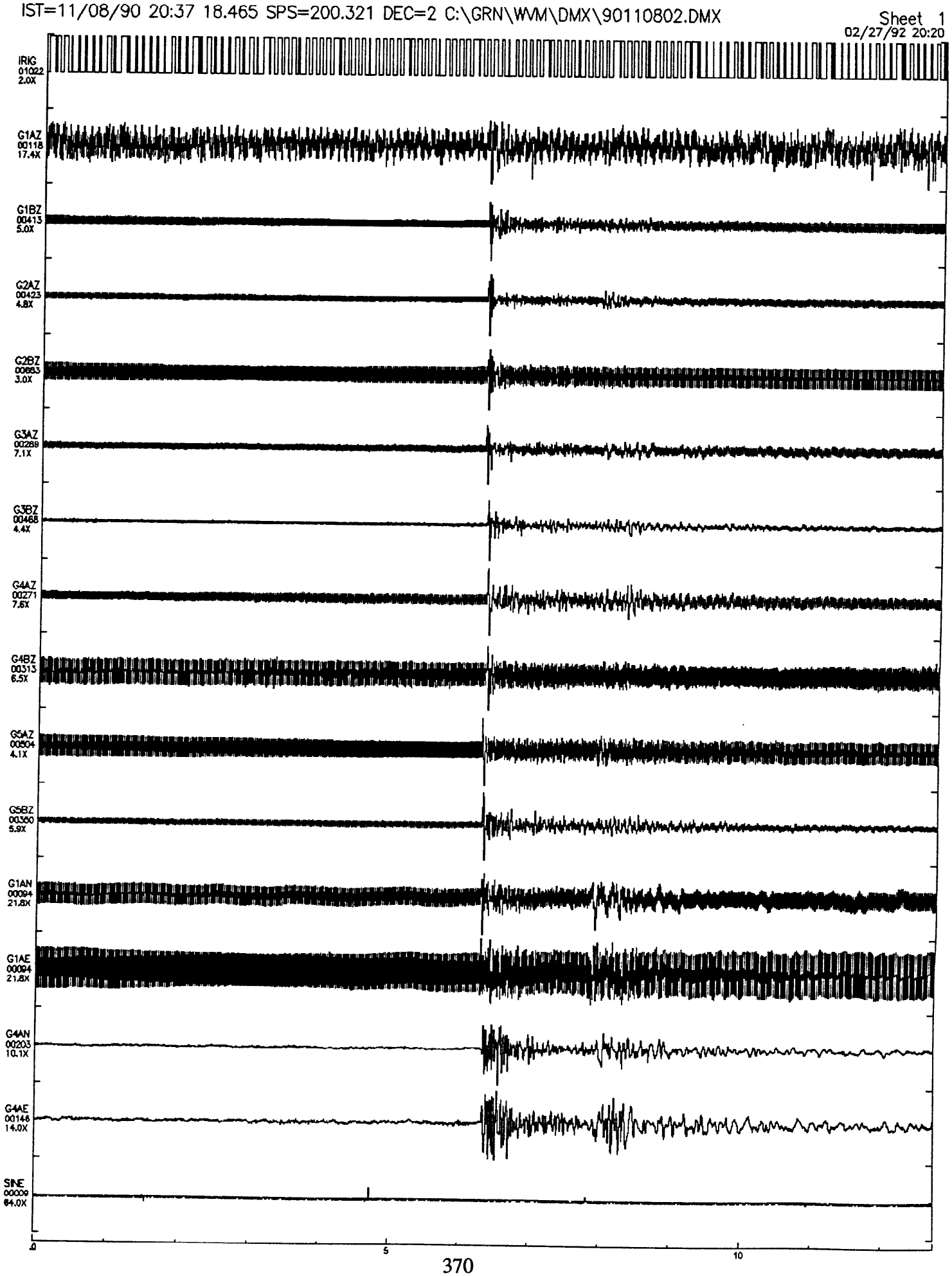

IST=10/27/90 05:44 32.206 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90102700.DMX
Sheet 1
02/27/92 20:15
IRIG
01022
2.0X
G1AZ
01377
1.5X
G1BZ
01240
1.7X
G2AZ
01355
1.5X
G2BZ
01351
1.5X
G3AZ
01849
1.1X
G3BZ
01564
1.3X
G4AZ
02047
1.0X
G4BZ
01064
1.9X
G5AZ
02048
1.0X
G5BZ
01769
1.2X
G1AN
01257
1.6X
G1AE
01157
1.8X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10
15
20

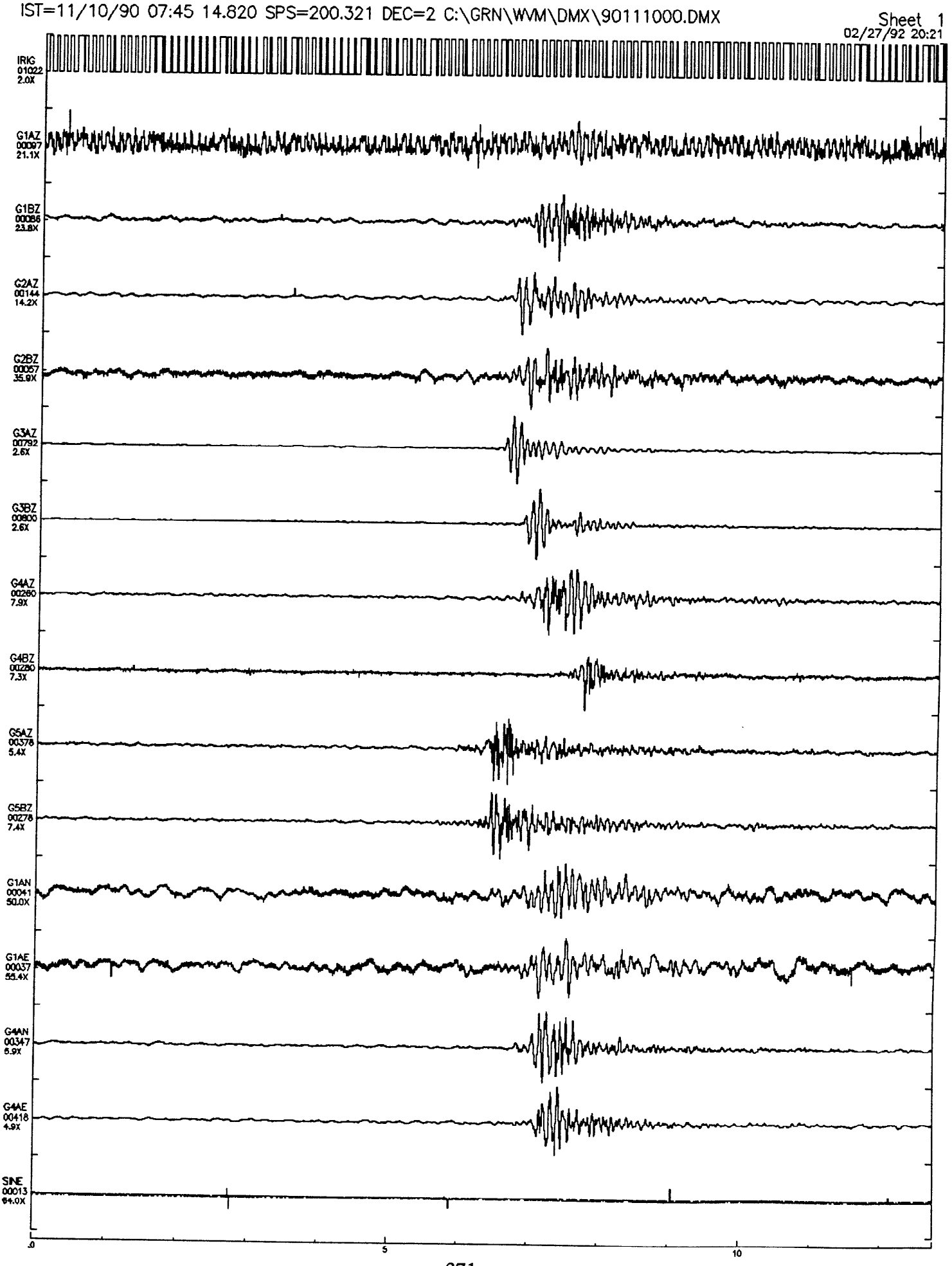

IST=11/01/90 07:55 09.821 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\9011010H.DMX
Sheet 1
02/27/92 20:16
IRIG
01022
2.0X
G1AZ
00091
22.5X
G1BZ
00083
24.7X
G2AZ
00067
30.6X
G2BZ
00310
6.6X
G3AZ
00055
37.2X
G3BZ
00046
44.5X
G4AZ
00072
28.4X
G4BZ
00065
31.5X
G5AZ
00462
4.5X
G5BZ
00056
36.6X
G1AN
00039
52.5X
G1AE
00105
19.5X
G4AN
00038
53.9X
G4AE
00044
46.5X
SINE
00009
64.0X
0
5
10

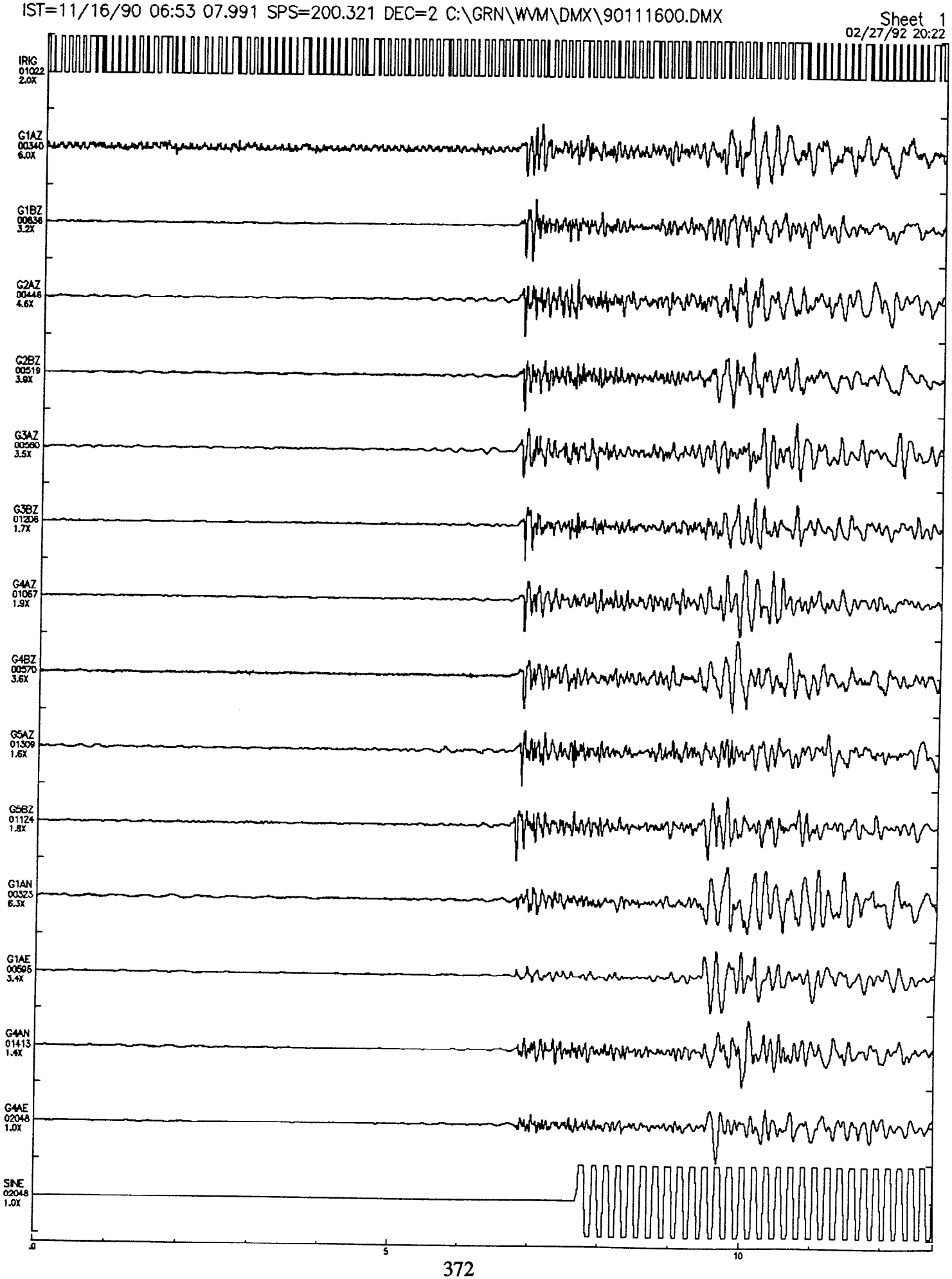

IST=11/01/90 07:56 00.939 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\9011010M.DMX
Sheet 1
02/27/92 20:17
IRIG
01022
2.0X
G1AZ
00101
20.3X
G1BZ
00096
21.3X
G2AZ
00074
27.7X
G2BZ
00346
5.9X
G3AZ
00059
34.7X
G3BZ
00045
44.5X
G4AZ
00071
26.6X
G4BZ
00077
26.6X
G5AZ
00517
4.0X
G5BZ
00057
35.9X
G1AN
00046
44.5X
G1AE
00124
16.5X
G4AN
00051
40.2X
G4AE
00044
46.5X
SINE
00009
64.0X
0
5
10

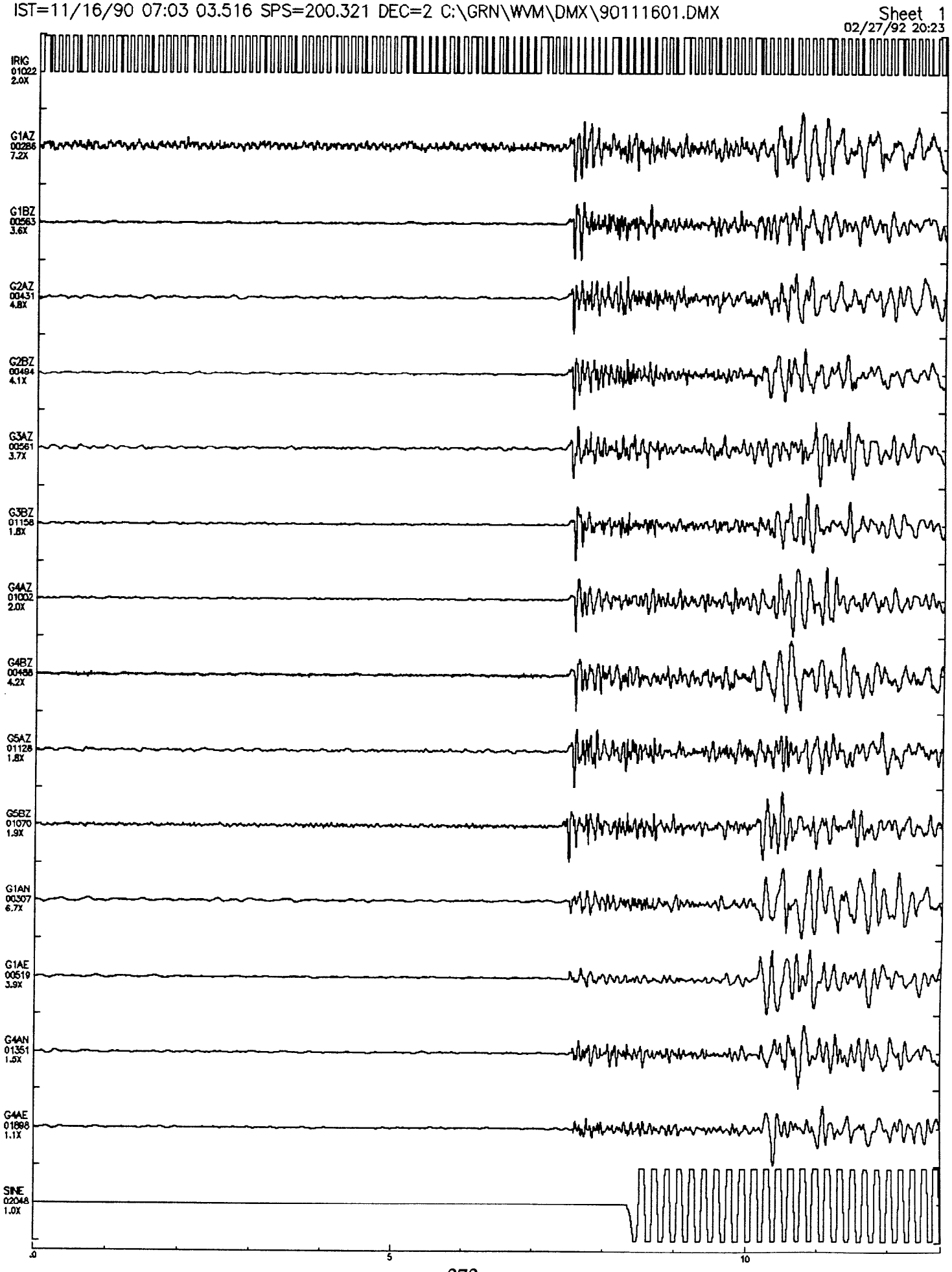

IST=11/06/90 17:12 19.895 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90110600.DMX
Sheet 1
02/27/92 20:18
IRIG
01022
2.0X
G1AZ
00068
30.1X
G1BZ
01320
1.6X
G2AZ
00023
64.0X
G2BZ
00112
18.3X
G3AZ
00021
64.0X
G3BZ
00018
64.0X
G4AZ
00027
64.0X
G4BZ
00047
43.6X
G5AZ
00082
25.0X
G5BZ
00024
64.0X
G1AN
00037
55.4X
G1AE
00049
41.8X
G4AN
00015
64.0X
G4AE
00016
64.0X
SINE
00007
64.0X
0
5
10

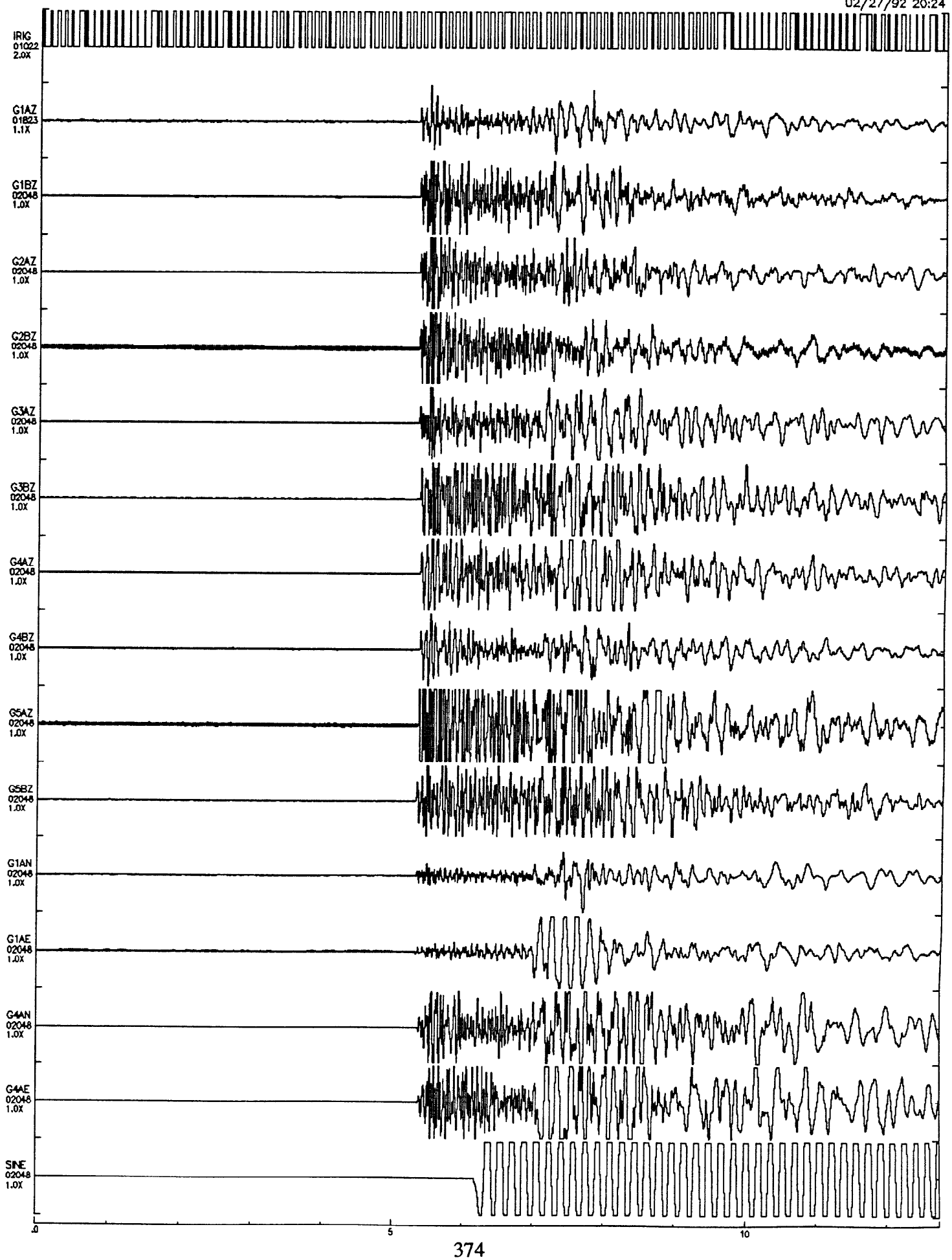

IST=11/08/90 19:29 39.690 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90110801.DMX
Sheet 1
02/27/92 20:19
IRIG
01027
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
01531
1.3X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10

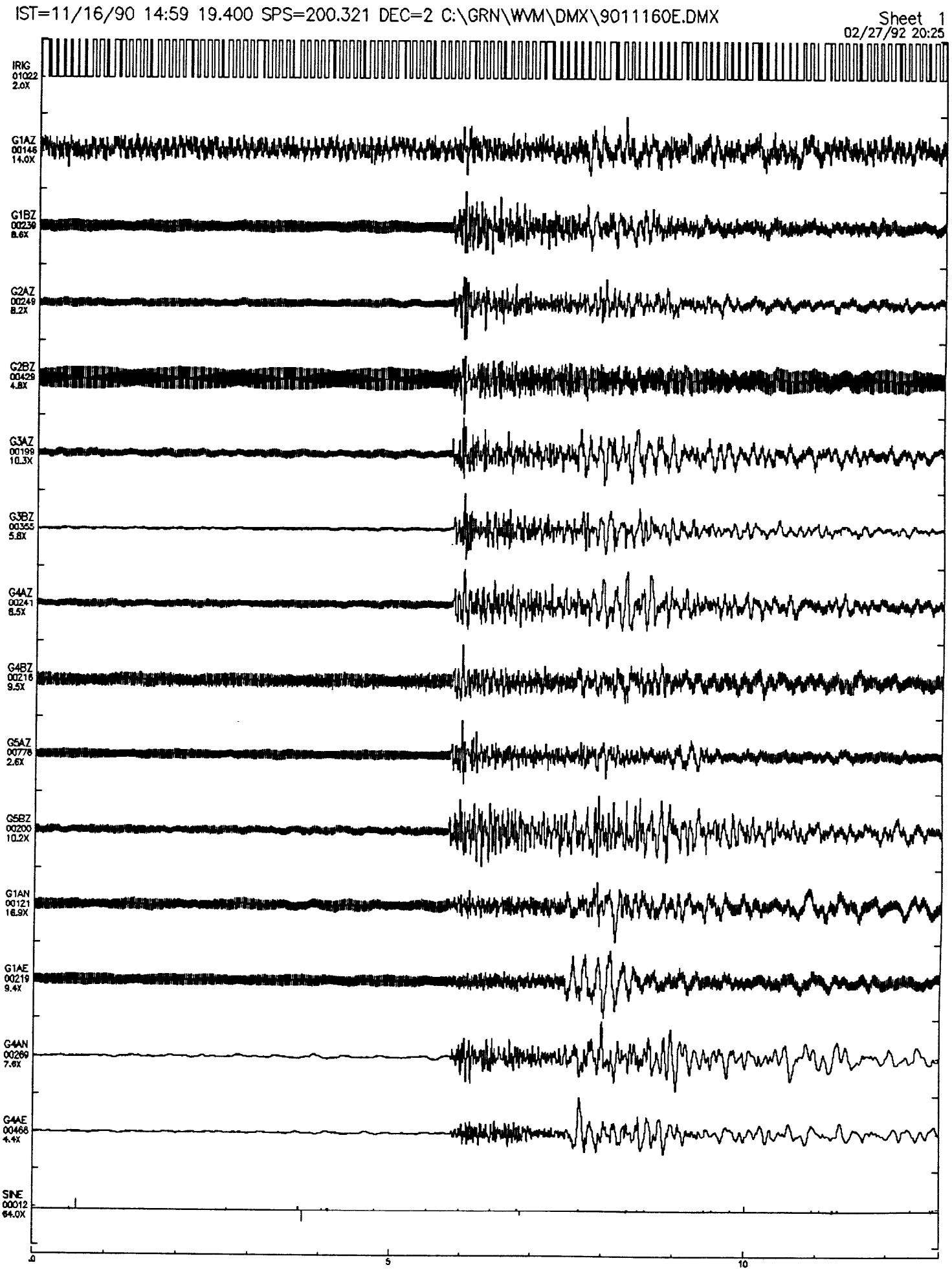

IST=11/08/90 20:37 18.465 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90110802.DMX
Sheet 1
02/27/92 20:20
IRIG
01022
2.0X
G1AZ
00118
17.4X
G1BZ
00413
5.0X
G2AZ
00423
4.8X
G2BZ
00683
3.0X
G3AZ
00288
7.1X
G3BZ
00468
4.4X
G4AZ
00271
7.6X
G4BZ
00313
6.5X
G5AZ
00504
4.1X
G5BZ
00350
5.9X
G1AN
00094
21.8X
G1AE
00094
21.8X
G4AN
00203
10.1X
G4AE
00146
14.0X
SINE
00009
64.0X
0
5
10

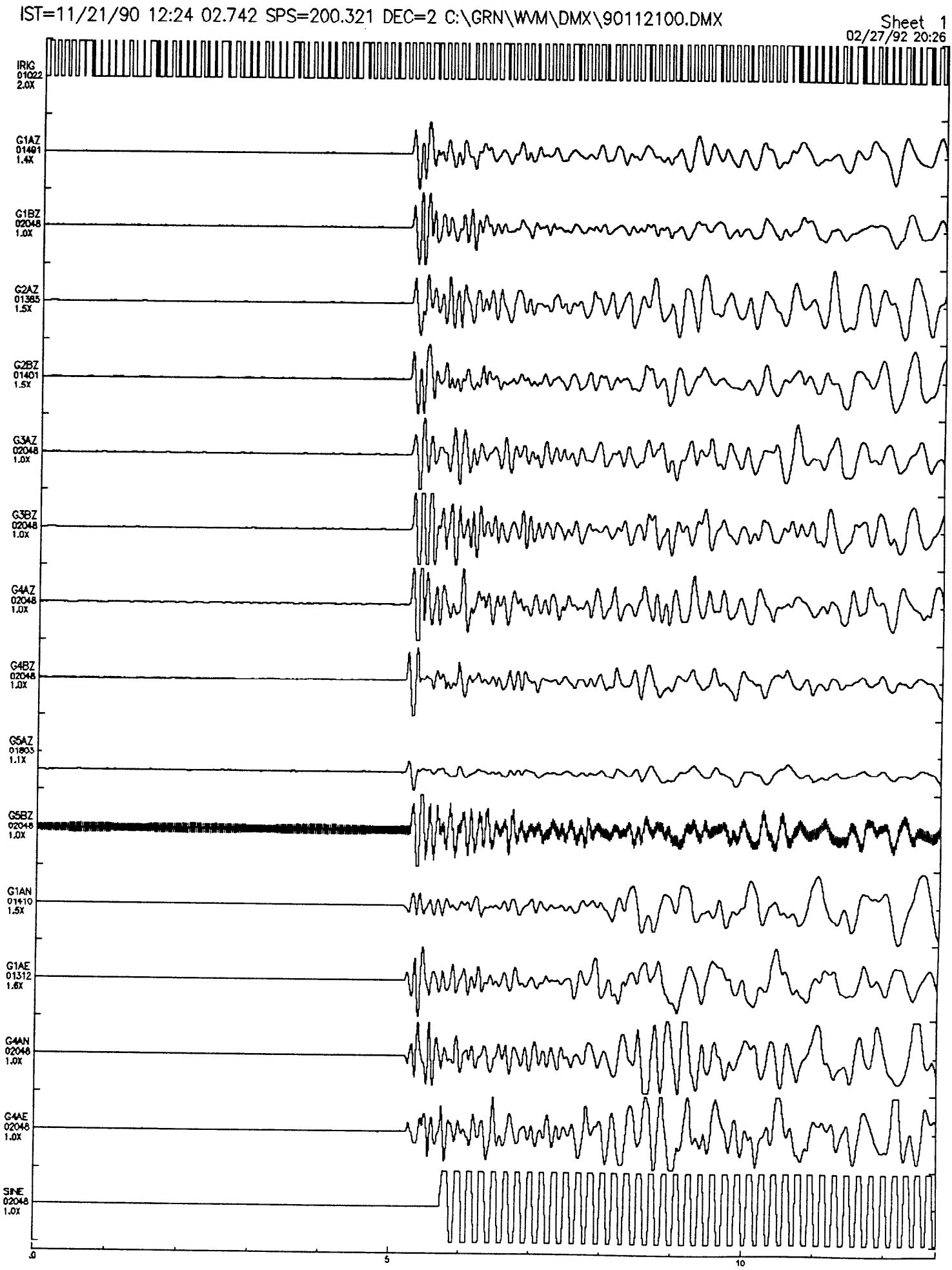

IST=11/10/90 07:45 14.820 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90111000.DMX
Sheet 1
02/27/92 20:21
IRIG
01022
2.0X
G1AZ
00097
21.1X
G1BZ
00086
23.8X
G2AZ
00144
14.2X
G2BZ
00057
35.9X
G3AZ
00792
2.6X
G3BZ
00800
2.6X
G4AZ
00260
7.9X
G4BZ
00280
7.3X
G5AZ
00578
5.4X
G5BZ
00278
7.4X
G1AN
00041
50.0X
G1AE
00037
55.4X
G4AN
00347
5.9X
G4AE
00418
4.9X
SINE
00013
64.0X
0
5
10

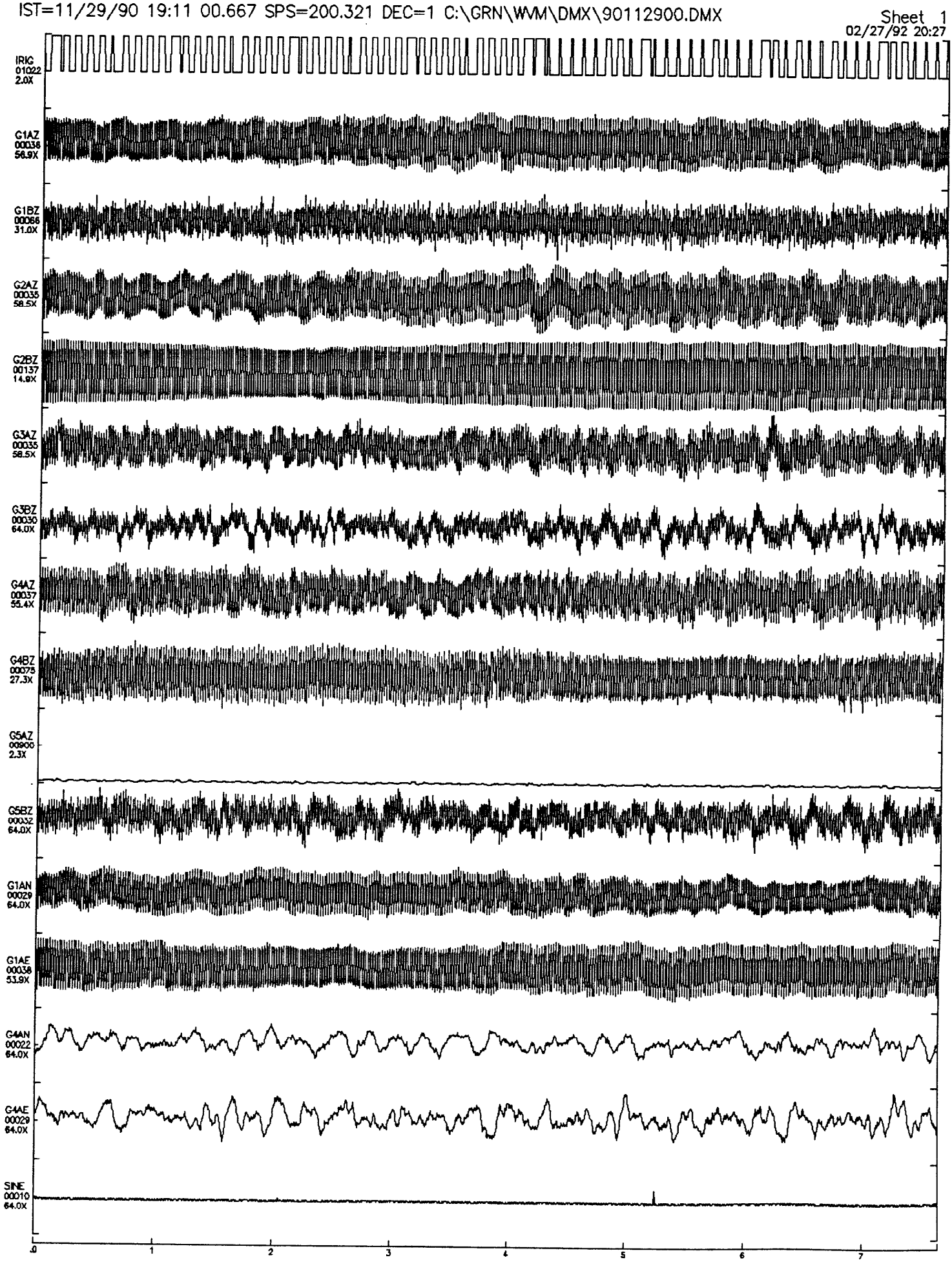

IST=11/16/90 06:53 07.991 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90111600.DMX
Sheet 1
02/27/92 20:22
IRIG
01022
2.0X
G1AZ
00340
6.0X
G1BZ
00636
3.2X
G2AZ
00448
4.6X
G2BZ
00519
3.9X
G3AZ
00580
3.5X
G3BZ
01206
1.7X
G4AZ
01067
1.9X
G4BZ
00570
3.6X
G5AZ
01309
1.6X
G5BZ
01124
1.8X
G1AN
00323
6.3X
G1AE
00595
3.4X
G4AN
01413
1.4X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10

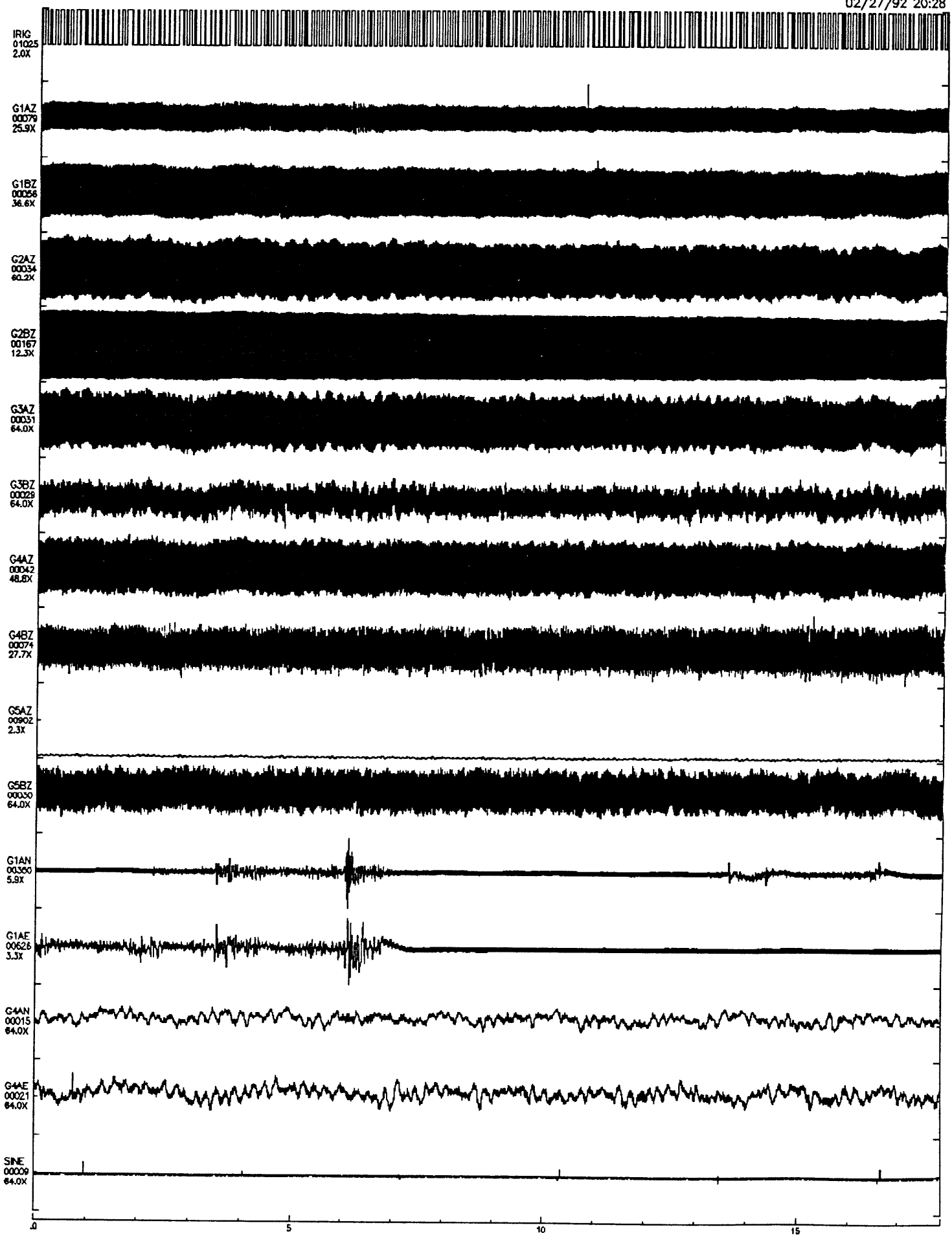

IST=11/16/90 07:03 03.516 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90111601.DMX
Sheet 1
02/27/92 20:23
IRIG
01022
2.0X
G1AZ
00286
7.2X
G1BZ
00563
3.6X
G2AZ
00431
4.8X
G2BZ
00494
4.1X
G3AZ
00561
3.7X
G3BZ
01158
1.8X
G4AZ
01002
2.0X
G4BZ
00488
4.2X
G5AZ
01128
1.8X
G5BZ
01070
1.9X
G1AN
00307
6.7X
G1AE
00519
3.9X
G4AN
01351
1.5X
G4AE
01898
1.1X
SINE
02048
1.0X
0
5
10

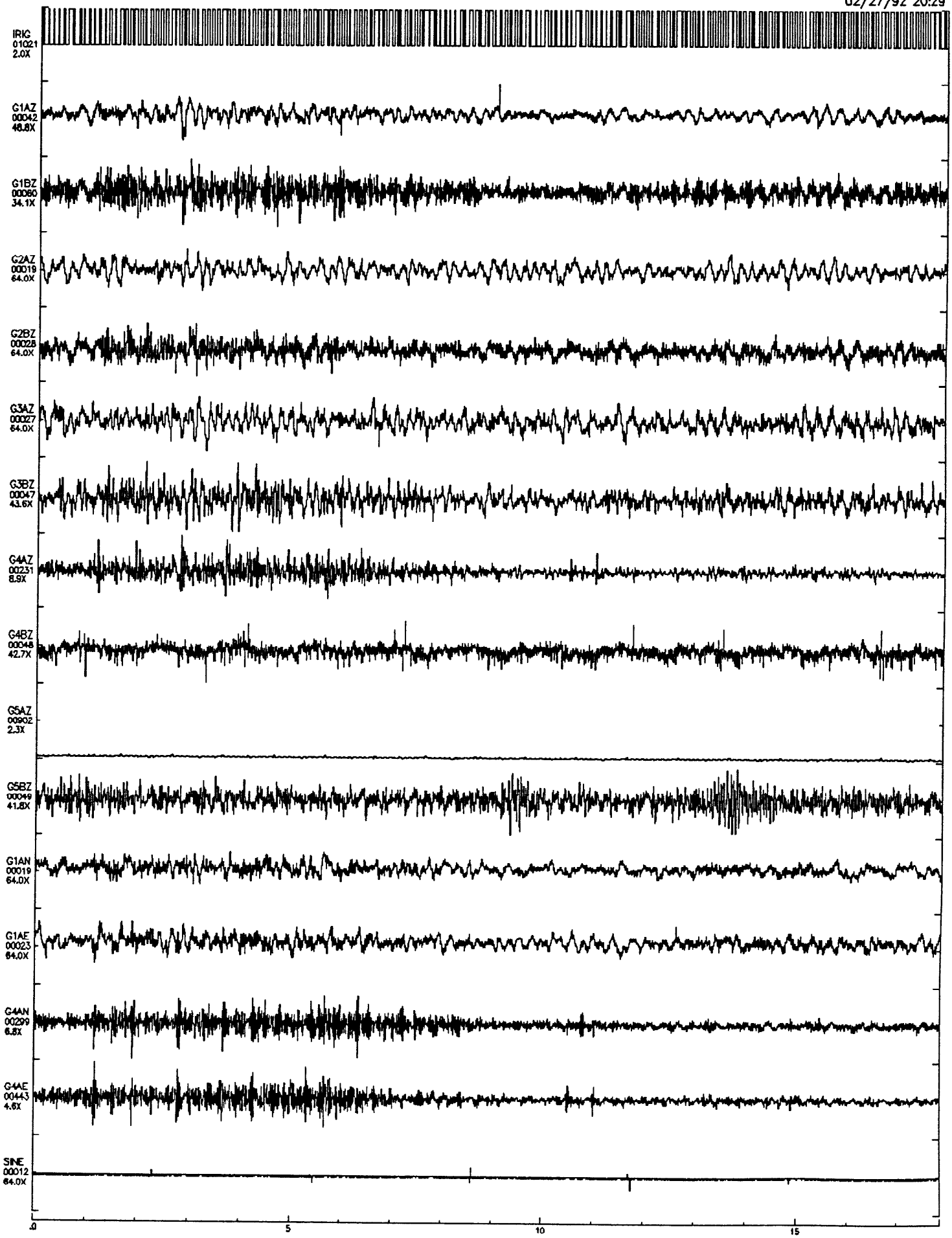

IST=11/16/90 14:53 36.909 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\9011160D.DMX
Sheet 1
02/27/92 20:24
IRIG
01022
2.0X
G1AZ
01823
1.1X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10

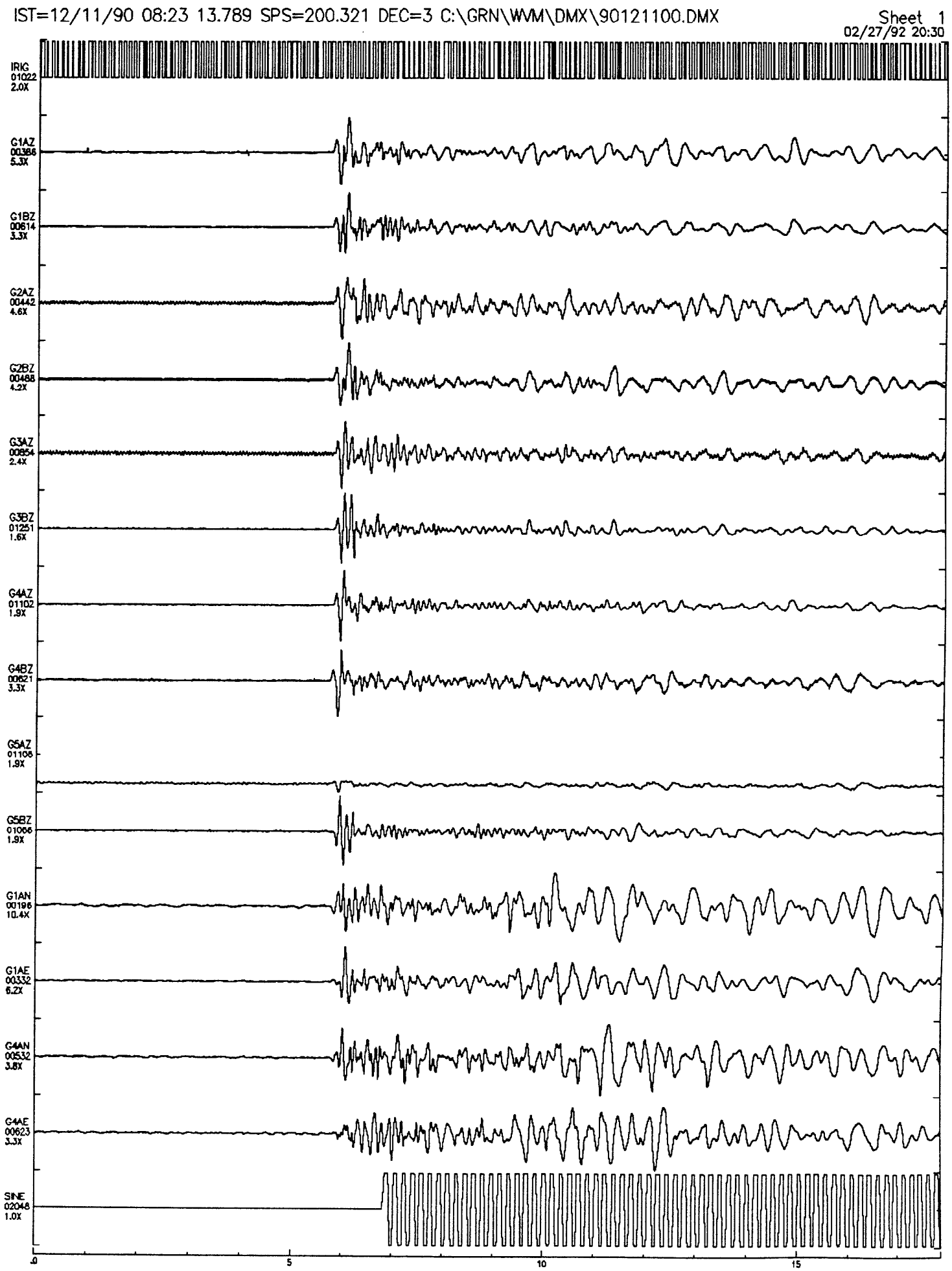

IST=11/16/90 14:59 19.400 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\9011160E.DMX
Sheet 1
02/27/92 20:25
IRIG
01022
2.0X
G1AZ
00148
14.0X
G1BZ
00239
8.6X
G2AZ
00249
8.2X
G2BZ
00429
4.8X
G3AZ
00199
10.3X
G3BZ
00355
5.8X
G4AZ
00241
8.5X
G4BZ
00216
9.5X
G5AZ
00778
2.6X
G5BZ
00200
10.2X
G1AN
00121
16.9X
G1AE
00219
9.4X
G4AN
00269
7.6X
G4AE
00468
4.4X
SINE
00012
64.0X
0
5
10

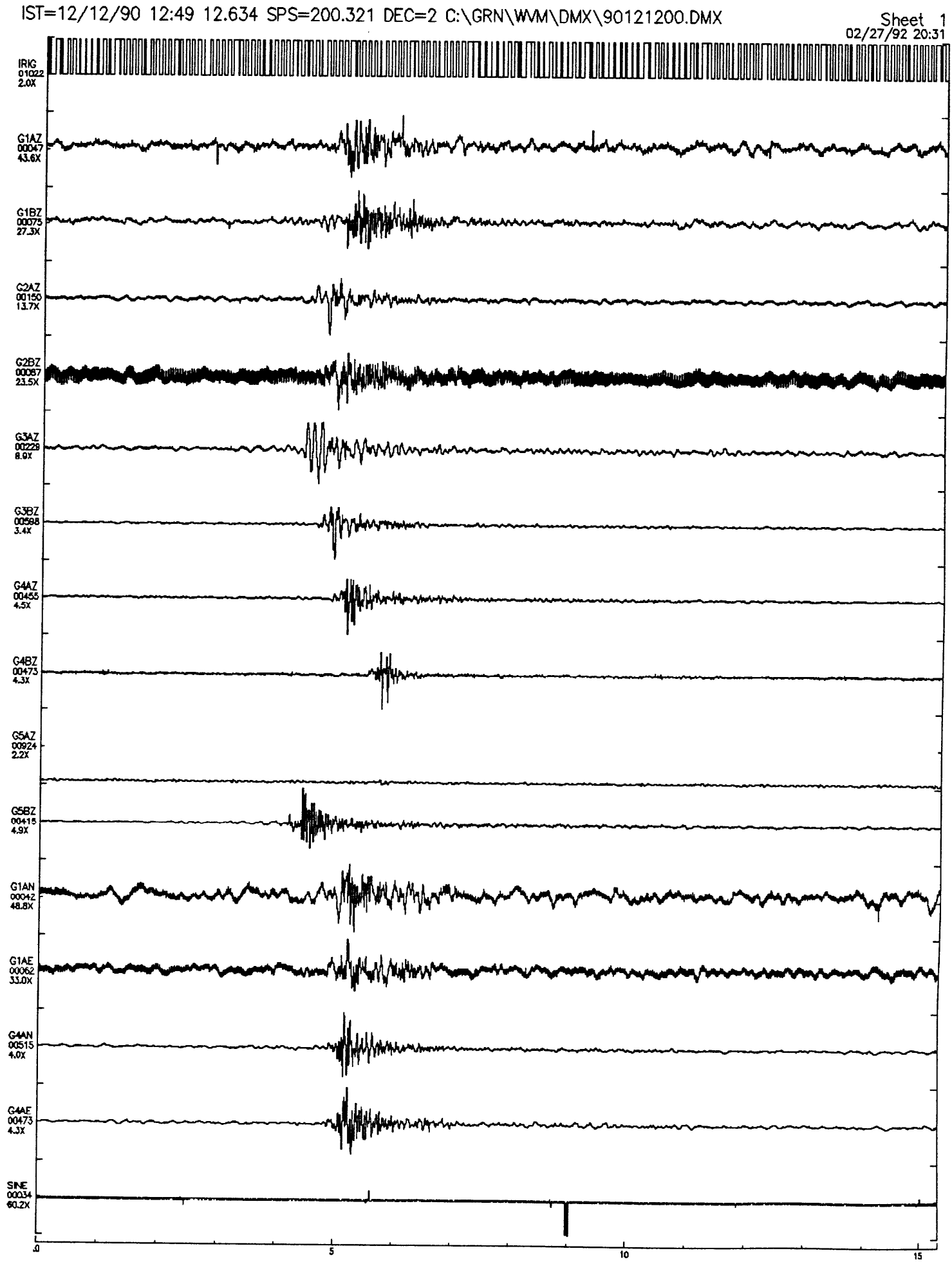

IST=11/21/90 12:24 02.742 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90112100.DMX
Sheet 1
02/27/92 20:26
IRG 01022 2.0X
G1AZ 01491 1.4X
G1BZ 02048 1.0X
G2AZ 01385 1.5X
G2BZ 01401 1.5X
G3AZ 02048 1.0X
G3BZ 02048 1.0X
G4AZ 02048 1.0X
G4BZ 02048 1.0X
G5AZ 01803 1.1X
G5BZ 02048 1.0X
G1AN 01410 1.5X
G1AE 01312 1.6X
G4AN 02048 1.0X
G4AE 02048 1.0X
SINE 02048 1.0X
0
5
10

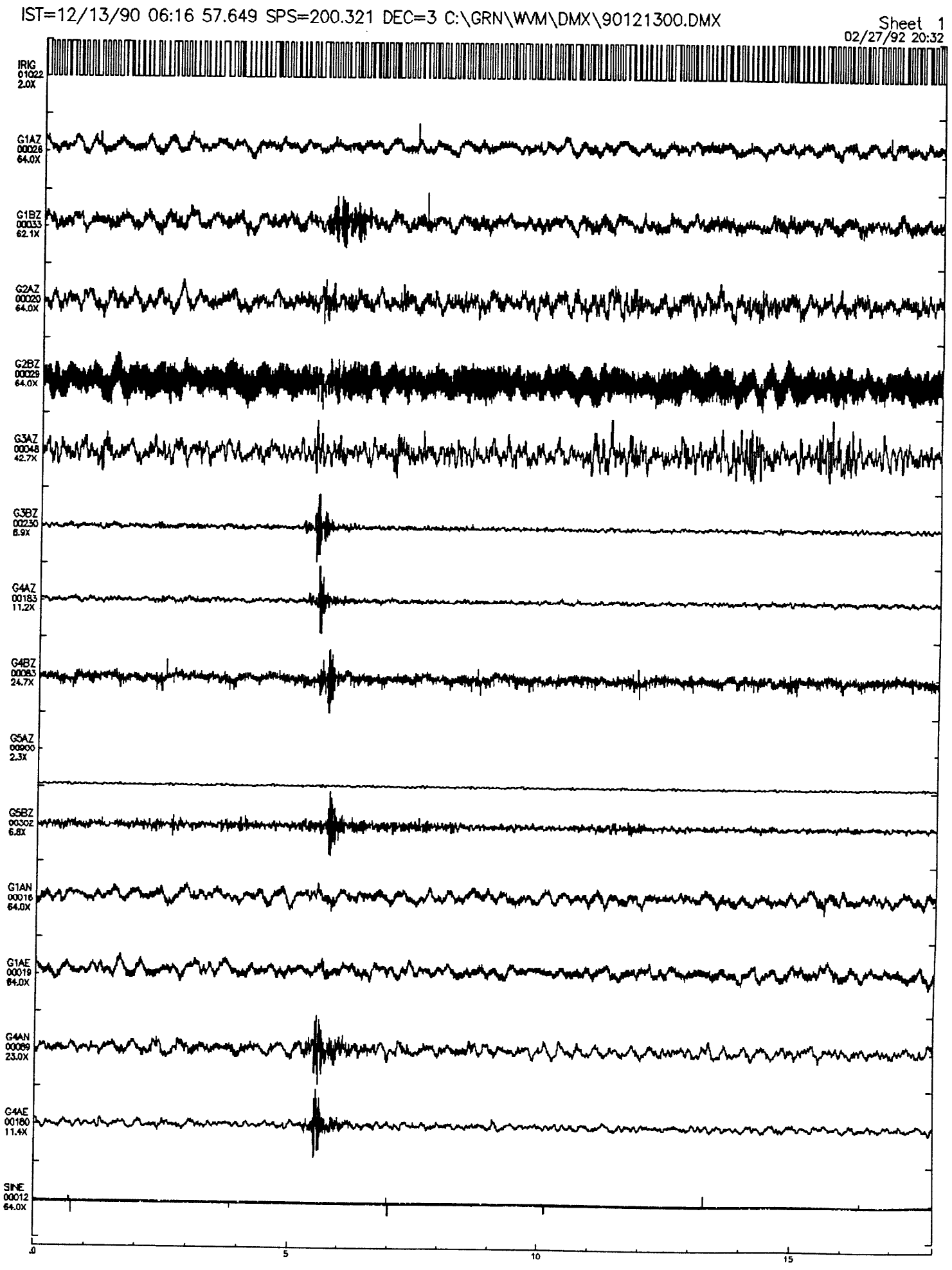

IST=11/29/90 19:11 00.667 SPS=200.321 DEC=1 C:\GRN\WVM\DMX\90112900.DMX
Sheet 1
02/27/92 20:27
IRIG
01022
2.0X
G1AZ
00038
56.9X
G1BZ
00066
31.0X
G2AZ
00035
58.5X
G2BZ
00137
14.9X
G3AZ
00035
58.5X
G3BZ
00030
64.0X
G4AZ
00037
55.4X
G4BZ
00075
27.3X
G5AZ
00900
2.3X
G5BZ
00032
64.0X
G1AN
00029
64.0X
G1AE
00038
53.9X
G4AN
00022
64.0X
G4AE
00029
64.0X
SINE
00010
64.0X
0
1
2
3
4
5
6
7

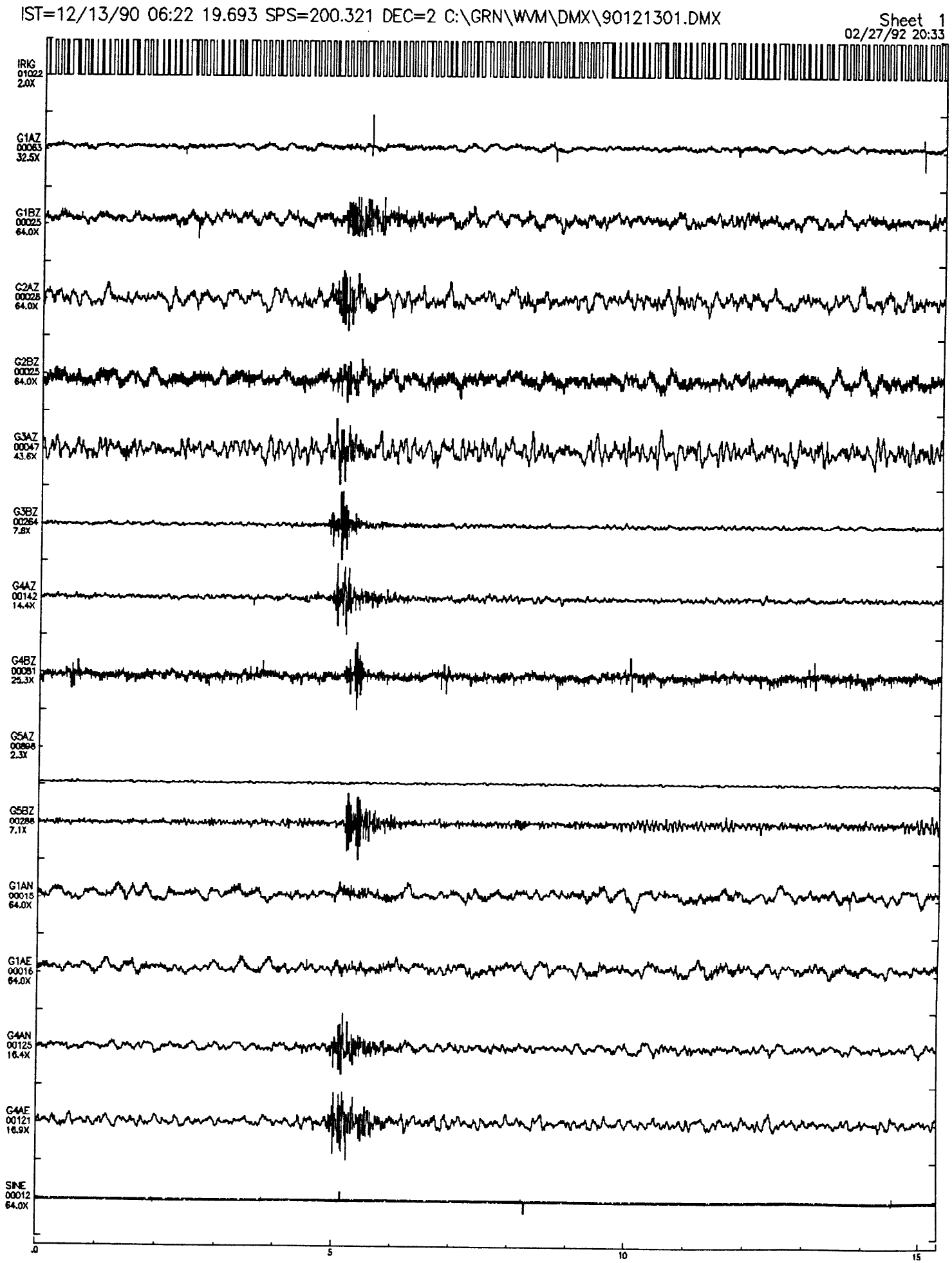

IST=12/05/90 03:18 35.284 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90120500.DMX
Sheet 1
02/27/92 20:28
IRIG
01025
2.0X
G1AZ
00079
25.9X
G1BZ
00058
36.6X
G2AZ
00034
60.2X
G2BZ
00167
12.3X
G3AZ
00031
64.0X
G3BZ
00029
64.0X
G4AZ
00042
48.8X
G4BZ
00074
27.7X
G5AZ
00902
2.3X
G5BZ
00030
64.0X
G1AN
00350
5.9X
G1AE
00626
3.3X
G4AN
00015
64.0X
G4AE
00021
64.0X
SINE
00009
64.0X
0
5
10
15

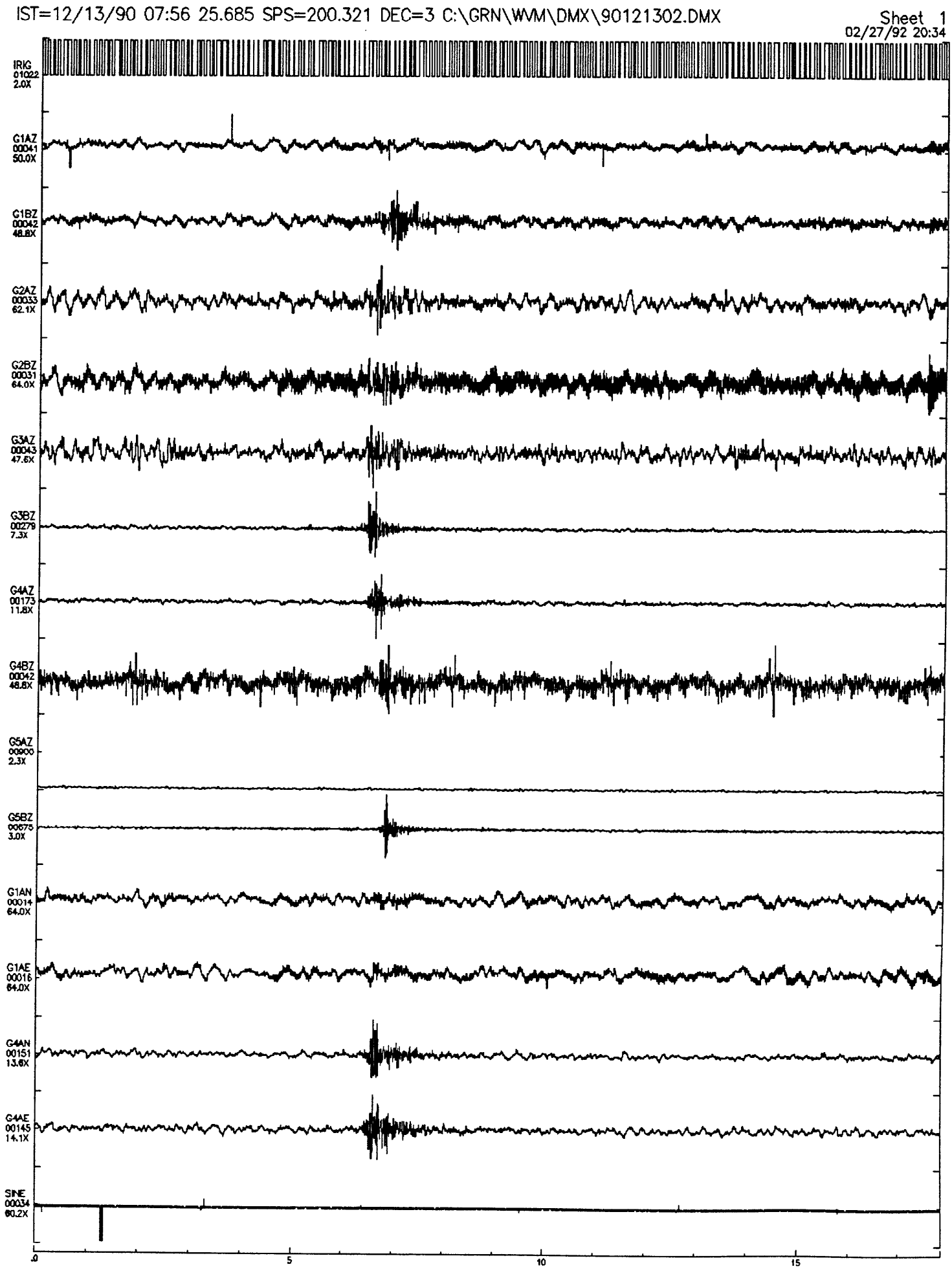

IST=12/08/90 08:56 35.722 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90120800.DMX
Sheet 1
02/27/92 20:29
IRIG
01021
2.0X
G1AZ
00042
46.8X
G1BZ
00060
34.1X
G2AZ
00019
64.0X
G2BZ
00028
64.0X
G3AZ
00027
64.0X
G3BZ
00047
43.6X
G4AZ
00231
8.9X
G4BZ
00048
42.7X
G5AZ
00902
2.3X
G5BZ
00049
41.8X
G1AN
00019
64.0X
G1AE
00023
64.0X
G4AN
00299
8.8X
G4AE
00443
4.6X
SINE
00012
64.0X
0
5
10
15

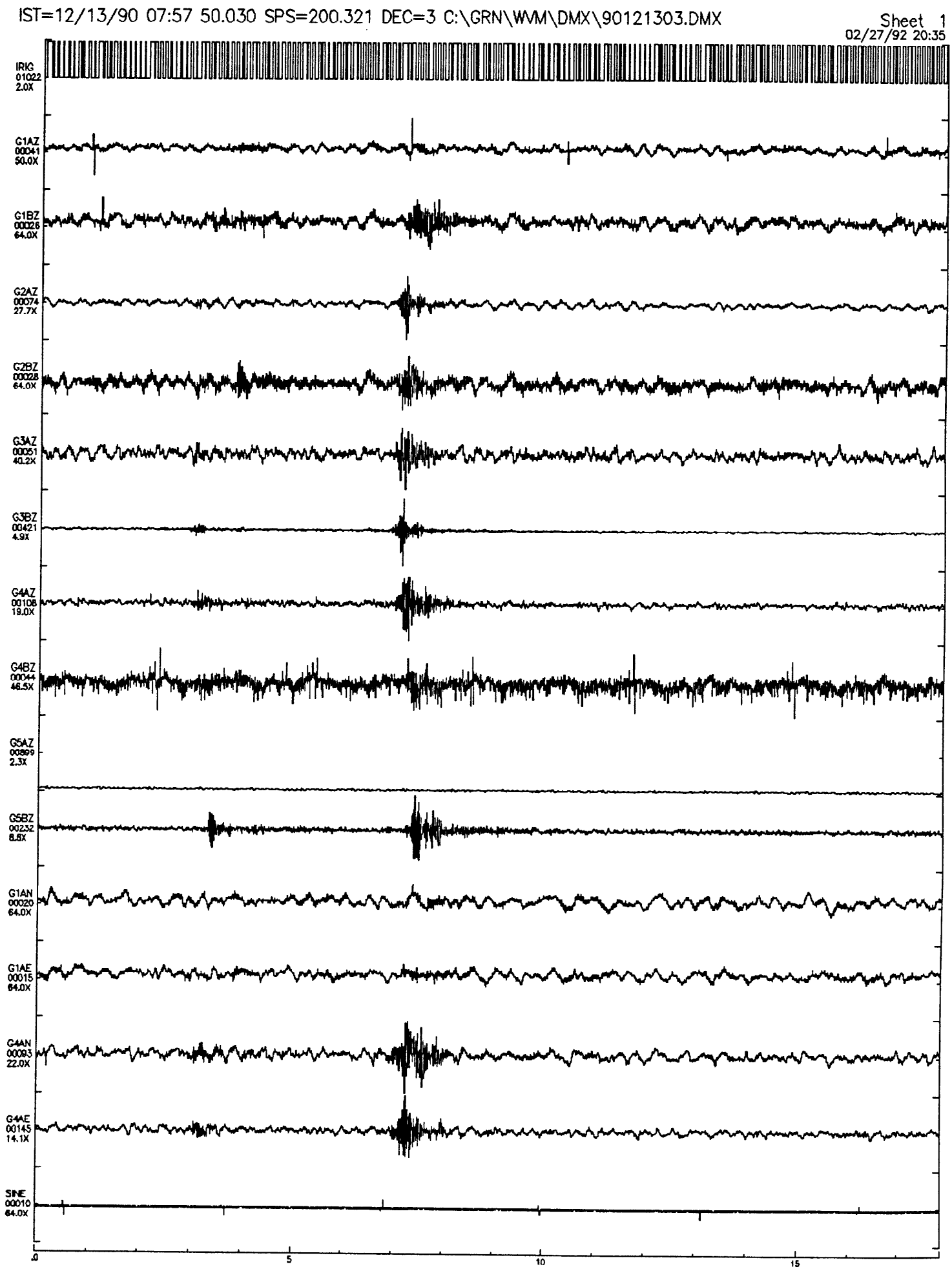

IST=12/11/90 08:23 13.789 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121100.DMX
Sheet 1
02/27/92 20:30
IRIG
01022
2.0X
G1AZ
00386
5.3X
G1BZ
00614
3.3X
G2AZ
00442
4.6X
G2BZ
00488
4.2X
G3AZ
00854
2.4X
G3BZ
01251
1.6X
G4AZ
01102
1.9X
G4BZ
00621
3.3X
G5AZ
01106
1.9X
G5BZ
01066
1.9X
G1AN
00196
10.4X
G1AE
00332
6.2X
G4AN
00532
3.8X
G4AE
00623
3.3X
SINE
02048
1.0X
0
5
10
15

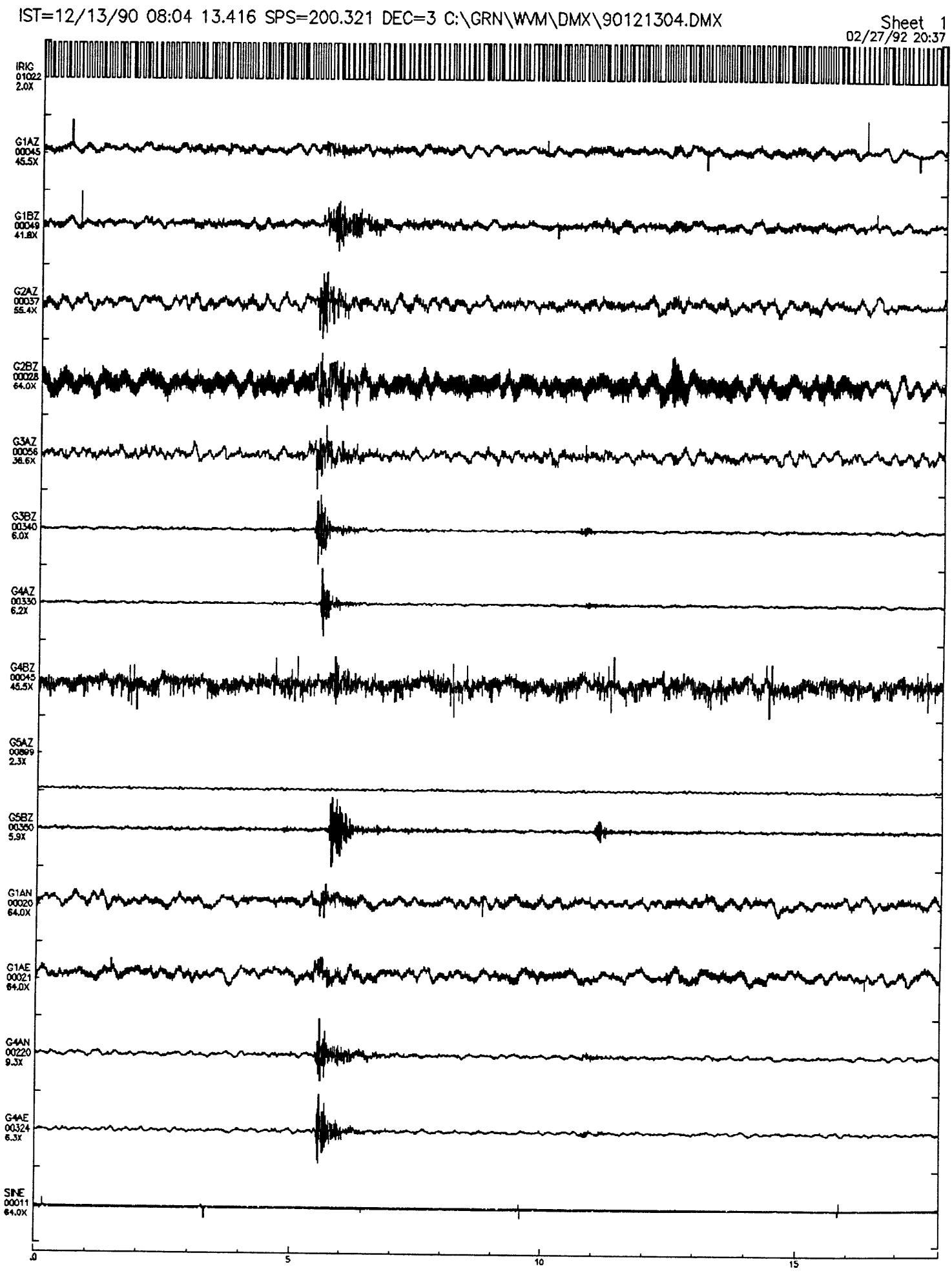

IST=12/12/90 12:49 12.634 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90121200.DMX
Sheet 1
02/27/92 20:31
IRIG
01022
2.0X
G1AZ
00047
43.6X
G1BZ
00075
27.3X
G2AZ
00150
13.7X
G2BZ
00087
23.5X
G3AZ
00228
8.9X
G3BZ
00598
3.4X
G4AZ
00455
4.5X
G4BZ
00473
4.3X
G5AZ
00924
2.2X
G5BZ
00415
4.9X
G1AN
00042
48.8X
G1AE
00062
33.0X
G4AN
00515
4.0X
G4AE
00473
4.3X
SINE
00034
60.2X
0
5
10
15

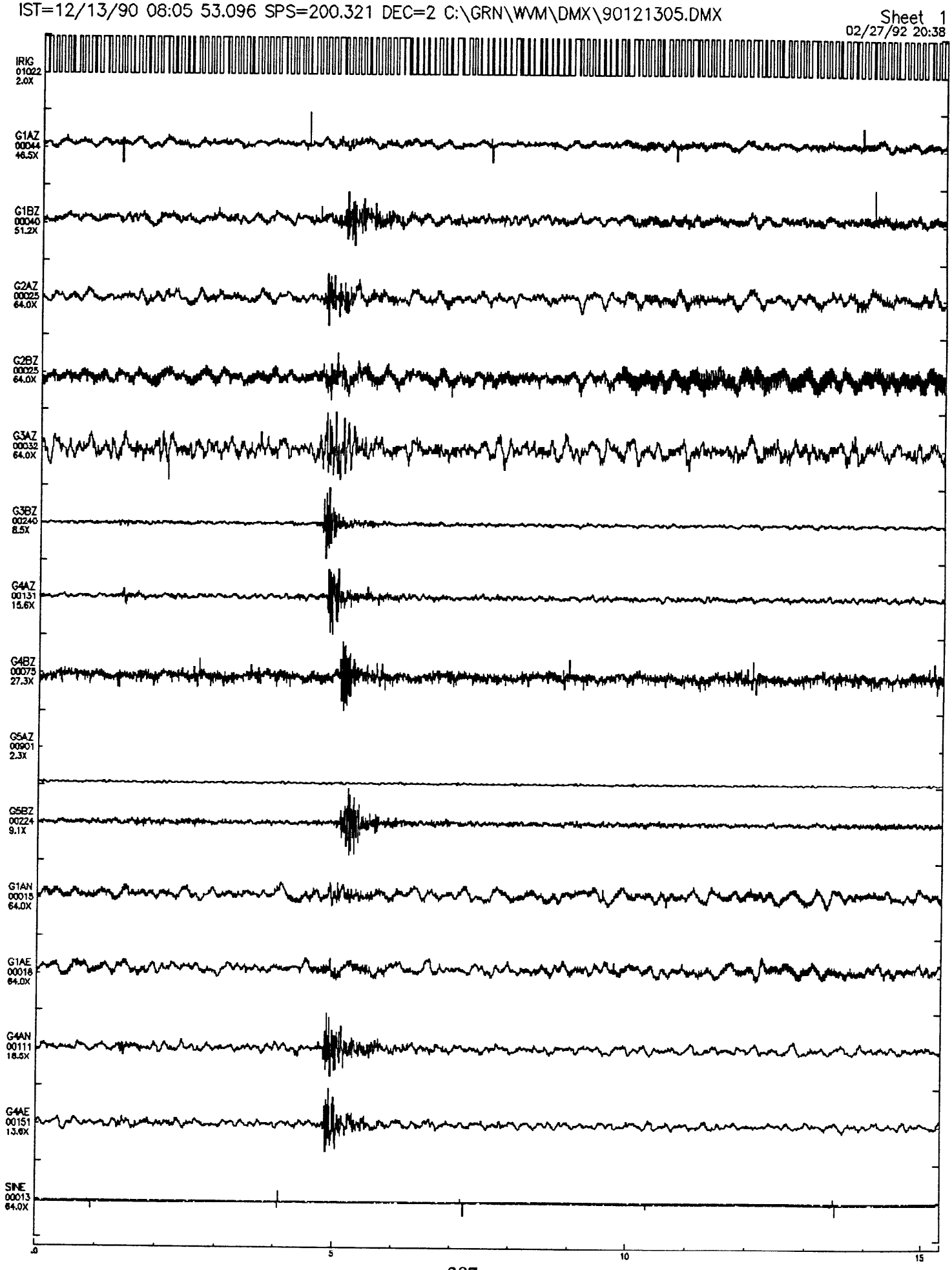

IST=12/13/90 06:16 57.649 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121300.DMX
Sheet 1
02/27/92 20:32
IRIG
01022
2.0X
G1AZ
00028
64.0X
G1BZ
00033
62.1X
G2AZ
00029
64.0X
G2BZ
00029
64.0X
G3AZ
00048
42.7X
G3BZ
00230
6.9X
G4AZ
00183
11.2X
G4BZ
00083
24.7X
G5AZ
00900
2.3X
G5BZ
00302
6.8X
G1AN
00016
64.0X
G1AE
00019
64.0X
G4AN
00089
23.0X
G4AE
00180
11.4X
SINE
00012
64.0X
0
5
10
15

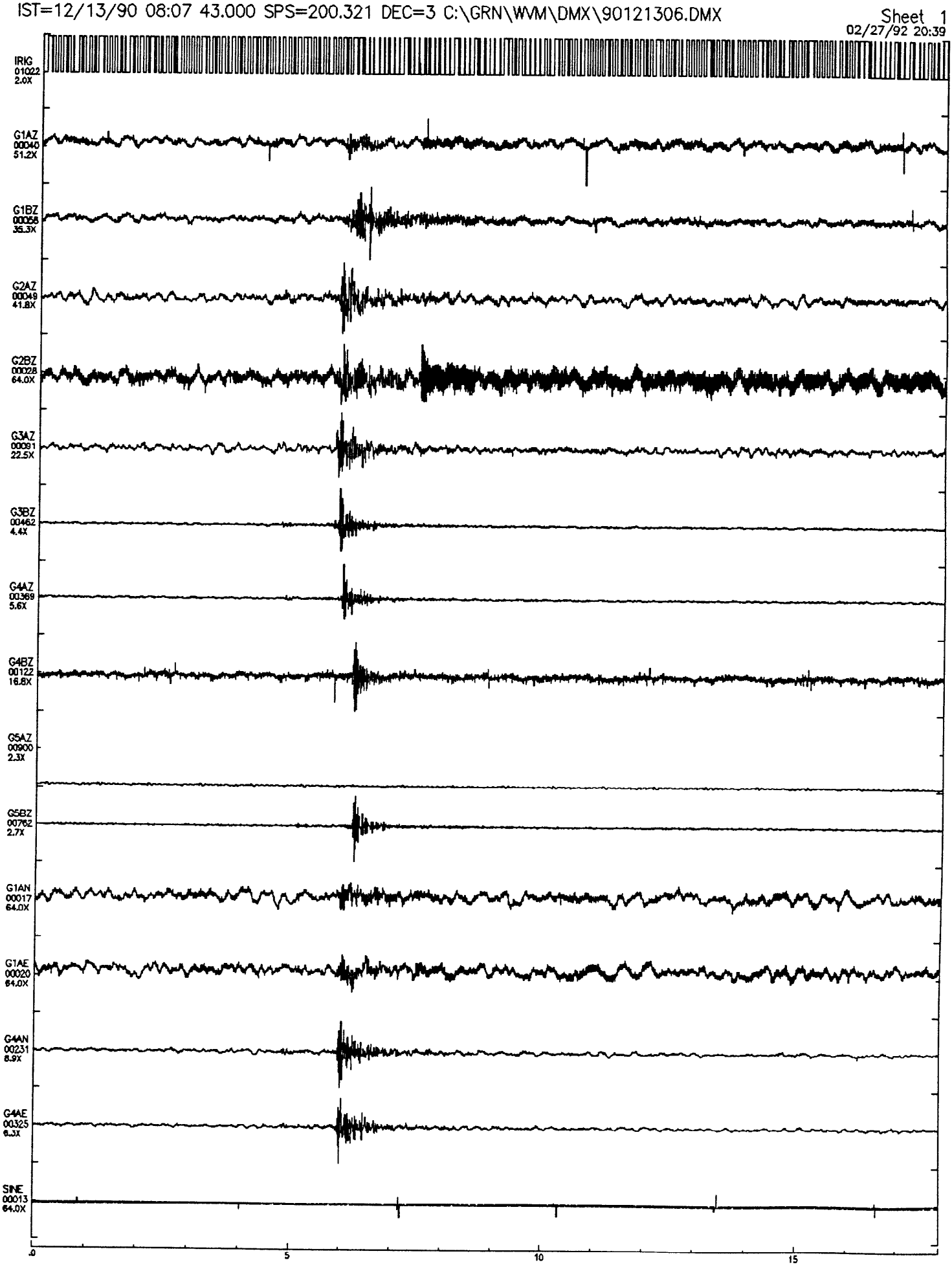

IST=12/13/90 06:22 19.693 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90121301.DMX
Sheet 1
02/27/92 20:33
IRIG
01022
2.0X
G1AZ
00083
32.5X
G1BZ
00025
64.0X
G2AZ
00028
64.0X
G2BZ
00025
64.0X
G3AZ
00047
43.6X
G3BZ
00264
7.8X
G4AZ
00142
14.4X
G4BZ
00081
25.3X
G5AZ
00898
2.3X
G5BZ
00288
7.1X
G1AN
00015
64.0X
G1AE
00016
64.0X
G4AN
00125
16.4X
G4AE
00121
16.9X
SINE
00012
64.0X
0
5
10
15

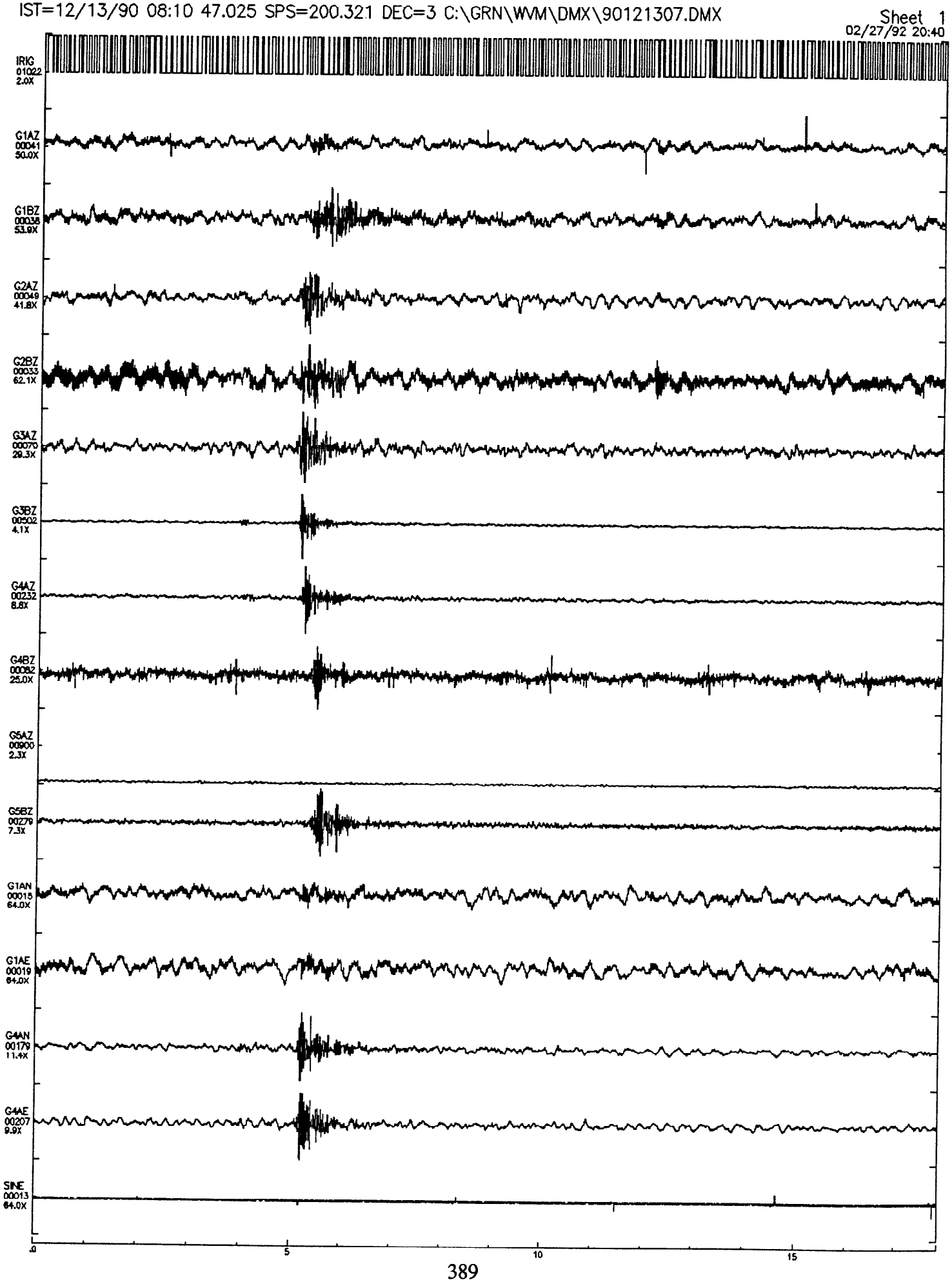

IST=12/13/90 07:56 25.685 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121302.DMX
Sheet 1
02/27/92 20:34
IRIG
01022
2.0X
G1AZ
00041
50.0X
G1BZ
00042
48.8X
G2AZ
00033
62.1X
G2BZ
00031
64.0X
G3AZ
00043
47.6X
G3BZ
00279
7.3X
G4AZ
00173
11.8X
G4BZ
00042
48.8X
G5AZ
00900
2.3X
G5BZ
00675
3.0X
G1AN
00014
64.0X
G1AE
00016
64.0X
G4AN
00151
13.6X
G4AE
00145
14.1X
SINE
00034
60.2X
0
5
10
15

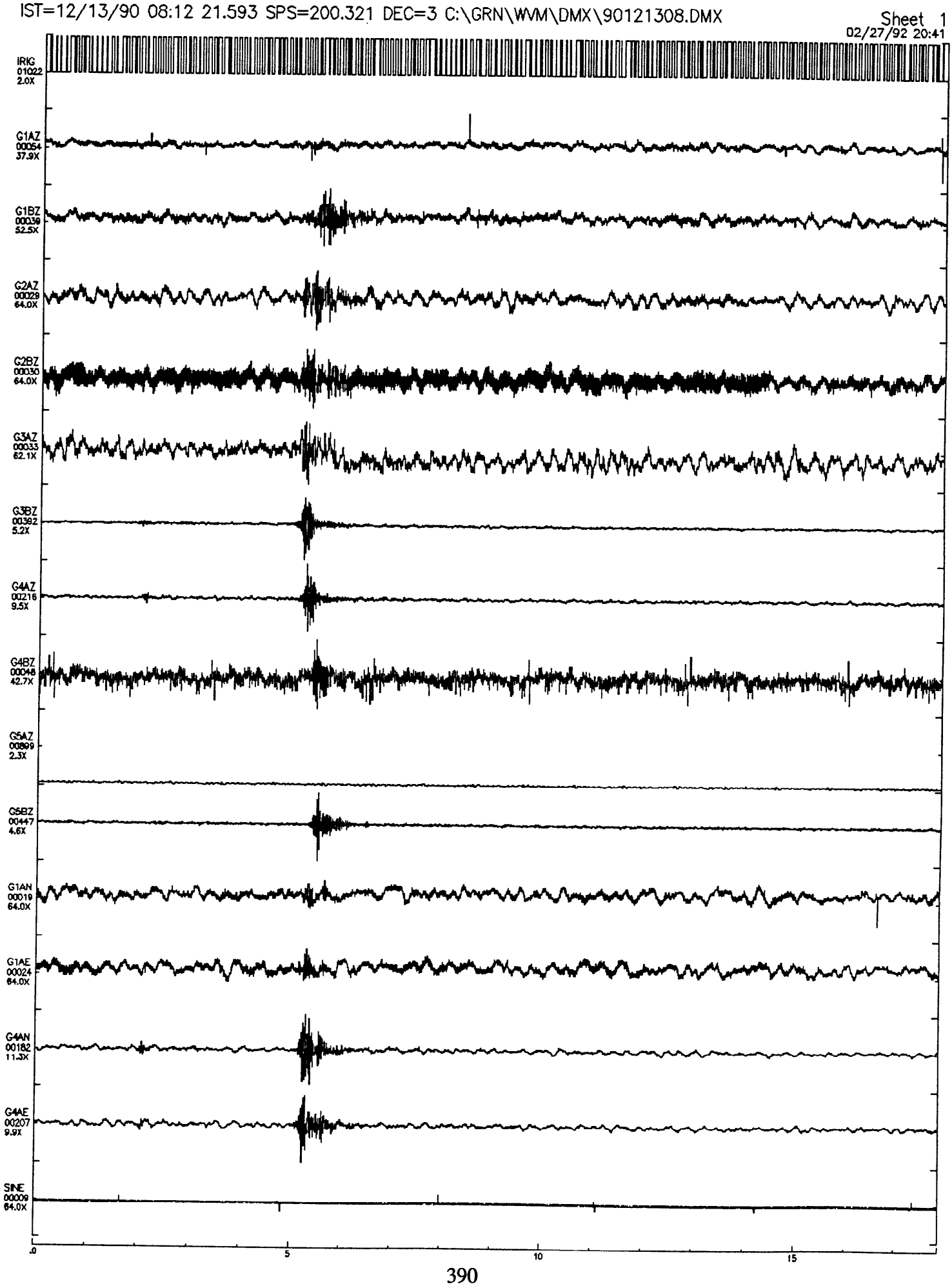

IST=12/13/90 07:57 50.030 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121303.DMX
Sheet 1
02/27/92 20:35
IRIG
01022
2.0X
G1AZ
00041
50.0X
G1BZ
00026
64.0X
G2AZ
00074
27.7X
G2BZ
00028
64.0X
G3AZ
00051
40.2X
G3BZ
00421
4.9X
G4AZ
00108
19.0X
G4BZ
00044
46.5X
G5AZ
00899
2.3X
G5BZ
00252
8.8X
G1AN
00020
64.0X
G1AE
00015
64.0X
G4AN
00093
22.0X
G4AE
00145
14.1X
SINE
00010
64.0X
0
5
10
15

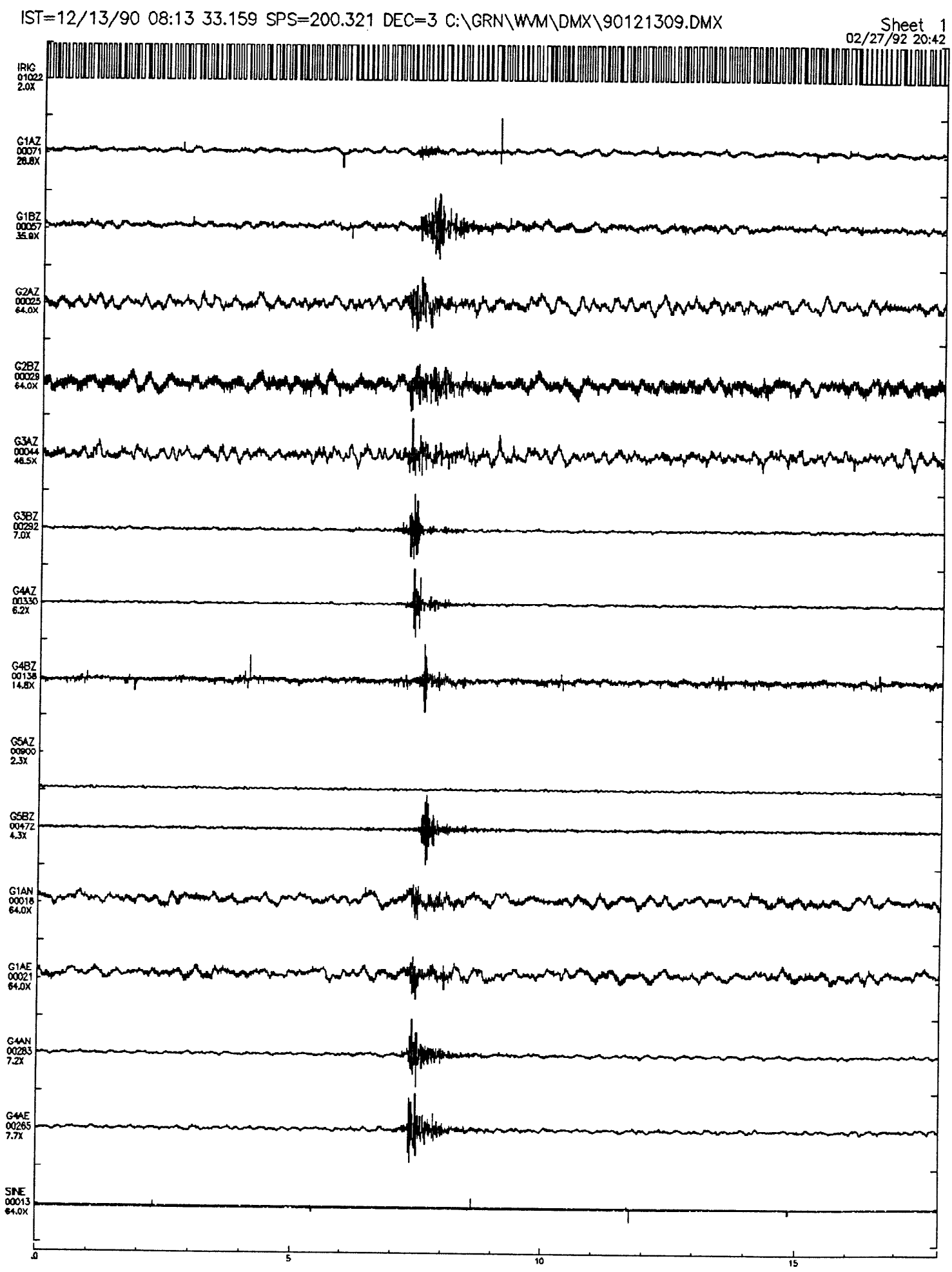

IST=12/13/90 08:04 13.416 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121304.DMX
Sheet 1
02/27/92 20:37
IRIG
01022
2.0X
G1AZ
00045
45.5X
G1BZ
00049
41.8X
G2AZ
00037
55.4X
G2BZ
00028
64.0X
G3AZ
00056
36.6X
G3BZ
00340
6.0X
G4AZ
00330
6.2X
G4BZ
00045
45.5X
G5AZ
00899
2.3X
G5BZ
00360
5.9X
G1AN
00020
64.0X
G1AE
00021
64.0X
G4AN
00220
9.3X
G4AE
00324
6.3X
SINE
00011
64.0X
0
5
10
15

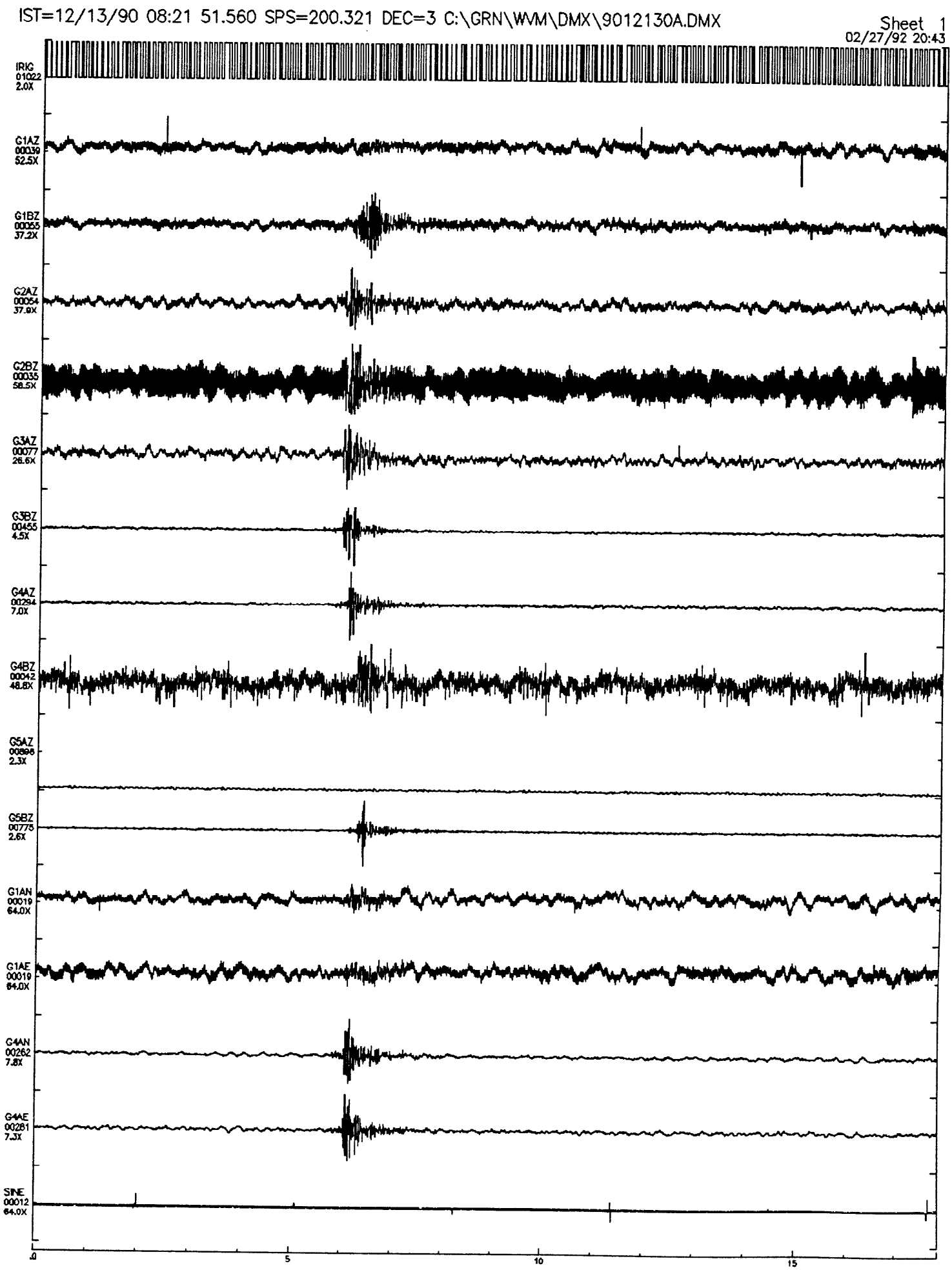

IST=12/13/90 08:05 53.096 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90121305.DMX
Sheet 1
02/27/92 20:38
IRIG
01022
2.0X
G1AZ
00044
46.5X
G1BZ
00040
51.2X
G2AZ
00025
64.0X
G2BZ
00025
64.0X
G3AZ
00032
64.0X
G3BZ
00240
8.5X
G4AZ
00131
15.6X
G4BZ
00075
27.3X
G5AZ
00901
2.3X
G5BZ
00224
9.1X
G1AN
00015
64.0X
G1AE
00018
64.0X
G4AN
00111
18.5X
G4AE
00151
13.6X
SINE
00013
64.0X
0
5
10
15

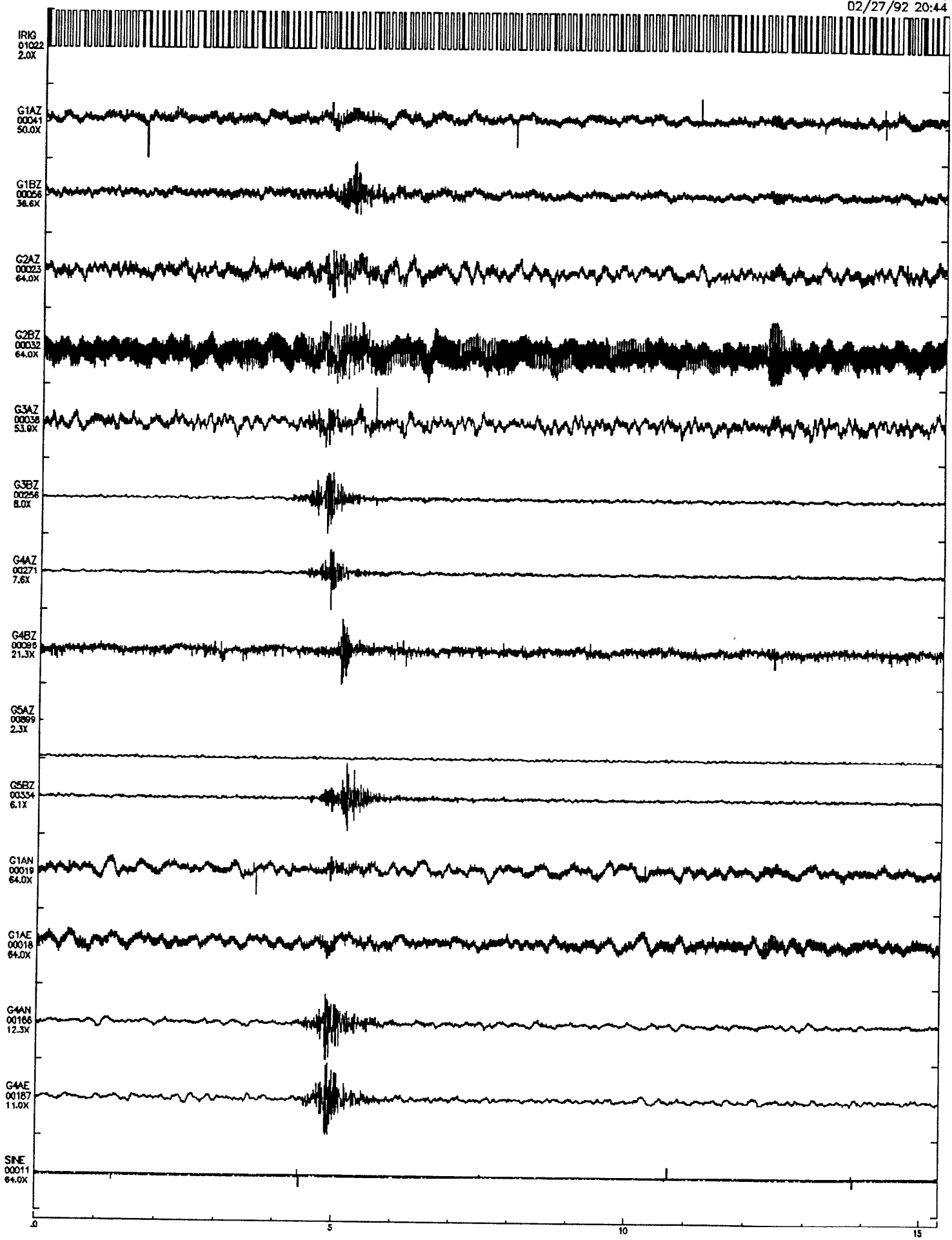

IST=12/13/90 08:07 43.000 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121306.DMX
Sheet 1
02/27/92 20:39
IRIG
01022
2.0X
G1AZ
00040
51.2X
G1BZ
00058
35.3X
G2AZ
00049
41.8X
G2BZ
00028
64.0X
G3AZ
00091
22.5X
G3BZ
00462
4.4X
G4AZ
00369
5.6X
G4BZ
00122
16.8X
G5AZ
00900
2.3X
G5BZ
00762
2.7X
G1AN
00017
64.0X
G1AE
00020
64.0X
G4AN
00231
8.9X
G4AE
00325
6.3X
SINE
00013
64.0X
0
5
10
15

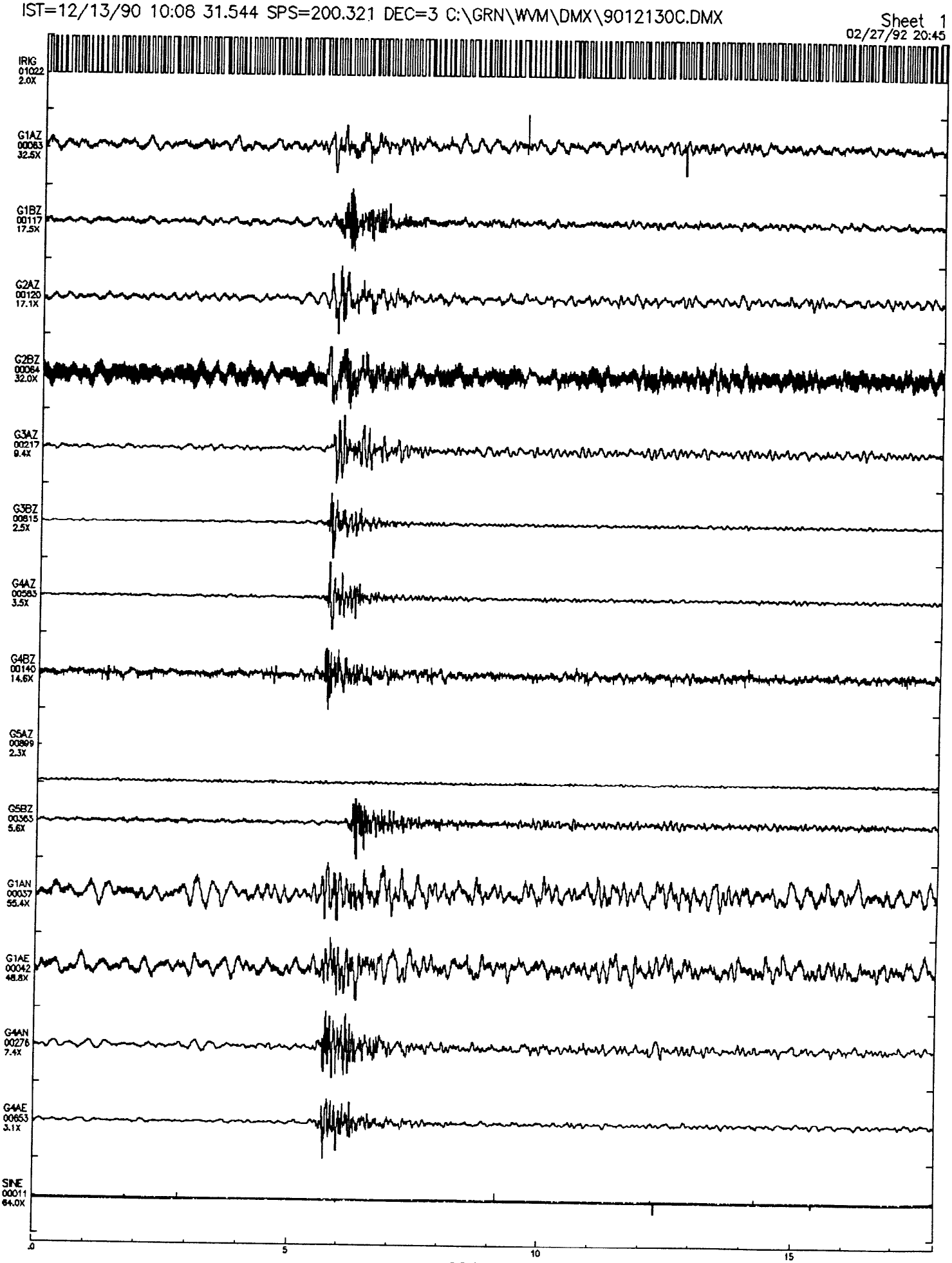

IST=12/13/90 08:10 47.025 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121307.DMX
Sheet 1
02/27/92 20:40
IRIG
01022
2.0X
G1AZ
00041
50.0X
G1BZ
00038
53.9X
G2AZ
00049
41.8X
G2BZ
00033
62.1X
G3AZ
00070
29.3X
G3BZ
00502
4.1X
G4AZ
00232
8.8X
G4BZ
00082
25.0X
G5AZ
00900
2.3X
G5BZ
00279
7.3X
G1AN
00015
64.0X
G1AE
00019
64.0X
G4AN
00179
11.4X
G4AE
00207
9.9X
SINE
00013
64.0X
0
5
10
15

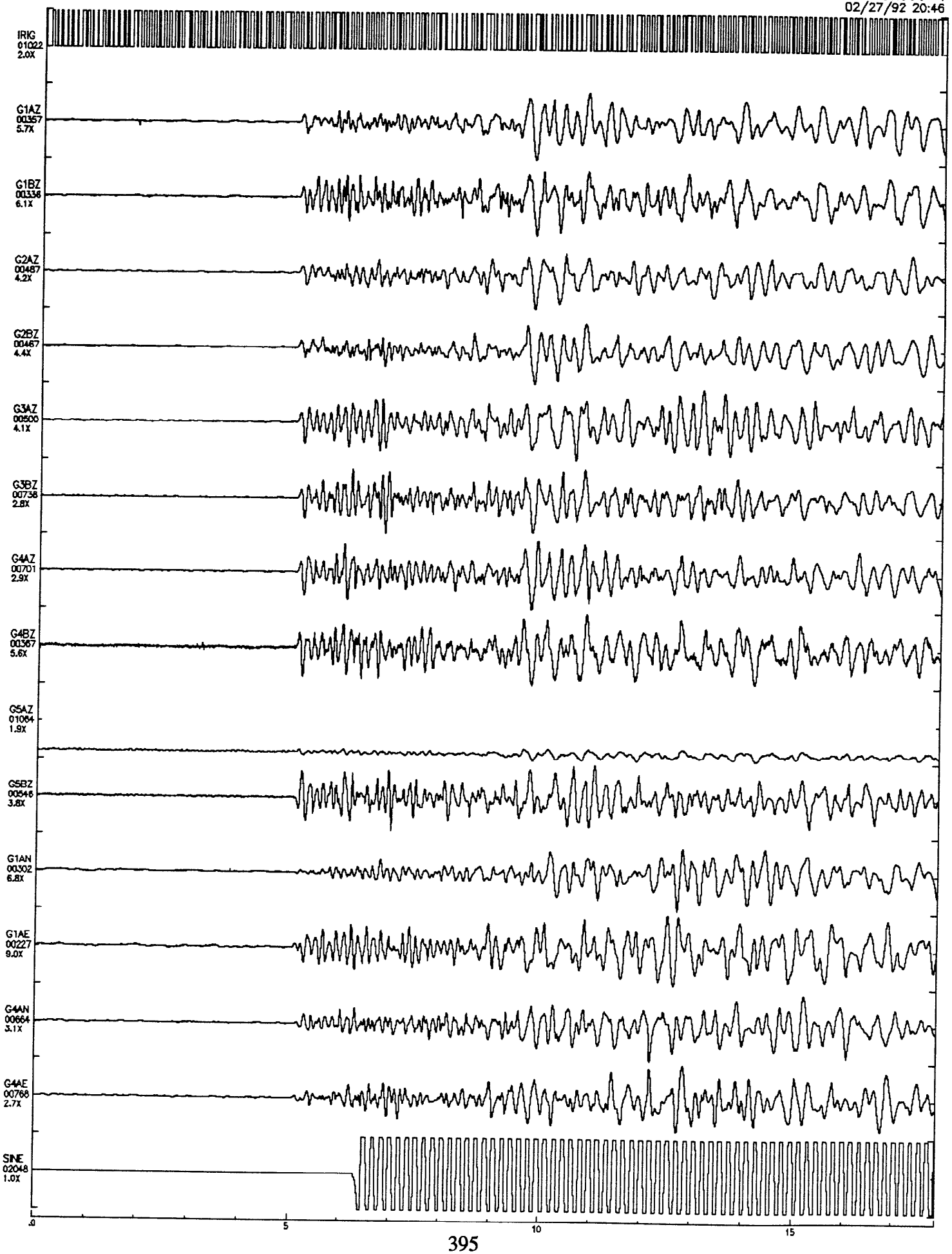

IST=12/13/90 08:12 21.593 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121308.DMX
Sheet 1
02/27/92 20:41
IRIG
01022
2.0X
G1AZ
00054
37.9X
G1BZ
00039
52.5X
G2AZ
00029
64.0X
G2BZ
00030
64.0X
G3AZ
00033
62.1X
G3BZ
00392
5.2X
G4AZ
00216
9.5X
G4BZ
00048
42.7X
G5AZ
00899
2.3X
G5BZ
00447
4.6X
G1AN
00019
64.0X
G1AE
00024
64.0X
G4AN
00182
11.3X
G4AE
00207
9.9X
SINE
00009
64.0X
0
5
10
15

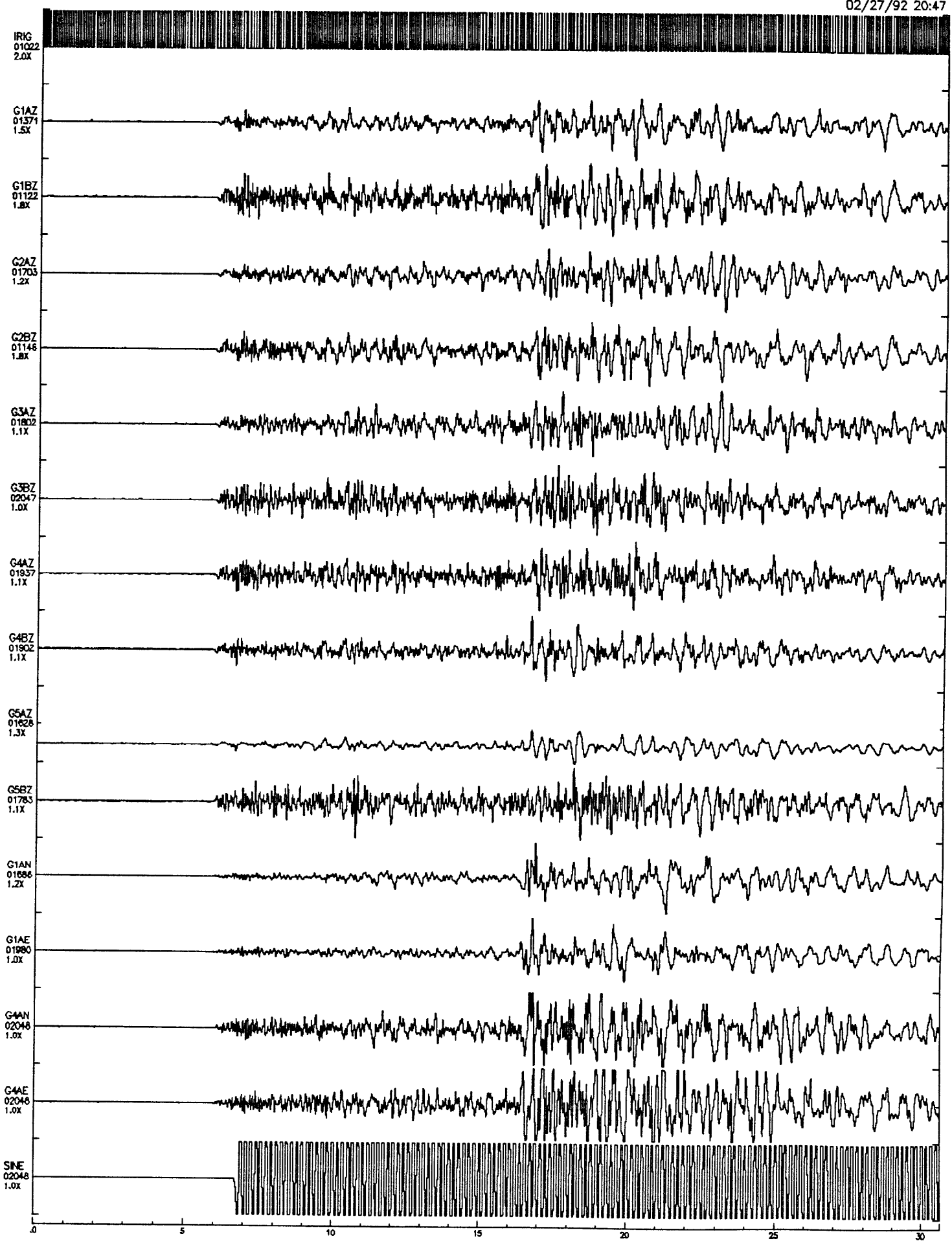

IST=12/13/90 08:13 33.159 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121309.DMX
Sheet 1
02/27/92 20:42
IRIG
01022
2.0X
G1AZ
00071
28.8X
G1BZ
00057
35.0X
G2AZ
00025
64.0X
G2BZ
00029
64.0X
G3AZ
00044
46.5X
G3BZ
00292
7.0X
G4AZ
00330
6.2X
G4BZ
00138
14.8X
G5AZ
00900
2.3X
G5BZ
00472
4.3X
G1AN
00018
64.0X
G1AE
00021
64.0X
G4AN
00283
7.2X
G4AE
00265
7.7X
SINE
00013
64.0X
0
5
10
15

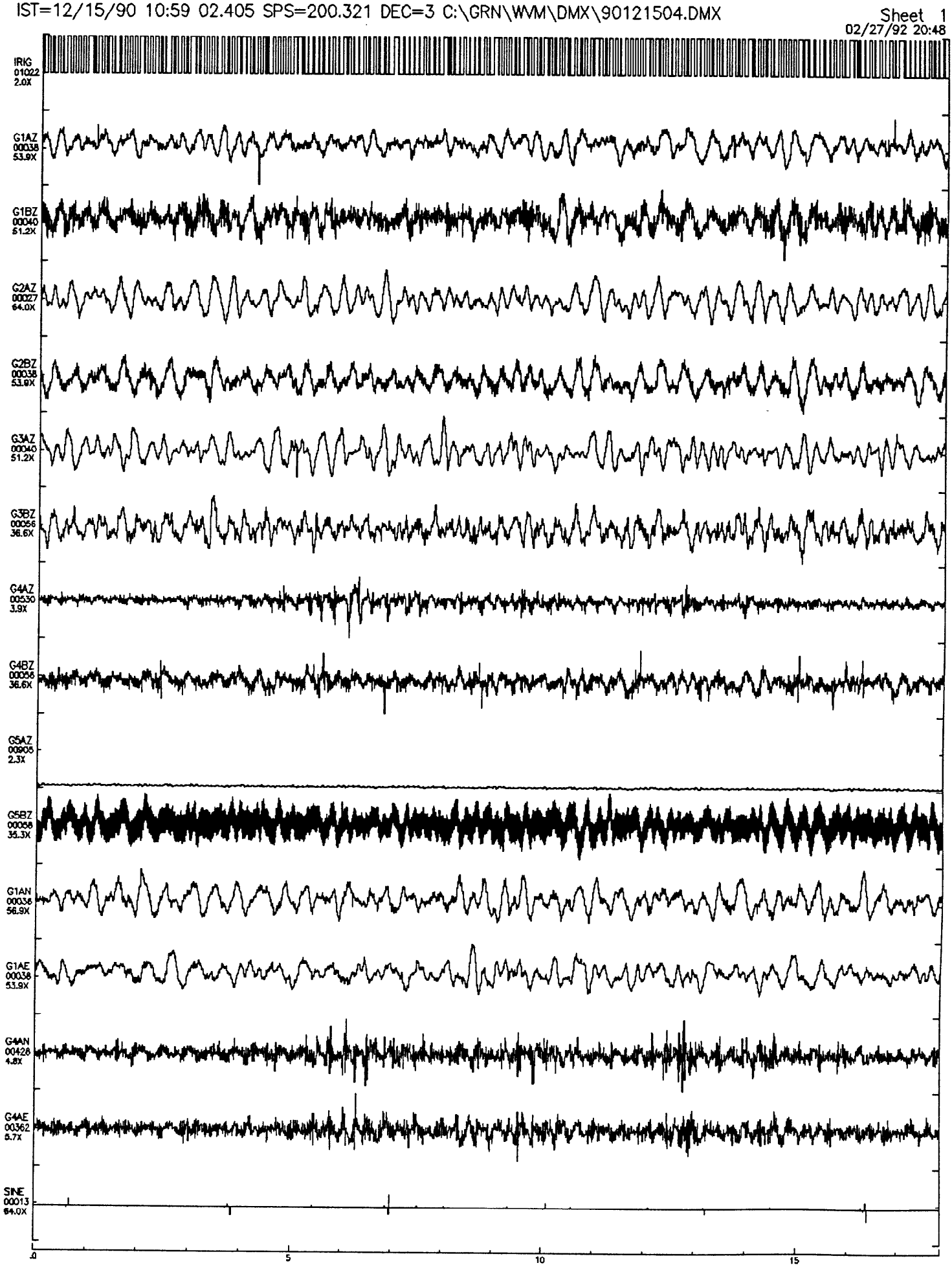

IST=12/13/90 08:21 51.560 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\9012130A.DMX
Sheet 1
02/27/92 20:43
IRIG
01022
2.0X
G1AZ
00039
52.5X
G1BZ
00055
37.2X
G2AZ
00054
37.9X
G2BZ
00035
58.5X
G3AZ
00077
26.6X
G3BZ
00455
4.5X
G4AZ
00294
7.0X
G4BZ
00042
48.8X
G5AZ
00898
2.3X
G5BZ
00775
2.6X
G1AN
00019
64.0X
G1AE
00019
64.0X
G4AN
00262
7.8X
G4AE
00281
7.3X
SINE
00012
64.0X
0
5
10
15

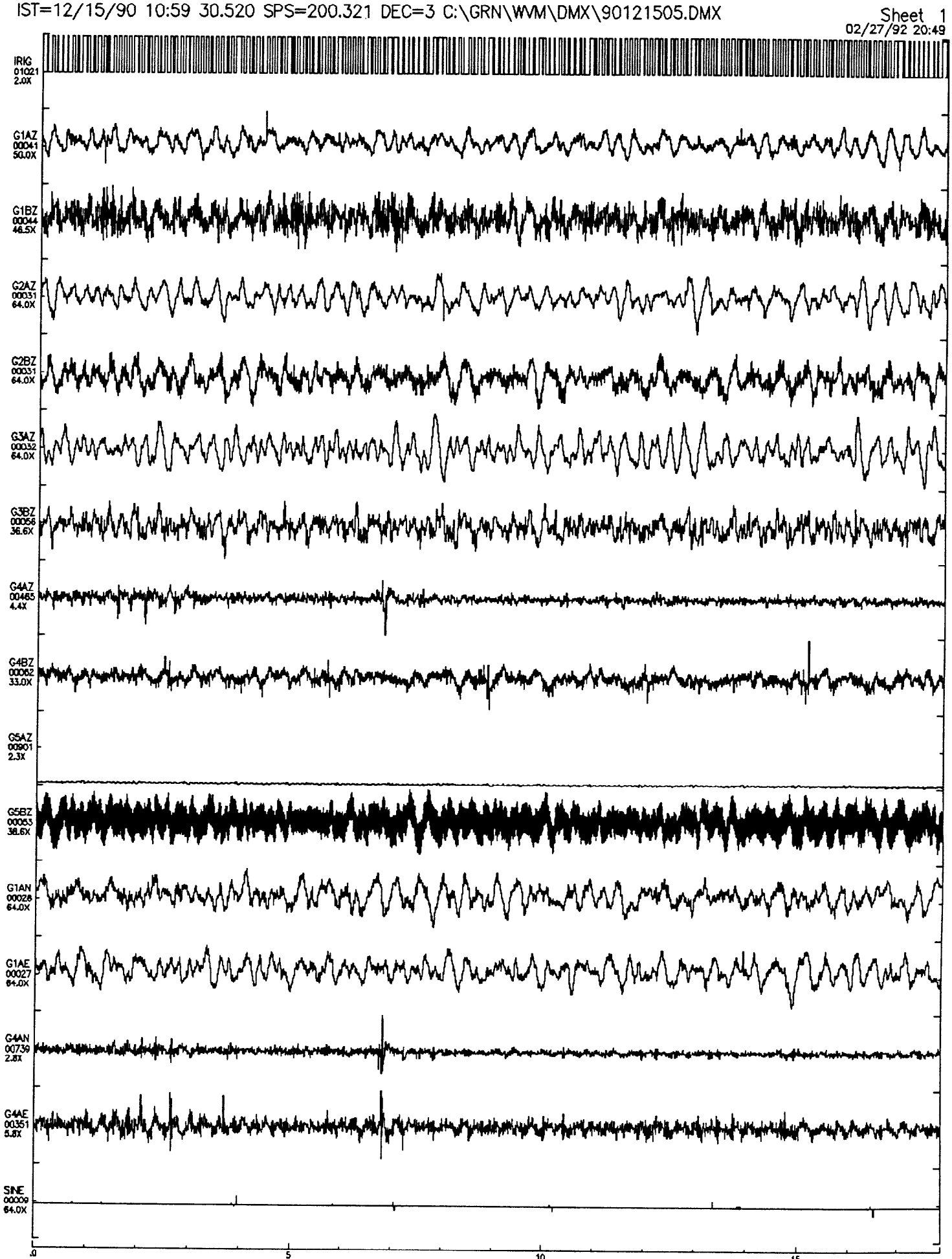

IST=12/13/90 08:32 07.533 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\9012130B.DMX
Sheet 1
02/27/92 20:44
IRIG
01022
2.0X
G1AZ
00041
50.0X
G1BZ
00056
36.6X
G2AZ
00023
64.0X
G2BZ
00032
64.0X
G3AZ
00038
53.0X
G3BZ
00256
8.0X
G4AZ
00271
7.6X
G4BZ
00095
21.3X
G5AZ
00899
2.3X
G5BZ
00334
6.1X
G1AN
00019
64.0X
G1AE
00018
64.0X
G4AN
00166
12.3X
G4AE
00187
11.0X
SINE
00011
64.0X
0
5
10
15

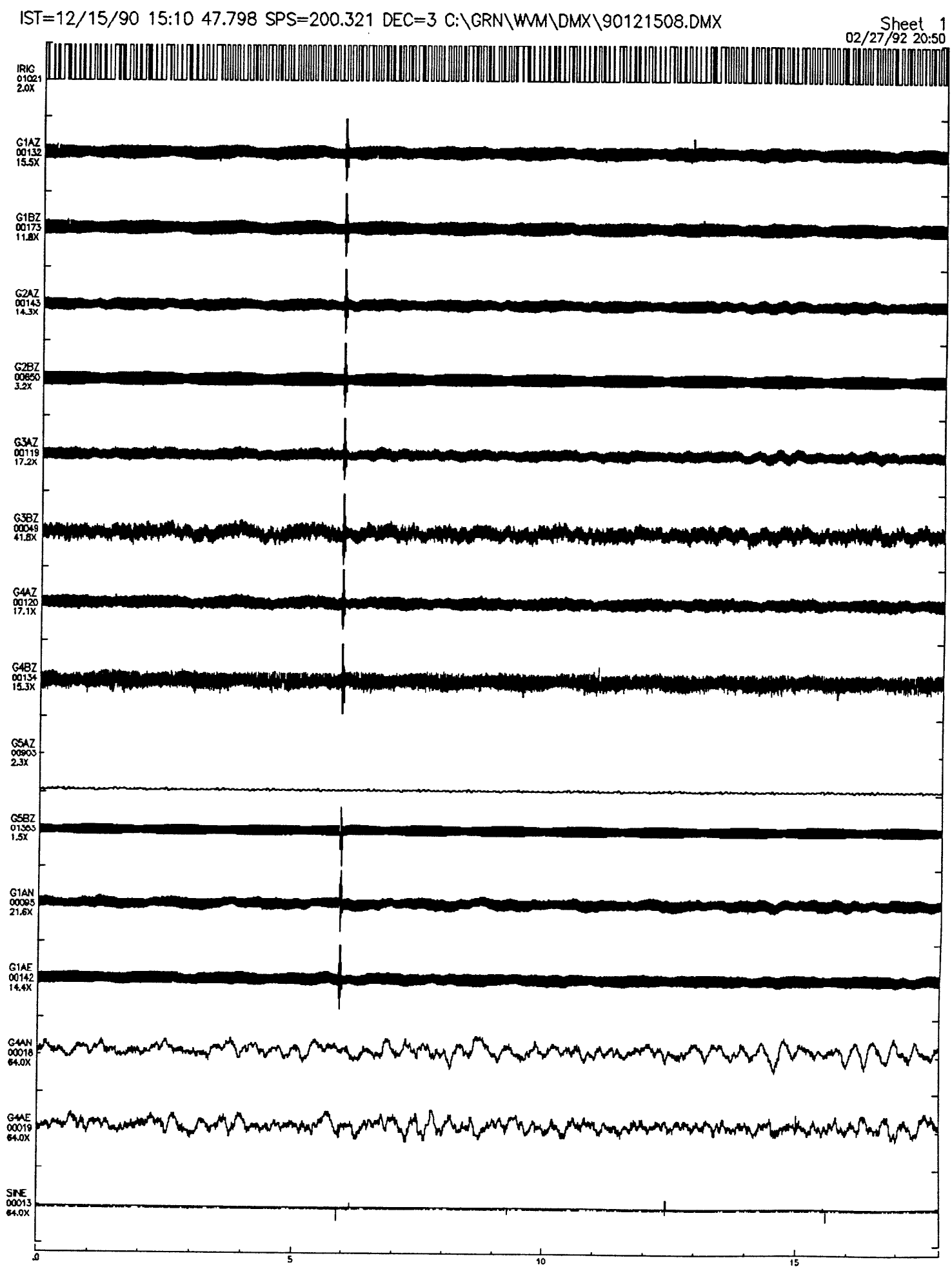

IST=12/13/90 10:08 31.544 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\9012130C.DMX
Sheet 1
02/27/92 20:45
IRIG
01022
2.0X
G1AZ
00083
32.5X
G1BZ
00117
17.5X
G2AZ
00120
17.1X
G2BZ
00084
32.0X
G3AZ
00217
9.4X
G3BZ
00815
2.5X
G4AZ
00583
3.5X
G4BZ
00140
14.6X
G5AZ
00899
2.3X
G5BZ
00365
5.6X
G1AN
00057
55.4X
G1AE
00042
48.8X
G4AN
00276
7.4X
G4AE
00653
3.1X
SINE
00011
64.0X
0
5
10
15

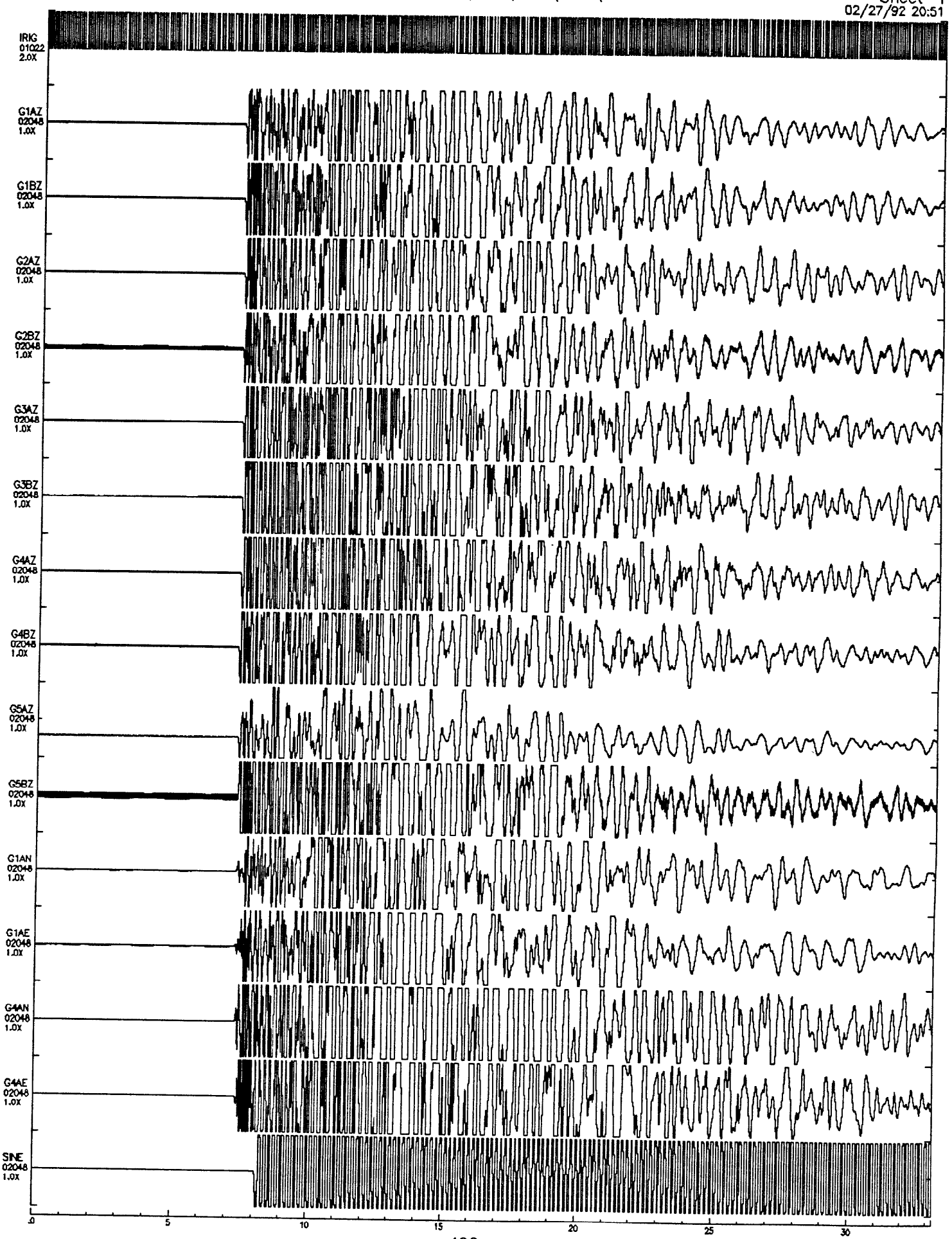

IST=12/15/90 09:38 49.638 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121502.DMX
Sheet 1
02/27/92 20:46
IRIG
01022
2.0X
G1AZ
00357
5.7X
G1BZ
00336
6.1X
G2AZ
00487
4.2X
G2BZ
00467
4.4X
G3AZ
00500
4.1X
G3BZ
00736
2.8X
G4AZ
00701
2.9X
G4BZ
00367
5.6X
G5AZ
01064
1.9X
G5BZ
00546
3.8X
G1AN
00302
6.8X
G1AE
00227
9.0X
G4AN
00664
3.1X
G4AE
00766
2.7X
SINE
02048
1.0X
0
5
10
15

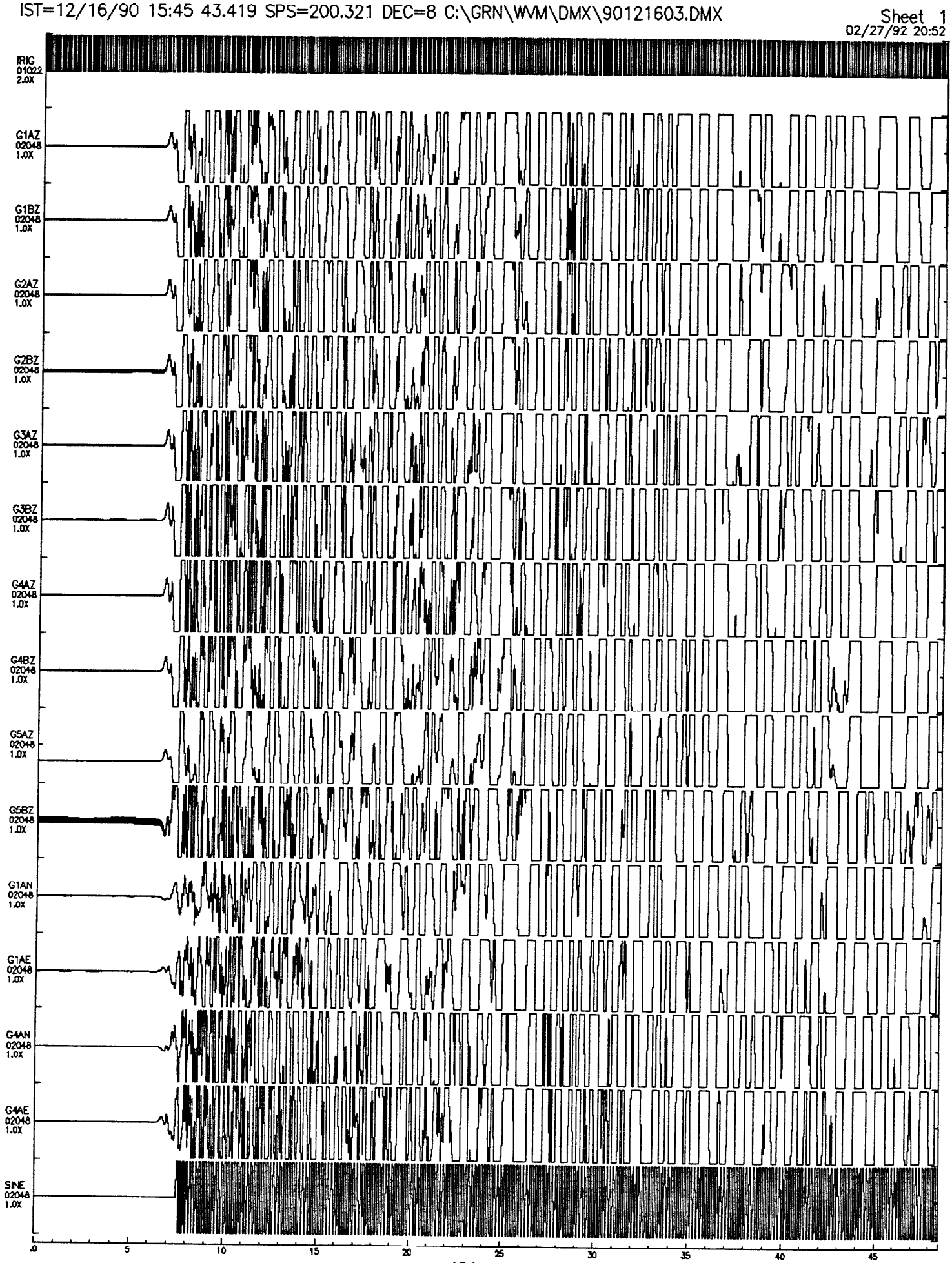

IST=12/15/90 10:38 12.568 SPS=200.321 DEC=5 C:\GRN\WVM\DMX\90121503.DMX
Sheet 1
02/27/92 20:47
IRIG
01022
2.0X
G1AZ
01371
1.5X
G1BZ
01122
1.8X
G2AZ
01703
1.2X
G2BZ
01146
1.8X
G3AZ
01802
1.1X
G3BZ
02047
1.0X
G4AZ
01937
1.1X
G4BZ
01902
1.1X
G5AZ
01628
1.3X
G5BZ
01783
1.1X
G1AN
01686
1.2X
G1AE
01980
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10
15
20
25
30

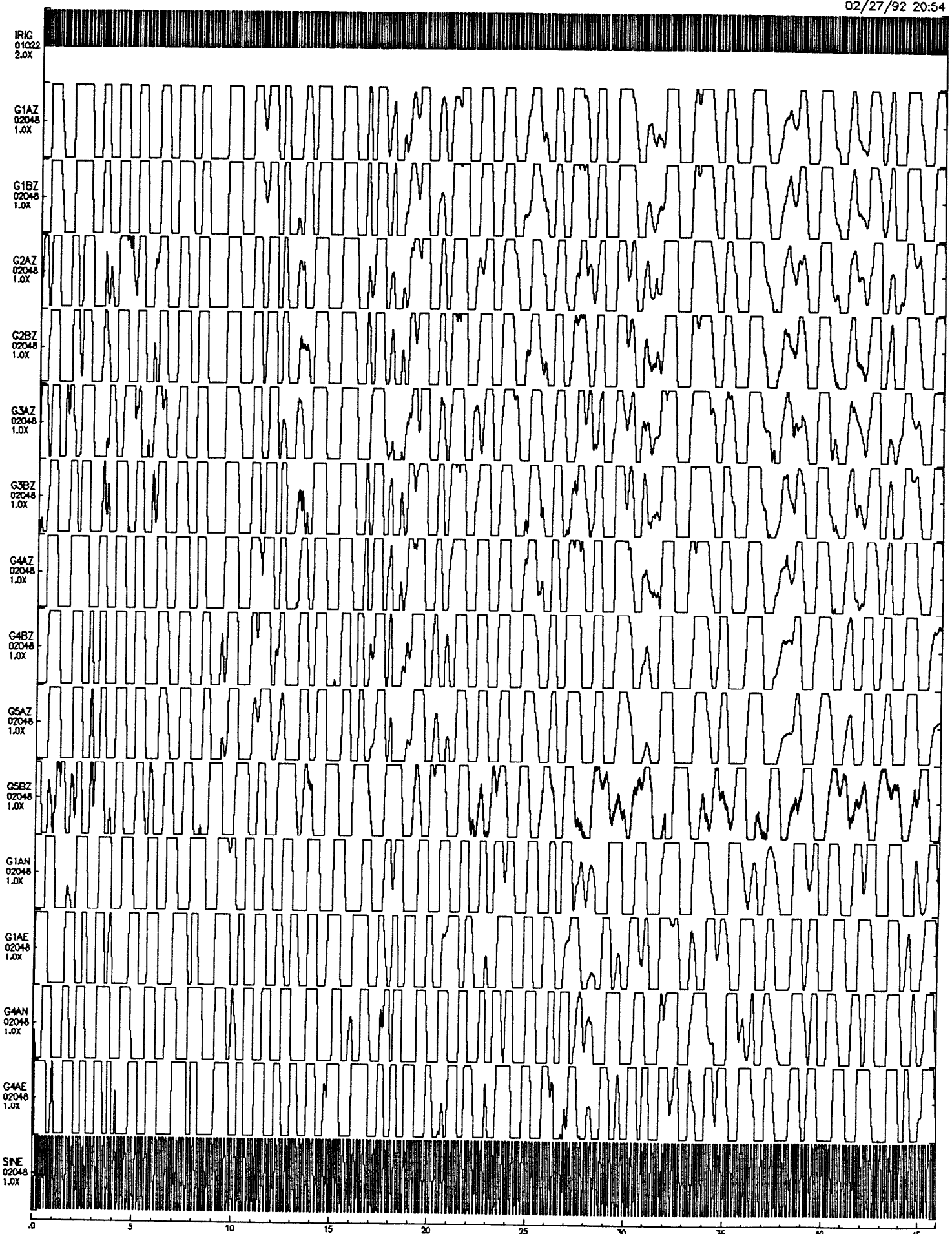

IST=12/15/90 10:59 02.405 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121504.DMX
Sheet 1
02/27/92 20:48
IRIG
01022
2.0X
G1AZ
00038
53.9X
G1BZ
00040
51.2X
G2AZ
00027
64.0X
G2BZ
00038
53.9X
G3AZ
00040
51.2X
G3BZ
00056
36.6X
G4AZ
00530
3.9X
G4BZ
00056
36.6X
G5AZ
00905
2.3X
G5BZ
00056
35.3X
G1AN
00038
56.9X
G1AE
00038
53.9X
G4AN
00428
4.8X
G4AE
00362
5.7X
SINE
00013
64.0X
0
5
10
15

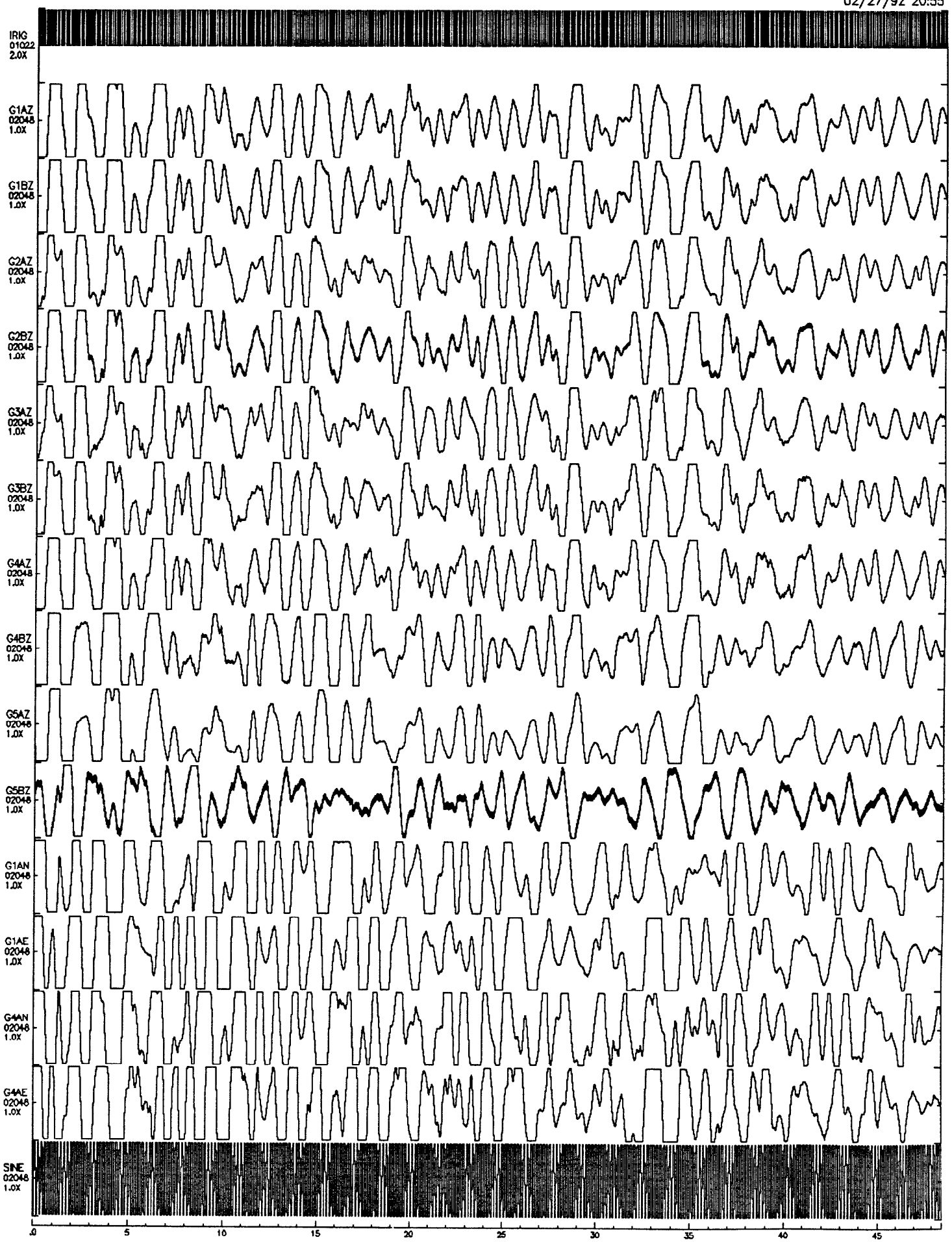

IST=12/15/90 10:59 30.520 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121505.DMX
Sheet 1
02/27/92 20:49
IRIG
01021
2.0X
G1AZ
00041
50.0X
G1BZ
00044
46.5X
G2AZ
00031
64.0X
G2BZ
00031
64.0X
G3AZ
00032
64.0X
G3BZ
00056
36.6X
G4AZ
00465
4.4X
G4BZ
00062
33.0X
G5AZ
00901
2.3X
G5BZ
00063
36.6X
G1AN
00026
64.0X
G1AE
00027
64.0X
G4AN
00739
2.8X
G4AE
00351
5.8X
SINE
00009
64.0X
0
5
10
15

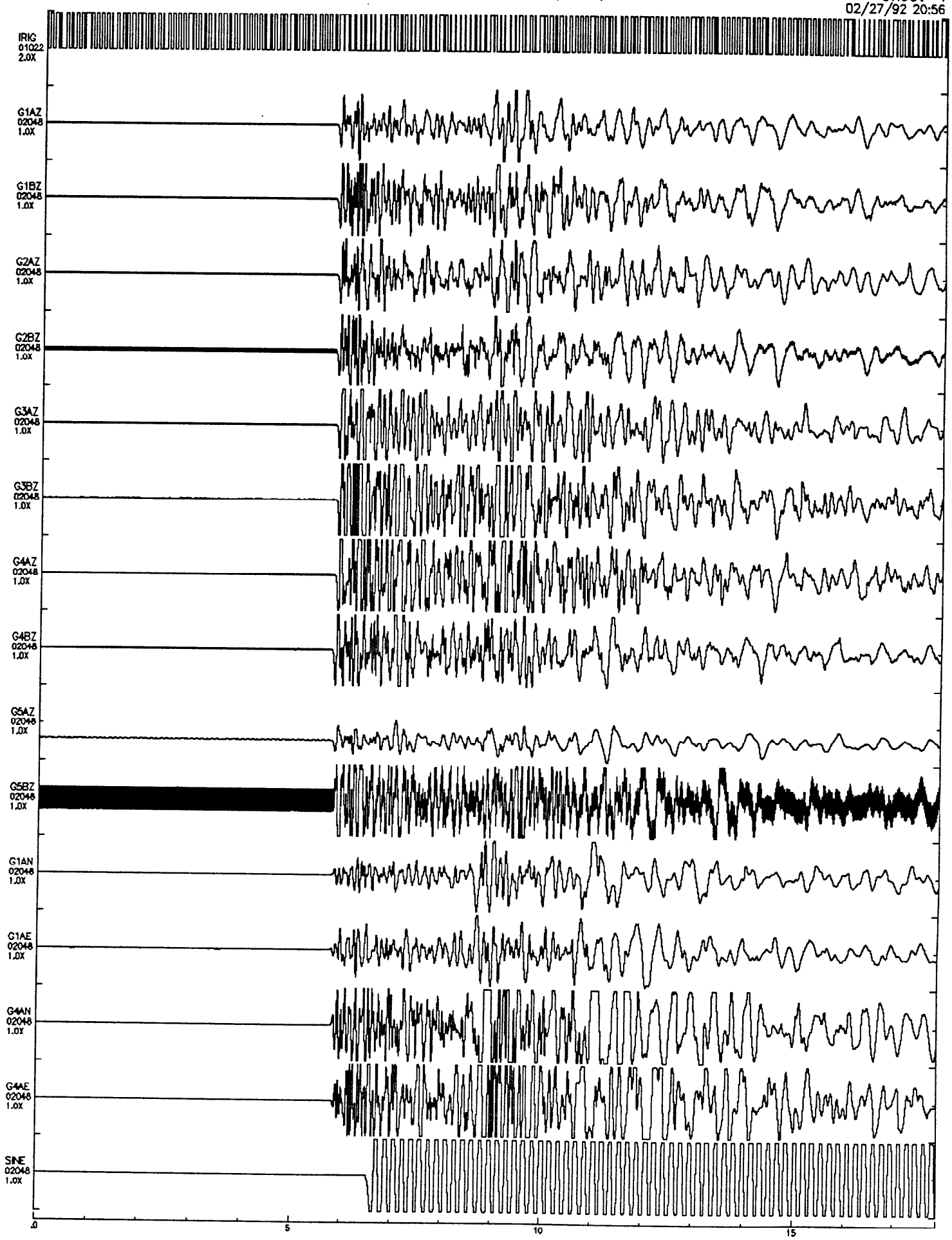

IST=12/15/90 15:10 47.798 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121508.DMX
Sheet 1
02/27/92 20:50
IRIG
01021
2.0X
G1AZ
00132
15.5X
G1BZ
00173
11.8X
G2AZ
00143
14.3X
G2BZ
00650
3.2X
G3AZ
00119
17.2X
G3BZ
00049
41.8X
G4AZ
00120
17.1X
G4BZ
00134
15.3X
G5AZ
00903
2.3X
G5BZ
01363
1.5X
G1AN
00095
21.6X
G1AE
00142
14.4X
G4AN
00018
64.0X
G4AE
00019
64.0X
SINE
00013
64.0X
0
5
10
15

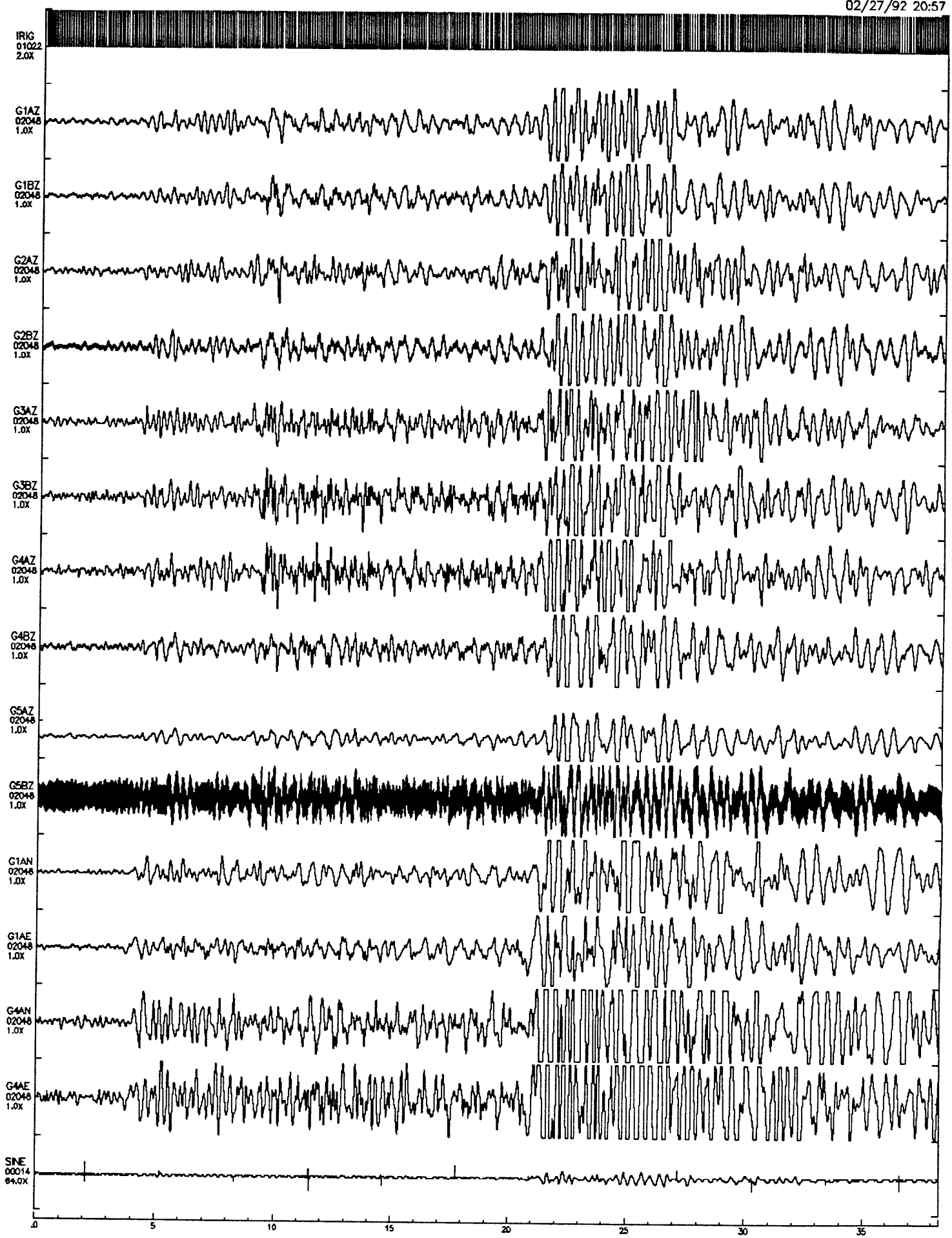

IST=12/15/90 15:40 52.267 SPS=200.321 DEC=5 C:\GRN\WVM\DMX\90121509.DMX
Sheet 1
02/27/92 20:51
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10
15
20
25
30

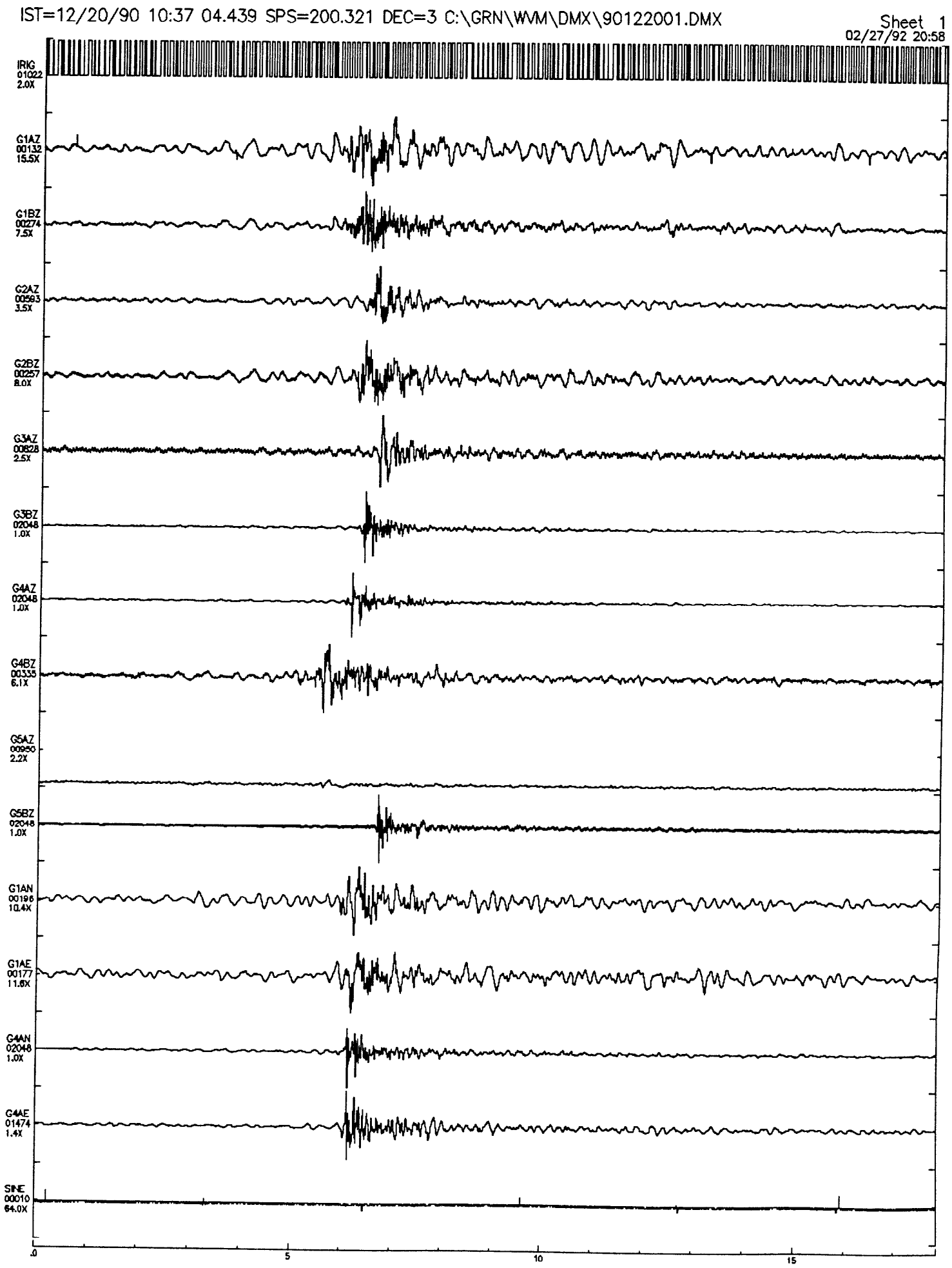

IST=12/16/90 15:45 43.419 SPS=200.321 DEC=8 C:\GRN\WVM\DMX\90121603.DMX
Sheet 1
02/27/92 20:52
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10
15
20
25
30
35
40
45

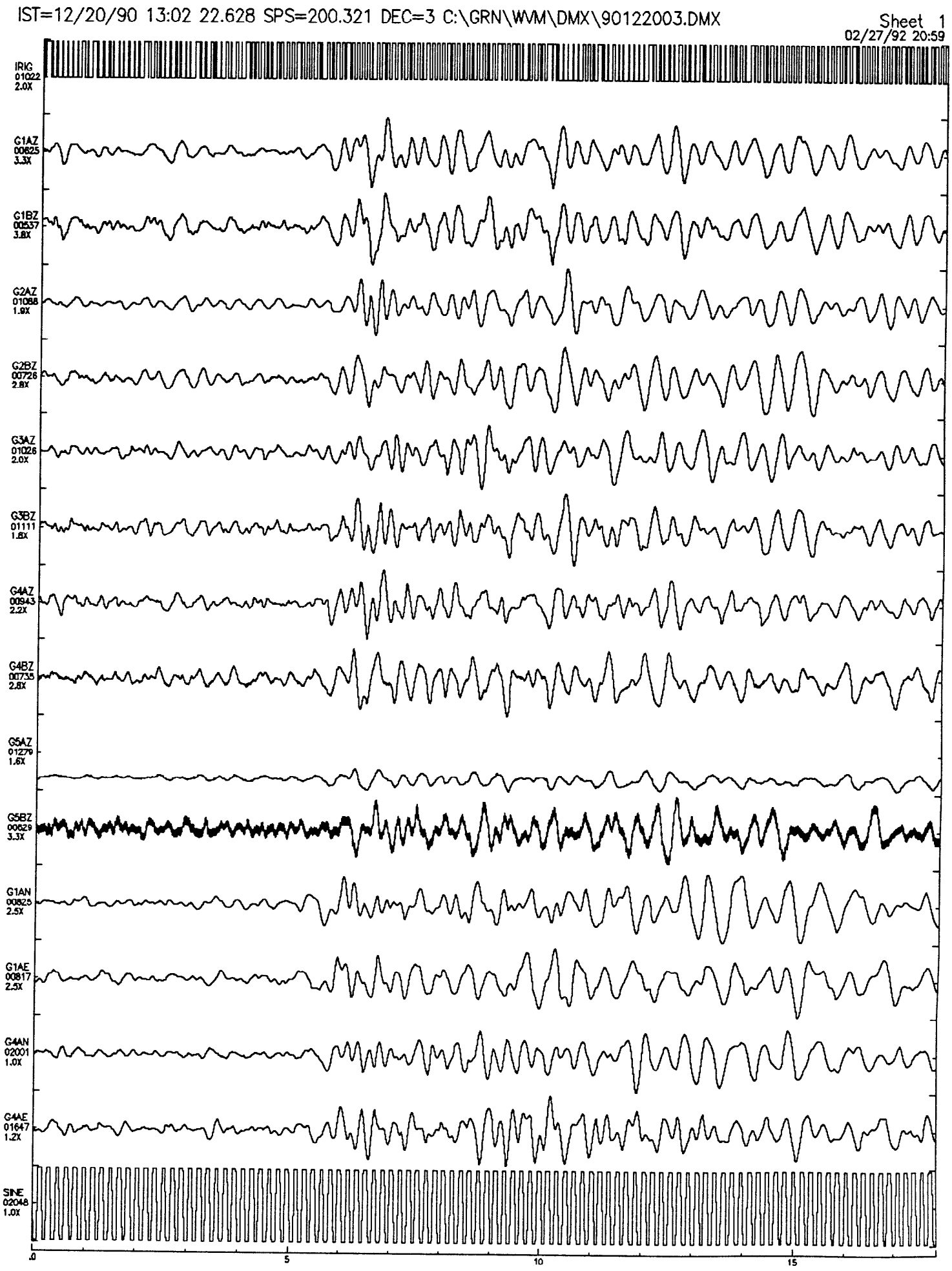

IST=12/16/90 15:46 29.426 SPS=200.321 DEC=7 C:\GRN\WVM\DMX\90121604.DMX
Sheet 1
02/27/92 20:54
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10
15
20
25
30
35
40
45

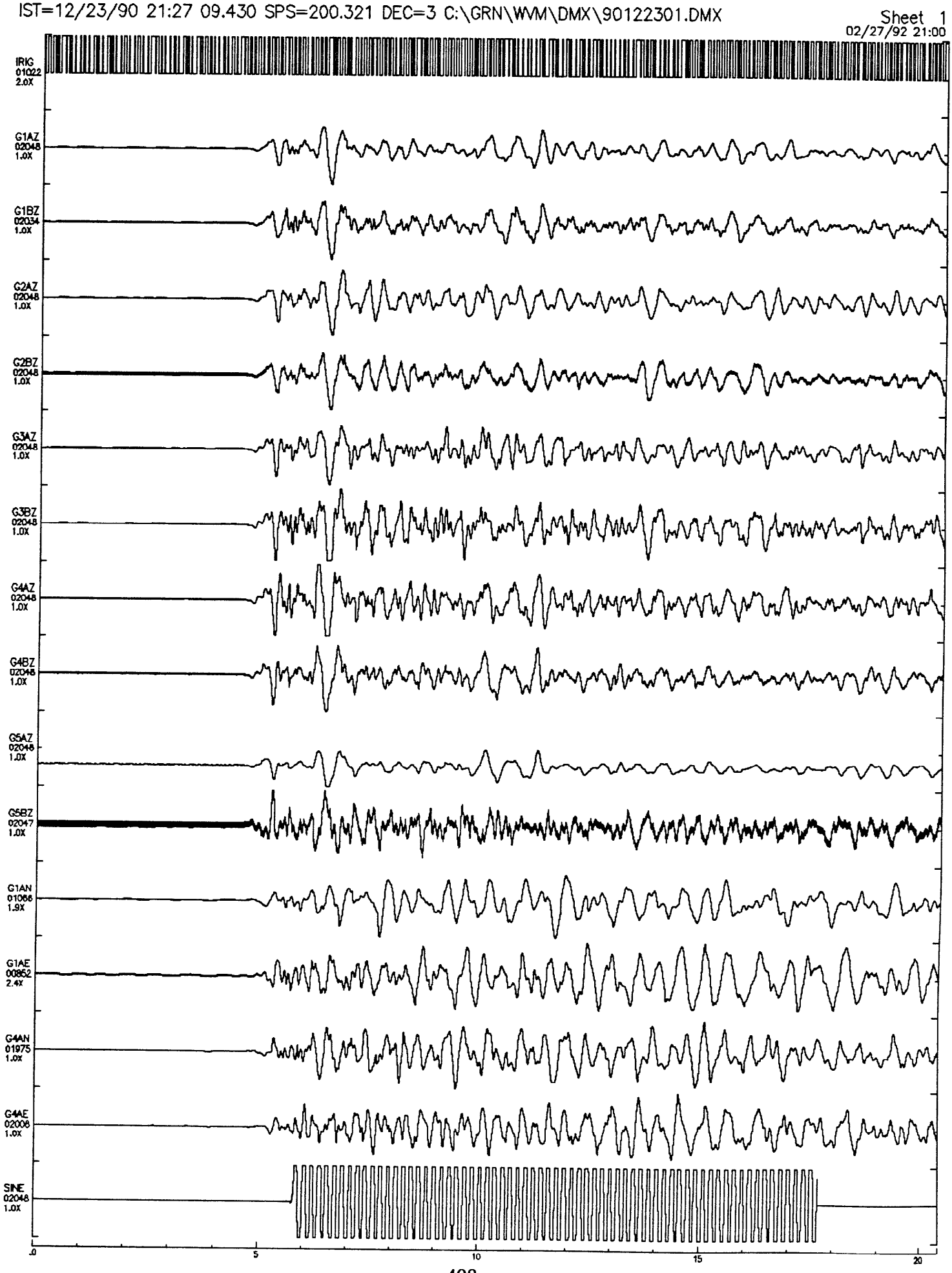

IST=12/16/90 15:47 12.876 SPS=200.321 DEC=8 C:\GRN\WVM\DMX\90121605.DMX
Sheet 1
02/27/92 20:55
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10
15
20
25
30
35
40
45

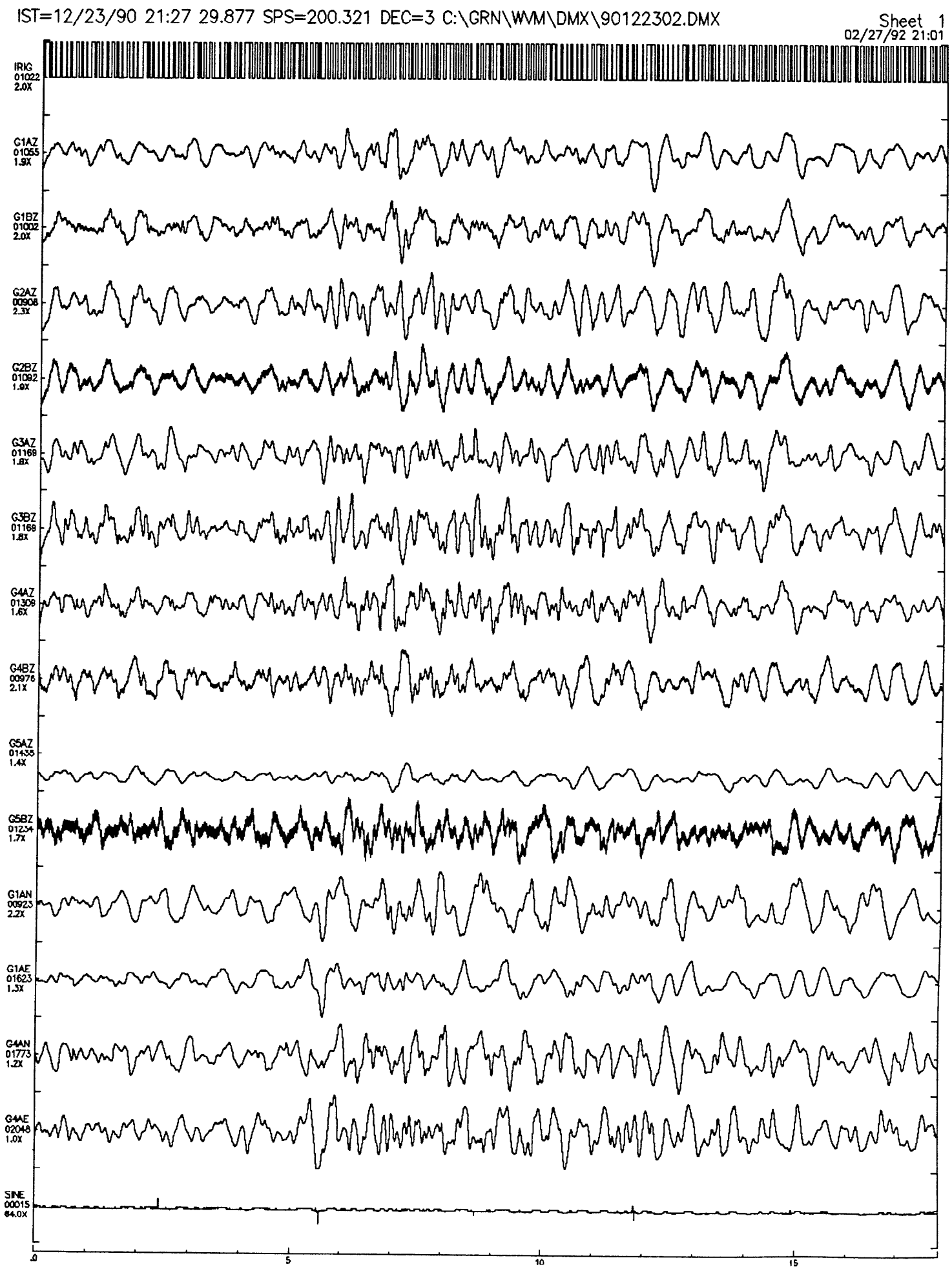

IST=12/17/90 01:16 40.201 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90121700.DMX
Sheet 1
02/27/92 20:56
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
02048
1.0X
0
5
10
15

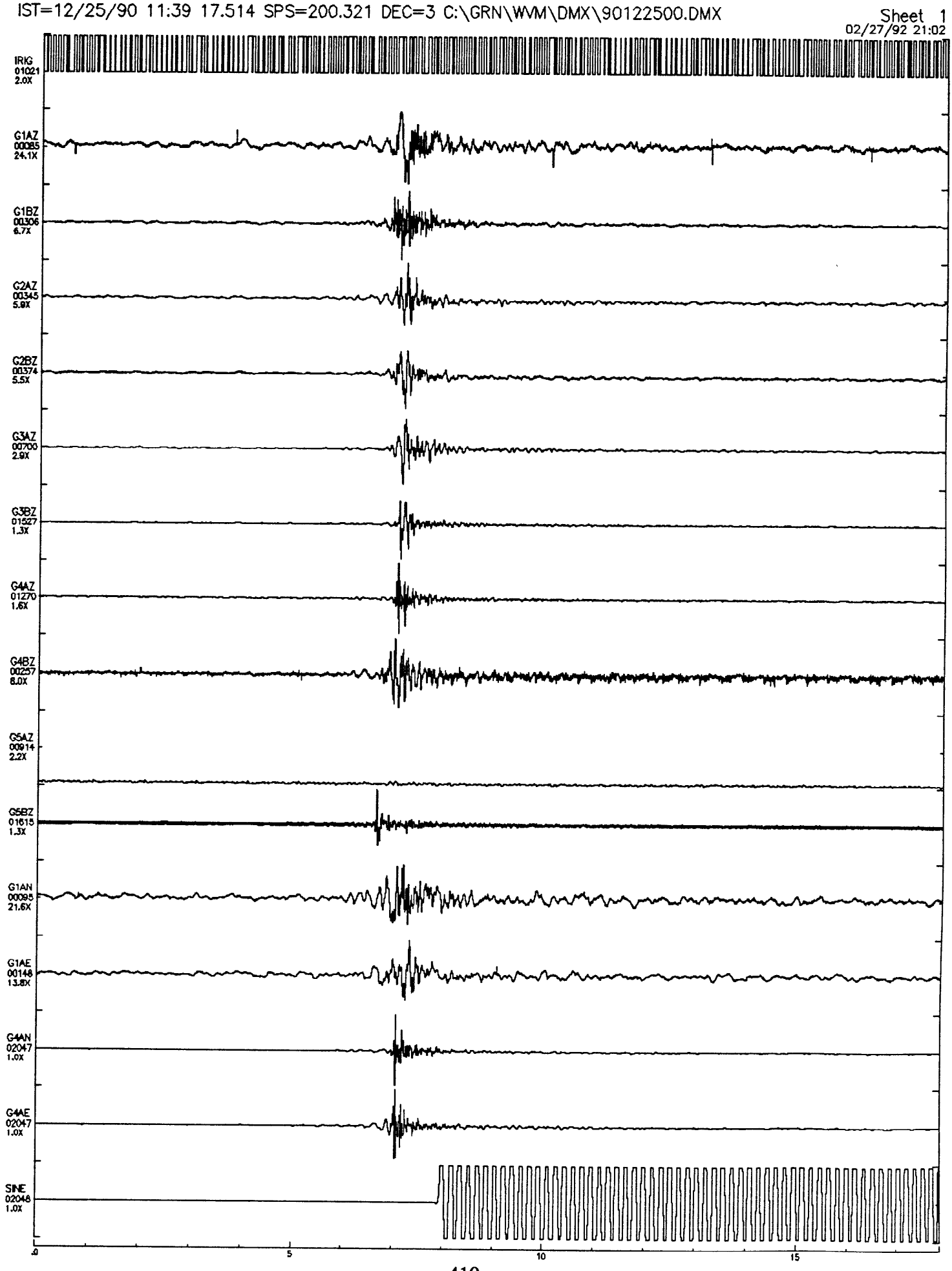

IST=12/17/90 17:42 49.379 SPS=200.321 DEC=6 C:\GRN\WVM\DMX\90121704.DMX
Sheet 1
02/27/92 20:57
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
00014
64.0X
0
5
10
15
20
25
30
35

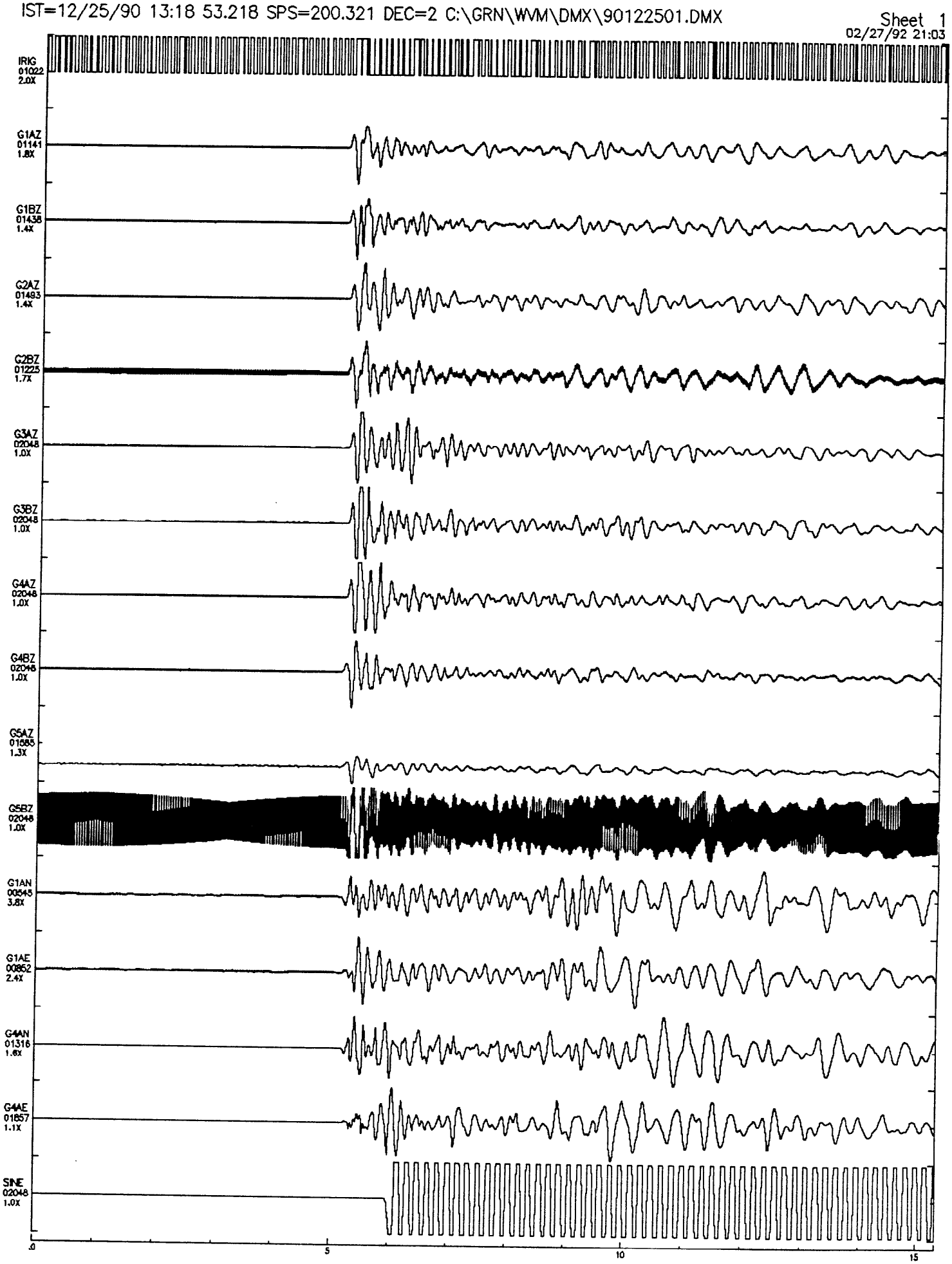

IST=12/20/90 10:37 04.439 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90122001.DMX
Sheet 1
02/27/92 20:58
IRIG
01022
2.0X
G1AZ
00132
15.5X
G1BZ
00274
7.5X
G2AZ
00593
3.5X
G2BZ
00257
8.0X
G3AZ
00828
2.5X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
00335
6.1X
G5AZ
00950
2.2X
G5BZ
02048
1.0X
G1AN
00196
10.4X
G1AE
00177
11.6X
G4AN
02048
1.0X
G4AE
01474
1.4X
SINE
00010
64.0X
0
5
10
15

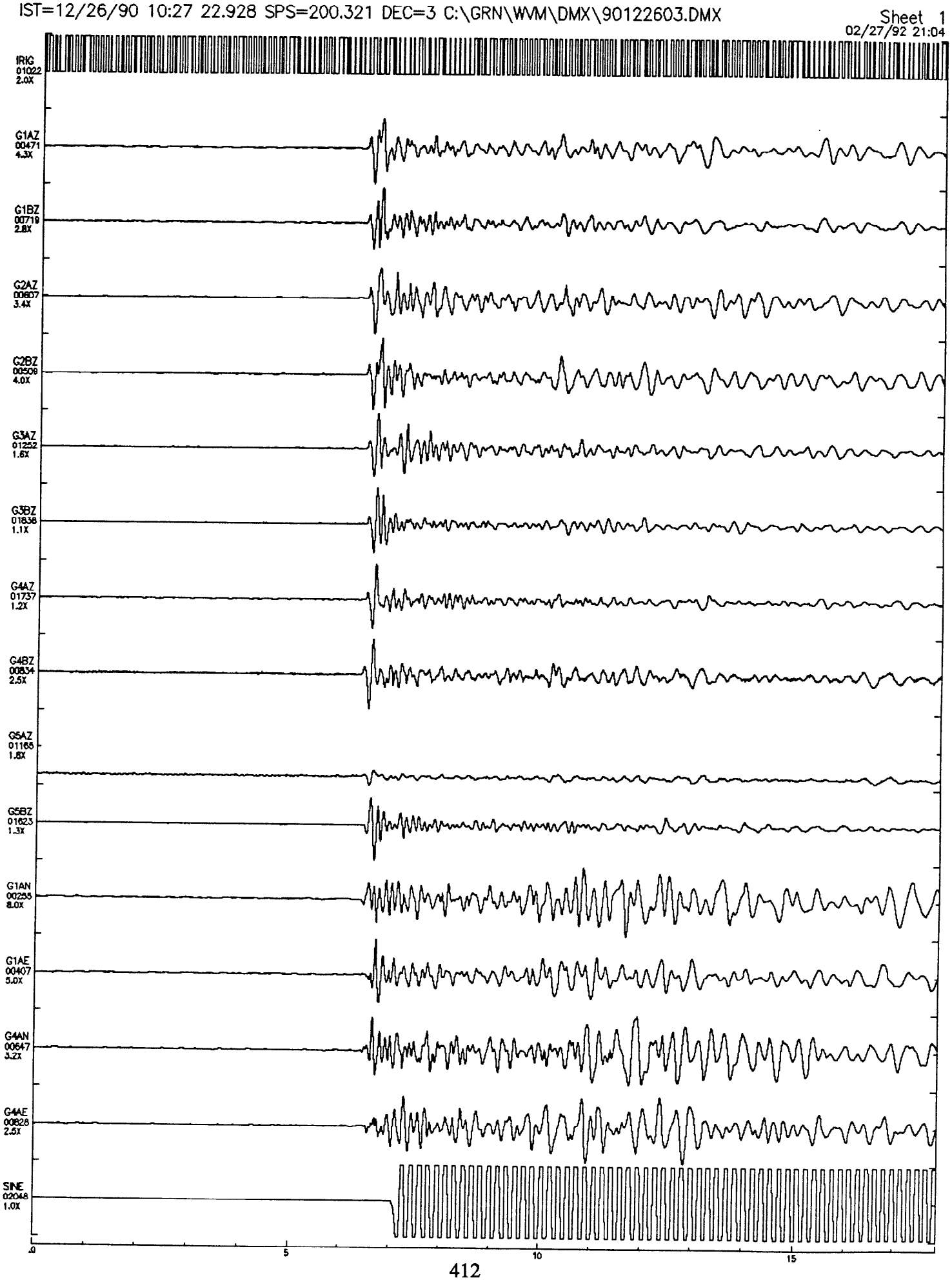

IST=12/20/90 13:02 22.628 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90122003.DMX
Sheet 1
02/27/92 20:59
IRIG
01022
2.0X
G1AZ
00825
3.3X
G1BZ
00537
3.8X
G2AZ
01088
1.9X
G2BZ
00726
2.8X
G3AZ
01026
2.0X
G3BZ
01111
1.8X
G4AZ
00943
2.2X
G4BZ
00735
2.8X
G5AZ
01279
1.6X
G5BZ
00629
3.3X
G1AN
00825
2.5X
G1AE
00817
2.5X
G4AN
02001
1.0X
G4AE
01647
1.2X
SINE
02048
1.0X
0
5
10
15

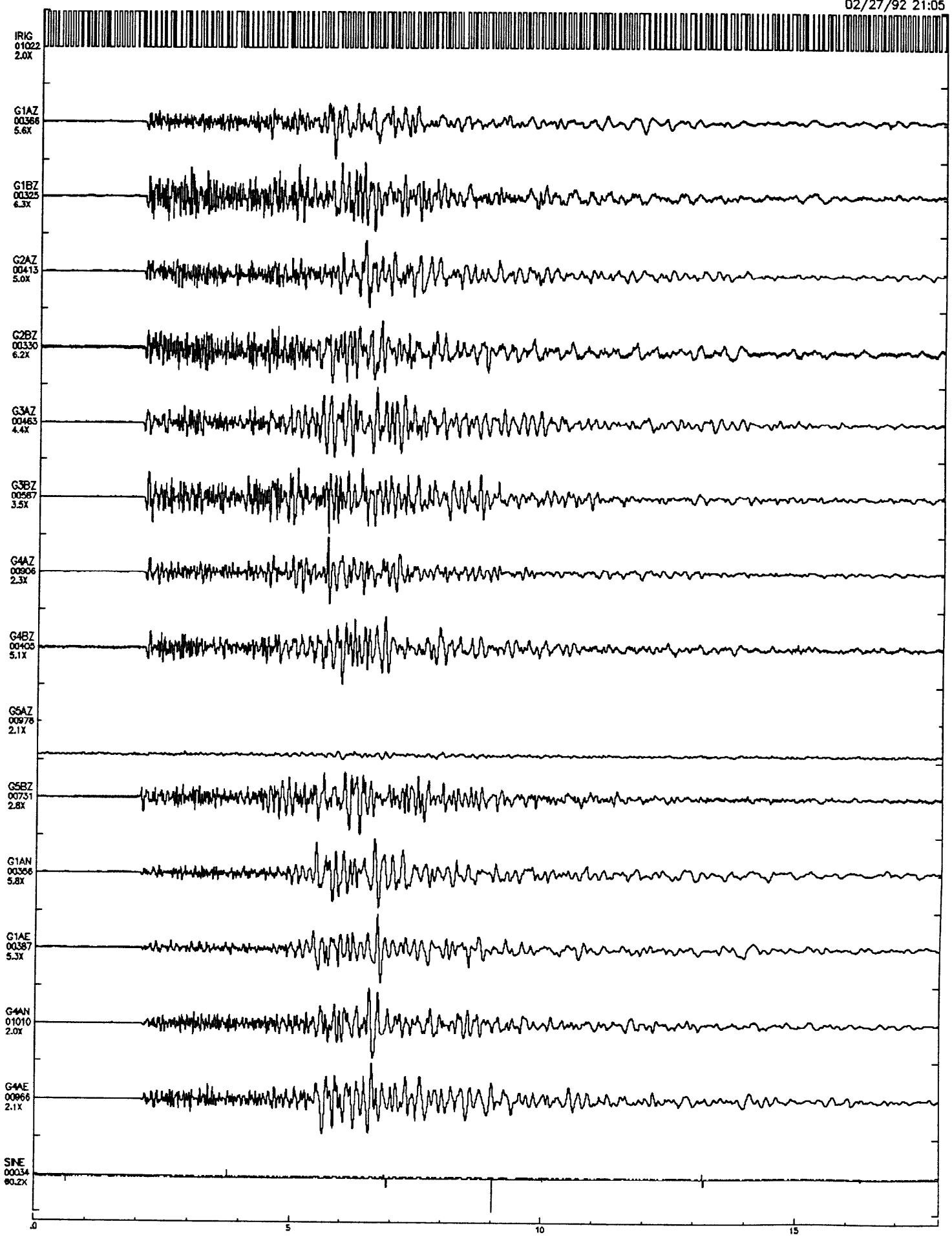

IST=12/23/90 21:27 09.430 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90122301.DMX
Sheet 1
02/27/92 21:00
IRIG
01022
2.0X
G1AZ
02048
1.0X
G1BZ
02034
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02047
1.0X
G1AN
01066
1.9X
G1AE
00852
2.4X
G4AN
01975
1.0X
G4AE
02008
1.0X
SINE
02048
1.0X
0
5
10
15
20

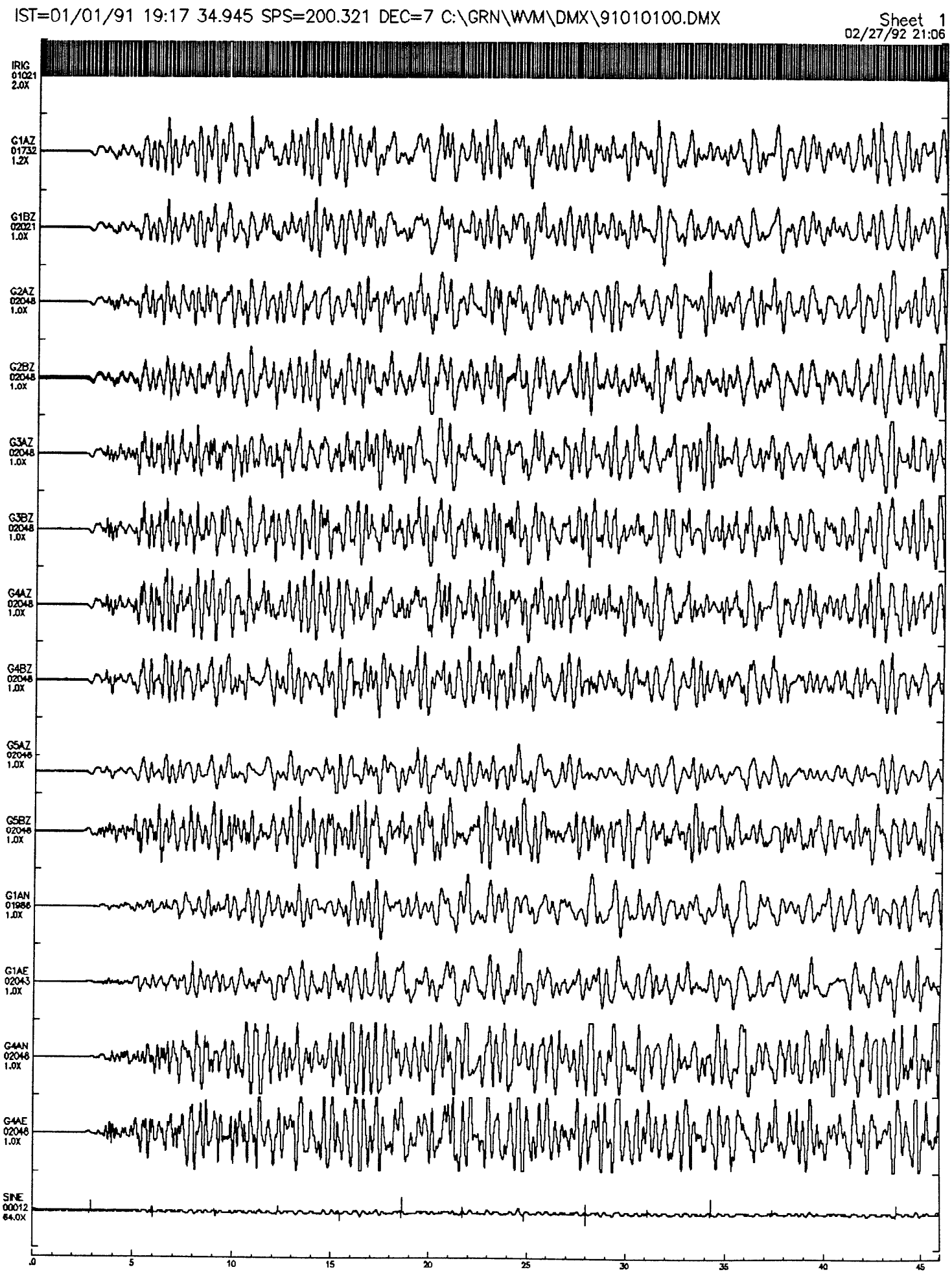

IST=12/23/90 21:27 29.877 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90122302.DMX
Sheet 1
02/27/92 21:01
IRIG
01022
2.0X
G1AZ
01055
1.9X
G1BZ
01002
2.0X
G2AZ
00908
2.3X
G2BZ
01092
1.9X
G3AZ
01169
1.8X
G3BZ
01169
1.8X
G4AZ
01308
1.6X
G4BZ
00976
2.1X
G5AZ
01435
1.4X
G5BZ
01254
1.7X
G1AN
00923
2.2X
G1AE
01623
1.3X
G4AN
01773
1.2X
G4AE
02048
1.0X
SINE
00015
64.0X
0
5
10
15

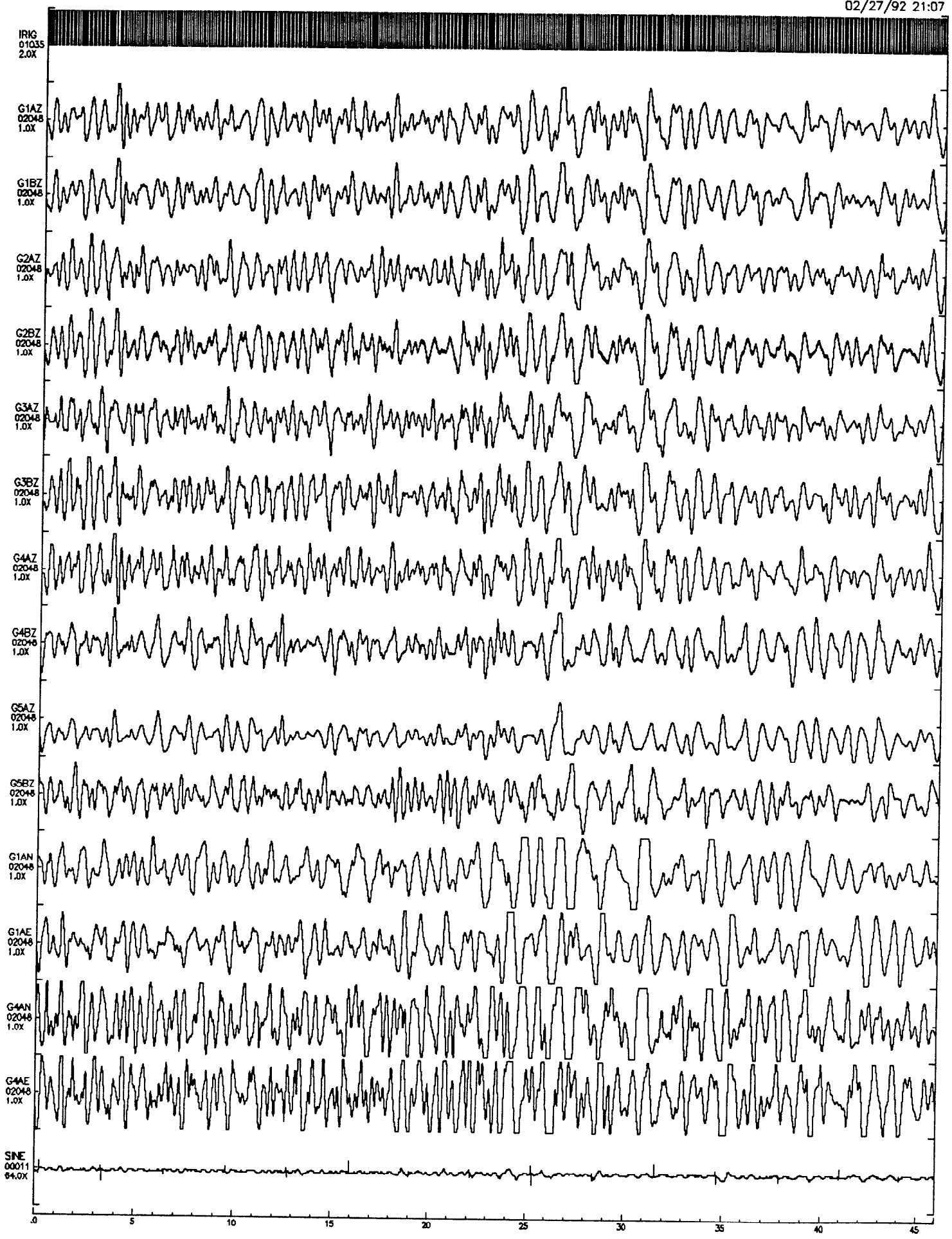

IST=12/25/90 11:39 17.514 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90122500.DMX
Sheet 1
02/27/92 21:02
IRIG
01021
2.0X
G1AZ
00085
24.1X
G1BZ
00306
6.7X
G2AZ
00345
5.9X
G2BZ
00374
5.5X
G3AZ
00700
2.9X
G3BZ
01527
1.3X
G4AZ
01270
1.6X
G4BZ
00257
8.0X
G5AZ
00914
2.2X
G5BZ
01615
1.3X
G1AN
00095
21.6X
G1AE
00148
13.8X
G4AN
02047
1.0X
G4AE
02047
1.0X
SINE
02048
1.0X
0
5
10
15


IST=12/25/90 13:18 53.218 SPS=200.321 DEC=2 C:\GRN\WVM\DMX\90122501.DMX
Sheet 1
02/27/92 21:03
IRIG
01022
2.0X
G1AZ
01141
1.8X
G1BZ
01438
1.4X
G2AZ
01483
1.4X
G2BZ
01225
1.7X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
01585
1.3X
G5BZ
02048
1.0X
G1AN
00545
3.8X
G1AE
00852
2.4X
G4AN
01316
1.6X
G4AE
01857
1.1X
SINE
02048
1.0X
0
5
10
15


IST=12/26/90 10:27 22.928 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90122603.DMX
Sheet 1
02/27/92 21:04
IRIG
01022
2.0X
G1AZ
00471
4.3X
G1BZ
00719
2.8X
G2AZ
00807
3.4X
G2BZ
00509
4.0X
G3AZ
01252
1.6X
G3BZ
01838
1.1X
G4AZ
01737
1.2X
G4BZ
00834
2.5X
G5AZ
01165
1.8X
G5BZ
01623
1.3X
G1AN
00255
8.0X
G1AE
00407
5.0X
G4AN
00647
3.2X
G4AE
00828
2.5X
SINE
02048
1.0X
0
5
10
15


IST=12/29/90 11:52 03.405 SPS=200.321 DEC=3 C:\GRN\WVM\DMX\90122900.DMX
Sheet 1
02/27/92 21:05
IRIG
01022
2.0X
G1AZ
00366
5.6X
G1BZ
00325
6.3X
G2AZ
00413
5.0X
G2BZ
00330
6.2X
G3AZ
00463
4.4X
G3BZ
00567
3.5X
G4AZ
00906
2.3X
G4BZ
00405
5.1X
G5AZ
00978
2.1X
G5BZ
00731
2.8X
G1AN
00366
5.8X
G1AE
00387
5.3X
G4AN
01010
2.0X
G4AE
00966
2.1X
SINE
00034
80.2X
0
5
10
15


IST=01/01/91 19:17 34.945 SPS=200.321 DEC=7 C:\GRN\WVM\DMX\91010100.DMX
Sheet 1
02/27/92 21:06
IRIG
01021
2.0X
G1AZ
01732
1.2X
G1BZ
02021
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
01986
1.0X
G1AE
02043
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
00012
64.0X
0
5
10
15
20
25
30
35
40
45


IST=01/01/91 19:18 18.395 SPS=200.321 DEC=7 C:\GRN\WVM\DMX\91010101.DMX
Sheet 1
02/27/92 21:07
IRIG
01035
2.0X
G1AZ
02048
1.0X
G1BZ
02048
1.0X
G2AZ
02048
1.0X
G2BZ
02048
1.0X
G3AZ
02048
1.0X
G3BZ
02048
1.0X
G4AZ
02048
1.0X
G4BZ
02048
1.0X
G5AZ
02048
1.0X
G5BZ
02048
1.0X
G1AN
02048
1.0X
G1AE
02048
1.0X
G4AN
02048
1.0X
G4AE
02048
1.0X
SINE
00011
64.0X
.0
5
10
15
20
25
30
35
40
45

CHAPTER V

Near-Surface Measurements of P- and S-Wave Velocities from the Dense Three-Dimensional Array near Garni, Armenia

J. Mori, J. Filson, E. Cranswick, R. D. Borcherdt, G. Glassmoyer, and W. H. K. Lee,
(U. S. Geological Survey)

R. Amirbekian, V. Aharonian
(Yerevan Seismic Station)

L. Hachverdian
(Armenian Academy of Sciences)

ABSTRACT

P- and S-wave arrivals from local earthquakes were studied using an array of ten three-component instruments in and around a tunnel at Garni Observatory, Armenia. The array has a three-dimensional configuration with lateral dimensions of 300 to 500 m and a depth extent of 100 m. Estimates of the horizontal and vertical components of slowness for P and S wavefronts were used to determine the angles of approach and the propagation velocity. The results show that the region around the array has low average velocities for both P (1.43 km/sec) and S (0.61 km/sec) waves, so wavefronts approach the array at steep angles of incidence. Waveforms from one event show clear reflections from the free surface for both P and S waves. The timing of these reflections gives the velocity variation with depth within the array. We estimate a P-wave velocity of 0.33 km/sec within a few meters of the surface increasing to 6.0 km/sec for the deepest portion of the array. Local site variations can greatly complicate the high-frequency waveforms even for tunnel stations in bedrock. The S waves exhibit stronger site-dependent waveforms and time delays than do the P waves.

INTRODUCTION

An array of ten three-component instruments was installed in and around a 200 meter horizontal tunnel (Figure 5-1) at Garni Observatory, Armenia (40.136^{o}N, 44.724^{o}E). The Garni array is located on the lower southwestern slope of Mt. Azhdahak in the Gegham Range of central Armenia. Mt. Azhdahak is a Cenozoic volcanic center with layered tuffs dominating the geology near the tunnel. With horizontal spacings of 60 to 480 meters and vertical spacings of 14 to 100 meters, this dense array provides one of the few opportunities to record three-components of ground motion in a three-dimensional array. We have used these data to make measurements of the three-dimensional slowness for incoming P and S arrivals from eleven earthquakes at distances of 10 to 60 km. These three-dimensional slowness estimates are useful because they show the angle of incidence with which the wavefront approaches the array and also directly give the velocity of the material in the region of the array. The predominant frequencies of the data used in this study are from 3 to 20 Hz which correspond to wavelengths of 90 to 570 meters for the P wave and 30 to 170 meters for the S wave. The instrument spacing is comparable to these wavelengths, so we are able to accurately map wavefronts as they pass through the upper 100 meters of the near-surface material.

The first part of this paper treats the data as single incoming wavefronts and we estimate the directions of approach and the average propagation velocity across the array. The second part of the paper looks at one specific detail of the waveforms, the free-surface reflections. The relative arrival time of the reflection as a function of station depth gives more information about the depth dependent velocity variation within the array.

DATA

The data for this study were recorded by 1 Hz (Mark Products L4C) velocity transducers both on a triggered IBM-compatible personal computer (PC) system at 200 samples/second/channel with 12-bit resolution (Tottingham and Lee, 1989) and on the General Earthquake Observations System

(GEOS) recorders (Borcherdt *et al*., 1985) at 200 samples/second/channel with 16-bit resolution. The PC system recorded all ten vertical and four horizontal components with a common time base. The five GEOS instruments recorded the complete three-component data for all ten sites. Comparisons between the two systems show spectral coherence above 0.9 in the frequency range of 1 to 50 Hz. The P-wave data used in this study were primarily taken from the PC system. The S-wave data were taken from horizontal components recorded by the GEOS system.

We studied eleven earthquakes recorded by the array from September through November 1990 (Table 5-1). Approximate hypocentral distances (km) were determined by multiplying the S-P time (seconds) by 7.8. Magnitudes were determined by convolving a Wood-Anderson instrument response with the data to produce equivalent Wood-Anderson amplitudes (Kanamori and Jennings, 1978). Amplitudes from all the available horizontal components (four to twenty per event) were used with the Richter (1937) distance correction to obtain the magnitudes. Based on the similarity of the waveforms and the relative arrival times, three of the earthquakes were located closely together at a hypocentral distance of about 12 km, nearly under the array (events 4, 5, and 8 in Table 5-1). Another two events (9,10), located 20 km to the east, also have similar hypocenters. The remaining 6 earthquakes arrived from a wide spread of azimuths (Table 5-1).

Figure 5-2 shows an example of the data for event 11. The P waves show similar impulsive waveforms across the array that are well suited for timing arrivals. The S waves on the horizontal components are also fairly clear, although some procedure of waveform matching is needed to accurately estimate arrival times. There are significant differences both in waveform and amplitude among these sites, which are located within a few hundred meters of each other. Differences in site response for closely spaced stations have also been noted at other arrays, such as in New York state (Menke *et al.*, 1990) and southern California (Vernon *et al.*, 1991; Mori, 1993). These site-response characteristics, especially for the S wave, are an indication of the problems that will be encountered in studying coherent wavefronts across the array.

THREE-DIMENSIONAL SLOWNESS MEASUREMENTS

For a plane wave traveling across a three-dimensional array of stations, the arrival time (t_i) at station *i* can be written as,

$$t_i = S_x x_i + S_y y_i + S_z z_i ,$$

where S_x, S_y, S_z are the three components of slowness and x_i, y_i, z_i are the spatial coordinates of the *i* th station. With arrival times measured at four or more sites distributed in space, the slowness in three dimensions can be determined. For the data used in this study, we determine the slowness vector using a grid search method that tests the correlation of the waveform data for each value of the three-component slowness. This is a three-dimensional extension of the two-dimensional method used by Frankel *et al.* (1991) to study apparent velocities with a small aperture array. The procedure used in this study consists of:

1. Calculating the relative arrival times at each station for the given value of slowness.
2. Shifting the waveforms by these time lags.
3. Calculating the cross correlation of each pair of stations and summing the values. For 10 arrivals, this involved 45 cross correlations.

The combined cross correlation for all the station pairs is a measure of how well the relative arrival times fit the given value of slowness. In this manner we searched for the three components of slowness that that give the highest correlation of the waveforms. After determining the slowness vector, the back azimuth (ϕ) to the event is,

$$\phi = \arctan(S_x/S_y) \quad .$$

The incoming angle of incidence (θ) from vertical is,

$$\theta = \arctan((S_x^2 + S_y^2)^{1/2} / S_z) \quad .$$

The apparent velocity (V_a) is,

$$V_a = 1/(S_x^2 + S_y^2)^{1/2} \quad .$$

The material velocity (V_o) is,

$$V_o = 1/(S_x^2 + S_y^2 + S_z^2)^{1/2} \quad .$$

We used time windows of 0.5 sec for the P wave and 0.7 sec for the S wave to compute cross correlations. The slowness was tested in increments of 0.03 sec/km. An example of the grid search for the P-wave window of the event recorded at 1500 on 11/16/90 is shown in Figure 5-3. The contoured values of the combined correlation are shown for horizontal and vertical slices out of the three-dimensional slowness space that was searched. The contour interval is 0.05. The highest values of the correlation for the P wave (shaded areas) show an incoming wavefront with a horizontal slowness of 0.12 sec/km (corresponding to an apparent velocity of 8.3 km/sec) moving toward the southwest in the horizontal slice. In the vertical slice the P wave is approaching the surface at an incidence angle of 11 degrees with a total slowness of 0.64 sec/km (P-wave velocity of 1.56 km/sec). The S-wave window (Figure 5-4) shows a wavefront of similar orientation moving with a horizontal slowness of 0.30 sec/km (apparent velocity of 3.3 km/sec) in the horizontal slice and total slowness of 1.71 sec/km (S-wave velocity of 0.58 km/sec) in the vertical slice.

In the horizontal slices, the contours are elongated in the east-west direction, indicating that there is better resolution for the north-south slowness than for the east-west slowness. This is due to the geometry of the array. The stations tend to be lined up in the direction along the axis of the tunnel, so that there is good station spacing in the north-south direction and more limited distribution of stations in the east-west direction. The contours in the vertical slice show contours that are elongated in the vertical direction, which is also probably due to station geometry. Since the vertical extent of the array is only 100 meters compared to the larger horizontal extent of 300-500 meters, there is a better constraint on the horizontal slowness compared to the vertical slowness. Another reason for poorer resolution in the vertical direction could be due to strong velocity variations as a function of depth.

In addition to the grid search method described above, we checked our results by picking the onset times and directly determined the slowness using a least-squares fit to the arrival times. In

general the two methods give consistent results. The advantage of the more tedious grid search method is that the cross correlations look at a larger portion of the waveform and are particularly useful for emergent P and S waves, where it is difficult to accurately pick the onset of the arrival. Also, searching through the whole slowness space shows the range of values that is consistent with the data and is useful for identifying directions from which secondary energy is arriving across the array.

SLOWNESS RESULTS

Using the grid search method, we determined the P-wave slowness for the eleven earthquakes and also the S-wave slowness for six earthquakes. There were incomplete horizontal data to determine S-wave slowness for the other five events. The cross correlation values generally have well-defined maxima, giving good estimates of the horizontal and vertical slowness.

For the P waves, the results presented in Table 5-1 show a large spread of incoming azimuths with steep incidence angles. 6 of the events (1, 4, 5, 7, 8, and 11) have large apparent velocities (>10 km/sec), indicating relatively deep earthquakes with raypaths to the array that take-off upward from the source. The other events, even to a distance of greater than 60 km, also have steep incidence angles (< 20 degrees) which is an indication of low-velocity material in the near-surface region. The low-velocity material will bend the ray paths toward the vertical as they approach the surface. One consistent result for all events is the P-wave velocity for the region near the array. For the wide range of incoming azimuths the estimates for the P-wave velocity had a standard deviation of 15%. The average velocity was determined to be 1.43 ± 0.22 km/sec. The stated uncertainty is one standard deviation.

For the S waves, the north and east horizontal components were rotated into a transverse direction assuming the back-azimuth obtained from the P wave, before the cross correlation procedure was run on the waveforms. The estimates of the incoming S wavefronts are generally in agreement with the P wavefonts. However, there is more variation among the S waveforms compared to the P, thus the correlation values were lower indicating more uncertainty in the results. The determinations for the back azimuth to the event and the vertical incidence angle are within 14 degrees of the values from the P waves. This indicates that the P and S wavefronts are approaching from approximately the same angle. The average S-wave velocity is 0.61 ± 0.06 km/sec. This gives a high P to S velocity ratio of 2.3 ± 0.2.

As mentioned above there tends to be more uncertainty in the S-wave estimates because of the variation in waveforms across the array. At a given frequency, the S waves might be expected to show more variations than the P waves, because the S-wave velocity is slower than the P-wave velocity and the wavelength is correspondingly shorter. For this reason, the S waves might also be more sensitive to site-dependent time delays. Figure 5-5 shows the P- and S-wave arrivals for the event at 1839 on 10/15/90. Note that the pattern of relative arrival times across the array is quite similar for the P and S, with the exception of G5A, where the S wave arrives late. This significant S-wave site delay appears to be azimuthally dependent and is strong for events 5 and 8, which approach the array steeply from the northwest. For these two events, G5A was not used in the S-wave slowness analyses. There is also some evidence that the delay could be due to phase response problems in the instrumentation at G5A.

FREE-SURFACE REFLECTIONS

Figure 5-6 shows the P- and S- wave arrival from the event at 1839 on 10/15/90 as recorded on the tunnel stations and one surface station directly above, plotted as a function of station depth. The instrument response was removed to convert the data to ground displacement and the waveforms were aligned on the first arrival. Note that there is a secondary arrival (dashed line) following both the initial P and S arrivals on the tunnel stations, but not on the surface station. This arrival is interpreted to be the downward reflection from the free surface, since it moves out with station depth. The timing and polarity of this arrival is also consistent with the direct arrivals at the surface station G4A and the tunnel station G1A located 60 meters directly below. Between these two stations there is a 0.04 sec time difference in the direct P arrival which corresponds to the 0.08 sec two-way travel time of the surface reflection seen on G1A (Figure 5-6). This type of arrival has been previously observed from borehole data (Hauksson *et al.*, 1987). The amplitude of the first arrival at the tunnel stations is about half that of the surface station. This difference can be partly explained because the energy is divided between the direct and reflected arrivals for the sub-surface stations, while for the stations on the surface all the energy is contained in the direct arrival. Also, there is an amplitude difference because the surface station is sited on lower-velocity material. At these high frequencies, the tunnel sites show more complicated waveforms than the surface sites. These differences in waveforms may affect the estimated slowness, if the waveform correlations are dominated by these high-frequency characteristics. To avoid this, we use relatively long (0.5 to 0.7 sec) time windows to give more weight to the lower-frequency components.

We can use this secondary arrival to estimate the P-wave velocity in the material between the tunnel stations and the surface. Assuming that the ray is traveling at a near-vertical angle of incidence as indicated by the slowness results, the time difference between the direct and reflected arrivals is the two-way travel time from the station to the surface. The measured times give average velocities of 0.33, 0.70, 1.1, and 1.5 km/sec for the material between the surface and stations G3A, G2A, G2B, and G1A, respectively, as shown in the top portion of Figure 5-7. If we assume that the velocity structure is parallel to the topography, the data can also be interpreted as a layered structure shown in the bottom portion of Figure 5-7, with velocities ranging from 0.33 km/sec at the surface to 6.0 km/sec at a depth of 60 m. The layer thicknesses in this model were arbitrarily set to match the station spacings. The actual velocity structure may be quite different from either of the simple models shown in Figure 5-7, especially given the various layers of volcanic tuff that are observed in the local geology near the tunnel. However, at present we do not have data to constrain the velocity of these more complicated structures.

The S waveforms in Figure 5-6 are very similar to the P waveforms, therefore the timing of the reflection phases gives an S-wave velocity structure similar to the the P-wave velocity structure but with 0.5 times the velocity. This P to S velocity ratio of 2.0 is the same as obtained from the slowness analysis for this event. The ratio of 2.0 measured from the reflected arrivals is probably the more reliable estimate because it is a direct measurement of the time differences of P and S waves arriving along similar paths.

DISCUSSION

We do not have independent determinations for the locations of these events, so it is difficult to judge the accuracy in the estimates for back azimuth and incidence angles. The estimates of the P- and S-wave velocities are much better constrained. The largest time differences are between the tunnel and surface stations, indicating that most of the arrivals have steep angles of incidence. Therefore, small errors in the back azimuth and incidence angle do not affect the velocity estimates significantly. This is reflected in our consistent estimates of the material velocity. Determination of apparent velocity for steep incidence angles are strongly dependent on the angle of incidence, so there is much more uncertainty in these values.

The slowness analysis used in this study assumes a plane wave incident on the array. This assumption breaks down for any vertical or lateral variations in velocity near the array, as was clearly inferred from analysis of the reflected phases. However, the values from the slowness analyses are still meaningful as velocities for the near-surface region averaged over the dimensions of the array. In particular, since the largest time differences are measured between the tunnel and surface stations, the velocity estimates in our study are dominated by the near-surface material above the tunnel. The consistent results we obtain for a wide range of P-wave azimuths indicate that lateral variations are not strong enough to affect the P-wave velocity estimates. However, there appear to be stronger lateral variations in the S-wave velocity structure to the extent that incoming wavefronts are not as well approximated by a plane wave.

The velocities estimated by the slowness method are also frequency dependent, since lower frequencies, corresponding to longer wavelengths, will sample material properties deeper in the crust. We see this effect in the higher P-wave velocity for event 2, which was the most distant event (S-P time > 9 seconds) and had P waves with the lowest frequencies. This is further evidence that the low velocities are associated with the near-surface material. In additon, the most direct evidence for the very low velocities near the surface are the time delays from the free-surface reflections at tunnel stations. Using four tunnel stations at various depths below the surface, we see a strong increase of both the P- and S-wave velocities with depth (Figure 5-7). The range of values we obtain are similar to the results from a borehole experiment at Anza, California (Fletcher *et al.*, 1990) and show P-wave velocities near the surface of a few hundred meters per second and increasing to several kilometers per second at 50 to 100 meters depth. This strong depth dependence of the velocity is some of the detailed velocity structure that is blurred together in our average P-wave velocity of 1.43 km/sec obtained from the slowness method.

This three-dimensional array experiment has been useful for making direct estimates of the P- and S-wave velocities and providing approximate locations of local earthquakes (Figure 5-8). Knowledge of the near-surface velocities is important for evaluating the site effects associated with strong ground-motions. However, in the slowness analysis we assume that the region around the tunnel was a uniform medium, and thus obtain only average near-surface velocities. Denser instrumentation would be useful for studying the lateral variations that exist on the scale of tens to hundreds of meters. These site conditions affect the ampltudes of the high-frequency waves and also affect our direction estimates of the incoming wavefronts. Further, for the purposes of more accurately locating earthquakes, the aperture of the array should be expanded to several kilometers. Even in that case, it would be necessary to have some indepently known source locations to detemine the individual site delays.

CONCLUSIONS

Estimates of slowness for incoming P and S waves recorded on the Garni three-dimensional array show steep incidence angles from local earthquakes. These arrivals give average P- and S-wave velocities of 1.43 $\pm$ 0.22 and 0.61 $\pm$ 0.06 km/sec, respectively, for the region around the array. Since the data used for slowness correlations have relatively high predominant frequencies (3-20 Hz), these values reflect the material close to the ground surface. This result was confirmed by measurements of the time delays from free-surface reflections observed on the tunnel stations. The P-wave velocity profile inferred from the surface reflections varied from 0.33 km/sec near the surface to 6.0 km/sec at 60 meters depth. At the higher frequencies used in this study, the tunnel sites have more complicated waveforms than the surface sites, because of the reflection off the ground surface. In addition to differences in waveform and amplitude between the closely spaced instruments, there are also arrival-time delays which are particularly strong for the S wave and affect the ability of the array to resolve the incoming azimuth of seismic waves.

Despite the high frequency complexities observed in the incoming wavefronts, the array was still useful for giving approximate locations of small earthquakes in the immediate region, which may be important for seismic hazard assessments. Garni lies on the northern edge of a narrow, east-west trending valley, a strong topographic feature that may be due to active faulting. This feature extends west to the outskirts of Yerevan, a city of 1.2 million people.

ACKNOWLEDGEMENTS

E. Sembera, C. Dietel, K. Safarian, H. Galagian, G. Apoian, and K. Kirakossian supplied technical support for the instrumentation. R. Banfill wrote much of the software for the PC system. The research is part of the Joint Seismic Program led by the Incorporated Research Institutions for Seismology (IRIS). This research was sponsored by the Defense Advanced Research Projects Agency and the Air Force Office of Scientific Research through the Air Force Geophysical Laboratory and the National Science Foundation. The work was carried out under the aegis of Area IX of the U.S./U.S.S.R Agreement on Cooperation in the field of Environmental Protection. D. Eberhart-Phillips and S. Hough provided helpful comments on this paper.

Table 5-1. Parameters of incident plane waves from events recorded on the Garni array. Distances were estimated from S-P times. Magnitudes were determined by convolving a Wood-Anderson instrument response with the data.

					P wave				S wave			
No.	Date	Time	Distance (km)	Magnitude	Back Azimuth (deg)	Apparent Velocity (km/s)	Velocity (km/s)	Incidence Angle (deg)	Back Azimuth (deg)	Apparent Velocity (km/s)	Velocity (km/s)	Incidence Angle (deg)
1.	09/21/90	0715	16	1.2	282	16.7	1.28	4				
2.	10/05/90	0755	>60		294	8.3	2.02	14				
3.	10/09/90	2054	12	0.8	176	4.2	1.27	18				
4.	10/15/90	0746	12	0.9	338	11.1	1.44	7				
5.	10/15/90	1839	12	1.7	338	11.1	1.44	7	326	6.7	0.71	6
6.	10/18/90	1118	30	2.3	82	6.7	1.21	11	90	3.3	0.55	10
7.	10/27/90	0544	42	3.0	204	11.1	1.44	7	198	10.0	0.62	4
8.	11/08/90	2037	12	1.6	354	16.7	1.33	5	8	5.0	0.62	4
9.	11/16/90	0653	20	1.8	74	6.7	1.36	12	80	3.3	0.58	10
10.	11/16/90	0703	20	1.8	74	6.7	1.36	12				
11.	11/16/90	1500	14	2.2	32	8.3	1.56	11	34	3.3	0.58	10

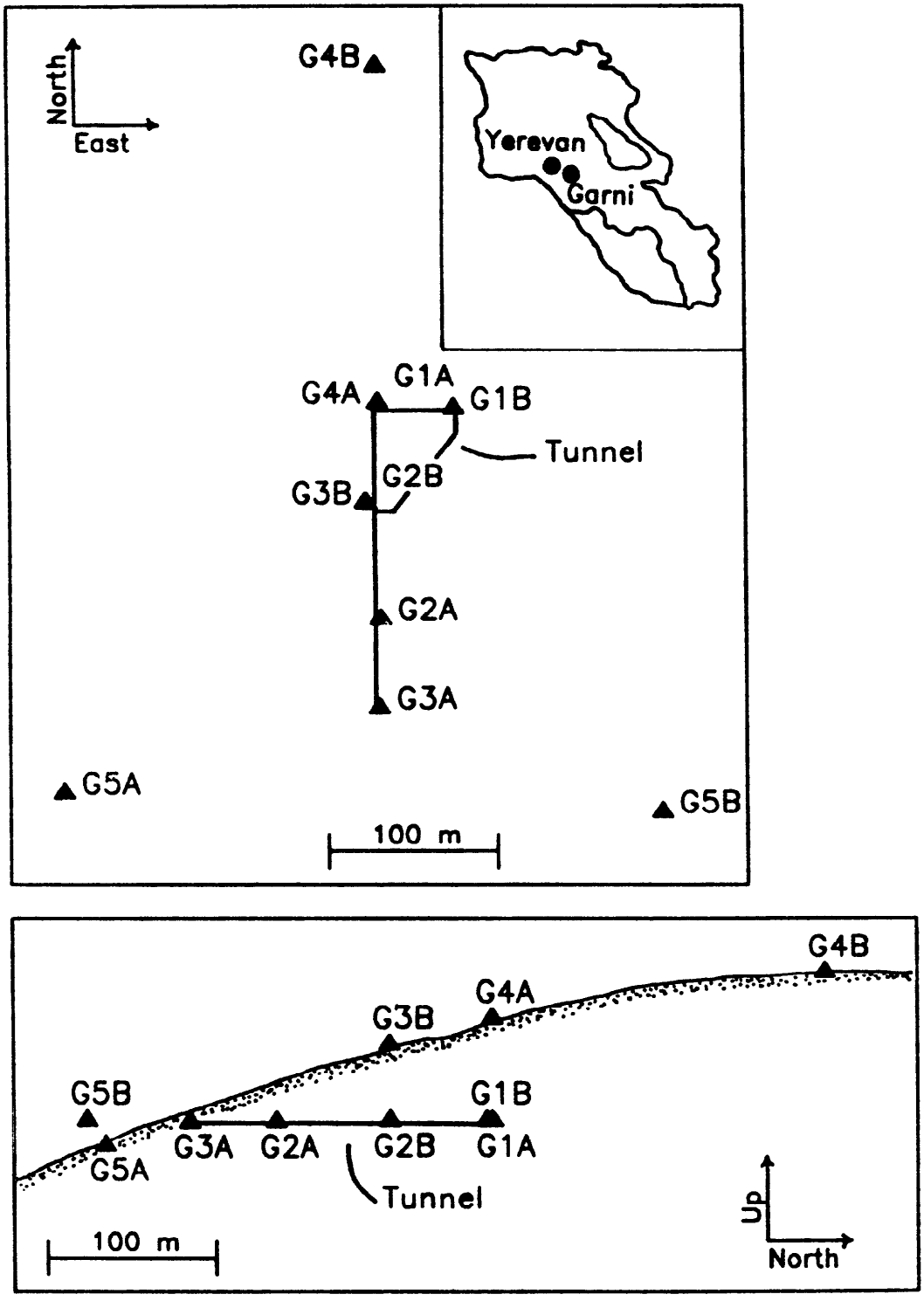


Figure 5-1. Approximate station configuration for the three-dimensional Garni Array. G5B which appears to be above the ground is on a hillside slope east of the array.

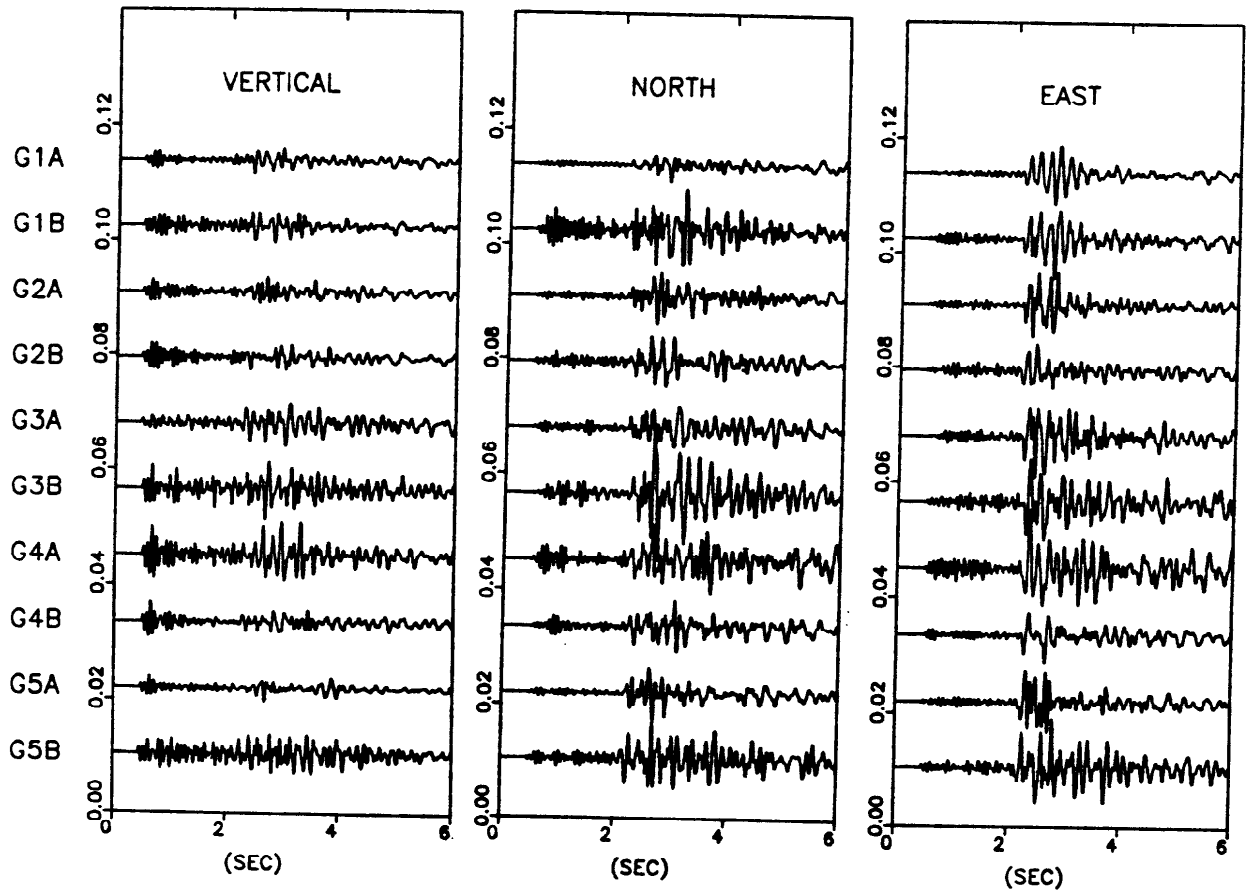


Figure 5-2. Example of the three-component velocity data for the event at 1500 on 11/16/90.

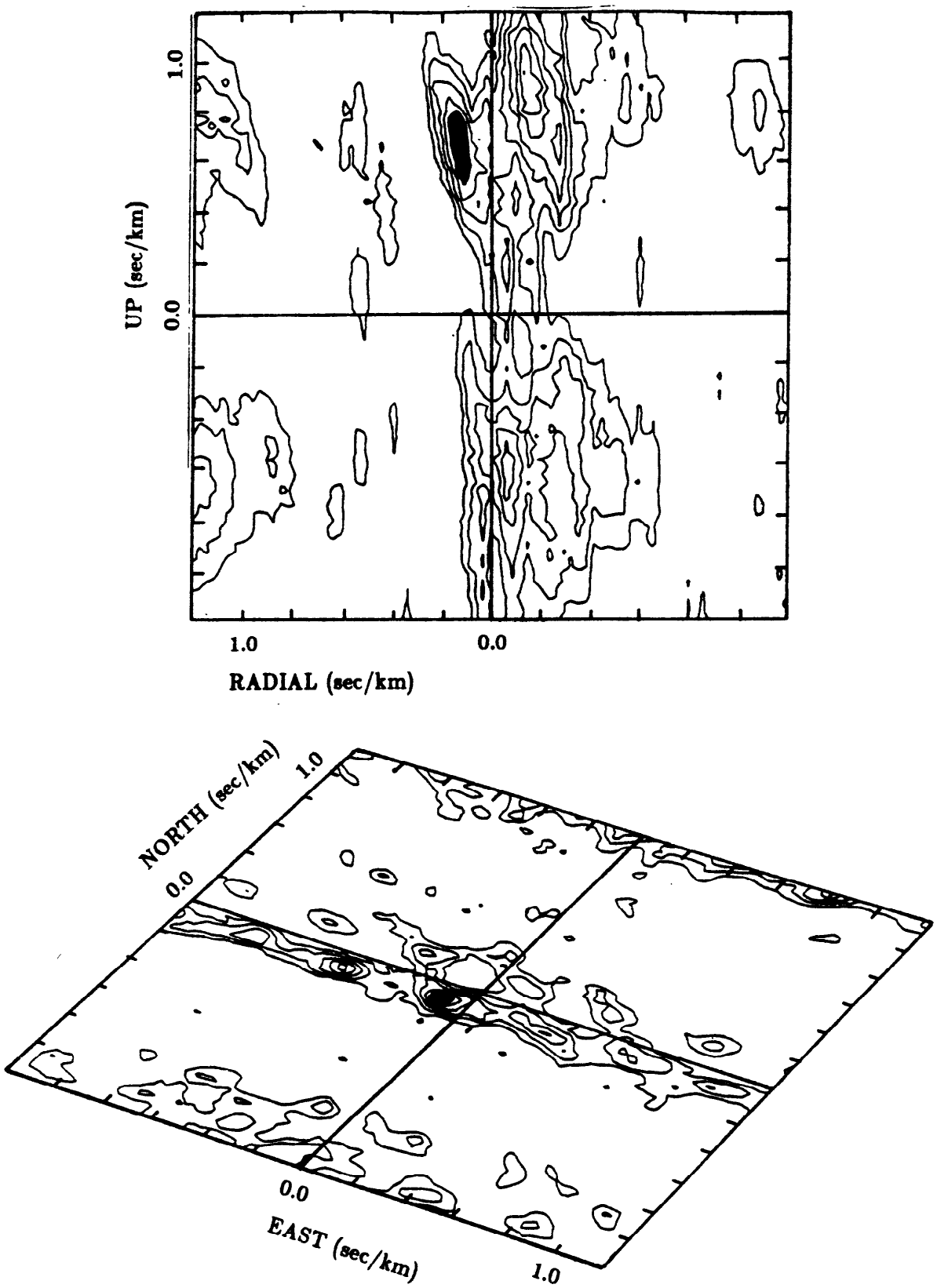


Figure 5-3. Contoured plots of combined cross correlation values for tested values of slowness from the P-wave window of the event at 1500 on 11/16/90. Vertical (top) and horizontal (bottom) slices of the three-dimensional slowness space are shown. High correlation values (shaded areas) correspond to values of slowness which are consistent with a plane-wave propagating across the array.

S WAVE

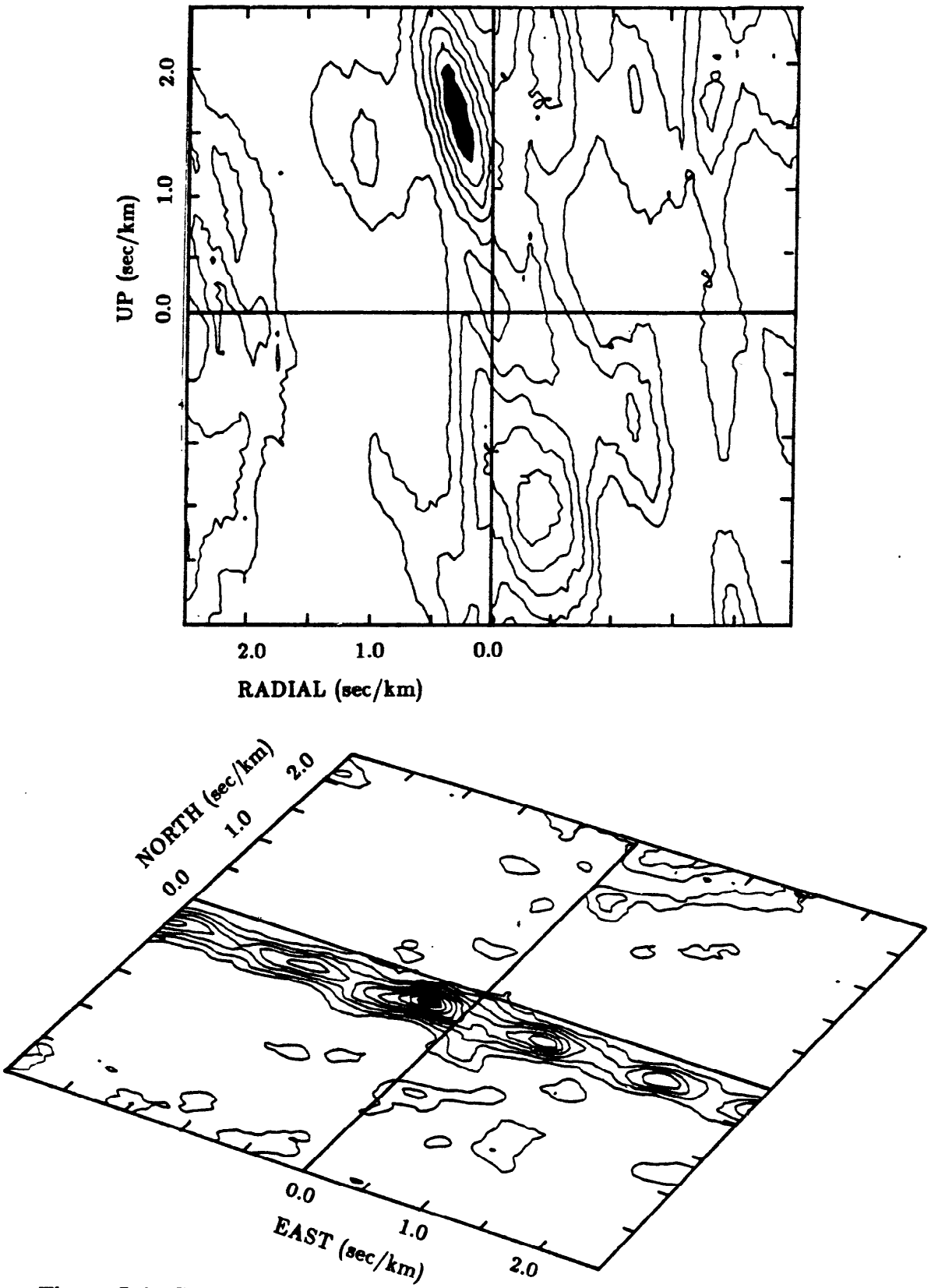


Figure 5-4. Contoured plots of combined correlation values from the S-wave window of the event at 1500 on 11/16/90.

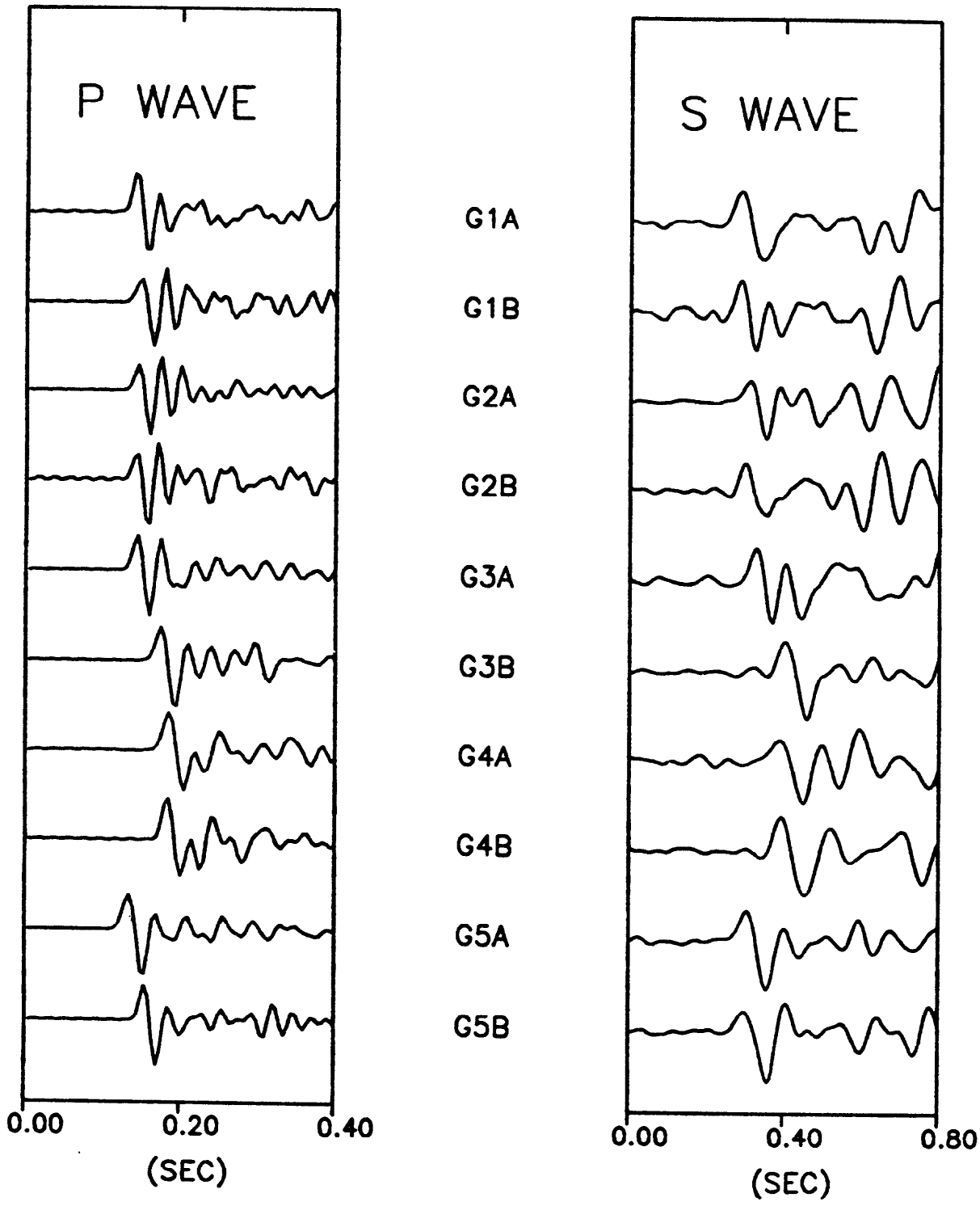


Figure 5-5. P- and S-wave arrivals for the event at 0746 on 10/15/90. Note that the relative arrivals for the P and S are similar, except at G5A where the S wave arrives significantly late.

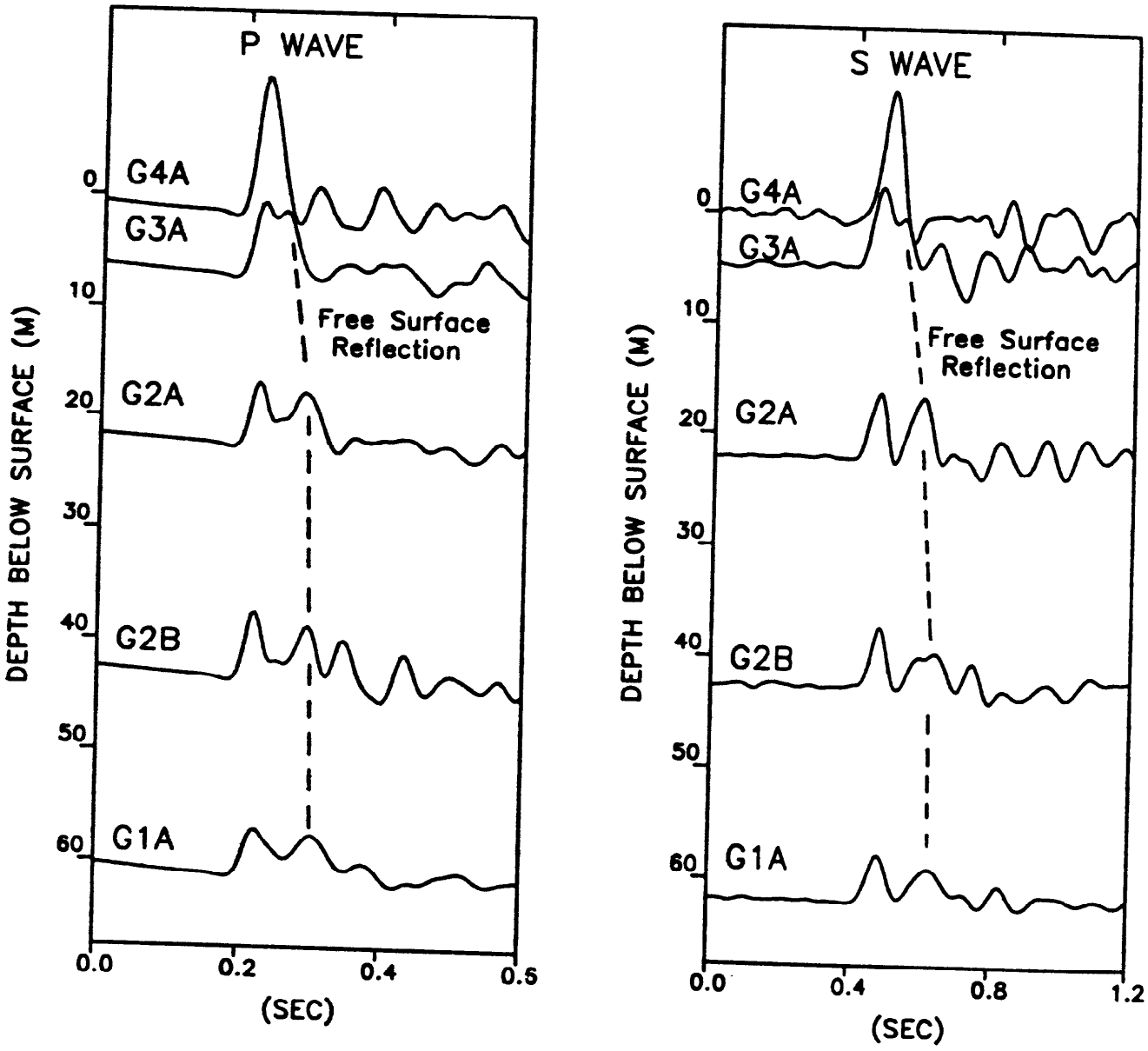


Figure 5-6. Ground displacements of the P and S waves for the event at 1839 on 10/15/90. Reflections from the free surface (dashed line) can be seen following both the P- and S-wave arrivals at the tunnel stations.

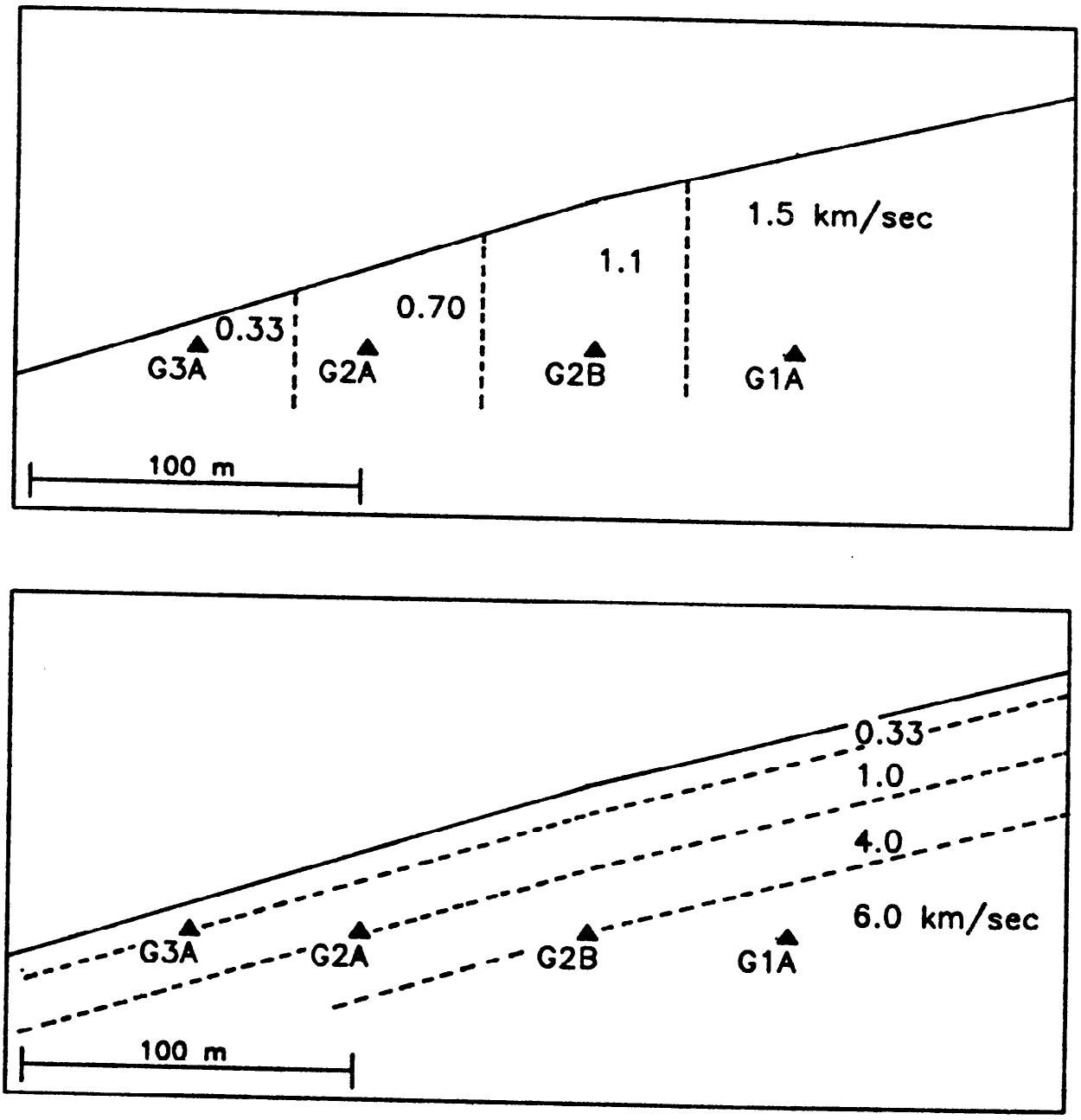
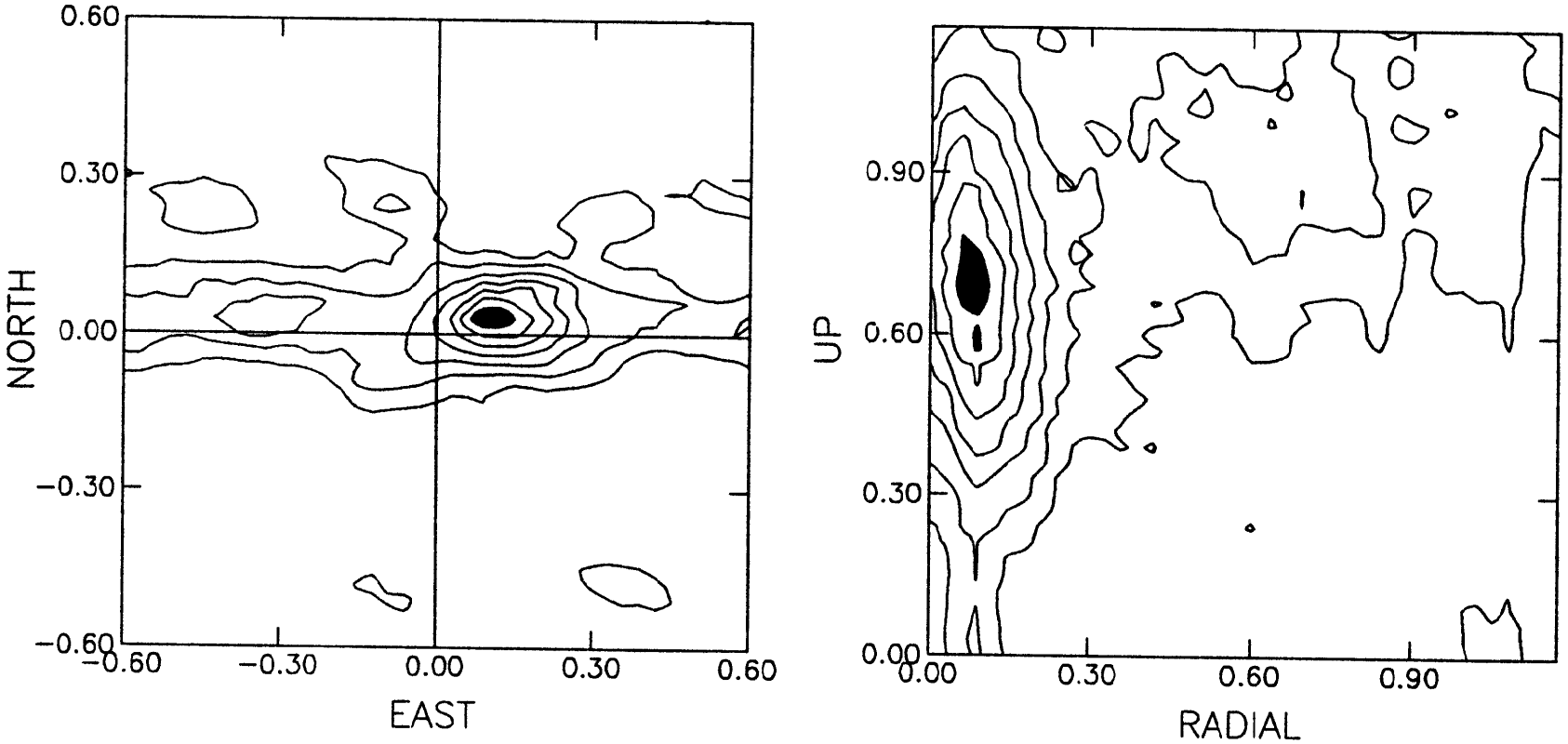


Figure 5-7. (Top) Average P-wave velocities between the tunnel stations and the ground surface from time delays of surface reflections.

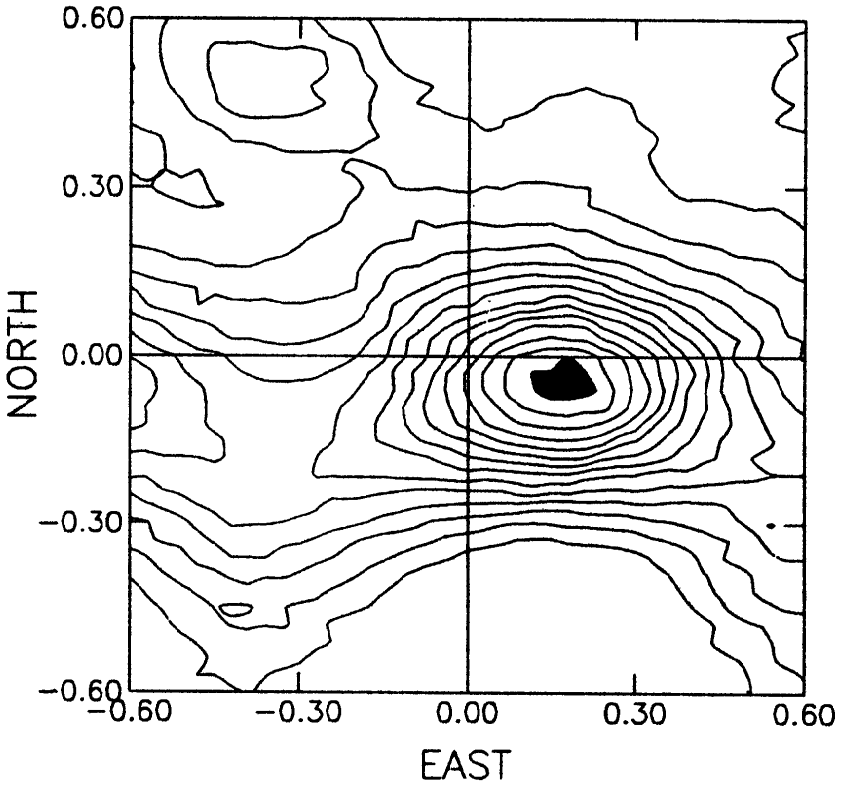
(Bottom) Velocity model consistent with the time delays of the surface relections, assuming a layered structure parallel to the topography.

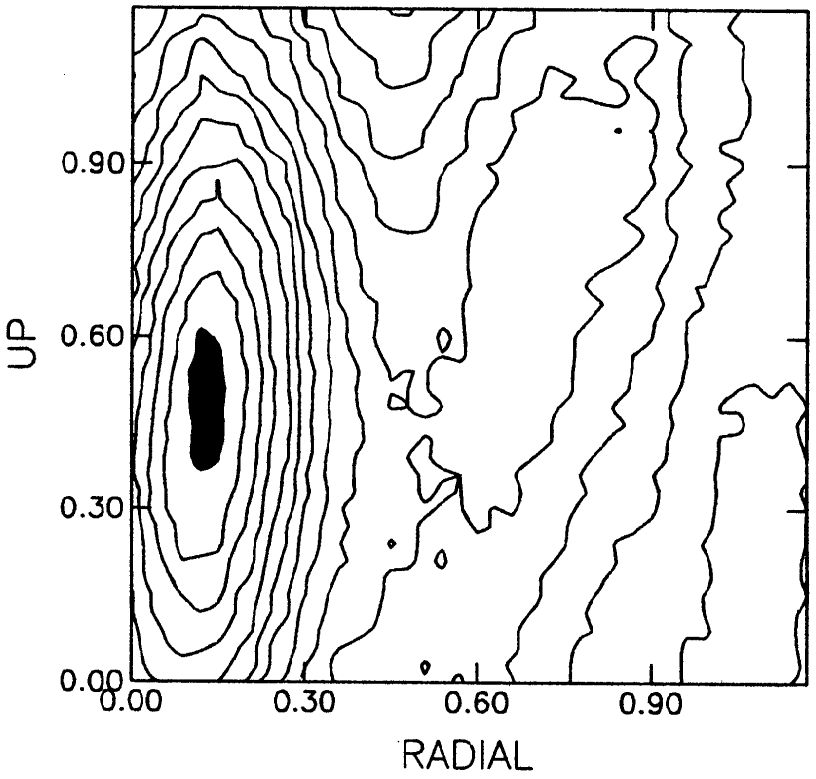
Figure 5-8. Rough locations of the numbered events from Table 5-1 shown on a map of northern Armenia.

Wave-slowness contour plots for selected events

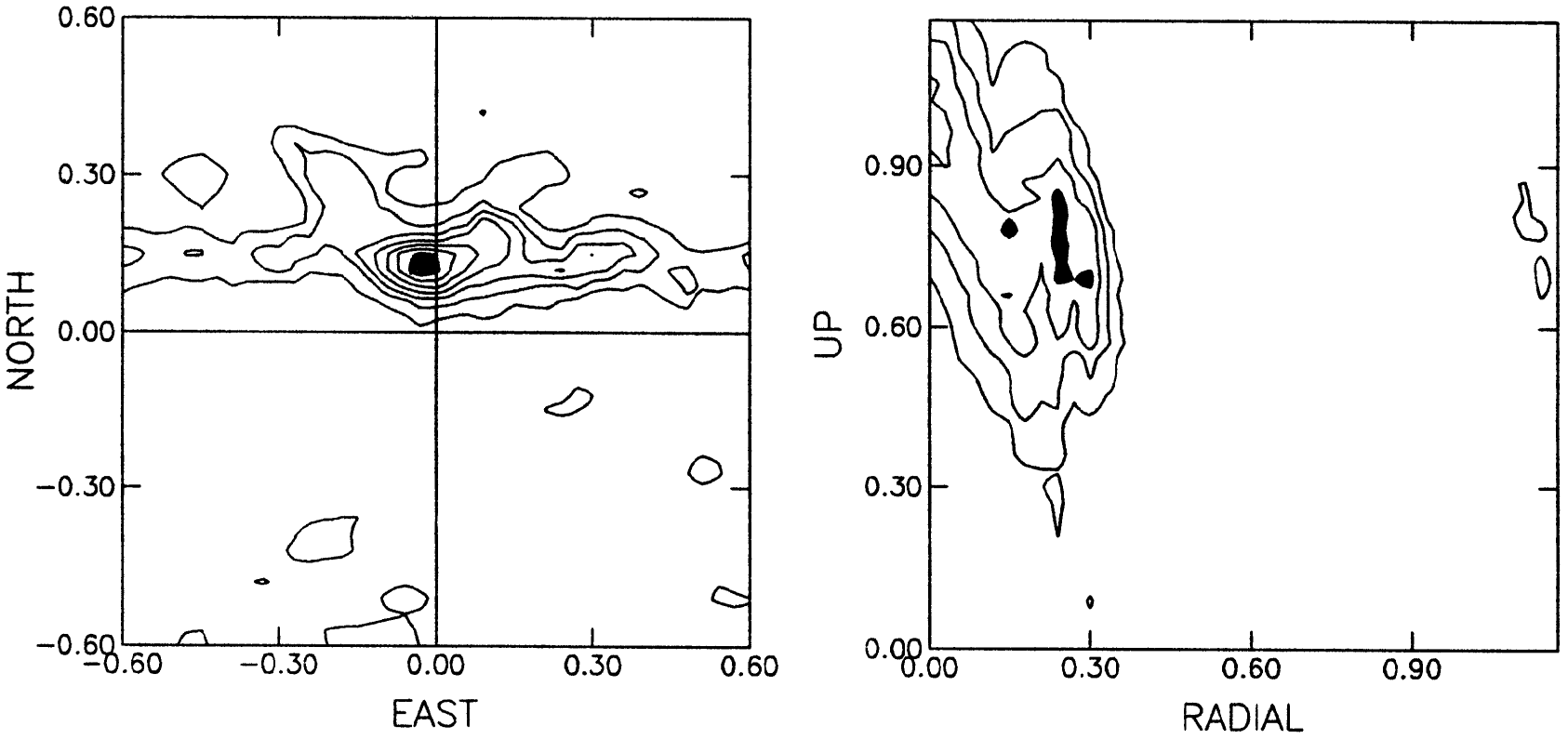

0.60
0.30
0.00
−0.30
−0.60
NORTH
−0.60
−0.30
0.00
0.30
0.60
EAST
0.90
0.60
0.30
0.00
UP
0.00
0.30
0.60
0.90
RADIAL

P 9/21/90 0715

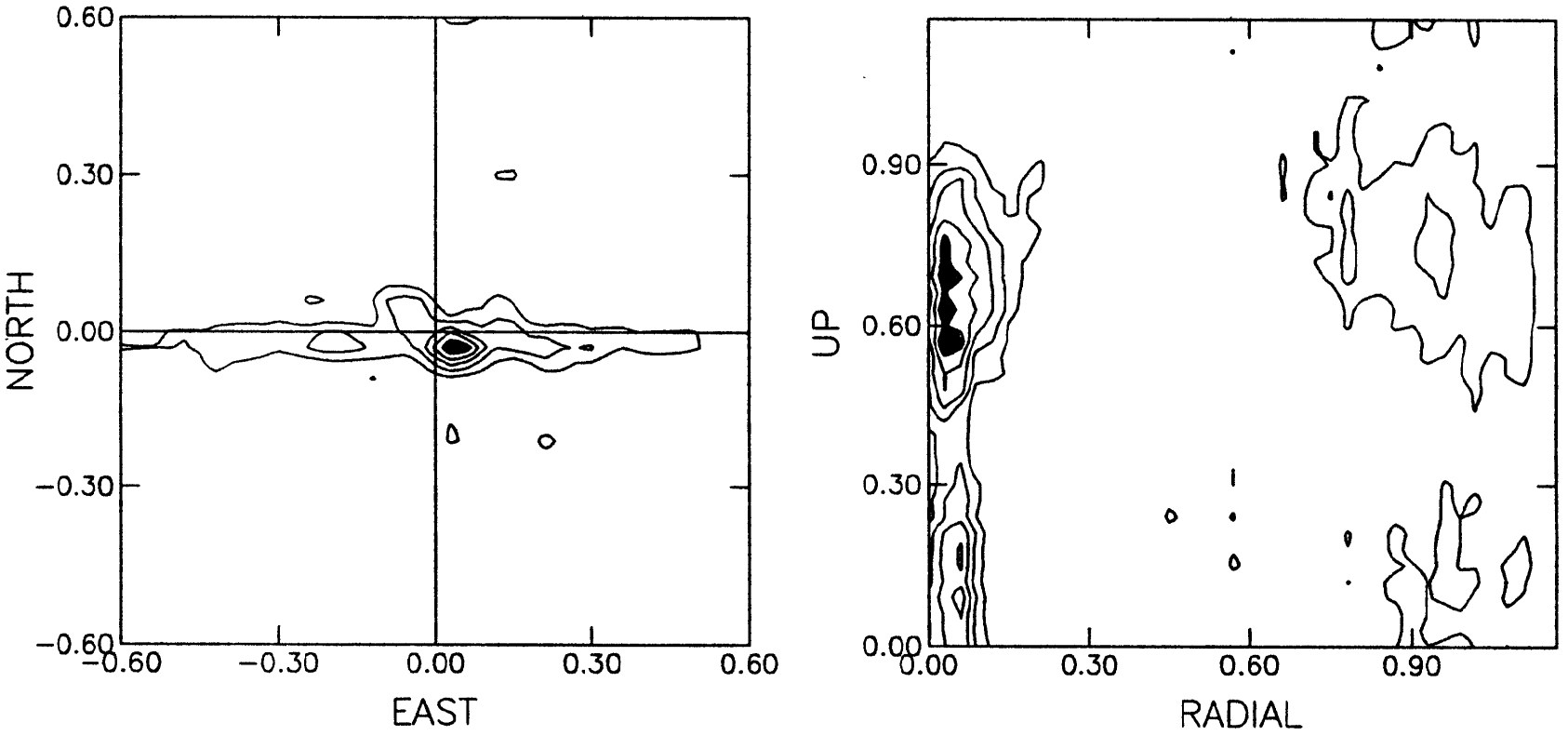




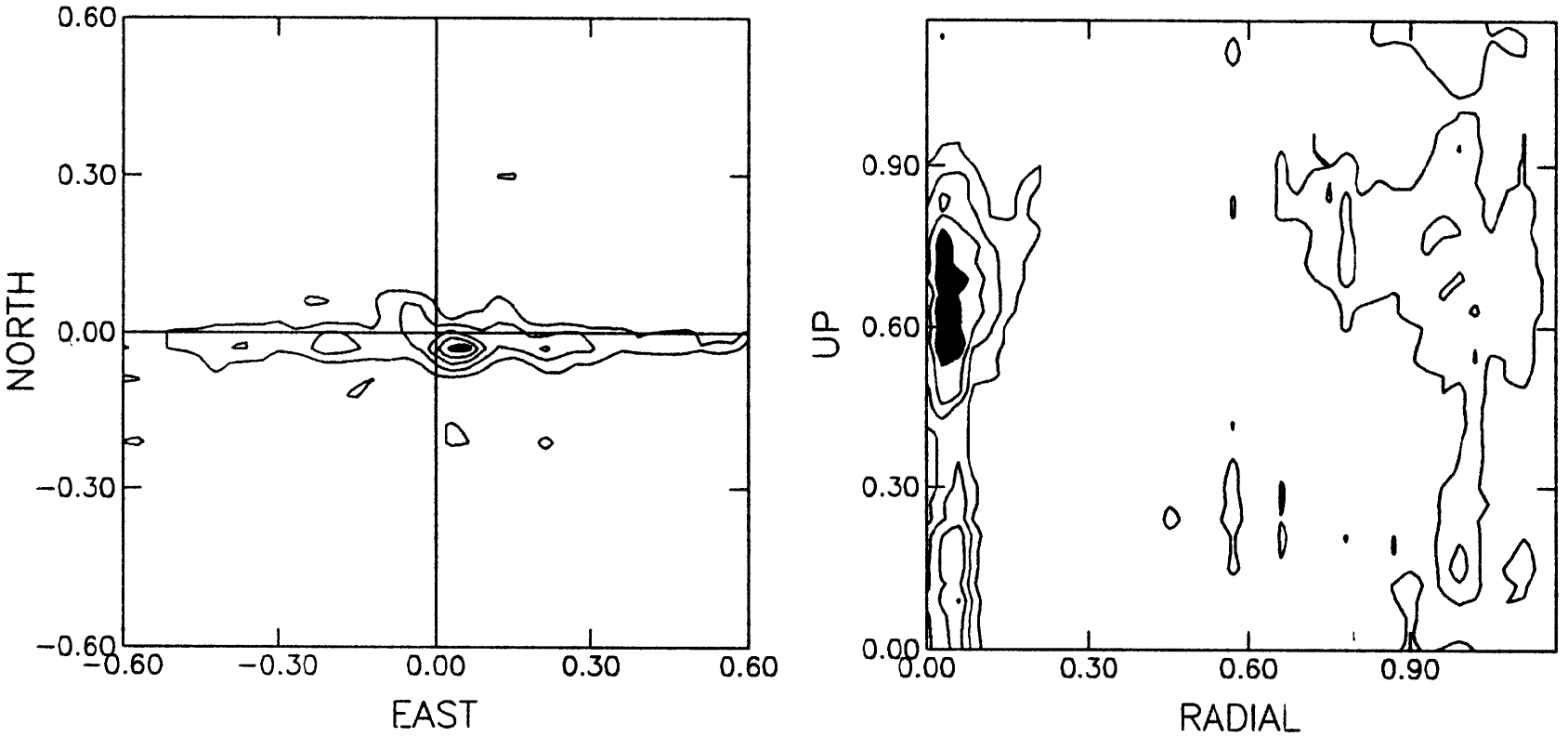
P. 10/05/90 0755



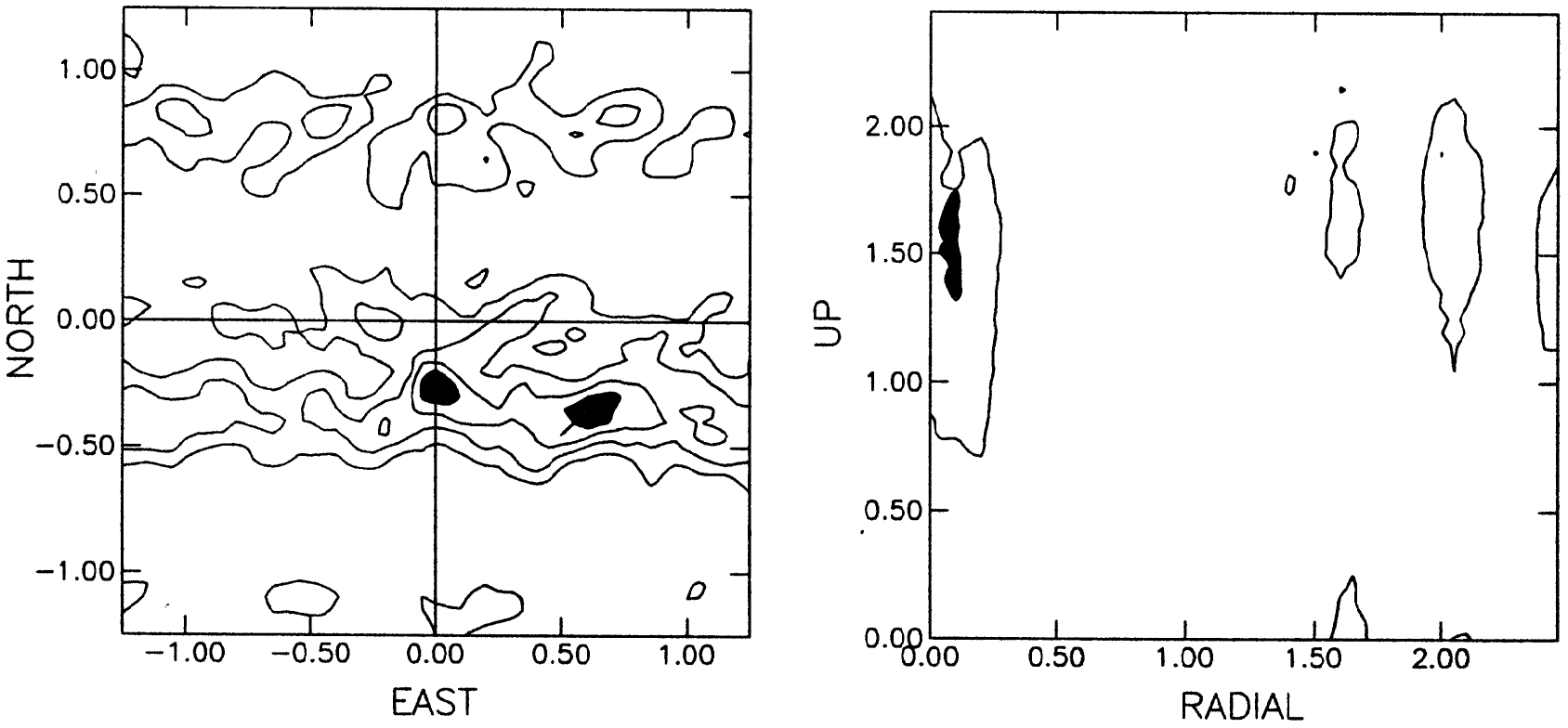
P 10/09/90 2054



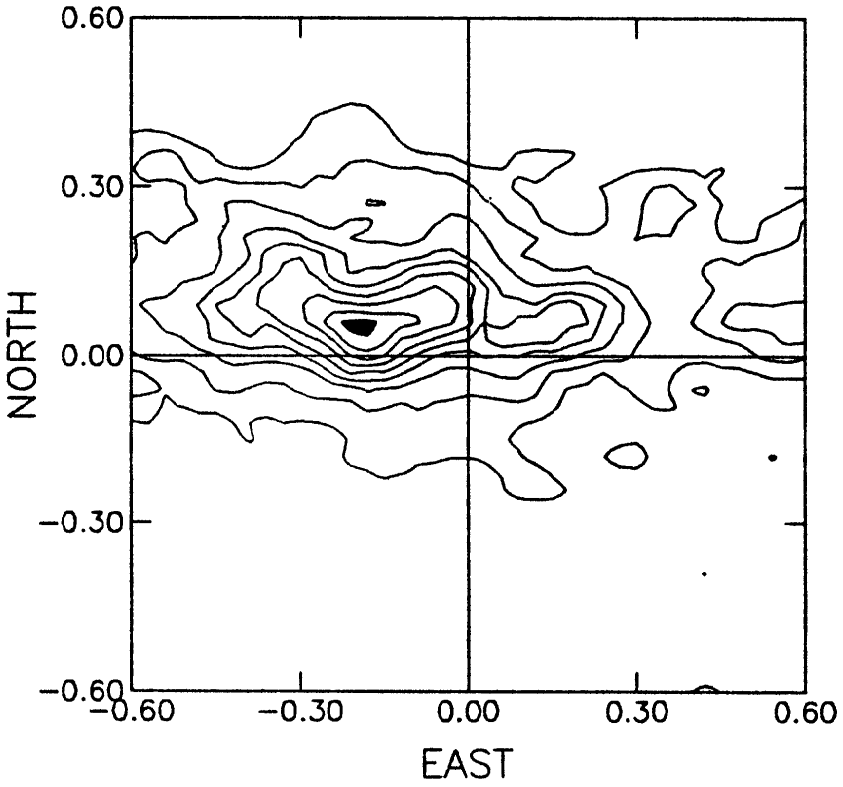
P 10/15/90 0746

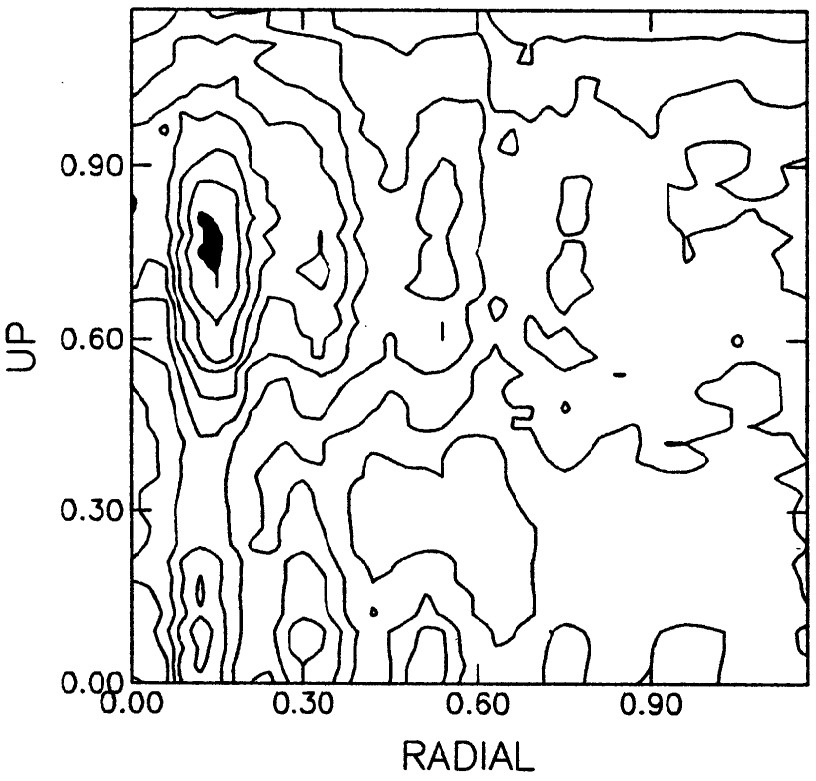


P 10/15/90 1839

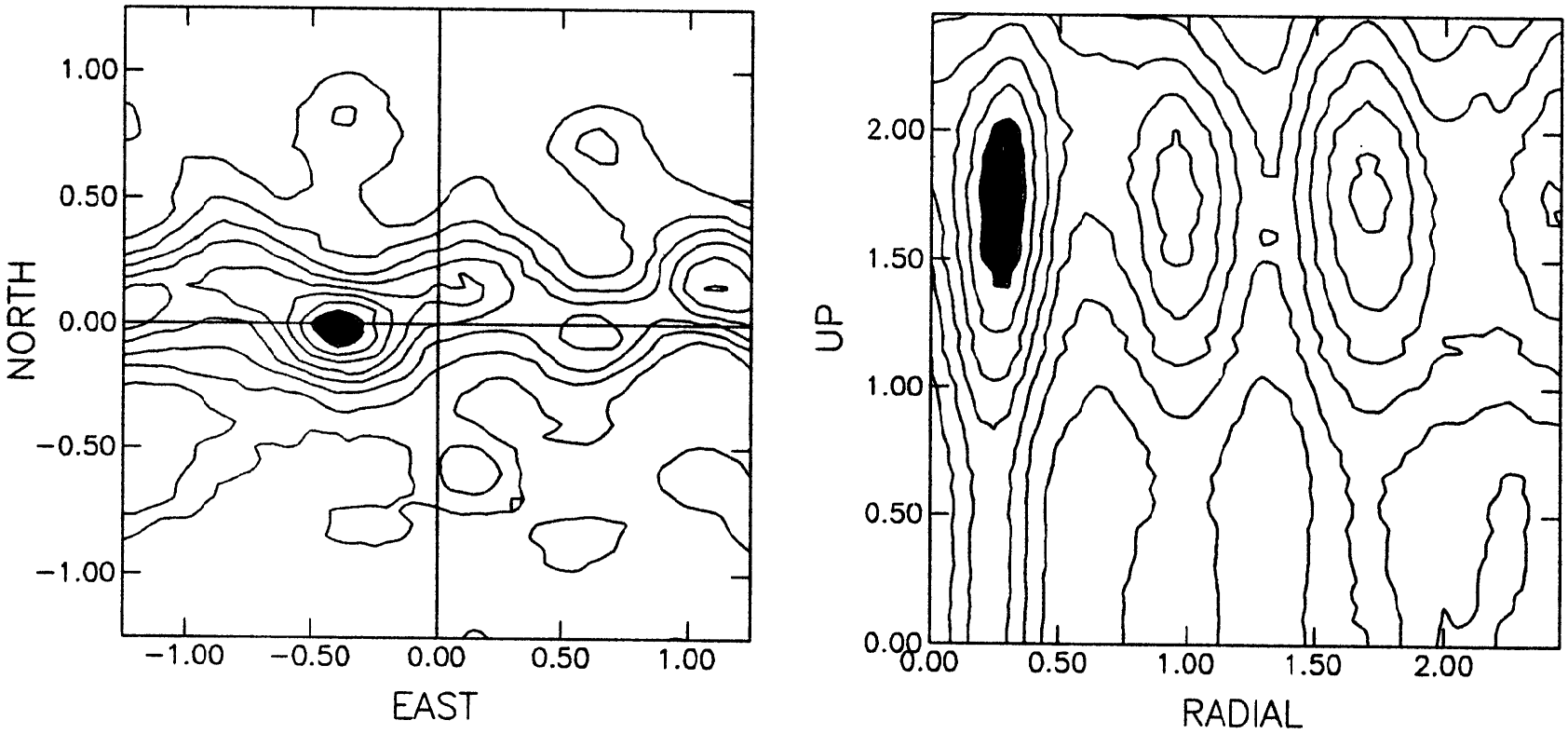


S 10/15/90 1839

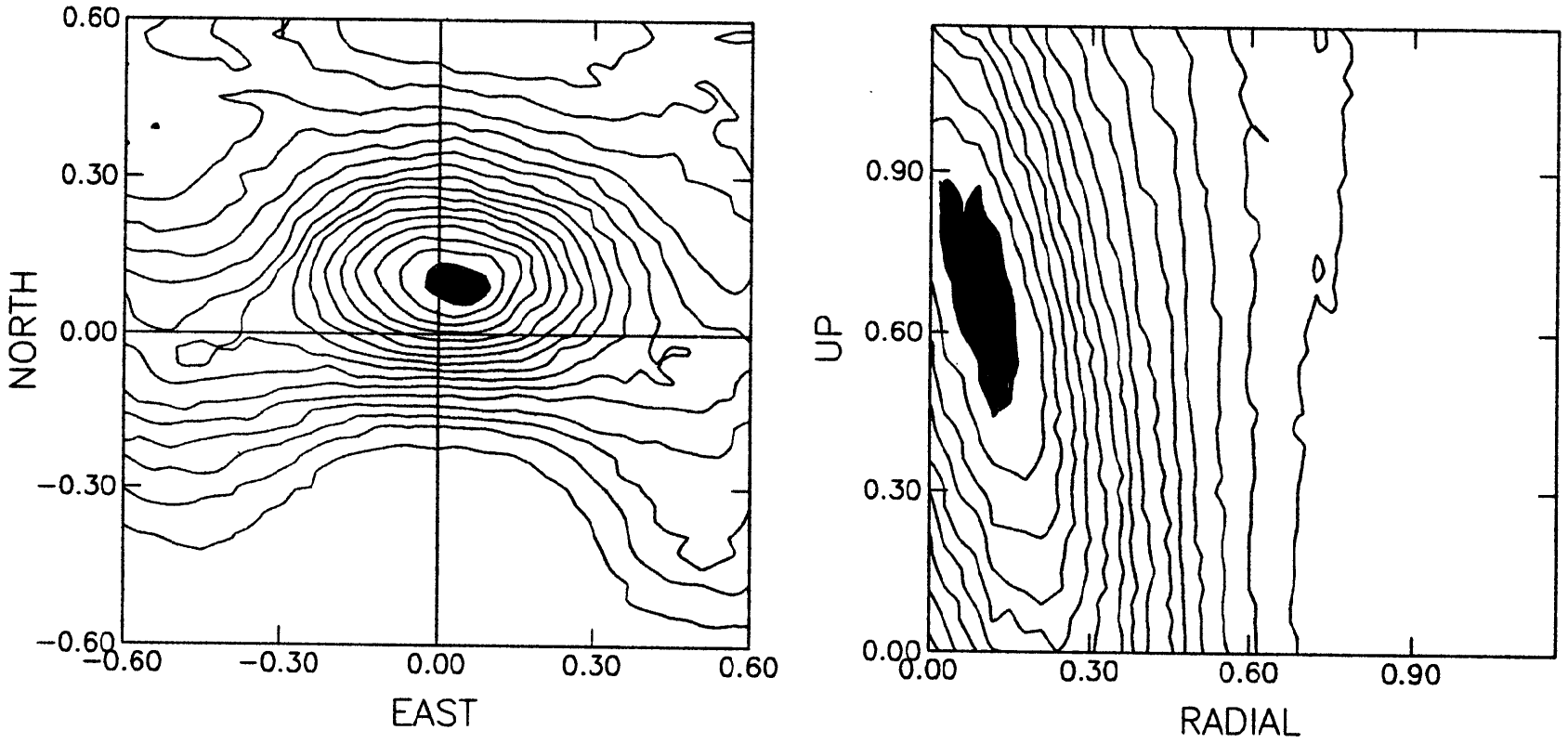




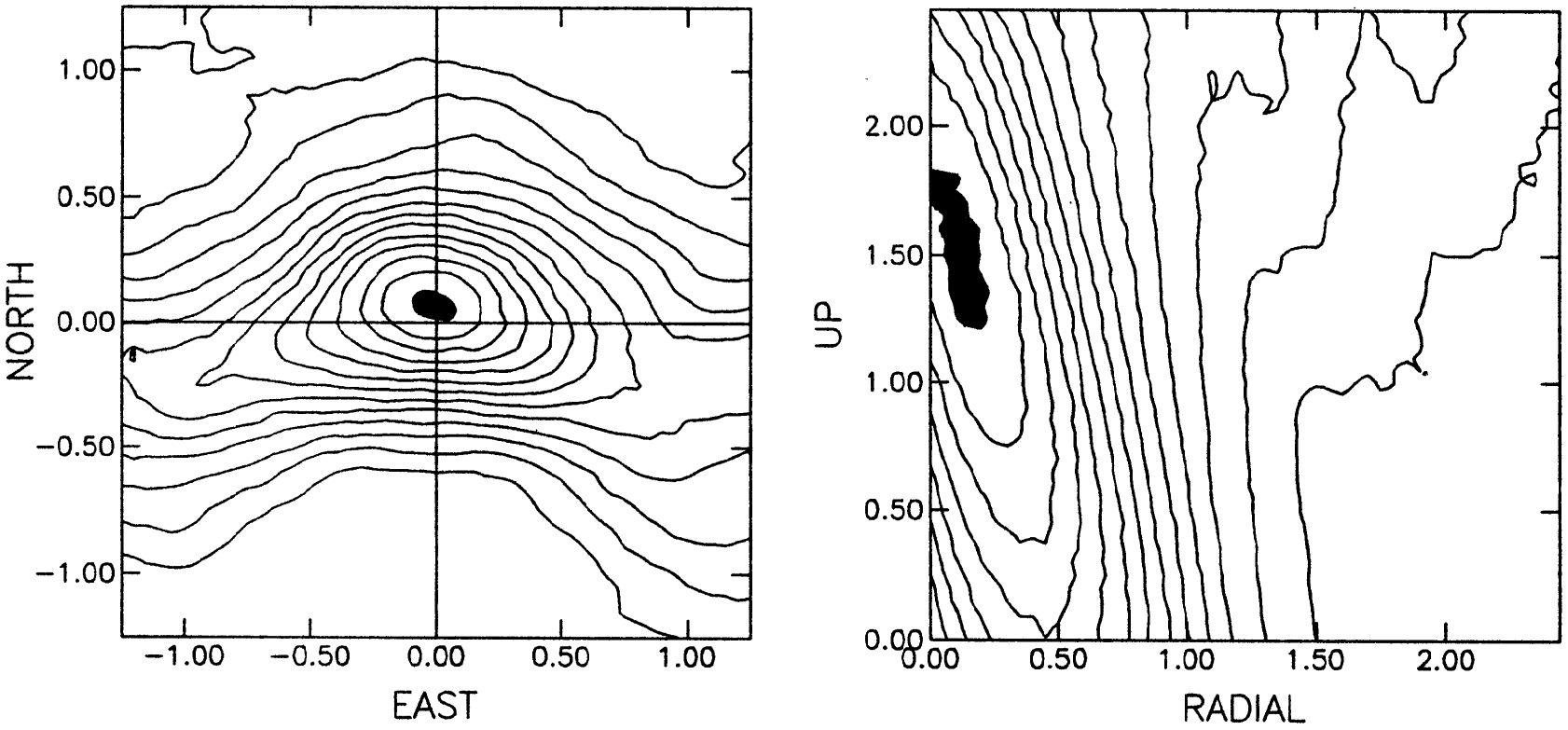
P 10/18/90 1118



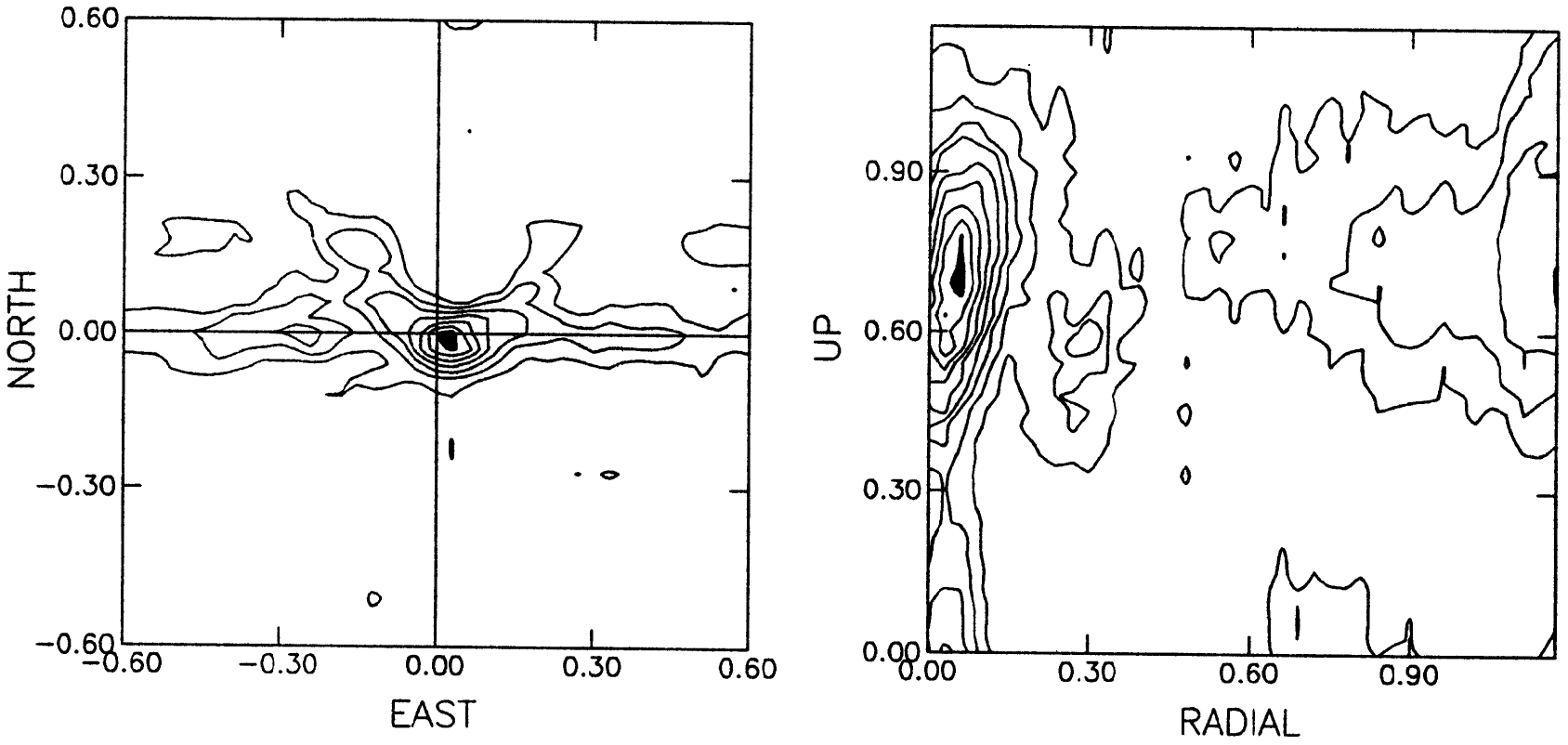
S 10/18/90 1118



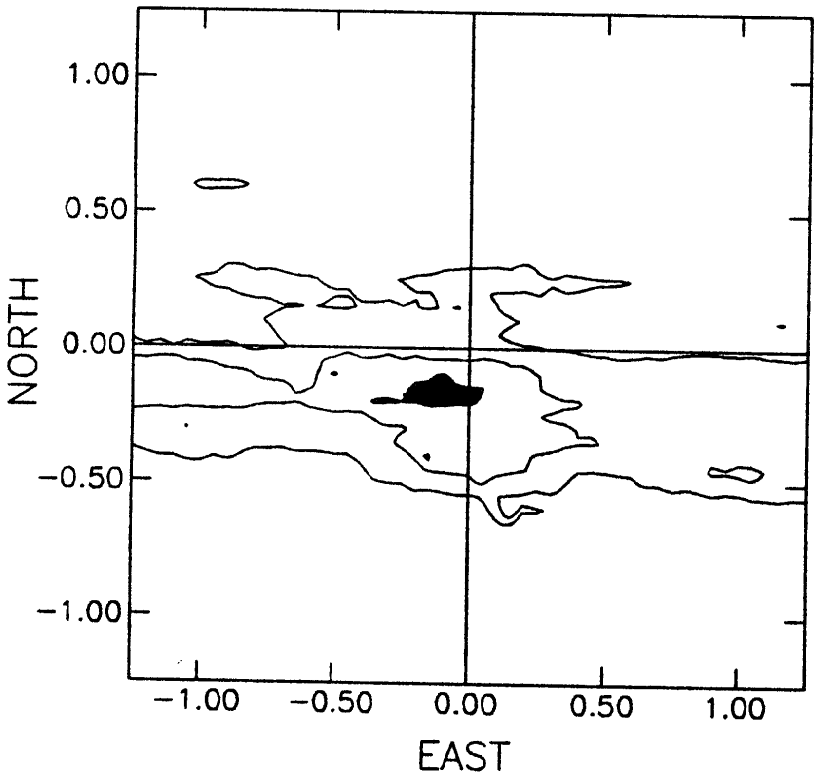
P 10/27/90 0544

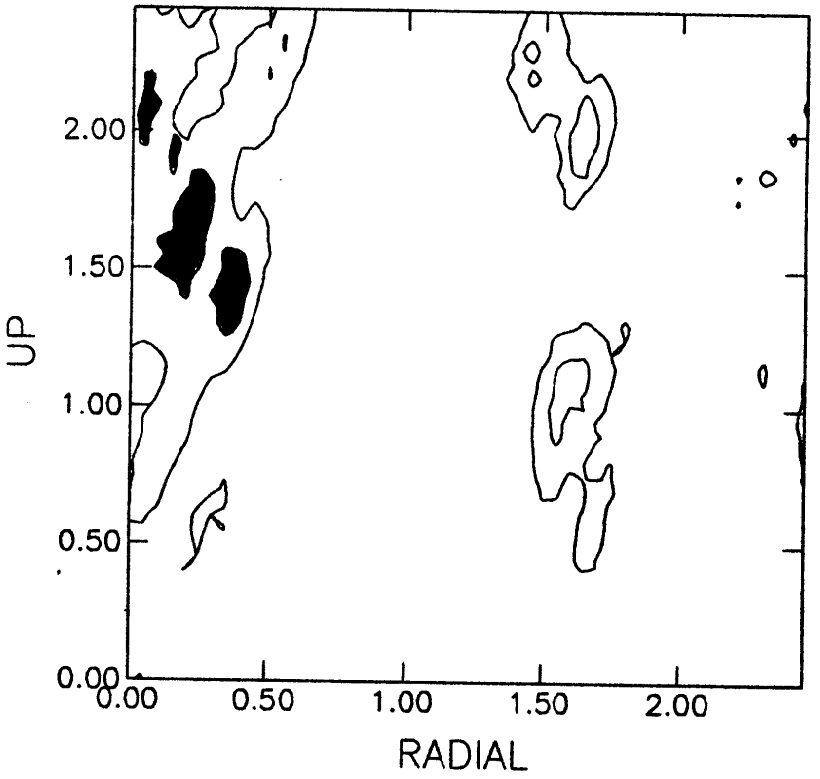


S 10/27/90 0544

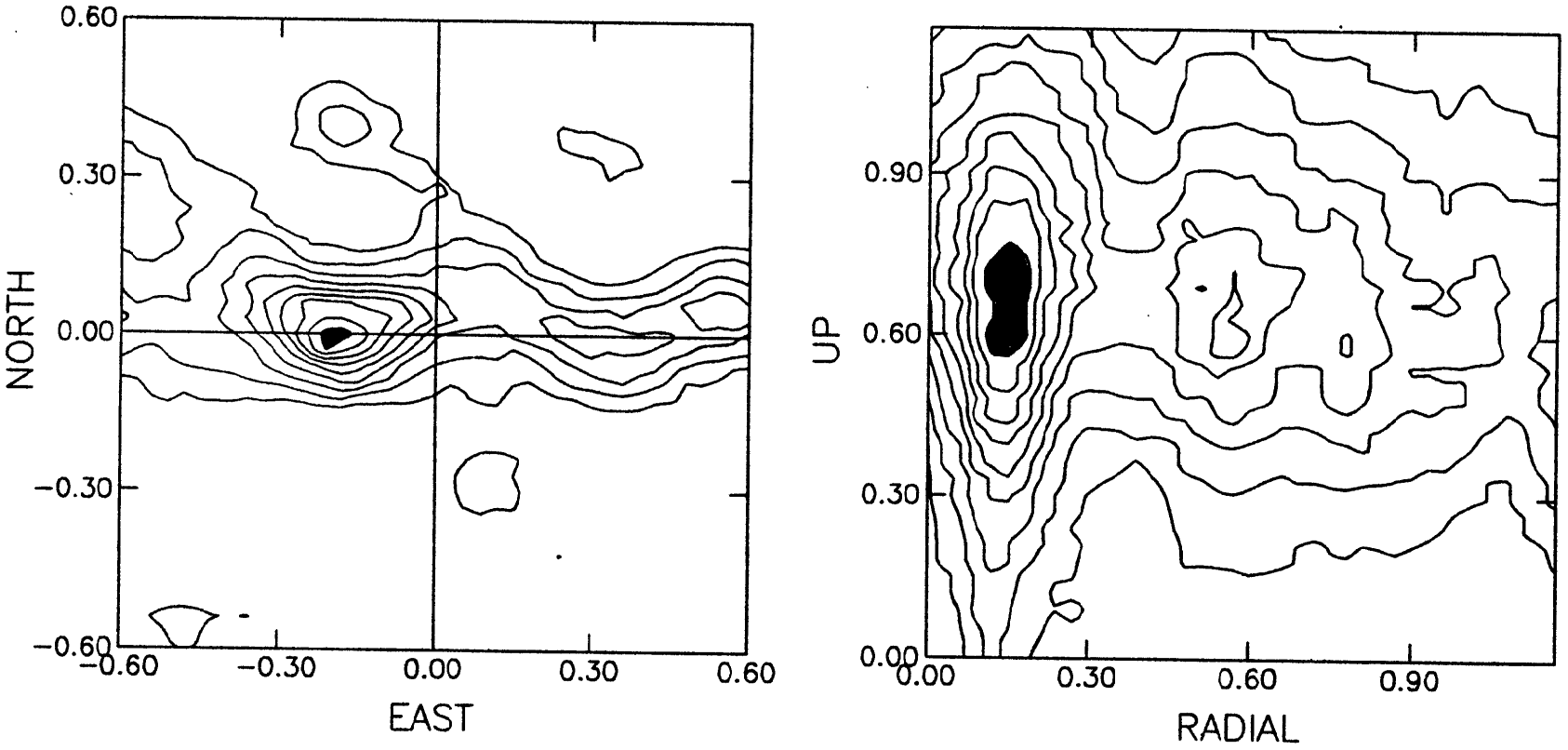


P 11/08/90 2037

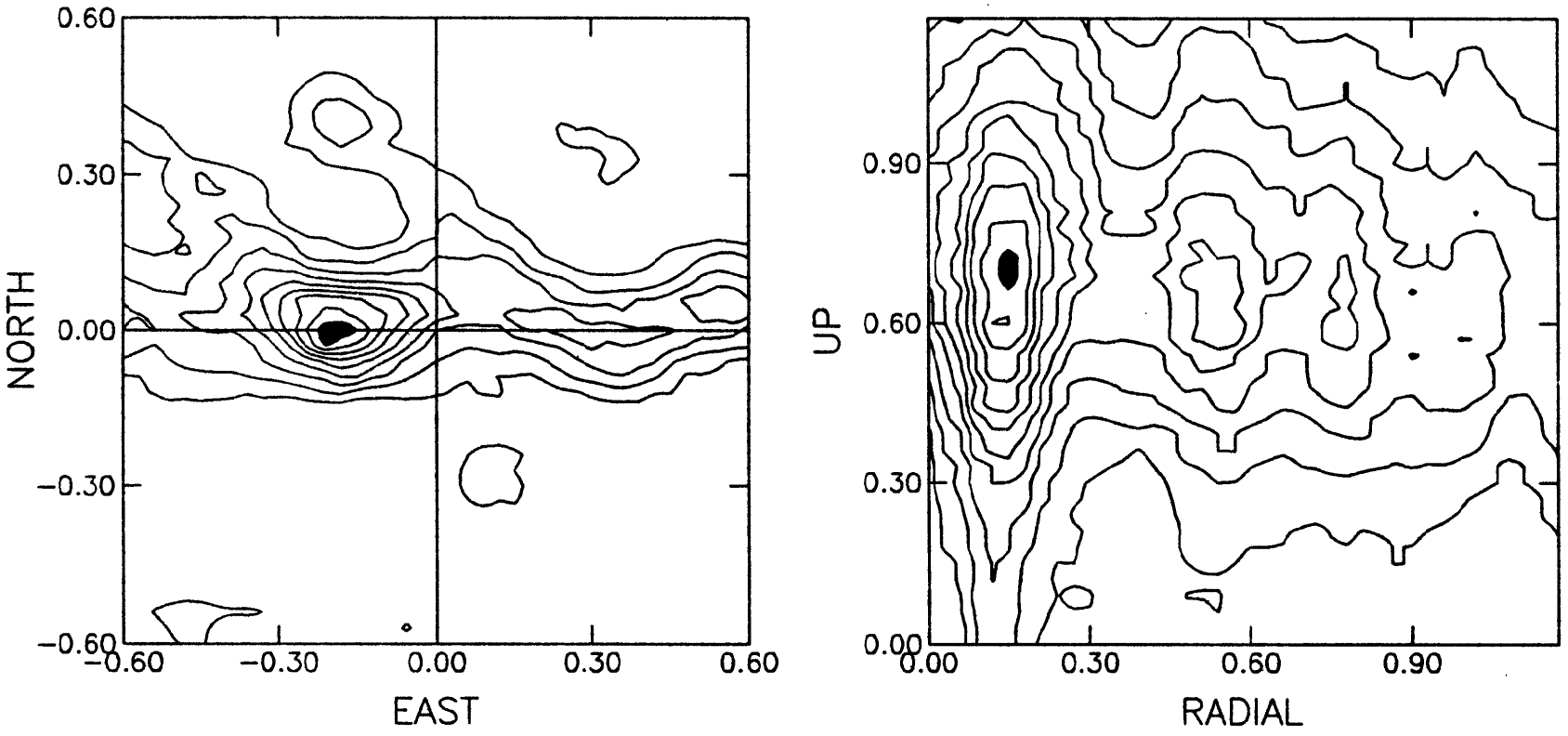




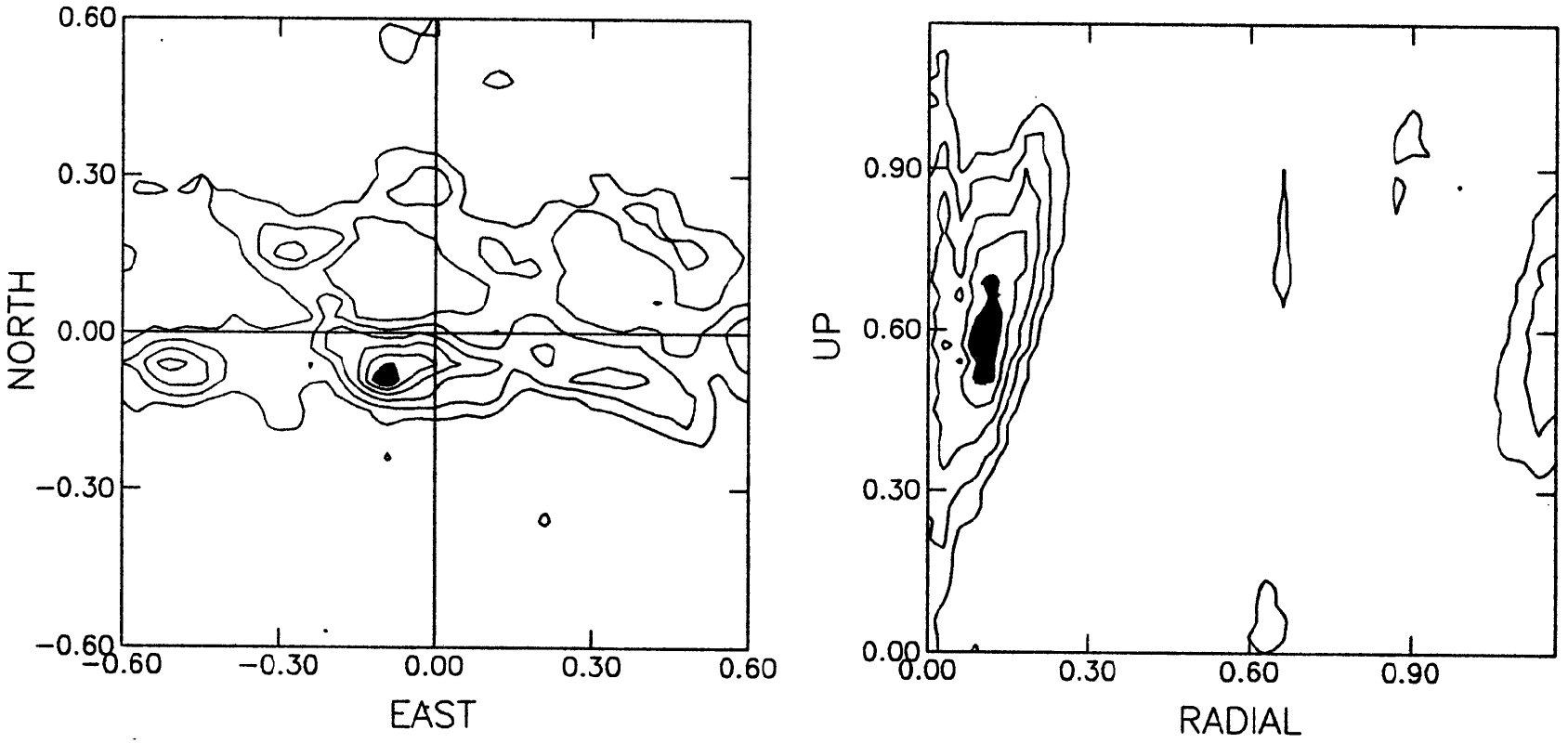
S 11/08/90 2037



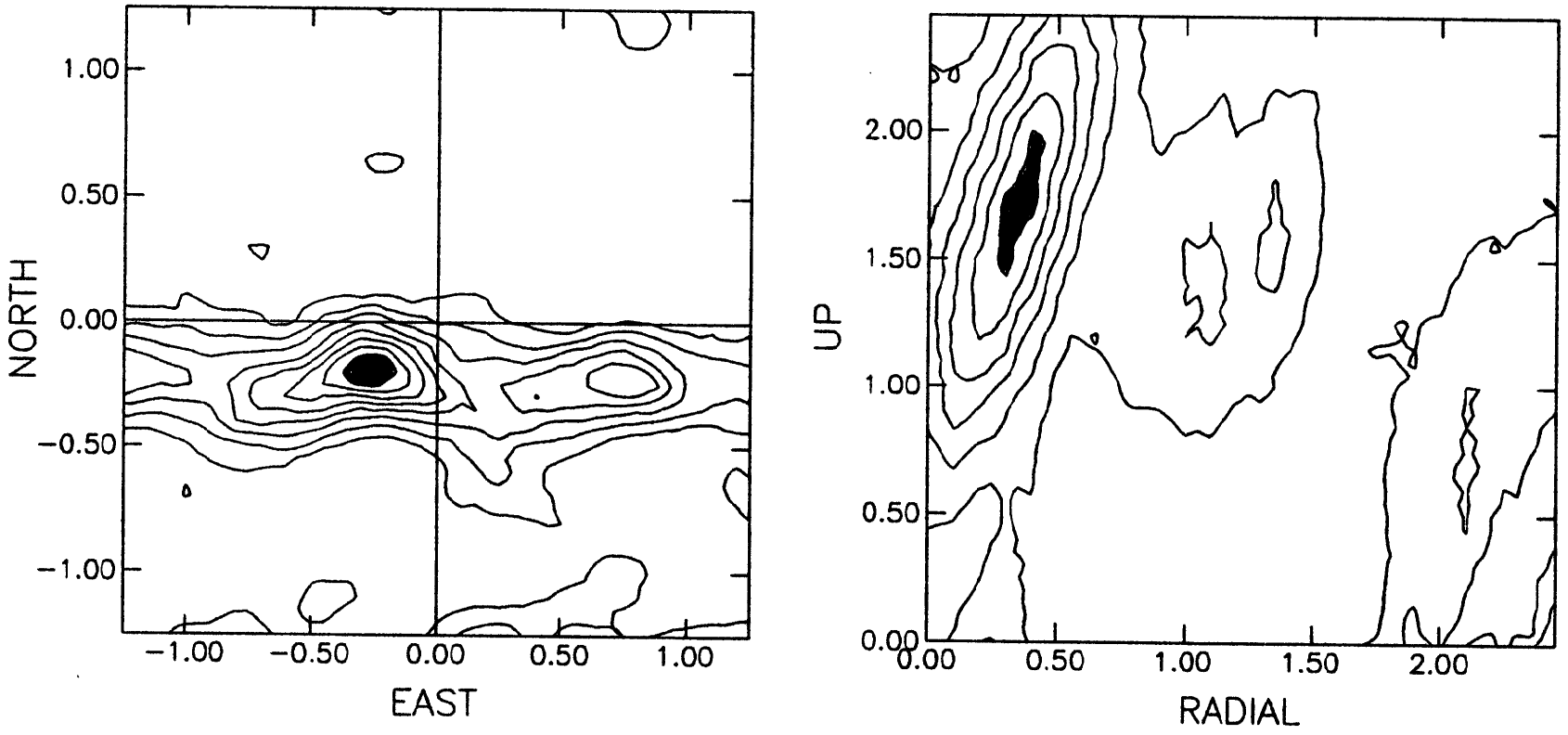
P 11/16/90 0653



P 11/16/90 0703



P 11/16/90 1500



S 11/16/90 1500

REFERENCES

Arefiev, S., I. Parini, K. Pletnev, A. Romanov, D. Mayer-Rosa, and P. Smit (1991). "Spitak (Armenia, USSR) 1988 Earthquake Region: Strong-Motion Data of Selected Earthquakes June 1990 - April 1991", *Technical Report No. 104, Publication Series of the Swiss Seismological Service,* Federal Institute of Technology, Zurich, Switzerland.

Borcherdt, R. D., J. B. Fletcher, E. G. Jensen, G. L. Maxwell, J. R. VanSchaak, R. E. Warrick, E. Cranswick, M. J. S. Johnston, and R. McClearn (1985). A general earthquake observation system (GEOS), *Bull. Seismol. Soc. Am.*, **75**, 1783-1826.

Borcherdt, R. D. (Editor), (1989), Results and data from seismologic and geologic studies following earthquakes of December 7, 1988, near Spitak, Armenian S. S. R.

Fletcher, J. B., T. Fumal, H.-P. Liu, and L. C. Haar (1990). Near-surface velocities and attenuation at two boreholes near Anza, California, from logging data, *Bull. Seismol. Soc. Am.*, **80**, 807-832.

Frankel, A., S. Hough, P. Friberg, and R. Busby (1991). Observations of Loma Prieta aftershocks from a dense array in Sunnyvale, California, *Bull. Seismol. Soc. Am.*, **81**, 1900-1922.

Hauksson, E., T. Teng, and T. L. Henyey (1987). Results from a 1500m deep, three-level downhole seismometer array: site response, low Q values and f_{max}, *Bull. Seismol. Soc. Am.*, **77**, 1883-1904.

Kanamori, H. and P. C. Jennings (1978). Determination of local magnitude, M_L, from strong-motion accelerograms, *Bull. Seismol. Soc. Am.*, **68**, 471-485.

Lee, W. H. K. (Editor), (1989). "Toolbox for Seismic Data Acquisition, Processing, and Analysis", *IASPEI Software Library Volume 1*, Seism. Soc. Am., El Cerrito, CA.

Lee, W. H. K. and D. A. Dodge (Editors), (1992). A course on: PC-based seismic networks, *U. S. Geol. Surv. Open-File Report 92-441*, 535 pp.

Lee, W. H. K., D. M. Tottingham, and J. O. Ellis, (1988). A PC-based seismic data acquisition and processing system, *U. S. Geol. Surv. Open-File Report 88-751*, 31 pp.

Menke, W., A. L. Lerner-Lam, B. Dubendorff, and J. Pacheco (1990). Polarization and coherence of 5 to 30 Hz seismic wave fields at a hard-rock site and their relevance to velocity heterogeneities in the crust, *Bull. Seismol. Soc. Am.*, **80**, 430-449.

Mori, J. (1993). Waveform coherence of near-field waveforms on a small-aperture array in Upland, California, in preparation.

Richter, C. F. (1937). *Elementary Seismology*, W.H. Freeman and Company, San Francisco.

Tottingham, D. M. and W. H. K. Lee, (1989). XDETECT: A fast seismic data acquistion and processing program, *U. S. Geol. Surv. Open-File Report 89-205*, 8 pp.

United States Geological Survey, (1990-1992). Preliminary Determination of Epicenters.

Vernon, F. L., J. Fletcher, L. Carroll, A. Chave, and E. Sembera (1991). Coherence of seismic body waves from local events as measured by a small-aperture array, *J. Geophys. Res.*, **96**, 11981-11996.